The Proliferation of Specialist Organizations in the American Wine Industry, 1941-1990

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To account for the proliferation of specialist organizations as industries mature, this paper examines the relative importance of four processes—density dependence in founding rates, niche formation through changes in consumer preferences, resource partitioning, and direct institutional support—to explain the level and dispersion in foundings of specialist organizations. Analyses of the founding rate of specialist organizations, farm wineries, over 1941–1990 reveal that state-level farm winery density has the strongest impact on both the level and dispersion of farm winery foundings. Density effects are followed by the effects of resource partitioning, institutional support, and niche formation, in order of level of importance, and by the effects of niche formation, institutional support, and resource partitioning, in order of the importance to dispersion.

The results suggest that factors such as density dependence and resource partitioning that are endogenous to a specific population need to be considered in combination with factors such as niche formation and changes in the institutional environment that are exogenous to the population to account adequately for the proliferation of specialist organizations.

Organizational populations as varied as newspapers, railroads, and banks apparently evolve in a strikingly similar pattern (Carroll, 1984: 88–89; Klepper and Graddy, 1990). The early history of these populations shows a small number of organizations. A period of rapid increase in numbers follows. Finally, the number of organizations either stabilizes or declines as the population matures. Several populations such as book publishing, music recording, newspaper publishing, brewing, and banking, however, show a dramatic resurgence in numbers after having experienced a protracted period of decline or stability (Powell, 1985; Carroll, 1987; Carroll and Swaminathan, 1991; Freeman and Lomi, 1994). Often, these newly founded organizations constitute specialist organizational forms, which depend on a narrow range of environmental resources for survival (Freeman and Hannan, 1983; Carroll, 1985). Further, their formal structure, patterns of activity, and normative order are different from those of dominant generalist organizations. This pattern of industry evolution and new firm entry is also characteristic of the American wine industry, the context of this study.

With few exceptions (Carroll and Swaminathan, 1992; Freeman and Lomi, 1994), the study of organizational foundings is rife with unitary causal explanations. For instance, founding rates of specialist organizations can be explained solely in terms of niche formation (Delacroix and Solt, 1988) or resource partitioning (Carroll, 1985). Conceptually, it is important to determine which if any of several proposed theories contribute to an explanation of the founding rate of specialist organizations. Empirically, it is important to gauge the extent to which these theories explain the founding rate of specialist organizations. An understanding of how powerful the effect of a unit change in a given causal factor is on the dispersion of founding rates adds significantly to our knowledge of the organizational conditions.
founding process (Singh and Lumsden, 1990). This study represents an initial attempt to estimate the relative influence of several causal factors that drive the founding of specialist organizations. These include density-dependent legitimation and competition (Hannan, 1986), niche formation due to changes in consumer preferences (Delaproye and Solt, 1988), resource partitioning (Carroll, 1985), and a supportive institutional environment (Tucker, Singh, and Mainhard, 1990).

In general, we would benefit from disentangling the various theoretical models that explain variations in organizational founding rates (Singh, 1993: 469-469). Delaproye and Rao (1994) recently criticized research on density-dependent evolution of organizational populations and proposed alternative interpretations of findings that support density-dependence theory. This study evaluates some of their arguments about organizational foundings by modeling density dependence in founding rates in addition to other factors, such as the effects of infrastructural support and vicarious learning. More importantly, support for one or more of the above-mentioned theoretical explanations suggests that different aspects of an organizational population’s environment may play a prominent role in the founding process. For instance, institutional support and niche formation are factors that are largely exogenous to an organizational population, whereas density dependence and resource partitioning are endogenous to the organizational population.

The study of specialist organizations is important for at least two reasons. First, specialist organizations may be responsible for “de-maturity,” or a reversal in industry maturity (Abemath, Clark, and Kantrow, 1983). Such reversal is often the result of changes in the relationship between technological and market preferences. Industry maturity is characterized by high levels of standardization in technology and products. Any reversal in industry maturity can be seen as an iterative process. The initial catalyst may be a change in the type of demand, as buyers seek new and different product attributes. In response, producers may engage in process and product innovation. As these innovations become standardized practice, the stage is set for another occurrence of de-maturity. Thus a movement toward de-maturity broadly involves an increase in organizational diversity as organizations utilize specialized technology and introduce differentiated products to respond to environmental changes.

The second reason for focusing on specialist organizations follows from the observation that such organizations are typically small in size. Small organizations, in turn, have been credited with industrial renewal in advanced capitalist economies (Sorgenberger, Loveman, and Piore, 1990). The growth of the small-firm sector is linked to a transition in the production system from one based on mass production to another based on flexible specialization. Piore and Sabel (1984: 202-220) documented trends toward specialization in several industries, such as steel, chemicals, machine tools, textiles, computers, and home entertainment products. Market turbulence associated with higher entry and exit
Specialist Organizations

rates of small firms suggests that, collectively, they act as
change agents, especially in mature industries (Beesley and
Hamilton, 1984). This view is supported by studies that
show small firms accounting for a significant proportion of
innovative activity in several industries (e.g., Acs and
that small firms (those with fewer than 500 employees) have
higher innovation rates in 14 of 18 two-digit Standard
Industrial Classification sectors. If small, specialist
organizations are partly responsible for industrial innovation
and renewal, it is important to develop an understanding of
the conditions under which they proliferate. In this paper, I
account for variations in the founding rate of specialist
organizations in the American wine industry over the period,


Trends in the American wine industry in the post-Prohibition
period suggest increasing industry consolidation, a common
feature of mature industries. Figure 1 plots the number of
wineries, or firm density, and total sales volume in the
American wine industry over 1940–90. Here, wineries refers
to winemaking firms, not individual production plans.1 At
the beginning of the observation period in 1940, 1,033 wineries
were in operation. This number declined almost continuously
to a minimum of 330 in 1967. Despite the shrinking number
of wineries, industry sales continued to rise. Most of these
sales gains were achieved by large firms, such as United
Vintners, E&J Gallo, and Guild Wineries, at the expense of
the smaller producers. This is reflected in high industry
centration. An indicator of concentration that is highly
related to the four-firm concentration ratio is the share of
industry capacity held by the largest four firms. This ratio
increased from 23 percent in 1940 to 52.4 percent in 1980
(Wines & Vines, various years). Observers of the wine
industry attribute industry consolidation to two factors: the
operation of economies of scale and the acquisition of small
and medium-sized wineries, often by firms from outside the
industry (Moulton, 1984). Thus, by the late sixties, the
American wine industry seemed to have entered the mature
phase of its life cycle. The industry’s growth rate was
slowing, and the industry was dominated by a few, large
mass producers whose products were more or less generic.

The major market segments in the immediate
post-Prohibition period were those for dessert and fortified
wines. Changes in consumer preferences began to manifest
themselves in altered patterns of wine consumption in the
1950s and 1960s. By 1968, table wine shipments exceeded
dessert wine shipments. The sparkling wine segment also
expanded from 0.7 percent to 5.7 percent of the domestic
market over the period 1940–1990 (Wines & Vines Statistical
Survey, various years). Some of this increased demand for
table and sparkling wines was likely met by existing
mass-production wineries that migrated to the new niche
composed of those two product market segments
(Delacroix, Swaminathan, and Solt, 1989). But a substantial
portion of this demand was met through the proliferation of
a specialist organizational form, the farm winery.2

1 Even in 1940 there were 45 winemaking
firms with more than one production
plant.

2 Of the 1,711 farm wineries founded
between 1941 and 1990, data on product
portfolios are available for 1,438 farm
wineries. Of these, all but 89 produced
either table or sparkling wine.
Consequently, the number of wineries had rebounded to 1,327 by 1990.

Farm wineries typically manufacture premium, varietal wines, often from a designated vineyard operating on a relatively small scale. These wineries have variously been called "boutique," "chateau," and "small" wineries. I follow Adams (1985: 537) in calling this specialist organizational form a "farm winery." Most definitions of boutique or chateau or farm wineries involve an indicator of size. Industry norms suggest that a farm winery is one that produces less than 50,000 cases of wine per year or has a storage capacity that is less than 100,000 gallons (Haring, 1976). These size-based definitions are also reflected in the farm winery laws passed by several states to encourage the establishment of farm wineries. The earliest available data indicate 722 farm wineries in existence in 1940. This number declined almost continuously to a minimum of 141 in 1967. Early farm wineries typically produced undifferentiated products, and their numbers likely declined due to increasing competition within the group and with the more efficient mass-production wineries. Since 1969, a new wave of farm winery foundings has fueled the rapid growth in numbers of this organizational form. Figure 2 depicts trends in the founding of farm wineries over the period, 1941–1990.

The initial spurt in farm winery foundings occurred in California, followed by Oregon and Washington. A few pioneering vintners took up winemaking as a hobby or in some cases, a second career. From 1967 onward, there was rapid growth in the number of California farm wineries. The number of California farm wineries increased from a
minimum of 60 in 1967 to 493 in 1990. Outside California, the proliferation of farm wineries has been particularly impressive in the states of Washington and Oregon (Clark, 1969). From a single farm winery in 1961, the number of farm wineries in Washington state had increased to 74 by 1990. The number of farm wineries in Oregon increased from eight in 1961 to 83 by 1990. Other states have also experienced phenomenal growth in the number of farm wineries, largely as a result of the passing of farm winery laws. At the end of 1990, 1,099 farm wineries were in operation, all except 30 having been founded over the period 1969–1990. The specialist strategy adopted by farm wineries is distinctive in that it involves the production of a wide variety of low-volume, high-value-added products.

The specialist-generalist distinction in the American wine industry was reinforced both by institutional action on the part of regulatory authorities and collective action on the part of individual organizations. The federal government made a distinction between farm wineries and mass-production wineries in 1990 when it raised excise taxes on wine, adding to the distinctions explicit in state farm winery laws. Taxes on a 750-milliliter bottle of wine containing less than 14 percent alcohol by volume were raised from 3 cents to 25 cents. The first 100,000 gallons produced by a winery, however, were exempt from the tax hike. This concession was in effect, a tax rebate for farm wineries. Mass-production wineries were further disadvantaged by an equally sharp increase in taxes on fortified wine (containing 14 percent to 21 percent alcohol by volume) from 13 cents to 35 cents a bottle (Norris, 1990).
The Wine Institute, the original trade organization for the California industry, is viewed by some farm wineries as representing the interests of large mass producers (Berger, 1990). So in 1990, several farm wineries in California formed an independent trade organization called the Premium Winemakers of America (or PWA). The PWA also offered membership to non-California farm wineries until then could not become members in the Wine Institute. Further signs of this industrywide split were evident when nine farm wineries filed a lawsuit against the California Wine Commission (CWC), an organization created by state law to promote wine through research and market development (Brank, 1990). In the court-ordered referendum, members of the Wine Institute voted 125–111 to disband the CWC. The 125 wineries that voted against the commission were mostly farm wineries (Graebner, 1990).

The formation of the Premium Winemakers of America, the dissolution of the California Wine Commission, and the growth of the premium varietal wine market signals the emergence of farm wineries as significant players in the wine industry (Fisher, 1990). It is the proliferation of this specialist organizational form that I attempt to explain here.

THEORY AND HYPOTHESES

Density Dependence in Organizational Founding Rates

Hannan (1986) proposed a model that related the number of organizations (or density) to the founding rate within an organizational population. At low levels of density, each addition of an organization to the population facilitates the legitimization process and therefore increases founding rates. Legitimisation of an organizational form implies that its use for a particular activity is widely accepted and its form acquires the status of a normative or a taken-for-granted solution to certain problems (Meyer and Scott, 1983). As density increases and approaches the environmental carrying capacity, competitive processes set in, the effect of density is reversed, and it lowers the founding rate. Thus this model predicts that density dependence in organizational founding rates is nonmonotonic. Empirical support for this model has been found in several organizational populations (Hannan and Carroll, 1992; Singh, 1993). At least three issues need to be considered when applying the density model to organizational subpopulations (see also Singh, 1993). First, subpopulation boundaries are often defined by organizational form (Ranger-Moore, Banaszak-Holl, and Hannan, 1991). Second, subpopulation boundaries are implicitly determined by the choice of a geographical level of analysis. Third, complex interdependencies can exist between organizational subpopulations (Barnett and Carroll, 1987; Barnett, 1993).

Below, I address each of the above issues in relation to the density-dependent proliferation of specialist organizations in the post-Prohibition American wine industry.

Form-specific density-dependent evolution. Previous research has shown support for form-specific density dependence in the founding rates of subpopulations such as craft and industrial unions (Hannan and Freeman, 1989: 219–224; 290–293), stock and mutual life insurance.
companies (Ranger-Moore, Banaszak-Holl, and Hannan, 1991), and commercial and savings banks (Ranger-Moore, Banaszak-Holl, and Hannan, 1991). In this study, I assume that the boundaries of specialist subpopulations are drawn around their organizational forms, which are distinct from the mass-production or generalist form that dominates the population. In doing so, I follow Hannan and Freeman (1989: 53–60), who suggested that researchers ought to focus on socially constructed boundaries in defining organizational forms. Below, I describe farm wineries in terms of their organization, technology, and marketing strategy, properties that can be used to classify them as a specialist organizational form (Hannan and Freeman, 1984).

Unlike organizations with generalist forms in the wine industry, specialists tend to remain small. Small size confers certain advantages on specialists. Among others, these include the ability to function with relatively simple internal organizational structures, quicker response to environmental changes, and an emphasis on the technical rather than administrative aspects of winemaking. Farm wineries often make wine from only one or two grape varieties. Farm winery owners and their families often supply most of the labor that is required for vineyard and winery operations.

Conforming to high quality expectations is crucial to the long-term success of farm wineries. Many farm wineries establish a second brand that is lower in quality and price to use wine grapes that do not meet quality standards established for the main brand. Farm wineries overcome resource constraints in the areas of production and distribution through cooperation with like organizations (Liebenson, 1986; Groves, 1991).

Most farm wineries do not possess the sophisticated technology, laboratories, and production facilities that are common for mass-production wineries. Instead of touting sophisticated technology, farm winners assert the supremacy of vineyards, characteristic of the French doctrine of goût du terroir, which literally means "taste of the soil" (Stoller and Martin, 1989: 37). In this view, only an appropriate match between climate, soil and grape variety can produce superior wine. Farm wineries often act in concert and petition the U.S. Bureau of Alcohol, Tobacco, and Firearms for recognition of limited geographical areas as American Viticultural Areas (AVAs). This allows wineries within an AVA to distinguish their products by labeling their wines with the AVA as an appellation of origin. Finally, farm wineries that own vineyards can appeal to an even smaller niche by labeling their products as estate-bottled. The ability to estate-bottle wines is useful for marketing purposes because consumers often interpret the label as signifying a superior wine (Priya, 1992). Thus the core technology used by farm wineries is widely available but is not used by generalist mass-production wineries that are committed to large-scale production and place a premium on the consistency of their generic products.

Perhaps the most striking difference between generalists and specialists in the wine industry lies in their contrasting strategies for marketing. Specialists tend to target small, upscale niches within their industries. Instead of using
mass-media advertising, farm vintners rely primarily on word of mouth or, as Alex Hargrave, a pioneer Long Island farm winery owner, put it "the exponential dinner party," in which someone who has tasted a wine serves it at dinner to people who subsequently serve it to others (Wax, 1990). Farm wineries reach consumers mainly through their tasting rooms. Many use the winery as a marketing tool. Attractions such as receptions, weddings, Renaissance fairs, harvest celebrations, picnicking areas, and trout fishing generate extra cash for farm wineries, cash that is scarce during the initial 5–10 years it takes for vineyards to mature (Fox, 1987). Farm wineries also augment their sales through private labeling, especially for restaurants. Farm wineries are further dependent on the whims and fancies of wine critics. Wine critics are influential enough that winemakers often create wines that agree with the critics' palates (Unwin, 1991: 355).

An observed spurt in foundings of specialist organizations within an organizational population may reflect either the emergence of a new specialist organizational form or the rapid growth of an existing specialist organizational form. The latter case would seem to apply to the post-Prohibition American wine industry. One thousand, seven hundred and eleven, or roughly 82 percent of the 2,073 wineries founded in the period 1941–1990 were farm wineries. Farm wineries, the specialist organizational form in the wine industry, should then be subject to independent processes of legitimation and competition based on farm-specific counts of density. Therefore I expect to find support for the following proposition:

Proposition 1: The founding rate of farm wineries will first increase and then decline with increasing farm winery density.

Levels of analysis in density-dependent evolution. The choice of an appropriate geographical level of analysis is also an important theoretical consideration in applying the density model to organizational subpopulations (Freeman, 1990: 64–65; Carroll and Wade, 1991; Baum and Mezias, 1993). Hannan and Carroll (1992: 208–209) suggested that the level of analysis chosen should encompass most of the competition occurring among similar organizations. In the wine industry, specialist organizational forms are responsive to local environments. The primary market for the products of these specialist organizations is geographically limited, mainly because of a lack of access to strong distribution channels. Farm wineries rely extensively upon on-premise sales. Further, several states have farm winery laws that accord preferential treatment to local farm wineries, and these specialist organizations use their localized presence to advantage by positioning their products as home-grown and thus appealing to the pride of local consumers. Therefore it would seem that the appropriate geographical boundary among these specialist organizational forms should be the state boundary. Proposition 1 can now be restated as the following hypothesis:

Hypothesis 1: The state-level founding rate of farm wineries will first increase and then decline with increasing state-level farm winery density.
Interdependence within and among organizational subpopulations. Specialist organizations may exhibit complex patterns of interdependence among themselves and with generalist organizations. Organizations with the same specialist form may be interdependent spatially if specialists outside the state boundary influence state-level founding rates of specialists in any way. The effect of specialists located outside state boundaries would depend on the relative strength of segregating and blending processes in the specialist subpopulation (Hannan and Freeman, 1989: 54). Segregating processes create and strengthen boundaries between organizational forms, whereas blending processes erode and dissolve such boundaries. In the extreme case, if the specialist subpopulations are totally segregated at the state level, then specialist organizations located outside state boundaries would have no effect whatsoever on the founding process. This may be the case when interaction, whether mutualistic or competitive, rarely extends beyond state boundaries. For specialist organizations based on existing organizational forms, however, we might witness interdependence across state boundaries. Farm wineries that are either large or premium producers increasingly have access to established distribution channels, such as wholesalers in other states, or use innovative methods, such as mail order, to compete aggressively with local producers. Such an argument suggests that out-of-state farm winery density will have a competitive effect on the state-level farm winery founding rates.

Alternatively, it is possible that out-of-state farm wineries enhance the legitimation of farm wineries in a focal state and thus accelerate the founding rate. Such a result would be consistent with Hannan et al.'s (1995) study of the founding rate of automobile manufacturers in Belgium, Britain, France, Germany, and Italy. Hannan et al. (1995) found that European automobile manufacturer density had a positive effect on the founding rate of automobile manufacturing firms in the four countries other than Britain. Though the competitive effects of density are intuitive, the positive effect of initial increases in density on the organizational founding rate is subject to interpretations other than the social legitimation of the organizational form (Delacroix and Rao, 1994). In particular, the legitimating effects of out-of-state farm winery density on the founding rate of farm wineries in a focal state can also be interpreted as a case of vicarious learning (Delacroix and Rao, 1994: 265). In fact, these processes may act in ways that reinforce each other. Farm wineries may also be subject to competition from in-state mass-production wineries that compete through similar distribution channels. In this study, I treat interdependence within the farm winery subpopulation and between the farm winery and mass-production winery subpopulations mainly as an empirical issue.

Niche Formation

Delacroix and Solt (1988: 54) argued that foundings in the California wine industry are driven by a niche formation process. In their view, the new niche in the wine industry evolved out of changes in lifestyle and associated consumer
preferences (see also Eysberg, 1990: 88–90). A change in consumer preferences is one among several exogenous factors that may lead to the creation of a new niche. A new niche could also be formed as a result of technological discontinuities. For example, foundings in the semiconductor manufacturing industry seem to be driven by technological innovation (Brittain and Freeman, 1980). Tushman and Anderson (1986) accounted for product substitution through technological changes that destroy the competencies of incumbent firms. The emergence of new product classes such as cement (in 1872), airlines (in 1924), and plain-paper copying (in 1959) is attributed to basic technological innovations. Innovation in production technology, however, does not seem to be a major force behind the proliferation of specialist organizational forms in the wine industry.

Abernathy and Clark (1985: 18) suggested that three specific kinds of environmental changes might lead to the formation of a new niche. First, new technological options offer improved performance or new applications that cannot be met by existing product designs. Second, changes in government policy, especially in regulatory regimes may favor revolutionary strategic development. Finally, changes in consumer preferences may impose requirements that can be met only through new designs. Delacroix and Solt’s (1989) niche formation argument thus has the same flavor as the process of “niche creation innovation” (Abernathy and Clark, 1985: 10–11), in which organizations build on existing technical competence and apply it to emerging market segments. Given an underlying change in consumer preferences, the influx of organizations with specialist forms is likely to be greater as the new market niche expands in volume:

**Proposition 2:** The greater the volume of the new niche, the higher the founding rate of specialist organizations that focus on that niche.

Delacroix and Solt (1988) used the level of wine imports as an indicator of the volume of a new niche comprising the table and sparkling wine segments. Most of these imports originated in continental European countries, where table and sparkling wines account for the bulk of wine consumption. Increases in the level of wine imports have a strong positive effect on foundings in the California wine industry. Delacroix and Solt (1986) interpreted this as evidence that niche formation increases the founding rate. Although the identity of entrants into new niches in the wine industry is unclear, if one assumes that mass-production wineries are likely to be subject to greater structural inertia (Hannan and Freeman, 1984; but see Haveman, 1994), the niche formation argument would suggest the following hypothesis:

**Hypothetical 2:** The greater the volume of wine imports, the higher the founding rate of farm wineries.

**Resource Partitioning**

Trends in organizational density are often related to trends in industrial concentration. As the number of organizations declines, the market share held by the largest few firms typically increases. Organizational populations usually experience two low-density periods characterized by
different degrees of concentration. The low-density period occurring early in a population's history is accompanied by low concentration. In contrast, the low-density period occurring late in a population's history features high concentration. Carroll (1985) developed a model of resource partitioning to account for the mortality rates of specialist firms in environments characterized by varying degrees of market concentration.

The resource-partitioning model predicts that when the market concentrates, the death rate of generalist organizations will increase and that of specialist organizations will decrease. Underlying this pattern is the observation that, in a concentrated market, generalist and specialist firms seem to operate in distinct resource spaces, whereas they rely on a common resource base in an unconcentrated market. With increasing concentration, generalists tend to compete vigorously for the center of the market, thus allowing specialists to thrive in the periphery. Carroll (1985) found support for the resource-partitioning model in an analysis of mortality rates in seven local newspaper populations over 1800–1975 (see also Carroll and Swaminathan, 1992).

The resource-partitioning model can easily be extended to the founding process. High concentration in the market implies that specialists can draw on peripheral resources without entering into direct competition with generalists. Increasing levels of market concentration frees more peripheral resources. Existing specialists may grow and survive longer by exploiting such resources. The increased availability of peripheral resources may also facilitate the founding of specialist organizations. Such a pattern would be consistent with the findings of Barnett and Carroll (1987). In a study of interdependence in the evolution of the early telephone industry, they showed that the greater the average size of incumbent telephone companies, the higher the founding rate of new telephone companies. More recently, Freeman and Lomi (1994) have applied the resource partitioning model to explain the founding rate of rural cooperative banks in Italy over the period 1964–1988. In keeping with the predictions of the resource partitioning model, they found that the size and market share of generalist national banks has a positive effect on the founding rate of specialist rural cooperative banks. Therefore,

Hypothesis 3: The greater the level of market concentration in the wine industry, the higher the founding rate of farm wineries.

Institutional Support

Changes in the institutional environment may have profound effects on the founding of specialist organizations. Tucker, Singh, and Meinhard (1990) studied the effect of one aspect of the institutional environment, changes in government policies, on the founding rates of voluntary social service organizations (VSSOs) in Canada. They found that the establishment of the "Opportunities for Youth" program between 1971 and 1975 legitimated and provided additional resources for VSSOs. Consequently, specialist VSSOs were founded at a much higher rate during this period.
The existence of a sympathetic institutional environment may also account for persistent differences in the evolution of the farm winery subpopulation in different states. Several states have farm winery laws on their books. Pennsylvania pioneered such legislation in 1968, and the number of farm wineries in Pennsylvania shot up from one in 1968 to 52 in 1990. Legislation has had similar effects on the wine industry in other states such as New York, where the law was passed in 1976. Of the 80 New York state farm wineries operating for all or part of 1990, 76 were founded in the period 1976–1990. Farm winery laws usually offer excise tax benefits and reduced licensing fees for operators of wineries below a certain size. Often, there is an additional stipulation that these farm wineries use a certain percentage of grapes grown within that state. In many states, such legislation allows farm wineries to sell directly to consumers and to restaurants, a practice that is illegal for mass-production wineries under the prevalent three-tier system of distribution (manufacturer to wholesaler to retailer). By 1990, 25 states had adopted farm winery laws.

The impact of such legislation is evident in the sudden increase in farm winery foundings in the 1970s and 1980s, as shown earlier in Figure 2. Of the 1,711 farm wineries founded in the period 1941–1990, as many as 1,409 were founded in or after 1969. In general, a supportive institutional environment may signify an underlying acceptance of locally based specialist organizations:

Hypothesis 4: The existence of state farm winery laws will increase the founding rate of farm wineries in such states.

Direct institutional action such as the passage of farm winery laws may act as an independent source of legitimation for farm wineries. Institutional support and density-dependent legitimation both facilitate an organizational form's access to resources (Delacroix and Rao, 1994: 259). Collective action by small groups of organizations is often aimed at securing institutional support in the form of government regulations that protect infant industries (Carroll, Delacroix, and Goodstein, 1968) or laws that structure industry competition in particular ways (Barnett and Carroll, 1993). If direct institutional support and density-dependent legitimation are independent processes, density-dependent legitimation is likely to be weaker in states that pass farm winery laws. The interaction effect of density and the existence of a farm winery law on state-level farm winery founding rates should thus be negative. I explore such an interaction effect in the analysis of farm winery founding rates.

Environmental Carrying Capacity

Organizational founding rates are likely to be higher when the excess carrying capacity of the environment is greater (Brittain and Freeman, 1980; Pennings, 1982; Baum and Singh, 1994). The carrying capacity of the environment for farm wineries is likely to vary across states. Hypotheses 1 through 4 need to be tested with reference to a baseline model of organizational founding among farm wineries that incorporates state-level variations in carrying capacity. I model those state-level differences in terms of three variables—the per capita personal income of a state's
Specialist Organizations

residents, the per capita wine consumption of a state's residents, and the percentage of a state's population that lives in "dry" areas, where alcohol is not sold. Consumer affluence is likely associated with the emergence of small upscale niches in the wine industry. Therefore, states with higher per capita incomes are likely to experience a higher farm winery founding rate. By contrast, states that have a large proportion of their populations living in dry areas likely reflect persistent social norms that discourage the sale and consumption of alcoholic beverages. These underlying attitudes may attain greater significance for farm wineries because these specialist organizations depend extensively on local patronage for survival and growth. In such states, farm winery foundings are likely to be low.

Mass Dependence and Externalities

The founding rate of organizations with specialist forms may also be dependent on the mass (the sum of sizes of organizations) of the farm winery subpopulation. On one hand, large organizations may create reputational benefits for smaller organizations. This is supported by results that show that population mass increases the founding rate within an organizational population (Barnett and Amburgey, 1990; Delacroix and Rao, 1994: 262). On the other hand, large organizations may impose infrastructural costs on other organizations by erecting entry barriers that reduce the organizational founding rate. According to this argument, population mass should lower the founding rate (Barnett and Amburgey, 1990: 82–84; Delacroix and Rao, 1994: 267). In this study, I test the sensitivity of the best-fitting farm winery founding model to mass dependence in farm winery founding rates.

RESEARCH METHODS

Data

Annual directories of wineries compiled by Wines & Vines, an industry trade publication, constitute the primary source of event-history data on the population of winemaking firms. Since the directories constitute a complete census of the American wine industry, the data include information on all American wine producers.

The entries in the Wines & Vines directories provide, for each bonded premise (or production plant), data on the company name and address, bonded winery or wine cellar license number, current owners or managers, size in terms of storage capacity, vineyards owned, products, and brand names. Because the listings in the annual directories relate to plants (individual bonded premises) rather than to firms, I aggregated the histories for all plants belonging to the same firm, so my data record firm-level event histories on foundings and deaths. The founding year is assumed to be the year in which a winemaking firm first appears in the directory. Since the directories are available from 1940 onward, I can accurately identify founding years for wineries founded during 1941–1990, the period covered by this study. I checked the data on winery foundings, dissolutions, and acquisitions by examining industry news columns in monthly issues of Wines & Vines over the period of observation. The
event-history data have been further cross-validated by examining annual records provided by the U.S. Bureau of Alcohol, Tobacco, and Firearms. Hannan and Carroll (1992: 163-167) argued that left-truncated data of the kind used in this study will likely lead to a lack of support for density dependence in organizational founding and mortality rates. But other studies using left-truncated data have shown support for density dependence in founding rates (Baum and Singh, 1994; Lomi, 1995). Thus, discrepant findings with respect to density dependence in founding rates cannot be attributed solely to the use of left-truncated data (Singh, 1993).


Dependent Variable

Organizational foundings: From the event-history data, I was able to construct this variable by aggregating the number of wineries founded at any time in a given year in each state. The time series of annual number of foundings was further subdivided by organizational form to obtain separate series for farm wineries and mass-production wineries.

Independent Variables

Organizational density: Following Hannan and Freeman (1989), I operationalized density as the number of wineries ever to operate in a particular state in a given year, regardless of how long. This total count was further broken up by organizational form to obtain measures of mass-production winery and farm winery densities. Form-specific density measures for wineries within and outside each state were calculated from the event-history data described earlier. These data were available for the period 1940–1990.

Industry concentration: A measure of industry concentration in terms of the four-firm concentration ratio, the share of the total market accounted for by the cumulative sales of the largest four firms in a given year, was available only for the period 1963–1990. Data on firm-level sales were available in volumes of Jobson’s Wine Marketing Handbook, the impact American Wine Market Review and Forecast, and periodically in the Census of Manufactures. To extend the coverage of data on industry concentration, I used a measure of the share of industry storage capacity accounted for by the largest four firms. For the period 1963–1990, the concentration measure based on sales averaged 50.2 percent, whereas the concentration measure based on capacity averaged 47.3 percent. The two measures of industry concentration were highly correlated (Pearson correlation coefficient = .99, p = .001). Given the similarity of the two measures, I used the concentration measure.
Specialist Organizations

based on capacity, because it was available over the entire period of observation, 1940–1990.

Niche formation: The niche creation process was captured by the volume, in millions of gallons, of wine imports. Data on the volume of wine imports were taken from annual volumes of the Wines & Vines Annual Statistical Survey. These data were available for the period 1934–1990.

Direct institutional support: Information on farm winery laws came from the description of state laws and regulations in the annual directories of Wines & Vines, from Adams (1985, 1990), and in some cases by contacting state alcoholic beverage control agencies.

Environmental carrying capacity: The carrying capacity of the environment for farm wineries was captured by three variables. First, data on real per capita personal income in each state came from statistics compiled by the Bureau of Economic Analysis, U.S. Department of Commerce (1994). This variable was measured in thousands of constant 1982 dollars. Data on real per capita personal income were available for the period 1940–1990 for all states except for Alaska for the years 1940–1949. Second, state-level data on the percentage of the population living in dry areas came from volumes of the Brewers Almanac published by the U.S. Brewers Association. These data were available for each state from 1938 to 1990. Third, state-level data on annual per capita wine consumption, measured in gallons, were calculated from volumes of the Wines & Vines Annual Statistical Survey. These data were available for each state from 1940 to 1990, except for Alaska for the years 1940–1952 and for Hawaii for 1940–1952. The missing data on per capita wine consumption resulted in a loss of 26 state-years in the time series of event counts for farm winery foundings. Consequently, I was able to use only 2,524 state-years of the 2,550 state-years (50 years × 51 states, including the District of Columbia) that are available for analysis in the period 1941–1990.

Population mass: Population mass for specialist organizational forms was measured in terms of the total storage capacity of farm wineries in a given year (see Barnett and Amburgey, 1990). These data were collected from the annual directories of Wines & Vines and were available for the period 1940–1990.

Table 1 provides descriptive statistics on the variables used in the founding rate analysis. Though farm wineries were assumed to be at risk of being founded after the repeal of Prohibition in 1933, because several variables were only available from 1940 onward and all independent variables were lagged by one year to ensure exogeneity with respect to the dependent variable in question, I was able to analyze farm winery founding rates only for the years 1941–1990. A total of 1,711 farm wineries were founded during the period 1941–1990. The data for the analysis of founding rates were organized in the form of an annual time-series from 1941 to 1990 for all variables.

Analysis

In the following analysis, I tried to identify factors that influence the proliferation of the farm winery organizational
form in the wine industry in post-Prohibition America. I used event count models to model the state-level founding rate of farm wineries.

In modeling the organizational founding process, I followed convention in defining the population as the unit of analysis and treated foundings as events in a point process (Cox and Isham, 1980; Amburgey, 1986). Because the dates of founding often record only the year of founding, I did not know the ordering of events within years. Nor did I know the exact duration between foundings. In doing work of this kind, organizational ecologists have typically assumed a constant rate of founding with log-linear dependence on covariates (Hannan and Freeman, 1989). This approach assumes that, conditional on the values of the covariates, a time series of annual counts of foundings is the realization of a Poisson process. This implies that the number of foundings in year $t$, $Y_t$, is determined by the probability law:

$$\Pr(Y_t = y_t) = \exp(-\lambda_t) \frac{\lambda_t^y}{y_t!}. \quad (1)$$

The relationship between the founding rate, $\lambda_t$, and the vector of covariates, $X_t$, is specified as follows:

$$\ln \lambda_t = \alpha + BX_t. \quad (2)$$

Assuming that a series of counts of foundings is a realization of a Poisson process implies that the occurrence of a founding is independent of previous foundings. It also implies that the expected number of foundings in a year equals the variance of the number of foundings in that year. But both of these assumptions are questionable when the variance of event counts exceeds the mean, a condition called overdispersion. Adopting the Poisson model in the presence of overdispersion can lead to misleadingly small standard errors for the estimated coefficients. Overdispersion can result either from unobserved heterogeneity in founding rates or from positive contagion. The Poisson model shown in equation (2) does not have an error term, thus allowing no role for either random error or unobserved causal variables (Hausman, Hall, and Griliches, 1984). In the presence of unobserved heterogeneity across
observations, the variance of the observed counts will exceed the variance estimated by Poisson regression. Further, some studies of organizational founding (Delacroix and Carroll, 1983; Delacroix and Soft, 1988) showed positive contagion in the founding process, implying that the count of founding in one year increases the rate of subsequent foundations. More generally, contagion effects may also operate within a given year. In practice, it is often impossible to isolate a specific source of overdispersion. One solution to the problem of overdispersion is to use the negative binomial model, which overcomes the limitations of the Poisson model through the inclusion of an overdispersion parameter (Barron, 1992). This model has been used in research both on political events (King, 1989) and organizational foundings (Ranger-Moore, Banaszak-Holl, and Hannan, 1991; Carroll and Swaminathan, 1991; Baum and Singh, 1994). The relationship between the founding rate, \( \lambda_p \) and the vector of covariates, \( X_p \), is specified as:

\[
\ln \lambda_p = \alpha + \beta X_p + \epsilon_p,
\]

where \( \epsilon_p \) has a gamma distribution. One can choose other probability distributions to describe \( \epsilon \) (Johnson, Kotz, and Kemp, 1992: 203-207). The gamma distribution is often chosen in practice because of computational ease and its ability to accommodate a wide variety of underlying shapes for the distribution of event counts (Barron, 1992: 189). The analyses reported in this paper used the quadratic specification of the negative binomial model (McCullagh and Nelder, 1989). According to this specification, the variance increases linearly with the expected count. The model has an additional overdispersion parameter, \( \theta \), where

\[
\text{Var}(Y_p) = E(Y_p) [1 + \theta E(Y_p)].
\]

Setting \( \theta = 0 \) in (4) simplifies the negative binomial model to a Poisson model. Thus one can form likelihood ratio tests of the Poisson process versus the negative binomial. The likelihood ratio test statistic is defined as

\[
\mu_p = \max L_p / \max L_0,
\]

where \( L_0 \) and \( L_1 \) denote the likelihoods of the null model (subject to, say, \( n \) constraints) and the alternative model that relaxes the constraints, respectively. With large samples, \(-2 \ln \mu_p\) is distributed as a chi square with \( n \) degrees of freedom. I report the negative of the log likelihood for the founding models in my tables. Therefore, two times the difference of the negative log likelihoods of a pair of hierarchically nested models in the tables has approximately a chi-square distribution under the null hypothesis. I report the change in the log-likelihood chi-square ratio for all models relative to a baseline model of farm winery founding. I used maximum likelihood methods available in the statistical package LIMDEP, Version 6.0 (Greene, 1991) to estimate negative binomial founding rate models.

Negative binomial regression models allowed me to estimate the effect of a particular independent variable on the farm winery founding rate, holding other variables constant. The effect of any variable on the founding rate is depicted in terms of a multiplier of the unobserved founding rate. This multiplier is obtained by exponentiating the
product of the estimated coefficient of any variable over the range of values for that particular variable. The multiplier for a variable \( X \) is given by the following formula:

\[
\text{Multiplier} = \exp(\beta X) / \exp(\beta X_{\min}),
\]

where \( \beta \) is the coefficient estimate for the independent variable, \( X \) is the value of that variable, and \( X_{\min} \) is the minimum value of that variable. For some variables, such as direct institutional support as measured by the existence of a farm winery law in a given state (a 0,1 variable), the multiplier equals \( \exp(\beta) \). The concept of a multiplier is similar to that of the level of importance of an independent variable in a particular sample: The multiplier indicates the degree to which an independent variable will influence the level of the dependent variable (Achen, 1982: 71–73).

Because an evaluation of the relative impact of different variables on variations in the founding rate of farm wineries requires the use of a standardized unit of measure, I converted all values of all variables to their standard normal equivalent. Since the farm winery founding counts follow a negative binomial distribution, I used a transformation of the dependent variable to approximate a standard normal distribution (Johnson, Kotz, and Kemp, 1992: 212). The transformed dependent variable \( Y_{1*} \) was calculated as:

\[
Y_{1*} = (k)^{Y_{1}} \sinh^{-1} \left( Y_{1} / k \right)^{\frac{1}{k}},
\]

where \( Y_{1} \) is the observed series of founding counts, \( k \) is equal to 0.1, and \( Y_{1*} \) is the transformed series of founding counts. I used values of \( k \) obtained from the negative binomial regression models.

Standardized betas, the estimates from ordinary least squares (OLS) regression models using the standardized data, can be used to compare the causal importance of different independent variables to dispersion. Standardized OLS regression estimates show the number of standard deviations that the farm winery count will change when a particular independent variable changes by one standard deviation. In that sense, standardized betas are a measure of the importance of an independent variable to dispersion, its impact on the spread of farm winery founding counts over 1941–1990 (Achen, 1982: 73–77).

RESULTS

Table 2 presents negative binomial regression models of farm winery foundings over the period 1941–1990. Model 1 estimates the baseline effects of variables that measure the carrying capacity of the environment. Results show that farm winery founding rates are higher in states with higher per capita income and wine consumption, although these baseline effects lose statistical significance in the more fully specified models 3 through 6. Hypothesis 4 is supported by model 2: The farm winery founding rate is higher in states that have implemented farm winery laws. Model 3 tests hypotheses 1 through 4 simultaneously. All of the hypotheses are supported. State-level farm winery density has a significant nonmonotonic effect on the founding rate of farm wineries, thereby supporting hypothesis 1. This result is consistent with the predictions of Hannan’s (1986)
In models not shown here, industry concentration had a negative effect on the founding rate of generalist (mass-production) wineries, a result that is consistent with the resource partitioning model.

Specialist Organizations

model of density-dependent evolution. Farm wineries do not show any interdependence with either farm or mass-production wineries located outside a focal state. Vicarious learning in the founding process seems localized both in terms of organizational form and geography. State mass-production winery density, however, exerts a negative effect on the state-level farm winery founding rate, suggesting competition between these two organizational forms in local output markets. The indicator of niche formation, volume of imports, has a significant positive effect on the founding rate in model 3. This result supports hypothesis 2. In model 3, the resource partitioning variable, industry concentration, has a positive and significant effect on the founding rate, as predicted by hypothesis 3. Hypothesis 4 is again supported in model 3. Direct

Table 2

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Model</th>
<th>Model 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-2.641***</td>
<td>-2.278***</td>
</tr>
<tr>
<td>State per capita</td>
<td>.0844***</td>
<td>.0179</td>
</tr>
<tr>
<td>annual personal income (thousands of constant 1987 dollars)</td>
<td>(.0186)</td>
<td>(.0227)</td>
</tr>
<tr>
<td>State per capita annual wine consumption (gallons)</td>
<td>.7126***</td>
<td>.8510***</td>
</tr>
<tr>
<td>% of State population living in dry areas</td>
<td>.0048</td>
<td>-.0055</td>
</tr>
<tr>
<td>Farm winery law in state 1 = yes; G = no</td>
<td>.6785***</td>
<td>.5039***</td>
</tr>
<tr>
<td>State farm winery density</td>
<td>.0629***</td>
<td>.0839***</td>
</tr>
<tr>
<td>(State farm winery density</td>
<td>.0059)</td>
<td>(.0072)</td>
</tr>
<tr>
<td>Quotahold farm winery density</td>
<td>.0002</td>
<td>(.0002)</td>
</tr>
<tr>
<td>State mass-production winery density</td>
<td>-.0080</td>
<td>-.0106***</td>
</tr>
<tr>
<td>Farm winery law × state farm winery density</td>
<td>-.0017</td>
<td>(.0027)</td>
</tr>
<tr>
<td>Volume of wine imports (millions of gallons)</td>
<td>.0070***</td>
<td>.0377***</td>
</tr>
<tr>
<td>(State farm winery density</td>
<td>.0018)</td>
<td>(.0018)</td>
</tr>
<tr>
<td>Industry concentration (4-firm ratio)</td>
<td>.0469***</td>
<td>.036***</td>
</tr>
<tr>
<td>- Log likelihood</td>
<td>1940.68***</td>
<td>1954.332</td>
</tr>
<tr>
<td>parameter</td>
<td>1248.88</td>
<td>629.364</td>
</tr>
<tr>
<td>Δ Likelihood chi-squared ratio (relative to model 1)</td>
<td>1 8 6 7 8</td>
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</tr>
</tbody>
</table>

* p < .10; ** p < .05; *** p < .01.

Standard errors are in parentheses.
in institutional support in the form of a farm winery law is associated with a higher farm winery founding rate.

The exclusion of the out-of-state density variables in model 4 results in a parsimonious model in which the effects of density dependence, niche formation, resource partitioning, and direct institutional support on the farm winery founding rate remain strong and as predicted by hypotheses 1 through 4. Model 5 examines whether increasing density and direct institutional support are independent sources of legitimation of the farm winery organizational form. Support for such an argument requires that the interaction of farm winery density and the existence of a state farm winery law exert a negative effect on the farm winery founding rate. Model 5 shows that even though the interaction effect is negative, it is not statistically significant. Model 6 tests the sensitivity of model 5 to the inclusion of the population-mass variable. In this model, mass does not affect the farm winery founding rate significantly, and the results still support hypotheses 1 through 4.

The calculation of multiplier effects using coefficient estimates from model 4, the one with the most explanatory power in Table 2, indicates the level of importance of the various factors in explaining the proliferation of farm

---

**Table 3**

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
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<td>Constant</td>
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<td>.3084***</td>
<td>.3084***</td>
<td>.3084***</td>
<td>.3084***</td>
<td>.3084***</td>
</tr>
<tr>
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<td>(0.0142)</td>
<td>(0.0099)</td>
<td>(0.0099)</td>
<td>(0.0099)</td>
<td>(0.0099)</td>
<td>(0.0099)</td>
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<tr>
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<td>.0238</td>
<td>.0141</td>
<td>.0140</td>
<td>.0093</td>
<td>.0011</td>
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<tr>
<td>(0.0224)</td>
<td>(0.0238)</td>
<td>(0.0169)</td>
<td>(0.0169)</td>
<td>(0.0169)</td>
<td>(0.0169)</td>
<td>(0.0169)</td>
</tr>
<tr>
<td>State per capita annual wine consumption</td>
<td>.2015***</td>
<td>.2124***</td>
<td>.0447***</td>
<td>.0447***</td>
<td>.0509***</td>
<td>.0482***</td>
</tr>
<tr>
<td>(0.0222)</td>
<td>(0.0221)</td>
<td>(0.0169)</td>
<td>(0.0169)</td>
<td>(0.0169)</td>
<td>(0.0169)</td>
<td>(0.0169)</td>
</tr>
<tr>
<td>% of State population living in dry areas</td>
<td>.0175</td>
<td>.0114</td>
<td>.0146</td>
<td>.0146</td>
<td>.0161</td>
<td>.0149</td>
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<td>(0.0150)</td>
<td>(0.0150)</td>
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<td>(0.0108)</td>
<td>(0.0108)</td>
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<td>.0227***</td>
<td>.0227***</td>
<td>.0227***</td>
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<tr>
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<td>(0.0157)</td>
<td>(0.0129)</td>
<td>(0.0129)</td>
<td>(0.0129)</td>
<td>(0.0129)</td>
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<tr>
<td>State farm winery density</td>
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<td>.0202***</td>
<td>.0473***</td>
<td>.0473***</td>
<td>.0473***</td>
<td>.0473***</td>
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<tr>
<td>(0.0347)</td>
<td>(0.0345)</td>
<td>(0.0275)</td>
<td>(0.0273)</td>
<td>(0.0275)</td>
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<td>State farm winery density*1000</td>
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<td>.0261</td>
<td>.0261</td>
<td>.0261</td>
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<td>.0261</td>
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<tr>
<td>(0.0172)</td>
<td>(0.0172)</td>
<td>(0.0172)</td>
<td>(0.0172)</td>
<td>(0.0172)</td>
<td>(0.0172)</td>
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<tr>
<td>Farm mass production density</td>
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<td>.1235***</td>
<td>-.1235***</td>
<td>-.1235***</td>
<td>-.1235***</td>
<td>-.1235***</td>
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<tr>
<td>(0.049)</td>
<td>(0.049)</td>
<td>(0.049)</td>
<td>(0.049)</td>
<td>(0.049)</td>
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<tr>
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<td>.0164</td>
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<td>.0164</td>
<td>.0164</td>
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<tr>
<td>(0.012)</td>
<td>(0.012)</td>
<td>(0.012)</td>
<td>(0.012)</td>
<td>(0.012)</td>
<td>(0.012)</td>
<td>(0.012)</td>
</tr>
<tr>
<td>Volume of wine imports</td>
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<td>.0741***</td>
<td>.0818***</td>
<td>.0818***</td>
<td>.0818***</td>
<td>.0818***</td>
</tr>
<tr>
<td>(0.0306)</td>
<td>(0.0306)</td>
<td>(0.0173)</td>
<td>(0.0173)</td>
<td>(0.0173)</td>
<td>(0.0173)</td>
<td>(0.0173)</td>
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<tr>
<td>Industry concentration</td>
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<td>.0565**</td>
<td>.0565**</td>
<td>.0565**</td>
<td>.0565**</td>
<td>.0565**</td>
</tr>
<tr>
<td>(0.0348)</td>
<td>(0.0348)</td>
<td>(0.0153)</td>
<td>(0.0153)</td>
<td>(0.0153)</td>
<td>(0.0153)</td>
<td>(0.0153)</td>
</tr>
<tr>
<td>Farm winery law × state farm winery density</td>
<td>.0225***</td>
<td>.0225***</td>
<td>.0225***</td>
<td>.0225***</td>
<td>.0225***</td>
<td>.0225***</td>
</tr>
<tr>
<td>(0.0152)</td>
<td>(0.0152)</td>
<td>(0.0152)</td>
<td>(0.0152)</td>
<td>(0.0152)</td>
<td>(0.0152)</td>
<td>(0.0152)</td>
</tr>
<tr>
<td>Farm winery capacity</td>
<td>0.0156</td>
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<td>0.0156</td>
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<td>0.0156</td>
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<tr>
<td>(0.0141)</td>
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<td>(0.0141)</td>
<td>(0.0141)</td>
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</tbody>
</table>

*Adjusted R-square: 0.1193, 0.1309, 0.5775, 0.5779, 0.5803, 0.5803

Number of cases: 2524, 2524, 2524, 2524, 2524, 2524

Number of foundations: 1711, 1711, 1711, 1711, 1711, 1711

* p < .10; ** p < .05; *** p < .01.

* Standard errors are in parentheses.
Specialist Organizations

wineries. Increases or decreases in the founding rate can be calculated as the multiplier minus one. For example, the multiplier for the direct effect of the existence of a state farm winery law is 1.709, which implies that the passage of such a law increases the founding rate of farm wineries by an average of 70.9 percent.

The multiplier effects of niche formation, resource partitioning, and density dependence were calculated at the mean values of the independent variables. The multiplier effects of niche formation and resource partitioning are also quite strong: They account for increases of 32.8 percent and 79.5 percent in the founding rate, respectively. Because the range of farm winery density varies widely from state to state, its effects are best estimated for individual states (see Appendix for founding-rate multiplier effects for farm winery density by state). The average value of the multiplier (mean) for farm winery density in all states is 3.346, the strongest observed effect on farm winery founding levels.

Standardized OLS regression was used to assess which of the four factors explains most of the variance in state-level farm winery founding counts. 7 Models 7 through 12 in Table 3 correspond exactly to models 1 through 6 in Table 2 with respect to the independent variables that are included in each set of models. State farm winery density, wine imports, industry concentration, and the existence of farm winery laws all affect the dispersion of farm winery foundings in ways that support hypotheses 1 through 4. Regression coefficients in Table 3 can be interpreted as the number of standard deviations that farm winery founding counts will change when an independent variable changes by one standard deviation. I use the coefficients in model 10 to examine the relative importance of the four causal factors in the dispersion of farm winery foundings. Model 10 is analogous to the best-fitting model 4 of Table 2. An examination of the magnitude of coefficients in model 10 suggests that state farm winery density has the greatest impact on the dispersion of farm winery foundings. The existence of farm winery laws has the next biggest effect on the dispersion of farm winery foundings, followed by the effects of niche formation and resource partitioning. The interaction effects of density and institutional support in models 11 and 12 are inconsistent with those found earlier in the negative binomial models 5 and 6. The interaction effect is positive in models 11 and 12, while it did not affect the founding rate significantly in models 5 and 6. An examination of the coefficients for state farm winery density in models 11 and 12 suggests that density effects have not weakened appreciably. Instead, the direct effect of farm winery laws on the dispersion of farm winery foundings falls off considerably in these two models. This pattern suggests that the effect of direct institutional support is stronger in states with higher farm winery density. One interpretation may be that farm wineries directly influence their institutional environment through collective action. The results of such organizing efforts are likely to be more fruitful in states with large numbers of farm wineries. The inconsistent findings across the negative binomial and standardized OLS regression models, however, suggest that this interpretation should be treated with great caution.

7 I am indebted to a reviewer for suggesting this supplementary analysis.
DISCUSSION

In this study, I examined several possible factors that could singly or in some combination account for the proliferation of specialist organizations in an existing organizational population. These include density dependence in founding rates, niche formation through changes in consumer preferences, resource partitioning, and direct institutional support. The analysis of founding rates of farm wineries over a 50-year period commencing shortly after the end of Prohibition suggests that all four processes influence the proliferation of farm wineries, specialist organizations in the American wine industry. The effect of form-specific density on the founding rate of farm wineries is consistent with the pattern predicted by Hannan’s (1986) model. Organizational founding rates first rise and then fall with increasing levels of form-specific density. Farm winery foundings are lower in states with higher numbers of mass-production wineries, suggesting competition between these two forms at the local level. The niche formation argument receives strong support. The creation of a new niche around the consumption of import-like varietal wines has a positive effect on the founding rate of farm wineries. Resource partitioning seems to affect the founding rate of farm wineries positively. Increasing concentration in the generalist mass-producer segment increases the founding rate of specialist organizations such as farm wineries. States that offer a supportive institutional environment experience higher farm winery founding rates. These local factors seem to be more important in determining state-level founding rates of farm wineries than external stimuli such as an increase in farm winery population mass, out-of-state farm winery density, or out-of-state mass-production winery density, which show little impact.

I also examined the relative importance of the four causal factors on both the level and dispersion of farm winery foundings. Founding rate multipliers suggest that, on average, density dependence has the strongest effect on the level of farm winery foundings, followed by resource partitioning, institutional support, and niche formation. These results are striking in view of Delacroix and Solt’s (1988) analysis that proposed niche formation as the primary driver of California winery foundings. Standardized OLS regression results show that density dependence explains most of the dispersion in farm winery foundings. The effects of density are followed by that of niche formation, institutional support, and resource partitioning, in order of the importance to dispersion. This study contributes to our understanding of industry evolution in two ways. First, it estimates the relative influence of various ecological factors that have been found to affect organizational founding rates. I found, for example, that though organizational density has the strongest effect on the founding rate of specialist organizations such as farm wineries, the effects of niche formation, resource partitioning, and the institutional environment are substantial. The effects of niche formation and the institutional environment suggest that the proliferation of specialist organizations is not driven purely by factors such as density dependence and resource partitioning that are endogenous.
Specialist Organizations

to the population. Both niche formation and changes in the institutional environment are likely to affect the carrying capacity of an organizational population. The powerful impact of these two factors on the proliferation of specialist organizations in the American wine industry highlights the importance of identifying factors exogenous to an organizational population that affect the carrying capacity for that population.

Second, the study contributes to previous research on small-firm entry that does not distinguish adequately between different kinds of entrants. Such studies often use highly aggregated industry-level panel data over short periods of time and rely on cross-sectional regression methods to model the effects on entry rates of industry characteristics such as entry barriers that reflect sunk costs, industry growth and profitability, and technological innovation (Geroski and Schwalbach, 1991). Though some studies distinguish entrants to the extent that they reflect new plants or branch expansions by incumbent firms or diversifying firms, the bulk of this research focuses on net entry, the change in the number of firms in an industry over a given period (Dunne, Roberts, and Samuelson, 1988). These studies are likely to underestimate entry, because the data exclude firms that were founded during the period of study but failed to survive until the end of the observation period. More recent research corrects for these deficiencies by measuring gross entry, the total number of entrants into a given industry, and distinguishing different types of entrants by size, measured in terms of total employment (e.g., Acs and Audretsch, 1989). Despite the superior quality of Acs and Audretsch's data, the analysis of entry rates reduces what is clearly a dynamic process into a static one—the entry rate is modeled as a function of covariates measured at the beginning of (or averaged over) the observation period. Moreover, the definition of small firms in terms of number of employees does not take into account interindustry variation along this dimension. Within this stream of research in industrial organization economics, there is increasing recognition of the need to study industry entry as a dynamic process that operates over long periods of time, a process that involves heterogeneity in entrant firms (Mueller, 1991: 15).

Though this study suffers from the limitations inherent in an industry case study, by focusing on the entry of specialist organizations over a 50-year period in a specific industry, it advances our comprehension of the entry of small firms into industries. It shows that organizational form is likely a better indicator of heterogeneity among industry entrants than the employment level of an organization. A variant of this research strategy would be to treat specialism as a continuous variable based on organizational niche characteristics and to model the entry of firms as a function of organizational niche overlap (Baum and Singh, 1994). The research reported here can be extended in at least three different directions. These include establishing the generality of niche formation in mature organizational populations, examining whether resource partitioning is a cyclical process, and investigating the plausibility of asymmetric

676/ASQ, December 1995
effects of the selection environment on founding and mortality processes.

The evolution of specialist organizational forms in the wine industry exhibits remarkable similarity to the later evolution of specialist forms in the brewing industry. In particular, the niche formation process appears to be instrumental in the proliferation of both farm wineries in the wine industry and microbreweries and brewpubs in the brewing industry. In the wine industry, higher levels of wine imports, an indicator of niche formation, are associated with a higher founding rate. Research on the effects of niche formation in other mature organizational populations would help in establishing the pervasiveness of this phenomenon.

Punctuated models of industry evolution suggest that resource partitioning is a continuous cyclical process. High levels of industry concentration in mature industries often reflect the success of dominant mass-production firms at producing low-cost standardized products. But in direct opposition to this trend toward standardization is another trend toward differentiation. There is some evidence to support such a cyclical process. Kamien and Schwartz (1982: 70–75) reviewed studies that, taken together, suggest that technological innovation and market structure influence each other in an iterative process. More recently, Anderson and Tushman (1990) proposed a cyclical model of technological change in which the emergence of a dominant design sets the stage for an era of incremental change that is abruptly followed by the next technological discontinuity. In examining the sources of dominant designs in four industries—cement, container glass, flat glass, and minicomputers—they found that, on average, new entrants are more likely to introduce designs that destroy the technological competence of incumbent firms. While Anderson and Tushman focused on technological evolution, this study addresses the evolution of market niches within an industry and the organizational forms that occupy these niches. In this study, the emergence of a dominant organizational form sets the stage for a discontinuity in product markets, a discontinuity that is often introduced through the entry of organizations with specialist forms.

A relatively recent trend in the wine industry is the proliferation of microwineries, a new specialist organizational form that is much smaller in size than the farm winery (Fisher, 1993). Microwineries produce less than 2,000 cases a year, in contrast to farm wineries, which can produce as many as 40,000 cases a year. My data indicate that of the 1,093 farm wineries alive at the end of 1990, 330 were microwineries. All but four of these microwineries were founded after 1970. A thorough examination of a cyclical model of resource partitioning would require data on market concentration in the farm winery segment of the industry and a time series of microwinery founding counts that is long enough to allow for statistical analysis. I plan to continue collecting such data so that I can examine this proposition in the future.

Though the conclusions drawn here are based on findings from the wine industry, they are broadly generalizable to the
Specialist Organizations

proliferation of specialist organizations in mature industries that are characterized by high degrees of concentration. Similar structural conditions exist in industries such as newspapers, book publishing, music recording, retailing, life insurance agencies, computer application software, advertising, and managerial consulting. In fact, since the resource partitioning process is likely to have occurred at an earlier time in some of these organizational populations, studying them might provide added insight, particularly into the prevalence of a cyclical process of resource partitioning within the industry.

Finally, a complete treatment of the evolution of specialist organizations in mature industries requires analyses of both founding and mortality processes. Some empirical evidence suggests that environmental selection may affect the founding and mortality processes asymmetrically. Carroll and Wade’s (1991) study of density dependence in the evolution of the American brewing industry revealed that the founding process in that industry was largely influenced by local (in-state) density, whereas the mortality process was affected to a greater extent by nonlocal (out-of-state) density. Gauging the effect and the relative importance of ecological mechanisms such as those modeled in this study on both founding and mortality processes would help us understand better the complexity of industry evolution.

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## APPENDIX: Multiplier Effects for State-level Farm Winery Density

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<tr>
<th>State*</th>
<th>Multiplier (mean)</th>
<th>State</th>
<th>Multiplier (mean)</th>
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<td>Missouri</td>
<td>1.732</td>
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</tr>
</tbody>
</table>

* No farm wineries were located in Alaska, the District of Columbia, Nebraska, North Dakota, South Dakota, and Wyoming during the period of the study.
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