Strategic Management Journal, Vol. 18 (Summer Special Issue), 75–98 (1997)

OPPORTUNITY AND CONSTRAINT: ORGANIZATIONS' LEARNING FROM THE OPERATING AND COMPETITIVE EXPERIENCE OF INDUSTRIES

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Organizational learning is central to a number of strategic theories. Recent arguments, however, identify risks associated with learning from own experience in the form of overattention to the short term and local conditions. The experience of the industry may offer opportunities for organizational learning that the experience of the organization does not, because industry experience is more varied, and not tied to the path-dependent history of any one organization. We investigate the influence of own experience and of two types of industry experience on the failure rates of U.S. hotel chains. The two types of industry experience are operating experience, which is a discounted sum of the units operated by U.S. hotel chains in the history of the industry, and competitive experience, which is a discounted sum of the number of failures of U.S. hotel chains in the history of the industry. We find that (a) organizations initially benefit from their own experience, but are harmed in the long run, (b) generalist organizations are more weakly affected by their own experience than specialists, (c) organizations benefit from their industry's operating experience, accumulated both before and after the organization's entry, and (d) organizations benefit from their industry's competitive experience, but only after the organization's entry. © 1997 by John Wiley & Sons, Ltd.

INTRODUCTION

Organizations' learning from their own experience has been argued to be a source of production efficiencies and, through improved efficiency, a source of sustainable competitive advantage (Yelle, 1979; Henderson, 1979). There are also arguments, however, that learning from own experience can constrain the organization by leading it into competency traps, where it focuses on perfecting routines that are invariably made antiquated by the changing world (March, 1991; Levinthal and March, 1993; Simon, 1993). The argument that own experience improves efficiency is strongly supported by empirical evidence (Yelle, 1979) but these results are not inconsistent with the idea that while efficiency at a set of routines improves, overall organizational effectiveness can decrease because the organization does not adjust to new demands (Baum and Ingram, 1995). The relationship between learning from own experience and the organization's capacity to compete in a changing environment remains uncertain.

Key words: organizational learning; population learning; organizational failure; franchising
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CCC 0143–2095/97/S10075–24 $17.50

Adding to the richness surrounding the relationship between organizational learning and competitiveness, interest has recently increased in the possibility that organizations also learn from the experience of others (Miner and Haunschild, 1995; Darr, Argote, and Epple, 1995; Baum and Ingram, 1995). Evidence on the importance of learning from others is not extensive (Foster and Rosenzweig, 1995). Even if organizations do learn from their industries, the implication of industry learning for the relative competitiveness of organizations is in contention. Barney (1986) has argued that information external to the organization is unlikely to be a source of competitive advantage because it is generally available to all competitors while Cyert, Kumar, and Williams (1993) point out that some organizations are better at processing information than others, and may therefore gain competitive advantage from information that is generally available. Cohen and Levinthal (1990) introduce the concept of absorptive capacity to explain organizations' differential learning capabilities.

In this paper we investigate the relationship of own experience and two types of industry experience on the risk of organizational failure. We study the influence of own and industry experience on U.S. hotel chains from 1896 to 1985. Chains appear to have both advantages and disadvantages for learning from experience. Their multiunit nature may facilitate experiments to generate information on consumer preferences. The same multiunit nature may also make it difficult to accumulate experience and apply it across units, particularly if the chain operates over a broad geographic area. Our comprehensive data covering the complete history of this industry allow us to operationalize industry experience accurately because we do not omit industry experience that accumulated before the beginning of our observation period. Further, the length of time covered by our data makes it possible for us to test the idea that organizations' learning from industry experience is affected by the point in the industry's history at which the organization enters. Operating experience for hotel chains (at both the organizational and industry level) is a discounted sum of the number of units (hotels or motels) operated in the past. We represent the competitive experience of the industry as a discounted sum of the number of hotel chain failures in the past, which captures an outcome that informs organizations about competitive relationships.

To anticipate our conclusions, we find support for the idea that organizations benefit from small amounts, but are harmed by large amounts of their own operating experience. We also find that influence of own experience is weaker for generalists than it is for specialists. Results also show that organizations benefit from both the industry's operating experience and the industry's competitive experience, and that they benefit from the industry's operating experience before their entry. Additionally, we examine the effects of franchisors on learning, and find that they are superior learners to chains, but the industry experience of franchisors has a mixed effect on other chains.

The consideration here of both operating and competitive experience is unique in the learning literature, but facilitates the application of organizational learning to strategic problems. As we explain in the next section, different types of experience contribute to learning for different elements of organizational performance. Most studies of organizational learning, and the few past studies of interorganizational learning, have operationalized experience as historical operations, corresponding to our operating experience. Operating experience can lead to improvements in internal efficiency and in the accuracy of the organization's understanding of consumers' preferences. Success for organizations, however, also requires effective interactions with competitors. We use competitive experience to test the idea that organizations may become more adept competitors by observing the competitive outcomes of other organizations. The strategic demands on the organization can be divided into internal and external categories (Saloner, 1994). Operational and competitive experience corresponds to the internal/external differentiation of strategic demands, and together contribute to satisfying all the strategic demands faced by the organization.

LEARNING FROM OPERATING AND COMPETITIVE EXPERIENCE

Two appropriate approaches for studying learning by doing and learning from others are to measure 'changes in productivity, or the rewards to productivity, that accrue from experience' (Foster

and Rosenzweig, 1995: 1177). The extensive learning curve literature on learning from own experience takes the first approach. Learning from industry experience has also been studied by measuring changing productivity (Irwin and Klenow, 1994; Darr *et al.*, 1995). That approach is generally less suited for strategic research because, as the argument that own experience leads to constraint contends, an organization's relative competitiveness may decrease even as efficiency at a given set of production routines increases; i.e., the organization suffers a competency trap. For this reason, we use a dependent variable, the risk of failure, that is a measure of the organization's long-term performance (Mitchell, Shaver, and Yeung, 1994), not just its cost of producing one product. If an organization falls into a competency trap, it will be reflected as an increase in its risk of failure, while a learning curve analysis would show continuing reductions in production cost for the product that the organization is fixated on.

Relative to other measures of organizational performance, failure has advantages such as objectivity, and disadvantages such as an uncertain link to stakeholder welfare (Mitchell *et al.*, 1994). For studying the influence of industry experience, the risk of failure may often be the only reasonable option because financial measures of performance are seldom available for all organizations in an industry over extended periods of the industry's history.[1] For U.S. hotel chains, alternative measures of performance are not available for the period we study. Our arguments about learning, however, should apply equally to alternative measures of organizational performance, and we would welcome tests in other contexts where alternative measures of performance are available.

We begin consideration of the relationship between experience and failure with own operating experience, examining the idea that it generates short-term advantage but long-term constraint. We also argue that generalist organizations should be more weakly affected by their own experience than specialist organizations. For industry experience, we discuss how organizations can benefit from both operating experience and competitive experience. The final part of the theoretical argument addresses the possibility that organizations may benefit from industry experience before their entry.

Own operating experience

There is substantial evidence that organizations become more efficient at doing something by repeatedly doing it. The learning curve for operations has been demonstrated in many manufacturing organizations (Yelle, 1979) and also in service organizations (Darr *et al.*, 1995). We will represent the level of operations of a hotel chain by the number of units it has operated in the past. Evidence from the learning curve literature suggests that a chain that has operated 100 units for 10 years should be more efficient than a chain that has operated 50 units for 5 years, which in turn should be more efficient than a new chain at providing service to patrons, hiring, training and scheduling employees, purchasing, and the other activities that account for the internal efficiency of the chain.

Cyert *et al.* (1993) point out that operating experience also contributes to the external capability of the organization. External capability in this instance refers to the organization's model of its markets, which contributes critically to effective strategizing and success (Cyert *et al.*, 1993; Simon, 1993; Sinkula, 1994). In the model presented by Cyert *et al.* (1993) what organizations seek to learn about their environment is the consumers' preference profile. Essentially, what do consumers want? Organizations start with a model of the preference profile, and using a Bayesian updating process improve on the model as their experience increases. Operating experience, when it involves interactions with consumers, provides feedback to the organization about the accuracy of its model of the consumers' preference profile. By operating a unit for a year, a hotel chain can observe consumers' response to its location, price, architecture, advertising, reservation cancellation policy, and anything else that may be part of the consumers' multidimensional preference profile for hotels. In fact, hotel chains should be particularly good at learning what consumers want from operating experience because their multiunit nature makes it pos-

[1] In certain industries performance data are available for all or most organizations. For example, Barnett, Greve, and Park (1994) use performance data in their study of learning from among Illinois bank branches. Their performance data, however, cover only 6 years, which would be a short period for a study of learning from industry experience.

sible to conduct controlled experiments (although experiments are not necessary for learning). For example, a hotel chain could vary price in two similar units to learn about consumers' price elasticities.

Despite the opportunities it presents for learning, own operating experience is not an unmixed blessing for the organization. The problem is that organizations can become constrained by their own experience (March, 1991; Levinthal and March, 1993). All organizations must allocate energy between the exploration of new routines and the exploitation of old ones (March, 1991). Typically, short-run rewards of exploitation drive out exploration since each increase in competence at an activity increases the likelihood of obtaining rewards for engaging in that activity, while returns from exploration are less certain. Given initial success at applying a routine, organizations are likely to continue applying it because they know how to, and because it is less risky than exploring alternatives. Even if the expected value of exploration were higher than that of exploitation, exploitation might still be preferred because of the risk of exploration (Kahneman and Tversky, 1975). Over time, this self-reinforcing bias toward exploitation of current routines purges variation in organizational routines and impairs the capacity for exploratory learning (Daft and Weick, 1984; March, 1991; Levinthal and March, 1993).

There are short-term benefits of this pattern of learning as evidenced by numerous learning curve studies that indicate that efficiency at a task increases with experience (Yelle, 1979). In the long term, however, the bias to exploitation can be costly. Levinthal and March argue that organizations' own experience can lead to myopia: 'The effectiveness of learning in the short-run and in the near neighborhood of current experience interferes with learning in the long run and at a distance' (1993: 97). If the demands placed on the organization change, its past investments in a given set of routines can be rendered obsolete, and the lack of exploitation that results from focus on those routines can inhibit its ability to adapt to new demands and result in the failure of the organization (Levinthal and March, 1993; Simon, 1993).

So, while we accept that efficiency at a given task increases with experience, we expect that the effect of experience on an overall measure of organizational effectiveness such as the rate of failure will be nonmonotonic. Initially, we expect the rate of failure to decrease with experience as the organization moves down the learning curve for its favored set of routines. Eventually, we expect that experience will cause the organization to become less able to change and, as the demands of the environment change (as they do over time), more likely to fail. Supporting this argument, Baum and Ingram (1995) found that the failure rate of Manhattan hotels first fell, then increased with increases in their own operating experience.

Hypothesis 1: The relationship between an organization's own operating experience and its rate of failure will be U-shaped.

We operationalize the OWN OPERATING EXPERIENCE of hotel chain i as:

$$= \sum_{t_i\,found}^{t-1} \frac{\mathrm{OE}_{it}}{Discount} \qquad (1)$$

where $t_{i\,found}$ is the first year of chain i's existence, $t-1$ is the year before the current year, OE_{it} is the number of units operated by chain i in year t, and *Discount*, which we apply to all experience variables and describe in detail below, is one of four weights that depreciate values of OE_{it} over time to account for possible antiquation (due to environmental change) or decay (due to forgetting) of knowledge gained from organizational operating experiences in the past (Argote, Beckman, and Epple, 1990). To test for a U-shaped influence of OWN OPERATING EXPERIENCE we also include OWN OPERATING EXPERIENCE^2 in models.

Examples of learning from operating experience among hotel chains are so many that it is impossible to determine which are most important. At the most practical level, there are thousands of details about operating hotels that have been discovered through experience. A small sample of these, from an October, 1939 article of the *Hotel Monthly*, include tips for reducing employee turnover, efficient usage of guest soap, minimizing insurance costs, limiting the expense of repairing damaged wallpaper, and a recipe for home-made furniture polish (Hotel Monthly, 1939a). Hotel chains can also learn about the process of managing multiple units. For example,

internal control methods developed largely from the experience of hotel chains in the first half of this century were important for the development of chains. These methods include the application of technology such as record-keeping machines, and the use of monitoring procedures, which reduce the risk of employee malfeasance (Podd, 1950). Chains also learned human resource management practices appropriate for their organizational form, such as Milner Hotels' practice of rotating managers between hotels (Kerley, 1949). Finally, as we have noted, the experience of operating hotels can lead to an understanding of consumer preferences. Consumer preferences in the hotel industry include architecture, furnishing, promotion, style of service, and pricing structures.

Hotel chain executives recognized that operating multiple hotels was a means to learning operating knowledge, as evidenced by the observation of the president of the American Hotels Corporation: 'The mistakes developing in one hotel, through cooperation can be prevented in all the others. The success achieved by one can likewise be passed on to the others' (*Hotel Redbook*, 1937: 513). Conrad Hilton gives examples of how other units of a chain can benefit from the operating experience of a chain. In his first hotel, he learned 'two principles that have been basic in every one of [his] subsequent operations from Waco to Istanbul' (1957: 113). The two principles were to minimize waste space in hotels, and to generate *esprit de corps* among employees. The diffusion of the principle of minimizing space from Hilton's humble first hotel to the marquee hotel in his chain is demonstrated by Hilton's decision, years later, to build profitable jewelry showcases into decorative pillas that had been taking up space in the Waldorf Astoria. A similar story about operating experience benefitting a chain comes from the Marriott chain. In the early years of that chain (while it still consisted of drive-in restaurants) a unit manager's effort to minimize costs resulted in a practice of closely monitoring gas and electric meters and demanding justifications for high energy usage. The manager was rewarded with the largest bonus in the chain, and 'the next year, every manager checked the meters every week' (O'Brien, 1990: 167).

Heterogeneity in the influence of own operating experience

Barnett, Greve, and Park (1994) argue that not all organizations will be affected to the same extent by their experience, particularly that generalists should be less affected than specialists. They argue that generalist organizations are buffered from competitive pressures by their structures, and are therefore less likely to pursue opportunities for learning. Specialists are dependent on success in their core activities for survival, and should be more motivated to learn from their experience. In a study of performance of Illinois banks, they found that specialists had higher returns on average assets (ROAA) as a function of experience, while generalists had no increase in ROAA as a function of experience.

Additionally, generalists may have difficulty learning from their own experience because their structures inhibit learning. Interaction between the learning efforts of subunits increases noise and can complicate learning (Levinthal and March, 1993). If the generalist has separate business units satisfying different markets, the experience of one unit may not be transferable to others. Moreover, generalists' diversity of experience may lower their capacity to determine whether and where the experience of each component is applicable, limiting possibilities for integrating complex technical, administrative, and strategic knowledge successfully into the organization's activities (Cohen and Levinthal, 1990).

For hotel chains, experience in one geographic market may not transfer well to another market where demands are different. In the hotel industry, strategies and operating procedures that are successful in one geographic area are often very different from those that succeed in another area. Baum and Ingram (1995) found that Manhattan hotels learned less from the experience of their chains' hotels outside Manhattan than from the experience of their chains' hotels inside Manhattan. So, hotel chains that cover many geographic markets might be seen as aggregations of differentiated specialists that learn individually to succeed in their local markets, but are unable to successfully transfer knowledge to each other because they face different market demands.[2]

[2] We are grateful to an anonymous reviewer for pointing this out.

Further, for an organization such as a hotel chain where markets are defined largely by geography, generalism typically involves operating across a large physical area. Such physical dispersion may present practical problems to learning from experience within the organization.

In summary, geographic generalists have greater challenges to learning, and may benefit less from a given amount of experience than geographic specialists. Geographic generalists have heterogeneous inputs to the learning process, and their units have heterogeneous learning needs. This creates a challenging matching problem because geographic generalists must diffuse the right information to each different unit, and avoid diffusing the wrong information. Compounding the challenge to learning for geographic generalists are the complexities presented by physical distance between units. Additionally, even if geographic generalists were not less effective learners, we would expect weaker effects of organizational experience for geographic generalists because not all of their experience is applicable to their whole organizations. For these reasons, we expect the influence of own experience to be weaker for geographic generalists than for geographic specialists.

Hypothesis 2: The influence of own experience on failure will be weaker for geographic generalists than for geographic specialists.

We operationalize geographic generalism as the number of the nine census regions that the chain operates in. There is substantial geographic variance in the U.S. hotel industry. Typically, there is a difference of 15–20 per cent between the highest and lowest occupancy rate among geographic markets in any year (Levinthal and Horwath, 1978). Thus, by operating in many geographic areas, chains can diversify the risk associated with any one geographic market, but at the cost of facing more diverse contexts and operating more diverse strategies. Consistent with the idea that geographic generalists contain sets of hotels that specialize in different markets, the internal variation of the chain's units is greater for geographic generalists. The evidence of this is a positive correlation (0.17) between the number of census regions and the standard deviation of the sizes of the chain's hotels. The standard deviation of the sizes of the chain's hotels could be an alternative measure of generalism except that it is systematically missing for large parts of our data. We interact ORGANIZATIONAL EXPERIENCE and ORGANIZATIONAL EXPERIENCE^2 with the number of census regions to see if own operating experience has a weaker influence on geographic generalists.

Industry operating experience

Organizations' own experience is not the only opportunity for learning. Organizations may also learn vicariously from the experience of others in their industry. In this section we focus on experience the focal organization observes during its life (i.e., experience since the focal organization's founding). It is also possible that industry experience before the focal organization is founded matters, but we see such *congenital learning* (Huber, 1991) as different from vicarious learning and consider it separately later in the paper.

Industry experience may improve both internal and external efficiency of the focal organization. The operating experience of other organizations in the industry may contribute to internal efficiency in a similar way to own operating experience. A chain may be able to use other chains' operating experience to improve its efficiency at providing service and managing employees and assets. By observing the internal operations of other chains, reading about them in trade journals, listening to lectures about them, or by hiring the employees of other chains, a chain can gain ideas about how to efficiently manage its operations.

The contribution of industry operating experience to the chain's external capabilities, however, is probably more important. Industry operating experience provides additional evidence about the consumers' preferences. Just as a chain can observe consumers' responses to one of its own units, it can observe (perhaps less accurately) consumers' responses to another chain's unit. Every unit operated by the hotel chain industry provides information about consumers' preferences. For example, in the 1920s hotels were slow to recognize the market opportunity presented by auto travelers, and failed to make necessary changes such as providing garage space and making it possible for guests to register without walking through a formal lobby in dirty road clothes

(Belasco, 1979). When one or a few hotels tried these things they were very successful, allowing other hotels that observed that success to realize that consumers wanted more conveniences for auto travelers than were being offered.

Industry experience has some advantages over own experience for learning consumers' preferences (Sinkula, 1994). The market for anything is complicated. Any one organization, even a chain with a promising structure for learning, is limited in how much it can learn about consumers' preferences from its own experience. The constraint on learning about consumers' preferences is not just the organization's size, but also limits on how much variance the organization's internal systems can handle, and external constituents will accept (Hannan and Freeman, 1984). Since any one chain is limited in size, and constrained in the amount of internal variation it can afford, there are only so many different products and prices it can offer to learn consumers' preferences. Unlike an organization, an industry can cover a great deal of preference space without violating internal or external standards of consistency and reliability. Further, industries can be a source of fresh experience for organizations that have fallen into competency traps. As Miner and Haunschild (1995) observe, industries can be expected to engage in exploration, even while the organizations within them engage in exploitation of old routines. Industries are less hierarchical and cohesive than organizations, and therefore more varied in their experience than individual organizations. So, 'the best strategy for any individual organization is often to emphasize the exploitation of successful explorations of others' (Levinthal and March, 1993: 104). With this approach, an organization can potentially learn the multiplicity of strategies, administrative practices, and technologies employed by other successful organizations in their industry.

Past empirical evidence on the performance consequences of vicarious learning from the operating experience of other organizations is mixed. Learning curve studies of the influence of others' experience on production costs can capture the internal efficiency element of vicarious learning. Darr *et al.* (1995) found that pizza stores enjoyed lower costs of production as a function of the operating experience of other pizza stores, but the benefit was only from the experience of related other pizza stores, not from every pizza store in the industry. Irwin and Klenow (1994), however, did find evidence of vicarious learning in a learning curve study of the costs of production in the worldwide semiconductor industry. There is also a large literature on knowledge spillovers in research and development, including many studies at the level of industries and some at the level of organizations, that supports the conclusion that research productivity increases with the stock of existing knowledge (Griliches, 1992; Henderson and Cockburn, 1996). To capture the external component of learning about consumers' preferences from the experience of others, a more comprehensive measure of performance than production costs or research productivity is required as the dependent variable. Baum and Ingram (1995) found that Manhattan hotels had lower failure rates as a function of the operating experience of Manhattan hotels that were related to them through being components of the same chain, but the experience of unrelated hotels had no influence. Also relevant is Foster and Rosenzweig's (1995) finding that Indian farms' profitability using high-yield seed varieties increased with their neighbor's experience with the varieties.

It is a tendency for past studies of vicarious interorganizational learning to find only evidence of learning from related organizations, but such studies are few, and suffer two basic design flaws that may bias their findings. First, learning curve studies typically study only surviving organizations. This restricts the range on the dependent performance variable of interest and biases empirical estimates for the effects of industry-level learning on performance outcomes. Second, and more critical, past findings (except Baum and Ingram, 1995) are based on industry experience variables computed using incomplete industry histories, making it impossible to accurately compute and estimate the effects of industry experience on organizational performance. Given these significant limitations of past research, we think the likely idea that organizations benefit from the experience of other organizations in their industries merits further testing.

Hypothesis 3: An organization's failure rate will decrease with its industry's operating experience since the organization's entry.

We operationalize the INDUSTRY OPERATING EXPERIENCE SINCE ENTRY for organization *i* as:

$$= \sum_{t_{i\,entry}}^{t-1} \frac{M_t}{\text{Discount}} \qquad (2)$$

where $t_{i\,entry}$ is the first year of the organization i's existence, $t-1$ is the year before the current year, M_t is the mass (total number of units in all chains) of the industry during year t less the number of units of the focal chain, and *Discount* is the discount factor. Thus, the variable is a discounted accumulation of all the units other chains have operated during the focal chain's life.

In preliminary analysis, we investigated the possibility that learning from others is localized in the sense that it is easier from organizations that are close to the focal organization. This analysis was not exhaustive, but indicated that results for the effect of industry operating experience were similar whether the variable was operationalized based on the whole industry (Equation 2 above) or on the experience of chains operating in the same geographic regions as the focal chain. Assuming that this exploratory finding is correct, it may be because some of the important mechanisms for learning from the operating experience of this industry included journals and conventions, which are not restricted by geography. It may also be that since the competition of hotels is based on geographic proximity (Baum and Mezias, 1992; Ingram and Inman, 1996) hotel and hotel chain managers are more willing to share their experience with other organizations that are farther away, reasoning that those organizations pose less of a competitive threat.

The mechanisms for learning from the operating experience of the hotel chain industry were both direct and indirect. A principal direct method was simply to tour the hotels of competitors. This practice was widespread. Direct access to the experience of competitors could also come from hiring their employees, which was very feasible due to high levels of labor turnover in the hospitality industry. Indirectly, hotel journals contain a surprising amount of detail about the operating experience of hotels and chains. A representative example is the article in the February 1939 issue of *Hotel Monthly* which detailed the accounting system of the Boss Hotels Chain (*Hotel Monthly*, 1939b). A chain president's admission that these mechanisms are used for learning from industry experience comes in an interview with Edward Boss that appeared in *Hotel Monthly*: 'A good thing observed in a competitor's house, in the pages of the Hotel Monthly, or in the dealer's showroom is tucked away in his inner mind to be brought forth when needed' (1938: 20).

Industry competitive experience

It is useful to differentiate experience that informs competitive relations from operating experience. Operating experience may improve internal efficiency as well as the organization's model of consumer preferences, but when results are dependent on the actions of competitors it is not enough to have internal efficiency and a good model of consumer preferences. The organization also needs a model of competitors. Operating experience can generate part of what is necessary for an adequate model of competitors by locating them in multidimensional attribute space. With the same effort used to collect information about consumers' responses to products offered in the industry, the organization learns what products are offered by competitors. In other words, strategists can identify a competitor's niche by observing their operations (White, 1981).

Other parts of an adequate model of competitors cannot come from observing their operations. With competition, the organization's success is interdependent with other organizations' competitive moves. Activities such as commitment to a market position, signaling and reputation reflect these interdependencies (Saloner, 1994). How should a competitor's moves be interpreted? How will the competitor respond to the organization's moves? What will it take to drive the competitor from a market position or cause it to fail? To answer these questions it is necessary to observe competitive outcomes.

We are aware of no research that examines industry competitive experience, but there are at least two studies that operationalize own competitive experience. Barnett *et al.* (1994) consider the average number of competitors a retail bank has faced in its past and Miller and Chen (1994) count the number of competitive moves an airline made in the previous year. While we believe the number of past competitors and the number of competitive moves are reasonable ways to measure competitive experience, in this paper we use a different measure, the number of past failures in the industry. Past failures cannot be used as a measure of the organization's own competitive experience (since each organization fails only

once) but their use to measure industry competitive experience is promising for at least three reasons. First, organizational failures are usually salient and well-publicized events. Managers naturally attend to failures, and unlike other sources of industry experience, since the failing organization is no longer trying to protect a competitive future, the details of its experience are probably more accessible for other organizations. Second, failures are rich in exactly the information that matters for competitive strategy: what kills other organizations? By looking at the failed organization, other organizations can learn what not to do; by looking at the failed organization's successful rivals other organizations can learn what competitive moves are effective at driving others from the market. Third, unlike numbers of competitors and competitive moves, organizational failures are *outcomes* of competition. As Foster and Rosenzweig (1995) indicate, for organizations to actually learn from others (as opposed to merely mimic others) observation of outcomes is necessary.

At the level of the organization, Sitkin (1992) has argued that small failures can enhance long-term performance by facilitating learning. Miner *et al.* (1996) apply a similar argument to the industry level. As organizations fail, the industry has an opportunity to learn. Even organizations that break radically from standards of effective practice and quickly fail contribute to the experience of the industry. Indeed, since the failing organization disappears, it is only the industry that can learn from its experience. The people who participated in the failed organization facilitate the dissemination of its experience when they join other organizations in the industry, and failures are usually well reported in the business press.

Hypothesis 4: An organization's failure rate will decrease with its industry's competitive experience since the organization's entry.

We defined INDUSTRY COMPETITIVE EXPERIENCE SINCE ENTRY using Equation 2, but with the number of chain failures in year t as the numerator. In preliminary analysis not presented here, we operationalized the competitive experience variable by weighing past failures by their size, so more experience would be derived from the failure of a 20-unit chain than from the failure of a three-unit chain. Results with that operationalization were comparable to those we present below.

One mechanisms for learning from competitive experience in this industry is through employees of failed chains. Those individuals often continue in the industry, and bring with them direct experience from the failed chain. This type of learning probably contributed to one of the most spectacular success stories in the industry; Conrad Hilton operated a small chain that failed during the Depression, but later began again and went on to build one of the largest hotel chains in the world. Chains can also observe the decline and failure of rivals, and learn in that way. Learning from more distant failures can occur from accounts of failures in the hotel and popular press. In some cases, what is learned from a chain failure concerns how to manage a declining organization, and what business conditions and financing arrangements put a chain at risk (Hilton, 1957). In other cases, what is learned from failure concerns competition. Moves by competitors, such as the introduction of a pricing structure designed to appeal to business travelers, or renovation of some properties to increase the homogeneity of the chain, in the period leading up to the failure will be seen as causally related to the failure of a rival, and therefore effective competitive moves. Competitive moves by the failed chain in the period leading up to failure will be seen as ineffective.

Industry experience before entry

Huber (1991) points out that organizations are not founded as clean states with respect to knowledge. He refers to learning from experience before the organization was founded as congenital learning. Although the organization itself did not exist in the industry before its entry to observe industry experience, its initial participants probably did, and they will bring knowledge of the industry's experience to the fledgling organization. Further, industry experience may be stored in books, journal and newspaper articles, university courses, and other repositories where the new organization can access it.

Congenital learning may be critical to an organization's success if its subsequent learning depends on starting with a good model. The learning model presented by Cyert *et al.* (1993)

holds that organizations learn through a Bayesian updating process. With a Bayesian updating process, or with any optimization process that uses iterative evidence to update a model to be more accurate, the starting model can be a critical determinant of subsequent success. Cyert *et al.* (1993) argue that differences in the starting models held by organizations can result in sustained differences in performance. Huber (1991: 91) also identifies the importance of the starting model when he observes that 'what an organization knows at its birth will determine what it searches for, what it experiences, and how it interprets what it encounters.'

A different justification for the importance of congenital learning comes from the theory of structural inertia which contends that organizational change is difficult, risky, and infrequent (Hannan and Freeman, 1984). Incorporating the experience of the industry during the organization's lifetime requires that the organization change. There are costs and risks of organizational change because necessary internal activities of an organization are disrupted by change, and because external constituents of the organization have expectations that may not change just because the organization does (Hannan and Freeman, 1984; Amburgey, Kelly, and Barnett, 1993). Reflecting this, it has been argued that organizations will be most influenced by their environments at the time of their entry (Stinchcombe, 1965). In the context of learning, Argote *et al.* (1990) found that shipyards were more influenced by the productive experience of other shipyards at the time of their entry than at later points in their histories. Baum and Ingram (1995) found that Manhattan hotels had lower failure rates as a function of the experience of their industry (excluding related organizations) before their entry, but not after their entry. Mitchell *et al.* (1994) found evidence that foreign entrants into U.S. medical sector markets benefitted in the form of a lower failure rate from the experience of previous foreign entrants.

Both the idea that it is important to start with a good model and that organizations are inertial support the relevance of congenital learning. The level of industry experience at the time of entry may therefore result in a persistent influence on the failure rate. Starting with a good model should be important both for models of consumers' preferences and competitors, and inertia should apply to both operations and competitive action. Therefore, we predict that the levels of both industry operating experience and industry competitive experience before the organization enters will cause the organization to have a lower failure rate.

Hypothesis 5: An organization's failure rate will be lower as a function of the operating experience of its industry at the time of its entry.

Hypothesis 6: An organization's failure rate will be lower as a function of the competitive experience of its industry at the time of its entry.

We define INDUSTRY OPERATING EXPERIENCE AT ENTRY for organization i as

$$= \sum_{t_j\,found}^{t_i\,entry\,-\,1} \frac{M_t}{\text{Discount}} \qquad (3)$$

where $t_{j\,found}$ is the first year of the industry's experience, $t_{i\,entry\,-\,1}$ is the year before organization i's entry, and M_t and *Discount* are as in Equation 2. Similarly, we define INDUSTRY COMPETITIVE EXPERIENCE AT ENTRY using Equation 3, but substituting the number of failures in a year for the industry mass.

METHOD

Data description

The data represent the complete hotel chain industry in the United States from 1896 to 1985. There were only three hotel chains in 1896, so the data effectively cover the entire history of the industry, making possible the accurate calculation of industry experience variables. Chains are defined as any organization operating three or more hotels or motels, which is the definition the hospitality industry uses (*Directory of Hotel and Motel Systems*). In the period we study there were three main types of hospitality organizations that could be categorized as chains.[3] The largest

[3] A fourth type, referral systems, consisted of collections of independent hotels that cooperated in some ways, for example in operating a reservation system, to act like a chain. These

group were organizations that owned and operated three or more units (78 per cent of observations). Next were organizations that owned and operated three or more units, but at least one of the units was franchised (e.g., a Holiday Inn unit or a Ramada unit). These accounted for 18 per cent of the observations. Franchisors, the third group, may have operated some units, but franchised others to franchisee-operators (three per cent of observations).

In the main part of the analysis, we focus on the first two groups that owned and operated their units, but omit the smaller group—franchisors. Our rationale for this is that since franchisors do not operate their own units, they do not generate experience in the same way as other chains. Consistent with this, Darr *et al.* (1995) found no learning among the units of a pizza franchisor unless they were owned and operated by the same person. It is possible, however, that franchisors are superior learners because they are in the business of selling experience.[4] So, although franchisors are an idiosyncratic organizational form, and not reflected in the general claims about learning represented by our hypotheses, we think that the implications of franchisors for learning from own and industry experience deserve investigation. We will therefore present a brief analysis of the effect of franchisors on the learning of hotel chains following the tests of our hypotheses.

The primary source of our data was the *Directory of Hotel and Motel Systems*, which has been published by the American Hotel and Motel Association since 1931. This directory claims to list all hotel chains. There has never been a fee for inclusion in the directory. The secondary data source (and the primary source for 1896–1930) was the *Hotel Redbook*. This directory lists individual hotels. The extent of its coverage has varied over the century of its publication, being comprehensive up to the 1930s and growing increasingly more selective since then. For the period 1896–1930 we identified chains by reading all the advertisements in the *Redbook*, and scanning the listed owners of the hotels. After 1930 we used the *Redbook* to confirm listings and de-listings in the *Directory of Hotel and Motel Systems*. The number of chains operating in each year between 1896 and 1985 is shown in Figure 1. In all, the data include the life histories of 1135 chains, 705 of which fail during the observation period. After much reading of historical accounts and hospitality industry journals, we have not found evidence of a single chain that is not in the data set, so we are confident that the coverage of the data is very good. The data end in 1985 because of the practical considerations regarding the expense of data collection, but that ending date is convenient because conditions affecting the founding and failure of hotel chains appear to change after that point, with real-estate speculation resulting in accelerated rates of founding and failure.

Analysis of chain failure

We define chain failure as occurring when the chain ceases to operate at least three units. It is also possible for chains to leave the industry by merging or being absorbed by other chains. Mergers and absorptions, however, were rare in the history of this industry (there were 44 as opposed to 705 failures) so we treat them as right censored (Hannan and Freeman, 1988).

We modeled chain failure using $r(t)$, the instantaneous rate of failing. This hazard rate of failure is defined as the limiting probability of a failure between t and $t + \Delta t$, given that the chain was operating at t, calculated over Δt:

$$r(t) = \lim_{\Delta t \to 0} Pr \frac{(\text{failure } t, t + \Delta t \mid \text{operating at } t)}{\Delta t} \tag{4}$$

Parametric estimates of the hazard rate require assumptions about the effect of time (in these models, age) on failure. Three of our explanatory variables—own operating experience and the two variables representing industry experience during the organization's life—increase as the hotel chain ages, so we wanted to use a flexible parameterization of age, to allow us to see the change in the estimated effect of age on failure when these additional variables are included. Therefore, we used a piecewise exponential model which allows the rate of failure to vary in an uncon-

organizations were rare (less than 1% of chains) and highly unstable. Further, the ownership structure of referral systems suggests that if they learn, their pattern of learning can be expected to be different from that of chains that own all their units. Because of their scarcity and their unusual properties, we do not include referral systems in this analysis.

[4] We are grateful to an anonymous reviewer for pointing this out.

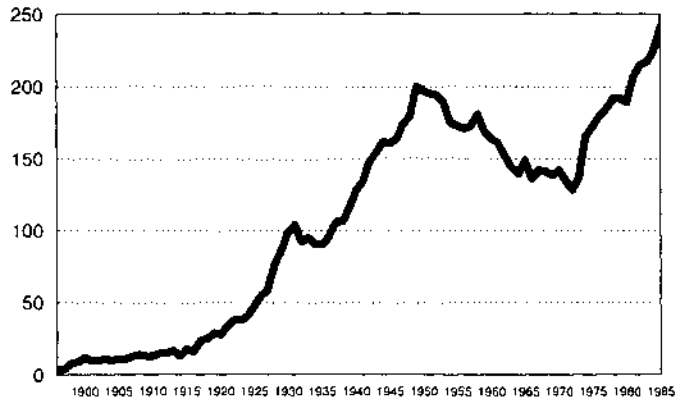

Figure 1. Number of hotel chains

strained way over preselected age ranges (Tuma and Hannan, 1984; Barron, West, and Hannan, 1994). In these models, the age range is divided at k points (a_1, a_2, . . ., a_k), which with $a_{k+1} = \infty$, creates k age periods; $I_l = \{t \mid a_l \leq t < a_{l+1}\}$, $l = 1$, . . .k. Constants (baseline failure rates) are estimated for each age period. Thus, the piecewise exponential model we estimate is of the form:

$$r(t) = e^{\beta X} e^{\alpha_l}, \text{ if } t \in I_l \qquad (5)$$

where X represents the vector of covariates, β the associated vector of coefficients and α_l is a constant coefficient associated with the lth age period. The life histories of each chain were broken into 1-year spells so time-varying covariates could be incorporated, yielding 10,998 spells. The reported results are maximum-likelihood estimates obtained using the statistical package TDA (Rohwer, 1993).

Discount factors for experience variables

Although there is evidence that experience becomes less valuable as it becomes older, there is no theoretical basis on which to predict *a priori* the functional form of the decay of experience (Argote *et al.*, 1990). It is necessary, however, to prespecify a functional form of experience decay before estimating models (e.g., Darr *et al.*, 1995; Henderson and Cockburn, 1996). We responded to the problem of choosing a functional form for experience decay as we did in two earlier papers that investigate the influence of experience on the failure rate of Manhattan hotels, by computing and analyzing four sets of experience variables using discounts based on the age of the experience (Baum and Ingram, 1995; Ingram and Baum, 1997). First, we set the discount equal to 1, which assumes no depreciation in the value of past experience. Second, we set the discount equal to the square root of the age of the experience, which assumes that depreciation of experience is initially slower than linear, and slows further with time. Third, we set the discount equal to the age of the experience, which assumes a linear depreciation in the value of prior experience. Finally, we set the discount equal to the age of the experience squared, which assumes that the value of past experience depreciates more rapidly than linear at first, and then accelerates further with time. We allow different discount rates for competitive experience and operating experience because we reasoned that the very different bases of those two types of experience might result in different rates of decay. For instance, it might be that organizational failures are less likely to be forgotten than operating outcomes of other organizations, resulting in slower decay for competitive experience than operating experience. In the models reported below, we use the age of the experience squared to discount operating experience, and the square root of the age of experience to discount competitive experience, which is consistent with the idea that operating experience will decay faster than competitive experience. Sensitivity analysis, however, indicated that our results are not dependent on the choice of these discount rates. Using any of the discount rates produces results comparable with those we report below, although some combinations of discount rates caused estimation problems.

Chain-characteristic control variables

To strengthen our tests, we included a number of variables to control for differences in the chains that may affect their risk of failure. AGE is the age in years of the chain. After some controversy, the most recent evidence indicates that the rate of organizational failure increases with the age of the organization (Barron *et al.*, 1994). However, there is still no agreement regarding why failure increases with age. Our argument regarding the tendency for own experience to be exploitive could account for findings that age increases failure. Own experience increases as the organization ages. To explore this possibility, we will compare estimated patterns of age dependence before and after our experience variables are entered into our models.

Size is almost always found to decrease the failure rate. Consistent with past findings that the effect of size on failure decreases as size increases, we use the natural log of the number of units in the year as the SIZE measure (Barron *et al.*, 1994). NAME CONCENTRATION is the percentage of units in the chain that have a name that identifies them with the chain. Ingram (1996) argued that giving units common names makes future outcomes for a chain contingent on current service to the customer, and is therefore a mechanism by which chains can make credible commitments to customers. CITY CONCENTRATION is the percentage of the chain's units that are in the city in which it is best represented, to control for the fact that it is easier to operate a chain that is geographically concentrated. REGIONS, as discussed, is a measure of geographic generalism. Finally, MOTEL CHAIN is a dichotomous variable coded one for chains whose units are mostly motels, to control for any difference in the failure rate of hotel and motel chains.

Industry-level control variables

There is a strong standard in models of organizational failure for measuring competition as a function of DENSITY, the number of organizations in the industry (Hannan and Carroll, 1992). The common finding is that the relationship between DENSITY and failure is U-shaped. The initial decrease in failure as density increases is attributed to the increasing legitimacy of the industry as it grows, and the subsequent increase in the failure rate is attributed to competition. We include DENSITY and DENSITY^2 to measure the relationship between the number of organizations in the industry and the failure rate. A related argument holds that organizational failure rates will be higher as a function of industry density at the time the organization entered the industry (Carroll and Hannan, 1989). The rationale for this is that organizations founded into dense environments will be forced into less attractive niches, and may lack crucial resources at the time of their entry. We include DENSITY AT ENTRY to test for this possibility. We also include the calendar YEAR as a control.

Table 1 shows basic statistics and a correlation matrix for the variables. Most of the correlations are below 0.5, but some are high. Such correlations are unlikely to bias estimates of coefficients but may inflate standard errors, causing our tests of hypotheses to be conservative (Kennedy, 1992). In response to the possibility of multicollinearity, our approach was to estimate a series of hierarchically nested models. This permits us to carefully examine coefficients and their standard errors for inflation across models and, should multicollinearity problems arise, permits us to test the significance of groups of variables in comparisons of nested regression models instead of relying only on significance tests for individual coefficients (Kmenta, 1971; 371). In a few cases variables were very highly correlated. DENSITY and DENSITY^2 had a correlation of 0.97, which is comparable to the correlation between those variables in other studies of organizational failure (e.g., Amburgey *et al.*, 1993; Baum and Mezias, 1992; Haveman, 1993). Not surprisingly, DENSITY AT ENTRY was highly correlated with INDUSTRY OPERATING EXPERIENCE AT ENTRY (0.97) and INDUSTRY COMPETITIVE EXPERIENCE AT ENTRY (0.90), and the latter two variables had a correlation of 0.95. There are theoretical reasons to believe that DENSITY AT ENTRY will increase the failure rate while the two variables representing industry experience at entry will decrease the failure rate, so we do not have the problem of attributing influences in the same direction to highly correlated variables. Further, to the extent that these variables were significant, they were significant in the predicted directions. We estimated models omitting one of the two highly correlated industry experience at entry variables, and the results were comparable to the results we report below.

Table 1. Means, standard deviations, and bivariate correlations for all study variables[a]

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1. Age	10.86	12.69	1.00																					
2. Failure	0.06	0.24	−0.04	1.00																				
3. Log(Size)	1.89	0.93	0.18	−0.14	1.00																			
4. Name Concentration	0.44	0.32	−0.12	−0.02	0.19	1.00																		
5. City Concentration	0.45	0.32	0.03	0.05	−0.49	−0.29	1.00																	
6. Regions	2.19	1.81	0.15	−0.08	0.80	0.25	−0.55	1.00																
7. Motel Chain	0.18	0.39	−0.18	−0.04	0.10	0.46	−0.22	0.04	1.00															
8. Franchisor	0.03	0.17	0.08	−0.04	0.57	0.28	−0.22	0.51	−0.08	1.00														
9. Density	147.4	42.98	0.04	−0.00	0.11	0.10	−0.13	0.10	0.16	0.03	1.00													
10. Density^2/1000	23.57	10.97	0.01	0.00	0.09	0.09	−0.12	0.09	0.15	0.02	0.97	1.00												
11. Density at Entry	142.1	75.63	−0.46	0.01	0.01	0.30	−0.14	0.03	0.38	0.03	0.58	0.57	1.00											
12. Calendar Year	64.76	19.21	0.09	−0.02	0.22	0.41	−0.20	0.21	0.43	0.15	0.63	0.56	0.74	1.00										
13. Organizational Experience	24.27	124.8	0.09	−0.04	0.58	0.18	−0.18	0.45	−0.02	0.54	0.04	0.04	0.02	0.11	1.00									
14. (Organizational Experience)^2/1000	16.17	249.2	0.05	−0.02	0.35	0.11	−0.09	0.24	−0.03	0.34	0.03	0.03	0.02	0.06	0.92	1.00								
15. Franchised Units	1.24	4.73	−0.10	−0.04	0.21	0.22	−0.20	0.22	0.27	−0.03	0.13	0.13	0.21	0.27	0.00	−0.02	1.00							
16. Franchisee Experience	1.45	5.97	−0.07	−0.03	0.21	0.21	−0.18	0.22	0.24	−0.02	0.13	0.14	0.17	0.26	0.01	−0.01	0.90	1.00						
17. Industry Operating Experience at Entry	1941.6	1327.8	−0.45	0.00	0.04	0.36	−0.16	0.05	0.44	0.04	0.54	0.53	0.97	0.77	0.02	0.02	0.25	0.21	1.00					
18. Industry Operating Experience Since Entry	2293.5	1515.8	0.26	−0.01	0.25	0.29	−0.16	0.22	0.27	0.16	0.56	0.56	0.40	0.73	0.14	0.08	0.23	0.31	0.42	1.00				
19. Industry Competitive Experience at Entry	77.97	53.42	−0.45	−0.00	0.10	0.46	−0.19	0.11	0.50	0.09	0.46	0.44	0.90	0.81	0.05	0.04	0.29	0.26	0.95	0.47	1.00			
20. Industry Competitive Experience Since Entry	46.84	37.66	0.80	−0.02	0.23	0.01	−0.02	0.20	−0.06	0.15	0.32	0.28	−0.10	0.42	0.14	0.07	0.00	0.06	−0.14	0.63	−0.13	1.00		
21. Franchise Operating Experience at Entry	1973.5	3332.6	−0.33	−0.03	0.06	0.39	−0.22	0.05	0.49	−0.03	0.36	0.39	0.73	0.63	−0.04	−0.03	0.32	0.27	0.82	0.39	0.78	−0.20	1.00	
22. Franchise Operating Experience Since Entry	2874.3	3892.5	0.09	−0.02	0.21	0.43	−0.18	0.20	0.40	0.15	0.34	0.34	0.46	0.74	0.09	0.03	0.31	0.36	0.53	0.87	0.61	0.39	0.58	1.00

[a] $N = 11{,}354$ yearly spells

RESULTS

Table 2 presents the results of the piecewise exponential models of chain failure. Model 1 is a basic model with the control variables. Model 2 adds the OWN OPERATING EXPERIENCE variables and interactions with REGIONS to test Hypotheses 1 and 2. It is a significant improvement over Model 1 ($\lambda^2_{4\,d.f.} = 48.42$, $p. < 0.01$). OWN OPERATING EXPERIENCE (-0.148, $p < 0.01$) and OWN OPERATING EXPERIENCE^2 /1000 (0.0021, $p < 0.01$) operate in the direction predicted by Hypothesis 1. The relationship between the organization's own experience and its failure rate is U-shaped. The interactions with REGIONS indicate that generalists are less affected by their experience, as predicted. Both are in the opposite directions of the corresponding OWN OPERATING EXPERIENCE effect.

We illustrate the relationship between OWN OPERATING EXPERIENCE and failure for chains with different degrees of geographic generalism in Figure 2. The *Y* axis of the figure is the multiplier of the rate, which is the influence of OWN OPERATING EXPERIENCE on the failure rate as determined by other covariates. The predicted U-shaped relationship between OWN OPERATING EXPERIENCE and failure is seen. As geographic generalism increases, the influence of experience on failure becomes muted. As the curve for chains in seven census regions demonstrates, for chains in seven, eight or nine census regions, the magnitude of the interaction terms overwhelm the main effects, causing the effect of OWN OPERATING EXPERIENCE on failure to be an inverted-U shape. We believe that this surprising result for high levels of geographic generalism is an artifact resulting from the relatively rare occurrence of chains operating in seven, eight or nine census regions. In our data, only 308 observations (2.8%) represent chains operating in more than six census regions. The modal number of regions for a chain was one, representing 5676 (51.6%) of observations. Those organizations could be considered geographic specialists.

An alternative operationalization of a chain's OWN OPERATING EXPERIENCE is the number of room-years the chain has operated in its history. This seems to us to be preferable to unit-years because a chain that operated three 1000-room hotels probably learns faster than a chain that operates three 75-room hotels. Unfortunately, our data sources only provide the number of rooms in the chain starting in the mid-1950s, so for much of our data rooms are unavailable. These missing data create left-censoring which is problematic for hazard models, but a brief discussion of results using rooms as the unit of experience is informative. The correlation between the number of units and the number of rooms in a chain is high (0.91), suggesting that only a limited amount of information is lost by using units to operationalize experience. To further investigate the effect of using units rather than rooms, we conducted additional analysis (not presented) where we reestimated our models on the 6760 observations for which room data were available, weighing the chain's experience calculated using Equation 1 above by the average size in rooms of the chain's units. This approach assumes that the chain's units were the same size in the past as they are currently, but it makes it possible to keep in the analysis chains for which we have room data for only some years. The model with the room-weighted experience did fit the data slightly better than the unit-experience model run on the same 6760 observations. However, the signs of the coefficients for the organizational experience variables, and their *t*-values, were comparable in the two models, indicating that our use of units to represent operating experience is reasonable.

Model 3 adds the variables to test for the influence of industry experience during the organization's life. It improves significantly over Model 2 ($\lambda^2_{2\,d.f.} = 48.88$, $p < 0.01$). As predicted by Hypothesis 3, INDUSTRY OPERATING EXPERIENCE SINCE ENTRY has a negative influence on failure (-0.0002, $p < 0.05$) and, as predicted by Hypothesis 4, INDUSTRY COMPETITIVE EXPERIENCE SINCE ENTRY also has a negative coefficient (-0.017, $p < 0.01$). Model 4 adds the variables to test the influence of industry experience at the time of the organization's entry, and improves over Model 3 ($X^2_{2\,d.f.} = 21.04$, $p < 0.01$). INDUSTRY OPERATING EXPERIENCE AT ENTRY decreases the failure rate as predicted by Hypothesis 5 (-0.0011, $p < 0.01$). INDUSTRY COMPETITIVE EXPERIENCE AT ENTRY is not significant.

A number of the control variables in the full model are also significant. As expected, larger chains had lower failure rates. Also as expected, chains that named more of their units the same had lower failure rates. Chains concentrated in a

Table 2. Piecewise exponential models of hotel chain failure

Variable	Model 1	2	3	4
Age 0–2 years	−0.864	−0.620	−1.635	−1.916
	(0.316)	(0.354)	(0.413)	(0.468)
Age 2–5 years	0.512	1.116	0.721	0.485
	(0.302)	(0.327)	(0.338)	(0.390)
Age 5–10 years	0.575	1.249	1.151	0.960
	(0.309)	(0.334)	(0.339)	(0.383)
Age 10–20 years	0.621	1.326	1.533	1.442
	(0.322)	(0.348)	(0.353)	(0.399)
Age 20–30 years	0.395	1.092	1.628	1.669
	(0.352)	(0.375)	(0.390)	(0.449)
Age 30–40 years	0.626	1.329	2.135	2.293
	(0.404)	(0.425)	(0.454)	(0.520)
Age > 40 years	1.321	2.056	3.085	3.315
	(0.450)	(0.468)	(0.506)	(0.600)
Log(Size)	−1.949**	−1.740**	−1.914**	−1.882**
	(0.122)	(0.186)	(0.183)	(0.182)
Name Concentration	−0.296*	−0.390*	−0.441**	−0.425**
	(0.172)	(0.174)	(0.173)	(0.174)
City Concentration	−0.639**	−0.785**	−0.804**	−0.788**
	(0.153)	(0.155)	(0.154)	(0.157)
Regions	0.131**	−0.078	−0.073	−0.057
	(0.054)	(0.067)	(0.067)	(0.067)
Motel Chain	−0.201	−0.239+	−0.327*	−0.297*
	(0.138)	(0.139)	(0.138)	(0.138)
Density	0.002	0.002	0.002	−0.016**
	(0.004)	(0.004)	(0.005)	(0.006)
Density^2/1000	0.000	0.000	0.000	0.0001**
	(0.000)	(0.000)	(0.000)	(0.0000)
Density at Entry	0.005**	0.005**	0.005**	0.018**
	(0.002)	(0.002)	(0.002)	(0.004)
Calendar Year	−0.011*	−0.009	−0.014*	0.029*
	(0.006)	(0.006)	(0.007)	(0.015)
Organizational experience		−0.148**	−0.112**	−0.107**
		(0.035)	(0.034)	(0.034)
(Organizational experience)^2/1000		0.0021**	0.0017**	0.0017**
		(0.0004)	(0.0004)	(0.0004)
Organizational experience * Regions		0.024**	0.021**	0.020**
		(0.005)	(0.005)	(0.005)
(Organizational experience)^2/1000 * Regions		−0.0003**	−0.0002**	−0.0002**
		(0.0001)	(0.0001)	(0.0001)
Industry Operating Experience at Entry				−0.0011**
				(0.0003)
Industry Operating Experience Since Entry			−0.0002*	−0.0002*
			(0.0001)	(0.0001)
Industry Competitive Experience at Entry				0.0064
				(0.0046)
Industry Competitive Experience Since Entry			−0.017**	−0.025**
			(0.003)	(0.004)
Log-Likelihood	−2373.12	−2348.91	−2324.47	−2313.95

** $p < 0.01$; * $p < 0.05$; standard errors in parentheses. One-tailed tests are used where predictions are made. Estimates of significance are not shown for age dummies since we are not testing the hypotheses that these coefficients are different from zero. The sample included 10,998 yearly spells and 705 hotel chain failures.

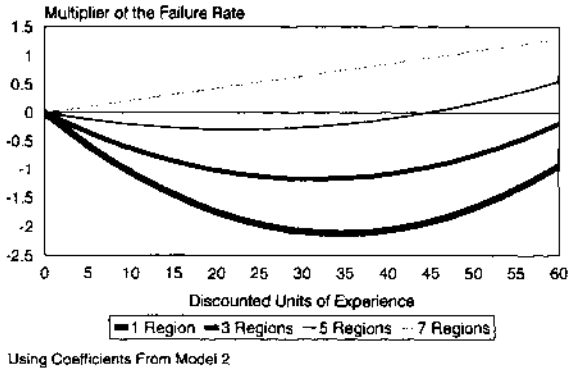

Figure 2. Effect of own experience on failure considering generalism

single city had lower failure rates, as did chains made up primarily of motels as opposed to hotels. Chains founded into environments with higher numbers of chains had higher failure rates. DENSITY had the predicted U-shaped effect on failure in the full model.

Franchisors and learning

There are three possibilities regarding franchisors and learning. First, franchisors may experience different learning from their own experience than other organizations. Second, franchisees may enjoy an additional learning benefit through their connection with franchisors. Third, the experience of franchisors may affect unrelated organizations as a type of industry experience. Table 3 shows models that investigate these three possibilities. The models include all the organizations used in the previous four models, and franchisors. With the addition of franchisors, the data represent 11,354 1-year spells, and 708 chain failures. The base model with franchisors, Model 5, includes the variables from Model 4 and a dummy variable to identify franchisors, and all results are comparable between Models 4 and 5.

Learning of franchisors

The learning of franchisors could be inhibited because some of the units are operated by franchisees, causing difficulties integrating the experience of individual units. It may also be, however, that franchisors are superior learners. The potential advantage of franchisors for learning can be seen in terms of absorptive capacity, which is the term offered by Cohen and Levinthal (1990) to describe the differential preparedness of organizations to learn. Cohen and Levinthal (1990) argue that organizations that invest in research and development will be more able to learn from industry experience because they are more likely to have prior knowledge that facilitates the integration of new information. The type of scientific research engaged in by the organizations studied by Cohen and Levinthal is much less common (but not completely absent) in service organizations such as hotel chains. Chains can, however, prepare themselves to integrate information in other ways. Franchisors sell operating knowledge to franchisees, suggesting the need to attend more explicitly to analyzing and recording operating experience. The systems franchisors establish for this purpose should have the effect of improving learning. Model 6 includes an interaction between the FRANCHISOR dummy and ORGANIZATIONAL EXPERIENCE. Model 6 improves over Model 5 ($X^2_{\text{1 d.f.}} = 8.50$, $p < 0.01$) and the interaction is significant and negative (−0.047, $p < 0.01$), indicating that franchisors do benefit more from their experience than other types of chains (we tested for and did not find evidence of a nonmonotonic effect of this interaction). This supports the argument that franchisors are superior learners.

Learning of franchisees

Since franchisees pay to franchise hotels, the obvious expectation is that chains benefit from the practice. We predict that a franchised unit will lower the failure rate of a chain more than an owned unit, because the chain has access, through the franchise, to the franchisor's experience. Model 7 adds FRANCHISEE EXPERIENCE, which is the discounted experience from hotels franchised by the chain, and FRANCHISED UNITS, which is the number of units the chain currently franchises, to control for the contemporaneous effect of being a franchisee. Model 7 does not improve over Model 6, and the added variables are not significant. Surprisingly, chains do not get a learning benefit from franchising units. This result raises questions about the benefits of franchising, but those questions are beyond the scope of this paper.

Table 3. Piecewise exponential models of hotel chain and franchisor failure

Variable	Model 5	6	7	8
Age 0–2 years	−1.860	−1.889	−1.886	−2.153
	(0.464)	(0.465)	(0.469)	(0.477)
Age 2–5 years	0.450	0.469	0.488	0.670
	(0.389)	(0.389)	(0.391)	(0.399)
Age 5–10 years	0.918	0.941	0.962	1.197
	(0.383)	(0.382)	(0.384)	(0.391)
Age 10–20 years	1.386	1.415	1.439	1.655
	(0.398)	(0.397)	(0.399)	(0.404)
Age 20–30 years	1.601	1.630	1.661	1.851
	(0.448)	(0.448)	(0.449)	(0.449)
Age 30–40 years	2.216	2.244	2.282	2.539
	(0.518)	(0.518)	(0.520)	(0.520)
Age > 40 years	3.190	3.241	3.291	3.539
	(0.597)	(0.597)	(0.600)	(0.604)
Log(Size)	−1.996**	−1.941**	−1.952**	−2.000**
	(0.173)	(0.177)	(0.181)	(0.180)
Name Concentration	−0.420**	−0.424**	−0.443**	−0.480**
	(0.174)	(0.174)	(0.176)	(0.176)
City Concentration	−0.783**	−0.790**	−0.789**	−0.818**
	(0.156)	(0.156)	(0.156)	(0.157)
Regions	−0.056	−0.055	−0.051	−0.034
	(0.068)	(0.067)	(0.067)	(0.067)
Motel Chain	−0.284*	−0.303*	−0.313*	−0.316*
	(0.137)	(0.137)	(0.138)	(0.138)
Franchisor	0.323	2.075**	2.141**	1.924**
	(0.722)	(0.729)	(0.723)	(0.737)
Density	−0.016**	−0.016**	−0.016**	−0.004
	(0.006)	(0.006)	(0.006)	(0.007)
Density²/1000	0.0001**	0.0001**	0.0001**	0.0000*
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Density at Entry	0.017**	0.017**	0.017**	0.015**
	(0.004)	(0.004)	(0.004)	(0.004)
Calendar Year	0.031*	0.030*	0.029*	0.010
	(0.015)	(0.015)	(0.015)	(0.018)

(continued on next page)

Franchising and industry experience

In the period we study, only three franchisors failed, so it is impossible to estimate an effect of the competitive experience of franchisors. Operating experience can be calculated at the industry level for franchisors in the same way it was for other chains. FRANCHISOR OPERATING EXPERIENCE SINCE ENTRY was calculated using Equation 2, but with the total units operated by franchisors in the year substituted for M_t. Similarly, FRANCHISOR OPERATING EXPERIENCE AT ENTRY was calculated using Equation 3, again substituting the total units operated by franchisors in the year for M_t. Model 8 includes these variables, and improves significantly over Model 7 ($X^2_{2\,d.f.} = 30.56$, $p < 0.01$). Like the industry operating experience variables representing the experience of other chains, FRANCHISOR OPERATING EXPERIENCE AT ENTRY decreases the failure rate of chains (−0.0001, $p < 0.05$). FRANCHISOR OPERATING EXPERIENCE SINCE ENTRY increases the failure rate (0.0002, $p < 0.01$). Additional analysis (not shown) indicated that the effects of franchisor experience at the industry level were the same regardless of whether the affected chain was a franchisor or not. These results indicate that chains benefit from franchisor experience before their founding, but are harmed by franchisor experience after

Table 3. Continued

Variable	Model 5	6	7	8
Organizational Experience	−0.070*	−0.087**	−0.087**	−0.071*
	(0.031)	(0.032)	(0.032)	(0.32)
(Organizational Experience)²/1000	0.0012**	0.0015**	0.0015**	0.0013**
	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Organizational Experience * Regions	0.017**	0.018**	0.017**	0.015**
	(0.005)	(0.005)	(0.005)	(0.005)
(Organizational Experience)²/1000 * Regions	−0.0002**	−0.0002**	−0.0002**	−0.0002**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Organizational Experience * Franchisor		−0.047**	−0.47**	−0.044**
		(0.017)	(0.017)	(0.018)
Franchised Units			−0.001	0.012
			(0.041)	(0.035)
Franchisee Experience			0.015	0.004
			(0.028)	(0.027)
Industry Operating Experience at Entry	−0.0011**	−0.0011**	−0.0011**	−0.0007*
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Industry Operating Experience Since Entry	−0.0002*	−0.0002*	−0.0002*	−0.0007**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Industry Competitive Experience at Entry	0.006	0.006	0.006	0.006
	(0.005)	(0.005)	(0.005)	(0.006)
Industry Competitive Experience Since Entry	−0.025**	−0.025**	−0.025**	−0.021**
	(0.004)	(0.004)	(0.004)	(0.006)
Franchise Operating Experience at Entry				−0.0001*
				(0.0000)
Franchise Operating Experience Since Entry				0.0002**
				(0.0000)
Log-Likelihood	−2333.51	−2329.26	−2328.66	−2313.38

** $p < 0.01$; * $p < 0.05$; standard errors in parentheses. One-tailed tests are used where predictions are made. Estimates of significance are not shown for age dummies since we are not testing the hypotheses that these coefficients are different from zero. The sample included 11,354 yearly spells, 705 hotel chain failures, and 3 hotel franchisor failures.

their founding. We speculate that this is because franchising represents a radical change in the operations of hotel chains. The experience of this new organizational form must have been particularly difficult for older chains to utilize or compete effectively against. Chains founded before franchising, or early in the history of franchising, are made antiquated by the experiential progress of franchising, accounting for the positive coefficient of FRANCHISOR OPERATING EXPERIENCE SINCE ENTRY. Chains founded after significant experience in franchising has accumulated can use that experience to their benefit when designing their organizations, accounting for the negative coefficient of FRANCHISOR OPERATING EXPERIENCE AT ENTRY.

DISCUSSION

Our results indicate that own operating experience, and both operating and competitive industry experience, affect the important organizational outcome of failure. At the level of own experience, we find that organizations initially benefit (in the form of a decrease in the failure rate) from their own operating experience, but eventually own operating experience comes to hurt the organization. We attribute the eventual harm from own operating experience to the inertia that develops from exploiting a given set of routines, ultimately leading the organization into a competency trap. We see this finding as supporting the view that learning from own experience can constrain the organization. This finding forces reconsideration of the prescription derived from earlier strategy research on learning, that organi-

zations can develop competitive advantage by moving quickly down the learning curve (Henderson, 1979). We show here that although production costs for a specific product may decrease by accumulating experience, organizational failure eventually increases with accumulated experience. In a changing competitive environment, heavy investment in a set of routines can be risky. The challenge to organizations is to develop efficiency in useful routines without becoming so enchanted with them that other opportunities are missed.

The finding that geographic generalists are less affected by their own operating experience illuminates one difference in how organizations learn. Geographic generalists are less dependent on success in any particular market, so may be less inclined to focus on learning from experience. Also, when generalism implies geographic diversity, as it does for hotel chains, practical issues about learning across physical space emerge. Finally, the experience of a geographic generalist in any one market may have limited applicability to the other markets it operates in. We discover here that there are advantages and disadvantages to learning from own operating experience, but as Figure 2 indicates, over a reasonable range of experience, geographic generalists always have higher failure rates than geographic specialists due to their lower responsiveness to experience. At very high levels of experience, geographic specialists have higher failure rates than geographic generalists, but few chains reached such high levels of experience. Using the coefficients from Model 2, a chain in one region has a lower failure rate than a chain in three regions until 81 units of experience are accumulated.[5] Discounting experience by its age[2], a 50-unit chain (which would be in the top two percent of the size distribution of nonfranchisor hotel chains) would only accumulate 77.25 units of experience in 20 years. The mean ORGANIZATIONAL EXPERIENCE for nonfranchisor hotel chains was only 12 units. Thus, geographic generalists give up something valuable in the capacity to learn from their experience.

We found evidence of industry learning during the chain's lifetime from both operating and competitive experience. There was vicarious learning during the organization's life on both operational and competitive issues. Chains also benefitted from the industry experience that had occurred before their entry, but only for operating experience, not for competitive experience. These results support our basic premise that industry learning is important for explaining organizational performance as well as the idea that it is useful to enter the industry after substantial experience has accumulated. The results differ from those in Baum and Ingram (1995), where it was found that Manhattan hotels did not learn from their industry's operating experience after their entry to the industry. If the different results of these two studies represent true differences of industry learning between these two organizational types, one explanation is that hotel *chains* have less inertia than hotels, and are therefore better able to change to reflect industry experience during their lives. Chains seem flexible compared to other organizational forms. They can add or drop units to adjust to new industry experience. In contrast, more characteristics of an individual hotel are set when it is built, and unable to be changed in response to subsequent industry experience.

Comparing industry operating experience to industry competitive experience, it is interesting that neither experience at entry nor since entry dominates. For operating experience, the coefficient of experience at entry is significantly larger than the coefficient for experience since entry ($X^2_{1\,d.f.} = 13.46$, $p < 0.01$). This indicates that one unit of industry operating experience before the organization enters the industry lowers the failure rate more than one unit of industry operating experience after the organization enters the industry. This is consistent with Argote *et al.*'s (1990) finding that shipyards benefitted most from the experience of others when they were new. For competitive experience, it is only industry experience since entry that helps the organization. This difference in the relevance of pre and postentry experience for operating and competitive experience suggests that there are differences in how the two types of experience are transferred. One explanation is that organizational change, which is required to utilize industry experience during the organization's lifetime, is more responsive to competitive experience. Just as organizations need crisis to escape their own competency traps

[5] OE (−0.1476 + (1)(0.0242)) + OE² (0.0021 − (1)(0.0003)) = OE (−0.1476 + (3)(0.0242)) + OE³(0.0021 − (3)(0.0003)) when OE = 80.667

(Starbuck, 1983; Nystrom and Starbuck, 1984), organizations may also be shaken out of complacency by failures in the industry. More fine-grained investigation of the processes involved in the two types of industry learning would be valuable.

Also valuable would be additional investigation of organization-level differences in industry-level learning. The evidence we provide for industry learning from operating and competitive experience treats all the organizations in our industry as the same in terms of their capacity to learn from the industry, except on the dimension of the time of entry. Of course, other things affect the capacity of the organization to learn from its industry. Cyert *et al.* (1993) suggest that differences in the internal information-processing capability of organizations can generate sustainable competitive advantage. Cohen and Levinthal (1990) argue that past preparation makes learning effectiveness path dependent. The research we present here could be complemented by more attention to the processes within organizations that can systematically account for differential capacity to learn from the industry. Similarly, protecting one's own operating experience from other organizations could be a source of competitive advantage. Methods to do this have received some attention in strategy (Rumelt, 1987).

The relevance of internal processes for learning highlights an important limitation of our study. We show evidence for the relationship between experience and failure, but the intermediate step of learning is assumed. In this limitation, we join most of the empirical literature on organizational learning. We feel that the current balance of literature on the constraint of own experience and learning from others favors elegant argument and anecdote over empirical tests, so we see our approach as a clear contribution despite the limitation. Still, we recognize that empirical research that links experience to learning to organizational outcomes is needed.

The absence of direct evidence of learning forces us to carefully consider alternative explanations for our findings. The most obvious alternatives for the effects of the chain's own experience, that it is confounded with age or size, are ruled out by the analysis, which controls for the chain's age, and contemporaneous size. Another alternative is that our experience variable captures something besides learning that accumulates over the life of the chain. For example, chains that have operated more units in their past might be expected to have accumulated slack resources. The results concerning ORGANIZATIONAL EXPERIENCE, however, are inconsistent with what would be expected if the variable reflected slack resources. Slack resources should monotonically decrease the risk of failue, yet ORGANIZATIONAL EXPERIENCE has a nonmonotonic effect. Further, the differential effect of ORGANIZATIONAL EXPERIENCE for generalists and specialists is predicted by learning theory, but is not easily explained if the experience variable is characterized as a proxy for slack resources.

At the level of industry experience, we also have appropriate controls to rule out alternative explanations. It might be argued that industry experience affects the cognitive legitimacy of organizations in an industry, but we use the accepted approach for modeling legitimacy as a nonmonotonic effect of density. Delacroix and Rao (1994) make the argument that the legitimacy effect of organizational density is a proxy for the kind of industry learning we describe, not the other way around. Supporting this idea, in Model 8, which includes all the relevant industry experience variables, DENSITY has a monotonic effect of increasing the failure rate of chains, which suggests that evidence of legitimacy disappears when industry experience is included in models. It might also be argued that the industry experience variables pick up some other temporal change in the robustness of hotel chains, but our models include a control for calendar time. Finally, it is compelling that our models include two types of variables to capture conditions at the time of a chain's founding: density at founding is predicted to increase the failure rate, while industry experience at founding is predicted to decrease the failure rate. Both types of variables work in the predicted directions, further supporting our claim that the experience variables reflect learning.

The U-shaped relationship between own operating experience and failure is a potential explanation for the finding elsewhere that older organizations have higher failure rates. To determine if we had found the cause of positive age dependence we constructed Figure 3, which shows the pattern of age dependence in Model 1 which does not include any experience variables, and Model 4 which includes all the nonfranchise

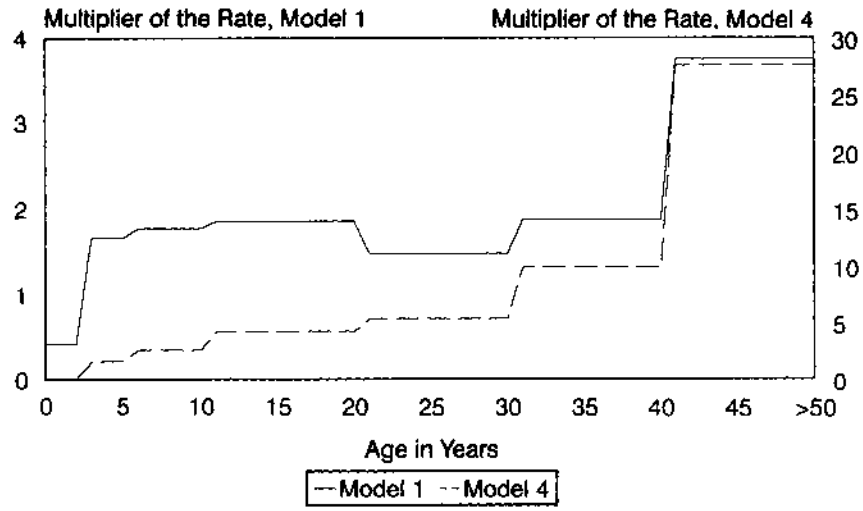

Figure 3. Comparison of age dependence with and without experience variables

experience variables. The piecewise exponential model does not include a constant, so age dependence is indicated by differences in the coefficients of the age ranges, not by the absolute value of any age range. In Model 1 there are statistically significant differences between the first (0–2 years) and the second (2–5 years) periods, and the sixth (30–40 years) and seventh (40+ years) periods. Thus, without including experience variables, the risk of failure increases over the early part of a chain's life, is constant for a long period, and increases again for chains over 40 years of age. In Model 4, there are significant differences between all the periods except the fourth (20–30 years) and fifth (30–40 years). Thus, while the patterns of age dependence are broadly similar, the 'flat in the middle' period is smaller when the experience variables are included. Also, the relative difference in the failure rate between very young and very old organizations is actually larger in Model 4. Thus, contrary to our suspicion that age dependence would disappear when experience variables are modeled, it actually became more pronounced. This is probably due to the influence of industry experience during the organization's lifetime, which grows as the organization ages, and reduces the risk of failure.

Finally, the analysis of franchisors and learning yielded some results that should stimulate researchers interested in that organizational form. Franchisors were superior learners, which gives support to the idea that preparation and attention to experience results in differential learning ability for organizations. Surprisingly, however, franchisees did not enjoy a benefit from their experience with franchised units. This invites reconsideration of past assumptions about the benefit of franchising to franchisees. At the industry level, the results for franchisor experience suggest that franchisors represented a radical change for the hotel chain industry. Franchisor experience made chains founded before franchising more likely to fail, and chains founded after the development of franchising less likely to fail.

CONCLUSION

We examined the influence of own operating experience, and the operating and competitive experience of the industry, on the failure rates of U.S. hotel chains. Our results indicate that: (a) chains enjoy a reduced risk of failure with initial increases in their own experience, but high levels of own experience increase the risk of failure; (b) generalists were more weakly affected by their own experience than specialists; (c) chains' failure rates were reduced by the industry operating experience that accumulated both before and since their entry to the industry; and (d) chains' failure rates were reduced by industry competitive experience since their entry to the industry.

The evidence that own experience eventually constrains the organization, and that industry

experience can benefit the organization, adds to the understanding of the relationship between experience and performance. Further additions to understanding would come from more evidence regarding what makes an organization better at learning from industry experience, and direct evidence that experience leads to learning. Industry experience is fundamental to strategic theory because, unlike own experience, it reflects the interdependencies between competitors. Competition is not a race for efficiency between closed systems. The integration of theories about learning and strategy is further facilitated by our identification of operating and competitive experience. Different types of experience generate different capabilities for the organization, and arguments about the strategic role of experience cannot ignore this.

ACKNOWLEDGEMENTS

We are grateful to Will Mitchell and two anonymous *SMJ* reviewers for their helpful comments.

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