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The Ecological Dynamics
of Organizational Change:
Density and Mass Dependence
in Rates of Entry into New Markets

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Campbell (1969) and Aldrich (1979) outlined a three-part evolutionary model involving variation, selection, and retention. Most research in organizational ecology has studied organizational failure, thereby focusing on the process of selection. Although variation is an equally important process in organizational evolution (Hawley, 1987; Fombrun, 1987), there have been comparatively few studies of this process, except the small number of studies of organizational founding. Variation is a necessary precondition for selection: without the diverse products of variation, selection would have no raw material upon which to operate (Campbell, 1969). One important source of variation in organizational populations is change in organizational structure and activities, which has recently become a topic of interest in organizational ecology and organizational evolution. Previous research has studied the effects of organizational characteristics on change and stability: age (Singh, Tucker, and Meinhard, 1988; Baum, 1990b), possession of specialized assets and vulnerability of existing domain (Mitchell, 1989), and past experience with change (Amburgey, Kelly, and Barnett, 1993; Delacroix and Singh, 1991; Ginsberg and Baum, chapter 7, this volume). Some work has also modeled the impact of competitive and institutional factors on rates of organizational change, such as population density and differentiation (Swaminathan and Delacroix, 1991), fluctuations in environmental munificence (Delacroix and Swaminathan, 1991; Singh, Tucker, and Meinhard, 1991), the uncertainty that follows exogenous shocks (Amburgey, Kelly, and Barnett, 1993; Delacroix and Swaminathan, 1991), and conditions at time of founding (Romanelli, 1991b).

This chapter extends the evolutionary research program to examine how the

structure of the competitive environment influences variation through organizational change. Change is defined as shifts in organizational domain and operationalized as product-market diversification. The environmental forces studied are market density (the number of organizations in a market) and mass (the total size of those organizations).

An Ecological Model of Organizational Change

Any ecological model of variation in organizational structure and activities must be reconciled with the concept of structural inertia (Hannan and Freeman, 1977, 1984, 1989). If organizational forms are strongly inert, then organizations will respond slowly to perceived opportunities and threats and will not change quickly enough to keep pace with shifting environmental conditions.

Inertia is posited to be the outcome of performance pressures favoring organizations that consistently reproduce desired behaviors and that account rationally for their actions (Hannan and Freeman, 1984, 1989). This model of selection-induced inertia assumes that achieving reliable performance requires keeping structure and activities stable; hence, organizations are inert. However, the model does not take into account the possibility that organizational change may be necessitated by shifts in environmental resources and demands. If the conditions that affect performance fluctuate greatly, then organizations that reproduce their previously effective structures will perform inconsistently. If the outputs required change frequently and by large amounts; if the inputs available changed in quantity, quality, or relative proportions; or if the technologies used change, then organizations will be forced to alter their structures and activity patterns in order to achieve consistent performance. In volatile environments, societal pressures for reliable output will result in flexible rather than inert organizations. Informality and instability can become familiar to organizations that face volatile environments (Starbuck, 1965). Organizational flexibility can derive from stable processes that routinize change (March, 1981). In unstable and uncertain environments, selection pressures will favor flexible organizational forms—forms that adjust to perform consistently.

What is it about organizations that changes or remains stable? The ecological model, like earlier structural contingency models, distinguishes between core and peripheral features. The organizational core consists of goals, authority structure, technology, and marketing strategy (Hannan and Freeman, 1977, 1989). The organizational core is its domain, meaning the claims an organization stakes out for itself in terms of the clients it serves, the products it offers, and the technology it employs (Thompson, 1967). Diversification—the introduction of new products, often to new clients and frequently requiring mastery of new technology—represents change of domain, a means of transcending the constraints of an organization's original sphere of activity by entering new markets and new competitive arenas.

Hypotheses

Within the ecological framework, density has been used as a proximate measure of the processes of legitimation and competition (Hannan and Carroll, 1992). Accord-

ing to this model, legitimacy grows monotonically with density, but at a decreasing rate, while competition grows monotonically, but at an increasing rate. The organizational founding rate is predicted to have an inverted U-shaped relationship with density. This follows from assuming that the founding rate is proportional to the degree to which the organizational form is legitimate and inversely proportional to the level of competition. A parallel argument can be made for the mortality rate by assuming that it is proportional to competition and inversely proportional to legitimacy. This assumption leads to a U-shaped relationship between density and the mortality rate. Empirical support for this model comes from studies of a wide variety of organizational populations, including labor unions, newspapers, breweries, cooperative associations, trade associations, Manhattan banks, and New York life insurance companies (see Hannan and Carroll, 1992 for a review).

The density-dependence model has implications beyond organizational founding and failure, however. It can also be applied to the process of change in existing organizations, specifically to diversification—entry into new product or client markets. The number of organizations operating in any market should affect both that market's perceived legitimacy and its level of competition. Market density thus influences both external legitimacy considerations and general competitive dynamics, two sources of organizational inertia (Hannan and Freeman, 1977, 1984). An inverted U-shaped relationship will exist between the number of firms operating in a market and entry into that market. At low levels of market density, an increase in the number of firms operating in any market will increase market legitimacy and thus raise the rate of entry. In contrast, at high levels of market density, a crowding or competitive effect dominates and further increases in the number of firms operating will lower the rate of market entry.

Hypothesis 1A: There will be an inverted U-shaped relationship between the number of firms operating in any market and the rate of entry into that market.

Research in economics suggests that both the number of firms operating in a market and the size of these firms will influence entry decisions by potential newcomers. Bain (1956) laid out a model of barriers to entry that was extended by Caves and Porter (1977) to include barriers to mobility across subgroups in an industry, thereby addressing the phenomenon of domain shift through diversification. According to this model, oligopolistic markets, which are dominated by a few large competitors, are more difficult to enter than atomistic markets, which are "contested" by many small firms (Bain 1956; Baumol, Panzar, and Willig, 1982), because both direct and diffuse competition are stronger in oligopolistic markets than in contestable markets.

Direct competition occurs when a pair of organizations reduce each other's performance and viability (Hannan and Freeman, 1989). In oligopolistic markets, large incumbents reap economies of scale that are not available to small firms (Bain 1956), so they operate more efficiently, have lower cost structures, and tend to possess more slack resources. Because incumbents in an oligopolistic market are large and few in number, each firm has substantial impact on market policy and price structure. The existence of a few, large-scale, low-cost competitors in oligopolistic markets makes it

likely that incumbents will act collectively, building excess capacity and adjusting prices to thwart entry of new competitors, thus increasing direct competition (Edwards, 1955; Bain, 1956).

Diffuse competition occurs when organizations reduce the viability of other, similar organizations by depleting a limited, common supply of resources (Hannan and Freeman, 1989). Large organizations operate on a larger scale than do small organizations, so they use more common resources: labor, capital, suppliers' capacity, distribution channel volume, and clients' demand. Hence, large organizations generate more diffuse competition and decrease the viability of competitors more than do small organizations (Barnett and Amburgey, 1990). Oligopolistic markets will be unattractive to potential entrants because oligopolists are large and generate strong diffuse competition.

This model predicts that both the number of firms operating in a market (density) and their size (mass) will affect barriers to entry and thus rates of entry. The impact of density is not independent of the impact of mass. Note that with market density controlled, market mass estimates the effect of average incumbent size.

Hypothesis 1B: Rates of entry will be high when density is high and firms are small, and low when density is low and firms are large.

Research Design

Research Setting: The Savings and Loan Industry

Since 1831 savings and loan associations have acted as the primary lenders for home mortgages and as the primary depositories for small savers in the United States. These interrelated tasks have, until recently, remained the core business activities of savings and loans. The strong focus on gathering deposits from individuals and lending money for home purchases is reflected in the use of the term "thrift" to describe these organizations.

The regulatory environment of the thrift industry has recently undergone dramatic change in response to volatile environmental conditions. The allowed scope of savings and loan activities was broadened by legislation enacted between 1978 and 1982, which extended the domain of savings and loan associations to include real estate development, commercial lending, consumer nonmortgage financial services, and mortgage banking.

This chapter studies the ecological factors that influence diversification by savings and loan associations, operationalized as entry into six new markets: real estate held for development and resale, nonresidential mortgages, mortgage-backed securities, consumer loans, commercial loans, and service corporation subsidiaries. These markets differ in many respects. Modeling rates of entry into such an array of nontraditional markets offers a broad picture of the process of organizational change through product-market diversification. This research design also allows for repeated tests of the hypotheses, which is unusual. Such replication is seldom done in organizational theory research.

Real estate investment has been identified by some critics as a risky move away from thrifts' traditional strengths (Strunk and Case, 1988; Eichler, 1989). The poten-

tial returns are great but are accompanied by high probability of failure. Investment in real estate entails shifting both product portfolio and client base, and so involves considerable reorientation of the technical core. In contrast, moving into *nonresidential mortgage lending* involves offering a familiar product (mortgages) to new clients (commercial establishments). Thrifts entering this market must adjust to new client demands but already possess considerable knowledge about product and technology. *Mortgage-backed securities* are composed of residential mortgages. Diversification into securitized mortgage instruments involves products similar to the traditional residential mortgage but different clients and somewhat different technology—the securitization of bundles of mortgages rather than the management of an aggregate of many individual mortgage loans. The fourth new market, *consumer nonmortgage lending*, is attractive to thrifts because the average maturity of consumer loans is short. Entering this market enables thrifts to achieve a closer match between the maturity of their liabilities and their assets. Because the clientele is familiar, offering consumer loans seems to be a relatively low-risk way for thrifts to diversify. *Commercial lending* includes very short-term unsecured commercial paper and longer-term secured loans. Moving into commercial lending offers thrifts higher interest rates and shorter-term assets: in other words, greater potential profits and greater flexibility. However, thrifts' primary competitors in this market—commercial banks—have strong ties to commercial clients. Hence the conditions of competition in the commercial lending market are very different from those in the traditional residential mortgage market (Eichler, 1989). Finally, *service corporation subsidiaries* represent vehicles for movement into activities not otherwise allowed to thrifts; for example, property management, insurance, accounting and tax services, escrow and trust services. Many service companies cater to traditional thrift clients, offering products that complement residential mortgage lending, such as escrow services.

Model Specification and Estimation

Questions about change are best addressed by dynamic research methods applied to longitudinal data. I analyze discrete change events (entry by thrifts into each of the six new markets), using data covering the period June 1977 to March 1987. Because 1977 is the year before deregulation began, it is an appropriate starting point for this study.

In this chapter I take an organizational perspective, studying diversification by existing organizations. An alternative perspective is that of the market: studying market entry by any organization, newly founded or established. The difference between the two points of view boils down to (1) whether newly formed organizations are included in the sample of firms that are "at risk" of entering a market and (2) whether models of market entry control for the characteristics of individual firms. Studying change from the market perspective makes it possible to examine differences in behavior between established and new firms. Caves and Porter (1977) argue that established firms will be the chief entrants to market niches that are composed of oligopolistic cores of dominant firms protected by product differentiation and absolute-cost barriers. In contrast, newly founded firms will sprout up in the competitive fringe, in more "contestable" market segments (Baumol, Panzer, and Willig, 1982).

On the other hand, studying change from the focal organization perspective makes it possible to control for variations in firm characteristics and past experience. The choice between the two perspectives must be based on theoretical interest. Which is the more pressing question: How do markets and industries change? or How do firms change? Although there is a wealth of literature investigating change in industries over time, relatively little empirical research has been devoted to following shifts in the strategy and structure of individual organizations (Dunne, Roberts, and Samuelson, 1988). This chapter takes the less-traveled road.

I use event-history methods to study change. The dependent variable is the rate of entry into a new market, the hazard rate of change, which is defined as

$$r(t) = \lim_{dt \to 0} \frac{Pr \text{ (change } t, t + dt \mid \text{no change at } t)}{dt},$$

where $Pr(.)$ is the probability of entry into a new market between times t and $t + dt$, given that the firm has not yet entered that market at time t. Entry into each new market is modeled separately. I first build a baseline model of the effects of organizational characteristics on change rates and then add variables representing the competitive and institutional environment. The model used is

$$\ln r(t) = \beta X + \gamma Y,$$

where X is a vector of organizational control variables and Y is a vector that includes market density and market mass. This modeling strategy makes it possible to determine the impact of environmental forces on organizational change, after controlling for diversity due to organizational characteristics. I use Tuma's maximum-likelihood program RATE to estimate these models (Tuma, 1980).

Analyses of entry into new markets cover the entire period from 1977 to 1987, since many firms were active in these markets before deregulation began, albeit on a very small scale.[1] I set a threshold of 5 percent of total assets to mark significant investment in each nontraditional market. For each market, the sample of thrifts analyzed includes only those firms that had not yet invested at least 5 percent of total assets in the market at the beginning of the observation period. A firm remains in the analysis until the period after it invests over 5 percent of its assets in the new market. Because I study change in existing firms, rather than replacement of traditional thrifts by new forms, I eliminate from my samples those firms that have investments over 5 percent of total assets in the focal market at the time of founding. I also perform sensitivity analysis, modeling rates of entry at several different thresholds: 0, 1, 2, 3, and 4 percent of total assets.

Data Sources

The Federal Home Loan Bank of San Francisco regulates savings and loan associations in California and publishes annual *Directories of Members*, which contain summary data on the industry and financial data on each thrift. These *Directories* formed the basic data used to construct the life histories of all California thrifts operating from 1977 onward. *Financial Reports* are filed by all regulated thrifts. These reports

were gathered semiannually through 1983 and quarterly thereafter. These *Financial Reports* provide extremely detailed balance sheets and income statements. They were used to determine timing of first entry into the six nontraditional markets.

The data gathered from these two sources cover the period June 1977 to March 1987. The data are semiannual (measured at the end of June and December) for the years 1977 through 1983 and quarterly (measured at the end of March, June, September, and December) from 1984 onward. All variables are updated at the end of each period. Independent and control variables are measured at the beginning of each period; dependent variables, at the end of each period.

Measurement of Variables

The *rates of entry* into the six new markets are the dependent variables in this analysis. For each new market, I observe whether or not a firm has entered the market, that is, whether or not a firm has invested 5 percent of its assets in the market. I code a firm's behavior zero if it has not yet reached the 5 percent threshold and one if it has. For each market, a firm remains in the data until the period after it reaches the 5 percent threshold.

The independent variables are measured as follows. *Market density* is a count of savings and loan associations operating in each of the product markets in each period, including both new firms (which entered the market at birth) and established firms (which entered the market later in their lives). *Market mass* is measured in terms of the dollar value of assets and includes both new and established firms.

Baseline models were built using several organizational control variables: age, size, slack resources, past performance, legal form, and diversity of investments. *Organizational age* has been shown to influence rates of organizational change (Singh, Tucker, and Meinhard, 1988; Baum, 1990b). I measure organizational age as years since incorporation. Previous research has proposed that *organizational size* is an important determinant of organizational change (Caves and Porter, 1977; Haveman, 1993). If scale economies exist, large firms can use excess capacity to facilitate entry into new markets and can purchase inputs common to old and new markets at low prices. Assets can thus lower barriers to entry, although they may not eliminate these barriers completely. Because the size distribution is skewed, I take the natural logarithm of this variable. To operationalize the degree to which *slack resources* are available to facilitate entry into new markets, I use net worth, which measures capital not committed to cover current obligations or to meet regulatory requirements and therefore available to invest in new businesses. I control for *financial performance* with net income, the difference between income and expenses. *Legal form* has two dimensions: capital structure and type of charter. Capital structure distinguishes between mutual and stock companies, while charter distinguishes between firms with state and federal charters. Finally, I control for *diversity of investments*. Thrifts' decisions to enter various markets are not independent of each other; instead, thrifts show consistent patterns of diversification (Haveman, 1990: table 4.2). For example, thrifts tend to move simultaneously into lending mortgages on undeveloped land and into real estate development; those that remain focused on residential mortgage lending also tend to move heavily into consumer nonmortgage lending. The interdependence of different diversification events is controlled with

Blau's (1977) index of heterogeneity, D, calculated as $D = 1 - \Sigma(P_i^2)$, where P_i is the proportion of assets invested in market i.

Results

Table 8.1 presents descriptive statistics on California savings and loans showing how rapidly these firms have moved into nontraditional markets. Nonresidential mortgage lending (NresM) shows considerable market density at the beginning of the observation period: almost half of California thrifts had investments in this market over the 5 percent threshold. This market continued to grow after deregulation. The market for mortgage-backed securities (MBSs) also shows strong growth, peaking in 1983 with 109 of 183 thrifts active. The market for consumer lending (ConsL) grew fastest between 1980 and 1981 and plateaued around 20 participants. Other markets grew later and were still growing at the end of the observation period: real estate (RE), after 1981; service corporations (SCo), after 1982; commercial lending (CommL), after 1983.

TABLE 8.1   Diversification Trends in the California Savings and Loan Industry

Year	RE	NresM	MBS	ConsL	CommL	SCo	Density
1977	1	79	16	11	4	1	166
	1	6	6	2	1	0	
1978	1	76	11	10	2	1	173
	0	7	2	2	1	0	
1979	1	76	13	17	2	0	180
	1	6	3	8	1	0	
1980	0	66	17	25	4	0	202
	1	4	5	15	3	0	
1981	5	72	34	20	0	0	202
	4	15	14	9	0	0	
1982	13	86	78	17	1	3	184
	13	27	58	8	1	3	
1983	32	111	109	21	4	10	183
	22	21	26	9	2	11	
1984	32	157	96	21	7	22	201
	16	38	14	7	6	15	
1985	43	176	58	20	14	23	227
	11	16	10	3	7	8	
1986	40	168	59	20	13	18	218
	19	6	12	4	8	6	

NOTE: The top row of figures presents the number of thrifts with investments above the 5% threshold in each nontraditional market at the end of each year: real estate (RE), nonresidential mortgages (NresM), mortgage-backed securities (MBS), consumer loans (ConsL), commercial loans (CommL), and service corporations (SCo). The second row presents the number of thrifts entering each nontraditional market for the first time; thrifts that have entered before, exited, and then reentered are not counted. The last column presents total savings and loan industry density at the end of each year.

TABLE 8.2　Entry Into New Markets by California Thrifts, 1977–87

Market	Real Estate			Nonresidential Mortgages			Mortgage-Backed Securities		
Constant	−5.47*	−4.53*	−5.47*	−7.34*	−1.28*	−7.68*	−4.20*	−1.81*	−4.07*
	(.961)	(.899)	(.962)	(1.32)	(.601)	(1.49)	(.634)	(.535)	(.632)
Log assets	.262*	.255*	.262*	−.142	−.122	−.142	−.043	−.083	−.014
	(.094)	(.093)	(.094)	(.080)	(.080)	(.079)	(.070)	(.068)	(.068)
Stock	1.69*	1.69*	1.69*	−.367	−.456	−.375	.149	.401	.244
	(.612)	(.624)	(.612)	(.394)	(.391)	(.395)	(.310)	(.318)	(.316)
State	1.11*	1.11*	1.11*	.787*	.938*	.790*	−.166	−.401	−.249
	(.453)	(.456)	(.453)	(.345)	(.337)	(.345)	(.275)	(.283)	(.285)
Net worth	−.048*	−.029*	−.031*	.002	.002	.002	.002	.003*	.002
	(.007)	(.007)	(.007)	(.003)	(.003)	(.003)	(.001)	(.001)	(.001)
Net income	−.005*	−.005*	−.005*	−.028	−.031	−.027	−.001	−.008	−.0002
	(.001)	(.001)	(.001)	(.021)	(.023)	(.021)	(.005)	(.005)	(.006)
Diversity	−2.80*	−3.69*	−2.80*	−1.18*	−1.72*	−1.15*	.577	−1.02	−.327
	(.934)	(.910)	(.934)	(.571)	(.580)	(.575)	(.614)	(.647)	(.652)
Age	.003	.002	.003	−.008	−.010	−.008	−.0005	−.002	−.003
	(.006)	(.006)	(.006)	(.006)	(.006)	(.006)	(.004)	(.002)	(.004)
Mkt density	.104*	.022	.104*	.120*	.006	.129*	.095*	.032*	.128*
	(.031)	(.012)	(.031)	(.022)	(.010)	(.028)	(.012)	(.006)	(.014)
Mkt dens^2/100	−.193*		−.193*	−.044*		−.045*	−.068*		−.079*
	(.063)		(.068)	(.009)		(.010)	(.011)		(.011)
Mkt mass/1000		−.021	.0002		.009	−.005		−.015*	−.021*
		(.019)	(.021)		(.011)	(.011)		(.006)	(.005)
#f, #s, #e	303	3999	91	200	1297	148	267	2367	153
χ^2	141.6	132.9	141.6	121.7	99.0	121.9	123.9	86.9	143.0
d.f.	9	9	10	9	9	10	9	9	10

(continued)

NOTES: Standard errors are below parameter estimates. * $p < .05$, two-tailed t tests. #f is the number of firms; #s, the number of spells; #e, the number of entries. d.f., degrees of freedom.

Direct Investments in Real Estate

Table 8.2 presents the analysis of entry into all markets, starting with real estate. The first model shows that the effect of market density on the rate of entry is curvilinear, supporting hypothesis 1A. As the market for direct investment in real estate opens for savings and loan associations circa 1981, the more thrifts that enter this market, the more legitimate it becomes, and the faster other thrifts are to follow. But when many savings and loan associations have acquired real estate investments, competition by incumbents slows further entries. This model fits the data significantly better than does a baseline model containing only organizational control variables, according to the χ^2 likelihood ratio test: $\Delta\chi^2 = 12.3$, Δ degrees of freedom $= 2$, $p = .002$. The next two models add market mass. Mass has a nonsignificant effect; moreover, the effect of market density is inverted U-shaped rather than positive. These results fail to support hypothesis 1B, which predicts that rates of entry will be greater when markets have a large number of small incumbents.

TABLE 8.2 (continued)

Consumer Lending			Commercial Lending			Service Companies		
−4.52*	−1.16	−4.29*	−1.28	−1.04	−1.39	−4.30*	−2.91*	−4.28*
(1.97)	(.883)	(1.92)	(1.23)	(1.17)	(1.23)	(1.15)	(1.05)	(1.15)
−.219*	−.152	−.152	−.318	−.302	−.314	−.035	−.032	−.036
(.104)	(.104)	(.103)	(.166)	(.165)	(.165)	(.143)	(.142)	(.143)
.173	.458	.376	−.991	−.947	−.952	.580	.686	.582
(.445)	(.453)	(.452)	(.806)	(.765)	(.803)	(.638)	(.652)	(.637)
−.651	−.810*	−.767	1.06	1.03	1.02	.920	.781	.924
(.400)	(.413)	(.412)	(.763)	(.765)	(.763)	(.546)	(.555)	(.545)
.003	.002	.002	.005	.005	−.005	−.005	−.005	−.005
(.002)	(.002)	(.002)	(.004)	(.004)	(.004)	(.004)	(.005)	(.004)
−.002	−.002	−.002	−.005	−.004	−.005	.0001	.0005	.0001
(.003)	(.004)	(.004)	(.016)	(.016)	(.016)	(.006)	(.007)	(.006)
−.005	−1.48	−1.10	−4.77*	−4.84*	−4.68*	−3.96*	−5.33*	−3.97*
(.839)	(.900)	(.908)	(1.56)	(1.55)	(1.55)	(1.43)	(1.40)	(1.43)
−.011	−.014	−.014	−.006	−.006	−.006	.018*	.018*	.018*
(.007)	(.008)	(.008)	(.012)	(.012)	(.012)	(.007)	(.007)	(.007)
.354	.048	.440*	.231	.126	.273	.274*	.053	.263*
(.222)	(.028)	(.214)	(.164)	(.069)	(.168)	(.074)	(.047)	(.078)
−1.02		−1.17	−1.15		−1.00	−.975*		−1.01*
(.670)		(.636)	(1.06)		(1.04)	(.268)		(.285)
	−.063*	−.067*		−.290	−.270		−.043	.020
	(.020)	(.021)		(.260)	(.258)		(.049)	(.055)
301	3834	68	305	4501	30	308	4463	43
23.4	31.3	34.9	32.5	33.1	34.1	59.0	46.3	69.1
9	9	10	9	9	10	9	9	10

The impact of market density can be better understood with a picture. Figure 8.1 shows how the number of thrifts investing in real estate affects the rate of entry into that market by other thrifts. The full inverted U-shaped effect occurs within the observed range of market density, showing that density has both legitimacy and competitive effects. The maximum impact occurs when density is about 28, which occurs sometime in 1983.

Nonresidential Mortgages

The next three models in table 8.2 estimate entry into the nonresidential mortgage market. The first model shows that market density has an inverted U-shaped relationship with the rate of entry into this market. This result supports hypothesis 1A. This relationship is shown graphically in figure 8.2. Again, the full inverted U-shaped effect occurs within the observed range of market density. The next two models show no statistically significant relationship between market mass and entry rates; moreover, the relationship between market density and entry rates is curvilinear rather than linear. Together, these results fail to support hypothesis 1B.

Mortgage-Backed Securities

The next three models present the analysis of entry into the market for mortgage-backed securities. The first model shows that the impact of the number of thrifts operating in this market has an inverted U shape. This finding supports hypothesis 1A. The impact of market density on entry rates is illustrated in figure 8.3, which shows that the downturn for entry rates occurs within the observed range of market density. Market density declines from a peak after 1983, indicating a shakeout. The effect of market mass on rates of entry into this market is negative and statistically significant, and the effect of market density is positive and statistically significant, supporting hypothesis 1B. However, the third model shows that the effect of density is actually inverted U-shaped. This model significantly improves on the fit of the second model: $\Delta\chi^2 = 56.1$, Δ degrees of freedom $= 2$, $p < .001$. Although the presence of larger firms deters potential entrants, rates of entry are highest when density is intermediate, rather than when density is high. This suggests that density has a strong legitimating effect as well as a competitive effect.

Consumer Nonmortgage Loans

The next three models analyze entry into the consumer loan market. The first model estimates the effect of market density and shows a curvilinear effect, as predicted by hypothesis 1A. But this effect is not statistically significant. The second model shows that the average size of savings and loan associations offering consumer loans has a significant negative effect, offering partial support for hypothesis 1B. The larger the average incumbent in this market, the more likely other thrifts are to attempt entry. When incumbents are large, the market is legitimated and other firms are more likely to enter. Moreover, the effect of density is positive, as predicted by hypothesis 1B, but only marginally significant ($p < .09$). When a quadratic term for density is added, an inverted U-shaped relationship between density and entry rate is seen, with a statistcially significant linear term and a marginally significant quadratic term ($p < .07$). The third model significantly improves fit to the data over a model containing only control variables and market mass: $\Delta\chi^2 = 6.5$, Δ degrees of freedom $= 2$, $p < .04$. Figure 8.4 shows the curvilinear effect of market density on entry into the consumer loan market. The market for consumer loans resembles the market for mortgage-backed securities in that the rate of entry is greatest when incumbents are small and density is intermediate.

Commercial Nonmortgage Lending

The next three models present the analysis of this market. The first model shows a curvilinear, inverted U-shaped relationship between rates of entry into commercial lending and market density; however, this effect is not statistically significant. Also, this model fails to improve on the fit of the baseline model containing only organizational characteristics ($\Delta\chi^2 = 3.3$, Δ degrees of freedom $= 2$, $p > .10$). This result fails to support hypothesis 1A. Moreover, the other two models show no support of hypothesis 1B. The effect of market mass is negative as predicted, but not statistically significant; neither the linear nor curvilinear specification for density is statistically

significant. Neither model significantly improves upon the baseline model. Together, these results suggest that entry into the commercial lending market is not affected by either the number or the size of thrifts already operating here.

Service Corporation Subsidiaries

The last three models in table 8.2 show the pattern of effect estimates for rates of entry into service corporation subsidiaries. Density has a statistically significant, inverted U-shaped effect on the entry rate, which supports hypothesis 1A. This relationship is illustrated in figure 8.5, which plots entry rate versus density. Market mass, which indicates average firm size, has a negative effect, consonant with the prediction of hypothesis 1B, but this effect is not statistically significant. The linear effect for density is also in the predicted direction, but is not statistically significant. The last model, which includes a quadratic term for density, shows that the effect of density is indeed curvilinear and is inverted U-shaped. These results indicate no support for hypothesis 1B.

Sensitivity Analysis

All models were reestimated using varying thresholds for investment in new markets: 0, 1, 2, 3, and 4 percent of total assets. As the threshold drops toward zero, the number of firms and the number of spells decline. The number of entry events generally, but not always, rises. For instance, for the real estate market at the 5 percent threshold, there were 3,999 spells, 303 firms, and 91 entry events. At 2 percent, there were 3,171 spells, 289 firms, and 128 entries; at 0 percent, there were 1,021 spells, 189 firms, and 148 entries.

The model testing density dependence is not sensitive to choice of threshold. Effect estimates are stable and there are only a few instances where significance levels change; for example, significance levels increase in models of commercial lending as the threshold drops. In the model testing the joint impact of density and mass, however, all parameter estimates are unstable, especially at low thresholds. This is easy to explain: Parameter estimates are unstable in markets where they are not statistically significant. Finally, in the full model, which contains linear and quadratic terms for density and a linear term for mass, density estimates are stable, but mass estimates are not. Instability generally occurs in markets where the effect of mass is not statistically significant.

This chapter investigated one source of variation in organizational evolution: change in the activities of existing organizations through diversification into new markets. The research presented here is part of a growing stream of evolutionary literature studying change in the structures and activities of individual organizations.

Hypothesis 1A predicts that the relationship between market density and rates of market entry is inverted U-shaped. Analyses of entry into five of six new markets— real estate, nonresidential mortgages, mortgage-backed securities, consumer non-mortgage loans, and service corporation subsidiaries—show inverted U-shaped effects, supporting hypothesis 1A. These results suggest that the number of firms active in a market is a good indicator of the competitive and institutional forces that
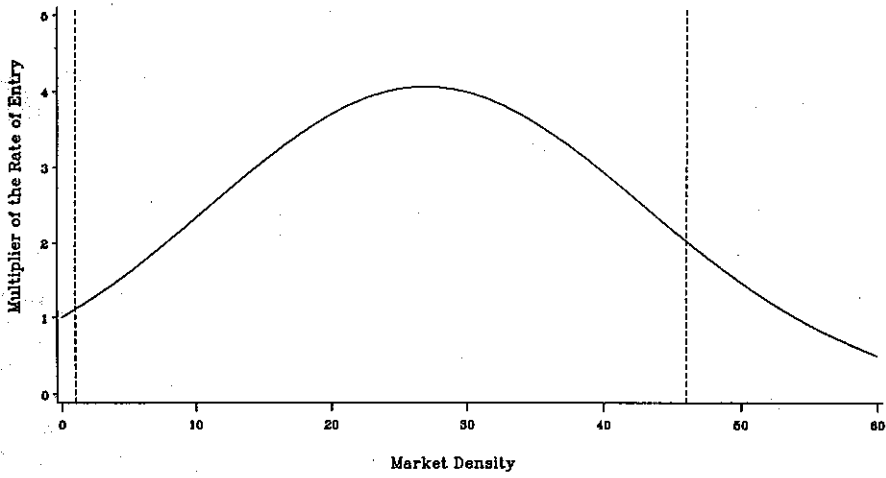
FIG. 8.1 Effect of market density on rate of entry into the real estate market (vertical lines enclose the observed range)
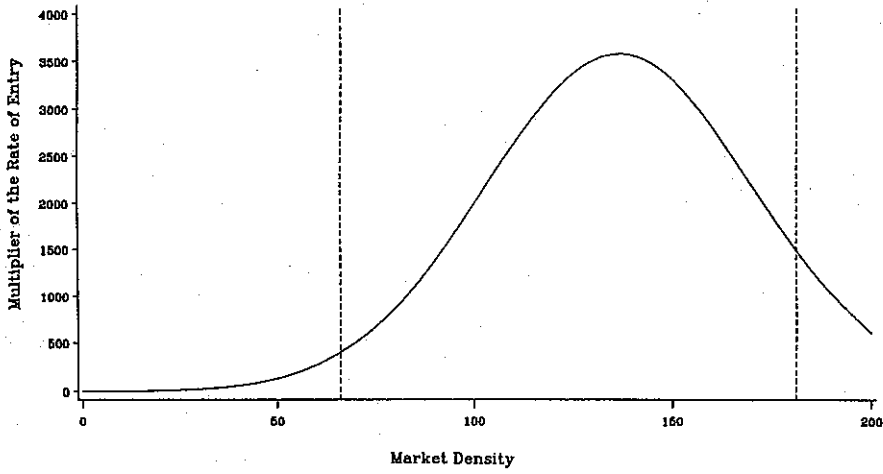

FIG. 8.2 Effect of market density on rate of entry into the nonresidential mortgage market (vertical lines enclose the observed range)
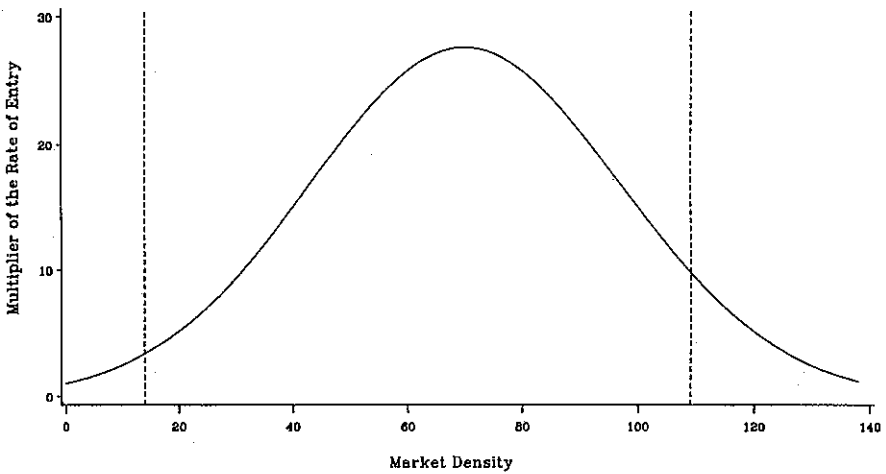

FIG. 8.3 Effect of market density on rate of entry into the mortgage-backed securities market (vertical lines enclose the observed range)
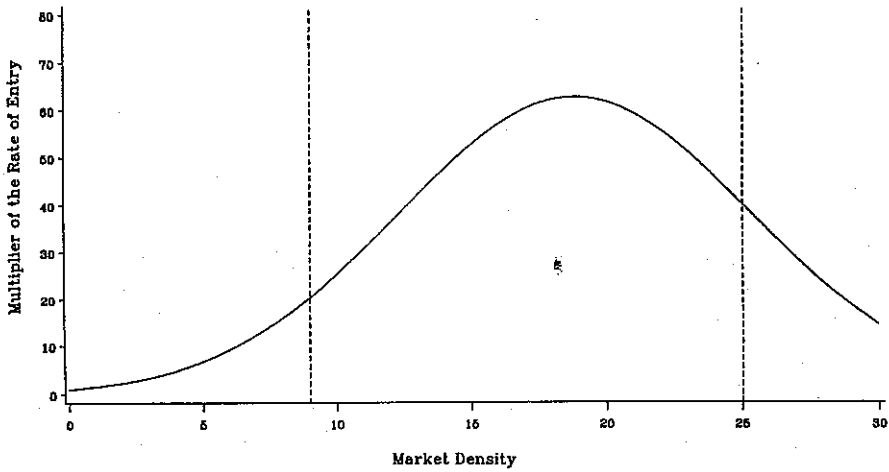
FIG. 8.4   Effect of market density on rate of entry into the consumer nonmortgage loans market (vertical lines enclose the observed range)
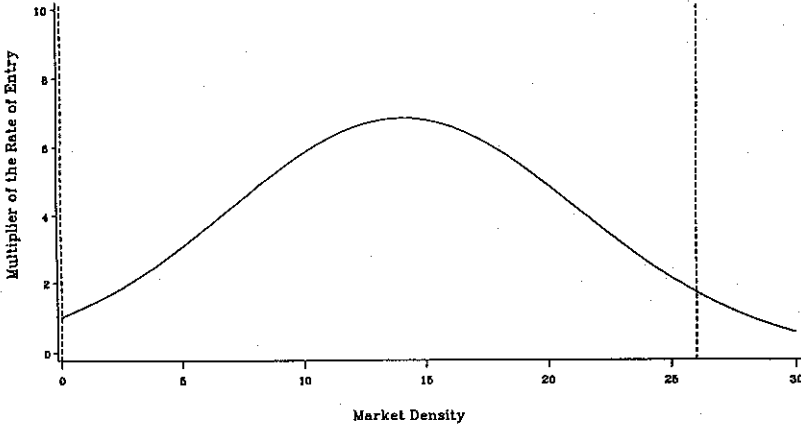

FIG. 8.5   Effect of market density on rate of entry into the service corporation subsidiaries market (vertical lines enclose the observed range)

impel or impede potential entrants. These findings give greater weight to the density-dependence model formulated by Hannan and Carroll (1992) and investigated empirically in a myriad studies, extending the scope of the density-dependence model beyond organizational birth and death processes to the process of change in existing organizations.

For the fifth market—commercial nonmortgage loans—estimates for density were in the predicted directions but were nonsignificant. (However, sensitivity analysis showed statisically significant results when lower thresholds for market entry were used.) These results suggest that when other organizational populations are large players in a market, as commercial banks are for commercial lending, the number of thrifts operating in the market does not fully capture market density. In such cases, data are needed on all populations, not just on the focal population. Unfortunately, data on the number and size of banks and other financial services firms operating in

the six nontraditional markets are not available, or are available only for the end of the observation period (1985 on), so market structure cannot be specified fully.

Following the reasoning of Hannan and Carroll (1992: chapter 7), market entry can be expected to have a positive linear effect on a market whose history has not progressed enough to show the full life cycle of growth, peak, and decline. For late-developing markets—real estate, commercial lending, and service corporations—I analyzed what is in essence a right-truncated data set. A longer time-series of data would provide greater variation in density and mass, which would allow a better test of the hypotheses.

The effects of density remain strong after controlling for market mass, and in one case (consumer lending), density effects become statistically significant only after controlling for mass. These results offer partial support for the idea that both the number and the average size of competitors are important forces impelling or imped-ing diversification. Neither size nor density alone indicates barriers to market entry that derive from market structure. Therefore, neither can explain fully the process of organizational variation through diversification into new markets.

Finally, the research presented here assessed the impact of market structure on rates of entry into six different markets, thereby offering repeated tests of density and mass dependence in rates of organizational change. Such replication is seldom seen in organization theory research.

Notes

1. In June 1977 savings and loan activity in these four markets was as follows: Of the 165 thrifts operating, 103 owned real estate (averaging 0.4% of assets); 77 invested in mortgage-backed securities (averaging 2% of assets); 150 had investments in nonresidential mortgages (averaging 5% of assets); almost all held consumer nonmortgage loans (averaging 2% of assets); 62 held commercial loans (averaging 0.4% of assets); and 136 had investments in service cor-porations (averaging 0.2% of assets).