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**SOCIAL NETWORKS, FIRM BEHAVIOR, AND INDUSTRY EVOLUTION:  
A STUDY OF PROFESSIONAL SERVICE FIRMS**

Kyungmook Lee

A DISSERTATION

in

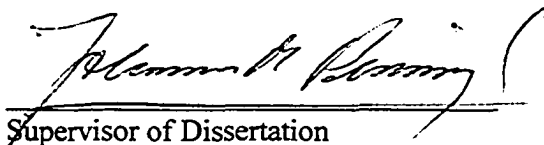
Organization and Strategy

for the Graduate Group in Managerial Science

and Applied Economics

Presented to the Faculties of the University of Pennsylvania in Partial Fulfillment of the  
Requirements for the Degree of Doctor of Philosophy

1995



Supervisor of Dissertation



Graduate Group Chairperson

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**DEDICATIONS**

*To my mother,  
for her love and encouragement*

*and*

*to my wife, Sooyoun, my son, Sanghyun, and my daughter, Heysoo,  
for their enduring love and patience.*

## ACKNOWLEDGMENTS

There are a great many people who have contributed to this dissertation. Johannes M. Pennings as advisor has provided me with all that I needed: insight, encouragement, critiques, and data. Without his precise and thoughtful guidance, this thesis would never have been completed. I was very lucky to get extremely talented and experienced scholars for my committee: Paul Allison, Bruce Kogut, Michael Useem, and Sidney Winter. They have provided valuable suggestions and critiques. I want to thank Sidney Winter for chairing the committee and Peter Sherer (now at Cornell University) for his support and guidance in my early doctoral work. Jeho Lee, Frits Pil, and Jaeyong Song, my fellow doctoral students, also provided me with helpful comments.

I express my special thanks to Professor Shin, Yoo Keun at the Seoul National University who inspired me to enter academia. Since I began my work on my Master's degree, he has been both a mentor and role model. Without his intellectual guidance and encouragement, I would never have started my doctoral work. I will never forget the enduring sacrifices, encouragement, and financial support of my mother, brothers and sisters, and my parents-in-law. Without their sacrifices and support, I would have neither started nor finished this dissertation. Most of all, my wife, Sooyoun, has provided me with warm affection and deep understanding during my years as a Ph.D. student. My two wonderful children, Sanghyun and Heysoo, have been a source of stimulus and fun in an alien part of the world. To all these people, Thank you.

**ABSTRACT****SOCIAL NETWORKS, FIRM BEHAVIOR, AND INDUSTRY EVOLUTION:****A STUDY OF PROFESSIONAL SERVICE FIRMS****KYUNGMOOK LEE****JOHANNES M. PENNING**

This dissertation examines the causes of industry evolution: adoption of innovation, mergers and acquisitions, and organizational dissolution. The research setting is the professional service firms, especially the Dutch accounting industry. Data on CPAs' demographic characteristics and their organizational affiliation were collected from CPA directories. The main body of this thesis consists of three empirical studies based on the data. To understand the research setting, I first survey the peculiarities of professional service firms and a partner-associate structure (PA structure). The first empirical study gives attention to the antecedents of the adoption of the PA structure. I distinguish population level factors from firm level ones, and at each level examine the role of "technical efficiency" and "legitimacy" conditions in accounting for adoption. Empirical analysis shows that adoption propensity is positively associated with market signaling, the level of PA diffusion, complementary needs, absorptive capacity, and social networks. The results also suggest that the market signaling, a technical efficiency factor, has a stronger influence during early diffusion periods, while the level of PA diffusion, an institutional factor, has stronger effect during later periods. The second study examines the events that firms founded by mergers and acquisitions (M&As) experienced. Investigation of the history of large Dutch accounting firms shows that most of them were created by M&As. It indicates that M&As have been a route to the emergence of large accounting firms. The multinomial logit analysis shows that firms founded by an M&A of complementary and compatible firms performed better than others. The results



also indicate that firms that were unable to handle internal variations brought about by previous M&As experienced high dissolution rates. Firms that were successful in dealing with those variations were more likely to utilize M&A specific knowledge by engaging in additional M&As. The third study explores the empirical validity of density dependence hypothesis by controlling for fine-grained organizational factors in explaining organizational dissolution rates. Empirical analysis shows that the density has a strong U-shaped relationship with organizational dissolution even when fine-grained organizational level variables are controlled. The analysis provides a strong support for the density dependence hypothesis. In conclusion, I summarize the findings of the three empirical studies and discuss what we learn from the studies.

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**CHAPTER 1*****EMPIRICAL SETTING: DUTCH ACCOUNTING FIRMS*****PLAN OF THE THESIS**

This dissertation examines the evolution of the Dutch accounting industry from its inception. The industry has changed significantly in terms of the size distribution of the organizations, and the way the work is structured within the organizations. Before 1925, the Dutch accounting firms were very small. There was little inequality among those firms in terms of their size, and no firm had an associate accountant. In 1990, size inequality among accounting firms was huge, and most of the large firms had a partner-associate structure (PA structure).

The main purpose of this thesis is to explain the evolution of the industry and to test existing organization theories against the data. I intend to investigate the following questions in three semi-independent papers: 1) "What are the antecedents of the adoption of the PA structure?", 2) "What can explain the performance of merger and acquisition?: the relation between relational characteristics of involved firms and the success of the event," and 3) "What industry and firm specific attributes can explain the variation of firm survival?" To answer those questions, I will examine the relationships among the resources of organizations, organizational changes, structure, and death. The choice of questions is based on the importance of the factors that may influence the changes of the population. The PA structure is the single most important structural innovation in the industry. M&As have changed the industry structure and have been a route to the emergence of large accounting firms. Human and social capital of organizations is the critical resource base on which the professional service firms can compete. Density, i.e.,



the number of organizations in a population, also has been explored as a key variable that explains the organizational dissolution rates.

I believe this thesis makes an important contribution to the field of organizational analysis and research. Even though the primary level of analysis is organizational, I will use not only individual level variables to create fine-grained organization level variables but also population characteristics. The life history data on all accountants in the history of the Dutch accounting industry allow me to do that. In other words, the data enable me to see the whole picture of the evolution of the industry.

This dissertation deals with the professional service firms (PSFs). The service sector has been growing in terms of its contribution to GNP and the number of people employed in the sector. The professional service sector also occupies a great share in GNP. The PSFs include medical service firms, investment banks, law firms, accounting firms, and consulting firms. Rather than endogenous technological innovations, organizing principles or routines have been a source of those sectors' evolution. Despite the rise of the service sector and the difference between manufacturing firms and PSFs, the organizational literature has tended to focus mainly on manufacturing firms rather than on PSFs. This dissertation will significantly contribute to our understanding on the evolution of the professional service industries.

This thesis consists of five chapters. This chapter will be devoted to the description of the PSFs and the nature of the data that will be used in later chapters. This chapter consists of three parts: the peculiarities of professional service firms, the core structural element of those firms, and the description of the data collection process. Each of the three chapters following Chapter 1 has its own objective.

Chapter 2 examines the adoption of the partner- associate structure. I will identify several factors from organization theories that can explain the adoption behavior of organizations. Since I have the history of the population and the market-selection-related

structure, this chapter can shed some light on the role of "market signaling," the interaction between organizational and population evolution, and the interaction between ecological and genealogical evolution.

In Chapter 3, I will examine the consequences of merger and acquisition among accounting firms in an evolutionary viewpoint. A basic idea is that relational characteristics of the involved firms before the event and the previous M&A experiences will influence their success. Relational characteristics of interest are the complementarities along the dimensions of human and social capital and office location as well as organizational compatibility in terms of firm age, size, organizational structure, and the existence of networks among the members of the firms. The consequences that will be investigated include organizational dissolution, being a target of mergers and acquisitions, and being an initiator of additional mergers and acquisitions. With a single industry, and detailed information on the consequences, this chapter will add some insights to the existing knowledge base on mergers and acquisitions.

Chapter 4 is devoted to explore the empirical validity of density-dependence hypothesis by introducing organizational resources in estimating organizational failure rates. The question is whether the strong support for the density dependence hypothesis in previous studies is due to the unobserved heterogeneity, i.e., model mis-specification. Resources that will be controlled are human and social capital that a particular firm is endowed with. The chapter will shed some doubts on what we have known from the population ecology.

Chapter 5 will summarize the findings from the three semi-independent papers, and attempt to evaluate the relevant theories in explaining the evolution of the industry. I will also discuss what we can learn about industry evolution from this dissertation when we consider the three empirical papers together.

## PROFESSIONAL SERVICE FIRMS

The data, that will be used in this dissertation, are based on all accounting firms in the Netherlands. Since accounting firms constitute a class of professional service firms (PSFs), I will first review the nature of PSFs. Then, I will explore the single most important structural element in those firms (the partner-associate structure), followed by a description of the accounting sector, and the data collection process.

PSFs are firms that provide professional services to their clients. Clients can be either organizations or individuals. The professional service is the service provided by professionals who possess a specialized educational degree or certification (Maister, 1993). Examples include law firms, accounting firms, consulting firms, medical centers, etc. Law firms and accounting firms share some characteristics. To be a practitioner in those professions, the individual must have a license that the government agencies or professional associations grant. Other than the license, the financial and physical investment for founding a law or accounting firm is minimal. Here I will focus on law and accounting firms as a type of professional firm, not only because my data are on accounting firms, but also because they are more similar to each other than to other professional service firms. Also, there is already sizable literature on these sectors.

PSFs and industrial firms show many similarities. Their organizational members are stratified by levels of power, income, and seniority. They can be partitioned into sub-groups, practice groups or departments depending on the degree of specialization. Yet, in some aspects, PSFs are still very different from industrial firms. I will describe the PSFs with respect to their specific inputs, outputs, collaborations, and forms of internal control.

### *Inputs*

Among the inputs of PSFs, human and social capital often outweighs financial capital and physical investments (Russell, 1985). The absence of major endogenous

technological innovations indicates that technological innovations are not a major factor for success. The key management issues of PSFs revolve around how to organize the work and how to develop human and social capital.

PSFs whose employees occasionally resemble quasi-free-agents, often display fleeting linkages and temporal arrangements, yet also maintain an inner core of consistency, reliability, and well-established intangible assets. They have a low capital investment level, but accumulate valuable human and social capital. As carriers of distinctive expertise, these firms and their members require social capital to supply the services they provide.

Since the most critical resources are carried by professionals, PSFs tend to be more flexible than manufacturing firms. The conflict among partners in PSFs often results in the dissolution of the firms or defection of some partners. Changes of the name of PSFs as well as mergers and acquisitions occur frequently. The flexibility of PSFs is due to the low sunk cost involved in the founding. Investments in human and social capital are the most significant ones among the investments that are required for the founding of PSFs. The professionals are the carrier of the capital. Most of the investments can be recovered even after the dissolution of the firm, provided the professionals can deploy their professional skills elsewhere. In an industry where a great deal of financial and physical capital is required to establish a firm and a large portion of that capital is not recoverable, the large sunk cost might be a source of organizational stability and inertia. Because of the large amount of sunk cost, establishing and dissolving the manufacturing firms involve a great deal of uncertainty and risk.

The composition of organizational membership is a very critical element in PSFs. The composition tends to be matched with the services that a particular firm provides. When a law firm generates about 50 % of its revenue from litigation practice and another 50 % from corporate law, about half of its professionals are likely to be litigation

specialists and the other half specialists in corporate law. Another example is the degree of standardization of the service. If a PSF provides services that are highly standardized, it is likely to employ less experienced and hence less expensive professionals (Maister, 1993). Matching with the services delivered, however, is not idiosyncratic to the professional firms. In industrial firms, skill requirements for the functioning of organizations also tend to match skills held by the organizational participants.

What is peculiar to the PSFs is the matching of professionals' characteristics with client characteristics, independent of the services delivered. Providing professional service to the clients requires a very intensive interaction between clients and professionals. Professionals should understand what the clients are demanding, and develop intimate relationship with them. Similarity in some demographic dimensions between the client and the professional smoothes delivery of service and thus may solidify their relation. Furthermore, clients may want to be served by professionals who are similar in race, ethnicity, religion, or status (Smigel, 1969). The client's preference results in the isomorphism between the demographic characteristics of a PSF's members and those of its clients.

The most salient demographic variable in client discrimination is ethnicity. When Jewish lawyers had difficulty in getting a job in prestigious law firms, for example, they established firms on the basis of ethnic background and served mainly Jewish clients (Smigel, 1969). The US law or accounting firms that serve Japanese multinationals tend to hire more Japanese or Japanese American professionals than do other firms that do not serve Japanese clients (Trahan, 1987).

### ***Outputs***

The outputs provided by professional service firms also differ from those of industrial firms. The professional services tend to be intangible and the quality of the

services is very hard to measure. Of course, there are some differences among the professional services. The results of litigation, for instance, are directly observable. When clients select service providers, however, they would not know what the results of litigation would be. The uncertainty and difficulty in measuring the quality of the services render the reputation of the professionals or firms as a significant competitive factor. Contingency fee contracts are also designed for dealing with uncertainty about the quality of the services.

Professional firms tend to compete based on their reputation and status (Podolny, 1993). The importance of reputation is mediated by the characteristics of the service delivered. In the area of litigation, track records of lawyers tend to determine their reputation and thus the reputations of the lawyers are more salient than those of the firms for which they work. In the case of auditing, client firms are likely to consider the public investors' perceptions of the accounting firms. By getting auditing service from a prestigious accounting firm, a client firm can signal to the public investors that its financial reports are accurate and believable. This difference in the salience of reputation between the law firms and the accounting firms results in the higher concentration in the accounting industry than in the legal industry (Galanter and Palay, 1991).

Contingency fee contracts are also for handling the uncertainty surrounding performance. Under the contract, professionals get fees in proportion to the quality of the services delivered. However, it is only applicable when the quality of the services can be unambiguously measured after the delivery. Litigation is one of those areas. The quality of service can be measured by wins or losses, or the amount of money that plaintiffs or defendants can get. Contingency fee contracts gain popularity in personal injury litigation and anti-trust litigation (Galanter and Palay, 1991).

Contingency contracts, however, are not applicable in auditing even though the output can be measured unambiguously. Client firms get no opinion, a qualified opinion,

or an unqualified opinion from the auditors. A contract that stipulates the 'fee' to depend on the type of opinion is obviously unacceptable, since it can hamper the independence of auditors. Furthermore, the output of management, tax consulting, and other services provided by accounting firms are difficult to quantify. Thus, the observation is warranted that contingency fee contracts are less popular in accounting sectors than in legal sectors.

### ***Collaboration***

Collaboration among competitors through industry associations is not unique to PSFs. Industry associations, for example, lobby government agencies and advertise their products to enhance their members' common stature. Collaboration among PSFs through professional association, however, is more salient than that among other industrial firms. Compared to other industry associations, professional associations tend to have more power over their members, try to preserve the image of professionalism through industry specific education, and are often permitted to enforce professional codes of conduct.

PSFs not only compete with one another but cooperate on certain fronts as well. Professional associations are the instrument for enhancing the common interests. Endeavors to promote the common interest have several forms. Among them are restrictions of competitions among professionals, setting professional rules, participation in legislation and setting regulation, and lobbying the government agencies to preserve their regulatory monopoly. Setting and enforcing their own professional codes of conduct aims at preserving the professional image of the professionals and thus enhancing the legitimacy of the profession.

Professional associations have tried to control the competition by adjusting the number of licenses issued either through their influence on government policy or through direct monopoly for issuing the license to practice. Other mechanism for controlling competition is prohibition against advertising. Examples include the US legal profession

until 1977 (Galanter and Palay, 1991), and the US accountancy profession until 1978 (Bushong, 1993). In Korea, a government agency had the legal power to assign independent auditors to the clients up to 1982. The purpose of this rule was not only to secure the independence of auditors but also to limit the competition among accounting firms. The accountant association in Korea influenced the government decision to introduce the rule. Even after the abolition of the rule and thus the introduction of competition, the auditing fee is still determined by a standardized formula. In other words, price competition for auditing is still prohibited in Korea (Chu-shik-who-i-sa Woe-bu Gam-sa-e Dae-han Bub-rwool: A Law on the External Auditing on the Limited Corporations, 1980).

Another striking example of the collaboration among competitors is the peer review among accounting firms. The accountant association in the U.S. (AICPA) designed a peer review system to respond to an escalation of government regulation of the profession (Collins, 1985). Under the system, accounting firms review the quality and performance of other accounting firms to assure compliance with professional standards. In 1988, members who wished to continue their AICPA membership were required to have their firm submit to a peer review by the association (McCabe, Luzi, and Brennan, 1993). The program's primary aim was not only to improve public accounting practice while retaining self-governance but also to avoid further government regulation (Defatta and Smith, 1985). Through this peer review, accounting firms reveal their competitive advantages to their competitors to preserve common interests.

### ***Internal Control and Management***

Professionals at PSFs are partners or in many cases, associates who seek to become partners. The owners form a large portion of the firm's membership. While some might be incorporated to alter liability risks, most PSFs are organized as partnerships in



which demography and stratification are salient attributes. The stratification into different classes of members, and ensuing leverage, appears much more pronounced in PSFs than in other industrial firms. The stratification into partners and associates engenders an infrastructure for the socialization of new members into the firm's inner core.

The separation of ownership and control is not as salient an issue here, since partners have an incentive to maximize the firm's value. The governance is much more horizontal than vertical, with monitoring through peers, as in "clan control" (Ouchi, 1980) rather than through bureaucratic control such as direct supervision and monitoring. Unless the firm is large and induces free-ridership, these conditions alleviate agency problems.

The choice of senior executives occurs from within, in contrast to corporations, which formally delegate the appointment to the board of directors, who may seek outside managers. Unlike managers who are mostly fixed claimants, partners resemble shareholders as residual claimants. Most importantly, partners are full owners, while most corporations show a separation of ownership and control (Berle and Means, 1932). Since the partners are the owners of the firms, managing partners, who are equivalent to CEOs in industrial firms, tend to rely on the consensus among partners rather than formal authority in important organizational decisions.

As some PSFs have grown and become large, they have become more bureaucratic and less collegial than before (Tolbert and Stern, 1985; *The American Lawyer*, 1993). For example, some PSFs have introduced complex rules regarding voting power that depart from the one vote per one partner rule. More important organizational decisions that had been decided through consensus among all partners are delegated to the managing partners and to special committees.

Among the critical management issues of PSFs are the accumulation of human and social capital, maintaining consensus among partners, and balancing firm resources

with skill requirements of service rendered (Maister, 1993). A partner-associate structure has been a device to decrease performance metering problem and to curb opportunistic behavior (Williamson, 1975; Gilson and Mnookin, 1989) such that large partnerships are feasible. The structure has also been a device to accommodate the accumulation of firm-specific human and social capital.

### **PARTNER-ASSOCIATE STRUCTURE**

At the turn of the twentieth century, the professional service industries consisted of very small firms. Nowadays, the industries consist of a small number of large firms along with a large number of small firms. Among law firms, the largest firm in New York City in 1901 had fewer than 16 lawyers (Hubbell's law directory, 1901). In 1992, the largest law firm, Baker & McKenzie, had more than 1600 lawyers (American Lawyer, 1994). The accounting profession followed a similar trajectory. In 1876, the first accounting firms in the U.S. were single proprietors. In 1994, the largest public accounting firm in the U.S., Arthur, Anderson & Co., had more than 20 thousand accountants (Public Accounting Report, 1994).

The accounting and legal industries show a skewed size distribution. The upper stratum consists mostly of large firms that recruit from elite law or business schools and serve large corporate clients. Most of the large firms utilize a combination of partners and associates. The lower stratum consists of single proprietorships or small firms, whose partners are drawn from less prestigious schools, and that serve individual clients and small firms (Galanter and Palay, 1991; Heinz and Laumann, 1982 for law firms; Public Accounting Report, 1994 for accounting industry).

Firms with a partner-associate structure (PA structure) are made up of two groups of professionals: partners and associates. Partners can be characterized as residual claimants as they take the profit from the operation while associates can be labeled as

fixed claimants since they enjoy a fixed or guaranteed amount of income. Partners make important decisions in the firm in exchange for taking the risk of income (Sherer, 1995). They also supervise and review the work of associates. Training of associates is imparted through a system of apprenticeship, which is called "partnership track." After the completion of their apprenticeship, associates are promoted to the partners or quit the firm. Associates have employee status. However, they are very different from employees in conventional corporations. If successful, they acquire a share in the ownership of the firm.

The leverage of associates has been advanced as a key attribute of PSFs. The tournament to partnership is a vehicle for sharing human and social capital in which partners collect rent from their human capital, in exchange for associates' labor (compare, Milgrom and Roberts, 1992). Sharing human capital with free-lance professionals or subcontractors implies a lack of control that is often unacceptable. The PA structure is a way of organizing the professional work to deliver comprehensive and high-quality service in the sense that it assumes a clear authority relation and division of labor among partners and associates. It is also a way of training young professionals through a relatively long probationary period.

Partners in a PSF can either rent their surplus capital to other professionals or limit the number of clients to the number they can serve. When they decide to rent their surplus capital, they can either contract temporary help or hire professionals as employees. Higher transaction costs in the market (Williamson, 1975) and the advantage of firms in transferring organizational knowledge (Kogut and Zander, 1992) favor the firm over market arrangements. Even in professional service sectors, contracting with other professionals involves a great deal of transaction costs including the possibility of losing clients and damage to reputation (Galanter and Palay, 1991; Gilson and Mnookin, 1985). The employment system is far from perfect. Monitoring of associate performance

and behavior is not costless and information asymmetry may exist. Accurate measurement of relative contributions is not easy. Tournaments can provide a good incentive system for this situation, especially when the firm has many associates in relation to the number of partners (Lazear and Rosen, 1981; Nalebuff and Stiglitz, 1984; Malcomson, 1984; Gilson and Mnookin, 1989).

Then why do partners share ownership with promoted professionals? As an associate sells his labor to the firm, he develops not only skills and knowledge in the profession but also client relations. His skills and knowledge are very similar to those of partners in the firm. When the associate establishes his own firm and provide professional service by himself, he can be one of the most formidable competitors of the firm. Since he invested in the relation with the clients and developed knowledge of them, he may depart with clients of his own. By providing a share of the ownership to promising associates, a PSF can decrease the loss of clients and the loss of firm-specific skills. In a sense, it is a way of eliminating potential competitors.

### *Elements of PA Structure*

Important elements of PA structure include selectivity in promoting associates to partners, the ratio of associates to partners, the length of probationary period, and the up-or-out rule. They are related with one another. The elements have strategic implications for the recruitment of junior professionals, and the development of human and social capital. Since PSFs get clients on the basis of their human and social capital endowments, how to recruit promising professionals and how to develop and accumulate firm capability are among the most important management issues (Brill, 1993). Decisions on each element of the PA structure are related to those strategic issues.

*Selectivity.* Selectivity is the ratio of associates who become a partner to the number of eligible associates. High selectivity means lower likelihood for associate to be

a partner. Other things being equal, firms with high selectivity may have difficulty in recruiting young professionals, since the expected income of associates in those firms will be lower than that in other firms. Firms with low selectivity are more likely to promote questionable associates. Thus, low selectivity may result in less profit per partner and/or increased income inequality among partners.

The relation between selectivity and the quality of partners, however, would be moderated by the selectivity in recruiting the associates from the universities. Firms that are successful in recruiting top-quality associates may maintain the quality level of partners regardless of promotion selectivity. PSF's ability to successfully counsel out failed associates to other firms affects the extent of selectivity. The external accommodation, i.e., counseling-out, decreases the burden of internal accommodation, i.e., promotion to partner and thus enables PSFs to maintain high selectivity (Gilson and Mnookin, 1989). In the US legal profession, the probability to become partner in large firms has not been high. Cravath, Swaine & Moore promoted only 36 associates to partnership out of 454, who were hired as beginning associates between 1906 and 1948 (Smigel, 1969). In other less selective law firms, chances of becoming a partner varied from one in seven to one in fifteen (Mayor, 1956).

*Leverage.* Leverage is the ratio of associates to partners. Partners in highly leveraged PSFs can get high profits if they can pay associates less than their productivity, provided they can bring in enough business to keep associates occupied (Maister, 1993). Highly leveraged firms tend to be more selective in promoting associates and thus will experience more difficulty in attracting top-quality professionals. Firms with low selectivity in promotion and high leverage tend to promote comparatively more associates to partner. Those firms will experience deteriorated profit-per-partner if they cannot bring in enough clients to support newly promoted partners and newly recruited associates.

Despite the high selectivity and leverage, very prestigious PSFs can attract top-quality junior professionals. Not only can they provide competitive compensation, but also the associates who fail to make partner in those firms enjoy good employment alternatives. Associates who work for prestigious PSFs develop greater professional skills and knowledge than those in less prestigious firms. Having been associated with prestigious firms signals the quality of professionals to the potential hiring firms. The experience at prestigious firms helps failed associates to find a prestigious job (Maister, 1993). For instance, Cravath, Swaine & Moore, which has been famous for its high selectivity in promotion and high leverage ratio, still attracts top-quality law school graduates based on its reputation and competitive compensation (Gilson and Mnookin, 1989; Galanter and Palay, 1991).

The correlation between leverage ratio and profit-per-partner is positive (The American Lawyer, 1994). However, two highly ranked US law firms in 1992 have very different leverage ratio and selectivity. Cravath, Swaine & Moore, ranked first in terms of profit-per-partner, has more than three associates per partner. Wachtell, Lipton, Rosen & Katz<sup>1</sup>, the second ranked firm, has less than one associate-per-partner (The American Lawyer, 1992). Success of Wachtell in spite of its distinctiveness can be attributed to its focus on hostile M&A work and on its good work ethic (Starbuck, 1992). It indicates that leverage influences the performance in combination with services provided.

Compared to law firms, consulting firms are slightly more leveraged. McKinsey & Company has about 6.1 associates per partner. Accounting firms are even more leveraged. Arthur, Andersen & Co., the largest accounting firm in the U.S., has more than 12 associates per partner (Public Accounting Report, 1994).

Variation of leverage ratios across industries can be attributed to the degree of standardization of professional works and the length of probationary period. Since

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<sup>1</sup>Wachtell, Lipton, Rosen & Katz is an outlier in the regression of profit-per-partner on leverage among top 100 law firms (Gilson and Mnookin, 1989).

standardized work can be done by associate professionals, the degree of standardization facilitates a greater reliance on associates (Maister, 1993). Accounting services such as book keeping, auditing, and tax consulting are more standardized than legal services and consulting services. The standardization leads to a higher leverage ratio in the accounting industry (Maister, 1993). The length of probationary period is positively related to the leverage ratio. Short probationary periods at medical practice groups entail a low leverage ratio (Gilson and Mnookin, 1989).

*Probationary period.* The probationary period is the period for associates to become a partner. Probationary period is a device to solve PSFs uncertainty about the quality and performance of newly hired associates (Gilson and Mnookin, 1989). A long probationary period, i.e., the long period of observation and training, enables partners to identify qualified associates. The long probationary period alleviates information asymmetry between associates and partners and curbs opportunistic behaviors (Williamson, 1975). However, a longer period hampers the organization's ability to attract promising young professionals, since the longer period means that associates have to wait a long time in becoming a partner and thus in getting more compensation and power. The amount of time to become a partner varied from city to city, from firm to firm, from industry to industry, and from time to time (Galanter and Palay, 1991). Most studies report the time to partnership to range from 6 to 12 years. At Cravath, Swaine & Moore, it took 6.8 years on average to be a partner between 1906 and 1948 (Smigel, 1969). Smigel (1969) reported that the average time to partnership for his sample of Wall Street law firms was 8.5 years. Nelson (1988) reported about 7 years for his sample of large Chicago law firms. In large U.S. accounting firms, the probationary period is between 10 and 12 years (Public Accounting Report, 1994).

*Up-or-out rule.* One of the fundamental elements of a PA structure is the "up-or-out" rule. The rule prescribes that a junior professional will either be a partner or quit the

firm after a probationary period. The rule is conducive to the associates' investment in firm-specific knowledge and preventing the employer's underreporting the employee's performance (Kahn and Huberman, 1988).

Gilson and Mnookin (1989) explained the advantages of the system on the basis of firm-specific investments and associate's uncertainty at the time of hiring. When an associate invests firm-specific skills and the skills are hard to measure unambiguously, the employer has an incentive not to promote even top-quality associates to partner for the following reasons. First, if an associate develops a considerable amount of firm-specific skills, he will be more productive in the present employment setting than in other firms. Because of the skill specificity, PSFs can successfully exploit associates with full-fledged skills and knowledge by not promoting them to partners and by paying a little bit more than the amount that other firms are willing to pay. As long as the present employer pays more than other PSFs will, the associate will stay with the present employer.

Second, the criteria in promoting associates to partners among PSFs are ambiguous. The ambiguity of promotion criteria results in the difficulty to measure the fulfillment of requirements to be a partner and prohibits the PSFs and associates from writing explicit contracts about the promotion decision up front. The ambiguity also generates peculiar adverse selection problems among the present employer and other PSFs. The present employer has much more information about the associate than other PSFs. Under this situation, a PSF's opportunistic behavior, i.e., not promoting qualified associates, can not be observed by other firms or incoming associates.

PSFs have an incentive to avoid the doubts on their opportunistic behaviors. The "Up-or-Out" rule forestalls PSFs from behaving opportunistically in their promotion decision. By firing unpromoted associates, a PSF can signal to incoming associates that it is not willing to behave opportunistically in promoting them to partner. By doing so, it



can attract promising professionals and provide an incentive for associates to develop firm-specific skills.

For associates who did not make partner, some firms have provided outplacement services. Firms usually recommended them for jobs with client corporations and with smaller firms (Smigel, 1969). The outplacement service is related to the creation of social capital, as will be explained later. In most firms, permanent associates who keep an associate position even after the probationary period have been phased out over time (Hoffman, 1973; Smigel, 1969). Recently, however, the trend has been reversed and non-partnership track associates are hired, as will be explained later.

### *Emergence of PA Structure*

The PA structure emerged at the turn of the twentieth century. In the Dutch accounting industry, it was first adopted by 4 firms in 1925. The current form of a partner-associate structure in the legal profession, called the "Cravath system," was introduced by Cravath, Swaine & Moore in 1927 (Galanter and Palay, 1991; Sherer and Lee, 1994). The Cravath system was characterized by recruiting top-quality associates directly from law schools and an "up-or-out" promotion policy. After some period of training and socialization, ranging from five to eight years, firms ask the associate to be a partner or to quit the firm. Success of Cravath, Swaine & Moore accelerated the diffusion of the structure (Smigel, 1969).

The emergence of a PA structure can be attributed to two major factors: government regulations regarding large corporations, and international expansion of those corporations. As the number of large corporations, with financing from security market and banks without collateral, has increased, governments in most countries have steadily strengthened their regulations to protect public investors. The increased and more

complex government regulations on large corporations, and the geographical expansions of large corporations have affected not only the demand side of professional services but the supply side of young professionals as well.

Both factors have contributed to the increased complexity of professional services. Due to the complex rules, professional should consider many factors to provide the service. International expansion by large corporations made the professional work much more complex. In addition to the regulations in their own country, professionals needed to know the institution of other countries.

Because of the complexity, large corporations could not economically solve their problems by themselves. The result was an increased demand of large corporations for professional services. The large corporations' need for professional services generated the stream of work that is necessary for the success with a PA structure (Galanter and Palay, 1991).

The complexity also has fostered the division of labor among professionals. The division of labor has progressed into two directions: horizontal and vertical. Horizontally, the professionals became specialized in narrowly defined areas of the profession. They could no longer have full knowledge on every subject in their profession. Since the delivery of professional service to the large corporations required a full spectrum of professional knowledge, professionals had an incentive to form a firm that has a full spectrum of professional knowledge and thus many professionals. Importance of client specific investment has made those professional firms more competitive.

Vertically, experienced professionals tend to focus on the non-routine and more productive work, while young professionals perform routinized and rather simple work. Increased complexity has made it harder for the young professionals to provide high-quality services by themselves, since they may not have enough knowledge even in specialized areas. The complexity thus has increased the supply of those young

professionals who are willing to take lower compensation and to perform routinized work. To take advantage of the supply of young professionals who were willing to be associates, professional firms devised a PA structure.

In sum, increased government regulations regarding accountability of large corporations, and international expansions of those corporations have made the professional work more complex. The complexity fostered the demand of the professional services and gave rise to the division of labor among professionals that are employed by those firms. To take advantage of those changes, PSFs adopted a PA structure.

### *Advantages of PA Structure*

The PA structure is conducive to the accumulation of human and social capital, and has an inherent growth imperative as will be elaborated later. Other than those advantages, the PA structure reduces labor costs, enhances the organizational flexibility, and enables the existence of large PSFs. Despite those advantages, not all firms are equally likely to adopt the PA structure. When a partner cannot bring in more clients than he can handle, hiring associates and paying for them will result in the reduction of the partner's revenue (Galanter and Palay, 1991).

The cost advantage of the PA firms can be traced to the division of labor between partners and associates. The division of labor promotes efficient allocation of existing resources. By assigning routinized and less productive work to the associates, partners can concentrate on higher value adding work such as getting clients, developing new practice areas. The division of labor within a firm decreases the cost and thus serves as a competitive advantage (Maister, 1993). Non-PA firms also can use the division of labor.

Because of the lack of formal authority differentiation among partners in those firms, however, the vertical division of labor might not be easy to implement.

The PA firms are more flexible than non-PA firms. Compared to non-PA firms, firms with a PA structure can adapt their human resources to the whims of demand. Under unfavorable economic conditions, the associates can function as a buffer that protects the core of the organization, i.e., partners. When the revenue of a firm is decreasing, for instance, partners can alleviate their financial problem by reducing the number of associates. Without associates, partners would get fewer payoffs in that situation than before, short of reducing the number of partners. Since the partners are the owners of the firm and the associates are employees, reducing the number of associates is much easier than reducing the number of partners. As a result, having associates stabilizes the revenue stream per partner during the economic downturns.

When a firm can bring in more clients than existing professionals can handle, the PA firms can adapt more flexibly than non-PA firms. The PA firms can hire more associates. Firms with partners only may have various options such as hiring additional partners, using freelance professionals, and hiring associates. Those options that non-PA firms can take are not easier to implement than the option of the PA firms. Hiring additional professionals as partners requires the amendment of the partnership agreement and makes the firm less flexible in dealing with future economic volatility. Using freelancer-professionals can expose firm to risk of the reputation loss and the appropriation of clients by the temporary, part-time accountants. Hiring associates, i.e., adopting a PA structure, also requires the firm to develop the knowledge on how to manage that structure, and reap its benefits.

In legal terms, the partners in a partnership agreement have equal amounts of investment and property right. The partnership in legal terms is very similar to the "peer group" in Williamson's work (1975). As Russell (1985) noted, however, we observe

hierarchical relationships among partners<sup>2</sup>. When professionals are specialized, and delivering service requires more than one specialty, they may have incentive to organize a firm to minimize transaction costs (Williamson, 1975; Russell, 1985). Using a market mechanism such as short-term contracts with freelance professionals may not be economic solution due to following reasons.

First, the freelance professional can take the clients away based on his investments in the client relationship. Since the freelance professional can develop a relation of trust and mutuality with clients, his departure might result in a potential loss, as the clients move with him. Where there is no relation-specific investment in developing and serving new clients, the loss of clients may be less serious. If the firm finds other clients under the situation, it does not lose anything. Providing professional services, however, requires a great deal of client-specific investments. Professionals should invest their time and energy to establish trustworthy relations with clients. The investments will be reduced as they repeatedly provide the services to the same clients. Thus, loss of clients means loss of prior investments in the relations with those clients.

Second, freelancers can shirk and may not provide the best service to the clients. Since monitoring of their behavior and writing all contingencies in the contract may not be perfect, controlling freelancers' opportunism is not an easy task (Williamson, 1975). When the information on the opportunism of professionals is fully and costlessly available to all other professionals, the opportunism of freelancers will be controlled. In most cases, that is not the case.

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<sup>2</sup>I do not want to be invited to the debate about the existence of hierarchical relationship within peer groups. The debate between Russell (1985) and Williamson (1985) is basically from their attitudinal difference in philosophy of science. Russell, adopting a positivist view, emphasized the reality, while Williamson used a peer group as a hypothetical form of organization. Russell defined peer groups on the basis of employee ownership rather than on the basis of authority relationship among organizational participants. The definition of the peer group, however, is independent of employee ownership. Organizations owned by employees, such as United Airline, may not be peer group if clear authority relations exist among organizational members. One of Russell's three examples of peer group is PSFs with a PA structure. Considering the hierarchical relations between partners and associates, I think they have a hierarchical employment system rather than a structure of peer group.

Forming partnership can reduce the moral hazard problem of using short-term contracts. Long-term exchange relationships among partners and mutual monitoring can curb opportunism. Compared with simple hierarchies, however, the peer group has some disadvantages. The disadvantages include free-rider abuse (Holmstrom, 1982) and coordination costs in rules and decision making (Williamson, 1975). The disadvantages would be positively related to the size of the peer group (Williamson, 1975).

Consensus and homogeneity among group participants can alleviate the disadvantages of the peer group. The PA structure helps PSFs build consensus among partners and transmit their cultural values to the next cohorts. By promoting only trustworthy and experienced associates, partners can maintain trust and collegiality. The PA structure can lessen moral hazard problems in the partnership as peer group. Partners usually assume unlimited liability, and thus trust among partners is a central aspect of their organization. Through a long period of socialization, incumbent partners can select associates who are most consistent with them. Promotion of those associates can decrease the internal coordination costs for reaching consensus. In sum, the PA structure enables the existence of the large partnership since the structure makes it possible to build up a partnership that is cohesive, homogeneous, with a reputation of reliability and reproducibility.

### ***PA Structure and Human and Social Capital***

A professional's capital consists mainly of social and human capital. The PA structure is conducive to the accumulation of the capital. The building of intangible assets requires time, and its transmission to potentially new partners calls for job ladders that ensure the most optimal replenishment of human resources. The evolving partnership through the PA structure contributes to the maintenance and accumulation of human and social capital.

Training and evaluating associates is facilitated through the PA structure. Since the PA structure defines the authority relationship between partners and associates, the PA firm can easily introduce formal and on-the-job training programs for them. The partners can also evaluate and reinforce the development of associates. The non-PA firm is not awarded the advantage of screening and socializing newcomers before they are admitted to the partnership. In fact there is no internal stratification of owners and non-owners. It is therefore plausible to expect more strife and dissensus about "who trains whom and who will be evaluatee and evaluator." The PA structure can facilitate the transfer of learning within organizations, which is one of the advantages that organizations have over markets (Kogut and Zander, 1992).

The PA structure helps PSFs to develop social capital. According to the "up or out" rule, the associates who fail to be promoted either stay in the industry or get a job in the other industries. Many PSFs put a great deal of effort to outplace those associates, especially in client sectors or in small satellite firms. Large PSFs even have a department for 'counseling out' those associates. Some junior professionals join the prestigious professional firms to accumulate professional knowledge and use that experience as a platform to get a prestigious and high-paying job in other industries.

When departing associates find jobs in other sectors, they are likely to have a job that can utilize their professional knowledge. "Controller" for the accountant and "legal counsel" for the lawyer are examples. As a result, they are likely to be in a position to choose the professional firm as a service provider in the future. Other things being equal, they are likely to choose the professional firm they worked for. In other words, they form part of PSFs' social capital. In a sense, associates are either future partners, future competitors, or future clients.

Localized learning is also related to the development of social and human capital. The PA firms are larger than non-PA firms and tend to serve big clients (Spurr, 1987).

Associates in those firms are exposed to big clients and thus can develop social and human capital specific to them. The associates who developed social and human capital that is specific to those clients will be promoted to partners, because they can bring in or deliver services to big clients. Those who do not develop such intangible capital are not likely to be promoted. Promotion of those associates may ruin the firm's future since it signals to the associates in the tournament that the accumulation of human and social capital is not so important to be a partner. The result of localized learning is that partners in PA firms tend to have professional knowledge specific to large clients, while partners in non-PA firms have knowledge on small clients.

### ***PA Structure as a Growth Engine***

The promotion-to-partner tournament in the PA structure contains an inherent driver of growth (Galanter and Palay, 1991). Once a PSF adopted the structure, it should grow exponentially to sustain that structure. The firm should promote some of its associates to solicit a maximum effort from them. The promotion signals to them that it rewards productivity but not shirking (Galanter and Palay, 1991).

To maintain the partner's compensation level prior to the tournament, the firm should maintain the ratio of associates to partners, i.e., leverage ratio (Maister, 1993). Otherwise partners would be performing less productive work and thus get less profit. Maintaining a constant leverage ratio means that, after the tournament, the firm should hire new associates not only to replace departing associates and all those who are promoted but also to support newly promoted partners. If the promotion percentage of associates and the associate-to-partner ratio remain constant and if the number of newly promoted partners is greater than that of departing partners, the firm will grow at constant percentage growth rate. On the basis of that logic, Galanter and Palay (1991) show that big law firms in the U.S. have grown at relatively constant percentage growth rate.



Another source of the growth advantage of the PA firms comes from their advantage in acquiring other firms. Compared with non-PA firms, PA firms are flexible in handling the professionals with a range of qualifications on professional skills. The PA firms can employ both well qualified and not-yet-qualified professionals by assigning them to partner and associate position, respectively. Non-PA firms may have difficulty in employing unqualified professionals since hiring them as partners may dilute the revenue of existing partners. When non-PA firms acquire PA firms, they must introduce a PA structure first to prevent the dilution of profit per partner. When PA firms acquire other firms, they can just evaluate the professionals and assign them either to partners or to associates. Since successful implementation of a new organizational structure requires tacit knowledge and investments, the PA firms can acquire other PA firms more easily than non-PA firms.

### *Modification of PA Structure*

The PA structure has been modified. The departures, ironically, are to protect a PA structure while keeping the firm competitive (Gilson and Mnookin, 1989). The modification can be summarized as the bureaucratization of PSFs. In the accounting industry, further stratification among associates is the major change. Even though the titles used by accounting firms differ across firms, staff associate, senior associate, supervisor, and manager are among frequently used job titles. All of them pertain to the associate accountants. The stratification indicates authority differentiation among associates. Since accounting firms have a comparatively long probationary period and higher leverage ratio than law firms, they had incentive to design a sequential screening process before promotion to partnership decision. They also have incentives to delegate the training and evaluation of associates to experienced associates. Still partners are the owners of the firm and associates are employees.

The evolution of the U.S. legal profession is different from that of the accounting profession. The authority relations within the ranks of associates are not introduced yet in the legal profession. Some law firms have two-tiered partnership in which some partners, called "senior partners," have more voice in policy-making and enjoy larger share of firm profit than others, called "junior partners," do.

Some firms hire second-tier associates, so called "staff attorneys." Second-tier associates join law firms without any possibility of promotion to partner and receive a lower compensation level than the regular associates (Galanter and Palay, 1991). Some associate lawyers do not leave the firm and work as "senior attorneys," even after they failed to become a partner. Part-time attorneys are working for some large law firms. Those lawyers might be called peripheral associates since they do not participate in the tournament. By hiring peripheral associates, law firms can increase the possibility for the regular associates to become a partner.

Some firms hire lawyers from other firms. Hiring laterals from other law firms enables them to cope with changes in demand and the growth strategy of the law firm. When a firm enlarges its practice areas to cope with the changing demand of segmented clients' market, it has an incentive to hire specialists with commensurate skills. The composition of the service market has been changed by the introduction of new laws, the emergence of new industries, the fluctuation of demand in established areas, etc. For example, the surge of mergers and acquisitions in 1980s required the firms, that wanted to take advantage of the lucrative opportunities, to hire more specialists in that area (Galanter and Palay, 1991). Law firms had two options. One was to develop the expertise in house. The other was to hire lawyers from other firms who had expertise in those areas. Firms that wanted to quickly take advantage of the surge of mergers and acquisitions took the second option.

In addition to the increased stratification in terms of job title, the differentiation in the power and rewards of partners also has increased over time (The American Lawyer, 1993). Law firms rely more on performance in deciding the compensation and the power of partners. Partners who bring in more clients have a larger voice than others (Galanter and Palay, 1991).

The drivers of the modification of a PA structure include increased competition among PSFs, the changes of the client market, the routinization of some professional work, and changes in professional labor markets. Since the transformation is observed in both the accounting and legal profession and more information is available for the legal profession, I will list the reasons of the structural changes of law firms as an example. Information on other sectors, most notably engineering and health care, is still relatively scant.

The increased competition among the law firms is partly responsible for the modification. An increase in the number, size, and responsibility of in-house legal departments and a surge of corporate litigation changed the relation between large corporations and law firms (Galanter and Palay, 1991). Since the in-house legal department can handle routinized and less complex legal matters, large corporations bought non-routine and complex legal services from law firms (Chayes and Chayes, 1985).

The growth of in-house legal departments also changed the nature of competition (Chayes and Chayes, 1985). Before the introduction of such departments, law firms competed with other law firms. Now law firms compete not only with other law firms but also with in-house legal departments. The increased competition required law firms to contain costs of their legal services. Unless law firms can contain the costs, in-house legal departments will take over more services from law firms. The modification helps law firms contain their cost. By using more lawyers outside the promotion-to-partnership

track and thus increasing the likelihood for regular associates to become a partner, law firms can contain the costs of their service and hire highly qualified law school graduates (Galanter and Palay, 1991).

The other major source of transformation is the upsurge of large, contested, and risk-prone transactions such as business litigation, takeovers, and bankruptcies since 1970s (Galanter and Palay, 1991; Gilson and Mnookin, 1989; Nelson, 1988). The huge surge of those transactions changed the role of partners and increased the demand for associates. In addition to retaining existing clients, getting new clients and business has become a more important requirement for partners than ever before. Law firms responded to the changes in the market by providing more money and power to partners who brought in more clients. Recently, law firms have even dismissed partners who were not able to bring in new clients (Bernstein, 1982; National Law Journal, 1989).

Routinization of some of the legal practice allows the firms to hire peripheral associates. Many areas have become more routinized as the professionals accumulated experience in those areas. Routinization means that less capable, less experienced, and less devoted lawyers can perform a job. By hiring more peripheral associates for the routinized work, firms can get cost advantages over competitors. The cost advantage means higher profit per partner and opens a door to serve price-sensitive clients.

Changes in the labor markets, such as the increasing number of female attorneys, increased supply of lawyers, and changes in the life style of lawyers, also enable the modification. For instance, lawyers who do not want to or cannot fully invest their time in practicing law prefer being a staff attorney, a senior attorney, or a part-time attorney to full-time associate or partner.

In sum, the PA structure has been modified. The modification can be summarized by more stratification among associates and among partners. The bureaucratization of PSFs is to protect the institutionalized PA structure. The increased

competition among PSFs, the changes of the client market, the routinization of some professional work, and the changes of the professional labor markets are responsible for the modification.

## THE ACCOUNTING SECTOR

I chose the research setting not only because the industry has played a significant role in the economy, but also because the setting shows a very interesting aspect of the evolution of the industry. The research questions I investigate here, however, may not be specific to the accounting industry. Other professional service sectors such as law firms, consulting firms, investment banking firms, engineering firms, and various forms of healthcare providers followed an analogous trajectory of evolution and shared similar management issues. For example, size inequality has increased over time and most of the large PSFs have a PA structure. In those sectors, beside getting clients, critical management issues have been how to get top quality professionals and how to organize the work inside the organization.

The accounting firm has traditionally been organized as a partnership, although the very first firms were typically single proprietorships. The split into partners and associates took place around the end of the first world war and became fully institutionalized after the second world war. The PA structure has been a major endogenous impetus for firm growth, with some PSFs exceeding thousands of partners.

The rise of the accounting sector dates from the industrial revolution. In the Netherlands, the first firm was founded in 1880. Several significant events, apart from the PA structure adoption, included governmental regulation and international affiliation, with the latter being confined to the larger firms. Concentration goes hand in hand with international affiliation and eventually leads to the emergence of a dual market structure: the market bifurcates into two segments between which there is not

much competition or overlap of client rosters. The segment comprising boutiques and other small firms consists mainly of single proprietorships or very small partnerships, frequently involving relatives. The other part consists of large partnerships, including the "Big-6". Compared with law, health care, investment banks, architecture, education, and civil engineering, this sector is more concentrated, with the biggest four controlling roughly 17 % of the market in the US in 1982 and more than 50 % in the Netherlands in 1990. Yet this level is substantially lower than that of many industrial sectors.

Mergers, acquisitions, splits, and divestitures are common events. The addition of new partners often results in a name change. Firms specialize or diversify, with some venturing into other areas such as head hunting and management consulting, while others focus more narrowly on auditing and financial reporting. In short while PSFs are a distinct set of firms in the corporate landscape, they also display many features that lend themselves to theory building and hypothesis testing.

Splits, defections, and other uncertainty producing conditions render a PSF vulnerable. While I assume accounting firms to be internal labor markets, with their own, distinct human capital, defections indicate comparatively low mobility barriers. Internal labor markets are thus discernible at both the firm and occupational level (compare, Wholey, 1985). Diversity in demographic and professional background can also undermine a firm's quest for an integral cadre of professionals. Senior positions need not always be staffed through internal promotions, and an accountant's job ladder might not only span multiple PSFs, but non-accounting firms as well. As will be shown, the partnerships in our sample show considerable variation in industry and firm tenure.

## **DATA COLLECTION**

The data of this study cover the entire population of Dutch accounting firms during the period 1880-1990. Firm level data were extracted from directories of

accounting associations that merged into a single association, currently called "NIVRA" or "Nederlands Instituut van Registeraccountants" (Netherlands Institute of Certified Public Accountants). During the first eight decades, there were numerous associations, each with their own membership roster until they merged into a single association in 1966. The directories provide the information about the members of associations and accounting firms.

Depending on the availability of rosters, the individual level data were collected with one to five year intervals. During the World War II, five year interval was used because no directories were available during 1942-1945. From 1970 to 1974, each year was recorded, while after 1974, every fourth year was recorded. Individual level data included the accountant's name, address, education, and status in the firm, if applicable. Also included is the employment affiliation, i.e., name of audit firm, business firm or governmental agencies. The directories also provide the name of cities where each accounting firm had an office. Majoor, et al. (1993) provide further details.

Individual level data were aggregated for creating firm level data. Organizational changes are captured by tracing the changes of accountants' firm affiliations. Population level variables are also created on the basis of the information on accounting firms. Detailed description of the variables will be available in each of the following three chapters.

## **CHAPTER 2**

### ***ADOPTION OF A PARTNER-ASSOCIATE STRUCTURE: TECHNICAL EFFICIENCY VS. LEGITIMACY***

The reasons underpinning the adoption of innovations in general and structural innovations in particular have received a great deal of attention in the organizational literature. The organizational adoption literature has gravitated towards two categories. First, there are studies, which argue that technical efficiency of innovation dictates adoption. Second, a significant body of literature has an institutional orientation and stresses the quest for legitimacy as an adoption motive.

This chapter examines the adoption of a partner-associate (PA) structure. The adoption of the PA structure is a significant structural innovation among professional service firms. Indeed, the PA configuration is a "core" rather than a "peripheral" structural aspect of organizations, since it implies the introduction of power and authority relations among organizational members (Hannan and Freeman, 1984). Its adoption has had major repercussions in law, accounting, and engineering firms. By testing hypotheses, expressing both technical efficiency and institutional viewpoints, this study can furnish important insights about the reasons underpinning the adoption of innovations.

Technical efficiency of an innovation has been emphasized as a motive of adoption by scholars in contingency theories and in the field of strategy. Contingency theory explains the adoption of the innovation on the basis of technical efficiency of the innovation. In other words, organizations adopt a structural innovation in order to improve their efficiency and effectiveness. There are two major tenets: (1) there exists a covariance between organizations and their environments, and (2) for organizations to be effective, there has to be a fit between organizations and their environments. Better



performing organizations are those whose structures are congruent with the environment (Pennings, 1992). Contingency theorists hold that the organizational environment constrains the choice set of organizations in designing their organizational structure because the 'goodness of fit' determines organizational effectiveness. Largely, studies have explored the existence of covariance under the assumption that existing organizations are effective ones. The environment considered by those scholars includes not only general environmental characteristics such as uncertainty (e.g., Burns and Stalker, 1961; Lawrence and Lorsch, 1967) but also strategic characteristics such as complexity and diversification (e.g., Chandler, 1962; Rumelt, 1974; Amburgey and Dacin, 1994).

Institutional theory, in contrast, maintains that organizations adopt innovations for achieving legitimacy (Meyer and Rowan, 1977; DiMaggio and Powell, 1983; Lincoln, Hanada, and McBride, 1986; Palmer, Jennings, and Zhou, 1993). Organizations are influenced by common understandings of what is appropriate and, fundamentally, meaningful behavior (Zucker, 1983). When a structure is taken-for-granted, adoption enhances organizational legitimacy, regardless of whether the adoption is instrumental for firm performance. Competitive pressure here only partly drives the structural innovation (DiMaggio and Powell, 1983). Adoption symbolizes compliance with widely accepted standards. Organizational integrity perceived by external constituents is particularly enhanced when a firm mimics other organizations or complies with the recommendation of influential norm-setters such as regulatory agencies and consulting firms.

Yet, research to date on the adoption of structural innovations has not resolved the relative explanatory power of these two theories (compare, Abrahamson, 1991). Scholars have tried to reconcile the theories. For instance, Scott (1987) claims that institutional arguments can explain the behavior of not-for-profit sectors, while technical efficiency ones can be applied to for-profit sectors. Tolbert and Zucker (1983) and Baron, Dobbin,

and Jennings (1986) show that efficiency considerations are more pertinent during early diffusion periods, while institutional ones provide a better explanation for later periods. Their study, however, provides only suggestive evidence. These authors argue that non-significant effects of efficiency-derived variables on adoption force us to invoke an institutional explanation. There can be numerous reasons for the original model's failure to predict adoption during later episodes of the diffusion window. Westphal and Zajac (1994) show that later adoptors of CEO's long-term incentive plans are less likely to implement and exercise them than early adoptors. Other institutional studies (e.g., Fligstein, 1990) can be evaluated on similar grounds. Questions like whether these two theoretical traditions are competing or whether they can be applied to different sectors or to different kinds of innovations have not been answered yet. The evidence to date is therefore limited in making definitive statements on the relative merits of contingency versus institutional accounts.

Drawing on technical efficiency and institutional arguments, the present study tests hypotheses on the organization's propensity to adopt structural innovations. The tests will be based on a population of Dutch accounting firms from the onset of the diffusion (i.e., 1925) to the present times (i.e., 1990).

Since this study deals with a single population, it also can inform us of the interaction between population and organization-level evolution. The results of population-level evolution, such as selective retention of certain organizational forms, signal to organizations important information about their own viability. Conversely, adoption of certain forms by organizational decision makers gives rise to population-level variation. In the present paper, the mutual influence of population evolution and firm-endogenous reorganizations is examined, and brings us, therefore, a step further in comprehending the interaction between them.

## PARTNER-ASSOCIATE STRUCTURE

### *Professional Service Firms and Partner-Associate Structure*

At the turn of the twentieth century, the professional service industries were highly fragmented with a preponderance of single proprietorships. Moving towards the twenty first century, these industries have evolved into a dual structure--they bifurcate into segments of a small number of large firms and a large number of small firms. Among US law firms, the largest firm in New York City in 1901 had fewer than 15 lawyers (Hubbell's legal directory, 1901). In 1994, the largest law firm, Baker & McKenzie, employed over 1600 lawyers (American Lawyer, 1994). The accounting profession showed an analogous historical trajectory. In 1876, the very first accounting firms were single proprietorships. In 1994, the largest public accounting firm in the U.S., Arthur, Anderson & Co., employed twenty thousand professionals (Public Accounting Report, 1994) and over 100,000 employees world-wide.

In the 1990s, the accounting and legal services industries show a skewed size distribution. The upper stratum consists mostly of large firms that recruit from elite law or business schools and serve large corporate clients. Most of these firms employ not only partners but also associates. The lower stratum consists of single proprietorships and small firms, whose professionals are drawn from less prestigious schools and that serve individual clients and small firms (Heinz and Laumann, 1982; Galanter and Palay, 1991, for the legal service industry; Miranti, 1990; Public Accounting Report, 1994, for the accounting industry).

A firm with a PA structure consists of two groups of professionals: partners and associates. Partners can be characterized as residual claimants as they take the profits from operations, while associates are fixed claimants since they enjoy a fixed or guaranteed income (Sherer, 1995). Partners make important decisions in exchange for

having their compensation at risk. They also supervise and review the work of associates. Professional skills and knowledge are imparted through a system of apprenticeship which is called "partnership track," or "tournament" of professionals (Galanter and Palay, 1991). After its completion, associates are either promoted to partner or they quit the firm. Thus, although associates have employee status, their status differs from that of employees in conventional corporations. If they successfully complete their apprenticeship, they acquire a share in ownership of the firm.

### *Emergence of PA Structure*

The PA structure emerged in 1925 in the population of Dutch accounting firms after four firms adopted the structure in that year. The emergence can be attributed to two major factors: government regulations on large corporations and international expansion of those corporations. As the number of large corporations grew and became increasingly financed by security markets and commercial banks, governments in most countries have steadily strengthened their regulations to protect public investors. Additionally, international expansion of large corporations made professional services more complex. Professionals were required to know the regulatory environment of other countries where their multi-national clients operated.

Both factors have contributed to the increased complexity of professional services. Because of the complexity, large corporations could not solve their auditing problems internally. The result was the increased demand from large corporations for sophisticated professional services. The large corporations' need for professional services generated a stream of work that is more commensurate with a PA structure (Galanter and Palay, 1991).

The complexity also has fostered the division of labor among professionals. The division of labor has progressed into two directions: horizontal and vertical. Horizontally,

the professionals became specialized in narrowly defined areas. Since the delivery of professional services to large corporations required a full spectrum of professional knowledge, professionals had incentives to form organizations that encompassed a wide range of specialists (Russell, 1985). The importance of client-specific investments and the ease of contracting with one PSFs rendered those professional firms more competitive.

Vertically, experienced professionals tended to focus on the non-routine and high value-adding work, while freshly minted professionals perform routinized and rather simple work. Increased complexity has made it harder for the young professionals to provide high-quality services, since they may not possess adequate knowledge in specialized areas. The complexity thus has increased the supply of those young professionals who are willing to tolerate lower compensation and to perform routinized work. To take advantage of the supply of young professionals who acquiesced in being associates, professional firms were increasingly induced to adopt a PA structure.

### *Advantages of PA Structure*

The PA structure provides an arrangement for the delivery of comprehensive, high quality services with clear authority relations and a well developed division of labor among partners and associates. The PA structure is conducive to the accumulation of human and social capital. It also reduces labor costs, enhances organizational flexibility, and facilitates organizational growth. Despite those advantages, all firms are not equally likely to adopt the PA structure.

The recruitment of promising professionals and the accumulation of human and social capital are among the most important organizational issues of PSFs, since they vie for clients on the basis of their human and social capital endowments. The implementation of a PA structure affects the organization's ability to accumulate those forms of capital (Gilson and Mnookin, 1985, 1989; Kahn and Huberman, 1988; Maister,

1993). Because the PA structure implies the authority relationship between partners and associates, the PA firm can readily introduce formal and on-the-job training programs for the associates. Without authority relations, as in non-PA firms (i.e., PSFs that consist solely of partners), cultural transmission can be problematic and internal strife around recruitment and retention issues is paramount. In sum, the PA structure facilitates the transfer of knowledge within organizations - a key advantage of organizations over market transactions (Kogut and Zander, 1992).

The PA structure helps PSFs develop client networks. According to the "up or out" rule, the associate who fails to become a partner either finds a job in other PSFs or gets employment elsewhere. Many PSFs put a great deal of effort in finding alternative employment, especially in client sectors, or in a small satellite firm. PSF's ability to counsel out those associates enables it to keep high selectivity in the promotion-to-partner decision (Gilson and Mnookin, 1989). Large PSFs even have a department for 'counseling out' those associates and they refer some service to the professionals who have a job in small satellite firms (Gilson and Mnookin, 1989). Some junior professionals join the prestigious professional firms to accumulate professional knowledge and use that experience as a platform for getting a prestigious and high-paying job elsewhere.

When departing associates find employment in client sectors, they are likely to perform tasks that utilize their professional knowledge (Gilson and Mnookin, 1989): "Controller" for the accountant and "legal counsel" for the lawyer are some examples. As a result, they might be in a position to influence the choice of their current organization's auditor. Other things being equal, they are more likely to favor the professional firm they worked for. In other words, they constitute a part of that PSF's social capital (Maister, 1993).

The labor cost advantage of the PA firms can be traced to the division of labor between partners and associates. By assigning less productive work to associates, partners

can work on more value-adding work such as getting clients, developing new practice areas, and so on. The division of labor within a firm decreases the cost and thus serves as a competitive advantage (Maister, 1993). Non-PA firms also can establish a vertical division of labor. However, because of the absence of power differentiation among partners, such division of labor is comparatively difficult to implement.

The PA firms are more flexible than the non-PA firms. Compared to non-PA firms, firms with a PA structure can modify their human resources to external demand conditions. Under unfavorable conditions, the associates can function as a buffer that protects the organization's inner sanctum, i.e., partners. When the firm's revenues decline, for instance, partners can alleviate financial short-falls by reducing the number of associates. Without associates as a buffer, partners would get fewer payoffs, unless the firm reduces the number of partners. Since partners are the owners and associates the employees, reducing the number of associates is much easier than that of partners. As a result, employing associates stabilizes the revenue per partner over time.

The buffering through associates confers additional flexibility. The PA firms can hire more associates when client demands require more labor. Firms without associates may have various options such as hiring additional partners, using freelance professionals, and hiring associates. Those options are relatively difficult to implement for non-PA firms. Hiring additional professionals as partners requires the amendment of partnership agreement and makes the firm vulnerable to adverse future conditions. Using freelance professionals can expose the firm to considerable risk, including damage to firm reputation and loss of clients. Hiring associates by adopting a PA structure also requires the firm to develop the tacit knowledge on how to benefit from the structure.

In legal terms, the signers of a partnership agreement have the same amount of investment and property rights. The partnership in legal terms is very similar to the "peer group" in Williamson's work (1975). When professionals are specialized and service

delivery requires more than one specialty, they have an incentive to reduce transaction costs (Williamson, 1975). Using short-term contracts with freelance- professionals may not be a viable solution due to the following reasons. First, the freelance- professionals can appropriate their clients. Since providing professional services requires a great deal of trust and interaction between service providers and their clients, professionals invest a considerable amount of time and energy to build relationships with them. The ongoing investments in the relationships will be reduced as they continue to provide the services to the same clients. Loss of clients means the loss of prior investments in the relations with those clients. Second, freelancers can shirk and may not provide best service to the clients. Since monitoring their behavior and writing all contingencies in the contract may not be perfect, controlling their opportunism is tenuous (Williamson, 1975). Temporary employment is not compatible with conditions where monitoring is problematic.

Partnerships reduce the moral hazard problem of short-term contracting. Long term exchange relationships among partners and mutual monitoring curbs their opportunistic behavior. Compared with simple hierarchies, however, the peer group has some disadvantages. These include free-ridership (Holmstrom, 1982), coordination costs (Williamson, 1975), and opportunistic behaviors caused by information asymmetry (Gilson and Mnookin, 1989). The disadvantages are exponential to the size of the peer group (Williamson, 1975).

Consensus and homogeneity among group participants can alleviate the disadvantages of peer groups. Partners usually assume unlimited liability and trust among partners is, therefore, central. PSFs face uncertainty about the abilities and dispositions of new hires at the time of hiring. A long probationary period alleviates the uncertainty (Gilson and Mnookin, 1989). The PA structure helps PSFs build consensus and trust among partners and transmit their cultural values to the next generation. By promoting only trustworthy and experienced associates, partners can maintain trust and collegiality.



Through a long period of socialization, incumbent partners can select associates who are most compatible with them and therefore decrease the internal coordination costs to reach consensus (Gilson and Mnookin, 1989). In sum, the PA structure enables the existence of the large partnership since the structure makes it possible to build up a group of professionals that is cohesive and homogeneous, and with a reputation of reliability and reproducibility.

The PA structure has evolved towards more complex forms. Modifications include two-tiered partnerships, permanent associates, second-tier associates, part-time professionals, etc. (see, Gilson and Mnookin, 1989; Galanter and Palay, 1991) and changes in legal forms to avert major liabilities (Gilson, Carr, and Mattewson, 1991). Despite these modifications, the PA structure continues to prevail among large accounting, consulting, and law firms, and surfaces in other service sectors such as health care, entertainment and real estate (e.g., Wholey and Burns, 1993). Educational institutions have traditionally mirrored many aspects of the vertical differentiation, including a PA equivalency and tournament towards "tenure." Universities and other educational organizations similarly show further differentiation--including, for example, "adjunct teachers," and "full" versus "chaired" professors. In spite of these blurring variations, we continue to witness PA-equivalent structures in diverse sets of professional organizations.

### **THEORETICAL FRAMEWORK AND HYPOTHESES**

The present study seeks to provide a comprehensive empirical testing of hypotheses that account for the adoption of the PA structure by PSFs. The theory and empirical testing include factors at the industry and firm levels of analysis and were drawn from the earlier mentioned technical efficiency and institutional arguments. The industry level factors represent conditions that are external to the individual firm and

which might explain its adoption propensity. They include a performance gap between adopters and non-adopters, variability, population characteristics, and governmental regulations. Firm level factors are those that are internal to the organization and represent endogenous explanations for the adoption of the PA structure. Examples include diversification, age, organizational slack, and the social connections of its professionals.

The efficiency versus institutional explanation can be anchored in the motivation of the adoption. When decision makers adopt a structural innovation because of its technical efficiency, the factors considered by them can be labeled as efficiency factors. When their adoption is predicated on mimetic grounds to secure legitimacy, the factors considered fit an institutional qualification. Figure 2-1 presents the four combinations.

**FIGURE 2-1**

**Four Conditions of Adoption of Structural Innovations**

	Technical efficiency	Institutional ("mimetic")
Population/Industry Level	Market signaling: Performance gap between adopters and non-adopters	Rate of adoption among industry members
Firm Level	Complementary needs Absorptive capacity	Social networks: Exposure to fad and fashion through inter-firm ties

The technical efficiency and institutional arguments can be articulated at the population and firm levels of analysis. At the population level a performance gap between adopters and non-adopters can be contrasted with the mere rate of adoption as illustrating technical efficiency and institutional arguments, respectively. At the firm level, an organization's conditions and its absorptive capacity to exact more rents from the adoption, together with the organizational decision makers' social networks exemplify

these two arguments. To propose a theory and hypotheses, environmental factors, followed by internal factors were examined. Finally, this study will explore the possibility that technical efficiency and institutional factors amplify or attenuate adoption propensity, depending on the progression of diffusion in the population.

### ***PA Adoption and Environmental Factors***

Two external factors that influence adoption of innovation were identified: market signaling and institutional pressures. The first one, market signaling is the result of what might be called prior market selection. When non-adopters become aware that customers significantly favor adopters, they are more likely to imitate them for improving their own performance. Non-adopters may not know the preference of customers, but the actual behavior of customers provides adequate feedback. Many markets signal their preference by rewarding organizations with a viable feature. The feedback can have the form of differential growth rate or survival rate. A visible performance advantage among adopters triggers adoption by non-adopters. This factor clearly fits an efficiency motivation for adoption.

Mimetic adoptions are predicated on the uncoupling of performance and structural arrangements, usually because there exists causal ambiguity about the latter leading towards the former. Organizations copy the conduct of other firms (Meyer and Rowan, 1977). By emulating their conduct, the adopting organization communicates compliance with what is considered good practice or sound management. Since securing organizational legitimacy is a major adoption motivation, the mere rate of diffusion represents an institutional ground for adoption. This second type of motivation is couched in terms of institutional pressures.

### *Market Signaling*

An important difference between social and biotic organisms is that the former can intentionally change their form while biological organisms cannot. For example, business organizations may modify their structures to enhance performance or legitimacy, in spite of strong pressures for reliability and consistency (Hannan and Freeman, 1984). These pressures are said to render organizations inert, yet ample evidence now shows that firms have the capacity to change (e.g., Amburgey, Kelly, and Barnett, 1993). Organizations can recognize what others are doing and how the market responds to their conduct. When the environment favors firms with a specific arrangement or product, for example, through higher growth or better survival rates, other firms follow suit (see, Rogers, 1983).

Scholars, ranging from economists to sociologists, have stressed the importance of imitative behavior. After investigating leading firms that adopted the multidivisional structure, Chandler (1962, p. 324) writes, "The four (Du Pont, General Motors, Jersey Standard, and Sears, our insert) clearly borrowed from others in building their early structures, and others borrowed from them when they set up new multidivisional form." Alchian (1950 p. 218) likewise writes, "--, whenever successful enterprises are observed, the elements common to these observable successes will be associated with success and copied by others in their pursuit of profits and success." Campbell (1965) also recognizes the importance of performance based imitation. He writes, "In the 'observation learning' processes, those acts of another most rewarding to the model tend to be imitated, and those acts most punished tend to be inhibited in future performance of observer" (Campbell, 1965, pp. 30-31).

The degree of causal ambiguity between the arrangement and the performance influences the speed of imitation. When an organization pioneers a novel innovation, other organizations may be unaware of its performance implications. Performance

feedback reduces a decision maker's uncertainty regarding the causal linkage. Often organizations may not have access to their competitors' know-how, particularly when the production function is too complex. Under those situations, organizations can first monitor the market reactions to the products or the service of the competitors. When an organization finds significant changes in market reaction, it begins to search for reasons that explain the success of its competitors.

Structural inertia and other impediments for change are widespread. Organizations implement mostly those changes that are in the vicinity of past practices (Simon, 1945). Organizations consist of people with differing interests that are frequently conflicting with each other (Pfeffer and Salancik, 1978). They might re-organize themselves even though the change is not fully congruent in dealing with the changing environment. Strong market signaling, favoring adopters, creates an atmosphere of crisis among non-adopting firms. The sense of crisis caused by market feedback diminishes resistance to change and unfreezes the structure. In fact, the visible benefits of innovation will feed the impetus for change and persuade those members who resist to reverse themselves.

The superior performance of PA firms over non-PA firms conveys the causal relationship between that structural innovation and performance rather unambiguously. Specifically, among peer firms, the difference in growth and survival rates between PA firms and non-PA firms provides powerful feedback about the innovation's benefits. The proven advantage of a PA structure will decrease the structural inertia in non-PA firms and thus foster adoption of a PA structure. The arguments produce the following hypothesis.

Hypothesis 2-1: The higher the revealed advantage of PA firms over non-PA firms, the more likely non-PA organizations adopt a PA structure.

*Institutional Pressure*

When the production technology is intricate and causal relations between organizational practices and performance are ambiguous, copying is no longer predicated on efficiency motives. Abrahamson (1991), for example, has argued that beyond a certain level, the mere spreading of an innovation among firms engenders a bandwagon that non-adopting firms will join. "Blind" imitation is more likely when prestigious organizations become adopters (DiMaggio and Powell, 1983), or when an increasingly large number of peer firms adopt a particular innovation (Meyer and Rowan, 1977; Fligstein, 1985). When diffusion is widespread and performance benefits of the adoption are tenuous, efficiency considerations give way to sheer mimicking. Other mimicking might be induced by recommendations from regulatory agencies or consulting firms. The end result is a new arrangement that is taken-for-granted, or that is no longer challenged on some cost-benefit ground. Rather, adoption is motivated by a "worst case scenario" (Abrahamson, 1991): Whenever organizations are not performing well, decision will be blamed of not-joining the bandwagon.

Numerous studies have investigated the institutional effects on adoption. Haveman (1993b) examined the diversification activity of the California savings and loan industry. Her study showed organizations to imitate the diversification of large and successful firms. Sherer and Lee (1994) explored the adoption of new employment arrangements among US law firms. They reported that law firms imitate the practices of other, local law firms. Fligstein (1985) recounted that organizations adopt a multidivisional form in proportion to the rate of peer firms, which previously implemented this form. A higher percentage of adopters within an industry signals stronger institutional pressure. Tolbert and Zucker (1983) explored the diffusion of civil service reform. They found that city characteristics are correlated with the adoption of the reform in the earlier period but not in the later period, although as noted before, their

analysis is subject to omitted variable bias. Baron, Dobbin, and Jennings (1986) also showed that, among manufacturing sectors, the rank-order correlation between firm size, as a proxy of organizational need, and the adoption of employment innovations declined during the period 1935 - 1946.

The number of prior adopters becomes a proxy of the degree of institutionalization (Fligstein, 1985). When applied to the current inquiry, a two pronged path of institutionalization might be surmised to account for the PA adoption. One institutional path consists of the direct effect on the perception of partners in non-PA firms. As the number of PA firms increases, professionals are likely to perceive the PA structure as an obvious organization design attribute. It follows that higher numbers of PA firms are conducive to the adoption of a PA structure.

The other path is through the perception of clients that, in turn, influences the firm's adoption decision. When widely diffused, clients are led to believe that a PA structure is instrumental for high quality service delivery and in fact may shun non-innovative firms. In the present study, clients choosing an accounting firm as service provider would increasingly prefer the conforming accounting firms. This preference might be even stronger when the client is a corporation. Its officers are prone to select those accounting firms that comply with prevailing industry practice, i.e., those with a PA structure. Their inclination toward such firms is exacerbated by their peer firms who are also pre-disposed toward accounting firms adhering to widely accepted structural arrangements. This mimetic process among large corporations in selecting their service providers furnishes another institutional pressure among accounting firms to adopt a PA structure. The high correlation between the size of corporate clients and that of their professional service providers (Spurr, 1987; Public Accounting Report, 1994) suggests the possibility. I hypothesize:

Hypothesis 2-2: The higher the percentage of PA firms is in the population, the more likely non-PA firms adopt a PA structure.

### *PA Adoption and Internal Factors*

The argument provided above, however, cannot explain why some organizations adopt innovative arrangements earlier than others. Besides environmental factors, organizational conditions influence the adoption of innovations. Three major firm-level factors are distinguished. The first and most obvious one is the organizational condition under which a firm exacts more rent from the adoption. Organizations that benefit from a new organizational arrangement are more likely to adopt it. Second, for the adoption to be successfully implemented, the firm needs some "absorptive capacity" (Cohen and Levinthal, 1990). Firms that possess innovation relevant skills are more likely to adopt the innovation. Finally, firms, whose members are networked with professionals having exposure to structural innovations, are more likely to import the innovation into their firm. The first and second factors are based on an efficiency argument, while the third one has affinity to the institutional theory.

### *Complementary Needs*

As contingency theory suggests, organizational innovations may not have the same performance implications for each and every firm. They may be congruent with some kinds of organizations, but not with others. For example, the multidivisional form is useful for diversified organizations (Chandler, 1962; Rumelt, 1974; Williamson, 1975) and for organizations with slack (Russo, 1991).

There have been numerous studies on the relationship between organizational needs and the adoption of innovations. A bundle of studies provides some evidence of the argument as the above studies on the M-form by authors indicate (e.g., Rumelt, 1974).



The M-form is instrumental for dealing with a diversified environment, for example when facing multi-point competition. Even more clear is the case of technological adoptions. For example, organizations that expect higher rates of return from a technological imitation adopt innovations earlier than others (e.g., Mansfield, 1961, 1993).

Those adoption studies are based on the unitary view of organizations: organizations express distinct needs that they seek to satisfy. Scholars emphasizing intraorganizational power politics (Allison, 1971; Hickson, et al., 1971; Pfeffer and Salancik, 1978; Bacharach and Lawler, 1980) represent a divergent view. They assume that organizational needs are defined through trade-offs among the members of the dominant coalition. Even if an innovation can improve its growth or survival prospect, it is unlikely to be adopted if adoption undermines the firm's power structure.

Organizational theories based on power concepts suggest the importance of alignments between organizational performance and the compensation to its members. The ramifications of organizational changes for organizational members are crucial. Organizational changes that are compatible with members' interests can be introduced with little resistance. For example, a growth strategy is easier to implement than a downsizing program. Distributional arrangements within an organization also affect the organizational flexibility. Firms that link compensation directly to organizational performance, for example firms with partnership arrangements as in our study, face less resistance in introducing retrenchment strategies than do firms where ownership and control are separated (Jensen, 1993).

Adopting a PA structure implies stratifying organizational members into two categories: owners and employees. Non-PA firms can introduce a PA structure by recruiting outsiders as associates and/or by regrouping some of the existing partners as associates. When a firm chooses the second scenario, it must rely on some objective criteria to minimize turmoil due to regrouping. Accountants who are reclassified as

associates may not be satisfied with the regrouping, since it means lower power, less prestige, and sometimes lower compensation. Accounting firms with diverse membership can ease the regrouping by asking people with lower human and social capital endowments to be associates. Those accountants may take an offer to become associates since they may not have enough capital endowments to get a partnership position in other firms. Furthermore, they benefit more from the adoption since the PA structure permits 1) a vertical division of labor in which partners can use more time on value adding activities and associates on standardized activities, and 2) training that partners provide to associates .

Hypothesis 2-3: Heterogeneity in membership will be positively related to the firm's propensity to adopt a PA structure.

#### *Absorptive Capacity*

Even when a novel organizational arrangement provides clear benefits, the firm might refrain from adopting the innovation. Structural innovations are highly tacit and require internal ability for implementation. If a firm commands the skills for successful adoption and thus is in a position to take advantage of the innovation, it is more likely to adopt a PA structure to exact rent from those skills.

Institutional theorists typically do not consider barriers for inter-organizational knowledge transfer. There are, however, plenty of empirical research findings regarding the difficulty of organizational learning across organizations, even among units within a single organization (e.g., Zimmerman, 1982; Joskow and Rose, 1985; Argote, Beckman and Epple, 1990; Kogut and Zander, 1992). The difficulty of knowledge transfer is due to its tacit or implicit nature (Polanyi, 1966; Kogut and Zander, 1992).

Turnover of individuals is conducive to the spillover of tacit knowledge across organizations (Zigler, 1985). When an organization lacks a certain knowledge base, the hiring of knowledgeable individuals endows it with the capacity to absorb extramural knowledge. For example, the emergence of Taiwan's electronic industry in the global economy has been attributed to the recruitment of individuals who studied and trained in the U.S. (Hou and Gee, 1993). Fligstein (1985) also shows that organizations with sales and marketing or finance presidents are more likely to adopt M-form. Compared with presidents with other functional backgrounds, presidents with a finance background are more skilled in evaluating divisional performance and in allocating limited resources among a portfolio of services such that their firm's profitability is optimal. The M-form, with self-contained divisions, facilitates such managerial oversight.

The recruitment of accountants previously affiliated with PA firms eases structural innovation in three ways. First, the inclusion of such professionals fosters increased exposure to how the market responds to an innovation. Second, these professionals have worked within such an arrangement and are familiar with its benefits. They comprehend how to allocate tasks between partners and associates, how to compensate and train the associates, and how to select, promote, and retain promising accountants. Third, they have acquired human and social capital during their tenure in PA firms. Complex and diverse audit regulations have resulted in specialization among professionals. In addition to industry-specific skills such as auditing and tax consulting, accountants accumulate skills that are idiosyncratic to distinct categories of clientele. For instance, professionals who provide service to large corporations become more familiar with corporate income tax, auditing or management consulting, than with individual income tax matters. Since PA firms typically serve larger corporate clients, their partners are bound to have bundles of skills that match the needs of such clients. Accountants who have been employed by PA firms are likely to bring in large corporate clients. The PA

structure is well equipped to provide services to large clients because its implied division of labor dovetails well with the vertical differentiation of organizations they serve (Russell, 1985; Maister, 1993).

In sum, firms that recruit professionals with previous PA firm affiliation are endowed with the absorptive capacity to implement a PA structure. The term *absorptive capacity* was coined by Cohen and Levinthal (1990) to denote a firm's ability to integrate extramural knowledge into its proprietary stock and therefore to successfully implement pertinent innovations. These arguments provide the following hypothesis:

Hypothesis 2-4: The higher the proportion of partners in a focal PSF, previously affiliated with a PA organization, the greater the firm's adoption propensity.

### *Social Networks*

Organizational decision makers are not atomized economic actors, rather they are embedded in social networks (Granovetter, 1985). Social networks function not only as a mechanism of disseminating information and knowledge (Granovetter, 1974; Burt, 1992), they also have implications for individual discretion. Networks confer influence, especially when the ties involve non-redundant sources of information (Burt, 1992), but they also constrain the behavior of individuals as actors in networks emit pressures toward conformity (Festinger, Schachter, and Back, 1950; Asch, 1951).

Information is not evenly disseminated throughout the society. Information is disseminated through the interaction among people (Granovetter, 1974). When an organization is successful with an innovation, its members share pertinent information with people with whom they interact (Rogers, 1983). For example, interlocking directors play the role of disseminator of information about certain business practices (Useem, 1984; Davis and Powell, 1992; Haunschild, 1993).

Social networks also restrict an actor's behavior. Opinions and behaviors of other people with whom a decision maker interacts influence his decision in two ways. First, an individual perceives a behavioral pattern that is shared by people in his networks as taken-for-granted. He does not question its appropriateness. Second, contrary to personal predisposition, he imitates others in his social network since they reward conformity with acceptance and approval, while deviance results in reputation loss and outright rejection (Festinger, Schachter, and Back, 1950). In sum, by imitating significant others, an individual is likely to be accepted and recognized (Asch, 1951; Zucker, 1977; Bernheim, 1994).

There have been numerous studies that explore the effect of social networks on the diffusion of organizational practices. These studies demonstrate the spread of practices through inter-firm ties, mediated by persons. Galaskiewicz and Wasserman (1989), Davis (1991), and Haunschild (1993) explore the effects of interlocking directorates on interorganizational imitation. Galaskiewicz and Wasserman (1989) report that corporations linked by interlocking directorates tend to donate charity to the same recipients. Exploring the spread of the poison pills, Davis (1991) finds that the network of interlocking directorates provide a route of the spread. Haunschild (1993) shows that organizations imitate the merger and acquisition behavior of other organizations that are connected by interlocking directorates. These studies support the cohesion argument rather than structural equivalence arguments.

Ties among professionals generate a communication web through which information about novel organizational arrangements takes on a normative character. A firm staffed with professionals well connected with individuals having PA exposure are comparable to firms with interlocking directors. The firm ties are mediated by individuals who transmit normative practices. I surmise that professionals who have rich social

networks with others professionals in PA firms render their firms more susceptible to copy innovating firms. I hypothesize:

Hypothesis 2-5: The greater the firm's external embeddedness toward PA structures, the greater its propensity to adopt a PA structure.

### *Splitting the Window*

In the beginning of this study, I indicated that the relative salience of efficiency and institutional arguments might vary by the developmental progress of diffusion. The evidence to date remains suspect, however. Some scholars examine the relative merits of efficiency and institutional arguments by partitioning the observation window (Tolbert and Zucker, 1983; Baron, Dobbin, and Jennings, 1986). However, these authors do not provide direct evidence in favor of institutional theory. Since proxies of conditions that trigger "blind" imitation were not included in these models, they suffer from omitted variable bias or unobserved heterogeneity. The implication is that we cannot yet make an unequivocal pronouncement regarding the relative importance of contingency and institutional antecedents of innovation.

Westphal and Zajac (1994) provide direct evidence of institutionalization. They report that late adoptors are less likely to implement CEO's long-term incentive plans after the announcement to do so than early adoptors. Institutional pressures in this study, as reviewed under the second and fifth hypotheses, were imputed rather than exposed. The force of institutional pressures is presumed to exist during the later stages of the diffusion when efficiency motives drop out of estimation models-- a view that accords with Abrahamson's (1991) band-wagon theory.

Population ecologists have joined in the debate. Hannan and Freeman (1989) argue that the evolution of population attributes signals their emergent legitimacy.

Institutionalization and implied legitimacy are inferred from the distributional configuration of a population--for example, if the number of organizations with a certain form exceed a certain minimum, then that form is presumed to become institutionalized, and accepted as a normative benchmark.

It follows that we should ascertain whether historical conditions vary by stage of diffusion. One might state that the inflection point of the diffusion S-curve signals the point at which band-wagon behavior becomes ostentatious. Prior to this inflection point, our efficiency based factors should have the strongest force, while roughly beyond this punctuation imitation-derived attributes are disproportionately more salient. During the early stages when adopters constitute a minority, efficiency considerations will justify the adoption, but eventually, and somewhere near or at the inflection point, those considerations give a way to imitation and band-wagon pressures become discernible. The literature in consumer behavior (e.g., Mahajan, Muller, and Bass, 1990) suggest that the midpoint in the diffusion process is appropriate for punctuating the evolutionary cycle in the industry.

Our hypotheses should therefore be supplemented with an interactive hypothesis in which the relative importance of efficiency and institutional factors varies by the timing of adoption. The argument produces a final hypothesis:

Hypothesis 2-6: Efficiency factors have a stronger effect on the adoption of a PA structure during earlier diffusion periods, while institutional factors predominate during later periods.

## DATA AND METHODS

### *Data Collection*

The data of this study cover the entire population of Dutch accounting firms during the period 1880-1990. Since the PA structure was first introduced in 1925, the present study used the firms that have been in our data set since 1925. In counting the firm's age, the present study had to use earlier years for those which existed in 1925. Firm level data were extracted from membership directories of accounting associations that merged into a single association in 1966, currently called "NIVRA" or "Nederlands Instituut van Registeraccountants" (Netherlands Institute of Certified Public Accountants). During the first eight decades, there were numerous associations, each with their own membership roster until they merged into a single association in 1966. The directories provide information about the members of associations and accounting firms.

The individual level data were collected with one to five year intervals, depending on the availability of directories. Before 1970, there are one four year interval (1919-1923) and one five year interval (1941-1946). From 1970 to 1974, each year was recorded, while after 1974, every fourth year was recorded. Individual level data included accountant's name, address, education, and status in the firm, if applicable. Also included is the employment affiliation, i.e. name of audit firm, business firm, or governmental agencies. The directories also provide the name of cities where each accounting firm had an office. Further details are provided by Majoor, et al. (1993).

### *Measures*

Individual level data were aggregated to produce firm level information, yielding 4456 firm years. Firm level data were aggregated to create population level information. I identified the adoption of a PA structure by flagging the status of accountants in the



firm. If a firm had at least one associate accountant for the first time in its history, I inferred that the firm had a PA structure.

Organizational foundings, deaths, and changes were measured by examining the changes of an accountant's organizational affiliation. Organizational changes, examined in this study, included merger, acquisition, split, and name change. Name changes were recoded when a firm's name differed from its previous one, provided two-thirds or more of its partners continued their affiliation with the firm. The name changes did not include changes due to merger or "cosmetic" name changes such as modifications in the order of named partners, or additions of the Dutch equivalents of "Accountants" or "Registered" and "Limited Liability" to the firm's original name.

Organizational splits were recoded when at least two partners left and formed a new firm while the remaining firm continued under its own name. When the defecting partners joined another firm, the departure was not treated as a split but as a lateral movement. Regardless of the way of split, the holder of the name of the existing firm was regarded as a continuation of the existing firm.

When two or more firms joined together and adopted one of the pre-existing names, the event was coded as an acquisition. The firm that maintained its name was coded as an acquirer, and the others were coded as the acquired firms. When two or more firms joined together and adopted a new name, the event was coded as a merger. Continuation of the firm was assigned to the largest of the involving firms. Other smaller counterparts were treated as merged firms. When the size of the involved firms was equal, the new firm was treated as the continuation of the firm whose name is alphabetically ahead. In identifying the events, I used the criterion of two-thirds of partners. That is, two-thirds or more of the partners should join a new firm to be considered as a counterpart of merger or acquisition. Since member rosters provided the data for this study, I did not have any information whether departing partners left the firm

before the changes or after the changes. The decision rule of treating the new firm as a continuation of one of two or more existing firms in these cases is unavoidable, since event history analysis precludes the treatment of an observation as the continuation of two different entities.

Organizational founding was coded when a new name was listed in the directories for the first time without merger or name change. A firm founded by the split of partners from existing firms was also treated as a founding. Termination was flagged when a firm's name was permanently delisted from the directories without merger or name change.

Two indicators were developed as proxies for *market signaling*. The first is the differential survival rate (*MSSURVIV*) and the second one the differential growth rate (*MSGROWTH*). When calculating the measures, I compounded the survival rate or average growth rate of each observation period of each group, i.e., PA firms and non-PA firms, from 1925 to the year under consideration. *MSSURVIV* is the compounded survival rate of PA firms divided by that of non-PA firms, and *MSGROWTH* is the compounded growth rate of PA firms divided by that of non-PA firms. These indicate the degree of survival or growth rate that PA firms enjoyed over non-PA firms in the past. Formally,

$$MSSURVIV_t = \prod_{i=1}^t SRPA_i / \prod_{i=1}^t SRNONPA_i,$$

where  $i$  and  $t$  are time,  $SRPA_i$  is the survival rate of PA firms during the period of time  $i-1$  and  $i$ , and  $SRNONPA_i$  is that of non-PA firms.

$$MSGROWTH_t = \prod_{i=1}^t GRPA_i / \prod_{i=1}^t GRNONPA_i,$$

where

$$GRPA_i = \sum_{PA} Size_{k,i} / \sum_{PA} Size_{k,i-1}, \text{ and}$$

$$GRNONPA_i = \sum_{NONPA} Size_{k,i} / \sum_{NONPA} Size_{k,i-1}.$$

$GRPA_i$  is the average growth rate weighted by firm size of PA firms during time  $i-1$  to  $i$  and  $GRNONPA_i$  is that of non-PA firms.  $Size_k$  is size of firm  $k$  measured by the number of accountants who were affiliated with firm  $k$ . In calculating survival rates and growth rates, I excluded the firms that changed their organizational structures in a corresponding period.

Following Fligstein's study (1985), I measured *institutional pressure* by using the proportion of PA firms at each observation period. Formally, it is the number of PA firms divided by the number of all firms in the population. The higher the percentage of PA firms in the population, the higher the institutional pressure to adopt a PA structure.

Demographic heterogeneity was presumed to indicate *complementarity needs* for the adoption of PA structure. I developed three indicators for the heterogeneity of organizational members. The first one is heterogeneity in terms of members' origination. Accountants can join the industry from three categories: universities, other industries, or government agencies. I calculated Blau's (1977) measure of heterogeneity based on the number of accountants in each of three categories. Formally it is  $1 - \sum_{j=1}^3 P_j^2$  where  $P_j$  is the proportion of accountants in each category. The second one is heterogeneity of formal education. There are three categories for educational attainment in the data: less than Master's degree, Master's degree, and Ph.D. For this index, I also used Blau's measure. The third one is heterogeneity of industry tenure. For each accountant, I calculated the number of years that he had been a member of the accounting industry. Since industry tenure is a continuous variable, I used coefficient of variation. It is the variance of member's industry tenure divided by its mean. Blau's measure for categorical variables and Allison's measure for continuous variables are well accepted measures for heterogeneity (e.g., Bantel and Jackson, 1989; Eisenhardt and Schoonhoven, 1990).

*Absorptive capacity* was measured by calculating the proportion of accountants who had previously been affiliated with PA firms. By tracing their organizational

affiliations, I could count the number of partners with previous careers in organizations with PA structures. Formally, it is the number of partners with experience in PA firms divided by the size of the focal firm.

*Social networks* were also measured by tracing the careers of accountants. Accountants developed social networks by changing their organizational affiliations. When two accountants had an affiliation with a firm during any overlapping period, they were assumed to have network ties with each other thereafter. I counted the number of ties ( $NTIES_{n,t}$ ) that accountant  $n$  had at time  $t$ . In counting these ties at time  $t$ , I did not include those who were in the same firm at time  $t$  nor those who left the accounting industry before time  $t$ . Among the ties, I also counted the number of accountants who were working for PA firms at time  $t$ . In counting these ties ( $PATIES_{n,t}$ ), I excluded those who had been affiliated with a PA firm before time  $t$  but not at time  $t$ . For each accountant, I divided  $PATIES$  by  $NTIES$  to create his embeddedness with other accountants who were affiliated with PA firms at time  $t$ . By aggregating individual network ties at the firm level, I developed firm level social networks. Formally,

$$SOCIAL\ NETWORKS_{k,t} = \left[ \sum_{n=1}^{Size_{k,t}} (PATIES_{n,t} / NTIES_{n,t}) \right] / Size_{k,t} ,$$

where  $n$  is an accountant and  $Size_{k,t}$  is the size of firm  $k$  at time  $t$ . Two implications should be noted regarding this proxy of social networks. First, I did not consider indirect network ties. Recall that networks were treated as channels through which normative information travels and conformity pressures are activated. Indirect ties, which consider the transmitter and recipient of such pressures by two, three, or more steps are not deemed relevant. Second, any accountant outside a focal firm can contribute more than one tie to the index. For example, if accountant C had network ties with A and B who were at a focal firm at time  $t$ , he contributed two ties to the focal firm at time  $t$ . This is also plausible for the inference of conformity pressure.

I controlled firm characteristics: firm size, age, the number of offices, and previous organizational changes. Firm size was measured by counting the number of accountants affiliated with the firm. Firm size has been considered as an important antecedent of organizational change in organization studies (e.g., Hannan and Freeman, 1984). Age was measured by years elapsed after founding. Age also has been considered as a key antecedent of organizational change (Hannan and Freeman, 1984). Age, indicating ossification, may have a negative effect on the adoption of the PA structure. Also controlled were the cumulative number of mergers, acquisitions, splits, and name changes a firm experienced. If organizations have a proclivity toward structural change, the number of prior changes may enhance their propensity to adopt the PA structure. Several other control variables, measured at the firm level, included the firm's number of domestic offices, and the number of establishments in the four largest Dutch cities (Amsterdam, Rotterdam, Utrecht, and Den Haag).

I also controlled for proxies of "history", including World War II, Indonesia's independence in 1949, and significant changes in regulations that governed the accounting profession and its clients (1971-1973 and 1984-1989). Specifying the length of the effect of these events, especially those for regulations, is not easy. The effects of World War II and Indonesia's independence would be short-lived. World War II was specified as if it would have effects during the period 1941-1947 and Indonesia's independence during the period of 1949-1951. Significant changes in the regulations such as the mandatory auditing of all listed firms, which changed the demand for audit services, would have persistent effects on the industry until the abolition of the regulation itself. Because the regulations were still effective in 1990, the regulations were specified as if they would have effects during the entire period following the onset of the regulations.

I also controlled the observation intervals. As mentioned before, the data have nonuniform observation intervals from one to five years. Since the odds of PA adoption may be positively related with the length of the observation interval and the relation may not be linear due to unobserved heterogeneity, I included the natural logarithm of the number of years of the interval. Instead of the natural logarithm, I estimated models with four dummies for each of the length of the intervals. Even though I could not perform formal statistical test to compare log-likelihood, four dummies did not seem to improve the log-likelihood substantially and did not change the results. Consequently, I reported here the results with the natural logarithm of observation length. For testing the differential conduciveness of technical efficiency and institutional factors during the observation window, a dummy variable that partitioned the window was introduced. The dummy variable is set to 1 if the year under consideration is after 1962, 0 otherwise. I selected 1962 as the cutoff point, since the number and percentage of PA firms reached maximum level in that year.

### ***Model and Estimation***

Empirical analysis of this study deals with time varying conditions that lead up to the adoption of PA structure. Firms that died, merged, or were acquired without adopting PA structure are treated as right censored. Firms that were alive in 1990, but failed to adopt the innovation, are also right-censored. After a firm adopted the PA structure, it was removed from the data set. Since the effect of organizational age was estimated as a time varying covariate, Cox's proportional hazard model could not be used for this study. Following Allison's (1982) recommendation, I employed discrete event history analysis. A discrete-time hazard rate is defined by:

$$P_{it} = \Pr [T_i = t \mid T_i \geq t, X_{it}],$$

where  $T$  is the discrete random variable giving the uncensored time of adoption event (Allison, 1982).  $P_{it}$  is the conditional probability that firm  $i$  will adopt a PA structure at time  $t$ , given that it has not already adopted the structure. Specifically, I used the complementary log-log function, since the model has an advantage over the logit function in handling nonuniform observation intervals. The complementary log-log function assumes that the data are generated by the continuous-time proportional hazard model and thus the coefficient vector is invariant to the length of the time intervals (Allison, 1982). The model is expressed as:

$$P_{it} = 1 - \exp[-\exp(\alpha_t + X_{it} \beta)],$$

or

$$\log[-\log(1 - P_{it})] = \alpha_t + X_{it} \beta,$$

where  $\alpha_t$  is a function of time,  $X_{it}$  is a row vector of the firm  $i$ 's state variable at time  $t$ ,  $\beta$  is a column vector of coefficients. In estimating the model, I specified

$$\alpha_t = \alpha_0 + \alpha_1 * t.$$

All independent variables except observation period were lagged. In other words, firm  $i$ 's state variable at time  $t$  and the natural logarithm of  $d$  were used as independent variables of the adoption during time  $t$  and  $t+d$ , where  $d$  is the length of observational intervals measured in years. Complementary log-log function in SAS (SAS Institute, 1990) was used to estimate the models.

## RESULTS

Figure 2-2 shows the number of adopters, the cumulative number of adopters, and the number of survivors among adopters in each observation period. Four accounting firms adopted the PA structure in 1925. They were comparatively large firms at that time. Until 1990, three hundred and one accounting firms had adopted the structural innovation. Among them, 46 firms were acquired, 31 firms merged, and 143

firms terminated or resorted to the previous structure. Most merged and acquired firms either joined with or were acquired by other PA firms.

**Insert Figure 2-2 about Here**

Figure 2-3 shows the compounded growth rate of PA firms and non-PA firms. PA firms had a clear advantage in firm growth over non-PA firms, enjoying higher growth rates in every observation interval except one, i.e., 1982-1986. Compounded growth rates of PA firms and non-PA firms in 1990 are 38.62 and 1.61, respectively. If two firms, one with and the other without a PA structure, employed each 10 accountants in 1925, and if they were still alive without changing their structure in 1990 and had grown in proportion with their group's growth rate, the PA firm and non-PA firm would have 381 and 16 accountants in 1990, respectively. Note that this observation does not control for other variables so that the estimates may be upwardly biased.

**Insert Figure 2-3 about Here**

Figure 2-4 shows the compounded survival rates of PA firms and non-PA firms. It shows the clear survival advantage of PA firms. PA firms had higher survival rates than non-PA firms during the window of our observation except for one period (1970-1971). Compounded survival rates of PA firms and non-PA firms are 0.373 and 0.02, respectively. If there had been 100 PA firms and 100 non-PA firms in 1925, and if they had not changed their structure, there would have been 37 alive PA firms and 2 alive non-PA firms in 1990.

**Insert Figure 2-4 about Here**



Figure 2-5 shows the changes of the proportion of PA firms and their market share, measured by the proportion of accountants who were affiliated with PA firms. The proportion and sheer number of PA firms in the industry peaked in 1962, when 87 accounting firms (27%) were PA firms. The figure indicates that the PA structure was not fully diffused in the industry in terms of the sheer number of PA firms but had become a major segment of the industry. In 1990, for instance, about 16 percent of accounting firms had a PA structure but they controlled about 81 percent of the industry.

**Insert Figure 2-5 about Here**

Table 2-1 presents the means, standard deviations, and the correlation matrix of the variables that were used in the present study. These statistics were based on 961 firms (4456 firm-intervals). Among 301 adopters, 4 firms were omitted in the present study because they adopted the structure in 1925. Additional 24 firms were deleted because, in the very first year of observed existence, they were already organized with a PA arrangement. I could not create firm-level factors, because I did not have any information whether they were really founded with PA structure or they were founded without PA structure and then adopted it later but before they were first observed in the membership directories. The deletion resulted in 273 adopters in this analysis. An additional 42 firms among non-adopters were omitted due to missing data on relevant variables during certain spells. Compared to the whole population, large firms and adopters were, therefore, over-represented in our analysis.

**Insert Table 2-1 about Here**

Table 2-2 presents the results from a regression analysis based on a complementary log-log specification. Two pairs of columns with regression coefficients and asymptotic standard errors are provided. Model I shows the effect of our

theoretically driven covariates while controlling for firm, industry, and other variables. In the model, the differential growth rate was used rather than the differential survival rate for the market signaling variable. Since using the differential survival and growth rates produced almost identical results, I report the results using the latter measure. In Model II, I added a period dummy and its interactions with theoretically derived external factors. In Model II, I report only the results with differential growth rates. In Model III, I added the interactions between a period dummy and all theoretically derived factors.

Market signaling has a positive effect on the adoption of the PA structure in Model I. The coefficient is .047 ( $p < 0.05$ ), giving some evidence for Hypothesis 2-1. Institutional pressure, proxied by the proportion of PA firms, also positively influences the adoption of a PA structure. Supporting Hypothesis 2-2, the coefficient is 4.380, about thrice its standard error.

All three measures for complementarity needs show positive and significant effects on the adoption. Heterogeneity in partner's origin, educational attainment, and industry tenure has a coefficient of 1.012 ( $p < .05$ ), 1.567 ( $p < .01$ ), and .027 ( $p < .10$ ), respectively. The result provides some evidence for Hypothesis 2-3.

Absorptive capacity, proxied by the partners' previous experience with PA firms, also leads to a greater rate of the adoption of a PA structure. Its coefficient is .306 ( $p < .05$ ). This result provides some evidence for Hypothesis 2-4. Social networks also have a very strong and positive effect on the adoption of PA structure. Supporting Hypothesis 2-5, its coefficient is .495, about thrice its standard error.

Among the control variables, organizational age has a negative but insignificant coefficient, while size has a very strong positive effect. The four proxies of cumulative previous "jolts" such as mergers and name changes are unrelated to adoption propensity. The regulation of 71-73, which introduced a CPA professional code, does produce a

negative and significant effect on the adoption. Finally, as expected, observation interval shows a positive and significant effect.

**Insert Table 2-2 about Here**

### ***Diffusion Stage and Adoption***

Now turn to an examination of the time-dependent relevance of technical efficiency and institutional factors. Recall that the propensity of diffusion might be motivated by efficiency and imitative factors, depending on the spread of adoption. Model II presents the results that include interactions between the period dummy and the variables of interest. I add the period dummy and its interactions with market signaling and institutional pressures, the interaction terms improve the goodness of fit (incremental  $\chi^2$  is 10.27 with 3 degrees of freedom).

The coefficients of market signaling ( $\beta=1.019$ ,  $p < .01$ ) and its interaction with a period dummy ( $\beta= -.941$ ,  $p < .01$ ) indicate that the effect of market signaling is positive and strong during the early part of the window, but is negated (no effect) after 1962. The coefficients of institutional pressure ( $\beta= -7.503$ , not significant) and its interaction with the period dummy ( $\beta=12.416$ ,  $p < 0.05$ ) indicate that institutional pressure has the predicted influence on PA adoption after 1962.

Incremental  $\chi^2$  test to compare Model II and Model III were conducted. It revealed that the addition did not significantly improve the goodness of fit ( $\chi^2 = 0.28$ ,  $d.f. = 5$ , not significant). This test provides some evidence for Hypothesis 2-6. The effects of two out of three heterogeneity measures, showing significant main effects, are persistent over the whole observation period but do not vary by diffusion stage as implied by Hypothesis 2-6. Model III also shows that absorptive capacity in interaction with the period dummy is not significant. The effects of social networks is not magnified or attenuated by the period dummy; rather, they are persistent during the entire window.

Comparing three models, the analysis provides supporting evidence for first five hypotheses and partial support for Hypothesis 2-6. In other words, external factors have their interaction effects with a diffusion stage, while there are no interaction effects between internal factors and the diffusion stage.

## CONCLUSION AND DISCUSSION

### *Technical Efficiency vs. Legitimacy Accounts*

The results of this study present important insights on what is currently known from a vast literature on innovation, adoption, and diffusion. Both efficiency and institutional accounts inform us about the adoption of the PA structure. They are complementary in explaining the adoption. However, efficiency accounts are more powerful in explaining the early diffusion process, while institutionally derived variables are more explanatory during the later period of the diffusion process.

Results from the present study provide direct evidence of the relative strength of two contrasting accounts alluded to by Tolbert and Zucker (1983) and Baron et al. (1986). This inference becomes evident when I partition the observation window into two parts. Market signaling has a significant effect only during the early diffusion process, while institutional pressures predominate during the later period of diffusion. In contrast, firm level factors have enduring effects over the whole observation window. During the early period of the diffusion process, when only scant information about the PA structure is available, a firm's social network will function as a route for knowledge transfer. Professionals whose social capital confers access to pertinent structural innovations are likely to augment the odds of adoption. During the later period, when more information on the PA structure becomes available--thus diminishing the importance of social networks' role of information transfer-- social networks still emit conformity pressures. Perhaps, the successful implementation of a PA structure requires

tacit knowledge that travels better if direct contact between individuals exists. Surveillance of compliance and norms of reciprocity are also more likely in the context of direct contacts.

### ***Bandwagon as Population and Firm Based Conduct***

The splitting of the observation window and the partitioning of efficiency and institutional accounts at the population and firm levels alert us also to the myriad manifestations of bandwagon conduct. I have implicitly assumed that PSFs respond in dissimilar ways to the same bandwagon pressures, for example, because they manifest different levels of absorptive capacity or operate under variable degrees of external embeddedness. Since complementarity needs and absorptive capacity render some PSFs more receptive to the structural innovation, we clearly should be aware of unique, firm-specific adoption antecedents. Virtually all innovation diffusion theory and research disregards the adopter-based idiosyncrasies (compare the overview article by Mahajan, Miller, and Bass, 1990). They respond in parallel fashion to external stimuli. The present findings clearly point to the need to incorporate factors at both the industry and firm levels.

This conclusion applies with even greater force when a firm's exposure to bandwagon pressures is considered. Because their social networks explain adoption, it follows that PSFs experience bandwagon pressures with different levels of intensity, regardless of whether these pressures have a rational or institutional identity. Their networks function as a vehicle for securing information about the PA structure. Peer firms provide additional justification for adopting a PA structure, regardless of its timing. I have speculated that firms are tempted to adopt the innovation because the market signals the benefits to be rather unambiguous, or because the peer firms have adopted the innovation to such a large degree that ambiguity, if any, evaporates for many

of the PSFs who have delayed the adoption. However, we need to add their external embeddedness, since their networks expose different firms to different levels. Bandwagon pressures are mediated by social capital. New diffusion models should therefore cease to assume that all members of the population have the same receptivity, or that they are equivalently exposed to evolutionary processes in their environment. Adopter characteristics will greatly affect the patterns of innovation diffusion and should therefore be included in any model that seeks to capture evolutionary processes in the population.

### ***Organizational Evolution and Population Evolution***

That very last statement of the previous section resonates also with concerns raised about population ecology (e.g., Young, 1988). Indeed, the present findings call into question the sort of pronouncements that emanate from Hannan and Freeman (1984). These authors assume that organizations have structural inertia and that structural transformations hamper the reliability and reproducibility of the output and thus increase their failure rates. In contrast, our results show that organizations are able to change and that, in fact, the change in the structural core enhances survival and growth prospect.

This study furnishes important insights on the interaction between organizational and population evolution (Baum and Singh, 1994c). Organizations can significantly direct the trajectory that the evolution of their population takes. Traditionally, it has been assumed that the population defines the viability of organizational form by selecting out those firms that were created with a particular form. The present study shows that it is not only negative selection, but also a firm's self-designed or self adopted form that contributes to the distribution of forms having survival value. The adoption of structural innovation signals therefore two important implications. First, it contributes to

organizational variation in the population. Second, it surfaces as a manifestation of negative selection because adopters have a better growth and survival outlook. These conclusions question orthodox population ecology, because our results show that organizations have the discretion to implement structural changes in response to innovation-relevant information in the population. They can therefore forestall negative selection. In short, individual firms can individually and collectively impact the distribution of population attributes and thereby challenge the assumptions that population ecologists have made about the nature of the firm and their "strategic choices" (Child, 1972), or the lack thereof. It is for these reasons that I prefer to employ the "technical efficiency" label when describing firm-environment relationships. Efficiency-oriented theories such as contingency frameworks acknowledge that firms interact with their environment because performance advantages induce them to select those organizational arrangements that are optimal in a given environment. Firms will proactively adapt their structures if environmental conditions trigger them to do so. Market signaling with demographic homogeneity and absorptive capacity do not fit an ecological framework, but can readily be subsumed under a contingency approach. They assume that organizations are rational, and that when capable they will select a new organization design if its adoption contributes to organizational performance, survival, and growth.

Professional firms are exposed to the discipline of the market, and as in any sector, negative selection is discernible among accounting firms. Institutional considerations would not be pertinent here. After all, the seminal paper by Scott (1987) implied that such considerations are primarily germane to those sectors where performance criteria are implicit if not elusive, or where organization structure is uncoupled from performance. Educational, artistic, governmental, charity, and other not-for-profit organizations fit such a classification (e.g., Meyer and Rowan, 1977; Tolbert

and Zucker, 1983). The present paper makes it abundantly clear that institutional explanations are also applicable to for-profit organizations.

While accounting firms monitor their performance, there exists a good deal of ambiguity about what constitutes a sound template for organizing a professional practice. The linkage between structure and performance is tacit and equivocal. Furthermore, when compared to product or service innovations, structural innovations defy a clear-cut cost-benefit analysis. The merits of a structural innovation are ambiguous in general, and among knowledge intensive firms they are even more indeterminate. The normative regularity which suppresses uncertainty in Scott's not-for-profit sectors also appears operating in this sector. Results of the present study show that institutional factors are important, even in for-profit sector organizations like the PSFs. This study invites us therefore to come up with a new perspective.

This new perspective calls for a blend of contingency or strategic choice and institutional frameworks, particularly for knowledge-intensive firms and professional service firms. The blending is based on the sigmoid diffusion patterns that characterize the spreading of innovations. The stage of diffusion reveals the relative salience of rational and institutional accounts. Both frameworks are required to fully account for the adoption of structural innovation. They should not only give rise to further empirical research, but new theoretical developments as well.



### **CHAPTER 3**

#### ***MERGERS AND ACQUISITIONS: AN EVOLUTIONARY PERSPECTIVE***

This chapter explores the consequences of mergers and acquisitions (M&As) from an evolutionary perspective. The chapter proposes a model that combines strategic decision making with organizational and industry evolution. The underlying idea is that the market favors firms that can deliver reliable and quality services by effectively utilizing their resources. The market exhibits this preference by selecting out firms that conduct bad strategic decisions. Apart from M&A-specific organizing skills, which firms might have accumulated in the past, the "matching" of the two firms that forge a union is central in understanding their post M&A outcomes. The matching of any dyad of firms is defined in terms of their organizational compatibility and resource complementarity. These three elements - compatibility, complementarity, and previous M&A experiences - are used as precursors of post M&A outcomes. Drawing from extant literature, the chapter presents several hypotheses and test them on a sample of professional services firms (PSFs) that operate in a single sector: the Dutch audit industry from 1880-1990.

Mergers and acquisitions are important strategic decisions that affect firm and industry evolution. First, firms conducting M&As experience discontinuous changes. An M&A brings differing cultures, strategic orientations, and practices into an organization and thus leads to intra-firm variations. Consequently, the firms created by M&As experience the collision among variations such as collision of cultures and routines (Sales and Mirvis, 1984; Phillips, 1994). Second, M&As alter the industry landscape by altering the size distribution and the competitive dynamics among the firms.

Despite the relevance of M&As for organizational and industry evolution, the literature to date has not explored the above issues even though many M&A studies have investigated the motives, performance effects, post-M&A integration, and relatedness of

merging firms and post-M&A performance (e.g., Lubatkin, 1987; Trautwein, 1990; and Matsusaka, 1993). This neglect of evolutionary issues surrounding M&As can be attributed to many factors. Numerous M&A studies are cross-sectional, including so called "event-studies" in which the M&A is used as a regressor on abnormal returns, and longitudinal studies are altogether rare (exceptions, Ravenscraft and Scherer, 1991; Pennings, Barkema and Douma, 1994). The concern with relatedness and complementarity has driven many researchers toward samples of firms belonging to multiple industries (e.g., Lubatkin, 1987), precluding any access to the interaction between industry and firm evolution. Collecting all M&A data among all firms in an industry over an extended period is prohibitively expensive. Hence most studies resort to convenience samples, like Fortune 500 firms (e.g., Chatterjee, 1990; Shelton, 1988).

The strategic decisions of individual firms become manifest at the firm and industry levels of analysis. These decisions have lasting effects on the firm's bundles of capabilities and future conduct. That is why the selected routines of firms are path dependent and reveal distinct trajectories of decisions (e.g., Amburgey and Miner, 1992; Nelson and Winter, 1982). The strategic decisions of firms also give direction to evolutionary processes in their particular industries. That is, processes of variation, selection, and retention at the firm level induce certain levels of variation at the industry or population levels; a linkage that has received only scant attention in the strategic management literature. Evolutionary studies in other areas such as population ecology and evolutionary economics have not paid much attention to the firm's strategic decisions as a driver of industry evolution. For example, much of the evolutionary research has focused on vital statistics (e.g., Hannan and Freeman, 1989) and technological innovation (e.g., Nelson and Winter, 1982).

Schelling's (1988) distinction between micro motives and macro behavior provides a good metaphor for linking M&As to organizational and industry evolution. An

M&A combines the cultures of two firms into a single firm, resulting in greater diversity of routines, skills, and other intangible assets. If the variation is too extensive and the elements of the variation contradict each other, the new firm might not be viable.

M&As also alter variation at the industry level. M&As might be compared to "recombination," since the two bundles of routines that are brought into the new organization are unpacked and repacked during a process of post-M&A implementation. Firms created through M&As need to integrate the two bundles of routines. Depending on which routines are selected and retained, the resulting firms are likely to differ from any of the two firms that existed before the M&A.

On the basis of the firm heterogeneity, the market will select firms that deliver reliable and high-quality service with low cost. Whether new firms that emerge out of an M&A can deliver these services will depend on the similarity of their cultures, routines, and other assets (i.e., compatibility), and on the possibility of utilizing previously underutilized capabilities (i.e., complementarity). The firms that develop successful routines in M&As will continue to exercise these routines in future situations (Nelson and Winter, 1982). Without exogenous or endogenous discontinuous changes, the market will reinforce these behaviors, increasing size dissimilarity among firms over time.

The selection outcome at the market level provides feedback to organizational selection entities, i.e., decision makers. In other words, firms can decipher the market selection rules and imitate the strategic moves of viable firms (Alchian, 1950; Campbell, 1965; Chandler, 1962). The feedback from market to organizations and from organizations to the market encourages them to evolve together (Levinthal and Myatt, 1994).

The present study does not draw data from the manufacturing sectors, which is so common in M&A research. Rather a sample of professional services firms (PSFs) is employed because M&As are common among PSFs. Several of the factors shaping M&A

outcomes can be identified. The data allow us to consider the impact that M&A conduct has on the evolutionary process in this sector. Because the data are fine-grained, I am in a position to examine the path dependence of M&A activities at the firm level, and thus also to shed light on firm evolution.

Present study examines mergers that are often sandwiched between previous and subsequent M&A actions. As a strategic move, M&A is frequently path dependent (Amburgey and Miner, 1992). Similarly, in this paper, the present study do not consider M&As in a temporal vacuum, but rather treat them as elements in a stream of strategic moves. The post M&A-process is conditioned by the match between bidder and target, but that very match is in turn conditional on the two firms' histories. The central part of the inquiry is the appropriate match between the two partners, as inferred from the compatibility and complementarity that they bring to the M&A agreement. That match is a predictor for the event that the new firm will experience: dissolution, becoming a target, or acquiring another firm. As this study will also show, M&As have major repercussions on the structure of the audit industry. The actual M&A and any of the three ensuing types of events will profoundly alter its population. Employing data on 357 M&As during the entire history of the Dutch accounting sector, this study explores the evolution of firms that were founded through M&As. Methodological difficulties, however, preclude me from testing all the relations in a single model. Present study will test those relations using diverse statistical techniques and will review the integration of those results. Thus, present study can shed important light on strategy research in an evolutionary perspective.

## **LITERATURE REVIEW AND HYPOTHESES**

Mergers and acquisitions can be lumped together as the mode through which previously independent firms combine to become a single entity. This mode can be

contrasted with direct entry, internal venture, joint venture, and minority investment. The term "merger" is reserved for firms viewed as somewhat equal in power, market or book value, or post-merger synthesis. "Acquisition" typically involves a bidder and target firm, where the bidder is usually the larger of the two in terms of equity holdings and other assets, or is the initiator of the move. Mergers and acquisitions may be friendly or hostile.

There have been a great number of studies on M&As. Topics on M&As include the motives, relatedness and relational characteristics between pairs of firms, the performance effects, etc. Among those topics, relatedness and post-M&A performances are the most relevant to the present study.

Attributes defining the relationships between the merging firms that stand out in the literature are potential synergy of assets and similarity of cultures and management practices. Scholars have used strategic fit or complementarity for the possibility of synergy and organizational fit or compatibility for similarity of organizational cultures and management practices (e.g., Shelton, 1988; Greenwood, Hinings and Brown, 1994).

Three organizational performance categories have received a great deal of attention from scholars. One of them is financial performance such as abnormal return in share price around the announcement and accounting measure of performance (e.g., Lubatkin, 1987). A second one considers the longevity of the subsidiaries, following M&A (e.g., Pennings et al., 1994). A third class consists of self-evaluation on M&A performance (e.g., Greenwood et al., 1994; Sales and Mirvis, 1984), job satisfaction, and employee turnover rate. The successive event of a firm experiences after a focal M&A, which is most relevant for studying evolution, has not received the attention it deserves.

Studies examining relatedness or compatibility and post-M&A performance tend to be bifurcated. Research on strategic fit or complementarity stresses the M&A implications for financial performance. The studies on the association between the relatedness and stock market response can be included in this category (e.g., Lubatkin,

1987; Singh and Montgomery, 1987). Large, multiple industry samples with a short time window characterize these studies. The research design widely used in these studies is "event study method" that has its root on the capital assets pricing model in financial economics. Other studies dealing with organizational fit or compatibility rely mostly on non-financial performance indices (e.g., Buono and Bowditch, 1989; Greenwood et al., 1994; Napier, 1989). Ethnographic methods on small samples of M&As or case studies characterize these studies.

The dual sets of studies suggest that both complementarity and compatibility are germane for the explanation of post-M&A performances. A positive M&A outcome hinges on the presence of complementary capabilities and compatible management practices. In a case study of the merger of two accounting firms, for instance, Greenwood et al. (1994) reported that partners of both firms seriously considered both strategic fit and organizational fit in merging them together. Interviewing 50 chief executives, Marks (1982) reported that the pair allocated their attention sequentially with complementarity considerations prevailing before the acquisitions, and compatibility after the M&A had been sealed.

### *Compatibility*

Two firms that have similar cultures and routines are defined to be more compatible. In any M&A, two organizational cultures and routines become unbundled and repacked into the new firm. Thus, an M&A enhances internal variations. Without a good internal selection mechanism, large internal variations that contradict each other would harm organizational functioning rather than enhance the new firm's viability. It is not surprising that culture collision has been observed in many studies (Buono, Bowditch and Lewis, 1985; Greenwood et al., 1994; Phillips, 1994). Successful integration depends on the partners' structural and cultural similarities, since integration of like cultures faces

lower resistance from organizational members. There can be considerable conflict and strife if the bidder and target have very different cultural orientations and management practices.

Attending to M&A induced conflict and strife detracts from attention to the firm's production function. Incompatible M&A firms draw more attention to conflict resolution and system integration. Consequently, incompatible M&As may harm the firm's ability to deliver reliable products or services with competitive pricing. In a competitive environment, firms consisting of recombined but incompatible cultures are selected out. Firms created by compatible M&As do not experience serious integration problems and thus can capitalize on the experience by building a platform for additional M&A activity.

Integration of employees is one of the most critical issues for smooth organizational transition towards a new firm (Buono and Bowditch, 1989). Such integration is particularly crucial in knowledge intensive firms - like accounting firms. In a study of large firms' acquisitions of small technology-based firms, Granstrand and Sjolander (1990) reported that in 60 % of cases where key R&D personnel (the general manager) left the firm, the acquisition resulted in a failure. The integration of people requires spillover mechanisms such as employee transfer, incentives for cooperation across cultures, and the creation of matrix and other structural arrangements.

With related mergers, Chatterjee, Lubatkin, Schweiger and Weber (1992) explored the relation between top management teams' perceptions of cultural differences and acquirers' stock market gains. They found that cultural similarity had a significant and positive association with shareholder gains, after controlling for perceptions of the buying firm's tolerance for multiculturalism and the relative size of the merging firms. Although the paper has a limitation of selective recall due to retrospective questioning, it provides suggestive evidence of compatible M&As being preferable. Using the survey method, Datta (1991) also reported that differences in top management styles had a

negative effect on post-acquisition performance. However, no such relationship was observed between differences in reward and evaluation systems and post-acquisition performance. In a study of two large accounting firms' merger, Greenwood et al. (1994) found that one firm emphasized the accountant's technical expertise, whereas the other stressed entrepreneurial competence. The difference in core values exacerbated the differences between the two former identities and delayed the integration of personnel.

The importance of compatibility, however, depends on the motives of M&As (Napier, 1989). When the acquiring firm leaves the acquired firm alone, and thus does not have a need to integrate cultures and routines, compatibility is not important. In M&As of accounting firms, integration is necessary. Most accounting firms are partnerships with unlimited liability. If one partner brings a loss to the firm, other partners are also responsible for the loss. Accounting firms, consequently, want to use a single associate-to-partner promotion rule to preserve the quality of partners. The firms also want to use an integrated auditing procedure to maintain the quality of auditing services and to minimize auditing risks. These concerns are exhibited in the merger of two Canadian accounting firms (Greenwood et al., 1994). The discussion and review of extant literature provide the following proposition.

Proposition 3-1: Compatibility of involving firms will be negatively associated with organizational dissolution and positively associated with the probability of becoming a partner in an additional M&A.

Organizations with similar age have similar organizational cultures and structures because founding conditions influence the structure at founding. Founders of organizations adopt the best or institutionalized practices at the time of founding. External and internal inertial forces perpetuate and solidify those practices (Stinchcombe,



1965). Stinchcombe (1965) showed that industries established at the same period had similar organizational demographics. Eisenhardt (1988) also reported that the age of a store chain was a significant predictor of the compensation system used. She interpreted the finding as evidence of the adoption of an institutionalized compensation system at founding and its retention by the organization. In a study of semiconductor producers, Boeker (1989) also reported that founding time influenced the firm's emphasis on functional areas and that the influence patterns set at founding were shown to maintain some consistency over time, depending on other factors. The implication is that firms with similar age are likely to have similar cultures and routines and are, therefore, more compatible.

Hypothesis 3-1-1: Age similarity of involving firms will be negatively associated with organizational dissolution and positively associated with the probability of being a partner in additional M&As.

The relation between organizational size and structure has been a central topic in the area of organizational theory. Research on the topic has shown that organizational size is a key driver of bureaucratization. Researchers agreed that large firms have more formalized rules and an extensive division of labor (see, Kimberly, 1976 for a review). Firm size is also related to the governance structure (Williamson, 1975).

Organizational size is also related to culture. Small firms tend to have an entrepreneurial culture, and large firms have a more rigid and bureaucratic culture. In investigating GrandCo's acquisition of DC, Sales and Mirvis (1984) observed cultural collision within the combined firm. DC, a smaller firm, emphasized entrepreneurial and participative values compared with the bureaucratic and conservative GrandCo. When the

effects of size on organizational culture and structure are considered, size similarity would be positively related to post M&A performance.

David and Singh (1993) noted that managing power issues are a very important element of post-M&A integration. On the relation between power disparity and integration, there are two competing hypotheses. On the one hand, balanced power induces reciprocal control of each party's malconducts. Alienation of one party by the other party's conduct may not happen. Furthermore, balanced power may help the firm to select best routines among variations created by M&As. Under equal power relationship, they may be willing to build an integrated firm (Napier, 1989).

On the other hand, similar sized firms are more likely to experience a "we-they" attitude. The attitude is dysfunctional for the integration of people (Greenwood et al., 1994). If one party is very small relative to the other, they are unlikely to question the culture or management practices of the majority of the firm. This argument has also been advanced by Demsetz and Lehn (1990) in their study of large versus small block holders.

In the accounting industry, size similarity and associated balance of power might be conducive to the implementation of the consolidation following the M&A event. The alienated party may split-off and establish its own firm, because in this industry, human and social capital carried by individuals outweighs other kinds of input such as financial or physical capital.

Empirical studies on compatibility and performance produced inconsistent results. Shelton (1988) reported that size similarity has positive association with the combined abnormal returns. Size-inequality findings have also been reported by researchers. For example, Cheng, Gup and Wall (1989) analyzed large samples of mergers and found that the target-bidder asset size differential was positively associated with "merger premium," measured by the degree to which the purchase price exceeded the target's book value. Singh and Montgomery (1987), using a multiple industry sample, reported that the

relation was positive in related M&As but negative in unrelated M&As. Studying the performance of acquisitions of distressed firms, Bruton, Oviatt and White (1994) did not find significant relationship between size similarity and performance judged by academic evaluators.

Considering the peculiarity of the accounting industry and the relation between firm size and organizational cultures and structure, I predict a positive relation between size similarity and post - M&A performance as follows.

Hypothesis 3-1-2: Size similarity of involving firms will be negatively associated with the possibility of organizational dissolution and positively associated with the possibility to be a partner of additional M&As.

While size is related to various attributes of organizational structure, structural similarity should also be considered in its own right. Organizational structure delineates how the organization's members should coordinate and divide their responsibilities. When precursors have the same structure, organizational members may not experience difficulty in working under the "new" structure. A new firm created by an M&A of firms with differing structures must establish a coherent structure for efficient functioning. The structure adopted will be new to at least some of organization's participants. Consequently, they will have to adjust or modify their activities and this adjustment and learning may not be easy to some members. Therefore, M&As of firms with similar structures will outperform others.

PSFs display rather distinct structural arrangements. The most ostentatious one is the partner-associate structure. That arrangement is not a peripheral but rather a core attribute of the firm since it introduces a formal authority relation in the organization (Hannan and Freeman, 1977). From 1925 onwards, some Dutch accounting firms began

to adopt a structure in which some members were partners with ownership claims. Other members were associates or apprentices whose status resembles that of employees, although many of them participate in a tournament to partnership.

The presence of the partner-associate structure confers significant advantages, including the transmission of tacit skills and flexibility in the deployment of human resources to match the quantity and type of services of the clientele. Furthermore, this structure allows partners to share their intangible assets with associates such that they exact additional rent. These assets include reputation, experience, and networking. Leverage of associates, when the partner-associate structure is present, yields significant additional rents from the owners' reputation, skills, and client networks (compare Lazear and Rosen, 1981; Galanter and Palay, 1991).

The leverage ratio, the number of associates divided by the number of partners, has been conceptualized as a key structural element in the professional service industry (Sherer, 1995). The leverage ratio is closely related to the extent of division of labor, possibility of promotion, and degree of competition among associates (Galanter and Palay, 1991). It also influences the organizational cultures. Low leveraged firms tend to have more collegial and less bureaucratic cultures than highly leveraged firms (Starbuck, 1992).

An M&A of two firms with differing leverage ratio, consequently, would cause adjustment problems to some organizational members. An extreme case is a merger between a highly leveraged firm and a firm consisting of partners only. Partners of the latter would experience difficulty in handling associates; e.g., training and socializing them and delegating some decisions to inexperienced associates. When involving firms had a similar leverage ratio, and thus similar routines and cultures, organizational members would be easily integrated into a new firm.

Hypothesis 3-1-3: Structural similarity of involving firms will be negatively associated with organizational dissolution and positively associated with the possibility to be a partner of additional M&As.

Familiarity through organizational members' network ties can facilitate the post-merger integration process for various reasons. A pair of firms of which members are densely tied to each other will have similar cultures and routines before the M&A. First, many theorists agreed that people influence and are influenced in forming their perception or attitude by those with whom they interact (Festinger, Schachter and Back, 1950; Homans, 1950; Newcomb, 1943). The social interaction perspective has been further developed in social information processing theory (Salancik and Pfeffer, 1978) and contagion models of network analysis (Burt, 1987; Erickson, 1988). People with network ties have similar views on how the organization should be structured and managed. Two firms of which members are densely tied, therefore, will have similar cultures and routines.

Second, they are likely to share managerial practices and cultures even before the merger. Information transfer through network ties will increase the similarity. Since interpersonal ties facilitate information transfer (Granovetter, 1974), employees tied to each other will have the same information on viable routines available in their societies. A related argument can be borrowed from information economics (e.g., Akerlof, 1970). When two firms are joined through extensive webs of social connections, they are likely to overcome the "adverse selection" problem. The mutual familiarity allows firms to anticipate the future conditions they are committing themselves to. Through network ties, there is diminished "information impactedness" (Williamson, 1975) since those ties render information between the two firms more symmetric.

Furthermore, members of previously well-networked firms may experience less conflict after M&A. Familiarity does not breed contempt; rather it produces positive attitudes (Zajonc, 1968). Employees already familiar with each other are likely to show positive affection. Accountants who were the linking pins between the two firms could function as the liaison in forging a smooth transition.

Hypothesis 3-1-4: Familiarity through the network ties of involving firms' employees is associated with the possibility of organizational dissolution and positively associated with being a partner of additional M&As.

### ***Complementarity***

Apart from being more compatible, M&A outcomes are also likely to hinge on the complementarity of the two firms. Literature on M&As tends to use synergy and complementarity interchangeably. Yet, the distinction has not been clarified. Synergy exists if two firms can perform better together than separately because of better utilization of existing resources or by charging higher prices (Copeland and Weston, 1988). The economy of scale and monopolistic power though horizontal M&As may achieve this synergy. That kind of synergy may also be achieved by an M&A of homogeneous firms.

The notion of complementarity, however, is based on the heterogeneity assumption. The merging firms complement each other if they mutually contribute the strategic resources each are lacking and if they can perform better together than separately. Complementarity, consequently, is a subset of synergy. For example, vertical M&As that can reduce transaction costs (Williamson, 1975) or the uncertainty about input and output markets (Pfeffer and Salancik, 1978) can be defined as a complementary M&As. Likewise, a biotechnology firm with R&D capabilities and a pharmaceutical firm with marketing resources complement each other when their capabilities are joined.

The notion of complementarity has been refined by the resource based view of the firm (Penrose, 1959; Wernerfelt, 1984; Black and Boal, 1994). To define inter-firm complementarity, the following conditions should be satisfied. First, firms should be heterogeneous in terms of their capabilities (Dierickx, Cool and Barney, 1989; Barney, 1991). Without heterogeneity across firms, inter-firm complementarity remains undefined. Second, firm resources can be quantified and dimensionalized. There should be two or more dimensions of firm resources. Third, those resources are not tradable in the market without incurring substantial costs (Barney, 1988). Fourth, relations among resource dimensions rather than the amount of resources in each dimension generates economic rents (Black and Boal, 1994). Firms that have balanced bundles of resources across resource dimensions are assumed to perform better since they may not have under-utilized resources.

Monopolistic power has been described as a major motive for horizontal M&As. As mentioned before, monopolistic power itself is not a form of complementarity. Complementarity, independent of the monopoly benefit, can exist in horizontal M&As (Chatterjee, 1986), because firms within an industry vary in their capabilities across diverse resource dimensions. For instance, some firms are strong in technology and other firms have downstream capabilities such as marketing and distribution (Teece, 1986).

The literature on the relationship between "relatedness" of merging firms and its performance is basically the argument of synergy or complementarity. A positive relationship has been predicted by scholars in the strategy field (e.g., Lubatkin, 1983; Salter and Weinhold, 1978). Those studies were partly inspired by the performance advantage of related diversification over unrelated ones reported by Rumelt (1974).

Empirical studies on the complementarity-performance relationship, however, produced inconsistent findings. Singh and Montgomery (1987) reported that abnormal returns of related targets were significantly higher than those of unrelated targets. Bruton

et al. (1994) and Shelton (1988) also reported that related acquisitions of distressed firms were more successful than the unrelated acquisitions. Lubatkin and O'Neill (1987) found that related mergers significantly decreased systematic and total risks of acquiring firms. Lubatkin (1987) and Seth (1990), however, did not find significant relationship among M&A relatedness and performance.

Studies on "relatedness" and merger performance have used FTC's merger classifications with minor modification (e.g., Chatterjee, 1986; Lubatkin, 1987; Singh and Montgomery, 1987). M&As, where the two firms belong to the same 2 or 3-digit SIC group, are considered related. Harrison, Hitt, Hoskisson and Ireland (1991) adopted other proxies for analyzing the relation between relatedness and post-M&A performance. Instead of using FTC types of categorization, they measured the degree of similarity across resource dimensions. They reported that inter-firm differences in resources before the M&A contributed significantly to performance in the merged firm. On the basis of their findings, they questioned the construct validity of FTC derived measures of synergy. In a study of a single industry setting, as in this paper, the relatedness measure can not be used. Logic of complementarity leads to the following proposition.

Proposition 3-2: Complementarity of involving firms' resources will be negatively associated with organizational dissolution and positively associated with being a partner of additional M&As.

Specific hypotheses on proposition 3-2 can be developed by considering the peculiarity of the industry. Accounting firms provide auditing, tax consulting, and/or management consulting services to their clients. Providing these kinds of services usually requires face-to-face interaction between accountants and clients. Geographical



proximity, consequently, has been a key factor for the clients in selecting their service providers.

When considering an M&A within such a single industry, complementarity may, therefore, be derived from geography, for example when the two firms cover different territories. Such complementarity was undoubtedly a key motive in the globalization of consulting and accounting firms. Banking mergers were likewise predicated on the mutuality of regional presence to match the needs of clients whose dispersed operations required access to the same financial institutions. Official equipment manufacturers, like Toyota and Nissan in the automotive sector, favor suppliers that are adjacent to each and every manufacturing facility (Dyer, 1995). Such transaction specific site-investments are predicated on the need for long-term, reliable, and tight JIT schedules. Audit firms whose premises are proximate to those of clients would produce analogous benefits.

Audit firms and other classes of PSFs depend very heavily on direct access to clients. The quality of the firm-client interface therefore favors firms that are proximate to the clients' premises. Thus multi-establishment firms are likely to choose PSFs that are physically close. Additionally, firms that have offices in multiple cities are better positioned to serve multi-establishment clients. Two observed correlations provide suggestive evidence for this. The first is a high correlation between an accounting firm's size, as proxied by the number of offices a given PSF has, and the number of publicly traded firms the PSF has as clients (Public Accounting Report, 1994). Secondly, and even more suggestive is a high correlation between service provider's size and client's size (Spurr, 1987).

Clients with multi-establishments provide a larger revenue stream and also tend to pay higher hourly fees to accounting firms. Large and multi-office accounting firms get premium fees not only for auditing service (Firth, 1993; Francis and Simon, 1987) but also for compilation and review services (Barefield, Gaver and O'Keefe, 1993). As a

result, accounting firms that have many offices are likely to perform better. I thus hypothesize that the merger of firms that occupy differing geographical niches is more likely to be successful than the merger of firms with overlapping niches.

Hypothesis 3-2-1: Geographical complementarity will be negatively associated with the possibility of organizational dissolution and positively associated with the possibility to be a partner of additional M&As.

To be successful, organizations should be accessible to both production and marketing capabilities. Firms can internalize those capabilities or outsource them to the market. When outsourcing incurs a great deal of transaction costs or increases the uncertainty of operation, firms have an incentive to internalize those capabilities through vertical integration (Caves and Bradburd, 1988; Pfeffer and Salancik, 1978; Williamson, 1975) or to semi-internalize through strategic alliances (Teece, 1986).

Granstrand and Sjolander (1990) provide a case in point when they explored large technology-based firms' acquisitions of small technology-based firms in Sweden. In their study, acquired firms enjoyed significantly higher growth rates than comparable non-acquired firms. Their growth rates after the acquisition were also significantly higher than before the acquisition. The authors interpreted those results as an indication of complementarity between small firm's R&D capabilities and large firm's marketing capabilities.

Accounting firms have some peculiarities. Among the inputs for production, the professional's capability often outweighs financial capital and physical investments because most of production and marketing capabilities are carried out by professionals. A firm consisting of accountants capable of conducting high quality services can be defined as a firm that has production capabilities. This study adopts the term "human

capital" for those capabilities. Human capital is originally defined as an individual's investments in education and training (Becker, 1975). A firm's human capital is the aggregation of human capital of accountants who are affiliated with the firm.

A firm consisting of accountants having a great deal of ties with potential clients can be defined as a firm that has marketing capabilities. This study uses the term "social capital" for representing marketing capabilities. Firm-level social capital can be inferred from the number of external ties to potential clients that organizational members have (Burt, 1992). The salience of network ties in obtaining clients comes from the difficulty in measuring the quality of the services. The professional services tend to be intangible with the quality of the services very hard to measure. In those settings, network ties are likely to come into play for the clients in selecting their service providers. The social capital is essential for the conversion of production capabilities into organizational returns (Burt, 1992).

A firm can be unbalanced in its human and social capital. If a firm has production capabilities more than it can sell, it has under-utilized production capabilities. Likewise, if a firm has marketing capabilities more than it can produce, it has under-utilized marketing capabilities. A merger of the two firms will be beneficial since it will allow them to take advantage of their previously under-utilized capabilities. In the same vein, the merger of an accounting firm endowed with under-utilized human capital with another firm endowed with under-utilized social capital will be more successful than the others. This reasoning leads to the following hypothesis.

Hypothesis 3-2-2: Human and social capital complementarity will be negatively associated with the possibility of organizational dissolution and positively associated with the possibility to be a partner of additional M&As.

### *Prior M&A Experiences*

Organizations learn from their prior experiences. Prior M&A experiences provide valuable lessons about how to integrate the firm created by an M&A (Fowler and Schmidt, 1989; Pennings et al., 1994). A firm with a great deal of M&A experience will know how to integrate the firm and will capitalize its M&A-specific knowledge by involving additional mergers and acquisitions (Amburgey and Miner, 1992).

Existing studies have reported the positive performance effects of M&A experience. Fowler and Schmidt (1989) reported a positive relation between previous M&A experience and returns of equity. Bruton et al. (1994) reported positive relation between prior M&A experiences and performance judged by academic evaluators. Prior acquisition experience is conducive to the persistence of new acquisitions (Pennings et al., 1994).

Prior M&A experiences can be positively associated with organizational failure by the following reason. Firms emerging out of a string of mergers have comparatively higher levels of internal variations. They may experience a great deal of conflict across routines and people. People socialized by diverse firms have diverse views of how to organize themselves. Therefore, they would be selected out by the market. Firms that have overcome the integration problems are likely to re-engage in more M&As to maintain their growth momentum (Amburgey and Miner, 1992) or to take advantage of their knowledge regarding M&A implementation.

Hypothesis 3-3: M&A-specific knowledge accumulated in its history will be positively associated with the possibility of dissolution and with the possibility to be a partner of additional M&As.

### *Firm Size*

As mentioned above, large firms are better positioned to serve multi-establishment clients. High correlations between an accounting firm's size and the number of its clients among publicly traded firms (Public Accounting Report, 1994), and the match between service provider's size and client's size (Spurr, 1987) provide suggestive evidence. Large firms also get premium fees not only for auditing services (Firth, 1993; Francis and Simon, 1987) but also for compilation and review services (Barefield, Gaver and O'Keefe, 1993).

Furthermore, larger firms command more resources, enjoy superior economies of scope and scale, and should therefore face a better post-acquisition process. Through growth, they signal success and accumulation of goodwill. It is therefore plausible to expect them to be an attractive partner in the population. Following the merger, up to the year of censoring, I expect large and growing firms to face better M&A outcomes than do smaller firms, or firms whose size remains constant or declines.

Hypothesis 3-4: Firm size will be negatively associated with the possibility of dissolution and positively associated with the possibility to be a partner of additional M&As.

## **DATA AND METHODS**

### *Data Collection*

The data of this study cover the entire population of Dutch accounting firms during the period 1880-1990. Firm level data were extracted from membership directories of accounting associations that merged into a single association in 1966, currently called "Nederlands Instituut van Registeraccountants" (Netherlands Institute of Certified Public Accountants). During the first eight decades, there were numerous associations, each with their own membership roster until they merged into a single association in 1966. The

directories provide information about the members of associations and accounting firms. In fact, the evolution of the Dutch accounting profession is rather similar to that observed in other countries, including the US (e.g., see Miranti 1990 for an exhaustive report).

The individual level data were collected over one to five year intervals, depending on the availability of directories. From 1970 to 1974, each year was recorded, while every fourth year was recorded after 1974. Individual level data included accountant's name, address, education, and status in the firm, if applicable. Also included is the employment affiliation, i.e., name of audit firm, business firm, or governmental agencies. The directories also provide the name of cities where each accounting firm had an office. Further details are provided by Majoor et al. (1993).

### *Sample*

The sample of the present study is the firms created by M&As from the population of accounting firms, since this study was exploring what happened to those specific firms. However, the relevant population data were also used for measuring variables in the present study. The initial sample consisted of 416 M&As in the history of the Dutch accounting industry.

Among the 416 M&As, 37 M&As were deleted because they happened during the period 1986-90. The deletion was unavoidable because the outcome information regarding those M&As was not available; these new entrants were right censored. Additional 22 M&As were also deleted because three or more firms were involved in an M&A during an observation interval. Applying the notion of compatibility and complementarity to more than two involving firms is very difficult, if not impossible. If firm A acquired firm B and C during an observation period, two observations can be created: A with B and A with C. No information exists as to whether firm A acquired firm B earlier than firm C. Even if a sequence could be randomly assigned, the resulting

data would suffer dependence problems among observations. Thus the final sample consists of 357 M&As.

Figure 3-1 illustrates how the sample of the present study was constructed. To simplify this explanation, let us assume the presence of yearly data. Case 1 had two M&As. The first M&A was consummated during the period 1935-36. There were 14 non-events (1936-1949) and one additional M&A (1950) between the first M&A and the second one. Inter-firm compatibility and complementarity were measured on the basis of firm A and B's information in 1935. Those measures were used as independent variables for the 15 firm-years. After A's acquisition of C, there were 39 non-events (1951-1989). As in the first M&A event, the compatibility and complementarity, calculated by using two firms' 1950 profiles, were used as independent variables for the 39 firm-years.

**Insert Figure 3-1 about Here**

In Case 2, D acquired F and G during the period 1950-1951. Any information was not available about whether D acquired F first or not. Firm-years of 1951 onwards, consequently, were not included in the sample. Case 2 contributed 14 non-events and one M&A. In Case 3, firm J contributed 13 firm-years: 12 non-events (1938-1949), and one being acquired (1950). Firm H contributed 54 firm-years: 52 non-events, 1 M&A, and 1 dissolution. Firm I and K did not contribute any firm-years for this study.

Applying the sampling procedure to the population data produced 1186 firm-intervals. The data were treated as if one observation interval is a year. Among them, there were 830 non-events, 48 dissolution, 69 being a target of M&As, and 239 initiating additional M&As.

### *Measures*

Individual level data were aggregated to produce firm level information. Examining the changes of an accountant's organizational affiliation produced measures for organizational foundings, deaths, and changes. Organizational changes, examined in this study, included merger, acquisition, and name change. Name changes were recorded when a firm's name differed from its previous one, provided two-thirds or more of its partners continued their affiliation with the firm. The name changed in this study did not include name changes due to M&A or "cosmetic" name changes such as modifications in the order of named partners, or additions of the Dutch equivalents of "Accountants" or "Registered" and "Limited Liability" to the firm's original name.

When two or more firms joined together, the event was coded as an M&A. The firm created by the M&A was considered as a new firm that has history of involving firms. This study differentiated the initiator or bidder from the target of M&As by using the following rules. When the resulting firm used the name of one of the involving firms, the firm that maintained its name was coded as the initiator, and the other as the target firms. When firms joined together and adopted a new name, the largest one was coded as the initiator. Other smaller counterparts were treated as target firms. When the size of the involved firms was equal, the firm whose name was alphabetically ahead was coded as the initiator.

In identifying M&As, the criterion of two-thirds of partners was adopted. That is, two-thirds or more of the partners should join a new firm to be considered as a counterpart of the M&A. One of the difficulties in selecting a criterion is that no information was available about whether other accountants left the firms before the M&A or after the M&A. I also used more than half, and more than three-fourths criteria to ensure the robustness of the results. The sensitivity analysis revealed that the results were not sensitive to the criterion.



The differentiation of the target from the initiator in the industry was not so clear-cut as the cases in M&As through the stock market bidding. A peculiarity of M&As in the accounting industry was that the hostile takeovers through the stock market were very rare. M&As in partnership were possible only if the partners of involving firms agreed to do so. Nevertheless this study differentiates the initiator from the target. The differentiation between a target and a bidder was validated by the differing predictors in the multinomial and binomial logistic regressions.

Organizational founding was coded when a new name was listed in the directories for the first time without an M&A or name change. Termination was flagged when a firm's name was permanently delisted from the directories without an M&A or name change. Previous M&A experience was measured by the number of M&As conducted by the initiating firms and by the target firm before the focal M&A.

To measure compatibility and complementarity, the firm level information in the last observation period before a focal M&A was used. For instance, if both firm A and firm B were listed in the directory of 1974 and if a firm resulting from A and B's M&A was listed in the directory of 1978, the firm-level information of 1974 was used for creating compatibility and complementarity measures.

Firm age at M&A was measured by subtracting founding year from the last observation year before M&As. The younger firm's age was divided by the older firm's age to measure age similarity. Maximum of the measure was 1 when the involving firms were founded in the same year. Number close to 1 indicates that the firms were similar in terms of their age. Firm size at M&A was measured by the number of CPAs affiliated with the firm in the last observation year before the M&A. To measure size similarity, the smaller firm's size was divided by the larger firm's size. Structural similarity was measured by the absolute difference of two leverage ratios. Leverage ratio is the number of associates divided by the number of partners. Since some firms did not hire any

associates, a ratio measure for structural similarity that was analogous to age or size similarity could not be constructed.

Familiarity between involving firms before an M&A was measured by considering the network ties among their CPAs. Ties between accountants were measured by tracing the careers of accountants. Accountants developed social networks by changing their organizational affiliations. When two accountants had an affiliation with a firm during any overlapping period, they were assumed to have network ties with each other thereafter. If firm  $i$  and  $j$  had 10 and 20 accountants respectively before the M&A, there were 200 ( $10 \times 20$ ) possible ties. I counted the actual number of ties that firm  $i$ 's CPAs had with firm  $j$ 's CPAs. Familiarity of two firms was measured by the actual number divided by the possible number of ties. The higher the number, the higher the familiarity.

Despite the importance of complementarity in studying strategic issues such as strategic alliances and M&As, scholars have not yet developed a non-controversial measure for complementarity. There has been some attempts to measure complementarity between two firms in a dyad. Gulati (1993) adopted cluster analysis to measure complementarity. The cluster analysis has a lot of problems. There is not a formal statistical test to determine the number of clusters. Differing clustering methods generate markedly different results (Aldenderfer and Blashfield, 1984). Researcher should rely on rule of thumbs or arbitrary decision to use the analysis.

In addition to the shortcomings of cluster analysis itself, applying the analysis to measure complementarity has an inherent logical flaw. Gulati used a dummy variable for complementarity. Whenever two are in differing clusters, they are coded as complementary firms. So two firms are measured to be complementary if they have differing resources profiles. If firm A has a great deal of resources across all dimensions and firm B does not have any resources across all dimensions, they are likely to be

assigned in differing clusters and thus will be treated as complementary firms. Because firm B does not have any resources to complement firm A, they are not complementary by definition.

The present study proposes an alternative measure for complementarity that can avoid the shortcomings of measures based on cluster analysis. Complementarity between two firms can be measured by a global measure or by diverse measures. The decision should be made on the basis of research settings or topics. If we assume that technological, administrative, and marketing capabilities are critical for success and can be measured, we can develop a global measure for the complementarity. When subcategorization of each of the three capabilities can be done and each subcategory is necessary for success, we can develop three sub-complementarity measures. For instance, if we can divide the market into niches and if presence in diverse niches create synergy, we can measure the market complementarity by using the information of two firms market share in each of the niches. The choice between a global measure and measures based on subcategorization should be made on the basis of data availability and validity of the measures in the research settings.

The first decision a researcher should make is the resources dimensions. In creating dimensions, researchers should consider only critical resources for the sake of simplicity. The resources that are substitutable should be collapsed into one category such that each category is complementary with other categories. Before collapsing, the researcher should make sure that they are measured by same metric. Otherwise he should standardize them and give a weight to each category. Finally, the amount of resources in each category should be measured.

When differing metric or scales are applied across remaining categories, the amount of resources in each category should be standardized. Before the standardization, the researcher should check the distribution of the resources. If the distribution

significantly differs from the normal distribution, he had better transform the amount of resources such that the distribution is close to a normal distribution. Mean and standard deviation of the transformed value within the industry or the sample can be used for standardization.

If a researcher has a priori or theoretical reasons that the importance of each category of firm capability differ from other categories, he should assign weights on each of the categories. Otherwise he can apply equal weight to each category. This procedure is not avoidable when we create one measure based on many categories.

Then researcher should choose the relative capability measure or the absolute capability measure. When we assume that firms have the same total capability score, we can apply the relative capability measure. Firm  $i$ 's relative capability score for category  $k$  can be calculated by

$$RC_{ik} = AC_{ik} / \sum^n A ,$$

where  $RC$  and  $AC$  indicate the relative and absolute capability score respectively, and  $n$  is the total number of categories.

When the capability score for each category is ready, he can use following method for measuring the complementarity between firm  $i$  and  $j$ .

$$Complementarity_{ij} = [\sum_{if+} W_k * (CS_{ik} - CS_{jk})] * [\sum_{if+} W_k * (CS_{jk} - CS_i$$

where  $CS_{ik}$  and  $CS_{jk}$  are the capability score in category  $k$  of firm  $i$  and  $j$  respectively,  $W_k$  is the weight assigned to category  $k$ , and  $if+$  indicates to add only if the number in the parenthesis is positive. The measurement can be applied to either relative capability score or absolute one. When relative capability score is adopted, researcher can also use following method.

$$Complementarity_{ij} = \sum_{k=1,n} W_k * |CS_{ik} - CS_j$$

where  $n$  is the total number of categories. The method, however can not be applied to absolute capability score.

With this brief review of the conceptual foundation of complementary measurement, I can now propose two specific indices: geographical complementarity and human and social capital complementarity. I developed three competing measures for geographical complementarity. The degree of non-overlap between two firms' market niches indicated geographical complementarity; geographical complementarity, consequently, is the degree of market extension in terms of FTC categorization. Differing rules to define market niche provided differing measures for the variable. The present study used three kinds of categorizations to divide the market. The first had three categories: the set of 4 largest Dutch cities (Amsterdam, Rotterdam, Utrecht, and Dan Haag), other domestic areas, and foreign markets. Geographically, the Netherlands bifurcates into a large conurbation in the west, called "De Randstad" versus what the French might call the "Province." De Randstad comprises the four largest cities, has a population of about 10 million people, and is the center of the Netherlands' economic gravity. The second measure for geographical complementarity was based on six categories: each of the four cities, as well as other domestic areas, and the foreign market. The last measure was based on 13 categories: each of 12 Dutch provinces with foreign market.

$$\text{Geographical complementarity} = \sum_{k=1, n} |DI_{ik} - DI_{jk}|,$$

where  $n$  is the number of categories,  $DI_{ik}$  is the number of firm  $i$ 's offices in  $k$ th market divided by the number of firm  $i$ 's offices, and  $DI_{jk}$  is the number of firm  $j$ 's offices in  $k$ th market divided by the number of firm  $j$ 's offices. The value of the measure ranges from 0 to 2. Zero indicates that two firms' market niches are perfectly overlapping. A value of 2 indicates that two firms' market niches do not overlap at all.

For the measurement of human and social capital complementarity, human capital was measured by using two variables, general human capital and industry-specific human capital of the firms. General human capital was measured by the proportion of CPAs among all CPAs in the firm who possessed a Master's or higher degree. Industry-specific human capital of a firm was measured by the average of CPA's industry-specific human capital. The CPA's industry-specific human capital was measured by the natural logarithm of his tenure in the accounting industry. The speed of industry-specific knowledge accumulation was assumed to decrease over the career of the CPA. This assumption is well accepted in labor economics.

Social capital was proxied by two measures. One was the proportion of CPAs among all CPAs in the firm who had worked in other industries or government. The other was the proportion of accountants among quitters who left the firm within the previous 10 years to work for other industries or government but never came back to the accounting industry. Ten year span was adopted not only because the strength of network ties decreases with the decrease of interaction, but also because the quitters retired from the business world and provided no longer any value to the firm. For comparison, 5 and 15 year spans were also tested. The sensitivity analysis showed that the results reported here were not significantly different.

The human and social capital score were standardized by using means and standard deviations of each resource dimension. Means and standard deviations were calculated by using 7027 firm-intervals (i.e., the population firm-intervals during the period 1880-1986). On the basis of the standardized scores, the addition of the standardized educational level score and the standardized industry-specific human capital suggested a global human capital score. Likewise the addition of two standardized social capital scores created a global social capital score. A rationale for collapsing the categories was that they may not be complementary. For instance, having both a high

educational level score and high industry-specific human capital would not produce any synergistic effect on organizational performance. If one party had more resources on both dimensions, 0 was assigned for human and social capital complementarity. Otherwise, human and social capital complementarity was the product of the absolute difference in human capital dimension and the absolute difference in social capital dimension.

The model controlled for proxies of "history", including World War II, the granting of Indonesia's independence in 1949, and significant changes in regulations that governed the accounting profession and its clients (1971-1973 and 1984-1989). Specifying the length of the effects of these events, especially those for regulations, was not easy. World War II was specified as if it would have effects during the period 1941-1946 and Indonesia's independence during the period of 1949-1951. The effects of those historical events would be short-lived. Significant changes in the regulations such as the mandatory auditing of all listed firms, which changed the demand for audit services, would have persistent effects on the industry until the abolition of the regulation itself. For that reason, the regulation was specified as if it would have its effect during the entire period following the onset of the regulation.

The observation intervals were also controlled as a time-varying covariate. As mentioned before, the data have non-uniform observation intervals from one to five years. Since the odds of events may be positively related with the length of the observation interval and that the relation may not be linear due to unobserved heterogeneity (Petersen and Koput, 1991), the model included the natural logarithm of the number of years of the interval.

### ***Model and Estimation***

The events of interest in this study are dissolution, being a target of an M&A, and being an initiator of an M&A. A multinomial logit model was adopted to estimate the

effects of the independent variables on the probability of an event. The decision was made on the basis of the following reasons. First, firms could not experience those events simultaneously. Applying competing risk models, consequently, was adequate to this setting. Second, Cox's proportional hazard model (Cox and Oakes, 1984) was not appropriate because of nonuniform observation intervals and many ties of events. Third, discrete time event history could be used instead of continuous event history model (Allison, 1982). As binomial logistic regression could be used to analyze repeated event history (Allison, 1984), a multinomial logit model could be used to analyze repeated and multiple types of events (Allison, 1982).

The multinomial logit model is expressed as follows.

$$\text{Log}[P_{ij} / P_{i4}] = X_i \beta_j, J = 1, 2, 3,$$

$$P_{ij} = P(C_i = j | X_i) = e(X_i \beta_j) / [1 + \sum_{k=1}^3 e(X_i \beta_k)], J = 1, 2, 3,$$

$$P_{i4} = P(C_i = 4 | X_i) = 1 / [1 + \sum_{k=1}^3 e(X_i \beta_k)],$$

$$\beta_4 = 0,$$

where,  $C_i$  is consequence category that firm  $i$  experienced,

$X_i$  = a row vector of firm  $i$ 's independent variables,

$\beta_j$  = a column vector of coefficients, and

$P_{ij}$  = probability that the firm  $i$  experiences consequence  $j$  where  $j$  is in a set of (1=dissolution, 2=being a target of M&A, 3=being an initiator of M&A, and 4=non-event).

Non-event ( $C_i = 4$ ) was used as a reference category. The parameters estimated in this model could be interpreted only in reference to the non-event category. For instance, a positive coefficient of a variable on category 3 (initiating M&As) indicated that the increase in the variable increased the ratio of the probability of initiating M&As to the



probability of non-event. In estimating the model, I lagged time varying covariates (firm size, and all control variables) by one observation period.

### **THE DUTCH ACCOUNTING INDUSTRY AND M&As**

Figure 3-2 shows the historical variation of C-4 ratio and Gini-index. Firm size here was measured by the accountants affiliated with the firm. The market structure, consequently, was measured based not on outputs, but on the key inputs. Since 'market' share and 'capacity' share were likely to be highly correlated in this sector, market structure derived from "capacity" would be similar to conventional measures. The figure indicates that disparity of firm size has been increased over time.

**Insert Figure 3-2 about here**

Figure 3-3 shows the yearly distribution of M&As. Because of non-uniform observation intervals, the figure presents the average number of M&As when a 2 or more years' interval is used. The figure indicates that there were not many M&As before 1934. The number of M&As in the industry increased drastically after 1960.

**Insert Figure 3-3 about Here**

Combining Figure 3-2 and 3-3, I noticed that M&As may be the driver for the evolution of the market structure. The correlation between the number of M&As and Gini-index is suggestive for delineating the relationship between M&A activity and consolidation of the industry. The correlation is  $-.789$ , which is significant at  $.0001$  level. Figure 3-4 presents the historical covariation between firm size and the firm's cumulative number of M&As. The correlation was calculated by using population data, and has been increased over time. The correlations in 1923 and in 1990 are  $0.26$  and  $0.80$ , respectively. This indicates that some firms that were successful in M&A activities conducted

additional M&As and became larger. Repetitive M&A activities of those large firms are associated with increased firm size disparity. Superimposing Figure 3-3 and Figure 3-4 suggests that decline of the correlation during some periods is related to the decrease of M&A activities during those periods.

**Insert Figure 3-4 about Here**

Table 3-1 shows interesting differences among the two groups including the so called "Big-6." Some firms followed an M&A route to organizational growth, while others expanded through direct entry. The largest global accounting firm, Arthur, Andersen & Co., was very small in the Netherlands compared with other large accounting firms, even though it was the largest firm world wide. A second Big-6 firm, Price Waterhouse also had a small scale; the firm divested its Dutch operation in 1939, but reentered the market in 1980. These two "Big-6" firms had a smaller number of partners. Their total employment was roughly 10 % and 2 % of that of their largest competitor, Moret, Ernst and Young. In the Netherlands, these two firms expanded only through direct entry, and refrained from merging with or acquiring local firms. In contrast, Moret was an aggressive acquirer. In fact, its lineage goes back to 1880 when the first audit firm was founded. After World War II, the Dutch firm Moret merged with the US based progenitors of Ernst and Young. KPMG's Dutch progenitor, Klynveld, merged with Peat Marwick to become the Klynveld Peat Marwick Goerdenler group. While Andersen had only four offices in large cities in 1990, Moret, Klynveld KPMG, and Coopers and Lybrand covered the entire Netherlands, with each having up to 43 offices spread over larger and smaller cities. These large firms were created by a sequence of M&As. In other words, firms that had been successful with previous M&As were large in 1990.

Among the second tier firms, all of them engaged in M&A, although the level and timing of M&A conduct varied considerably. Clearly, these firms were not equivalent in

terms of their strategies for growth. Overall, these results indicated a preponderance of M&A conduct among audit firms, suggesting the path dependent nature of M&A conduct.

**Insert Table 3-1 about Here**

We observed mega-mergers in the industry. Dechesne van den Boom en Co. (58 CPAs), Accountants Brands & Wolff (88 CPAs), Accountants Reyn de Blaey en Co. (47 CPAs) and Moret and Limperg (317 CPAs) merged together during 1986-1990. The mergers created Moret, Ernst and Young, the largest Dutch accounting firm in 1990. Another example is Coopers & Lybrand Dijker Van Dien, the second largest firm in 1990. The firm was created by a merger of Dien & Co. Van (184 CPAs in 1986) and Coopers and Lybrand (226 CPAs in 1986). The merger was also conducted during 1986-1990. Mega-mergers in the accounting industry have also been observed in the US. The 1989 merger of Ernst & Whinney and Arthur Young & Co. is an example. Those mega-mergers changed the industry structure and competitive dynamics among the firms in the industry.

## RESULTS

Table 3-2 presents the means and standard deviations of the variables used in this study. It also presents correlations among the variables. The descriptive statistics are based on 357 M&As and 1186 firm-intervals. Firm size is highly correlated with its previous M&A activity level.  $G^2$  tests revealed that deletion of any of the two deteriorates the goodness of fit.

**Insert Table 3-2 about Here**

Table 3-3 provides the results of multinomial logit regression. The analysis is also based on 357 M&As and 1186 firm-intervals. In the present study, firms established by M&As can experience one of three organizational events: dissolution, being an M&A target, or being an initiator of an additional M&A. I first tested if the event categories were collapsible. A series of  $G^2$  tests revealed that any of them could not be collapsed with other categories. The tests suggested that the coefficients of independent variables differed across outcome categories. I also compared the predictive power of the three geographical complementarity proxies. Even though I could not compare the results with formal statistical procedures, comparisons of three  $\chi^2$  favored the simplest categorization of geographical niches (i.e., the four "Randstad" cities, the province and foreign countries). The results reported in Table 3-3 are based on this simplest measure.

**Insert Table 3-3 about Here**

Age similarity significantly enhanced the probability for the merged firm to initiate additional M&As (vis-a-vis the status quo). It did not, however, have any significant effect on the probability of dissolution and of being a target of additional M&As. Size similarity significantly increased the probability for the resulting firm to be a target of additional M&A activities ( $p < .10$ ). Its effects on other two outcomes were not significant.

Structural similarity had positive and significant effects on the probability to be a target ( $p < .05$ ) and to initiate additional M&As ( $p < .01$ ). It did not, however, significantly influenced the probability of dissolution. Contrary to hypothesis 3-1-4, familiarity through CPAs' direct network ties significantly decreased the probability to initiate additional M&As ( $p < .01$ ). A firm created by an M&A of two firms whose members were

densely tied before the M&A was less likely to initiate additional M&A than a firm created by an M&A of two firms whose members were sparsely tied before the M&A.

The two complementarity hypotheses received rather strong support. Geographical complementarity significantly decreased the probability of dissolution ( $p < .01$ ). Geographically overlapping M&As were more likely to dissolve than geographically non-overlapping M&As. In other words, the merger of firms with differing geographical niches were more viable than the merger of firms with geographically overlapping niches. Geographical complementarity, however, did not have a significant effect on the probability of the new firm to engage in additional M&As (*vis-a-vis status quo*).

Human and social capital complementarity significantly enhanced the probability to be a target of an M&A ( $p < .01$ ) and to initiate additional M&As ( $p < .01$ ). If the target and bidder were complementary in their human and social capital, a firm created by an M&A was more likely to engage in additional M&As (*vis-a-vis status quo*).

Supporting Hypothesis 3-3, previous M&A experiences had positive and significant effects on all three types of events. If the target and bidder conducted many M&As before merging together, a firm created by the two firm's M&A was more likely to dissolve ( $p < .01$ ), to be an M&A target ( $p < .05$ ), and to initiate additional M&As ( $p < .01$ ). Firm size also had the predicted effect on dissolution and on the initiation of additional M&As. Large firms were less likely to dissolve ( $p < .01$ ) and more likely to initiate additional M&As ( $p < .05$ ). The parameters support Hypothesis 3-4.

Table 3-3 also shows the effects of the various control variables on post M&A outcomes. The governmental regulation of 1984-1989 significantly increased the probability of dissolution and of being an M&A target. The regulation involved the mandatory external audit and financial disclosure of small and medium sized firms. The previous regulation, i.e. the one of 1971-1973, pertained to large firms and had a much

milder effect on M&A outcomes. Finally, I note that Indonesia's independence in 1949 increased the possibility of dissolution, and diminished the propensity to acquire other accounting firms.

## DISCUSSION

The historical analysis of industry structure and M&As suggests that M&As are drivers for the industry evolution. The decision of pairs of firms to merge has a profound impact on the structure of their sector. The number of M&As in each observation interval was positively correlated with an index of industry concentration, the Gini-index. The correlation between firm size and the firm's cumulative number of M&As has increased over time.

The results of this study show that prior M&A experience, and aspects of compatibility and complementarity are important preconditions for post M&A outcomes. Three types of outcomes were examined: dissolution, being a target, or merging with another firm. The effects of preconditions vary by type of outcome. The most important and only significant predictor of dissolution was geographical complementarity. In contrast, with the exception of familiarity, proxies of compatibility, complementarity, and resources accumulation had strong, hypothesis-consistent effects on the merged firm to initiate additional subsequent mergers. The results indicate that environmental selection favors compatible and complementarity M&As.

One exception is the influence of familiarity through CPAs' direct network ties. It was negatively related to the possibility to initiate additional M&As. One plausible reason is that firms may have some tendency of risk-taking in selecting M&A partners. Merging with a familiar firm is less risky than merging with an unfamiliar firm, as spelled out when I developed proposition 3-1. If firms are risk averse and if risk aversion is retained in a new firm, the firm created by a merger of two familiar firms may not

consider unfamiliar firms as a target of additional M&As. The tendency decreases the number of possible targets and thus decreases the probability to initiate additional M&As.

Two complementary measures have differing effects on post-M&A outcomes. Creating a stronger presence in a single locale increases the likelihood of dissolution compared with firms that spread their presence over several locales. Human and social capital complementarity does not affect the likelihood of dissolution, but it creates a much higher propensity in the new firm to seek out and merge with other firms. Such complementary mergers foster a growth strategy through M&As. As I have seen in Table 3-1, audit firms that adopt an acquisitive strategy grow faster than those firms that grow through direct entry.

As Black and Boal (1994) have indicated, it is not the sheer accumulation of those intangible assets, but rather the relationships among bundles of assets that produce a sustainable competitive advantage. The architecture of those resources, or what they call factor networks with specific inter-resources relationships confer an edge over the competition. The findings in this study can be fitted into the Black and Boal framework: it is the bringing together of under-utilized human and social capital through a merger that generates a superior merger outcome.

It is crucial to view M&A conduct in a dynamic perspective. As the findings in this study demonstrate, many mergers are sandwiched between other M&A activities. Having prior M&A experience is a predictor of both firm dissolution and becoming a target or bidder following the current merger. The findings indicate that all firms do not develop M&A related knowledge through their M&A experience. M&A experience does not automatically make the firm accumulate acquisitive knowledge. Firms that dissolved despite a great deal of experience may be the firms that could not handle huge internal variations brought about from many separate entities. Firms that were involved in additional M&As may be the firms that had the capability to handle merger-induced

internal diversity. Those firms tried to take advantage of that capability or to retain their strategic momentum (Amburgey and Miner, 1992).

I have also included the new firm's size as a time variant covariate to obtain an additional grasp on this post-acquisition process. If the firm shrinks, perhaps through attrition, through a split, or by breaking up it evidently is not undergoing a positive post-acquisition process. However, if the firm remains stationary in size or grows, its life after the merger is very much assured. I should therefore not be surprised that resource accumulation either through internal growth or M&A makes such firms prone to continue with an acquisitive expansion strategy.

Finally, I should acknowledge, once more, that the present study is based on a sample of a single industry. The sample is a 100% sample. It provides some very strong advantages, as well as some limits in generalizability. Among the advantages I mention are the avoidance of aggregation bias (Schmalensee, 1985), the ability to examine jointly firm and industry evolution, the use of fine-grained data to measure compatibility and complementarity, and the focus on a service sector.

Disadvantages include the lack of financial measures of performance, the absence of data on M&A with firms outside the audit industry (e.g., diversification towards management consulting and headhunting), which the Economist (1995) signals as important trends. While the data are fine-grained, and single industry studies are becoming the norm (Rumelt, Schendel, and Teece, 1991), one would desire additional studies to further enrich the insights of this paper. Ideally these studies should include both manufacturing and service sectors, as well as U.S. and non-U.S. settings.

Like any study, this study combines limitations with important strengths that should inspire others to develop additional theory and collect data on the interaction between organizational strategy and firm and industry evolution. The strategy of a firm exists neither in a temporal vacuum, nor is it disjointed from its ecological context.



M&As are a major punctuation in a firm's history, and give rise to changes in industry structure. The resources that the two firms bring together and rebundle in the subsequent implementation process inform us about the future prospects of the firm. M&As also shape the structure of the industry. Other research should inform us about the extent to which these relationships are robust across a range of industries, and across different parts of the industrialized world.

### CONCLUSION

In this paper, I have explored M&As with an evolutionary perspective. M&As, as a very important strategic decision, were conceptualized as a key factor that influences organizational and industry evolution. Analysis suggest that M&As, as a firm level decision, are responsible for the changes of industry structure. M&As had increased the dispersion of firm size and had led to a higher market concentration ratio.

M&As also influence organizational evolution. M&As increase intra-firm variations and change firm's resources configuration. As the effects of compatibility and complementarity show, finding "right" M&A partners allows a firm to engage in a future growth race through M&As. Finding a good "match" does not only free the new firm from expending important resources to solve internal conflicts, but also permits utilization of previously under-utilized resources. The effects of previous M&A experience and firm size suggest that firm capability to integrate internal diversity created by M&As is important as well.

Three M&A outcomes were distinguished. The firm that emerges after the merger faces at least three different ways to exit: it leaves the industry, it is taken over by a third firm, or it merges with another firm. Dissolution is a negative outcome, while I view the other two as positive outcomes. Three sets of antecedents were examined to account for

these outcomes: compatibility and complementarity of the two merging firms, as well as their asset accumulation before and after the merger.

While compatibility does not predict bankruptcy, it is a strong predictor for the new firm to be a take-over candidate and to become a bidder for other firms in the audit industry, with the effects of compatibility being most pronounced in the case of the new firm becoming an initiator of new acquisitions. Structural similarity has strong effects for the firm to engage in additional M&As, either as a bidder or as a target. Finally, asset accumulation, again, is a strong predictor for the firm to adopt an acquisitive strategy. Prior acquisitive behavior has a positive effect on all three possible outcomes. All these effects hold while controlling for significant historical political and regulatory events.

## **CHAPTER 4**

### ***EMPIRICAL VALIDITY OF DENSITY DEPENDENCE HYPOTHESIS: UNOBSERVED HETEROGENEITY AND FAILURE RATES***

During the past two decades, population ecology has contributed to organizational sociology by showing the importance of environmental factors in explaining founding and failing rates of organizations. Among those factors, the density, i.e., the number of organizations in a population, has been most emphasized. With some exceptions (e.g., Delacroix, Swaminathan, and Solt, 1989; Barnett and Amburgey, 1990; Baum and Oliver, 1992), extant studies on density dependence of founding and failing rates generally produced the results consistent with the hypothesis across diverse populations (see Singh and Lumsden, 1990 for a review; Hannan and Carroll, 1992).

The present study tests whether the strong support for density dependence of failing rates in previous studies is due to the unobserved heterogeneity<sup>3</sup>. Unobserved heterogeneity exists when at least one variable that affects the dependent variable is omitted. Therefore almost all of empirical studies suffer from the unobserved heterogeneity problem. The problem is serious especially when the inclusion of omitted variables alters the relationships that are found to exist in the observed model. Petersen and Koput (1991) raised this question about density dependence hypothesis. By using simulation, they showed that unobserved heterogeneity, independent of density dependence, could generate a positive relationship between the density and failing rates<sup>4</sup>.

In this chapter, I empirically test the robustness of the density dependence hypothesis by using the population data of the Dutch accounting firms. If the density

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<sup>3</sup>Lomi (1995) questioned the validity of the density dependence hypothesis in explaining organizational founding rates. He reported that regional density rather than national density was a better measure to explain organizational founding rates.

<sup>4</sup>Additional analysis of Hannan and Carroll (1992) by using the simulation model provided by Petersen and Koput showed that the results reported by Petersen and Koput (1991) were not typical.

dependence hypothesis could not be rejected when organizational innovation and firm-specific resources are introduced in the model, the hypothesis is robust. If I were to find a strong support for the hypothesis when I did not introduce organizational heterogeneity and if I could reject it when I introduced organizational heterogeneity in the model, the present study can suggest that strong supports for density dependence hypothesis in previous studies may be due to unobserved heterogeneity. Organizational heterogeneity controlled in this study includes the adoption of a partner-associate structure, an organization's relative size, the number of domestic offices, human and social capital that an organization has through its members, the founding type, and the number of organizational changes that an organization experienced. By controlling for fine-grained organizational level variables, this chapter can expose the strength of density dependence formulation.

### DENSITY DEPENDENCE HYPOTHESIS

Hannan and Freeman (1987, 1988, 1989) proposed a density dependence hypothesis of organizational founding and failure rates. The hypothesis posited that *the density will have a U-shaped relation with the failure rates and an inverted U-shaped relation with the founding rates*. Legitimation and competition processes lead to the hypothesis. The initial growth in density increases the legitimacy of organizational forms. The enhanced legitimacy lowers the failing rates and elevates founding rates. The process leads to rapid growth in density during the early stage of population development. When density grows high enough, the additional growth in density does not enhance the legitimacy but instead increases competition among organizations. The competition process elevates the failing rate and lowers the founding rate and results in the decline of density and stabilization during the late stage of population development. With some exceptions, extant studies produced results that are consistent with the theory over diverse

populations and from diverse geographical areas (see Singh and Lumsden, 1990 for a review and Hannan and Carroll, 1992).

Winter (1990) claimed that large firms contribute more to the competition and industry evolution than small firms. To deal with Winter's claim, Hannan and Carroll (1992) introduced mass dependence. The mass is the population density with each organization weighted by its size. Mass dependence interpretations were based on the recognition of size heterogeneity since, without size heterogeneity, total mass will have perfect linear relation with the density. Hannan and Carroll (1992) added the total mass and organizational size in estimating failing rates. They found that density still had a significant and consistent U-shaped relationship with failing rates. They concluded that these findings favored density dependence of failing rates over a mass-dependence explanation. However, they did not have the data for population mass and organizational size over much of the long periods studied. They, consequently, could not effectively control the influence of population mass and organizational size on failing rates. Their conclusion was misleading. In a study of failure rates in the population of Manhattan banks over the two hundred year history, Banaszak-Holl (1991) also reported a U-shaped relationship between density and failure rates even when size of bank and mass of the population were added in the model as time varying covariates. Her results provided strong support for the density dependence hypothesis.

### **CRITICISMS AND INCONSISTENT FINDINGS**

Despite the strong empirical support for the density dependence hypothesis, the ecological paradigm has been criticized on the bases of its conceptual validity and the precision of measurements. Young (1988) argued that the biological analogy of gene, species, and population cannot be applied to organizations managed by human beings. Other scholars criticized the validity of the homogeneity assumption under which the

density dependence hypothesis was formulated. Earlier formulations of population ecology emphasized the importance of heterogeneity in the evolution of population. Organizations differ across diverse dimensions in formulation. They can differ in terms of size, organizational form, and organizational resources (Hannan and Freeman, 1977). Hannan and Freeman's (1977) fitness theory was based on the assumption of firm heterogeneity. Freeman and Hannan's study on the survival of specialists and generalists interacting with environmental characteristics (Freeman and Hannan, 1983, 1987) illustrated the importance of organizational heterogeneity in the population ecology. Aldrich's (1979) notion of variation also stressed organizational heterogeneity. Under the condition of heterogeneity, the environment-induced negative selection can reinforce organizations without viable characteristics (Hannan and Freeman, 1977; Aldrich, 1979).

Later development on the density dependence hypothesis (Hannan and Freeman, 1987, 1988; Carroll and Hannan, 1989b), however, introduced homogeneity assumption. It assumed that each organization contributes the same degree of legitimacy of the population and produces same degree of competition with other organizations. With this assumption, Hannan and Freeman's (1977) original ideas of "the maximization by the selection environment" can not be explored. In empirical studies on density dependence, organizations are heterogeneous only with respect to their age, age cohort, and their organizational size.

In contrast with the density dependence hypothesis, evolutionary economics (Nelson and Winter, 1982; Winter, 1990) and the resource based view of the firm (Penrose, 1959) adopted the assumption of organizational heterogeneity rather than homogeneity. Evolutionary economics begins with the assumption that organizations have divergent competencies or technologies. An entrepreneur's entry (Schumpeter, 1934) or an incumbent's innovative search (Nelson and Winter, 1982) are among the events that generate organizational heterogeneity. Under the condition of heterogeneity,

the selection mechanism reinforces viable organizations by granting them more resources. The assumptions of organizational heterogeneity and the existence of selection mechanisms are consistent with the fitness theory of the early Hannan and Freeman (1977) but inconsistent with their density dependence. In sum, scholars who emphasize organizational heterogeneity are more interested in *what kinds of organizations* perform better, while density dependence based theory in population ecology is more interested in *what conditions* render organizations prone to emerge or fail.

Concern with measurement issues is related to the conceptual development regarding legitimacy and competition. Zucker (1989) and Delacroix and Rao (1994) claimed that the density is not a good legitimacy proxy of organizational forms. Winter (1990) questioned the validity of density in measuring competition and recommended instead firm size and location. Baum and Mezias (1992) and Baum and Singh (1994a, 1994b) acknowledged the importance of organizational heterogeneity and formulated localized competition, under which organizations are more likely to compete with similar organizations than with dissimilar ones. The recognition of organizational heterogeneity itself questioned the validity of density as a measure of the degree of competition.

Some studies included organizational-level characteristics in estimating the effect of density on vital rates and reported findings that were discrepant with the density dependence hypothesis. With data of Pennsylvania telephone companies, Barnett and Amburgey (1990) showed density to have a major effect on founding and failure rates, with the relationship being curvilinear as predicted by the density dependence hypothesis. In contrast, when population mass was included in the equation, only competition, but not legitimation, was related with founding and failure rates. In other words, the first-order density had a negative effect on founding rates and a positive effect on failure rates, while the effects of density squared term disappeared from the equation. Baum and Oliver (1992) reported similar findings. In an effort to model the effects of external ties on

founding and failure rates, they included the number of ties that organizations had with their institutional environments. Whereas they found a strong support for the density dependence hypothesis when the measure of external embeddedness was not included, they reported a pure competition effect of density with the inclusion of embeddedness. The two studies provided some doubts on the empirical validity of density dependence hypothesis.

### **COMPETING EXPLANATIONS: INNOVATIONS AND COMPETITION**

Other than the conceptual and measurement issues, some scholars provided alternative explanations for a common pattern for which the density dependence model was formulated. The common pattern is slow initial growth in density with rapid acceleration, followed by a peak, and then decline and stabilization. Petersen and Koput (1991) showed that unobserved heterogeneity could generate the first-order effect of density on failing rates. They constructed a single population of 10,500 organizations consisting of five subpopulations with variable mortality rates that are constant over time and hence independent of density. In each period, they created equal numbers of organizations in each subpopulation. With the simulated population, Petersen and Koput found a negative relation between the density and the failure rates. When they controlled for the previously unobserved heterogeneity, the density did not have any effect on the failure rates. The reason was that organizations with low failing rates increased with the density, as organizations with high failure rates were removed from the population. Levinthal (1992) showed that the pure selection forces coupled with rational calculation of economic return of entry and exit could generate the U-shaped relation between the density and failure rates.

Scholars in evolutionary economics (e.g., Gort and Klepper, 1982; Winter, 1984; Klepper and Graddy, 1990; Jovanovic and MacDonald, 1994) provided other reasons to



explain the same trajectory of density: the initial growth in density, shake-outs, and stabilization. They dealt with competition among organizations *with heterogeneous competencies*. Organizational heterogeneity in an industry is a regularity rather than an exception (Lippman and Rumelt, 1982; Iwai, 1984a). Rational decisions of entry and exit, innovations and imitations, and competition among heterogeneous organizations can lead to equivalent trajectories of density. Their underlying assumptions are *heterogeneity* among organizations and market selection mechanisms.

Innovative search processes generate organizational heterogeneity in Winter's (1984) model. Uncertain imitability (Lippman and Rumelt, 1982) as well as the innovations of new entrants and incumbent organizations (Schumpeter, 1934; Nelson and Winter, 1982; Iwai, 1984b) contributes to the persistence of heterogeneity among firms that produce homogeneous product. By using simulations, Winter (1984) showed that Schumpeter's two innovation regimes generated the same density trajectory as described in population ecology up to some point. Gort and Klepper (1982) collected the historical trends of the number of organizations, outputs, and price as well as technological innovations in the industry of 46 new products. They found the same density trajectory as described in population ecology in most of aged industries. They reported that the frequencies and characteristics of technological innovations could well explain the changes in density.

Product life cycle formulations (e.g., Abernathy and Townsend, 1975; Utterback and Abernathy, 1975; Abernathy, 1978; Utterback, 1979) also explained the equivalent historical trajectory of density. In the early stage of industry development, producers have uncertainty over what the customers want. Customers also have uncertainty about their needs and desirable characteristics of a product because the product is new to them. Due to the uncertainty, producers use heterogeneous technologies and produce heterogeneous products. Because of the uncertainty and heterogeneity, customers cannot directly

compare the products of diverse producers. It means that the selection mechanism is not strong. Because of the initial uncertainty and worry on the entry of more efficient producers, incumbent producers hesitate to increase their scale even though they are most efficient at the time of decision (e.g., Porter and Spence, 1982). With increasing demand over time, the period can be characterized by the high entry and exit rate as well as the increase in density.

As "*dominant designs*" emerge, organizations capable to produce the dominant designs drive out others from the industry. Furthermore, the standardization of product features enables customers to compare the prices and qualities of products and thus generates a strong selection environment. The customer's selection drives out organizations that cannot produce the dominant design and that cannot produce it efficiently. The emergence of a dominant design is also related to the emergence of process technology that enables the large scale operation. The emergence of dominant designs and standardized product and process technology, combined with its decreasing effects on the producers' uncertainty, result in the emergence of large producers. The large producers drive out the small producers from the market. This period can be characterized as the period of "shake-outs."

After the emergence of dominant designs, product innovations become incremental (Abernathy and Utterback, 1975). The slowdown of major innovations stabilizes the number of organizations in the industry. Studies on the automobile and airframe industries (Klein, 1977) as well as on the steel, petroleum, and tire industries (Mansfield, 1962) provided the suggestive evidence of product life cycle explanations.

Stobaugh (1988) applied the product life cycle formulation to non-assembled products. The number of methanol producers in the US monotonically increased during the period 1926-1966 from 1 to 15. After 1966, the number monotonically decreased until 1973 when there were 9 producers (Stobaugh, 1988: 120-121). The average annual

production per manufacturer grew from 2.8 million gallons in 1930 to 118 million gallons in 1973. The decrease in the number of producers and the sharp increase of the average annual production per methanol manufacturers after 1966 can be attributed to the introduction of a major process innovation: a low-pressure process to produce methanol. The low-pressure process, that Imperial Chemical Industries (ICI) first introduced in 1966, had tremendous cost advantages. The advantages included "higher efficiency, lower energy consumption, longer catalyst life, increased reliability, lower maintenance costs, and *greater economies of scale from large plants*" (Italic: my emphasis, Stobaugh, 1988: 116). ICI's low-pressure technology and an imitative innovation of Lurgi Minerraloltechnik forced existing plants to be shut down or to convert to the new process. By 1982, all methanol produced in the US was based on the low-pressure process. In sum, the introduction and diffusion of a low-pressure process to manufacture methanol determined the industry density, i.e., the number of manufacturers. The study illustrated the importance of technological innovation and competition in shaping industry structure.

In sum, evolutionary economics and product life cycle formulations provided an alternative reason for describing the density trajectory. The common underlying constructs are organizational heterogeneity and selection mechanism rather than the legitimation and competition emanated from density itself.

## DATA AND METHODS

### *Data Collection*

The data of this study cover the entire population of Dutch accounting firms during the period 1880-1990. Firm level data were extracted from membership directories of accounting associations that merged into a single association in 1966, currently called "NIVRA" or "Nederlands Instituut van Registeraccountants" (Netherlands Institute of Certified Public Accountants). During the first eight decades,

there were numerous associations, each with their own membership roster until they merged into a single association in 1966. The directories provide information about the members of associations and accounting firms.

The individual level data were collected with one to five year intervals, depending on the availability of directories. Before 1970, there are one four year interval (1919-1923) and one five year interval (1941-1946). From 1970 to 1974, each year was recorded, while after 1974, every fourth year was recorded. Individual level data included accountant's name, address, education, and status in the firm, if applicable. Also included in the directories is the employment affiliation, i.e. name of audit firm, business firm, or governmental agencies. The directories also provide the name of cities where each accounting firm had an office. Further details are provided by Majoor, et al. (1993).

### *Analytic Strategy*

Many studies on the density dependence used only founding and dissolving dates or years. To replicate the density dependence of failure rates, I assumed that I had information about only founding and dissolving years. If I found strong predicted effects of density on organizational failure rates, it indicated that the sample I am using is not a peculiar sample. With the data, I identified the model that has the best goodness of fit. The model was used as a base line model for the additional analysis that included proxies of organizational heterogeneity.

In the second set of models, I introduced organizational level characteristics beyond those included in the first set of models. If the density dependence hypothesis could be rejected in the second sets of equations, the results would suggest that the strong supports for the density dependence in previous studies may be due to unobserved

heterogeneity. If I could not reject it, the findings may indicate that density dependence formulation may be a robust formulation in the population of the present study.

***Measures for the First Set of Equations (Replication of Previous Investigations)***

The year of an organization's founding was measured by the year that the organization was first registered in the directory. The year that its name permanently disappeared from the directory measured dissolving year. The number of firms at a focal time measured the *density*. To take into accounts the competition level at the time of founding (Carroll and Hannan, 1989a), I controlled the *density at founding*. Carroll and Hannan's density delay hypothesis posited that organizations founded at high density have high failing rates because they are forced to occupy peripheral and non-affluent niches and do not have the opportunity to accumulate resources to migrate to affluent niches. The number of firms at the time of a focal firm's founding indicated the density at founding.

Also controlled was *organizational age*. The liability of newness argument (Stinchcombe, 1965; Hannan and Freeman, 1984) holds that young organizations have higher failure rates due to the lack of established rules and of legitimacy in the web of organizational networks. Organizational age was measured by years elapsed after founding. The density at founding and organizational age are the indicators of organizational heterogeneity. To replicate the previous studies on the density dependence that controlled the density at founding and organizational age, I controlled them in investigating the density dependence of organizational dissolution.

I also controlled *the annual average numbers of foundings and failures during the previous observation period* as time-varying covariates. Delacroix, Swaminathan, and Solt (1989) argued that these two numbers have a negative effect on failing rates. The number of prior foundings indicates the existence of a new niche into which existing organizations could migrate. The possibility of migration into a new niche renders the

association between prior foundings and dissolution rate negative. They also maintained that prior failings free up resources that can be used by survivors. The availability of resources freed up by dissolving organizations decreases the failure rates of survivors. Since I had non-uniform observation intervals, I used the annual average numbers of foundings and failures during previous observation intervals.

I controlled for proxies of "history", including World War II, Indonesia's independence in 1949, and significant changes in regulations that governed the accounting profession and its clients (1971-1973 and 1984-1989). Specifying the length of the effect of these events, especially those for regulations, is not easy. The effects of World War II and Indonesia's independence would be short-lived. World War II was specified as if it would have effects during the period 1941-1947 and Indonesia's independence during the period of 1949-1951. Government regulations during 1914-1918 and 1929 that dealt with a short-term political and economic changes may not have long-lasting effects on the dissolving rates. The government regulation during 1914-1918 was modeled to have its effect during 1914 to 1920. The government regulation of 1929 was modeled to have its effect during 1929 and 1931. Significant changes in the regulations such as the mandatory auditing of all listed firms, which changed the demand for audit services, would have persistent effects on the industry until the abolition of the regulation itself. Because the regulations were still effective in 1990, the regulations were specified as if they would have effects during the entire period following the onset of the regulations. Also controlled was the period when there was a single powerful accountant association in the Netherlands. Since the single association was established in 1966, I used a dummy variable that was set to 1 after 1966, 0 otherwise.

I also controlled the observation intervals. The possibility of dissolution during a focal time  $t$  and time  $t+d$  will depend on the length of  $d$ . The possibility may be positively related to the length. As mentioned before,  $d$  ranged from one to five years. I

introduced four dummies to handle these nonuniform observation intervals. To obtain a parsimonious model, I also tried the natural logarithm of  $d$ . I also introduced four dummies to represent the length of *previous* observation interval. The reason was that the observed annual average number of foundings and failures during the *previous* observation interval would depend on the length of the previous observation interval. When I measured the number of foundings and failures with a 5 year interval, for instance, the organizations that were both founded and dissolved during the interval were not counted as foundings or failures. These organizations would be counted as foundings and failures if I observed them with one year observation intervals.

Figure 4-1 presents the historical variation of density and the number of single proprietors. Figure 4-2 presents the historical variation of foundings and failures. Since the data used in this study have non-uniform observation intervals, I presented the annual average number of foundings and failures in Figure 4-2.

**Insert Figure 4-1 about Here**

**Insert Figure 4-2 about Here**

### ***Measures for the Second Set of Equations: Introducing Organizational Heterogeneity***

In the second sets of equations, I introduced organizational level characteristics. Data on accountants were aggregated to produce organizational level information. Organizational foundings, deaths, and changes were measured by examining the changes of an accountant's organizational affiliation. Organizational changes, examined in this study, included merger, acquisition, split, and name change. Name changes were recorded when a firm's name differed from its previous one, provided two-thirds or more of its partners continued their affiliation with the firm. The name changes did not include changes due to merger or "cosmetic" name changes such as modifications in the order of

named partners, or additions of the Dutch equivalents of "Accountants" or "Registered" and "Limited Liability" to the firm's original name.

Organizational splits were recorded when at least two partners left and formed a new firm while the remaining firm continued under its own name. When the defecting partners joined another firm, the departure was not treated as a split but as a lateral movement. The holder of the name of the existing firm was regarded as a continuation of the existing firm.

When two or more firms joined together and adopted one of the pre-existing names, the event was coded as an acquisition. The firm that maintained its name was coded as an acquirer, and the others were coded as the acquired firms. When two or more firms joined together and adopted a new name, the event was coded as a merger. Continuation of the firm was assigned to the largest of the involving firms. Other smaller counterparts were treated as merged firms. When the size of the involved firms was equal, the new firm was treated as the continuation of the firm whose name is alphabetically ahead. In identifying the events, I used the criterion of two-thirds of partners. That is, two-thirds or more of the partners should join a new firm to be considered as a counterpart of merger or acquisition. Since member rosters provided the data for this study, I did not have any information whether departing partners left the firm before the changes or after the changes. The decision rule of treating the new firm as a continuation of one of two or more existing firms in these cases is unavoidable, since event history analysis precludes the treatment of an observation as the continuation of two different entities.

Organizational founding was coded when a new name was listed in the directories for the first time without merger or name change. A firm founded by the split of partners from existing firms was also treated as a founding. Termination was flagged when a firm's name was permanently delisted from the directories without merger or name



change. The density, density at founding, the number of foundings and failures were constructed based on the new measure of organizational foundings and failures.

Based on the new measures for organizational foundings and failures, I constructed organizational level variables. I controlled the types of foundings. A dummy was created to control the founding type. It was set to 1 if it was founded by a split from an existing organization, 0 otherwise. I also controlled the number of organizational changes that a focal firm experienced. They included the cumulative number of mergers, acquisitions, splits, and name changes. If organizational changes hampered the reliability of organizations and reset the liability of newness clock (Hannan and Freeman, 1984; Amburgey, Kelley, and Barnett, 1993), they would increase the dissolution rates. Also controlled were the number of a focal organization's domestic offices, and its relative size. The number of accountants associated with a focal firm divided by the number of accountants in the industry at a focal time proxied the relative size. To incorporate Winter's (1990) claim that large firms generate more competition than small firms, I constructed *population mass*. Population mass was measured by the number of accountants who were affiliated with all accounting firms in each observation period. To avoid competition pressure from a focal organization itself, I subtracted the focal firm's size from the population mass.

Other heterogeneity factors included human and social capital of organizations. As explained in Chapter 1 in this thesis, human and social capital that an organization developed is the most important competitive resources of accounting firms. Human capital was measured by using two variables, general human capital and firm-specific human capital of the firms. General human capital was measured by the proportion of CPAs among all CPAs in the firm who possessed a Master's or higher degree. Firm-specific human capital of a firm was measured by the average of CPA's firm-specific human capital. The CPA's firm-specific human capital was measured by the natural

logarithm of his tenure in the focal accounting firm. The speed of firm-specific knowledge accumulation was assumed to decrease over the tenure of the CPA. This assumption is well accepted in labor economics.

Social capital was proxied by two measures. One was the proportion of CPAs among all CPAs in the firm who had worked in other industries or government. The other was the proportion of accountants among quitters who left the firm within the previous 10 years to work for other industries or government but never came back to the accounting industry. A ten year span was adopted, not only because the strength of network ties decreases with time, but also because the quitters are bound to retire from the business world and provided no longer any value to the firm. For comparison, 5 and 15 year spans were also tested. The sensitivity analysis showed that the results reported here were not significantly different.

I also controlled the adoption of structural innovation (a partner-associate structure). As I explained in Chapter 1 and 2 of this thesis, the partner-associate structure enabled organizations to accumulate human and social capital. The structure also enables the emergence of large accounting firms. Rather than using dummy variables for the adopters, I constructed a continuous variable, leverage ratio, to proxy the organizational structure. The leverage ratio was measured by the number of associate accountants divided by the number of partners.

Figure 4-3 presents the historical variation of foundings and failures. As in Figure 4-2, I presented annual average number of foundings and failures to handle non-uniform observation intervals. When we compare Figure 4-2 and Figure 4-3, we can notice that the Dutch accounting industry experienced turbulence after 1960. According to Figure 4-2, there were many organizational foundings and failures after 1960. The decrease in the number of foundings and failures in Figure 4-3 after 1960 indicated that there were many organizational changes which were counted as organizational foundings

and failures in Figure 4-2. In fact, a great deal of mergers and acquisitions happened and many organizations changed their name after 1960.

**Insert Figure 4-3 about Here**

### ***Model and Estimation***

Empirical analysis of this study deals with time varying conditions that lead up to the organizational dissolution. Organizations that were alive in 1990 were treated as right-censored. Since the effect of organizational age was estimated as a time varying covariate, Cox's proportional hazard model could not be used for this study. Following Allison's (1982) recommendation, I employed discrete event history analysis. A discrete-time hazard rate is defined by:

$$P_{it} = \Pr [T_i = t \mid T_i \geq t, X_{it}],$$

where  $T$  is the discrete random variable giving the uncensored time of failure (Allison, 1982).  $P_{it}$  is the conditional probability that firm  $i$  will die at time  $t$ , given that it has not already died. Specifically, I used the complementary log-log function, since the model has an advantage over the logit function in handling nonuniform observation intervals. The complementary log-log function assumes that the data are generated by the continuous-time proportional hazard model and thus the coefficient vector is invariant to the length of the time intervals (Allison, 1982). The model is expressed as:

$$P_{it} = 1 - \exp [ - \exp(\alpha_t + X_{it} \beta)],$$

or

$$\log [ - \log (1 - P_{it})] = \alpha_t + X_{it} \beta,$$

where  $\alpha_t$  is a function of time,  $X_{it}$  is a row vector of the firm  $i$ 's state variable at time  $t$ ,  $\beta$  is a column vector of coefficients. In estimating the model, I specified

$$\alpha_t = \alpha_0 + \alpha_1 \log t.$$

All independent variables except the dummies for observational intervals were lagged by one observation period. In other words, environmental and population level variables and firm  $i$ 's state variables at time  $t$  were used as independent variables to explain the failure during time  $t$  and  $t+d$ , where  $d$  is the length of observational interval measured in years. A dummy for  $d$  was used as an independent variable to explain the failure during time  $t$  and  $t+d$ . The procedure with complementary log-log function in SAS (SAS Institute, 1990) was used to estimate the models.

## RESULTS

### *Replication of Previous Investigations*

When I assumed that I have information only on the founding and failing years, there have been 3062 organizations in the history of the Dutch accounting industry. Among them, 2561 accounting firms exited in one way or another before 1990. 501 firms including 354 firms founded in 1990 were still alive in 1990. Episode-splitting resulted in 11,119 firm-intervals. Table 4-1 presents the means, standard deviations, and the correlation matrix. These statistics are calculated on the basis of 2708 organizations founded before 1986 and 11,119 firm-intervals.

### **Insert Table 4-1 about Here**

Table 4-2 presents the results from regression analysis with complementary log-log function. In Model I, the density and squared term of density did not affect the failure rates. The log of age showed a significant and negative effect on dissolution rates, as predicted by the liability of newness hypothesis. As predicted by the density delay argument, density at founding also had a significant and positive effect on dissolution rates. It indicated that organizations founded at high density were more likely to die than organizations founded at low density.

**Insert Table 4-2 about Here**

In Model II, I added the numbers of prior foundings and failures. The incremental  $\chi^2$  test ( $\chi^2=339.79$ , d.f.=4,  $p < .001$ ) showed that the addition of four variables significantly enhanced the goodness of fit. When they were controlled, the density had a predicted U-shaped relation with dissolution rates. The numbers of prior foundings and failures had an invertedly U-shaped relation with dissolution rates. The influence of age and the density at founding was not changed from Model I. Since the first-order effect of prior failures was not significant, I deleted the variable from Model II to obtain a more parsimonious model. Model III presents the results. Based on Model III, I plotted the density against the probability of dissolution. Figure 4-4 presents the relationship between the probability of dissolution and the density when all other independent variables were set to zero. The figure shows that the density has a U-shaped relation with the probability of dissolution.

**Insert Figure 4-4 about Here**

As the significance level of the number of prior failures in Model II indicated, the deletion did not significantly change the log-likelihood ( $\chi^2=1.34$ , d.f.=1, not significant). I also ran a model with the number of prior failures instead of its squared term.  $\chi^2$  test ( $\chi^2 = 12.35$ , d.f.=1,  $p < .01$ ) to compare Model III with Model II revealed that the deletion of the squared term significantly deteriorated the goodness of fit. Therefore, I used Model III as a baseline model to investigate the robustness of density dependence hypothesis.

### ***Introducing Organizational Heterogeneity***

Table 4-3 presents the means, standard deviations, and correlation matrix for the second set of equations. These statistics are based on 7027 firm-intervals (1416 firms). The measure of organizational founding and failure, that was explained in the measurement section, generated 1805 accounting firms in the history of the Dutch accounting industry. 163 accounting firms disappeared temporarily from the directories. Among 1642 non-missing accounting firms, 1141 firms dissolved and 501 firms were alive in 1990. Among 1141 dissolved firms, 790 firms terminated, while 351 firms were the targets of mergers and acquisitions.

#### **Insert Table 4-3 about Here**

Table 4-4 presents the results from regression analyses with complementary log-log function. Model IV and V were based on the sample that I constructed by excluding temporarily disappeared firms from the population. When a temporarily disappeared firm disappeared temporarily from the directories, I did not include it in counting density, relative size, and mass. In Model IV, termination and being a target of merger and acquisition were treated as the same kind of events. Consistent with the density dependence hypothesis, the density had a significant U-shaped relation with dissolution rates. The density at founding also had a strong and positive effect on the dissolution rates. However, the effect of firm age disappeared in the model. The effects of variables proxying the population dynamics were not changed from Model III.

Among the organizational heterogeneity variables, relative size, leverage ratio, and the number of domestic offices had negative effects on the dissolution. The average firm-specific human capital had a U-shaped relation with the dissolution rates. The cumulative number of mergers that a focal organization participated in significantly increased the dissolution rates. Other organizational changes did not have any significant

effect in this model. Log of mass had a marginal positive effect on dissolution rates, suggesting that the emergence of large firms slightly increased the dissolution rates of small firms.

**Insert Table 4-4 about Here**

In Model V, I treated the last observation interval of organizations that were the target of mergers and acquisitions as right-censored. In the model, the density had a significant U-shaped relation with termination rates. Compared with its effect in Model IV, density became more significant in explaining termination. Other major changes in the results from Model IV were the effects of firm age, organization's social capital, and general human capital. Contradicting the liability of newness argument, the log of firm age had a positive effect on organizational termination. The organization's social capital and general human capital that an organization enjoys through its members had significant and negative influences on termination.

Model VI and VII were based on the sample when I resolved the issue of the temporarily disappeared firms through interpolation. I interpolated firm size, the human and social capital, the number of domestic offices, and the leverage ratio. It was based on the assumption that those firms were operating during their missing intervals but were not listed in the directories and that they changed linearly during those intervals. Because of this interpolation, the density, relative size, and mass differed from those measured for Model IV and V. Among 1304 dissolving firms, 911 firms experienced termination while 393 firms were a target of mergers and acquisitions.

In Model VI, I treated the termination and being a target of mergers and acquisitions as the same class of events (dissolution). Consistent with the density dependence hypothesis, density had a significant U-shaped relation with dissolution rates. The density at founding also had a strong and positive effect on the dissolution. However,

firm age had a positive effect on the dissolution rates. The effects of other variables were not significantly changed from Model IV.

In Model VII, I treated the last observation interval of organizations that were a target of mergers and acquisitions as right-censored. In the model, the density had a significant U-shaped relation with termination rates. Other major change in the results from Model V was the effect of firm age. The log of firm age had no effect on organizational termination. The results of Model VI and VII showed that the findings from the sample with non-temporarily disappeared firms were not sensitive to the specification of temporarily disappeared firms.

I also ran the same models from Model IV to Model VII with the sample that I treated the firms founded by a merger as a new firm, not as a continuation of one of the involving firms. The results were not significantly different from the results that I presented in Table 4-4. All the results suggested that the density had a stable and strong curvilinear effect on the organizational failures even when I controlled the major organizational heterogeneity variables.

To investigate the contribution of population ecology related variables in explaining organizational dissolution, I conducted a series of  $\chi^2$  tests. Table 4-5 presents the results of  $\chi^2$  tests. I used four models (Model IV, V, VI, and VII) as full models. From the full models, I constructed nested models by deleting population ecology related variables.

**Insert Table 4-5 about Here**

The tests revealed that the addition of population ecology related variables to the models with organizational heterogeneity and other control variables significantly improved the goodness of fit. The tests also strongly supported the density dependence hypothesis.



## DISCUSSION AND CONCLUSION

In the present study, I tested the robustness of density dependence hypothesis. The density had a strong and consistent U-shaped association with the organizational dissolution even when the major organizational level variables were controlled. The empirical analyses of the population of the Dutch accounting firms strongly supported Hannan and Freeman's density dependence hypothesis (Hannan and Freeman, 1987, 1989). The results also showed a strong support for Carroll and Hannan's density delay hypothesis (Carroll and Hannan, 1989a) even when the organizational characteristics were controlled. The natural logarithm of firm age did not have a predicted negative effect on organizational dissolution when organizational characteristics were controlled.

Delacroix et al. (1989) argued that the effects of prior foundings and failings instead of the density can explain the S-shaped growth curve of density. The present study showed that the density did not affect organizational dissolution when the numbers of prior foundings and failures were not controlled. The density, however, had a strong U-shaped relation with the dissolution rates when they were controlled. The number of prior foundings had an inverted U-shaped relation with the dissolution rates. It may suggest that a small number of prior foundings may increase the competition but that the large number of prior foundings may indicate the development of new niches. One possibility is the increasing demand for accounting and consulting services from small businesses and individuals. The number of prior failures had an accelerating negative influence on the dissolution rates. The findings favored Hannan and Carroll's (1992) argument that the density dependence hypothesis is not incompatible with the population dynamics argument (the effects of prior foundings and failures).

Since all empirical studies can suffer from unobserved heterogeneity, I cannot reject the possibility that the strong support for density dependence hypothesis in this study is due to other unobserved variables, for example stable network ties with large

sized clients or CPA's family background. However, the strong support for the density dependence hypothesis, even with fine-grained organizational level factors controlled, provides suggestive evidence.

When the literature of the innovation and market development was taken into accounts, the strong support for the density dependence hypothesis is somewhat surprising. The surprising finding may be related to the peculiarity of the accounting industry. Even when some accounting firms adopted an innovation (a partner-associate structure), these firms did not experience instantaneous growth rate and thus did not drive out small accounting firms from the market. The following reasons may account for the findings.

First, accounting firms have inertia in their structural arrangement. Accounting firms are usually structured as partnership. The partnership arrangement with unlimited liability may prohibit instantaneous growth of accounting firms. Under the arrangement, partners are responsible for the loss that other partners create. Accounting firms, consequently, are very conservative in hiring new partners or in promoting associates to partners. The arrangement constrains the instantaneous membership growth, even when a structural innovation (a PA structure) that enables a large partnership is adopted.

Second, there is a *relational inertia*, independent of intra-organizational inertia. As Levinthal and Fichman (1988) observed, the relationship between the accounting firms and their clients is stable rather than volatile. The relational specificity between the service-providers and their clients is responsible for the stable relation (Levinthal and Fichman, 1988). The difficulty experienced by clients in measuring the quality of accounting services may also be responsible for the stability. The difficulty renders the relational ties (social capital) central when the clients select their service-providers. The relational inertia prohibits rapid growth of accounting firms.

Third, the development of new market niches enables the small firms to survive. As the complexity of tax regulation has been increased, the demand of accounting services from small businesses and individuals has also been increased. Small businesses and individuals are more price sensitive than large corporate clients. Premium pricing by large accounting firms makes price-sensitive small clients choose small accounting firms. Small clients also prefer service providers that are easily accessible. As a result, we can observe a positive relationship between the size of the client business and the size of professional service providers.

In sum, internal and relational inertia that accounting firms have prevent them from growing instantaneously and thus from driving out small firms from the market. The small accounting firms also may proactively respond to the competitive pressure generated by the emergence of large accounting firms by migrating into new market niches. Because of those reasons, we observed the steady increase in the number of single proprietors accompanied with the emergence of large accounting firms in the history of the Dutch accounting industry.

The present study showed that the density had a predicted U-shaped relation with the organizational dissolution rates even when fine-grained proxies for organizational heterogeneity were controlled. The findings supported Hannan and Carroll's (1992) argument that the density dependence argument is compatible with innovation literature. Having strong structural inertia forces, the organizations investigated here had a limit on instantaneous organizational growth. Future studies on populations in which innovations led instantaneous organizational growth may provide more information about the compatibility of density dependence hypothesis and the literature of evolutionary economics.

**CHAPTER 5****SUMMARY AND CONCLUSION****SUMMARY**

In this dissertation, I examined the evolution of the Dutch accounting industry from its inception. The industry has changed significantly in terms of its firm-size distribution of the organizations. The size inequality among accounting firms has increased up to the present time. To understand the transformation of the industry, I surveyed the peculiarities of professional service firms on dimensions of their inputs, outputs, collaboration, and internal control mechanism in Chapter 1. That chapter also dealt with a partner-associate structure. The structure has been the most significant structural element in PSFs. Two major industry endogenous factors were identified to be partly responsible for the changes of size distribution. One is the emergence of a partner-associate structure and its diffusion. The other is the mergers and acquisitions among accounting firms. In three empirical papers, I explored these issues in depth. Chapter 2 was devoted to explore the antecedents of the adoption of the PA structure. In Chapter 3, I examined the events that firms founded by mergers and acquisitions experienced. I examined the empirical validity of density dependence hypothesis by introducing fine-grained organizational factors in Chapter 4.

Chapter 2 explored adoption of the partner - associate (PA) structure among Dutch accounting firms. The PA structure is an innovation that emerged for the first time after World War I and spread later among numerous professional services firms. I distinguished population level factors from firm level ones, and at each level examined the role of "technical efficiency" and "institutional" conditions in accounting for adoption. The history of the Dutch accounting firms revealed that adopters of the PA structure experienced higher survival and growth rate than non-adopters. Empirical

analysis for the adoption showed that adoption propensity is positively associated with market signaling (advantage of the PA structure indicated by previous market selection), the level of PA diffusion, complementary needs, absorptive capacity, and social networks that are mediated by organizational members. The results also suggested that the market signaling, a technical efficiency factor, has a stronger influence during early diffusion periods, while the level of PA diffusion, an institutional factor, has stronger effect during later periods. Organizational level factors, however, had persistent effects on the adoption propensity even during later diffusion periods. The findings led us to argue that organizational form cannot be solely accounted for by population characteristics. I concluded, therefore, that future research ought to focus on firm-endogenous factors as well.

Taking an evolutionary perspective, Chapter 3 examined the effects of resource complementarity and organizational compatibility on merger and acquisition (M&A) outcomes. Complementarities were measured along the dimensions of human and social capital and office location of involving organizations. Organizational compatibility was measured in terms of firm age, size, organizational structure, and the existence of networks among the members of the firms. The influence of firms' previous M&A experiences was also explored. The chapter investigated three classes of events following M&A: organizational dissolution, being a target of successful M&A, and being an initiator of additional M&A. Using multinomial logit model for repeated-event history analysis that reflects dynamics of organizational evolution, the chapter tested the relations against 357 mergers and acquisitions in the history of the Dutch accounting industry.

Investigation of the history of large Dutch accounting firms showed that most of them were created by M&As. It indicated that M&As have been a route to the emergence of large accounting firms. The multinomial logit analysis showed that firms founded by an M&A of complementary and compatible firms performed better than others. The

results also indicated that firms that were unable to handle internal variations brought about by previous M&As experienced high dissolution rates. Firms that were successful in dealing with those variations were more likely to utilize M&A specific knowledge by engaging in additional M&As.

Chapter 4 was devoted to explore the empirical validity of density-dependence hypothesis by introducing organizational characteristics as well as population characteristics in estimating organizational dissolution rates. The question was whether the strong support for the density dependence hypothesis in previous studies is due to the unobserved heterogeneity. Empirical analysis showed that the density has a strong U-shaped relationship with organizational dissolution even when fine-grained organizational level variables are controlled. The analysis provided strong support for density dependence hypothesis.

## CONCLUSION

### *Organizational Resources, Environmental Factors, and Organizational Failures*

While population ecology (Hannan and Freeman, 1984) has stressed the importance of environmental factors, the literature in strategic management (e.g., Penrose, 1959) has emphasized organizational resources in explaining organizational success. Chapter 2 and 3 showed that intra-organizational conditions as well as environmental factors influenced the organizational level decision (adoption of PA structure in Chapter 2 and additional M&A in Chapter 3). The decision, in turn, alters the organization's destiny. Chapter 4 also showed that both environmental factors, especially density, and organizational resources explain organizational failures.

### ***Social Networks and Organizational Level Behavior***

This thesis showed that organizational behaviors are embedded in the webs of social relations mediated by its members. The social networks can be a route of information transfer and a route of conformity pressure. Social networks among accountants are important factors in explaining the adoption of a PA structure in Chapter 2. Chapter 3 showed that existing ties among members of M&A involving firms significantly decreased the possibility that the firm initiate additional M&A. Empirical analysis in Chapter 4 showed that social capital, i.e., an organization's network ties with client sectors, enhanced the survival chances of organizations.

A contagion model as opposed to a structural equivalence model was incorporated in exploring the role of social networks in this thesis. The former posits that the entities closely tied with each other will exhibit similar behavioral patterns, while the latter maintains that the entities sharing similar relational ties will have similar behavioral patterns (Burt, 1987; Strang and Tuma, 1993). Future research can compare the strength of two models in exploring the adoption of a PA structure.

### ***Organizational Evolution and Population Evolution***

Population ecology and evolutionary economics provide differing view on the reasons of industry or population evolution. Both of them emphasize the role of selection by the environment or market. They differ in explaining the sources of population level variation. Population ecology emphasize the organizational foundings as a source of variation at the population level, while evolutionary economics stress both the foundings by entrepreneurs and the innovations by incumbent organizations.

*Population ecology* explains the changes of population characteristics by using the founding and dissolution rates of organizations rather than the structural changes of incumbent organizations (Hannan and Carroll, 1992; Hannan and Freeman, 1977, 1984,

1989). The rationale for studying founding and failure rates is structural inertia and the detrimental effects of organizational changes (Hannan and Freeman, 1984). The argument here is that organizations have difficulty in changing their structure and any attempt to alter organizational structure increases the possibility of failure. Organizations have limited abilities to adapt their design to the environment (Hannan and Freeman, 1977, 1984). Inertial forces arise from both internal arrangements and external constraints. Internal sources of inertia include sunk cost, limited information on the part of decision makers, internal politics, and constraints generated by the organization's history. External constraints include barriers to exit and entry, limits to gathering external information, and external legitimacy claims (Hannan and Freeman, 1977).

*Evolutionary economics* investigates the creation and diffusion of organizational routines for explaining industry evolution. Still major routines in the center of Nelson and Winter's work are related to technological innovations (Nelson and Winter, 1978, 1982). Some innovative firms can find and adopt a viable structure and enjoy a high return and growth based on the structure. Other firms engaged in imitative search can find the optimal relation between organizational structure and performance by investigating what other firms are doing and might mimic those organizations which have a viable structure. Firms that can not adopt the structure may show low performance levels or they may be driven out of the market altogether. By this market competition process, organizations with successful routines can increase their market share until even more successful routines are introduced.

Favoring evolutionary economics, Chapter 2 and 3 showed that the organizations can conduct changes in their core structure (adoption of the PA structure in Chapter 2 and M&As in Chapter 3) and that the decisions by incumbent organizations provide variation at the population level. Based on inter-firm variation, the negative selection by the environment reinforces organizations with viable structure or resources. This thesis can



furnish important insights on the interaction between organizational and population evolution (Baum and Singh, 1994c). Organizational level evolution, especially organization's strategic behavior, provides the variation at the population level and population level evolution changes the context on which organizational behaviors are anchored.

**TABLE 2-1**  
**Means, Standard Deviations, and Correlations for the Study of PA Adoption\***

Variables	Mean	S. D.	1	2	3	4	5	6	7	8	9
1. Adoption	0.0667	0.2494									
2. Market signaling	7.8413	6.6667	0.07								
3. Proportion of PA firms	0.1767	0.0487	0.03	0.11							
4. Diversity of origin	0.0223	0.0985	0.15	0.01	-0.04						
5. Diversity of education	0.0365	0.1257	0.22	0.08	0.01	0.19					
6. Diversity of industry tenure	0.7416	2.7167	0.21	0.02	-0.02	0.39	0.42				
7. Social networks	0.1763	0.3603	0.08	-0.11	-0.15	0.16	0.16	0.15			
8. Absorptive capacity	0.2609	0.4273	0.12	0.19	0.07	0.12	0.24	0.20	0.04		
9. Firm's Age	8.6719	10.3822	0.02	-0.04	0.03	0.08	0.09	0.16	0.15	0.08	
10. Firm size	1.5029	5.7966	0.14	0.05	-0.01	0.11	0.15	0.16	0.03	0.12	0.02
11. Cumulative number of mergers	0.0281	0.298	0.03	0.03	0.00	0.12	0.16	0.10	0.03	0.06	0.10
12. Cumulative number of acquisitions	0.0640	0.4186	0.06	-0.03	0.00	0.06	0.09	0.10	0.06	0.12	0.45
13. Cumulative number of splits	0.0083	0.1224	0.02	0.00	-0.01	0.12	0.05	0.08	0.01	0.05	0.25
14. Cumulative number of name changes	0.0864	0.3084	0.09	0.00	0.02	0.13	0.18	0.21	0.18	0.10	0.28
15. Number of offices	1.3151	1.1819	0.19	0.11	0.00	0.15	0.17	0.19	0.07	0.16	0.03
16. National niche	0.5364	0.5845	0.08	-0.28	-0.07	0.08	0.07	0.14	0.10	0.00	0.08
17. Log of observation interval	0.6234	0.4931	0.06	0.39	0.06	0.01	0.01	0.00	-0.01	0.07	0.00
18. World War II	0.0186	0.1352	0.00	-0.12	-0.04	0.02	0.03	0.01	0.04	0.00	0.04
19. Indonesia independence	0.057	0.2319	0.01	-0.19	-0.08	0.04	0.01	0.07	-0.05	-0.04	-0.03
20. Regulation of 71-73	0.254	0.4354	0.05	0.87	0.01	0.03	0.07	0.02	-0.07	0.17	-0.01
21. Regulation of 84-89	0.0518	0.2217	0.07	0.56	-0.03	-0.01	0.02	0.01	-0.04	0.09	-0.05
22. Period dummy(year>62)	0.5	0.5001	-0.03	0.78	0.24	-0.01	0.06	-0.01	-0.11	0.16	-0.01

\*Based on 4456 firm-intervals

(Continued)

Variables	10	11	12	13	14	15	16	17	18	19	20	21
1. Adoption												
2. Market signaling												
3. Proportion of PA firms												
4. Diversity of origin												
5. Diversity of education												
6. Diversity of industry tenure												
7. Social networks												
8. Absorptive capacity												
9. Firm's Age												
10. Firm size												
11. Cumulative number of mergers	0.07											
12. Cumulative number of acquisitions	0.06	0.06										
13. Cumulative number of splits	0.02	-0.01	0.42									
14. Cumulative number of name changes	0.04	0.05	0.17	0.13								
15. Number of offices	0.50	0.19	0.07	0.02	0.12							
16. National niche	0.14	0.05	0.04	0.02	0.08	0.30						
17. Log of observation interval	0.03	-0.05	-0.01	-0.01	0.02	0.04	-0.07					
18. World War II	0.00	-0.01	0.00	-0.01	0.02	-0.01	0.04	0.28				
19. Indonesia independence	0.00	-0.01	0.04	0.03	0.00	0.01	0.10	-0.22	-0.03			
20. Regulation of 71-73	0.04	0.02	-0.03	0.00	-0.01	0.09	-0.22	0.36	-0.08	-0.14		
21. Regulation of 84-89	0.06	-0.02	-0.01	-0.01	0.00	0.06	-0.14	0.36	-0.03	-0.06	0.00	
22. Period dummy(year>62)	0.03	0.06	-0.03	-0.02	0.01	0.07	-0.26	0.13	-0.14	-0.25	0.00	0.00

**TABLE 2-2**  
**Regression Results of PA Adoption**  
 (4456 firm-intervals: 273 adopters)

Variables	Model I		Model II	
	B	S.E.	B	S.E.
Intercept	-4.918***	.334	-5.560***	.434
<b>External Factors:</b>				
Market Signaling	.047**	.024	1.019***	.342
Proportion of PA Firms	4.380***	1.484	-7.503	4.787
<b>Internal Factors:</b>				
Heterogeneity of Partner's Origin	1.012**	.409	1.096***	.411
Heterogeneity of Partner's Educational Level	1.567***	.343	1.558***	.343
Heterogeneity of Partner's Industry Tenure	.027*	.015	.025	.015
Absorptive Capacity	.306**	.140	.324**	.140
Social Networks	.495***	.153	.513***	.153
<b>Control Variables (Firm):</b>				
Firm's Age	-.011	.007	-.009	.007
Firm's Size	.289***	.045	.286***	.046
Cumulative Number of Mergers	-.236	.179	-.218	.175
Cumulative Number of Acquisitions	.141	.138	.146	.138
Cumulative Number of Splits	-.305	.385	-.295	.391
Cumulative Number of Name Changes	.176	.144	.178	.143
Number of Domestic Offices	.054	.037	.053	.037
Number of Offices in 4 Largest Dutch Cities	.103	.099	.100	.099
<b>Control Variables (Industry):</b>				
Log of Interval Length	.294*	.159	.276	.195
Government Regulation: 1971-1973	-.646**	.324	-.795*	.407
Government Regulation: 1984-1989	.383	.281	.192	.359
World War II: 1941-1945	-.068	.461	.365	.493
Indonesia's Independence: 1949	.368	.257	.331	.267
Period (1 if Year > 1962)			.175	1.248
<b>Interaction with Period Dummy:</b>				
Market Signaling * Period			-.941***	.348
Proportion of PA Firms * Period			12.416**	6.151
Heterogeneity of Origin*Period				
Heterogeneity of Education*Period				
Heterogeneity of Industry Tenure*Period				
Absorptive Capacity*Period				
Social Networks*Period				
Log-Likelihood	-931.083		-925.623	
Degrees of Freedom	20		23	

Note: \*:  $p < .10$ ; \*\*:  $p < .05$ ; \*\*\*:  $p < .01$  (Two-tailed test)

(Continued)

Variables	Model III	
	B	SE
Intercept	-5.598***	.447
<b>External Factors:</b>		
Market Signaling	1.030***	.345
Proportion of PA Firms	-7.517	4.838
<b>Internal Factors:</b>		
Heterogeneity of Partner's Origin	1.228**	.580
Heterogeneity of Partner's Educational Level	1.608***	.505
Heterogeneity of Partner's Industry Tenure	.026	.019
Absorptive Capacity	.288	.230
Social Networks	.535**	.224
<b>Control Variables (Firm):</b>		
Firm's Age	-.010	.007
Firm's Size	.288***	.047
Cumulative Number of Mergers	-.215	.177
Cumulative Number of Acquisitions	.147	.139
Cumulative Number of Splits	-.302	.391
Cumulative Number of Name Changes	.188	.144
Number of Domestic Offices	.052	.037
Number of Offices in 4 Largest Dutch Cities	.096	.102
<b>Control Variables (Industry):</b>		
Log of Interval Length	.271	.196
Government Regulation: 1971-1973	-.788*	.407
Government Regulation: 1984-1989	.186	.360
World War II: 1941-1945	.369	.495
Indonesia's Independence: 1949	.321	.271
Period (1 if Year > 1962)	.248	1.267
<b>Interaction with Period Dummy:</b>		
Market Signaling * Period	-.952***	.351
Proportion of PA Firms * Period	12.332**	6.186
Heterogeneity of Origin*Period	-.261	.822
Heterogeneity of Education*Period	-.091	.669
Heterogeneity of Industry Tenure*Period	-.005	.030
Absorptive Capacity*Period	.055	.289
Social Networks*Period	-.043	.306
Log-Likelihood	-925.482	
Degrees of Freedom	28	

**TABLE 3-1**  
**Descriptive M&A Related Statistics of Large Dutch Accounting Firms**

Name of the Firm in 1992	Size in 1960	M&As 61- 70	Size in 1970	M&As 71-78	Size in 1978	M&As 79-90	Size in 1990*	Revenue in 1992**
Moret Ernst & Young, Rotterdam	28 (5)	5	185(19)	7	281(24)	26	516(35)	726
KPMG, Amstelveen	76 (10)	1	141(12)	4	289(18)	10	383(26)	691
Coopers & Lybrand Dijker van Dien	27 (11)	5	92(15)	7	209(22)	11	451(27)	681
Deloitte & Touche, Rotterdam	23 (6)	13	97(19)	3	148(24)	9	253(35)	454
Arthur Andersen & Co, Den Haag					7(2)	0	25(2)	113
Price Waterhouse, Rotterdam							12(2)	96
BDO CampsObers Groep, Eindhoven			4(3)	4	30(11)	2	68(16)	127
Paardekooper & Hoffman, Rotterdam	7 (3)	5	19(5)	4	31(7)	1	37(17)	85
Walgemoed, Hoorn	3 (3)	0	9(5)	2	29(11)	4	48(18)	82
Berk Groep, Gouda	6 (4)	0	14(9)	6	30(11)	5	32(13)	75

Note: Firm size is the number of accountants affiliated with the firm. Number of domestic offices are in parantheses.

\*: The number of offices in the column is the number of domestic offices in 1986.

\*\* : In millions of guilders (\$1=2 Guilders). The number is adopted from F.A.J. van den Bosch, W. van der Aa and T. Elfring. 1993. Organisatorische Innovaties en Vrije Beroepsbeoefenaren. MOVIR-DTO, Nieuwegein, p. 80.

**TABLE 3-2**  
**Means, Standard Deviations, and Correlations for the Study of Mergers and Acquisitions\***

Variables	Means	S.D.	1	2	3	4	5	6	7
1. Dissolution	0.04	0.20							
2. Being Acquired	0.06	0.23	-0.05						
3. Acquiring Other Firms	0.20	0.40	-0.10	-0.05					
4. Age Similarity	0.41	0.32	-0.02	0.00	0.01				
5. Size Similarity	0.38	0.33	0.07	0.01	-0.20	0.16			
6. Structural Similarity	0.21	0.23	-0.02	0.03	0.29	-0.05	-0.41		
7. Familiarity through CPA's Direct Network Ties	0.30	0.42	0.00	-0.02	-0.07	0.06	-0.11	0.02	
8. Geographical Complementarity	0.82	0.71	-0.07	-0.01	0.00	-0.07	-0.17	0.01	0.04
9. Human and Social Capital Complementarity	0.50	1.65	-0.02	0.05	0.18	0.01	-0.16	0.17	-0.03
10. Previous M&A Experience	2.26	3.67	-0.01	0.02	0.32	-0.11	-0.42	0.32	-0.09
11. Firm Size (time-varying)	27.24	55.05	-0.07	-0.01	0.33	-0.09	-0.29	0.37	-0.03
12. Logarithm of Observation Intervals	0.62	0.48	0.10	-0.02	0.12	-0.07	-0.10	0.10	0.03
13. Government Regulation: 1971-1973	0.21	0.41	0.13	0.00	0.17	-0.03	-0.11	0.22	-0.08
14. Government Regulation: 1984-1989	0.04	0.18	0.24	0.11	0.06	-0.04	-0.06	0.12	0.03
15. World War II: 1941-1945	0.02	0.15	0.00	0.01	0.00	-0.02	0.00	-0.06	0.07
16. Indonesia's Independence: 1949	0.06	0.25	0.03	-0.07	-0.10	0.01	0.03	-0.13	0.05

\*Based on 357 mergers and acquisitions and 1186 firm-intervals

(Continued)

Variables	8	9	10	11	12	13	14	15
1. Dissolution								
2. Being Acquired								
3. Acquiring Other Firms								
4. Age Similarity								
5. Size Similarity								
6. Structural Similarity								
7. Familiarity through CPA's Direct Network Ties								
8. Geographical Complementarity								
9. Human and Social Capital Complementarity	0.00							
10. Previous M&A Experience	0.05	0.17						
11. Firm Size (time-varying)	0.08	0.13	0.70					
12. Logarithm of Observation Intervals	0.01	0.01	0.18	0.18				
13. Government Regulation: 1971-1973	-0.02	0.08	0.45	0.42	0.37			
14. Government Regulation: 1984-1989	0.04	0.02	0.27	0.15	0.31	0.37		
15. World War II: 1941-1945	-0.04	-0.04	-0.06	-0.05	0.31	-0.08	-0.03	
16. Indonesia's Independence: 1949	0.02	-0.04	-0.07	-0.08	-0.14	-0.13	-0.05	-0.04



**TABLE 3-3**  
**Multinomial Logistic Regression Results for the Consequences after M&As**  
 (357 M&As; 1186 firm-intervals)

Variables	Dissolution	Being Acquired	Acquiring Other Firms
Intercept	-1.297 (1.068)	-5.541*** (.865)	-2.266*** (.600)
<b>Compatibility:</b>			
Age Similarity	-.426 (.515)	.017 (.435)	.468* (.263)
Size Similarity	.897 (.617)	.831* (.493)	-.437 (.335)
Structural Similarity	.531 (.891)	1.474** (.656)	2.045*** (.394)
Familiarity through CPAs' Direct Network Ties	-.196 (.403)	-.512 (.359)	-.488** (.209)
<b>Complementarity:</b>			
Geographical Complementarity	-.770*** (.263)	-.145 (.204)	-.130 (.127)
Human and Social Capital Complementarity	.040 (.161)	.196*** (.068)	.167*** (.050)
<b>Resources Accumulation:</b>			
Previous M&A Experience	.350*** (.099)	.131** (.066)	.093*** (.031)
Firm Size (time-varying)	-.078*** (.020)	-.005 (.005)	.004** (.002)
<b>Controls:</b>			
Log of Interval Length	.675 (.423)	-.720* (.379)	.323 (.200)
Government Regulation 1971-1973	.412* (.233)	-.442* (.255)	-.083 (.122)
Government Regulation 1984-1989	1.296*** (.323)	1.883*** (.396)	.421 (.278)
World War II: 1941-1945	-.107 (.577)	.795* (.446)	.140 (.289)
Indonesia's Independence: 1949	.451* (.269)	# #	-.515* (.268)
Number of Events	48	69	239
$\chi^2$ : Degrees of Freedom		1536.38: 2764	

Note: Asymptotic standard errors are in parentheses.

#: The standard error can not be estimated due to the lack of variation.

\*:  $p < .10$ ; \*\*:  $p < .05$ ; \*\*\*:  $p < .01$  (Two-tailed test).

**TABLE 4-1**  
**Means, Standard Deviations, and Correlations for the Study of Density Dependence\***  
 (Under No Heterogeneity Assumption)

Variables	Means	S.D.	1	2	3	4	5	6	7	8	9	10
1. Dissolution	0.2301	0.4209										
2. Current Interval 1 Year	0.2672	0.4425	-0.09									
3. Current Interval 3 Years	0.0581	0.2339	0.01	-0.15								
4. Current Interval 4 Years	0.1325	0.339	0.25	-0.24	-0.10							
5. Previous Interval 1 Year	0.2643	0.441	-0.03	0.21	-0.15	0.00						
6. Previous Interval 3 Years	0.055	0.2279	-0.09	-0.15	-0.06	-0.09	-0.14					
7. Previous Interval 4 Years	0.1064	0.3084	0.20	-0.14	-0.09	0.79	-0.21	-0.08				
8. Previous Interval 5 Years	0.0256	0.158	-0.05	0.27	-0.04	-0.06	-0.10	-0.04	-0.06			
9. Government Regulation 1914-1918	0.0367	0.188	-0.07	-0.12	-0.05	-0.08	0.00	-0.05	-0.07	-0.03		
10. Government Regulation 1929	0.023	0.15	-0.05	-0.09	-0.04	-0.06	-0.09	-0.04	-0.05	-0.02	-0.03	
11. Government Regulation 1971-1973	0.1808	0.3848	0.23	0.05	-0.12	0.77	0.21	-0.11	0.65	-0.08	-0.09	-0.07
12. Government Regulation 1984-1989	0.0382	0.1917	0.20	-0.12	-0.05	0.51	-0.12	-0.05	0.58	-0.03	-0.04	-0.03
13. World War II: 1941-1945	0.0262	0.1597	0.00	-0.10	-0.04	-0.06	-0.10	-0.04	-0.06	-0.03	-0.03	-0.03
14. Indonesia's Independence: 1949	0.0533	0.2247	-0.02	0.15	-0.06	-0.09	0.10	-0.06	-0.08	-0.04	-0.05	-0.04
15. Single Association (1 if year > 1966)	0.3012	0.4588	0.34	0.19	-0.16	0.54	0.17	-0.16	0.46	-0.11	-0.13	-0.10
16. Log of Organizational Age	1.6761	1.2253	-0.22	-0.10	0.03	-0.20	-0.04	0.08	-0.18	0.09	0.02	0.07
17. Density at Founding	233.2	109.7	0.26	0.08	-0.17	0.24	0.08	-0.16	0.19	-0.04	-0.28	-0.12
18. Density	296.9	79.8268	0.18	-0.01	-0.01	0.19	-0.06	-0.14	0.19	-0.02	-0.39	-0.08
19. Density Squared	94494.2	39615.5	0.19	-0.04	0.01	0.24	-0.10	-0.16	0.26	-0.05	-0.37	-0.11
20. Prior Foundings	39.6649	42.9258	0.04	0.38	-0.15	-0.02	0.48	-0.09	-0.05	-0.13	-0.12	-0.08
21. Prior Foundings Squared	3415.8	7361.9	0.01	0.40	-0.11	-0.10	0.36	-0.09	-0.10	-0.07	-0.08	-0.07
22. Prior Failures	34.7222	32.7108	0.21	0.26	-0.22	0.14	0.28	-0.08	0.00	-0.10	-0.19	-0.13
23. Prior Failures Squared	2275.5	4161.5	0.15	0.21	-0.13	0.03	0.21	-0.07	-0.08	-0.08	-0.11	-0.08

\*Based on 2708 firms and 11119 firm-intervals

(Continued)

Variables	11	12	13	14	15	16	17	18	19	20	21	22
1. Dissolution												
2. Current Interval 1 Year												
3. Current Interval 3 Years												
4. Current Interval 4 Years												
5. Previous Interval 1 Year												
6. Previous Interval 3 Years												
7. Previous Interval 4 Years												
8. Previous Interval 5 Years												
9. Government Regulation 1914-1918												
10. Government Regulation 1929												
11. Government Regulation 1971-1973												
12. Government Regulation 1984-1989	0.42											
13. World War II: 1941-1945	-0.08	-0.03										
14. Indonesia's Independence: 1949	-0.11	-0.05	0.04									
15. Single Association (1 if year > 1966)	0.72	0.30	-0.11	-0.16								
16. Log of Organizational Age	-0.24	-0.11	0.11	0.05	-0.38							
17. Density at Founding	0.37	0.17	-0.05	-0.02	0.50	-0.52						
18. Density	0.26	0.32	-0.01	0.01	0.35	-0.07	0.68					
19. Density Squared	0.28	0.43	-0.04	-0.03	0.36	-0.12	0.66	0.97				
20. Prior Foundings	0.13	0.01	-0.12	-0.14	0.47	-0.21	0.33	0.30	0.29			
21. Prior Foundings Squared	-0.01	-0.04	-0.07	-0.10	0.39	-0.20	0.26	0.22	0.22	0.97		
22. Prior Failures	0.28	0.01	-0.10	0.01	0.75	-0.34	0.48	0.40	0.38	0.53	0.47	
23. Prior Failures Squared	0.12	-0.05	-0.08	-0.04	0.64	-0.34	0.33	0.26	0.26	0.44	0.42	0.95

**TABLE 4-2**  
**Regression Results of Organizational Dissolution**  
 (Replicating Previous Investigations: 2708 Firms and 11119 Firm-Intervals)

Variables	Model I	Model II	Model III
Intercept	-1.976*** (.225)	-1.837*** (.230)	-1.848*** (.230)
Current Interval 1 Year	-.969*** (.071)	-.620*** (.100)	-.598*** (.098)
Current Interval 3 Years	.894*** (.096)	.853*** (.116)	.792*** (.103)
Current Interval 4 Years	.135 (.127)	.779*** (.146)	.841*** (.136)
Previous Interval 1 Year	-.302*** (.072)	.096 (.104)	.077 (.103)
Previous Interval 3 Years	-.681*** (.161)	-.305* (.169)	-.273 (.167)
Previous Interval 4 Years	-.505*** (.120)	-.955*** (.160)	-1.059*** (.134)
Previous Interval 5 Years	.535*** (.207)	.864*** (.224)	.830*** (.221)
Government Regulation 1914-1918	-.449** (.201)	-.042 (.207)	-.077 (.205)
Government Regulation 1929	-.158 (.205)	.286 (.216)	.233 (.211)
Government Regulation 1971-1973	-.278** (.112)	-2.136*** (.166)	-2.141*** (.166)
Government Regulation 1984-1989	.935*** (.141)	-.210 (.165)	-.231 (.164)
World War II: 1941-1945	.572*** (.133)	1.173*** (.147)	1.156*** (.147)
Indonesia's Independence: 1949	.854*** (.111)	.957*** (.136)	1.019*** (.126)
Single Association (1 if year > 1966)	1.564*** (.065)	3.338*** (.157)	3.443*** (.131)
Log of Organizational Age	-.108*** (.021)	-.283*** (.025)	-.281*** (.025)
Density at Founding / 100	.480*** (.042)	.167*** (.047)	.176*** (.047)
Density / 100	-.142 (.205)	-.730*** (.221)	-.692*** (.219)
Density*Density / 10000	-.038 (.040)	.180*** (.045)	.160*** (.045)
Prior Foundings / 100		1.980*** (.463)	2.110*** (.449)
Prior Foundings*Prior Foundings / 10000		-1.500*** (.240)	-1.600*** (.240)
Prior Failures/100		.620 (.524)	
Prior Failures* Prior Failures / 10000		-1.800*** (.300)	-1.500*** (.090)
Log-Likelihood : Degrees of Freedom	-4936.74:18	-4768.84:22	-4769.54:21

Note: Asymptotic standard errors are in parentheses.

\*:  $p < .10$ ; \*\*:  $p < .05$ ; \*\*\*:  $p < .01$  (Two-tailed test)

**TABLE 4-3**  
**Means, Standard Deviations, and Correlations**  
**for the Study of Density Dependence\***  
**(Introducing Organizational Heterogeneity)**

Variables	Means	S.D.	1	2	3	4
1. Dissolution	0.1624	0.3688				
2. Termination	0.1124	0.3159	0.81			
3. Current Interval 1 Year	0.2691	0.4435	-0.10	-0.10		
4. Current Interval 3 Years	0.046	0.2094	0.15	0.18	-0.13	
5. Current Interval 4 Years	0.1767	0.3815	0.12	0.09	-0.28	-0.10
6. Previous Interval 1 Year	0.2668	0.4423	-0.06	-0.04	0.27	-0.13
7. Previous Interval 3 Years	0.0386	0.1926	-0.03	-0.02	-0.12	-0.04
8. Previous Interval 4 Years	0.1425	0.3495	0.10	0.07	-0.21	-0.09
9. Previous Interval 5 Years	0.0206	0.1422	-0.01	-0.02	0.24	-0.03
10. Government Regulation 1914-1918	0.0185	0.1348	0.00	0.02	-0.08	-0.03
11. Government Regulation 1929	0.0162	0.1263	-0.02	-0.01	-0.08	-0.03
12. Government Regulation 1971-1973	0.2405	0.4274	0.07	0.03	0.02	-0.12
13. Government Regulation 1984-1989	0.0552	0.2284	0.10	0.08	-0.15	-0.05
14. World War II: 1941-1945	0.0201	0.1402	0.04	0.05	-0.09	-0.03
15. Indonesia's Independence: 1949	0.0492	0.2164	-0.01	0.02	0.18	-0.05
16. Single Association (1 if year > 1966)	0.3602	0.4801	0.05	0.00	0.22	-0.16
17. Log of Organizational Age	1.7992	1.1743	-0.12	-0.12	-0.01	-0.09
18. Density at Founding	240.32	80.36	0.00	-0.03	0.12	-0.21
19. Density	267.60001	73.6777	0.05	0.00	-0.09	-0.12
20. Density Squared	77024.703	35029	0.06	0.02	-0.14	-0.12
21. Prior Foundings	24.8999	24.747	-0.06	-0.04	0.05	-0.10
22. Prior Foundings Squared	1232.3001	3356	-0.06	-0.04	0.00	-0.07
23. Prior Failures Squared	569.79999	687.40002	-0.06	-0.08	0.28	-0.16
24. Log of Mass	6.7081	0.851	0.04	-0.01	0.05	-0.25
25. Relative Size	0.00478	0.0142	-0.05	-0.06	-0.01	0.02
26. Number of Domestic Offices	1.6714	2.4304	-0.05	-0.07	0.01	-0.04
27. Founded by Split	0.0404	0.1969	0.03	-0.03	-0.01	-0.02
28. Cum. Number of Mergers	0.102	0.7096	-0.01	-0.03	0.04	-0.03
29. Cum. Number of Acquisitions	0.2254	1.124	-0.05	-0.05	0.01	-0.03
30. Cum. Number of Splits	0.037	0.318	-0.02	-0.02	-0.01	-0.01
31. Cum. Number of Name Changes	0.1164	0.3608	-0.04	-0.05	0.00	-0.04
32. Partners "From" Client Sectors	0.1371	0.3186	0.01	0.02	0.00	-0.01
33. Partners "To" Client Sectors	0.00787	0.0702	0.01	0.00	-0.01	-0.02
34. General Human Capital (Education)	0.2141	0.379	-0.01	-0.05	-0.01	-0.11
35. Firm-Specific Human Capital	1.5272	0.9972	-0.10	-0.08	-0.03	-0.08
36. Firm-Specific Human Capital Squared	3.3266	2.9681	-0.06	-0.04	-0.04	-0.06
37. Associate/Partner Leverage	0.1425	0.448	-0.05	-0.08	-0.04	-0.05

\*Based on 1416 firms and 7027 firm-intervals

(Continued)

Variables	5	6	7	8	9	10	11
1. Dissolution							
2. Termination							
3. Current Interval 1 Year							
4. Current Interval 3 Years							
5. Current Interval 4 Years							
6. Previous Interval 1 Year	-0.05						
7. Previous Interval 3 Years	-0.09	-0.21					
8. Previous Interval 4 Years	0.84	-0.25	-0.08				
9. Previous Interval 5 Years	-0.07	-0.09	-0.03	-0.06			
10. Government Regulation 1914-1918	-0.06	0.00	-0.03	-0.06	-0.02		
11. Government Regulation 1929	-0.06	-0.08	-0.03	-0.05	-0.02	-0.02	
12. Government Regulation 1971-1973	0.80	0.21	-0.11	0.69	-0.08	-0.08	-0.07
13. Government Regulation 1984-1989	0.52	-0.15	-0.05	0.59	-0.04	-0.03	-0.03
14. World War II: 1941-1945	-0.07	-0.09	-0.03	-0.06	-0.02	-0.02	-0.02
15. Indonesia's Independence: 1949	-0.11	0.06	-0.05	-0.09	-0.03	-0.03	-0.03
16. Single Association (1 if year > 1966)	0.59	0.21	-0.15	0.51	-0.11	-0.10	-0.10
17. Log of Organizational Age	-0.03	0.03	-0.02	-0.05	0.02	-0.02	0.00
18. Density at Founding	0.06	0.12	-0.21	0.00	-0.08	-0.24	-0.14
19. Density	0.34	-0.13	-0.25	0.37	-0.08	-0.30	-0.19
20. Density Squared	0.41	-0.18	-0.25	0.46	-0.11	-0.26	-0.19
21. Prior Foundings	-0.11	0.36	0.00	-0.10	-0.12	-0.06	-0.05
22. Prior Foundings Squared	-0.11	0.33	-0.02	-0.10	-0.05	-0.04	-0.04
23. Prior Failures Squared	-0.14	0.21	0.15	-0.16	-0.10	-0.11	-0.10
24. Log of Mass	0.52	0.07	-0.24	0.48	-0.08	-0.26	-0.17
25. Relative Size	-0.04	0.01	0.03	-0.04	0.00	0.07	0.02
26. Number of Domestic Offices	0.12	0.02	-0.03	0.11	-0.02	-0.03	-0.02
27. Founded by Split	0.08	0.00	-0.01	0.07	0.00	0.01	0.00
28. Cum. Number of Mergers	0.07	0.04	-0.02	0.06	-0.01	-0.02	-0.02
29. Cum. Number of Acquisitions	0.03	0.01	-0.02	0.03	0.00	-0.02	-0.01
30. Cum. Number of Splits	0.07	-0.01	0.00	0.07	0.00	0.02	0.00
31. Cum. Number of Name Changes	0.01	-0.01	-0.01	0.01	0.01	-0.02	-0.02
32. Partners "From" Client Sectors	-0.04	0.00	0.01	-0.03	0.03	0.05	0.00
33. Partners "To" Client Sectors	0.02	-0.01	-0.02	0.02	0.01	-0.02	-0.01
34. General Human Capital (Education)	0.11	0.00	-0.07	0.11	0.02	-0.07	-0.06
35. Firm-Specific Human Capital	-0.03	0.03	-0.02	-0.05	0.02	0.00	0.01
36. Firm-Specific Human Capital Squared	0.01	-0.02	-0.01	0.00	0.04	-0.01	0.01
37. Associate/Partner Leverage	0.03	-0.02	-0.02	0.04	-0.01	-0.04	-0.03

(Continued)

Variables	12	13	14	15	16	17	18
1. Dissolution							
2. Termination							
3. Current Interval 1 Year							
4. Current Interval 3 Years							
5. Current Interval 4 Years							
6. Previous Interval 1 Year							
7. Previous Interval 3 Years							
8. Previous Interval 4 Years							
9. Previous Interval 5 Years							
10. Government Regulation 1914-1918							
11. Government Regulation 1929							
12. Government Regulation 1971-1973							
13. Government Regulation 1984-1989	0.43						
14. World War II: 1941-1945	-0.08	-0.03					
15. Indonesia's Independence: 1949	-0.13	-0.06	-0.03				
16. Single Association (1 if year > 1966)	0.75	0.32	-0.11	-0.17			
17. Log of Organizational Age	0.00	-0.05	0.05	-0.06	-0.01		
18. Density at Founding	0.19	-0.03	-0.11	-0.03	0.35	-0.20	
19. Density	0.33	0.43	-0.13	-0.06	0.45	0.05	0.62
20. Density Squared	0.35	0.57	-0.15	-0.10	0.48	0.03	0.54
21. Prior Foundings	-0.15	-0.01	-0.09	-0.12	0.00	-0.04	0.09
22. Prior Foundings Squared	-0.14	-0.05	-0.05	-0.07	-0.08	-0.06	0.05
23. Prior Failures Squared	-0.04	-0.11	-0.07	0.26	0.19	-0.06	0.15
24. Log of Mass	0.62	0.35	-0.11	-0.09	0.72	0.09	0.64
25. Relative Size	-0.06	-0.04	0.00	-0.01	-0.08	0.14	-0.32
26. Number of Domestic Offices	0.14	0.08	-0.02	-0.02	0.15	0.22	-0.05
27. Founded by Split	0.07	0.04	-0.01	-0.01	0.06	0.06	-0.11
28. Cum. Number of Mergers	0.10	0.03	-0.01	-0.02	0.13	0.19	-0.03
29. Cum. Number of Acquisitions	0.04	0.02	0.00	0.01	0.04	0.30	-0.18
30. Cum. Number of Splits	0.05	0.04	0.00	0.00	0.03	0.18	-0.15
31. Cum. Number of Name Changes	0.01	0.00	0.01	0.00	0.02	0.31	-0.13
32. Partners "From" Client Sectors	-0.06	-0.02	0.01	0.03	-0.10	-0.04	-0.11
33. Partners "To" Client Sectors	0.01	0.00	0.00	-0.01	0.01	0.12	-0.03
34. General Human Capital (Education)	0.12	0.09	0.01	-0.01	0.10	-0.01	0.17
35. Firm-Specific Human Capital	0.02	-0.05	0.06	-0.10	0.00	0.85	-0.03
36. Firm-Specific Human Capital Squared	0.04	-0.02	0.06	-0.07	0.01	0.77	-0.05
37. Associate/Partner Leverage	0.02	0.03	0.01	0.00	0.01	0.17	-0.04

(Continued)

Variables	19	20	21	22	23	24	25
1. Dissolution							
2. Termination							
3. Current Interval 1 Year							
4. Current Interval 3 Years							
5. Current Interval 4 Years							
6. Previous Interval 1 Year							
7. Previous Interval 3 Years							
8. Previous Interval 4 Years							
9. Previous Interval 5 Years							
10. Government Regulation 1914-1918							
11. Government Regulation 1929							
12. Government Regulation 1971-1973							
13. Government Regulation 1984-1989							
14. World War II: 1941-1945							
15. Indonesia's Independence: 1949							
16. Single Association (1 if year > 1966)							
17. Log of Organizational Age							
18. Density at Founding							
19. Density							
20. Density Squared	0.97						
21. Prior Foundings	0.10	0.07					
22. Prior Foundings Squared	0.04	0.01	0.95				
23. Prior Failures Squared	0.00	-0.03	0.17	0.07			
24. Log of Mass	0.88	0.83	0.04	-0.03	0.09		
25. Relative Size	-0.25	-0.20	-0.05	-0.02	-0.03	-0.30	
26. Number of Domestic Offices	0.11	0.11	-0.01	-0.02	0.01	0.14	0.49
27. Founded by Split	0.02	0.03	-0.01	-0.01	-0.01	0.05	0.24
28. Cum. Number of Mergers	0.06	0.06	0.00	-0.01	0.03	0.10	0.33
29. Cum. Number of Acquisitions	0.05	0.04	0.01	0.00	0.00	0.05	0.42
30. Cum. Number of Splits	0.01	0.01	-0.01	-0.01	-0.01	0.02	0.26
31. Cum. Number of Name Changes	0.04	0.04	0.00	-0.01	0.00	0.04	0.14
32. Partners "From" Client Sectors	-0.14	-0.11	-0.02	-0.01	-0.06	-0.15	0.04
33. Partners "To" Client Sectors	0.04	0.04	-0.01	-0.01	-0.01	0.04	0.12
34. General Human Capital (Education)	0.21	0.20	0.01	0.00	-0.01	0.22	-0.06
35. Firm-Specific Human Capital	0.05	0.02	-0.07	-0.09	-0.10	0.09	0.00
36. Firm-Specific Human Capital Squared	0.06	0.04	-0.08	-0.10	-0.08	0.10	-0.03
37. Associate/Partner Leverage	0.11	0.10	0.01	0.00	-0.02	0.09	0.22



(Continued)

Variables	26	27	28	29	30	31	32
1. Dissolution							
2. Termination							
3. Current Interval 1 Year							
4. Current Interval 3 Years							
5. Current Interval 4 Years							
6. Previous Interval 1 Year							
7. Previous Interval 3 Years							
8. Previous Interval 4 Years							
9. Previous Interval 5 Years							
10. Government Regulation 1914-1918							
11. Government Regulation 1929							
12. Government Regulation 1971-1973							
13. Government Regulation 1984-1989							
14. World War II: 1941-1945							
15. Indonesia's Independence: 1949							
16. Single Association (1 if year > 1966)							
17. Log of Organizational Age							
18. Density at Founding							
19. Density							
20. Density Squared							
21. Prior Foundings							
22. Prior Foundings Squared							
23. Prior Failures Squared							
24. Log of Mass							
25. Relative Size							
26. Number of Domestic Offices							
27. Founded by Split	0.22						
28. Cum. Number of Mergers	0.62	0.05					
29. Cum. Number of Acquisitions	0.61	0.18	0.36				
30. Cum. Number of Splits	0.38	0.18	0.31	0.41			
31. Cum. Number of Name Changes	0.19	-0.04	0.15	0.15	0.18		
32. Partners "From" Client Sectors	-0.03	0.00	-0.02	-0.03	0.00	-0.03	
33. Partners "To" Client Sectors	0.17	0.02	0.12	0.16	0.06	0.11	0.00
34. General Human Capital (Education)	-0.01	-0.02	0.03	-0.01	0.00	0.03	-0.03
35. Firm-Specific Human Capital	0.04	-0.05	0.03	0.09	0.06	0.14	-0.02
36. Firm-Specific Human Capital Squared	0.01	-0.06	-0.01	0.06	0.05	0.10	-0.02
37. Associate/Partner Leverage	0.27	0.13	0.15	0.22	0.11	0.17	0.02

(Continued)

Variables	33	34	35	36
1. Dissolution				
2. Termination				
3. Current Interval 1 Year				
4. Current Interval 3 Years				
5. Current Interval 4 Years				
6. Previous Interval 1 Year				
7. Previous Interval 3 Years				
8. Previous Interval 4 Years				
9. Previous Interval 5 Years				
10. Government Regulation 1914-1918				
11. Government Regulation 1929				
12. Government Regulation 1971-1973				
13. Government Regulation 1984-1989				
14. World War II: 1941-1945				
15. Indonesia's Independence: 1949				
16. Single Association (1 if year > 1966)				
17. Log of Organizational Age				
18. Density at Founding				
19. Density				
20. Density Squared				
21. Prior Foundings				
22. Prior Foundings Squared				
23. Prior Failures Squared				
24. Log of Mass				
25. Relative Size				
26. Number of Domestic Offices				
27. Founded by Split				
28. Cum. Number of Mergers				
29. Cum. Number of Acquisitions				
30. Cum. Number of Splits				
31. Cum. Number of Name Changes				
32. Partners "From" Client Sectors				
33. Partners "To" Client Sectors				
34. General Human Capital (Education)	0.04			
35. Firm-Specific Human Capital	0.05	0.00		
36. Firm-Specific Human Capital Squared	0.03	0.00	0.95	
37. Associate/Partner Leverage	0.09	0.03	0.08	0.06

**TABLE 4-4**  
**Regression Results of Organizational Dissolution**  
 (Under Heterogeneity Assumption)

Variables	Model IV (All Types of Exits)		Model V (Termination Only)	
	B	S.E.	B	S.E.
Intercept	-2.451***	.922	1.872	1.367
Current Interval 1 Year	-.502***	.121	-.447***	.145
Current Interval 3 Years	1.561***	.151	1.639***	.181
Current Interval 4 Years	.705***	.209	.975***	.251
Previous Interval 1 Year	-.010	.124	-.084	.150
Previous Interval 3 Years	.013	.236	.064	.280
Previous Interval 4 Years	-.302	.201	-.293	.248
Previous Interval 5 Years	.426	.278	.085	.381
Government Regulation 1914-1918	.298	.252	.379	.268
Government Regulation 1929	.052	.314	-.014	.360
Government Regulation 1971-1973	-.683***	.244	-.512	.324
Government Regulation 1984-1989	.293	.240	-.055	.290
World War II: 1941-1945	1.005***	.196	1.242***	.222
Indonesia's Independence: 1949	.516***	.184	1.040***	.204
Single Association (1 if year > 1966)	.056	.176	.074	.236
Log of Organizational Age	.134	.089	.234**	.117
Density at Founding / 100	.565***	.088	.703***	.111
Density / 100	-1.510***	.494	-2.480***	.642
Density <sup>2</sup> / 10000	.160*	.088	.340***	.110
Prior Foundings / 100	1.080*	.632	2.330***	.761
Prior Foundings <sup>2</sup> / 10000	-1.100**	.470	-1.800***	.550
Prior Failures <sup>2</sup> / 10000	-2.500**	1.230	-5.800***	1.520
Log of Mass	.378*	.229	-.156	.293
Relative Size	-.123*	.075	-1.367***	.296
Number of Domestic Offices	-.059**	.027	-1.147***	.054
Founded by Split	.806***	.150	.593**	.267
Cum. Number of Mergers	.203***	.057	.407***	.090
Cum. Number of Acquisitions	-.046	.069	.088	.121
Cum. Number of Splits	.122	.142	.229	.257
Cum. Number of Name Changes	.038	.108	.035	.150
Partners "From" Client Sectors	-.096	.094	-.199*	.105
Partners "To" Client Sectors	.066	.127	.161	.177
General Human Capital (Education)	-.147*	.083	-.379***	.106
Firm-Specific Human Capital	-1.073***	.137	-1.317***	.168
Firm-Specific Human Capital <sup>2</sup>	.305***	.034	.377***	.040
Associate/Partner Leverage	-.149*	.088	-.378**	.169
Temporary Disappearance				
Firm-Intervals		7027		6676
Log-Likelihood: Degrees of Freedom		-2821.84:35		-2083.46:35

Note: \*: p < .10; \*\*: p < .05; \*\*\*: p < .01 (Two-tailed test)

(Continued)

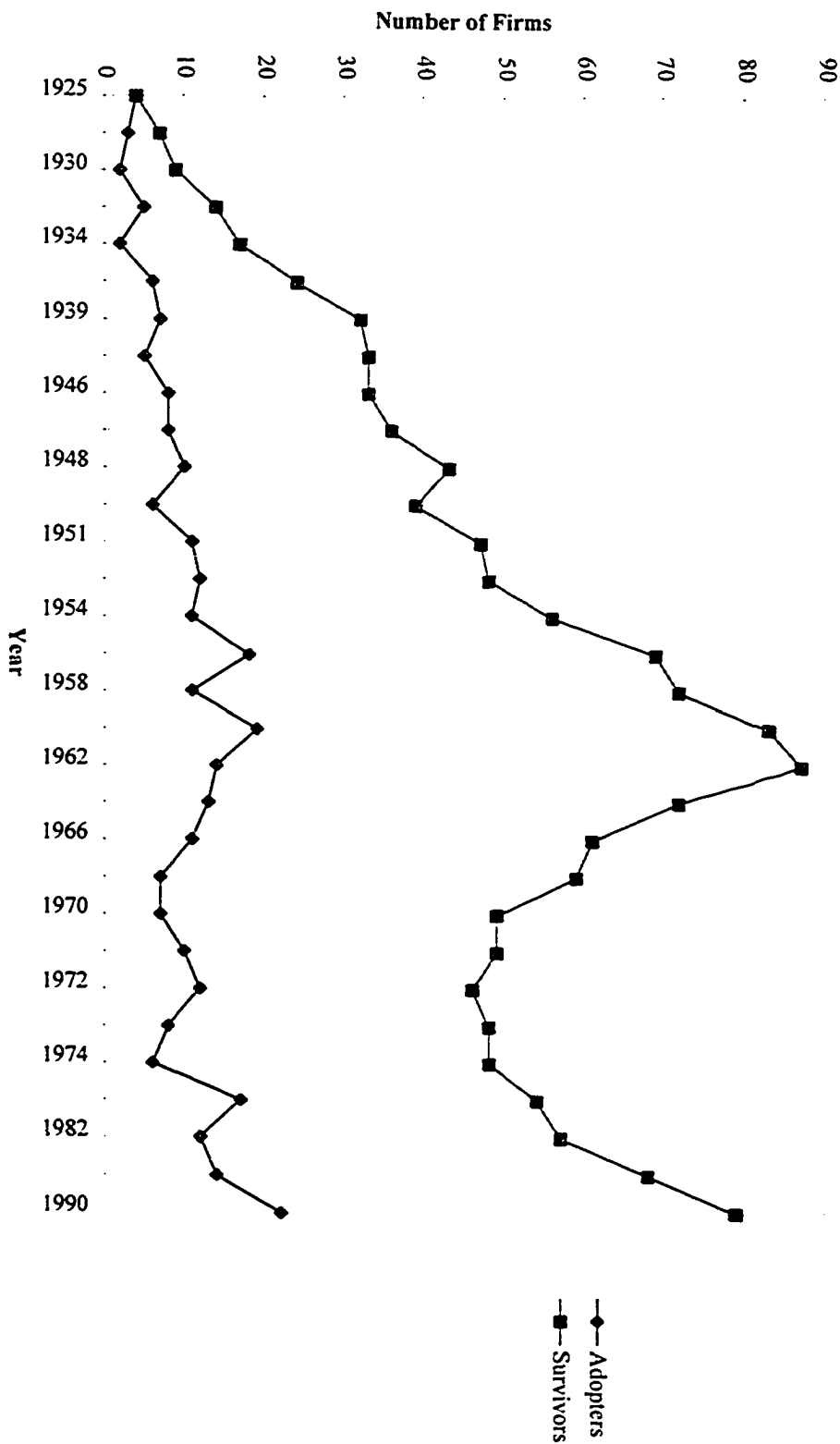
Variables	Model VI (All Types of Exits)		Model VII (Termination Only)	
	B	S.E.	B	S.E.
Intercept	-4.792***	.851	-.932	1.219
Current Interval 1 Year	-.551***	.111	-.498***	.133
Current Interval 3 Years	1.500***	.140	1.636***	.166
Current Interval 4 Years	.523***	.191	.700***	.227
Previous Interval 1 Year	.028	.116	-.005	.139
Previous Interval 3 Years	.143	.213	.256	.248
Previous Interval 4 Years	-.457**	.191	-.447*	.235
Previous Interval 5 Years	.328	.266	-.025	.374
Government Regulation 1914-1918	-.034	.238	.002	.256
Government Regulation 1929	-.081	.307	-.083	.352
Government Regulation 1971-1973	-.707***	.228	-.465	.293
Government Regulation 1984-1989	.227	.223	-.181	.268
World War II: 1941-1945	.910***	.182	1.149***	.209
Indonesia's Independence: 1949	.934***	.152	1.411***	.172
Single Association (1 if year > 1966)	-.060	.163	-.095	.216
Log of Organizational Age	.051	.062	.118	.075
Density at Founding / 100	.302***	.072	.366***	.089
Density / 100	-1.800***	.451	-2.820***	.582
Density <sup>2</sup> / 10000	.220***	.080	.420***	.100
Prior Foundings / 100	1.040*	.587	2.260***	.708
Prior Foundings <sup>2</sup> / 10000	-1.000**	.430	-1.600***	.500
Prior Failures <sup>2</sup> / 10000	-3.400***	1.110	-6.000***	1.350
Log of Mass	.923***	.211	.486*	.265
Relative Size	-.134***	.049	-1.244***	.257
Number of Domestic Offices	-.052**	.024	-.160***	.051
Founded by Split	.669***	.136	.265	.244
Cum. Number of Mergers	.207***	.052	.381***	.084
Cum. Number of Acquisitions	-.033	.056	.147	.094
Cum. Number of Splits	.062	.127	-.053	.227
Cum. Number of Name Changes	.109	.092	.111	.126
Partners "From" Client Sectors	-.111	.086	-.201**	.096
Partners "To" Client Sectors	-.066	.102	.022	.136
General Human Capital (Education)	-.080	.076	-.255***	.095
Firm-Specific Human Capital	-1.016***	.108	-1.191***	.128
Firm-Specific Human Capital <sup>2</sup>	.308***	.028	.363***	.034
Associate/Partner Leverage	-.182**	.084	-.457***	.161
Temporary Disappearance	-.933***	.104	-1.095***	.123
Frim-Intervals		11119		10726
Log-Likelihood: Degrees of Freedom		-3450.36:36		-2590.90:36

Note: \*:  $p < .10$ ; \*\*:  $p < .05$ ; \*\*\*:  $p < .01$  (Two-tailed test)

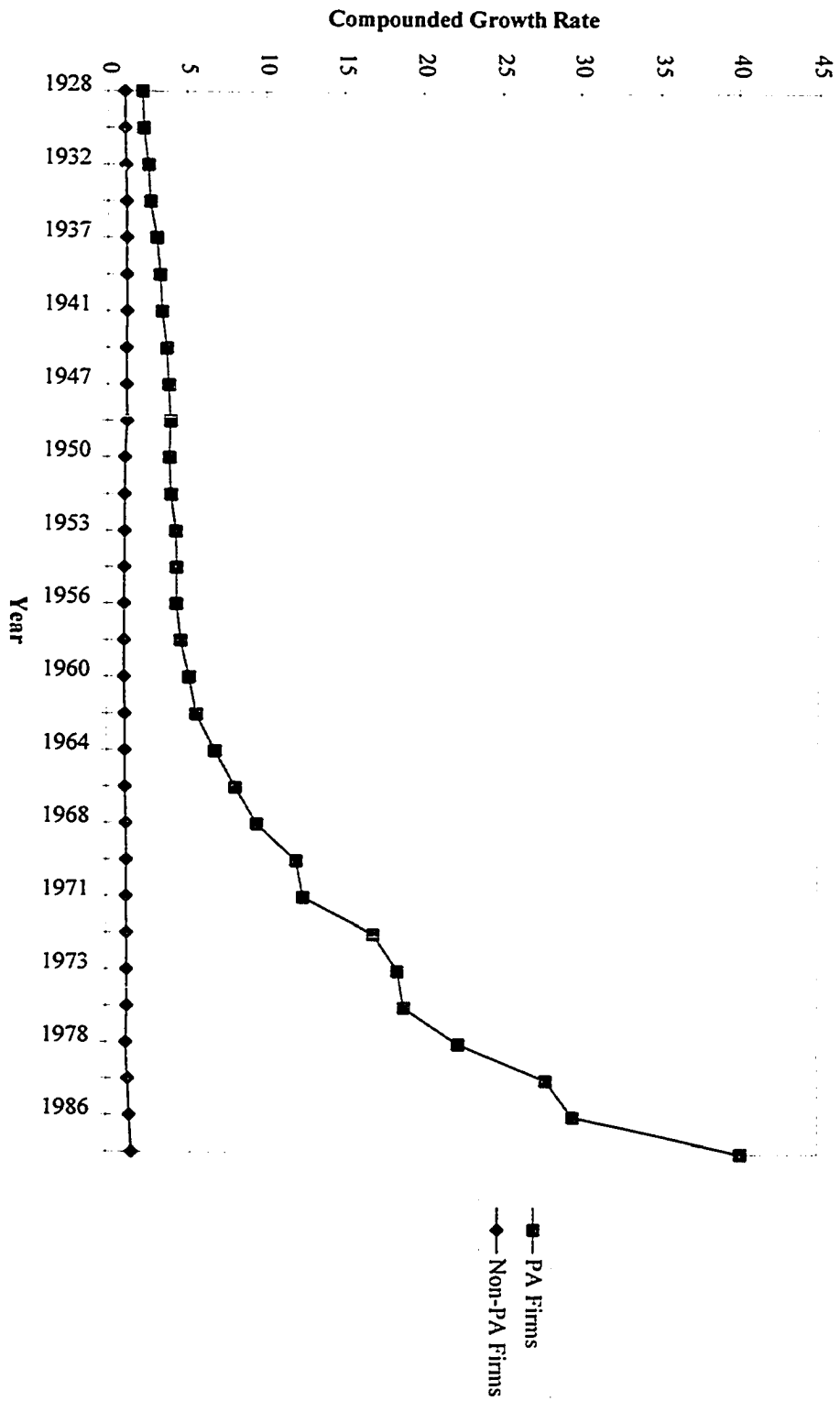
**TABLE 4-5**  
 $\chi^2$  Test for the Strength of Population Ecology Related Variables

Full Model (Log-Likelihood)	Nested Model (Deletion from Full Model)	Log-Likelihood	$\chi^2$	d.f.
Model IV (-2821.83)	Density, Density <sup>2</sup>	-2831.63	19.592	2
Model IV (-2821.83)	Density, Density <sup>2</sup> , Prior Foundings, Prior Foundings <sup>2</sup> , Prior Failures <sup>2</sup>	-2839.48	35.284	5
Model IV (-2821.83)	Density, Density <sup>2</sup> , Prior Foundings, Prior Foundings <sup>2</sup> , Prior Failures <sup>2</sup> , Density at Founding	-2856.39	69.104	6
Model IV (-2821.83)	Density, Density <sup>2</sup> , Prior Foundings, Prior Foundings <sup>2</sup> , Prior Failures <sup>2</sup> , Density at Founding, Firm Age	-2857.66	71.659	7
Model V (-2083.46)	Density, Density <sup>2</sup>	-2092.87	18.823	2
Model V (-2083.46)	Density, Density <sup>2</sup> , Prior Foundings, Prior Foundings <sup>2</sup> , Prior Failures <sup>2</sup>	-2103.06	39.195	5
Model V (-2083.46)	Density, Density <sup>2</sup> , Prior Foundings, Prior Foundings <sup>2</sup> , Prior Failures <sup>2</sup> , Density at Founding	-2121.58	76.238	6
Model V (-2083.46)	Density, Density <sup>2</sup> , Prior Foundings, Prior Foundings <sup>2</sup> , Prior Failures <sup>2</sup> , Density at Founding, Firm Age	-2122.07	77.223	7
Model VI (-3450.36)	Density, Density <sup>2</sup>	-3463.8	26.89	2
Model VI (-3450.36)	Density, Density <sup>2</sup> , Prior Foundings, Prior Foundings <sup>2</sup> , Prior Failures <sup>2</sup>	-3472.64	44.568	5
Model VI (-3450.36)	Density, Density <sup>2</sup> , Prior Foundings, Prior Foundings <sup>2</sup> , Prior Failures <sup>2</sup> , Density at Founding	-3479.71	58.694	6
Model VI (-3450.36)	Density, Density <sup>2</sup> , Prior Foundings, Prior Foundings <sup>2</sup> , Prior Failures <sup>2</sup> , Density at Founding, Firm Age	-3481.06	61.406	7
Model VII (-2590.9)	Density, Density <sup>2</sup>	-2604.01	26.228	2
Model VII (-2590.9)	Density, Density <sup>2</sup> , Prior Foundings, Prior Foundings <sup>2</sup> , Prior Failures <sup>2</sup>	-2616.94	52.077	5
Model VII (-2590.9)	Density, Density <sup>2</sup> , Prior Foundings, Prior Foundings <sup>2</sup> , Prior Failures <sup>2</sup> , Density at Founding	-2624.9	68.012	6
Model VII (-2590.9)	Density, Density <sup>2</sup> , Prior Foundings, Prior Foundings <sup>2</sup> , Prior Failures <sup>2</sup> , Density at Founding, Firm Age	-2625.22	68.646	7

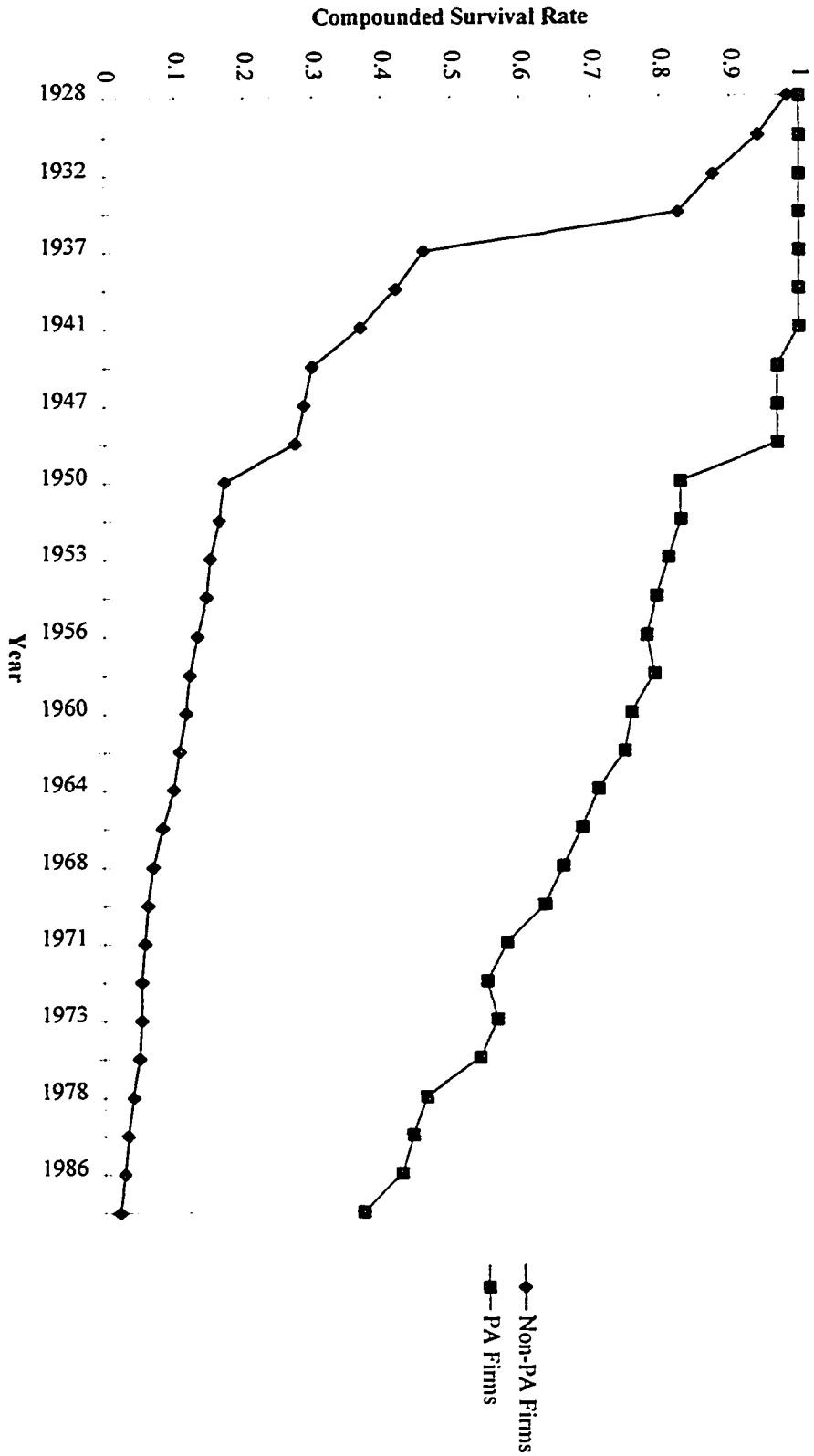
Note: All  $\chi^2$ s are significant at  $p < .01$ .



**FIGURE 2-2**  
Number of Adopters and Survivors

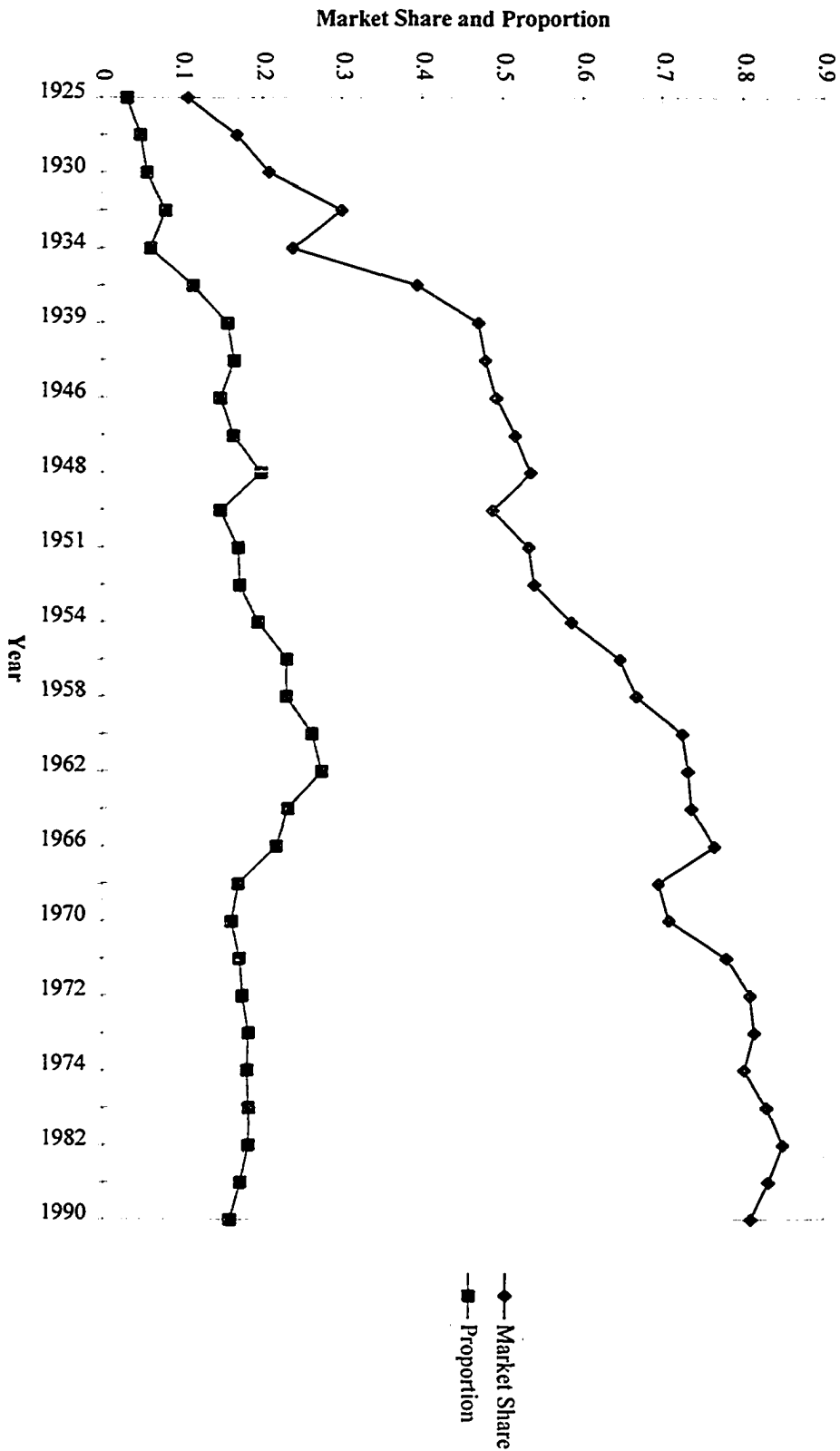


**FIGURE 2-3**  
**Compounded Growth Rates of PA and Non-PA Firms**



**FIGURE 2-4**  
Compounded Survival Rates of PA and Non-PA Firms

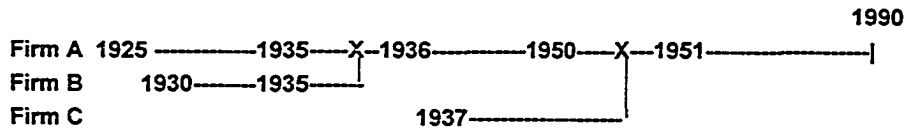




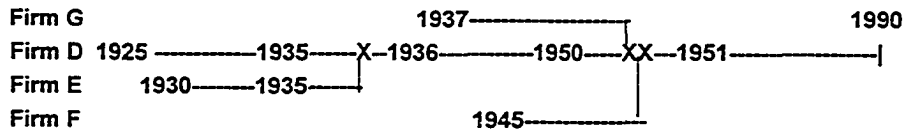
**FIGURE 2-5**  
**Market Share and Proportion of PA Firms**

**FIGURE 3-1**  
**An Illustration of Sample Composition in a Repeated Hazard Model**

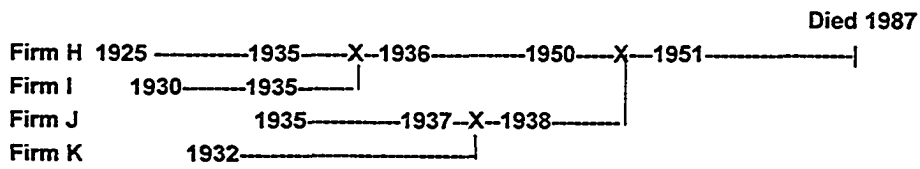
Case 1:



Case 2:



Case 3:



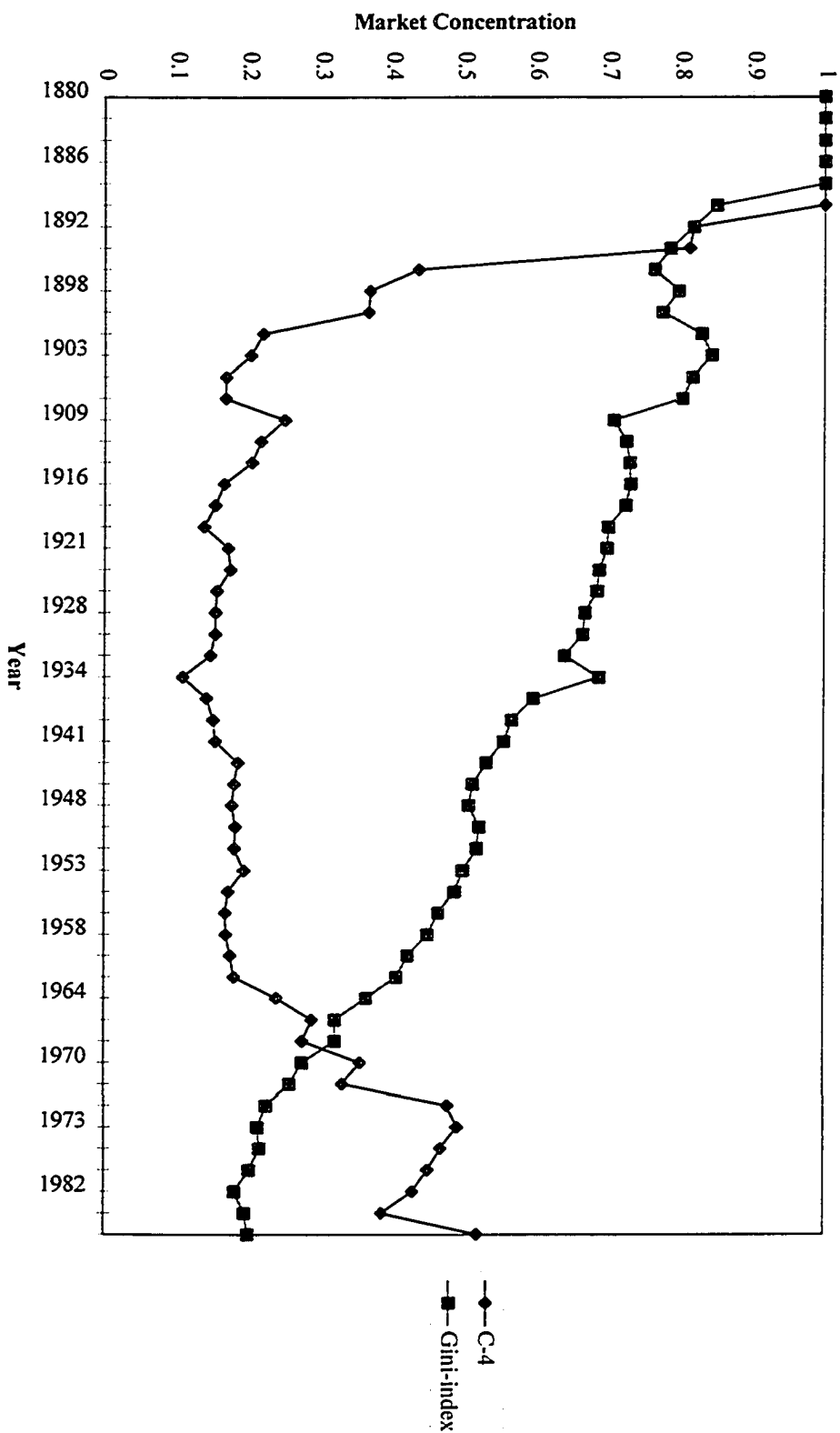
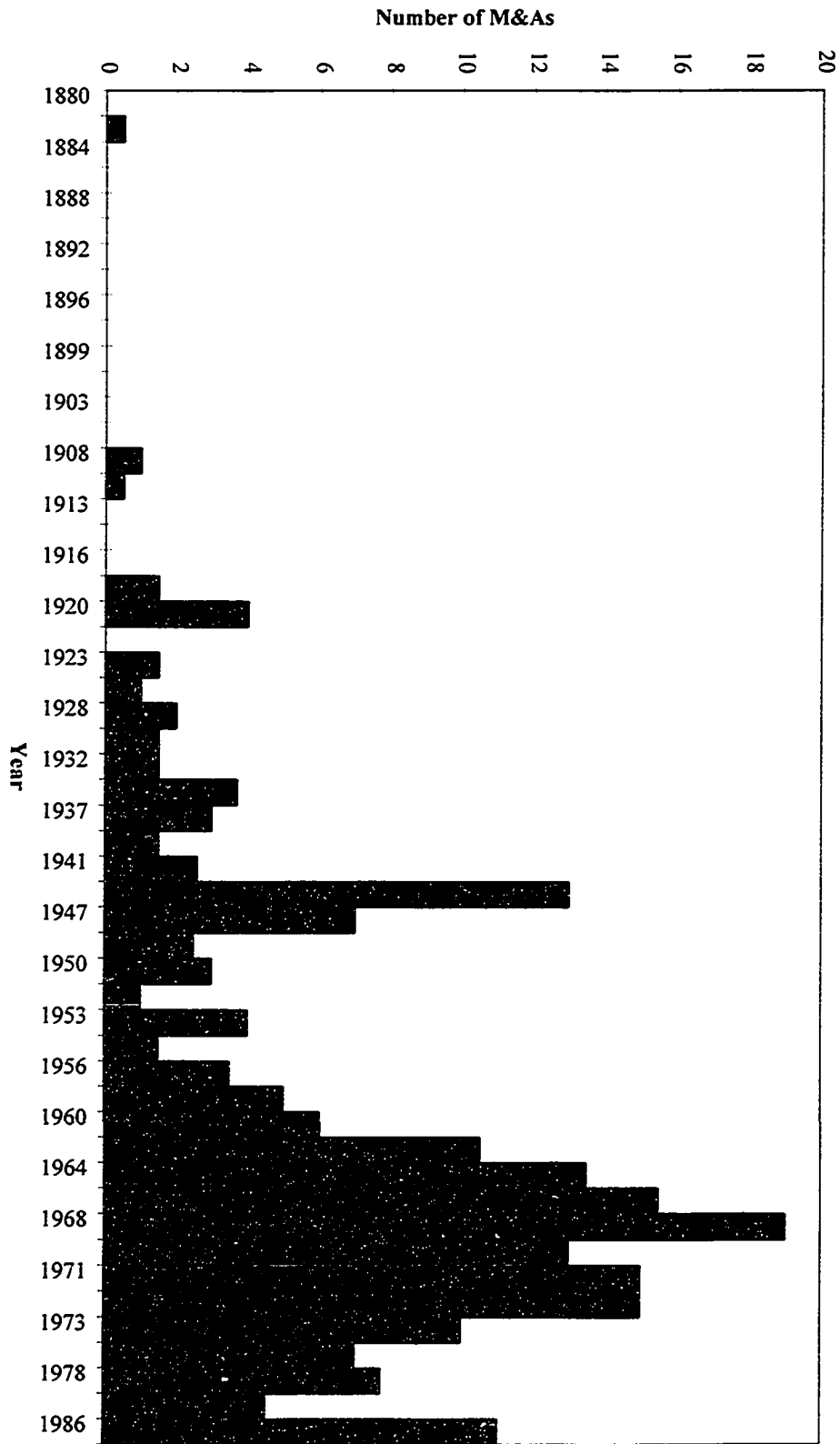


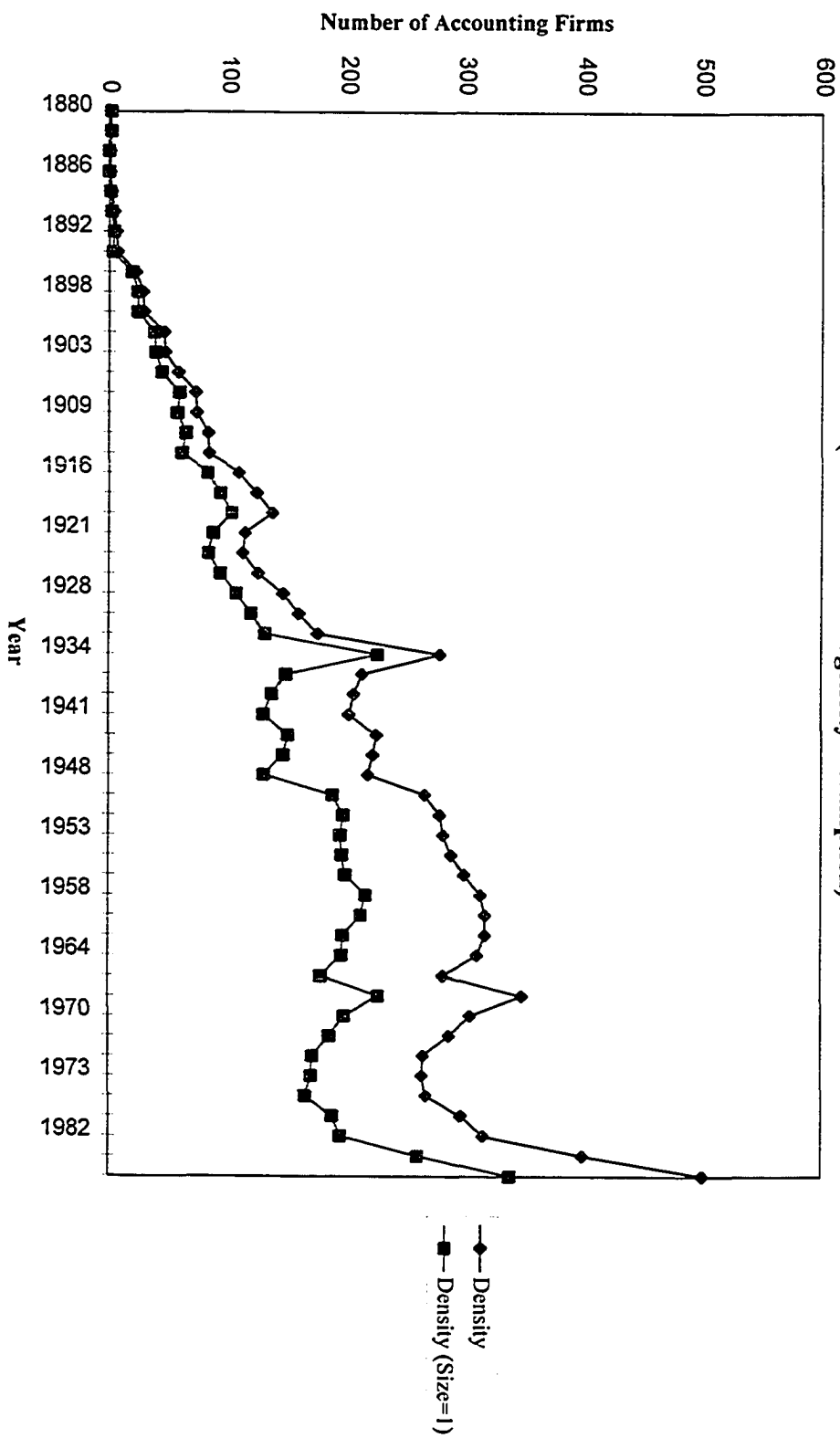
FIGURE 3-2  
Historical Variations in C-4 Concentration Ratio and Gini-index



**FIGURE 3-3**  
**Historical Distribution of M&As**

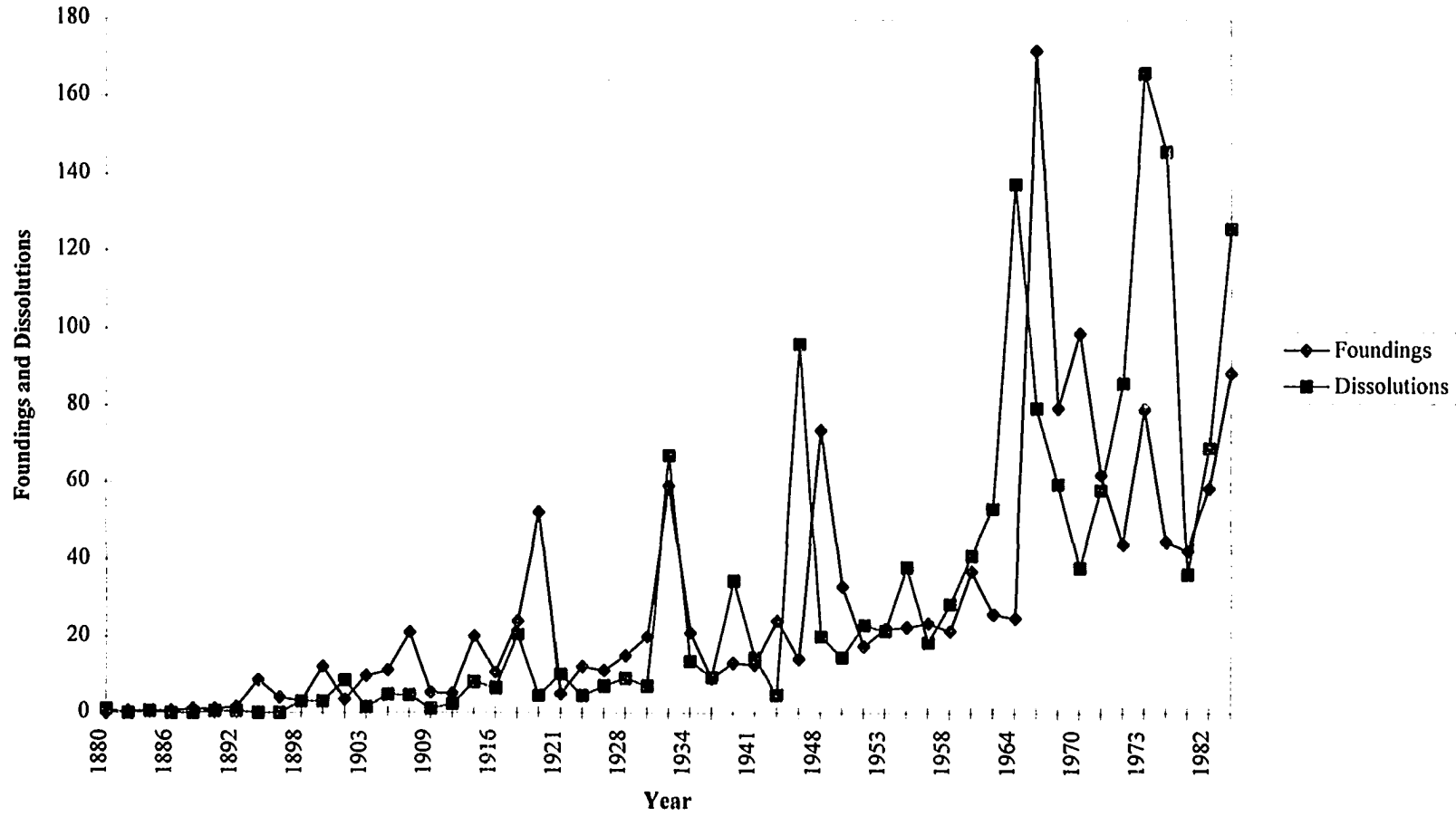


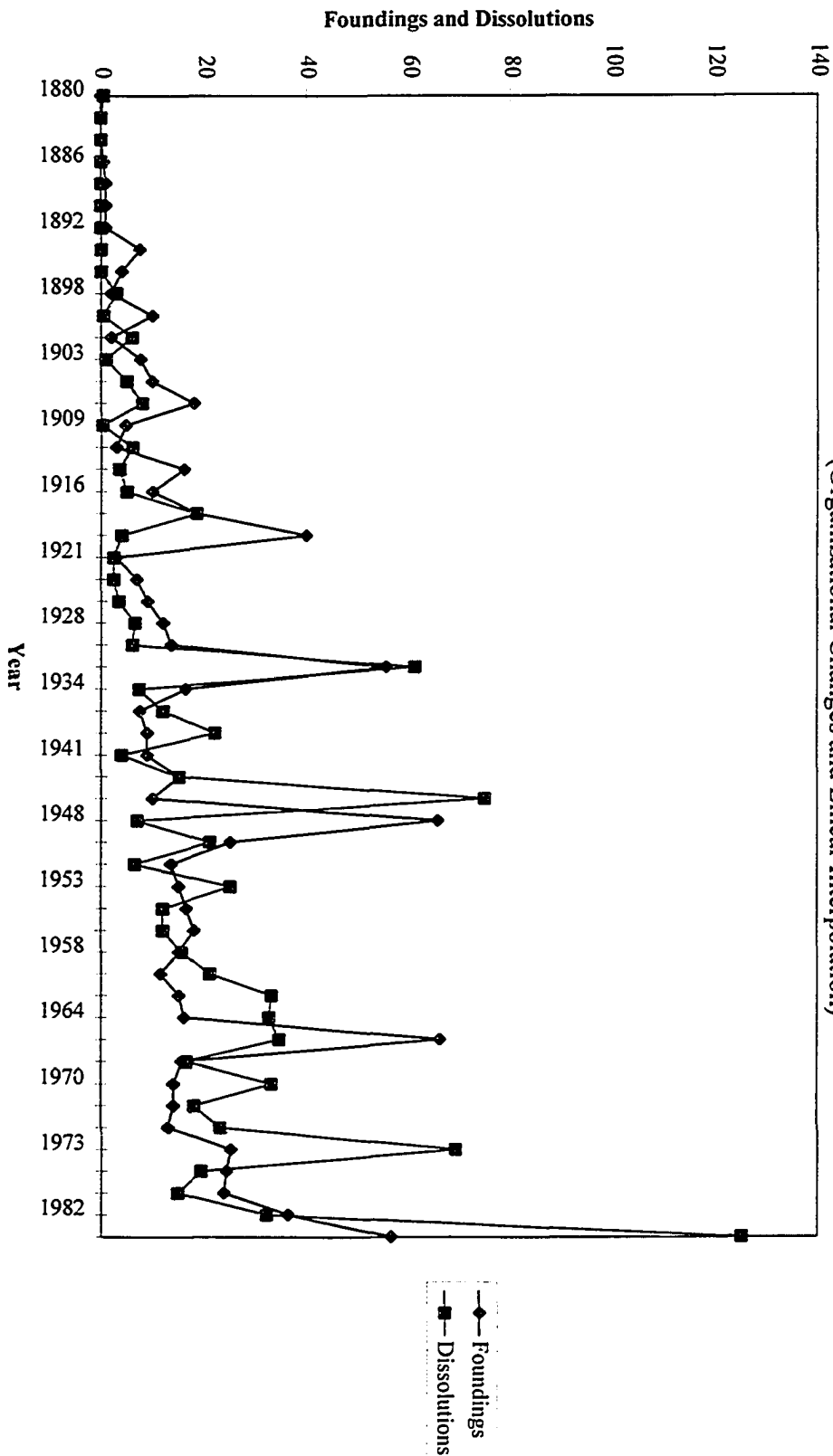
**FIGURE 3-4**  
Historical Trend of Correlations between Firm Size and Its Cumulative Number of M&As



**FIGURE 4-1**  
**Historical Variations in Density for the Population of Dutch Accounting Firms**  
**(Under No Heterogeneity Assumption)**

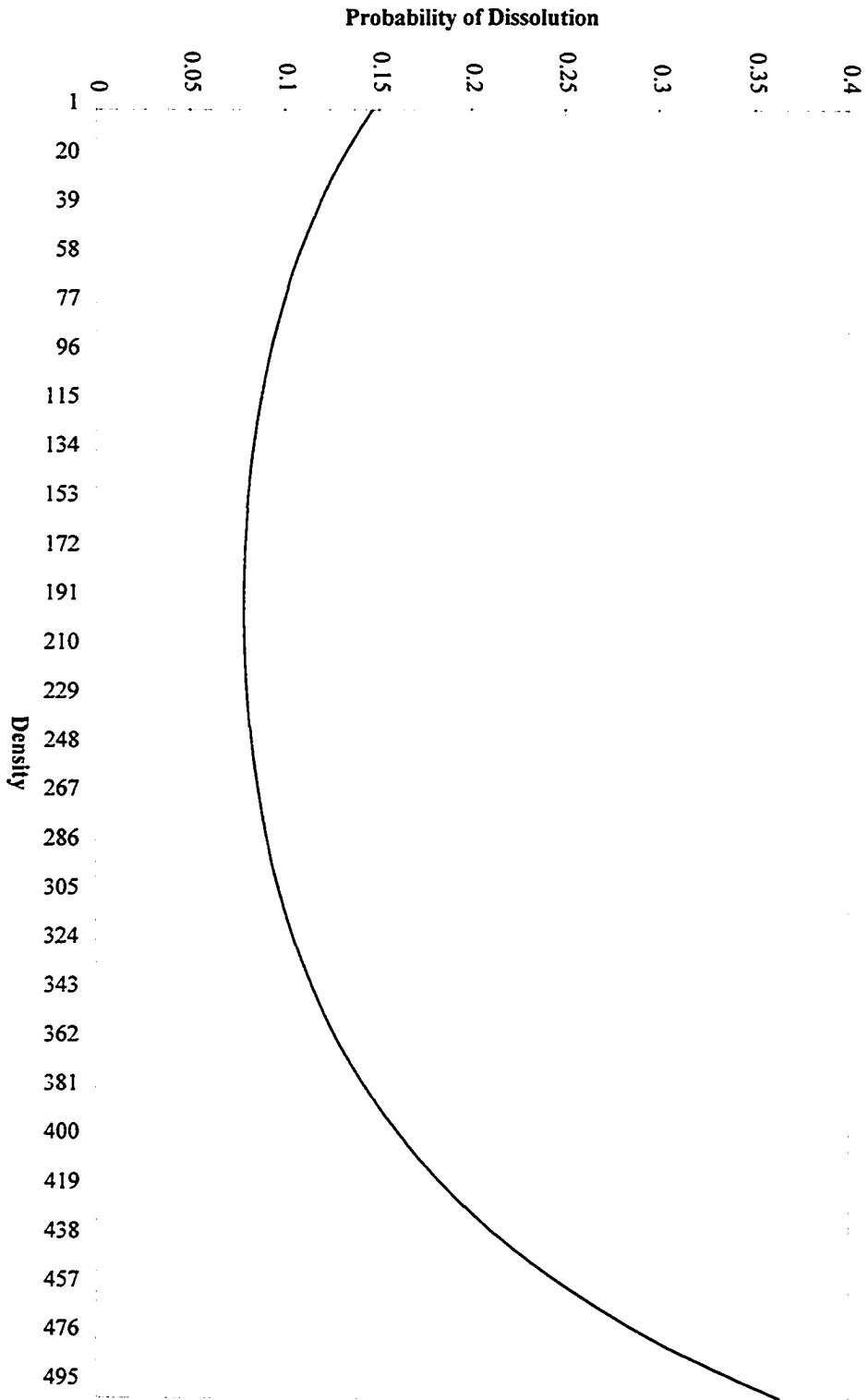
**FIGURE 4-2**  
**Historical Variations in the Number of Foundings and Dissolutions**  
 (Only with Founding and Dissolving Years: No Organizational Changes)





**FIGURE 4-3**  
Historical Variations in the Number of Foundings and Dissolutions  
(Organizational Changes and Linear Interpolation)





**FIGURE 4-4**  
**Density and the Probability of Dissolution**

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