The Social Structure of Entrepreneurial Activity: Geographic Concentration of Footwear Production in the United States, 1940–1989[1]

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Nearly all industries exhibit geographic concentration. Most theories of the location of industry explain the persistence of these production centers as the result of economic efficiency. This article argues instead that heterogeneity in entrepreneurial opportunities, rather than differential performance, maintains geographic concentration. Entrepreneurs need exposure to existing organizations in the industry to acquire tacit knowledge, obtain important social ties, and build self-confidence. Thus, the current geographic distribution of production places important constraints on entrepreneurial activity. Due to these constraints, new foundings tend to reify the existing geographic distribution of production. Empirical evidence from the shoe industry supports this thesis.

INTRODUCTION

A look at almost any industry reveals geographic concentration. The high-technology industry in the United States is known for Silicon Valley, the

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region between San Francisco and San Jose, and the area along U.S. Route 128 circling Boston. Los Angeles serves as a hub for many entertainment industry businesses, such as motion pictures, television, computer graphics, and music-recording. The area around Tijuana, a Mexican city close to the California border, recently emerged as a production center for consumer electronics. A large portion of the world's more mature industries, such as textiles, leather goods, furniture, and ceramic tiles, resides in small Italian cities, such as Como and Prato, Carpi, Sassuolo, and Ancona. Automobile manufacturing, steel production, machine tooling, and garment construction also offer examples of regional concentration.

These industrial agglomerations may arise for a variety of idiosyncratic reasons (Myrdal 1957; Arthur 1990; Krugman 1991). But why do they persist over such long periods of time? From an evolutionary perspective, two processes could sustain these agglomerations. On the one hand, organizations in concentrated regions might perform better—and hence survive longer—than those located in sparse areas. On the other hand, new production facilities might simply open more frequently in the vicinity of industrial agglomerations. In other words, both lower failure rates and higher founding rates can sustain geographic concentration, though different forces might drive each of these processes.

Economic explanations of industrial agglomeration explicitly emphasize better performance, and implicitly lower failure rates, as the key process underlying the continuing geographic concentration of production. Theorists suggest that organizations benefit economically by locating in efficient positions. Several factors can make a location economically advantageous. In some cases, organizations benefit by minimizing the transportation costs for inputs, such as when scarce raw material, cheap factors of production, or unique skills can be obtained locally (Weber [1909] 1928). Alternatively, organizations may locate near consumers to better serve these constituents (e.g., Smithies 1941). In other cases, the colocation of structurally equivalent organizations—those that operate in the same markets[2]—itself yields advantages to these actors regardless of the particular location they choose. Several mechanisms can drive these "economies of agglomeration," including an extended division of labor (Marshall 1922; Chinitz 1961), common labor markets (Krugman 1991;

[2] Structural equivalence implies that organizations occupy similar roles relative to other actors, though not necessarily with the same alters (Lorrain and White 1971). In other words, structurally equivalent firms receive inputs from the same types of suppliers, in the case of shoe manufacturers, tanneries. Their outputs meet the same needs for their consumers. In this sense, structural equivalence essentially means that organizations occupy the same niche in the parlance of organizational ecology (Hannan and Freeman 1977; McPherson 1983).

Rotemberg and Saloner 1990), and knowledge spillovers (Scherer 1984; Saxenian 1994). All these factors presumably enhance the performance and survival chances of firms in efficient locations.

Although these explanations seem plausible, they ignore the fact that structurally equivalent organizations also compete with each other for vital resources. To the extent that geography provides another dimension along which organizations can differentiate, colocation should increase the degree of structural equivalence—and competition—between organizations (Hawley 1950; Hannan and Freeman 1977; Burt 1992). The fact that organizational ecology studies support this expectation by showing that organizations apparently compete more intensely within local population boundaries (Carroll and Wade 1991; Hannan and Carroll 1992) provides a serious challenge to traditional theories of geographic concentration.

To resolve this conundrum, we suggest an alternative explanation for the persistence of geographic concentration in production that focuses on the structure of entrepreneurial opportunities as the force maintaining industrial agglomeration. Like other forms of economic action, entrepreneurial action occurs within a web of social relations that both enable and constrain activity (Granovetter 1985). We argue that dense local concentrations of structurally equivalent organizations increase the pool of potential entrepreneurs in a region, thereby increasing founding rates.[3] Not all individuals have equal chances of becoming successful entrepreneurs. Rather, entrepreneurial action requires knowledge of the business (Liles 1974), ties to scarce resources (Stinchcombe 1965), and self-confidence (Bandura 1986). Although some of this knowledge and these resources (e.g., financial capital) might enable any potential business venture, many of these factors apply only to a particular type of enterprise. Without prior experience in the industry, a potential entrepreneur will find it difficult to acquire this specific human and social capital. Thus, the current location of production structurally constrains access to these resources.

We examine these competing explanations of the persistence of geographic concentration by studying the failure and founding rates of shoe manufacturing plants in the United States from 1940 to 1989. Like other industries, production in the shoe industry occurs primarily in a few highly concentrated regions. Historical accounts of the industry attribute its geographic distribution to transportation and labor costs (Hoover 1937). Nonetheless, we find that plants located in or near large concentrations

[3] To make this argument, we assume that founders usually do not move to start their new ventures. We justify this assumption when we explicate our theory later in the article.

of producers experience substantially higher failure rates than isolated plants. Over time, this heterogeneity in failure rates should spread the location of production geographically. Yet further examination of the evolution of the industry finds that foundings also tend to occur in states with large concentrations of shoe plants. Thus, we conclude that variation in the structure of entrepreneurial opportunities, rather than variation in the economics of production and distribution, maintains geographic concentration in the shoe industry. This finding suggests that geographic concentration can continue to characterize industries even when the underlying economic equilibrium no longer justifies such a spatial distribution.

GEOGRAPHIC CONCENTRATION IN FOOTWEAR PRODUCTION

Footwear manufacturing provides a particularly good industry for the application of ecological models because the niche is well defined. Shoe plants engage in similar activities and rarely operate as divisions of larger companies. Although a few of the largest multiplant shoe firms operate their own tanneries, most shoe manufacturers buy leather from the complementary tanning industry (Schultz 1951). Through the application of more than 200 mechanized processes and a great deal of labor, they turn this leather into shoes. The manufacturing process differs somewhat from plant to plant, but this transformation involves a common set of processes that includes inspecting the leather, cutting the pieces to make the uppers, stitching the uppers together, preparing the insoles, lasting (attaching the insole to the upper), attaching the outsole, and finishing (Szenberg, Lombardi, and Lee 1977). Although a small number of large firms operate their own retail outlets, the vast majority of production either moves through distributors to independent shoe stores or goes directly to chains for national distribution and sale.

Small firms dominate the industry. Even in 1991, nearly half of all firms employed fewer than 50 workers (Raehse and Sharkley 1991). Two factors probably contribute to the continuing prevalence of these small, typically family-run businesses. First, economies of scale offer only modest cost savings in the production of shoes (Bain 1956; Szenberg et al. 1977). Plants can operate efficiently with a small number of employees. For example, Simon and Bonini (1958) estimated that 1–49 employees could operate efficiently in the medium- and high-quality segments of the industry.[4] Second, potential entrepreneurs face relatively low financial barriers to

[4] In a more recent study, Szenberg et al. (1977) also find that plants with fewer than 50 employees can operate efficiently, though plants with 250–500 employees appear to enjoy modest economies of scale.

FIG. 1.—Distribution of shoe plants in 1940

entry. With a small deposit, anyone can lease equipment from the United Shoe Machinery Corporation (USMC) for a modest royalty, a little less than 2% of the cost on each pair of shoes produced (Schultz 1951). The lack of strong scale economies and barriers to entry allows small, independent plants to continue playing an important role in the footwear industry.

Many industries display extreme geographic concentration, and the shoe industry in the United States offers no exception. (Hoover 1948; Krugman 1991). Figure 1 shows the distribution of shoe plants in 1940. Darker shadings indicate states with larger numbers of shoe plants. Several states had no plants, while the densest states, Massachusetts and New York, had 281 and 264 plants, respectively, in 1940. The industry exhibited excessive concentration in the Northeast and in the corridor from St. Louis to Wisconsin. This situation did not change much over time. Figure 2 shows the distribution of shoe plants in 1989. Although the total number of plants in nearly all states declined as a result of the influx of imports, the states with heavy concentrations of plants in 1940 generally continued to have the heaviest concentrations of plants in 1989.

Although the raw counts of plants suggest strong regional concentration, these graphs actually understate the concentration of production activity for three reasons. First, they do not account for the distribution of people in the United States. One might expect a dispersed industry to follow the distribution of workers and consumers, but many of the states with a large number of shoe plants also had small populations. Figure 3 depicts the distribution of shoe plants in the United States per 1,000,000 population in 1989. Although the vast majority of states operated fewer

FIG. 2.—Distribution of shoe plants in 1989

than eight plants per million people, four states exhibit much higher concentrations: Maine (32 per million), New Hampshire (19 per million), Missouri (9 per million), and Massachusetts (8.5 per million). Second, these maps do not show the geographic concentration of production within states. Nevertheless, plants tended to cluster in small regions: around Boston in Massachusetts, near St. Louis in Missouri, and close to Milwaukee in Wisconsin. Third, towns typically specialized in the types of footwear they produced. For example, in Massachusetts, Haverhill and Lynn primarily made women's shoes, while the South Shore specialized in men's shoes (Davis 1940). Why do we see such extreme concentration in the location of shoe manufacturing facilities? Moreover, why do we observe such stability in the geographic distribution of production?

EXPLANATIONS FOR GEOGRAPHIC CONCENTRATION

Alfred Weber wrote the seminal work on location theory, *Theory of the Location of Industries* (1928). He presents a model where minimizing the transportation costs for inputs determines the optimal location of manufacturing facilities. By assuming constant sales regardless of plant location, he asserts that industries should become geographically concentrated when they depend on inputs that only exist in a limited number of locations. More recent work posits that inputs must not only concentrate geographically but must also cost more to transport than the final product in order to play an important role in optimal plant location (Isard 1949; Greenhut 1956). Thus, one would expect to find production facilities clus-

FIG. 3.—Density of shoe plants per capita in 1989

tered around sources of raw materials. For example, steel manufacturers tend to locate near iron ore reserves (Harris 1954).

An alternative approach considers the effect of location on sales. Hotelling (1929) offers a simple model in which both production costs and sale prices do not vary with the distance from the firm to the consumer, yet consumers always purchase from the closest producer. In this model, organizations cluster at the midpoint of a uniform distribution of consumers. In a more realistic model, where prices increase as the distance from the producer to the consumer increases, presumably due to transportation costs, organizations maximally space themselves across a uniformly distributed population of consumers (Smithies 1941; Lösch 1954). Nevertheless, clustering in the distribution of consumers leads producers to concentrate in a similar way. Thus, the location of retail centers (e.g., bank branches) mimics the distribution of the population because consumers must travel to these locations to do business.

Neither of these models should dominate the locational decisions of shoe manufacturers. The raw materials used to make shoes and the end product differ in weight by only 6% (Hoover 1937). Although the finished product might not stand up to abuse as well as raw leather, shoes typically do not require excessive care and handling in transportation. Therefore, the location of consumers and raw materials should play roughly equal roles in determining the transportation costs associated with the production and sale of footwear. Nonetheless, transportation costs only form a small component of the cost structure for shoe production. According to Hoover's estimates, shipping shoes from one coast to the other only added 5%–6% to the cost of a pair of shoes in 1937, and these costs have declined

since then (Raehse and Sharkley 1991). Thus, neither the location of raw materials nor the distribution of consumers should play a large role in determining the geographic distribution of footwear production.

The British economist Alfred Marshall (1922) provides a third potential explanation that focuses on the benefits of colocation itself. Marshall, and the many economists who have recently refined his original insights, most notably Paul Krugman, argue that the geographic concentration of a large number of organizations operating in a single industrial sector can benefit firms in several ways, through what economists call "external economies." First, economies of specialization arise from an extended division of labor between firms in complementary activities and processes. When several firms operating in the same industry reside near one another, they often outsource certain production activities to other firms (Piore and Sabel 1984; Angel 1990). If economies of scale exist in these activities, then firms in an industrial district can benefit by sharing these resources (Romer 1987). Central location can also stimulate the development of new technologies (Chinitz 1961). Although the operations of a single firm often fail to justify the cost of developing these innovations, geographically proximate firms can share these costs across many organizations.

Nevertheless, the availability of complementary activities to the footwear industry does not appear to vary much geographically. Nearly all firms lease their equipment from the USMC located in Beverly, Massachusetts (Davis 1940; OECD 1976). Though one might expect firms in New England to benefit from their proximity to USMC, studies of the company's leasing arrangements find no evidence of geographic discrimination (Davis 1940). Similarly, almost all shoe manufacturers, regardless of location, purchase leather from independent tanneries. Yet, if shoe manufacturers in agglomerations enjoyed an extended division of labor relative to their isolated rivals, one would expect that shoe firms in remote locations would need to integrate vertically into this stage of production.

Second, the circulation of knowledge through face-to-face contact can generate economies of information and communication (Scherer 1984). The recent success of Silicon Valley, in particular, has stimulated interest in the role of these knowledge spillovers (e.g., Saxenian 1994). Though often expensive to acquire, the distribution of information typically costs little. Thus, the economy operates more efficiently when firms only pay the cost of acquiring knowledge once and share this acquired knowledge amongst one another. Since this transfer of tacit knowledge requires personal contact, geographic proximity plays an important role in facilitating the transfer of this information both within and across organizations. Indeed, several studies find evidence that information spillovers decline rapidly with distance (Argote, Beckman, and Epple 1990; Jaffe, Trajtenberg, and Henderson 1993; Greve 1999).

Third, economies of labor supply stem from the availability of a large pool of trained workers.[5] Labor pooling might benefit firms in two ways. First, when companies utilize labor at different times, geographic concentration allows workers to move from firm to firm as demand dictates. Since this reduces the risk of unemployment, workers should accept lower wages in exchange for stability in their income streams (Diamond and Simon 1990; Krugman 1991). Second, the close proximity of several structurally equivalent firms provides additional incentive for prospective employees to invest in industry-specific skills because these skills will not lock the employee into a dependent position when several potential employers exist (Rotemberg and Saloner 1990).

Labor plays an important role in the shoe industry. Indeed, labor accounted for the bulk of production costs at the beginning of our study (60% in Hoover [1937]). However, this proportion declined over time as more advanced machinery increased labor productivity (Battelle Memorial Institute 1966). By the end of the period under investigation, labor accounted for little more than 20% of the costs of production (Raehse and Sharkley 1991). Although labor accounts for a large share of the cost of production, we would classify most of this labor as unskilled (Hoover 1937; Battelle Memorial Institute 1966). Only a few critical tasks, such as the cutting of the leather, require substantial training.

Although the economic literature remains relatively silent on the expected organizational dynamics associated with industrial districts, these explanations for geographic concentration imply two possibilities for the survival rates of organizations. Under one scenario, organizations select locations randomly, but the discipline of competition removes organizations that pick inefficient locations from the population. Pred (1969) explicitly posits this process as the reason for agglomerations. If this process leads to and maintains geographic concentration, we should observe a positive relationship between locating near competitors and organization survival (i.e., colocation increases survival rates). This positive relationship does not necessarily indicate that locating near competitors is beneficial in itself. Rather, the number of organizations existing in a local area might also serve as a rough measure for the underlying economic efficiency of the location. On the other hand, no observed relationship between geographic concentration and failure rates would also fit with traditional economic explanations. If entrepreneurs always select the ideal location that balances competition with locational advantages when positioning their organizations, this efficient allocation of resources would

[5] Weber (1928) also acknowledges the role that skilled, or cheap, labor can play in determining production costs, but he and his followers focus on transportation costs.

prevent one from being able to observe differences in performance.[6] Recent work by Krugman (1991), for example, tells just such a rational entry story.

The one relationship between geographic concentration and failure rates that does not allow extant locational theory to explain the persistence of agglomerations is the one predicted by social models of competition: namely, that organizations located near competitors will experience higher rates of failure (Hannan and Freeman 1977). Competition occurs when two parties vie for control of the same set of resources. Thus, in ecological theory, competition increases as the degree of overlap in resource requirements between two organizations increases (Hannan and Freeman 1977; McPherson 1983). When geography provides a meaningful dimension in the distribution of resources, organizations will compete more intensely with local rivals. In nearly any industry, it seems likely that location will be salient. For example, organizations almost always draw from a local labor pool. Thus, even when the market for the organization's output does not have a local character, the organization typically must compete locally for inputs. Moreover, several studies find that geographically proximate organizations compete more intensely (Carroll and Wade 1991; Baum and Mezias 1992; Hannan and Carroll 1992; Ingram and Inman 1996). When geographic concentration increases failure rates, heterogeneity in founding rates must drive agglomeration. We analyze the failure rates of plants to determine the net effect of geographic concentration in the shoe manufacturing industry.

MORTALITY RATES OF SHOE MANUFACTURERS

The data used incorporate the histories of all U.S. shoe manufacturers from 1940 to 1989. The *Annual Shoemaking Directory of Shoe Manufacturers* 1922–90, a publication of the Shoe Traders Publishing Company that provides a listing for virtually every footwear production facility operating in a given year, serves as the primary data source. For each facility, this publication contains an array of information including the year of its founding, the year of its dissolution, plant location, and organizational ownership. We cross-referenced and supplemented this information with annual data from *Moody's* and *Footwear News*. Where the sources disagree, we gave privilege to the *Shoemaking Directory*, as

[6] Empirical research on location provides mixed support, at best, for the proposition that entrepreneurs select efficient locations. Katona and Morgan (1952) and Stafford (1974), e.g., find that plant managers list personal reasons more commonly than economic reasons for their choice of plant location. Greenhut (1956) also finds that plant managers cite personal preferences as the primary factor determining plant location choices in his case studies of manufacturing plants.

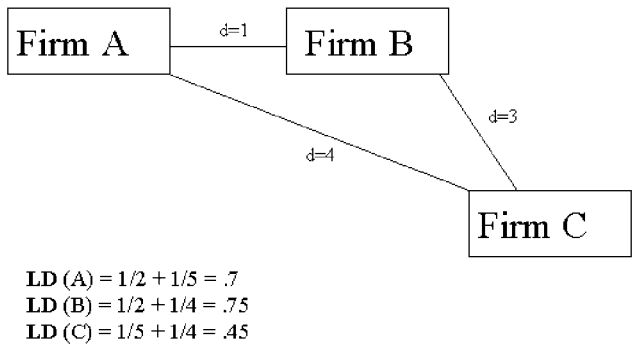

FIG. 4.—Calculation of local density measures

it provides the most comprehensive listing of footwear plants. Data on the international trade of footwear come from publications of the Footwear Industries of America (1940–90).

To test the benefits of locating near other plants, we construct a measure of localized density for each plant for each year it operates. We create this measure for a focal plant by weighting the contribution to the measure of each alter plant according to the inverse of the distance between the focal plant and each alter. We then sum these weighted contributions across all plants. Thus, we calculate localized density, LD, for plant i at time t using the following equation:

$$LD_{it} = \sum_j \frac{x_j}{(1 + d_{ij})},$$

where j indexes all plants other than i, x is the variable being weighted, and d_{ij} denotes the distance between plant i and plant j. For density, we simply assign a vector of ones to x. If we had no information regarding the relative location of firms, $d_{ij} = 0$ for all firms and local density collapses to the traditional measure of density, the count of firms operating at time t.[7] In this sense, one can consider our measure a relaxation of the assumption of geographic equivalence implicit in most ecological models.

Figure 4 provides an example of how one would calculate this measure for three plants. Consider plant A. It lies one unit distant from plant B; thus, we increment the local density measure (LD_A) by 0.5[$= 1/(1 + 1)$] to account for the influence of plant B. Next, we add 0.2[$= 1/(1 + 4)$] to

[7] To be precise, $LD = N - 1$ when all $d_{ij} = 0$.

LD_A to count plant C, which lies four units distant from plant B. Thus, the local density for A is 0.7. Apply the same procedure to plants B and C. Doing so yields calculations for $LD_B = 0.75 = 0.5 + 0.25$ and $LD_C = 0.45$.

We calculate distances using latitude and longitude. The *Annual Shoemaking Directory of Shoe Manufacturers* provides the town in which each plant operated. Using information available from the U.S. Postal Service, we match these plants to the latitude and longitude of the geographic center of the town in which they reside. Spherical geometry allows one to calculate easily the distances on curved surfaces.[8] The distance between two points, i and j, can be calculated by:

$$d_{ij} = C\left\{\arccos\left[\sin\left(lat_i\right)\sin\left(lat_j\right) + \cos\left(lat_i\right)\cos\left(lat_j\right)\cos\left(\left|long_i - long_j\right|\right)\right]\right\},$$

where latitude (*lat*) and longitude (*long*) are measured in radians and C is a constant based on the radius of the sphere that converts the result into linear units of measure. To convert the result to miles on the surface of the Earth, we use $C = 3{,}437$.[9]

Several control variables also appear in the models. National density counts the number of plants in operation nationally in a given year. A long line of research in organizational ecology finds support for density dependence in organizational mortality rates. These studies typically find a U-shaped relationship between organizational density and failure rates (Hannan and Freeman 1989; Hannan and Carroll 1992; Baum 1996). Plant age measures the period of time in years that the plant has been in operation. Although the relationship between organizational age and mortality rates can vary greatly, from a liability of newness (Stinchcombe 1965) to a liability of adolescence (Brüderl and Schüssler 1990) to the liabilities of obsolescence and senescence (Barron, West, and Hannan 1994), age typically has a strong impact on mortality rates. Plant size, the number of pairs of shoes produced per day at the plant, controls for

[8] For small regions, one could calculate the distance between locations using Euclid's formula, but the United States encompasses a large enough area for the curvature of the Earth to affect this calculation significantly.

[9] The choice of units (i.e., miles vs. hundreds of miles vs. kilometers) does not matter except to calibrate the relative importance of plants located within the same town from those located a small distance outside the town.

TABLE 1
DESCRIPTIVE STATISTICS FOR MORTALITY ANALYSIS

Variable	Minimum	Maximum	Mean	SD
Age	0	68	15.65	14.13
Imports	.02	9.41	1.54	2.32
Exports	21	158	50.47	27.78
Domestic production	2.25	6.42	5.07	1.02
National density	566	1,893	1,347	324.8
Ln(size)	0	11.91	7.12	1.81
Local density	.17	8.23	3.65	1.88
No. of plants	0	52	2.78	8.30
Left censored	0	1	.00	.06

economies of scale in production.[10] Several previous studies find modest plant-level economies of scale in the shoe industry (Bain 1956; Simon and Bonini 1958; Szenberg et al. 1977). Plants provides a count of the number of other plants that belong to the same ownership structure. Although only a small percentage of the plants in the shoe industry belong to multiplant organizations (8%), research finds that membership in larger collectives improves a plant's life chances (Ingram and Baum 1997; Audia, Sorenson, and Hage 2001). The models also include measures to control for changes in the carrying capacity. Domestic production measures the number of pairs of shoes (in hundreds of millions) produced domestically by all manufacturers. Exports counts the millions of pairs of shoes produced in the United States shipped to foreign markets, and imports reports the hundreds of millions of pairs produced in other countries and sold in the United States. All variables update yearly. Table 1 provides descriptive statistics for the variables used in the mortality models.

We employ a piecewise exponential model to estimate the instantaneous hazard rate of plant failure. The piecewise exponential model splits time into pieces according to the age of the organization. The base failure rate remains constant within each piece, but base rates vary freely across age pieces (Barron et al. 1994). The piecewise exponential model provides two principal advantages over parametric specifications. First, it avoids misspecification of age dependence by not requiring one to assume a functional form for time dependence. Second, left-censoring does not bias

[10] Roughly 70% of plants fail to report output in any given year. To increase the proportion of valid cases, we interpolate these size values linearly. Interpolation yields size information for 92% of plant-years. However, if we drop the size variable and include all cases in the analyses, the results do not change qualitatively.

parameter estimates in the piecewise exponential (Guo 1993).[11] We implement these models using TDA (Rohwer 1993).

Use of the instantaneous hazard rate allows one to estimate the risk of failure while explicitly controlling for age dependence (Tuma and Hannan 1984). The instantaneous hazard rate of failure can be defined as follows:

$$\mu(t) = \lim_{\Delta t \to 0} \frac{\text{Prob}\,(t < T \leq t + \Delta t | T > t)}{\Delta t},$$

where T is a random variable for the time of plant closure, t denotes the amount of time that plant i has been in operation, Pr represents the probability of plant closure over the interval $(t, t + \Delta t)$ given that the plant was still operating at the beginning of the interval, and the rate can vary as a function of plant age. We consider the cessation of plant operations a failure event. Using this definition, 4,395 of the 5,119 plants in the sample failed during the study period. We did not include changes in name or ownership as plant failures because the plant continued to produce shoes.

Table 2 shows the results of estimation. Model 1 provides a baseline model with controls for plant age, plant size, national density, and carrying capacity (imports, exports, and domestic production). Although the relationships between the control variables and exit rates make sense (e.g., imports increase failure rates), the results with respect to national density do not conform to the expectations of ecological theory. This discrepancy stems from the use of a left-censored population. Model 2 adds the local density variable to the baseline. The addition of this variable significantly improves the baseline. Notably, organizations show strong competitive interaction at this local level. Model 3 estimates the effect of local density contingent on plant age.[12] This modification of the local density effect further improves the model's fit to the data. Younger organizations appear to be more vulnerable to local competition. In model 4, we add a variable to control for the number of other plants owned by the same organization because earlier research shows that this structure can significantly impact competitive effects (Ingram and Baum 1997; Audia, Sorenson, and Hage 2001). Consistent with prior research, plants that belong to larger collec-

[11] The life histories of 1,003 plants begin before 1940. Using sources dating back to 1922, we could determine the age of 758 of these plants. Nevertheless, we coded the remaining 245 plants as starting in 1921 and included a dummy variable to account for downward bias in our age measure.

[12] Interactions with age in the piecewise exponential essentially estimate a separate coefficient for the variable, in this case local density, within each age range.

TABLE 2

PIECEWISE EXPONENTIAL MORTALITY MODELS FOR U.S. SHOE PLANTS, 1940–89

VARIABLE	MODEL 1	2	3	4	5
Age < 5 years	−1.915*	−2.222*	−2.506**	−2.587**	−1.727
	(−2.14)	(−2.48)	(−2.78)	(−2.87)	(−1.93)
Age 5–10 years	−1.724	−2.031*	−2.176*	−2.238*	−1.418
	(−1.93)	(−2.27)	(−2.42)	(−2.49)	(−1.59)
Age 10–20 years	−2.113*	−2.418**	−2.421**	−2.452**	−1.663
	(−2.36)	(−2.70)	(−2.69)	(−2.73)	(−1.85)
Age > 20 years	−2.307*	−2.612**	−2.671**	−2.649**	−1.876*
	(−2.58)	(−2.92)	(−2.98)	(−2.95)	(−2.10)
Imports	.187**	.217**	.219**	.226**	.174**
	(6.92)	(7.99)	(8.07)	(7.94)	(6.46)
Exports	−.005**	−.005**	−.005**	−.005**	−.006**
	(−4.11)	(−4.15)	(−4.03)	(−4.08)	(−4.88)
Domestic production	.000	.000	.001	.000	.000
	(.16)	(1.51)	(1.67)	(1.52)	(.23)
National density/100	−.157	−.178	−.163	−.155	−.130
	(−1.25)	(−1.42)	(−1.30)	(−1.24)	(−1.03)
National density^2/10,000	.009*	.008*	.008	.008	.007
	(2.20)	(1.99)	(1.86)	(1.86)	(1.74)
Ln(size)	−.059**	−.066**	−.067**	−.052**	−.108**
	(−7.00)	(−7.78)	(−7.91)	(−5.96)	(−17.66)

Local density		.130**			
		(11.22)			
Local density (< 5 years)			.165**	.149**	.107**
			(9.84)	(8.89)	(7.43)
Local density (5–10 years)			.132**	.113**	.076**
			(7.52)	(6.40)	(4.55)
Local density (11–20 years)			.096 **	.072 **	.042 *
			(4.97)	(3.70)	(2.18)
Local density (> 20 years)			.105**	.072**	.057**
			(5.07)	(3.40)	(2.68)
No. of plants				−.030**	
				(−3.50)	
No. of plants × local density				−.001	
				(−.35)	
Left censored	−.337**	−.317 **	−.296**	−.284**	−.404**
	(−4.21)	(−3.96)	(−3.66)	(−3.51)	(−4.32)
Log likelihood	−13,445.04	−13,378.33	−13,372.82	−13,336.40	−13,241.57
Haberman's χ^{2a}		133.42 (1)	11.02 (3)	72.84 (2)	

NOTE.—Numbers in parentheses represent *t*-scores.
[a] Numbers in parentheses indicate degrees of freedom for test.
* $P \leq .05$.
** $P \leq .01$.

tives enjoy significantly lower exit rates. Nevertheless, this membership does not appear to buffer these plants specifically from local competition (i.e., the interaction between the number of plants and local density does not affect mortality rates). Since plants that belong to the same organization probably have correlated exit rates, model 5 estimates model 3 using only plants that do not belong to larger collectives to determine whether this nonindependence of events poses a problem. Although the pattern of results remains the same when we restrict the sample to independent plants, the magnitude of the local density effect appears to decline.

Local density clearly plays a strong role in the life chances of shoe manufacturing plants. The models consistently show that plants located in concentrated regions of shoe manufacturing failed at a higher rate than isolated plants. The size of this difference is substantial. In 1948, the year with the largest variance in local density, plants in dense locations experienced failure at nearly three times the rate of the most isolated plants (model 2). Figure 5 illustrates the size of this local density effect for the lowest, mean, and highest values of the local density variable over the study period. Even in this national market, plants experienced competition over local resources. This finding supports earlier research that finds stronger competition among geographically proximate firms (Carroll and Wade 1991; Hannan and Carroll 1992; Baum and Mezias 1992; Ingram and Inman 1996). Nevertheless, it seems inconsistent with the fact that the shoe industry exhibits geographic concentration. Indeed, local competition should lead organizations to space themselves out over time (Smithies 1941; Arthur 1990; Sorenson 2000).

Interestingly, vulnerability to local competition varies with plant age. Established plants appear less susceptible to local competition than new plants. When we split the effects of local density across plant age, we find that the magnitude of the coefficient decreases consistently over the first 10 years of a plant's life. After 10 years, the relationship between local density and failure stabilizes. Nevertheless, even well-established plants fare better in isolated locations. In 1948, in the oldest age category, a plant in the densest region suffered a 111% increase in exit rate relative to the most isolated plant, while a new plant in a dense region experienced a 327% increase in the likelihood of failure relative to its isolated equivalent (model 3). We suspect that three factors might account for this relationship. First, ties to local resources that critically affect the entrepreneur's success probably matter most when the organization is young (Stinchcombe 1965). As organizations become embedded in the local economy, these relations become routinized (Granovetter 1985). Second, differences in size could drive this effect. Barnett (1997) finds that large organizations do not experience competition as strongly as small organizations. Without size con-

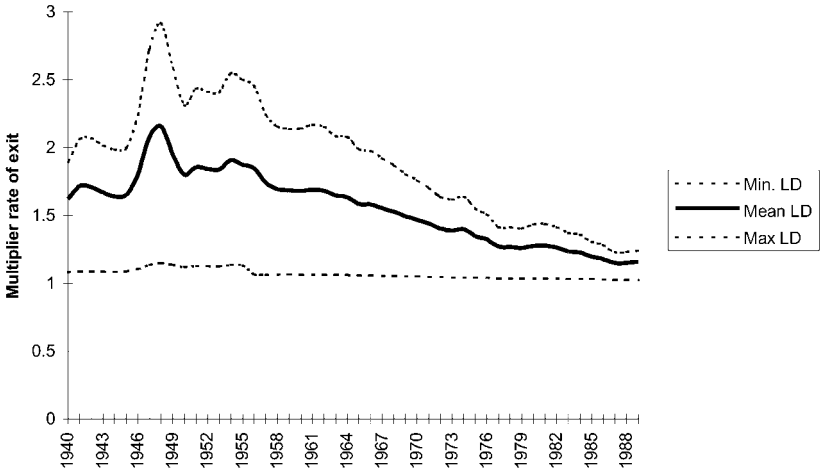

FIG. 5.—Distribution of local density effects over time

trols, these effects can show up as a form of age dependence (Barron et al. 1994).[13] Third, a type of mover-stayer problem could arise from unobserved heterogeneity. Obviously, older organizations have successfully staved off many competitive threats. The same elements that allowed them to survive earlier competition may continue to depress future failure rates.

It is surprising that although membership in a larger collective decreases the exit rate of plants, it does not affect the relationship between local density and exit rates. Plants that belong to multiunit organizations, when located in densely concentrated areas, still exit at a higher rate than their peers in isolated regions. Apparently, organizations cannot buffer their constituent units from local competition. The fact that the magnitudes of the local competition coefficients decline from model 4 to model 5 suggests that local competition might impact plants that belong to multiunit organizations even more heavily.

Given that local density decreases the life chances of plants, one would expect the industry to spread geographically over time (Smithies 1941; Arthur 1990). The fact that geographic concentration persists *requires* a nonrandom distribution of foundings. We believe that variation in the

[13] Although we include a size control, we investigate this possibility further by interacting plant size with local density. Not only does the interaction not explain the relationship between local density and failure over a plant's life cycle, but also scale at the plant level apparently offers no protection from local competition (i.e., the interaction term does not significantly predict exit).

structure of entrepreneurial opportunities drives geographic heterogeneity in plant founding rates.

THE SOCIAL STRUCTURE OF ENTREPRENEURSHIP

We propose an alternative explanation by which industries remain concentrated not as a result of the efficiency of particular locations, but rather due to the constraint that the current location of production places on the distribution of future entrepreneurs. We believe that the presence of many structurally equivalent organizations increases the pool of potential entrepreneurs in a manner similar to a pollination process in which plants produce pollen that blows away in the wind only to land somewhere nearby and burst into new plants. Concretely, this process occurs because production centers provide individuals with more opportunities to acquire knowledge of the business, form critical networks, and build confidence in their ability to open a new venture. These factors increase the likelihood that individuals will leave their current employers and become entrepreneurs.

Career trajectories constrain the activities about which a potential entrepreneur has information. A steel worker knows much less than a shoe worker about the process of making shoes. Working in a particular job both requires the individual to allocate attention to acquiring knowledge about the business and allows the individual to accumulate tacit knowledge important to the success of the activity. Although a motivated individual could learn a great deal about any industry simply by reading the information publicly available, he might have difficulty obtaining crucial tacit knowledge without enlisting the aid of current participants in the industry. Even in the most mundane industries, the production of goods and services likely entails substantial tacit knowledge. Moreover, research suggests such specific knowledge does improve an entrepreneur's chance of success (Liles 1974; Chandler 1996; Cressy 1999).

Knowledge of the business alone may not make for a successful entrepreneur. The entrepreneur must persuade many constituents to invest valuable resources in a risky venture (Stinchcombe 1965). Employees must contribute labor. Investors might need to provide capital. Relationships must be established with suppliers and distributors. Entrepreneurs with prior industry experience should enjoy an advantage in assembling these resources for two reasons. First, these individuals already have social ties to some of these constituents. At a minimum, the entrepreneur with experience in the industry might persuade former coworkers to join the venture. Furthermore, the entrepreneur may have previously occupied a position that allowed her to serve as a conduit between her employer and other organizations, thereby allowing her to develop personal relationships

with members of critical resource providers. Indeed, several studies suggest that these ties play a crucial role in determining entrepreneurial success (Borjas 1986; Evans and Leighton 1986; Aronson 1991; Burton, Sørensen, and Beckman 1998). Second, even constituents that do not know the entrepreneur personally might feel more confident of the venture's success (and therefore more likely to commit) if the entrepreneur comes with prior experience in the industry. For example, accounts of venture capitalists suggest that these financiers seek out entrepreneurs with prior experience in the industry (Bygrave and Timmons 1992).

Knowledge of the business and access to the necessary resources alone, however, may not motivate an individual to become an entrepreneur. The individual must also develop confidence in her ability to transition successfully from employee to entrepreneur (Bandura 1986; Hackett 1995). Prior experience in an industry can bolster this confidence in at least two ways. First, previous successes on tasks tapping skills relevant to the entrepreneurial role—such as new product development, research and development, or production—give people an opportunity to develop strong and resilient perceptions of their ability to orchestrate the activities and resources needed to start a new venture. Not only does their confidence spur entrepreneurial action, it also gives them the energy to maintain a positive attitude when they face the setbacks and adversities often associated with the development of new business activities. Second, exposure to successful entrepreneurs who come from similar social and occupational backgrounds offers another means by which previous experience in the industry strengthens people's confidence. Through direct contact with successful entrepreneurs, people gain opportunities to gather more information about the transition from worker to entrepreneur and to conduct a more accurate personal assessment of their ability to succeed. Often their conclusion is that, "If they can do it, I can do it too." For example, the founder of Nunn-Bush relates in his autobiography that he first thought of becoming an entrepreneur when the supervisor at the shoe plant he managed left to start his own company (Nunn 1953).

Founders of shoe firms appear to gain experience in existing footwear companies before embarking on their entrepreneurial ventures. Though no source systematically documents the careers of footwear entrepreneurs, biographies of shoe company founders consistently report that the individual worked for one or more shoe companies prior to founding their own firm (e.g., Inglis 1935; Quimby 1946; Nunn 1953; Holloway 1956). Similarly, previous research on the shoe industry supports the assertion that most entrepreneurs come from existing organizations. Rabellotti (1994) reports that the shoe plant agglomeration around Brenta in Italy originated when many workers left the first shoe factory in Italy, located nearby, to set up their own businesses. Clark (1928) traces the development

of shoe production in the St. Louis area to German immigrants that worked in shoe production in Germany prior to their immigration.

Research in other sectors of the economy points to the ubiquity of this phenomenon. For example, Saxenian (1994) and others trace the initial development of Silicon Valley to the eight firms founded by engineers who left Fairchild Semiconductor. Since then, spin-off processes have become increasingly common in the region. More generally, Pred (1966) notes the importance of current agglomerations as fermenting grounds for entrepreneurs in his history of U.S. industry. Pyke and Sengenberger (1992) report similar dynamics in industrial agglomerations in Italy, Germany, and Denmark. Similarly, surveys repeatedly find that a large percentage of entrepreneurs previously worked in the same industry as their ventures. For example, in high-technology industries, Cooper (1973) finds that 97% of entrepreneurs had experience in the industry in which they struck out on their own. Other studies cite similarly high levels of prior experience within the industry(Susbauer 1972; Vesper 1979; Timmons 1989; Milton 1990).[14]

Our argument requires an important assumption—that entrepreneurs tend to start their new ventures in the same area in which they previously worked. We think that the geography of social structure justifies this assumption. Individuals tend to develop geographically localized networks of friends, acquaintances, and contacts (Festinger, Schachter, and Back 1950). Thus, they become embedded in the local social structure. These ties constrain an individual's ability to move to geographically distant areas. Relocation would entail serious social costs in the form of breaking old ties and making new ones. Regardless of which ties constrain actors, we expect entrepreneurs to exhibit geographic inertia in their choice of location for a new business venture. The empirical literature on entrepreneurship supports this assumption. Most first-time entrepreneurs locate their businesses close to their home (Katona and Morgan 1952; Mueller and Morgan 1962; Johnson and Cathcart 1979; Cooper and Dunkelberg 1987). These entrepreneurs seem more concerned with the practical considerations of moving to a new house than locating in the ideal location for the business venture (Katona and Morgan 1952). Moreover, many entrepreneurs work part-time for their existing employer while they launch their new venture (Gudgin 1978).

Together these factors suggest that organizations in a particular industrial sector will be founded at higher rates in areas in which organi-

[14] Surveys of franchised restaurant owners provide an exception—only 50%–60% of these entrepreneurs have experience in the restaurant business (Vesper 1979)—however, franchising represents an unusual situation where entrepreneurs essentially pay for the franchiser's experience.

TABLE 3
DESCRIPTIVE STATISTICS FOR FOUNDING ANALYSIS VARIABLES

Variable	Minimum	Maximum	Mean	SD
Imports	.02	9.41	2.24	2.83
Exports	21	158	56.44	33.12
Domestic production	2.25	6.42	4.81	1.17
State population (millions)	.07	29.84	3.77	4.07
State density	0	474	24.96	54.55
Mean (local density)	0	7.79	1.73	1.55
Neighboring density	0	4.54	1.30	3.94
National density	566	1,893	1,248	351.8
Relative wage	.65	1.50	1	.30
Tannery workers	0	56.44	7.36	10.20
Lagged failures	0	101	1.84	5.75
Relative density	0	13.3	1	3.92

zations of that type already exist. Even if these organizations also experience higher failure rates, this heterogeneity in entrepreneurial activity can reify the existing geographic distribution of production.

FOUNDING RATES OF SHOE MANUFACTURERS

We cannot model founding rates at the plant level because we do not know the risk set of potential entrepreneurs. The typical solution to this problem has been to model entry rates as counts with independent variables simultaneously predicting both the pool of potential entrepreneurs (i.e., risk set) and the likelihood that a potential entrepreneur actually starts a business. To account for local variation in both of these factors, we model entry rates at the state level. Our 2,500 state-years capture 3,499 entrepreneurial founding events.[15] The state provides a relatively coherent geopolitical unit in the United States. Many of the institutional factors that social scientists suggest as determinants of entrepreneurship, such as tax policy and incorporation laws, vary primarily at this level. (See table 3.)

With event count data, one expects a highly skewed error distribution because negative event counts cannot occur. The most common estimation procedure used to analyze such data is Poisson regression. This procedure assumes that an underlying Poisson process governs the occurrence of events. Nevertheless, many situations violate the assumptions of the Poisson process. For example, Poisson processes assume that no unobserved

[15] We differentiate foundings of new firms from organizational expansions when existing organizations open new production facilities. The data include information on 617 corporate expansions.

heterogeneity exists; independent variables completely describe the rate. Yet theory in the social sciences rarely covers all possible sources of variance. Poisson regression also assumes that events occur at a constant rate. Contagion, either positive or negative, violates this assumption (King 1989). To cope with unobserved heterogeneity and time-dependence in the rate, one can estimate negative binomial regression models using maximum likelihood methods.

Table 4 shows the estimates for the negative binomial models of state founding rates. Model 6 provides a baseline model controlling for carrying capacity and the crudest measure of the risk set of entrepreneurs, state population. As one might expect, more populous states generate more entrepreneurs. The variable, relative state wage,[16] tests for differences in wealth effects in demand and labor costs from state to state. This wealth measure has inconsistent effects across the models, though the typically positive sign indicates that low wage states do not attract shoe manufacturers. The number of tannery workers (in thousands) provides some information about the availability of complementary activities in the state. However, the presence of these facilities do not influence entry once we include state density. Model 7 adds variables to measure the impact of state-level shoe plant density. Essentially, this specification assumes that organizations within a state exist at a point. We test for deviation from this assumption in model 8. The addition of state density significantly improves the fit. States with more shoe plants experience higher founding rates. In model 8, we introduce another variable for the mean local density of the plants in the state.[17] This variable accounts for variation within states in the degree to which firms space evenly or clump. This addition improves the fit of the founding rate model substantially. States with more concentrated production activity experience higher founding rates. In model 9, we add another variable to account for the existence of shoe plants in neighboring states. Prior research finds that organizational populations in adjacent states influence organization vital rates in the focal state (Wade, Swaminathan, and Saxon 1998). We divide this variable by the size of the focal state to control for the average probable distance between plants inside the state and plants in neighboring states. Popu-

[16] We create this variable by calculating the ratio of the state's per capita wages (for employed persons) to the national per capita wage rate for each year.

[17] We obtain this variable by averaging the local density variable LD across all plants residing in a state in a given year. This variable essentially accounts for two factors. First, organizations can cluster to varying degrees within a state. This variable has higher values when organizations tend to group more closely within the boundaries of the state. Second, organizations can locate closer or further away from organizations in other states. This measure also has higher values when organizations within a state reside closer to concentrations of organizations outside the state.

lations of manufacturers in adjacent states suppress founding in the focal state, suggesting competition across borders. Model 10 includes controls for national density to test for diffuse competitive and legitimating effects. National density does not influence firm founding rates after accounting for local density.

Local density greatly increases the rate of founding. In all models, state density exhibits a nonmonotonic relationship with founding rates. At low levels of production density, increases in the number of shoe plants increase founding rates. As the state density rises, the rate of increase in the founding rate slows. When the density of shoe manufacturers reaches 266 (model 9), further increases in state density decrease the founding rate. (Only New York and Massachusetts ever exceed this level.)[18] Thus, it appears that potential entrepreneurs might eventually realize the unattractiveness of locating in extremely dense areas. Nevertheless, states with existing shoe plants continue to experience higher founding rates than states without shoe plants until the density of manufacturers exceeds 532 plants (a level outside the range of the data), despite the irrationality of such entry.

Simply looking at state densities underestimates the importance of local density. When we relax the assumption that plants disperse evenly across the state by including the mean of the local density measure as a covariate, the model improves dramatically. Even within states, production facilities tend to cluster. States with more severe clustering experience even higher founding rates of new shoe plants. These strong positive local effects map well onto our proposition that entrepreneurship occurs within the existing social structure. Entrepreneurs learn the trade from existing organizations. Thus, we find entrepreneurial activity most abundant in those areas in which a large number of established organizations reside.

DISCUSSION AND CONCLUSION

Traditional explanations of the geographic concentration of industries conflict with social and spatial models of competition. Although they offer different mechanisms, all explanations of agglomeration assert that concentration occurs because the benefits derived from the efficiency of a location exceed the negative consequences of being located in a congested area. Nevertheless, more firms in an area should also generate greater competition. Many scholars resolve this contradiction by suggesting that firms that locate in such areas mix cooperation and competition in ways

[18] Notably, if we exclude Massachusetts from the analysis, state density has a monotonically increasing impact on founding rates. Moreover, the slope of the positive relationship between state density and founding increases substantially in these models.

TABLE 4

NEGATIVE BINOMIAL REGRESSION OF FOUNDING MODELS FOR U.S. SHOE MANUFACTURERS, 1940–89

Variable	Model 6	7	8	9	10
Constant	−3.507**	−2.054**	−1.630**	−2.111**	−3.537*
	(−6.43)	(−4.12)	(−3.29)	(−4.26)	(−2.00)
Imports	−.129**	−.159**	−.162**	−.141**	−.094
	(−4.87)	(−6.36)	(−6.52)	(−5.70)	(−1.65)
Exports	.013**	.012**	.011**	.012**	.012**
	(5.83)	(6.11)	(6.00)	(6.25)	(5.86)
Domestic production	.116	−.047	−.142	−.127	−.165
	(1.44)	(−.63)	(−1.92)	(−1.72)	(−1.95)
State population	.145**	.087**	.103**	.102**	.102**
	(14.91)	(10.02)	(11.53)	(11.78)	(11.75)
Relative wage	.826**	.266*	−.076	.199	.212
	(6.69)	(2.28)	(.60)	(1.51)	(1.60)
Tannery workers	.075**	.007	−.008	−.003	−.003
	(17.92)	(1.44)	(−1.55)	(−.64)	(−.52)
State density		.029**	.029**	.025**	.025**
		(15.52)	(15.61)	(13.68)	(13.59)

State density^2/1,000		−.054**	−.056**	−.047**	−.047**
		(−13.32)	(−13.96)	(−11.58)	(−11.47)
Mean (local densities)			.234**	.486**	.478**
			(7.17)	(9.67)	(9.20)
Neighboring states density				−.334**	−.331**
				(−6.75)	(−6.66)
National density					.020
					(.81)
National density^2/1,000					−.062
					(−.75)
Alpha	.601**	.177**	.119	.013	.012
	(8.94)	(2.25)	(1.52)	(.84)	(.15)
Log likelihood	−2,631.77	−2,505.87	−2,479.45	−2,455.00	−2,454.53
Haberman's χ^{2}[a]		251.8 (2)	52.8 (1)	48.9 (1)	1.0 (2)

NOTE.—Numbers in parentheses represent *t*-scores.

[a] Numbers in parentheses indicate degrees of freedom for test.

* $P \leq .05$.

** $P \leq .01$.

that go beyond conventional competitive dynamics (e.g., Saxenian 1994); however, the ubiquity of geographic concentration in industries with varying competitive patterns leads us to question this explanation. Our findings support an alternative explanation that relies on more general forces and does not conflict with traditional theories of competition. Organizations located in dense areas, as one would expect, face stronger competitive pressures than isolated organizations. Nevertheless, the current distribution of production powerfully shapes the opportunity structure for future entrepreneurs. New entrepreneurs arise more frequently in dense locations because these locations allow individuals to accumulate the knowledge, social ties, and confidence necessary to mobilize resources for a new venture. Thus, higher founding rates, not lower failure rates, sustain agglomerations.

To illustrate the importance of the founding process to maintaining concentration, we estimate the expected time for the system to reach geographic equilibrium—that is, a point where organizations do not differ in failure rates according to location. From 1956 to the present, the shoe industry has been dispersing spatially. Assuming that the economics of shoe production do not change drastically over time, at the current rate of diffusion, it would take 91 years for the population to reach a stable geographic distribution (in 2047). In contrast, the system could have reached equilibrium in only eight years if entrepreneurial activity did not continually reify the distribution of production.[19] In other words, shoe manufacturers would have dispersed geographically by 1964 if failures alone drove the distribution of production. Structural constraint in entrepreneurial opportunities appears to increase the time that the population of shoe manufacturers will take to reach equilibrium by an order of magnitude. Since the underlying economic landscape may not remain stable for time periods on the order of a century, this result suggests that disequilibrium may represent the typical state of the geographic distribution of industry.

This study offers several contributions to the literature. Most notably, we provide a sociological account for geographic concentration by linking microlevel processes surrounding entrepreneurship to a macrolevel phenomenon, industrial districts. Our systematic consideration of all plants in the industry—not just those found in concentrated regions, as one often sees in empirical work on agglomerations (e.g., Angel 1990; Saxenian 1994; Staber 1998)—allows us to determine whether these districts arise as a response to favorable economic conditions or as a result of constraint in the social structure of opportunity. Moreover, by providing a means for

[19] We obtain rough estimates of the long-run effects of the failure process by integrating the relative survivor functions over time.

the continuous consideration of distance and by linking founding and failure rate analyses to the larger literature on economic geography, we provide new opportunities for organizational ecologists to inform a complementary theoretical literature.

At least four alternative explanations might account for these effects in the founding rates. First, entrepreneurs might rationally enter locations with high failure rates if firms that survived competition in these regions received higher returns than those located in remote areas. A second type of rational entry story would argue that entrepreneurs that enter crowded regions profit quickly and then exit. Essentially, both of these accounts suggest that exit does not provide a good indicator of performance. Third, entrepreneurs might move from others areas to agglomerations, violating our assumption of immobility. Fourth, the presence of local industry might generally indicate the presence of local institutional factors that ease the process of resource mobilization for all individuals, not just those with prior experience in the industry. We discuss each of these possibilities in turn.

Let us first consider that agglomerations might offer higher returns to surviving firms than remote regions. Entrepreneurs seeking to maximize their *expected* return might then prefer to open businesses in these concentrated regions despite the higher risk of failure. Nonetheless, several facts suggest that a risk-reward trade-off cannot explain our results. First, plants in concentrated regions experience failure at higher rates than isolated plants throughout their lives (i.e., all of the piecewise interactions in models 3–5 show increasing failure rates in concentrated regions). However, if a risk-return trade-off existed, one would expect firms in agglomerations to benefit from their location after surviving early selection pressures. Second, plants in concentrated regions do not grow larger than those in remote areas. Indeed, local density appears to impede plant growth rates. Local density and output correlate at −.08. Moreover, segmenting the population by plant age shows increasingly negative relationships between local density and output as plants mature. Third, the local availability of cheap assets from failed plants might increase expected returns by decreasing the cost of entry. To test this possibility, we added another variable—lagged failures, an indicator of resources recently released in the local area—in model 11 (see table 5). Though one would expect foundings to increase in regions with recent failures if this exit decreases entry costs, model 11 shows no relationship between lagged failures and future foundings. Thus, the data do not support this risk-return story.

A second type of account simply argues that failure does not indicate an undesirable outcome. Thus, entrepreneurs might rationally enter dense locations, earn their profits, and exit. Unfortunately, without complete

TABLE 5

NEGATIVE BINOMIAL REGRESSION OF FOUNDING MODELS FOR U.S. SHOE MANUFACTURERS, 1940-89

Variable	Model 11	Model 12	Model 13 (Fixed Effects)	Model 14 (Corporate Plants)
Constant	−2.181**	−2.093**		
	(−3.90)	(−4.19)		
Imports	−.137**	−.138**	−.174**	.017
	(−5.21)	(−5.44)	(−3.31)	(.47)
Exports	.012**	.012**	.009**	−.003
	(5.91)	(6.18)	(7.19)	(−1.11)
Domestic production	−.103	−.130	−.155**	−.211**
	(−1.24)	(−1.74)	(−4.54)	(−3.84)
State population	.104**	.104**	−.008	.000
	(11.81)	(11.84)	(−.59)	(.01)
Relative wage	.101	.191	.490**	.191
	(.69)	(1.45)	(3.98)	(.80)
Tannery workers	−.006	−.004	−.006	.008
	(−1.08)	(−.74)	(−.97)	(.78)
State density	.026**	.026**	.007**	.004
	(13.40)	(7.04)	(3.60)	(1.11)

State density^2/1,000	−.047 **	−.048 **	−.009**	−.015*
	(−11.47)	(−9.97)	(−2.80)	(−2.21)
Mean (local densities)	.482**	.484**	.125*	.176
	(9.47)	(9.55)	(1.99)	(1.36)
Neighboring states density	−.317 **	−.331 **	−.000	−.005 **
	(−6.31)	(−6.64)	(−.32)	(−3.47)
Lagged failures	−.007			
	(−1.23)			
Relative density		−.071		
		(−.19)		
Alpha	.026	.007		
	(.31)	(.08)		
Log likelihood	−2,454.11	−2,454.99	−2,083.37	−979.96
Haberman's χ^{2a}	1.8 (1)	.0 (1)		

NOTE.—Numbers in parenthese represent t-scores.
[a] Numbers in parentheses indicate degrees of freedom for test.
* $P \leq .05$.
** $P \leq .01$.

information on the revenues and expenses of each of these plants, we cannot completely discount this possibility. Nevertheless, we believe that two factors point to the improbability of this account. First, it essentially requires that one believe that profit opportunities only exist in the short-run for any particular firm, but that these short-run profit opportunities remain a characteristic of concentrated regions for long periods, an unlikely combination. If the profit opportunities lasted beyond a very short time-frame, rational entrants would stay in the market to continue capturing these rents; so, they would not exit quickly as this account requires. On the other hand, if profit opportunities did not continue to exist in agglomerations over long periods, rational entry would not generate a positive relationship between local density and entry rates. Although one can imagine arbitrage opportunities with these characteristics in financial markets, we have had difficulty constructing explanations that meet these requirements in the shoe industry. Second, one must also assume that entrepreneurs do not suffer a loss of reputation when their firm fails. Though the stigma associated with failing arguably impacts entrepreneurs less in the United States than in some other countries (e.g., Germany), we find this assumption somewhat severe.

Third, entrepreneurs might move to crowded areas to start their firms. We assume that entrepreneurs within a particular geographic region originate from organizations that already exist in those regions; however, entrepreneurs might come from a wide geographic base but move to crowded locales. Two factors could explain this action. First, entrepreneurs might seek locational legitimacy. Certainly, a high-technology venture located in Silicon Valley may seem more legitimate to investors and potential customers alike. Thus, entrepreneurs might actively seek these dense locations for the beneficial reputation effects of being located in a region associated with a particular industry. Second, entrepreneurs may simply restrict their search patterns. Entrepreneurs often decide what structures to adopt based on the configuration of existing firms (Meyer and Rowan 1977). Likewise, since the task of actually calculating the optimum location seems daunting for the individual, the entrepreneur might approach the locational decision process by simply restricting their consideration set to locations that already house many structurally equivalent players. In essence, the entrepreneur makes the mistake of assuming historical efficiency—that is, all of these businesses must be located here because it is a good place to be (Carroll and Harrison 1994). These closely related explanations both rely on an institutional logic. Although they constitute valid sociological explanations for agglomeration, in our view they cannot drive our results because research repeatedly finds that entrepreneurs rarely move from their current location to found organizations (Katona and Morgan 1952; Mueller and Morgan 1962; Johnson and Cath-

cart 1979; Cooper and Dunkelberg 1987). However, to pursue this account further, we construct a measure of "relative density," in essence the proportion of the industry in a particular state. One would expect that relative visibility, rather than the absolute scale of local production would drive these institutional effects. Nevertheless, the inclusion of this term in model 12 shows that this relative density does not increase founding rates.

Finally, institutional factors, such as favorable laws or local training facilities, might ease the resource mobilization process for all potential entrants, not just those with prior experience in the shoe industry. Though prior research repeatedly shows that the vast majority of entrepreneurs enter businesses in which they have experience (Susbauer 1972; Vesper 1979; Timmons 1989; Milton 1990), and we have no reason to expect that the shoe industry represents a special case, we address this possibility in three ways. First, the models control for access to two important resources: the availability of complementary tanning activities and the availability of cheap labor; neither of these factors explains the geographic distribution of foundings. Nevertheless, one could easily imagine a host of other institutional factors (e.g., local distribution networks) that might influence founding rates. Therefore, our second approach controls for one class of these factors—those that remain relatively constant within a state. We estimate model 13 using a fixed-effects specification,[20] which essentially conditions the count probability on the total number of foundings that ever occurred in each state (Hausman, Hall, and Griliches 1984; Greene 1997). Therefore, only within-state variation over time drives the arrival of new entrants. Although the magnitude of the estimated state density coefficients decline, the current distribution of industry continues to play a strong role in determining founding rates. The fact that the results remain robust to this specification eliminates the possibility that relatively stable institutions drive regional differences in founding rates. Moreover, because the industry experiences decline over the period being studied, we can also eliminate as alternatives those time-varying institutional factors that operate asymmetrically—in other words, those that might arise over time but exhibit stickiness in response to industry decline (e.g., infrastructures or legitimacy). Although this analysis drastically reduces the set of potential alternatives, one might still worry about other factors that ease entry and vary with the scale of local production, such as the presence of a trained labor force. To further limit the set of potential alternatives, we analyze the foundings of new plants by existing shoe companies in model 14 (using a fixed-effects specification and the same predictors as the models of entrepreneurial entry). If time-varying institutional factors

[20] A Hausman test indicated that the fixed-effects model fit the data better than a random-effects specification.

ease resource mobilization for any potential entrant, they should also ease entry for these corporate actors. Nevertheless, the presence of many local competitors actually *decreases* the likelihood that these organizations will expand in the state.[21] This suggests that factors that generally ease entry do not drive the effects. Although one might offer other institutional accounts to explain our results, we believe that we have limited this to a very small set—essentially, time-varying and symmetric factors that differentially impact entrepreneurial and corporate entry.

Although these results provide strong evidence of the role of social structure in the shoe industry, two types of future research could expand usefully on our argument. First, it seems imperative to investigate these processes in other industries. Most of the recent literature on agglomerations focuses on high technology segments of the economy that depend crucially on innovation and skilled labor (e.g., Saxenian 1994). Footwear manufacturing may be unusual because of the low rate of innovation and the limited importance of human capital. Thus, it seems particularly useful to investigate whether a high technology industry, such as computer hardware or biotechnology, operates according to the same principles.

Second, direct tests of the microlevel processes could further our understanding of the role that social structure plays in entrepreneurial opportunities. For example, local networks might bind the entrepreneur to a particular region in space. Indeed, we have stressed the important role that ties to local actors can play in the recruitment of labor, capital, and other scarce resources. If an entrepreneur resides in a dense location, she may not improve her chances by moving to a remote location to start her business. Such dislocation could magnify the liability of newness if the entrepreneur now faces the task of recruiting constituents in a community in which she has no ties. Thus, we cannot offer clear advice to the would-be entrepreneur. We do suspect, however, that brokering positions may be particularly valuable (Burt 1992). In other words, individuals that have ties to both existing organizations in an industry and geographic regions distant from these organizations might have the ability to translate these positions into particularly promising entrepreneurial opportunities. This trade-off between the advantage of being embedded in the local economic structure and the disadvantage of locating near structurally equivalent actors strikes us as an interesting topic for future research.

Our results also raise policy issues for the location decisions of multiplant firms. We expected that multiplant organizations would not experience local competition as strongly as single-plant organizations; however,

[21] The quadratic specification does not improve the model fit over a linear state density specification (which yields a negative relationship between state density and corporate expansions). However, we report the quadratic model to keep the specifications parallel.

our results did not reveal any ability on the part of multiplant organizations to buffer themselves from the effects of local competition. The manager of the multiplant firm appears to be in a bind. On the one hand, it seems advantageous for the manager of the multiplant firm to locate in relatively isolated locations (even from each other). On the other hand, organizations that disperse their plants over a wide geographic area probably experience higher coordination costs. Thus, if operating geographically dispersed plants entails substantial coordination costs, the organization must trade-off between cannibalizing resources by locating their plants near each other and bearing high coordination costs from locating plants in diverse locations. Again, we suspect this question could generate an interesting line of future research.

The policy implications for regional planners seem somewhat clearer. Traditional prescriptions for regional development emphasize external economies and a cooperative political climate. Policy researchers point to the development of infrastructures, such as technical schools, efficient transportation routes, and so on as key steps favoring the formation of agglomerations. Our theory suggests instead that policy makers might have more success starting the pollination process by recruiting one or more successful companies to the region that can "fertilize" the area. Without such firms, individuals might find it impossible to acquire the tacit knowledge and confidence necessary to become entrepreneurs. Once the entrepreneurial process has started, it may become self-sustaining. Employees will leave the new organizations to create a second generation of ventures and so on. Interestingly, although this process might benefit the community, these benefits probably come at the expense of any given firm that gets caught in these waves of creative destruction (Schumpeter 1950).

Organizational populations of the same size may also vary in the degree to which they spawn entrepreneurs. For example, Saxenian (1994) argues that the firm's organizational structure plays an important role in stimulating spin-off processes. Decentralized and flat organizational structures may provide employees with better opportunities to accumulate knowledge about the business and build confidence in their ability to run a firm. Thus, differences in the typical structures of organizational populations could explain why we saw so much entrepreneurship in the 1980s in Silicon Valley, while the area around U.S. Route 128 stagnated. This relationship between the structure of existing organizations and entrepreneurial rates also strikes us as an interesting area for future research.

Although the geographic distribution of organizations has received limited attention from sociologists, we find ample evidence to suggest that the social structure plays a strong role in determining this distribution. Indeed, we believe that the distribution of entrepreneurial opportunities

drives the geographic distribution of industry. Although we consider this work an early investigation along these lines, we believe this angle of attack can bring fresh insight to this question. We hope other researchers will join us in investigating the relationship between geography and social structure.

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