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Localized competition, organizational changes, and organizational mortality: A study on early professional legal service industry in New York City*

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Abstract

This study investigated the explanatory power of environmental selection perspectives and organizational adaptation perspectives by examining the effects of density, intensity of size-localized competition and organizational changes on organizational mortality with New York City professional legal service industry during 1901-1929. Selection perspectives predicted that density, density at founding, and intensity of size-localized competition will be positively associated with organizational mortality. Results of this study in general provided support for the perspectives. The perspectives also predicted that organizational changes would increase organizational mortality. However, results of this study did not provide empirical supports for the hypothesis. On the basis of the empirical results, possibility of integrating selection perspectives and adaptation perspectives and future research directions were discussed.

INTRODUCTION

This paper examines a debate between organizational adaptation perspectives and environmental selection perspectives by investigating the impacts of organizational

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changes and intensity of size-localized competition on the rates of organizational mortality in the New York City professional legal service industry from 1901 to 1929.

The debate is about the relative importance of the two perspectives in explaining the source of observed variations in organizational structure and behaviors (Child, 1972; Hannan and Freeman, 1977, 1984; Singh, House, and Tucker, 1986; Romanelli and Tushman, 1986). The major difference between the perspectives is whether the changes and variations in an organizational population are due to random variation by organizational birth and dissolution or to the adaptation of existing organizations.

Adaptation model represented by contingency theory had been a dominant paradigm in the field of organization theories. The model typically focuses on the match between organizational structure and environment (Burns and Stalker, 1961; Child, 1972; Lawrence and Lorsch, 1967; Thompson, 1967). The model assumes that intentional and planned behaviors of organizations are the major source of changes and variations in an organizational population. However, the model does not rule out the possibility of selection (Van de Ven and Drazin, 1985). Organizations of which structures are better matched to their environments by rational decision making are assumed to have better organizational performance and thus higher chance of survival. Resource dependency model is also a kind of adaptation models, because the model claims that organizations behave to reduce its dependence on other organizations and the reduction of resource dependence in turn enhances organizational performance and survival chance (Pfeffer and Nowak, 1976; Pfeffer and Salancik, 1978).

Selection model regards random variations as a major force of changes in an organizational population (McKelvey and Aldrich, 1983). The model assumes a very high level of organizational inertia (Hannan and Freeman, 1984). Hannan and Freeman (1977) argued that organizations typically have a high level of structural inertia because of various internal and external constraints. They however revised their theory of organizational inertia in their 1984 paper, arguing that organizational inertia is a consequence rather than a precursor of selection process. They suggested that selection environment favors organizations

with structural inertia and winnows out organizations that change their structural aspects. Because of the structural inertia and the detrimental effect of organization changes, a major source of changes and variations in an organizational population is organizational birth and dissolution rather than the adaptation of existing organizations. Therefore, Hannan and Freeman (1984) argued that studying organizational birth and dissolution is a better approach in investigating historical changes in an organizational population.

For the applicability of the two models, there seems to be a tentative agreement among organizational theorists. Selection model assumes a unidirectional influence of selection environments on organizations as well as the inability of organizations in successfully changing their core elements. Adaptation model assumes that organizations have slack resources to absorb the impact of changes in core elements and that organizations can influence their selection environments by using various strategic moves.

Compared with small organizations, large ones are more capable of changing their environments and have more slack resources to change their core elements. For this reason, several scholars argued that adaptation model could be applied to a small number of large organizations and selection model to a large number of small organizations (Scott, 1992). Hannan and Freeman (1984), however, did not agree with the argument. They maintained that the level of structural inertia increases with the size of organizations and thus large organizations are less likely to reorganize their structure than small ones. Even though large organizations are less likely to dissolve because of their slack resources, those organizations are also replaced by other organizations when we use an observation window of a longer time span (Hannan and Freeman, 1977, 1984).

Current conception about relationship between organizational size and the applicability of adaptation and selection model however has been oversimplified. We observed that even small organizations can adapt to their selection environments by changing the way of absorbing critical resources through the formation of collectives. For instance, an association of small organizations can influence legislative authority and government agencies to impede the entry of large organizations into their

market segments.

This paper examines the applicability of the two models to the population characterized by a large number of small organizations. For empirically comparing explanatory power of the competing models, we can investigate the effects of organizational changes and population characteristics on organizational mortality. If we find the detrimental effects of organizational changes and predicted effect of population characteristics, the results will support environmental selection model. If we get predicted effects of organizational changes and insignificant effects of population characteristics, the results will favor adaptation model.

THEORY AND HYPOTHESES

Environmental selection model

Hannan and Freeman (1986, 1988, 1989) argued that the mortality rates of social organizations depend on population density — the total number of organizations in a population that a focal organization is included — as well as the properties of individual organizations. At low densities, the growth of a population can decrease mortality rates of organizations. To provide the hypothesis, Hannan and Freeman relied on the argument of institutional theory, which is that the lack of organizational legitimacy due to small number of organizations in an organizational population increases their mortality rates (cf., DiMaggio and Powell, 1983; Meyer and Rowan, 1977; Scott and Meyer, 1983).

To sustain, organizations should continuously acquire resources from their environments (Thompson, 1967; Pfeffer and Salancik, 1978). The rarity of organizations with a similar organizational form undermines the legitimacy of such organizations. Compared with institutionalized organizations, organizations absent of social legitimacy have difficulties in mobilizing external resources (Stinchcombe, 1965). It is mainly because there is little congruence between activities of organizations with a new form and the expectations of the society. For instance, banks would not lend money to

organizations with a new form because those banks cannot estimate the success probability of those organizations. Capable people would not bet their career with the new firms because their prospect is very susceptible.

The increase in the number of organizations with a new form heightens the visibility of the new organizational form, thus making them more familiar and augmenting their political capabilities (Hannan and Freeman, 1989). When the number of organizations grows, organizations with a new form can claim their institutional standing (Hannan and Freeman, 1988). As a result, at low density, increase in density would decrease the death rates by increasing the legitimacy of a population using the form.

At high densities, competition force presumably overwhelms legitimation forces (Hannan and Freeman, 1989). Organizations that occupy the same market niche have to compete with one another for acquiring similar resources because the carrying capacity of the niche is usually limited (Hannan and Freeman, 1977). When the density is high enough to acquire legitimacy from the society, additional growth in density cannot enhance the legitimacy of a population anymore. Instead, growth in density increases the intensity and likelihood of competition within the population. The increased intensity of competition heightens the mortality rates of organizations in the population (Hannan and Freeman, 1989). Combining the legitimation and competition processes, Hannan and Freeman predicted a U-shaped relationship between density and organizational mortality. In other words, they predicted that the density has a negative effect on mortality rates and the squared term of density has a positive effect. The legitimation process produces the negative effect of density and the competition process entails the positive effect of density-squared term.

The curvilinear relationship between density and organizational mortality rates has been supported in many previous studies (Baron, West, and Hannan, 1994; Carroll, Presendorfer, Swaminathan, and Wiedenmayer. 1993; Hannan and Freeman, 1987, 1988; Tucker, Singh, and Mainhard, 1990). However, Anderson (1988) found only the competition effect — the positive relation between density and death rate — with three different industries and Barnett (1990) also found only the

competition effect in a population of an early US telephone industry. Delacroix, Swaminathan and Solt's study (1989) did not provide supporting evidence of the curvilinear effect in the California wine industry, when they controlled the effects of foundings and failures of previous year. Opposite to Hannan and Freeman's prediction, Singh, Tucker, and House (1986) found a statistically significant negative effect of population density on organizational mortality in a population of voluntary service organizations.

Data on professional legal service industry in New York City collected for this study are left-censored. Though law firms in New York City existed before 1850, I collected data from 1901 because of difficulty in collecting data for earlier years. A review of prior research on the relationship between density and organizational mortality summarized that left-censored populations do not produce the effect of legitimation process but the effect of competition process (Hannan and Carroll, 1992). Since law firms in New York City were institutionalized before 1901, only the competition process is hypothesized as follows.

Hypothesis 1: The density of law firms will be positively associated with the death rate of law firms.

Carroll and Hannan (1989) examined the effect of density at the time of an organization's founding on its mortality. They proposed that the density at founding have a delayed effect on organizational mortality rate. They argued that organizations founded at high density are more susceptible to dying because of liability of resource scarcity and tight niche packing. High density at founding indicates intense competition at the time of an organization's founding and the intense competition at founding creates conditions of resource scarcity. When resources are scarce, new organizations cannot move quickly from initial founding stage to full-scale operation and thus face strong selection pressures. Even if some organizations can survive the initial period, they do not have enough resources for creating formal organizational structure and highly reproducible routines.

Tight niche packing is related with the amount and quality of exploitable resources. High density and intense competition at

the time of founding means few exploitable resources are remained for new entrants. Because newly founded organizations can hardly compete head-to-head with established organizations, new entrants tend to be pushed to thinly spread and ephemeral resource space. The new entrants can try to exploit richer center of resources at some later time, otherwise those entrants cannot accumulate resources enough to buffer environmental shocks. The reorganization process however increases the mortality rate, since structures and routines for exploiting an inferior region of resources presumably differ from those for a richer center of resource space. Carroll and Hannan (1989) found supporting evidence of the argument from four populations (American labor unions, Argentinean newspaper, Newspaper publishers in San Francisco region, American breweries), but did not find supporting evidence from a population of Irish newspapers. Following Carroll and Hannan's argument, I hypothesize as follows.

Hypothesis 2: Density at the time of a law firm's founding will be positively associated with death rate of the law firm.

Several critics charged that the density dependence model treats all members of a population as competitors for acquiring same scarce resources and the members thus compete with one another (Winter, 1990). Hannan and Freeman (1977, 1989) however already mentioned the inequivalence of competition. They argued that the intensity of competition among organizations is predicted to be a function of similarity in organizational resource requirements: The more similar the resource requirements of two organizations, the greater the potential for intense competition between the organizations. It is obvious that organizations occupying same niche compete more intensely with one another than the organizations occupying different niches do. The equivalence assumption might be a reasonable starting point. If we have any variable that can cause localized competition, however, we had better incorporate the localized competition in our model.

Several recent studies captured the effects of organizational differences on the intensity of competition (e.g., Baum and Haveman, 1997; Baum and Korn, 1996, 1999; Baum and Singh,

1996; Dobrev, Kim, and Hannan, 2001; Podolny, Stuart, and Hannan, 1996). For instance, Barnett (1990) disaggregated the density of multipoint[1] and single point competitors to examine how specific theoretically discerned subpopulations of organizations interact with one another. He found that the competitive effects of density of single and multipoint competitors on organizational mortality were localized within strategic groups. The analysis showed that memberships of single and multipoint competitors determine the patterns of competitive interactions between single point and multipoint competitors.

With American brewing industry, Carroll and Wade (1991) disaggregated density according to geographic location and showed that the characteristics of local population better represent competition process than those of national level population do. Swaminathan and Wedenmayer (1991) also found similar results in a study of the German brewing industry. Similarly, Baum and Singh (1994a, 1994b) disaggregated the density according to the similarity in the ages of the children served by day care centers and in geographic location. The findings indicate that the intensity of competition between day care centers increases with both the extent of overlap in the ages of children served and geographic proximity.

Hannan and Freeman (1977) proposed more specific models of size-localized competition. They discussed a model in which intrapopulation competition is localized by organizational size. They suggested an idea that organizations with different sizes in a population adopt different strategies and structures. Therefore, organizations of different sizes, though engaged in similar activities, depend on different mixes of resources. This argument implies that intensity of competition faced by organizations in a population depends on the size distribution of other organizations. By using simulation techniques and historical data of New York City banks and life insurance companies, Hannan, Rager-Moore, and Banaszak-Holl (1900) explored how size-localized competition would affect evolution of size distribution. However, their data and analysis did not allow

1) Multipoint competitors are rivals that compete in more than one market segment or business.

them to examine the impacts of size-localized competition on the failure rate of organizations. With Manhattan hotel industry, Baum and Mezias (1992) empirically examined the effect of size-localized competition in addition to location-localized and price-localized competition. They found that organizations with larger number of competitors of similar size have higher failure rate.

Size has been very important strategic variable in New York City professional legal service industry. In the early twentieth century, lawyers were seldom specialized in a single practice area and the required work for providing professional legal service to client was not so complex because the law itself was not well developed and complicated. Still, large lawsuit and business legal claims required a lot of work that could not be handled by a single lawyer. In other words, large law firms served large-scale lawsuits and clients, and small firms served for small cases. Accordingly, Spurr (1987) found a positive association between the size of law firms and that of legal claims. The size also indicates the degree of institutional specialization. In other words, large law firms provided various legal services from business law to immigration, while small law firms were specialized in some specific practice areas.

Following earlier research on size-localized competition and the historical evidence from legal industry, I propose following hypothesis.

Hypothesis 3: The larger the number of law firms with similar size that a law firm has, the more likely the firm will experience dissolution.

Organizational change and mortality

Environmental selection model suggests that organizational changes, especially fundamental reorganization, increase the mortality of organizations. Hannan and Freeman (1984) argued that organizational changes and reorganization attempts that require the revision of established work routines, the modification of communication patterns, and regrouping of work groups raise organizational mortality rate, because the changes hamper the reliability of organizational performance.

In contrast to the selection view, organizational adaptation

perspective suggests that organizational changes reflect the decisions and strategies of rational leaders and dominant coalition in organizations in response to environmental changes and thus the changes can enhance the survival chance of organizations. For instance, contingency theorists argued that organizational structure should be matched to the contextual demands of size, environment, and technology (Burns and Stalker, 1961; Lawrence and Lorsch, 1967; Thompson, 1967). The contingency model implies that organizations that change their structural elements to match environmental changes will perform better.

Similarly, resource dependency model suggests that organizations depend upon their environments for acquiring resources critical to their survival. To minimize resource dependence on external environments and critical uncertainty, organizations should attempt M&As, joint ventures, and interlocking directorates (Burt, Christman, and Kilburn, Jr. 1980; Pfeffer and Nowak, 1976; Pfeffer and Salancik, 1978). This model implies that strategic move to reduce an organization's dependence on external environments can enhance the survival chance of the organization. Scholars in the field of strategic management (e.g., Miller and Friesen, 1984) and organizational learning (Levinthal and March, 1981; Nelson and Winter, 1984) also proposed the same relationship between organizational changes and success.

Examining the effect of organizational changes on the mortality rate of voluntary service organizations in Toronto metropolitan area, Singh, House, and Tucker (1986) reported that two kinds of changes (executive change and location change) among six reduce the hazard of organizational mortality and other two changes (service area change and sponsor change) increase the hazard. However, the authors failed to find any significant impacts of goal change and structural change on the mortality rate. The authors interpreted the mixed results by adopting the notion of the location of changes in organizations. Singh and his colleagues argued that selection perspectives best describe changes in the core elements of organizations, which require serious revision of existing core routines. On the other hand, adaptation perspectives best describe peripheral changes, which do not require important changes in core routines or

capabilities of organizations.

The most important resource of professional service organizations is human resource (Pennings, Lee, and Witteloostuijn, 1998). By acquiring or bringing up eminent professionals, a professional service firm can get a good reputation and thus can get more clients with greater resources (Smigel, 1967). About the nature of competition in professional legal service industry, Stephen Bill (1990), the editor of The American Lawyer, put it this way. "... the real competition among professional [law] firms is for product (i.e., lawyers), not for customers. The lawyers bring in customers, just the way, for example, authors bring customers to book publishers."

However, the addition of eminent lawyers, M&A of law firms, and organizational split requires changes in partnership agreement among lawyers, which is a fundamental change in law firms. Additions of new partners from outside of the firm indicate changes in clients and frequently changes in product mix. Especially when a law firm is small, the impact of membership changes on organizational routines is very substantial.

In sum, selection perspective predicts that three organizational changes in this study—major M&A, major organizational split, and the acquisition of eminent lawyers—will raise mortality of law firms that experienced those changes. However, adaptation perspective predicts that M&As of law firms and the addition of eminent lawyers to the firm will decrease the mortality of law firms. The perspective predicts that major organizational split will increase the mortality of law firms, since the event means failure in maintaining existing critical resources and thus mal-adaptation.

METHODS

Data

Data used for this study are life history information on 719 law firms that operated in New York City at any time from 1901 to 1929. Hubbel's legal directory that was annually published was used to construct the life history of law firms. The directory

provides the names of law firms, the names of lawyers affiliated with each law firm, and legal practice areas of each law firm. Solo practitioners were not included in the sample, because the life of a firm with single practitioner is closely related with the life of the lawyer and thus the firm may not be considered as a going concern. One hundred and fifty-nine law firms were already existent at the start of observation (i.e., year 1901) and their founding years were not traced. During the observation period, 581 law firms were founded and 459 firms dissolved. Two hundred and sixty law firms were still alive in 1929, which were right-censored in this study. The average size of New York City law firms grew from 3.5 in 1901 to 5.5 in 1929.

Measurement

Founding and failure: The year of a law firm's founding was measured by the year that the law firm first appeared in the directory. One problem in measuring organizational founding is inability to identify founding years of 159 law firms that were already operative in year 1901. I assigned year 1901 as the founding year of those firms and added a dummy variable for left-censored cases in statistical analyses. The year of a law firm's failure was measured by the year that the law firm was permanently delisted from the directory.

Size: The size of each law firm was measured in each year as the number of lawyers working for the firm — generally accepted measure of size in professional service industry. The lawyers include partners who are residual claimants for the profits of the firm, counsels who usually used to be partners of the firm and are close to retire, and associate lawyers who are employees with fixed payment and can be promoted to partners after a probationary period.

Population density: Population density was measured as the total number of law firms existed at the start of each year. According to Hypothesis 1, the density is predicted to have a positive effect on organizational mortality as the intensity of competition increases with the density.

Mass: A mass of each law firm was measured by the total number of lawyers who were affiliated with any law firm in New York City except for the lawyers in the focal law firm. To reduce

the skewness in the distribution of mass, natural logarithm was taken for the mass. The variable was included in empirical models to control the effect of organizational size on mortality.

Intensity of size-localized competition: Following the work of Hannan and his colleagues (Hannan and Ranger-Moore, 1990; Hannan, Ranger-Moore, and Banaszak-Holl, 1990), the intensity of size-localized competition is measure by using the Euclidean distance of a focal law firm to other law firms in the population. Size difference between the focal organization and every other organization is converted to a Euclidean distance as $D_{it} = \sqrt{\sum_{j \neq i}(S_{it} - S_{jt})^2}$, where S_{it} and S_{jt} are size of firm i and firm j at time t, respectively.

D_{it} increases as a focal organization deviates from the center of size distribution of other organizations in terms of size. Thus, small value for D_{it} indicates intense competition because the focal organization has a large number of similar-sized organizations. If the size-localized competition is related with higher mortality rate, then D_{it} is predicted to have a negative relationship with organizational mortality. The measure D_{it} assumes that all organizations compete with one another on the basis of their size similarity. If the assumption is correct, the largest organization has the biggest advantage in competition, which allows the organization to grow faster than any other organizations. The self-accelerating process generates extreme monopolies that do not seem to be empirically plausible. Hannan, Ranger-Moore, and Banaszak-Holl (1990) tried to solve the problem by introducing the notion of competitive window. They assume that organizations compete only with other organizations with some range of their own size. To measure size-localized competition with the competitive window, Hannan and his colleagues suggested following formula, $D_{it} = \sqrt{\sum_{|S_{it} - S_{jt}| < \mu}^{\mu}(S_{it} - S_{jt})^2}$, where S_{it} and S_{jt} are size of firm i and firm j at time t, respectively, and μ is the range of competition window.

However, how to determine the width of the competition window (μ) is not theoretically developed yet. Baum and Mezias (1992) used the size of a focal organization divided by 2 as μ. In other words, competitors of an organization i with a size of S_{it} are organizations whose size is larger than $0.5 * S_{it}$ and smaller than $1.5 * S_{it}$. The formula incorporates a nice feature of competition as larger organizations have wider competitive window. It might

be a better approximation of reality, because in many industries the distribution of size measured by the number of employees or sales volume usually has a shape like χ^2 distribution, which has dense distribution in small size and sparse distribution in large size. This is why many organizational studies take natural logarithm when they use a measure of organizational size.

Baum and Mezias's formula however does not correctly incorporate the nature of competition. If we use the formula, an organization with a size of 11 is considered as a competitor of a focal organization with a size of 20. However, an organization with a size of 20 is not considered as a competitor of a focal organization with a size of 11. The width that varies with the logarithm of size, which was experimented by Hannan, Ranger-Moore, and Banaszak-Holl (1990), also lead to an asymmetric competition as Baum and Mezias (1990) did. In strategy formulation processes, CEOs of an organization A may not consider other organization B as its competitor even though B considers A as its competitor. When we investigate strategy formulation process, the asymmetry assumption is defendable. In studying organizational mortality, however, we are interested in real competition in market rather than the cognition of CEOs. By definition, if A is a competitor of B, B is also a competitor of A.

To incorporate the symmetric nature of competition and the actual distribution of size, I used a fixed width with the logarithm of organizational size. In other words, the width of competitive window (Log(μ)) can be expressed as $|\ \mathrm{Log}(S_{it}) - \mathrm{Log}(S_{jt})\ | = \mathrm{Log}(\mu)$. If we take an exponential to each side of the inequality, we get Max $[(S_{it}/S_{jt}), (S_{jt}/S_{it})] = \mu$. In this formula, μ of 2 for example means that a focal organization competes with organizations that are not only larger than the half of the focal organization but also smaller than the twice of the focal organization. The formula for calculating Euclidean distance used in this study is $D_{it} = \sqrt{\sum_{\mathrm{Max}(S_{it}-S_{jt}/S_{it})\le\mu}^{\mu} (S_{it}-S_{j\mu})^2}$. Because I do not have a priori rationale for the μ, five different values of μ(1.5, 2, 3, 4, 5) are selected to examine the explanatory power of the width.

Organizational changes: I identified three kinds of organizational changes in New York City professional legal service industry. First, *major merger and acquisition* was identified when a law firm merged with or acquired other law

firm whose size was larger than the half of the acquiring firm. Second, *major split* was flagged when more than one-third of a focal firm's lawyers quitted the firm and established a law firm of their own. Third, *acquisition of eminent lawyers* was defined by the change in the name of a law firm due to the addition of new lawyers. Law firms usually changed their names by adding the last names of new partners to their firm names when eminent lawyers joined the firm. The three kinds of organizational changes presumably have lagged effects on organizational mortality. For instance, the addition of eminent lawyers may decrease the possibility of a law firm's failure in that year as well as in later years. Unlike RATE program, BMDP 2L that was used for this paper has a shortcoming in handling the functional form of lagged effects. Thus, I used the cumulative number of previous organizational changes of same kind in estimating Cox regression model.

Model and Estimation

I estimated the effects of intensity of size-localized competition and organizational changes on organizational mortality by using Cox (1972) proportional hazard model. The model is given by $h(t; z) = h_0(t) \exp(\beta z)$, where β is a vector of unknown regression coefficients for independent variables z, and $h_0(t)$ is an unknown hazard function for an organization with vector $z=0$. In this model, no parametric model is assumed for the underlying hazard function $h_0(t)$. For causality, time varying covariates are assumed to have one year lagging effect in this study. BMDP 2L was used for estimating the parameter estimates β.

RESULTS

Yearly distribution of major variables is presented in Table 1. Yearly changes in density and mass indicate that the number of law firms and that of lawyers who were affiliated with law firms had increased over time for 1901-1929. The number of foundings in year 1901 is 158 in the table. The number is not exactly the number of firms founded in 1901, but the number of law firms that had been established until 1901 and were still

TABLE 1. Yearly Distribution of Major Variables

Year	Foundings	Failures	Density	Mass	Eminent Lawyer	Major Split	Major M&As
1901	158		158	537			
1902	23	13	168	574	23	2	6
1903	32	18	182	613	7	0	0
1904	20	14	188	646	9	2	1
1905	16	10	194	664	14	0	1
1906	26	12	208	715	11	0	0
1907	17	22	203	704	9	4	1
1908	25	16	212	759	11	0	1
1909	11	12	211	752	12	1	3
1910	24	13	222	781	7	2	1
1911	28	17	233	824	12	0	2
1912	13	19	227	796	9	3	3
1913	16	29	214	768	8	2	2
1914	19	19	214	795	29	1	1
1915	11	15	210	828	18	0	4
1916	38	17	231	905	15	1	2
1917	16	29	218	883	15	3	7
1918	15	11	222	934	13	4	2
1919	13	25	210	935	16	4	2
1920	23	12	221	1017	13	3	4
1921	25	15	231	1121	16	2	0
1922	22	14	239	1187	23	1	4
1923	16	12	243	1230	18	3	4
1924	20	12	251	1249	18	3	0
1925	11	8	254	1297	18	1	7
1926	22	17	259	1336	16	3	0
1927	20	17	262	1427	11	2	8
1928	21	16	267	1443	18	1	3
1929	18	25	260	1441	10	2	0
Total	719	459			399	50	69

alive in year 1901. For 29 years of observation, there were 399 cases of the acquisition of eminent lawyers, 50 cases of major split, and 69 cases of major mergers and acquisitions. From 1902 to 1929, 561 law firms were founded and 459 firms dissolved in New York City.

Table 2 reports the estimates of Cox proportional hazard regression. In table 2, winX means that a focal firm competes only with other organizations of which size is smaller than X-

TABLE 2. Results of Proportional Hazard Regression Analysis

Variables	Model				
	1	2	3	4	5
Size at Founding	-0.157***	-0.157***	-0.137***	-0.130***	-0.230***
	(0.032)	(0.032)	(0.035)	(0.033)	(0.034)
Density at Founding	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Left Censoring	-0.257	-0.251	-0.262	-0.297	-0.317
	(0.204)	(0.203)	(0.204)	(0.204)	(0.204)
Acquisition of	-0.172**	-0.172**	-0.181**	-0.182**	-0.192***
Eminent Lawyers	(0.074)	(0.074)	(0.073)	(0.073)	(0.073)
Major Split	0.670***	0.671***	0.625**	0.607**	0.517**
	(0.256)	(0.256)	(0.258)	(0.257)	(0.259)
Major M&As	-0.498**	-0.498**	-0.479**	-0.476**	-0.421**
	(0.225)	(0.225)	(0.226)	(0.224)	(0.225)
Density	0.015**	0.018	0.013**	0.016***	0.016***
	(0.006)	(0.024)	(0.006)	(0.006)	(0.006)
Density^2/10000		-0.097			
		(0.622)			
Ln (Mass)	-1.012*	-0.949	-0.588	-1.104	-0.881
	(0.616)	(0.735)	(0.674)	(0.619)	(0.620)
D_{it}^{Size}/100			-0.043		
			(0.028)		
$D_{it}^{Win1.5}$/100				-0.359**	
				(0.162)	
D_{it}^{Win2}/100					-0.275***
					(0.072)
D_{it}^{Win3}/100					
Degree of Freedom	8	9	9	9	9
Log-Likelihood	-2711.61	-2711.60	-2711.31	-2709.16	-2704.35

Note: Asymptotic standard errors are in parentheses.
* p < .10; ** p < .05; *** p < .01 (two-tailed test)

times the size of the focal firm and larger than 1/X-times of the size. Model 1 estimates a model of density and mass dependence along with the effect of organizational changes. Model 2 is for additionally investigating the effect of legitimation process.

The density has a statistically significant positive effect on organizational mortality in Model 1, but the effect disappeared when I added the squared term of density in Model 2. As the

TABLE 2. (Continued)

Variables	Model			
	6	7	8	9
Size at Founding	-0.052	-0.136***	-0.091***	-0.051
	(0.035)	(0.033)	(0.034)	(0.036)
Density at Founding	-0.002	-0.001	-0.001	-0.001
	(0.005)	(0.005)	(0.005)	(0.005)
Left Censoring	-0.332	-0.322	-0.345*	-0.357*
	(0.203)	(0.203)	(0.203)	(0.202)
Acquisition of	-0.202***	-0.178**	-0.189***	-0.201***
Eminent Lawyers	(0.073)	(0.073)	(0.073)	(0.073)
Major Split	0.440*	0.597**	0.502*	0.421*
	(0.261)	(0.258)	(0.259)	(0.261)
Major M&As	-0.376*	-0.507**	-0.450**	-0.396*
	(0.225)	(0.225)	(0.225)	(0.225)
Density	0.013*			
	(0.006)			
Density^2/10000				
Ln (Mass)	-1.303	0.126	0.307	0.693
	(0.635)	(0.439)	(0.442)	(0.455)
D_{it}^{Size}/100				
$D_{it}^{Win1.5}$/100		-0.301*		
		(0.161)		
D_{it}^{Win2}/100			-0.264***	
			(0.071)	
D_{it}^{Win3}/100	-0.231***			-0.237***
	(0.049)			(0.048)
Degree of Freedom	9	8	8	8
Log-Likelihood	-2700.50	-2713.11	-2708.06	-2703.02

change in log-likelihood at the bottom of table 2 indicates, the addition of the squared term of density did not significantly enhance the explanatory power of estimated model. The results strongly support Hypothesis 1. As hypothesis 1 suggested, legitimation process was not operative from year 1901 to 1929 in the New York City legal service industry. Law firms might have been already legitimized before year 1901 — year starting the observation of law firms for this study. Removing the density-squared term from Model 2 did not significantly reduce the goodness of fit (χ_2 =0.0246 with 1 degree of freedom). Therefore,

the density-squared term was not included in other models.

I tried various specifications of size-localized competition and in this paper I reported only the part of results in model 3 through model 9. In model 7, 8, and 9, the density was not included as an independent variable because both the density and the intensity of size-localized competition can represent the competition process.

The coefficient estimate for a dummy indicating left-censored cases is not significant in all models except for model 8 and 9. This result indicates that law firms founded before 1901 have only marginal survival advantages over newly founded law firms. Organizational size at founding has a statistically significant and negative effect on firm mortality in all models except for model 9. The results suggest that the larger the size of a law firm at founding, the lower the possibility of mortality the firm has. The finding supports a random work hypothesis,[2] because the size can be regarded as the amount of initial stock resources. The coefficient estimate for Mass is very unstable across models. From model 1 to 6, the estimate is negative but it is positive in other models. The results indicate that organizational size itself is not important when the effect of size-localized competition is controlled.

Comparison of results that are provided by various specifications of competitive window suggests that μ of 3 is the best approximation of size-localized competition among μ of 1.5, 2, 3, 4, and 5 in New York City professional legal service industry for 1901-1929. When 1.5 or 2 is used as a value of μ, the number of law firms outside the competitive window has a statistically significant and negative effect on organizational mortality.[3] The result suggests that a focal firm competes not only with others located within a competitive window but also with other firms located outside the competitive window, which is not plausible for the assumption of localized competition. When 4 or 5 is used for a value of μ, the coefficient estimate of

2) The hypothesis posits that the growth and decline of organizations are the results of a random walk process. As a result, an organization founded with a larger amount of initial stock resources is less likely to dissolve (Levinthal, 1991)

3) The results when I got by adding the number of other firms located outside the competitive window to each model were not reported here. They were available from the author.

the intensity of size-localized competition variable is less significant than when 3 is used for the value of μ. Additionally, the log-likelihood indicates that μ of 3 is better than μ of other values in explaining organizational mortality in the current population. All the findings suggest that New York City law firms from 1901 to 1929 competed with other firms of which size is larger than 1/3-times and smaller than 3 times of the size of the focal firm.

When the density-squared term was taken out from models, the coefficient estimates of density are statistically significant and positive in all models. The findings provided strong support for Hypothesis 1. Hypothesis 2 states that density at the time of a law firm's founding will be positively associated with death rate of the law firm. However, density at founding did not have any significant effect on organizational dissolution.

Hypothesis 3 states that the larger the number of other law firms with similar size that a focal law firm has, the more likely the firm will experience organizational mortality. Model 3 introduced a variable for the intensity of size-localized competition without any restriction on competitive window. In other words, a law firm was assumed to compete with all other law firms. The coefficient estimate for size-localized competition is not statistically significant in the model. A separate analysis not reported in Table 2 however showed that the estimate is statistically significant and negative, when the density was taken out from Model 3. As predicted by Hypothesis 3, Euclidean distance representing size-localized competition with a competitive window of μ being 1.5, 2, or 3 has statistically significant and negative effects on organizational mortality in all models. The results suggested that law firms compete more intensely with similar sized law firms than with law firms of different size.

Environmental selection perspectives predicted that major organizational changes would increase organizational mortality. All of the coefficient estimates for organizational change variables are statistically significant. The acquisition of eminent lawyers and major mergers and acquisitions significantly decreased the probabilities of organizational mortality, while major organizational split increased the hazards of organizational dissolution. The results did not support the

selection perspectives.

DISCUSSION AND CONCLUSIONS

This study investigated the explanatory power of environmental selection perspectives and organizational adaptation perspectives by examining the effects of density, the intensity of size-localized competition and organizational changes on organizational mortality with New York City professional legal service industry during 1901-1929. Environmental selection perspectives predicted that density, density at founding, and the intensity of size-localized competition will be positively associated with organizational mortality. Results of this study in general provided support for the perspectives. The perspectives also predicted that organizational changes would increase organizational mortality, as the changes will hamper the reproducibility of organizations. However, results of this study did not provide empirical supports for the hypothesis.

This study suggested that both selection perspectives and adaptation perspectives were required to explain the evolution of a population. In other words, not only organizational founding and dissolution but also major organizational changes were engines for population-level evolution. This study also suggested that Scott's (1987) argument—adaptation model is adequate for a population with a small number of large organizations and selection model for a population with a large number of small organizations—is an oversimplification. This study also showed that reconciliation of Singh, House, and Tucker (1986) is not adequate. Singh, House, and Tucker (1986) found mixed results when they examined the effects of various organizational changes on organizational mortality. These scholars interpreted the results that changes in core structure might increase organizational failure rate and changes in peripheral structure would decrease the failure rate. Contrary to the interpretation, New York City professional legal service industry from 1901 to 1929 showed that even changes in core structure such as major mergers and acquisitions and the acquisition of eminent lawyers decreased organizational mortality.

The findings however might be specific to New York City professional service industry from 1901 and 1929. Compared to organizations in other industries, law firms were much easier to establish for the lawyers at that time, because lawyers did not have to have large sum of resources to establish a law firm. To establish a law firm at that time, lawyers need reputation as competent lawyers and financial resources to rent an office. Furthermore, membership changes in law firms might be much easier than structural or strategic reorganization in manufacturing industries. The other possibility is that small size of law firms during the observation period may reduce the detrimental effects of organizational reorganizations. These limitations suggest further future research on professional service industries. This kind of future research can suggest whether hypotheses provided by selection model and adaptation model can be applicable to professional service industries.

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