

**Institutions, Intergroup Competition, and the Evolution of Hotel Populations
Around Niagara Falls**



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Institutions, Intergroup
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Evolution of Hotel
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Niagara Falls

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This paper examines institution building and the problems of collective action that must be overcome so that institutions can regulate the self-interested activity of organizations and facilitate the production or protection of resources that collectively benefit organizations. We show that the presence of competing groups of organizations is key to institution building because it may allow cooperating organizations to gain relative competitive advantage over other organizations and because the presence of salient rivals facilitates collective action. We use the history of tourism institutions at Niagara Falls to illuminate the collective action problems, and their solutions, associated with building institutions. We propose that (1) institution building in this context was the result of collective action among competitors to solve a common problem, (2) rivalry and competition between hotels on either side of the falls enhanced collective action among locally competing hotels, and (3) the regulation provided by the institutions lowered the failure rates and increased the founding rates of hotels on both sides of the falls. We examined these propositions first through historical analysis to show the motivation and process of building institutions and then through analysis of hotel failure and founding rates to show the presence of interpopulation competition and the influence over time of the institutions on organizational populations. Our analysis of failure and founding rates indicates that Niagara Falls hotels did benefit from the institutions they helped create and that there were two competing groups of organizations, but, surprisingly, institutions helped all Niagara Falls hotels, regardless of which group created them. •

The simple but powerful idea that institutions form the constraints that shape human interaction has had a dramatic impact on economics and political science and is gaining influence in sociology (Eggertsson, 1990; Alt and Shepsle, 1990; Brinton and Nee, 1996). Institutions, in this view, are formal and informal "rules of the game" that, with associated enforcement mechanisms, provide the structure for economic action (North, 1990:3). In this paper, we examine the coevolution of a set of institutions in response to a collective action problem and two populations of organizations. The institutions are rules that developed in response to a tragedy of the commons at Niagara Falls resulting from overexploitation, and the organizations are the hotel populations in Niagara Falls, New York, and Niagara Falls, Ontario, which were leaders in the effort to establish these institutions at Niagara Falls. We first examine the historical development of tourism in the two hotel communities at Niagara Falls to explain how and why hotels responded to collective action problems. We then present dynamic analysis of hotel failures and founding rates to show how institutional structures and interpopulation competition affected population dynamics. This study, therefore, attempted to address two research questions: How do collective action problems among competitors lead to the development of institutional solutions, and how do interpopulation rivalry and institutional structure affect failure and founding rates?

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This study contributes to both organizational theory and the new institutional economics. Organizations are the principal actors in institutional economics, but the theory suffers from a general inattention to the realities of organizational action. The recognition in institutional economics of organizations as the agents of institutional change is a critical insight, but the characterization of organizational agency has been too simplistic. North (1990) referred to organizations as "players" in the game defined by institutions, and the treatment of organizations as unitary, rational actors is common in the literature. As we show in our historical analysis, the contributions of organizations to the creation and change of institutions can depend on factors that do not fit neatly into a rational model of collective action. Further, although North (1990: 5) claimed that institutions fundamentally influence organizational evolution, this idea has not been tested in institutional economics. Organizational theory has sophisticated methods for studying the evolution of organizational forms, and by applying them here, we demonstrate that institutions affect organizational populations in surprising ways.

In organizational theory, it is well established that organizations are influenced by the institutional structure of their environments (e.g., Hannan and Freeman, 1989) and that they affect their institutional environments (e.g., Mizruchi, 1992). Often, institutions provide a structure of incentives that is a benefit to a set of organizations, even if some or all of those organizations did not contribute to the creation of the institutions. This creates an opportunity for organizations to free-ride on the institution-building efforts of others and makes critical the question, "Why do organizations contribute to the creation of institutions when other organizations that did not contribute can also benefit?" Unlike the few other historical studies that have examined jointly the creation and influence of institutions (Hirsch, 1975; Torres, 1988; Leblebici et al., 1991), we consider this problem of collective action. We examine this collective action problem in this study of the dynamics of the populations of hotels at Niagara Falls. By hotels, we mean all organizations that host transient overnight visitors, including organizations called houses, inns, and motels.

Hotels at Niagara Falls had a collective action problem that was solved by the establishment of institutions. At the same time, intergroup rivalry—the cross-border competition between the Niagara Falls tourism industries in Canada and the United States—played an important role in overcoming the collective action problem associated with creating institutions. We begin with a historical analysis of the problem, from which we derive testable hypotheses about the evolution of these hotel populations and the effects of the institutional structures of their environments.

INSTITUTION BUILDING AT NIAGARA FALLS¹

Niagara Falls, a cataract on the Niagara River, has attracted visitors since Father Louis Hennepin first described it to Europeans in 1683. The Niagara River forms the border between two cities at Niagara Falls: Niagara Falls, Ontario

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We used a number of unpublished sources to develop this history, in addition to the published sources reported in the references. The Niagara Falls Public Library in Niagara Falls, New York has an excellent local history department that holds city directories, phone books, and local newspapers, including the *Niagara Falls Gazette*, from 1854 to the present. That department also holds the earliest annual reports of the commissioners of the State Reservation, and other rare materials related to tourism around the falls. The Niagara Falls Public Library in Niagara Falls, Ontario holds city directories and phone books and is a good source for local papers from the Canadian side, such as the *Niagara Falls Review* and the *Welland Gazette*. That library also holds all of the annual reports from the Ontario park and has a clipping file on the local hotel industry that includes items from the late nineteenth century. The Niagara Parks Commission in Ontario keeps a collection of historical material on its own development, and the State Reservation in New York has some early material on the tourism industry in New York, including some documents of the Niagara Falls Association and at least one early copy of *In the Mist*, a newspaper published by Niagara Falls hotels from 1894 to at least 1919. The Archives of Ontario in Toronto has extensive records on the Niagara Parks Commission, including correspondence of the Ontario premier and that of the first head of the park commission, regarding the establishment of the park. The American Hotel and Motel Association archives in Washington, D.C., has complete holdings of the *Hotel Redbook*, and the *Directory of Hotel and Motel Systems*.

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(hereafter Ontario) on the western bank and Niagara Falls, New York (hereafter New York) on the eastern bank. In each city, since early urban development, there have been various types of firms such as hotels, taverns, restaurants, and tour-guide companies that serve the visitors who come primarily to see the falls. Each city has tried to develop institutions that would regulate activities immediately surrounding the falls and enhance the attractiveness of the falls as a place to visit. The first attempts were relatively small-scale community efforts, but the eventual result was elaborate public parks in both cities. Among the most visible of those pushing for the development of these parks were hoteliers, who had much to lose if the parks were not created and much to gain by their development.

Hotels within each of these cities compete with each other. A hotel in New York competes for tourists with the hotel down the block. All hotels within a community, however, share rivals: they compete with the hotels across the river for tourist business and with any type of organization that threatens the development of tourism in their community. Although two hotels in New York are competitors, they would both prefer that tourists come to New York, where the two hotels would have the opportunity to compete for them, than that tourists go to Ontario. Hotels in Ontario are in an identical position with respect to New York hotels. Likewise, hotels in each community share concerns about confidence men, tourist abusers, and even industrial firms that become eyesores. Hotels within each community have also undertaken cooperative activities throughout their history, such as groups formed to establish standards for the treatment of hotel patrons, and neighborhood hotel associations have been common. One such group—the Niagara Promotion Association—even ran a school of hospitality for the benefit of member hotels. Hotels have often undertaken joint advertising efforts as well. Hoteliers in New York cooperated to publish what was at the time the only daily tourism newspaper in the world. Almost all of these activities were within communities, either among New York hotels or Ontario hotels, not between communities.

Intergroup rivalry in many forms has characterized the relations between hotels in the two communities during the last 150 years. At its fiercest moments, the rivalry between the two hotel communities has involved direct attacks. In the late-nineteenth century, New York hoteliers secretly funded carriage drivers to go into Ontario and entice tourists into their cabs with the promise of a ride through the Niagara Gorge but then take them across the border and leave them on the New York side (*Welland Tribune*, August 3, 1889). Similarly, Ontario hoteliers were accused of tempting tourists bound for New York to get off trains on the Ontario side of the falls (*Niagara Falls Gazette*, Winter 1891). More recently, New York hoteliers claimed that Ontario hoteliers were conspiring with bus companies to dump tourists on the Ontario side of the falls (*Niagara Falls Gazette*, February 24, 1955). Hotels also maligned their cross-border rivals in advertisements (e.g., Official Hotel Red Book and Directory Co., *Hotel Red Book*, 1909).

The Tragedy of the Commons at Niagara Falls

The collective action at Niagara Falls was in response to a "tragedy of the commons," a term offered by Hardin (1968) to describe situations in which actors have unrestricted access to a common asset and overuse it. The tragedy that developed at Niagara Falls during the early 1800s was that peddlers, hucksters, con artists and sideshow men on both sides of the falls became extremely aggressive in their attempt to profit from tourists. Particularly on property close to the falls, it was impossible to have a free, undisturbed view of the natural scenery. The properties close to the falls, including hotels, built elaborate walls and fences enclosing all viable spaces from which to see the falls; they charged admission to their properties, not only for the privilege of a view, but also for the privilege of encountering the hucksters who had negotiated to work within the confines of these spaces. These activities generated externalities that hurt all tourist organizations by giving the area a reputation for corruption that scared away tourists. The offending organizations eventually overstepped their boundaries by threatening the economic viability of other tourists organizations. As Way (1960: 8–9) described the problem: "since it is almost a truism that uncontrolled enterprise in any sphere is apt to mistake liberty for license, it is not surprising that the falls [became] the scene of unprincipled exploitation of the tourists by rapacious cabmen and others practiced in the art of polite robbery."

One incident illustrates as well as any the excesses of commercialism around the falls: the highly publicized *Michigan* event of 1827. This involved an irreparably leaking Lake Erie schooner that the property owners on both shores of the falls transformed into a crowd-gatherer by announcing that it would be retired by sending it over the falls—loaded with exotic circus animals. Fifteen thousand spectators reportedly showed up to witness the event. According to the editor of a local newspaper, on both shores "there were show men with wild beasts, gingerbread people, cake and beer stalls, wheel of fortune men, . . . the tavern-keepers cleared a great deal of money" (*Niagara Falls Review*, September 8, 1888; Welch, 1977).

Because of the entrepreneurial success of such events, all varieties of spectacle followed. A colony of starving dogs was placed on "a small barren island in the great rapids, to be wept over in the distance by crowds of sympathetic tourists" (*New York Times*, July 31, 1881). Advertisements were floated over the falls (*New York Times*, January 15, 1881). Men brought explosives to detonate near the falls to see if they could rival the water's thunder. Daredevils rode over the falls in various rigs; they jumped over the falls, they tightrope-walked over the falls. Other built precarious observation decks and bridges off the precipices surrounding the falls (McKinsey, 1985). The *New York Times* (August 8, 1881: 1) editorialized, "it is high time for the hotel owners to take the matter in hand and protect themselves from the worm that is eating them to death." The majority of hoteliers were particularly alarmed that a few hotels (those immediately overlooking the falls) were in the thick of the abuse.

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The Table Rock House, one of the closest properties to the falls on the Canadian side, and its proprietor, Saul Davis, were investigated and found guilty of extortion of tourists. Their common practice was to pay cabbies to advertise to tourists the museum and tours offered at Table Rock House as either free or nearly free. Once tourists had their fill of the sights available within the confines of Table Rock's walls, they were told they must pay several dollars (an exorbitant amount then) before they could leave and were confronted by "enormous ushers" at the exit should they choose not to pay. Threats of murder were common (Niagara Parks Commission, 1874). Other hoteliers called for an investigation, and the Ontario premier commissioned one in 1873. It was the first step in the institution-building process, with the aim of cleaning up around the falls, and it required the cooperation of local hotels.

Interpretation: The structure of commensalism. The structure of organizational populations at Niagara Falls illustrates two important preconditions for cooperation between organizations of the same type (hereafter, commensalism). The first is a common interest in some resource. The degree of competition between organizations is determined by the overlap of the resources they require (McPherson, 1983). Organizations of the same type rely on the same resources and therefore compete intensely. Competing organizations, however, share an interest in having common resources protected or increased. Competition and commensalism are both driven by reliance on shared resources.

The second precondition for commensalism is an opportunity for relative advantage. Competitive advantage is relative, so merely increasing or protecting a shared resource does not necessarily provide a benefit to competing organizations. If all competitors have equal access to the enhanced resource, the results of commensalism may be competed away. In many instances, relative advantage can be obtained because there is a broad range of competitors for a given resource. If competitive groups can be differentiated, legal and other mechanisms can be used to exclude some of them from accessing enhanced resources (Porter, 1980). In the simplest example, resources are usually geographically localized, and distant competitors will not benefit (or will benefit less) from the protection or enhancement of local resources.

Applying these arguments to institution-building efforts of Niagara Falls hotels results in the prediction that there should be two competing subpopulations of hotels. Organizations within a population or subpopulation share an interest in resources, satisfying the first precondition for commensalism, and the presence of two subpopulations makes it possible for one group to gain a relative advantage over the other, satisfying the second precondition. Hotels on each side of the border could potentially gain relative advantage by solving the tragedy of the commons and thereby attracting more tourists to their side. Hoteliers at Niagara Falls felt there were two competing subpopulations, but it is not obvious that there actually were. The border at Niagara Falls was extremely permeable for tourists over the period that we examine, which allows the possibility that hotels at Niagara Falls were undifferentiated in their competitive relationships.

For testing, we formulate our hypothesis as the hoteliers would have:

Hypothesis 1: There are two subpopulations of hotels at Niagara Falls, and there is competition between them.

Community Institutions at Niagara Falls

There was no clear single solution to the tragedy of the commons at the falls. In each community, private efforts by hoteliers and others resulted in some progress, but not enough to solve the problem entirely. These efforts were most important as precursors to the stronger institutions that would grow out of the community efforts. For example, the Niagara Falls Business Men's Association was formed in Niagara Falls, New York by "the proprietors of the leading hotels, and the local business men, [who] gradually saw that the abuse and robbery of the public . . . were killing the place" (Rand McNally, 1896: 15). The association's initial action was to develop a new system of ordinances and means of enforcing them. Most notably, these efforts included forcing the hackmen (carriage drivers) to sign an agreement to follow a code of behavior. Those who violated the codes would lose their licenses.

This did nothing, however, to combat the equally large problem of hucksters and peddlers hawking around all of the spots from which to view the falls. At the same time that it became clear that this local effort was not enough, there was discussion in the press and in New York's state government about the possibility of creating a state-run park at Niagara Falls. The Niagara Falls Business Men's Association immediately began a lobbying campaign to further this cause by organizing a statewide petition. The result was the formation of a larger, more cosmopolitan organization, the Niagara Falls Association. The stated goal of this organization was to "promote legislative and other measures for the restoration and improvement of the natural scenery of Niagara Falls" (Niagara Falls Association, 1885: 1).

On the Ontario side, there were also private efforts to free the falls from hucksterism. As early as 1832, hoteliers and other businessmen on the Ontario side developed schemes to buy the property around the falls to create a park in which commercial activity would be strictly controlled. The earliest recorded scheme, in 1832, was the City of the Falls plan to purchase 400 acres on the Canadian shore for such a purpose. Invariably, these plans ran into obstacles, including failure to raise enough funds, but most importantly, the inability to compel all property owners around the falls to sell their land.

The plans for a private park were most nearly achieved by a real estate developer and hotelier named William Oliver Buchanan. In the 1870s he began efforts to convince the Ontario premier of the importance to the province of a park at Niagara Falls for tourism development purposes. In his view, the park should be established using the land acquisition powers of the government, but should be managed privately. Not only was protecting the falls from hucksters a selling point in Buchanan's arguments to the premier, but competition with New York was important as well (Niagara

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Parks Commission, 1873–1885). While Buchanan's plans came very close to being realized, they were finally scuttled by others in the community. An 1885 petition from citizens of Ontario to the premier asked him to support a government park rather than a private one (Welch, 1977). While there was a strong public outcry by hoteliers and others for a park, public officials also got the message that to make such an institution fair to all, it must be developed as a government entity. The issue had become what kind of institution would best solve the problem.

Interpretation: Choosing among institutional alternatives.

The solution to the tragedy of the commons suggested by economics' theory of the firm (Coase, 1937; Alchian and Demsetz, 1972; Williamson, 1975) would be to give control to entrepreneurs: An entrepreneur who acquired the tourism assets at the falls would have the incentive to maximize present and future returns, which would mean not abusing tourists for short-term gains. Further, it would be in the entrepreneur's interest to monitor employees to discourage the abuse of tourists. It is noteworthy that despite some aggressive campaigns, nobody succeeded in implementing this solution. The best explanation for the failure of the entrepreneurial solution at the falls is Holm's (1995) observation that political and economic activity takes place in a hierarchy of institutions, and what is possible and reasonable at a lower level depends on higher-order institutions. A concrete example of this is the Canadian government's lease clauses on property at the falls, which gave the government the right to revoke the lease at any time and thus denied entrepreneurs sufficient property rights to make the huge investment necessary to privatize the falls (Welch, 1977). Holm's (1995) observation that the preferences of individuals are influenced by higher-order institutions is reflected in the bias of the citizens of the falls against an entrepreneurial solution. The *New York Times* (January 10, 1883: 1) attributed the failure of privatization schemes at the falls to the fact that they each "savored too much of a private speculation which would result in less benefit to the public than to its individual promoters."

Voluntary organizations such as the Niagara Falls Business Men's Association are an alternative for solving the tragedy of the commons. These voluntary associations are designed to encourage behavior that benefits the collective and threaten penalties for organizations or individuals who defect. The problem with voluntary associations is that they rely on mutual monitoring (Elster, 1989; Ostrom, 1990). It is costly for one tourist organization to monitor another, and if defection is detected, it is costly to punish the offender. Rational members of the voluntary organization will be tempted to free-ride when it comes to monitoring and enforcing the association's rules. These problems with private institutional alternatives for managing the tragedy of the commons at the falls allow an opportunity for government institutions to be implemented.

Government Institutions at Niagara Falls

The idea of governments establishing parks free of commerce around the falls had been first offered publicly by

Lord Dufferin, Canada's governor-general from 1872 to 1878. Dufferin offered the park as a solution to "the various squatting interests that have taken possession of every point of vantage at the falls; who tax the pockets and irritate the nerves of the visitor" (*Times of London*, June 15, 1878: 7). He proposed an international park in 1878 to Lucius Robinson, governor of New York. The plan was for each country to acquire suitable lands on its side of the border. Hoteliers manipulated the planning process by lobbying to make their interests salient to legislators. Their efforts included local politicking and testimonials before various legislative committees. The potential establishment of a state park at Niagara became the hot issue in the races for assemblyman and senator in the region surrounding the falls. The family that owned the principal newspaper in Niagara Falls, New York was originally opposed to the park idea because it also owned nearly all of the property that had views of the falls (including a hotel); they editorialized against the park proposal and those who favored it. Counter-campaigning by members of the Niagara Falls Business Men's Association and the larger Niagara Falls Association helped win enough votes for the candidates who campaigned in favor of the park idea. The petitioning and statewide lobbying was equally matched by local efforts to persuade voters that the park was in the interest of Niagara Falls residents (*New York Times*, 1880–1885; *Niagara Falls Gazette*, 1880–1885). Hoteliers appeared prominently in hearings to determine the potential cost and impact of forming the park; all who testified were in favor of the idea (*Niagara Falls Gazette*, August 9, 1884).

According to the *New York Times* (August 21, 1880; August 8, 1881), hoteliers in New York became even more vigorous in their private efforts to rid the falls area of hucksters as the state began to respond to the public outcry for a park. In particular, the International, Cataract, Spencer, Prospect, and Clifton hotels were given credit for this crusade to clean up the area. These were among the larger hotels, and the implication of the reports is that they were trying to distinguish themselves from other hotels so that when the park was finally established, they would be given credit for their efforts, bringing more tourist business to them.

Interpretation: An institutional solution to the tragedy of the commons. A government park would solve the tragedy of the commons by establishing a buffer around the falls, protecting the area most attractive to tourists from the individuals and organizations that had been defiling it. The establishment of laws against commerce in the area immediately surrounding the falls reorganized the incentives of tourist organizations. With the parks, anyone in the area immediately around the falls who tried to engage in the activities that had been discouraging tourists would end up in jail. With the establishment of the parks, and their subsequent development, more tourists could be attracted to the falls. North (1990: 5) argued that "what organizations come into existence and how they evolve is fundamentally influenced by the institutional framework"; because parks at the falls had a positive effect on the resources that hotels rely on,

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they positively influenced the evolution of the hotel populations there:

Hypothesis 2: The development of parks at Niagara Falls positively influenced the evolution of the local hotel populations.

Recognizing the usefulness of parks at the falls did not completely solve the collective action problem. Even though government parks could solve the tragedy of the commons, it was costly to lobby for their establishment. There was a second-order collective action problem because rational tourist organizations could be tempted to free-ride on the efforts of others to establish the parks. The organizations at Niagara Falls, however, had motivations to contribute to efforts to establish the government institutions. Foremost among them was intergroup rivalry.

Intergroup Rivalry Facilitating Institution Building

The establishment of the Canadian park was hindered by a battle of jurisdiction between the federal and provincial governments (Way, 1960), but residents on the Ontario side of the falls became confident that if the New York side acted, their own government would follow suit (*New York Times*, June 3, 1883). While the park concept evolved out of a desire to restrict the activities of aggressive entrepreneurs, as both sides realized the value of such an enterprise in enhancing the attractiveness of their side to tourists, the focus shifted to cross-border rivalry over who would build a park first and better. One official, in favor of establishing a park on the New York side first, made the plea in a public debate that New York "must not be outdone in so noble a rivalry" (Dow, 1914). The rush to be the first to open a park created a stir in the two communities, such that rhetoric and bravado became standard modes of dialogue across the falls. The day the park opened on the New York side, local hotels raised their flags for the occasion as a sign of victory (*Niagara Falls Gazette*, July 16, 1885).

New York's progress in establishing a park finally stimulated the public park movement on the other side of the falls to take serious action, and the first meetings of the Ontario Niagara Falls Park Commission coincided with the opening of the New York Park. The commission's first head was Casimir Gzowski, who with Canada's first prime minister, Sir John A. MacDonald, was a co-owner of a prestigious Toronto hotel. There was no public opposition to Gzowski's appointment, despite his being a hotelier, because the commissioner was an agent of the province and not working on behalf of his own interests. Moreover, because there was no way for him to gain personal advantage in this position, he was the perfect representative for the community's hoteliers on this commission, which would determine the park's future scope. And, fittingly, the first meeting of the commission was hosted at Prospect House, a prominent hotel, rather than in a government office. Perhaps the most important issue to hoteliers, an issue on which they sought and gained guarantees, was that no hotels would operate in the park. Hoteliers and others also lobbied successfully to have the park boundaries drawn to come close to their properties without including them (Niagara Parks Commission, 1885).

The Ontario park opened in 1888, three years after the New York park.

The rivalry that created the race to open the first park maintained momentum in subsequent years. When the commissioners of the Ontario park wanted to expand the territory they controlled along the Niagara River, they made the provocative claim that businessmen from Buffalo were planning to lease historic land on the Canadian side of the river and build a golf course. The commissioners could not "refrain from expressing [their] hope that a more honorable and worthy disposition shall yet be made of this hallowed ground, the scene of many sanguinary battles in 1812–1814 and where many of our honored dead still lie buried" (Ontario Legislative Assembly, *Annual Report of the Commissioners of the Queen Victoria Niagara Falls Park*, 1899: 438). Not surprisingly, the image of American businessmen golfing on the graves of Canadian heroes stirred up patriotic sentiment, and the Ontario commissioners were given the capital to purchase the land in question for their park. Intergroup rivalry had been used to advantage in motivating collective action.

Interpretation: Intergroup rivalry and collective action.

Research on the social psychology of groups has shown that the presence of a rival group increases cohesion and cooperation within a group, which suggests that actors may be sufficiently motivated by the process of collective action to forego the opportunity to free-ride. The idea that intergroup rivalry increases intragroup cooperation was demonstrated compellingly by Sherif et al. (1961) in their "Robber's Cave" experiment. When their two groups "met in competitive and reciprocally frustrating engagements, in-group solidarity and cooperativeness increased" (p. 207). This could be because the presence of a rival increases group identity: Common features of the focal group may become more salient with the introduction of "others" with whom to draw contrasts (Kramer and Brewer, 1984; Brewer and Kramer, 1986). Bornstein, Erev, and Rosen (1990), in a laboratory experiment, and Erev, Bornstein, and Galili (1993), in a field experiment, have demonstrated that intergroup rivalry decreases free-riding in collective action.

The implication of these experimental results for Niagara Falls is that intergroup rivalry may have added to the willingness of hoteliers, other tourist organizations, citizens, and politicians to make the contributions to collective action that were necessary to establish the parks. The intergroup rivalry explanation is also consistent with the instances of institution building on one side of the border being spurred on by institutional progress on the other side of the border. The actors involved believed that by building a park they were helping their side and developing a local competitive advantage in the cross-border rivalry. From this perspective, the hotel subpopulations should have derived benefit from the development of their parks because a developed park would attract tourists, in particular, to the focal population rather than to the competing population. The correctness of this belief can be tested in our analysis of the effects of the institutions on the hotel populations. Thus, we hypothesize:

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Hypothesis 3: Hotel subpopulations benefited more from the development of the park on their side of the border than from the development of the park across the border.

Subsequent Development of the Parks

The creation of the parks restored the public's interest in Niagara Falls as a tourist destination. The superintendent of the New York park estimated that the park caused the number of tourists to the falls to double immediately (Niagara Parks Commission, 1885). Creation of the parks alone, however, was not a panacea for hotels. The parks needed to survive, if not thrive, if they were to be helpful in the long run. It quickly became clear on both sides of the falls that this would not be a simple matter.

The New York park was officially called the Niagara Falls State Reservation and represented the first time a state had used public money to preserve a natural setting (Berton, 1992). The federal government had recently created the first national park at Yosemite, but for a state to make such a commitment was unprecedented. The legislation establishing the reservation stipulated that after the appropriation for the purchase of lands, the state would have to make annual allotments to the reservation for capital improvements, maintenance, administration, and other expenses (*Laws of New York*, 1887). Between 1885 and 1900, the state spending for the reservation was frugal, with expenditures on basic infrastructure such as roads, bridges, walkways, and grading. When electrical generation became available shortly after the turn of the century, arc lights and an inclined electric railway were added. After these additions, some shelters, and a lookout point, very few major capital improvements were made to the reservation itself. The state acquired more land when the reservation was expanded into the Niagara Frontier State Park in 1935, but it was at a considerable distance from the falls.

When the Ontario park was established, a bond issue provided funds for land acquisition, but all operating funds were to be provided by minimal tolls for the use of optional features, such as bridges to the islands and an elevator to the foot of the falls. The original intent was in the same spirit as the New York reservation: to set aside the land surrounding the falls so that there would be as little evidence of human intervention as possible (Niagara Parks Commission, 1885). Almost immediately this plan proved unrealistic. The revenues from the tolls were not nearly enough to cover expenses. By the end of the fourth year, a large operating debt had accumulated. The park commissioners, holding up the New York reservation as a model, asked for an annual provincial appropriation to cover expenses, but it was denied.

The struggle to keep the park open during the next year forced the commissioners to make plans to cover the financial shortfalls through entrepreneurial venturing. In particular, they would reverse the original plans for the park by leasing out the rights to electrical generation, electric railways through the park, and other forms of concession. This provided enormous revenue windfalls through the next century. By the 1950s, the Ontario park had experienced impressive expansion: A scenic highway was built along the length of the Niagara River; Fort George, a strategic site in the War of

1812, was restored and opened to the public; a floral clock 40 feet in diameter was erected; and an observation plaza, a school of horticulture, and a golf course were all opened.

Not all of the developments the parks engaged in served the interests of hoteliers. Electrical power generation, in particular, had two distinct negative impacts. First, any water used to generate electricity is diverted from the falls, making the spectacle less grand. Rules were set allowing up to half of the Niagara River's volume to be diverted away from the falls during tourist season, and up to 80 percent during the off-season. Perhaps even more important was the secondary impact of the diversion. The electricity that was generated attracted energy-intensive industries, such as chemical and metallurgical producers. These industries have by-products that are antithetical to tourism: noxious fumes, ugly air pollution, and toxic waste dumped directly into the river (though there are now restrictions on this). By most accounts, these by-products have overwhelmingly hurt the New York side more than the Ontario side (McGreevy, 1991, 1994; Berton, 1992), which is further evidence of the differences in institutional evolution on the two sides of the river.

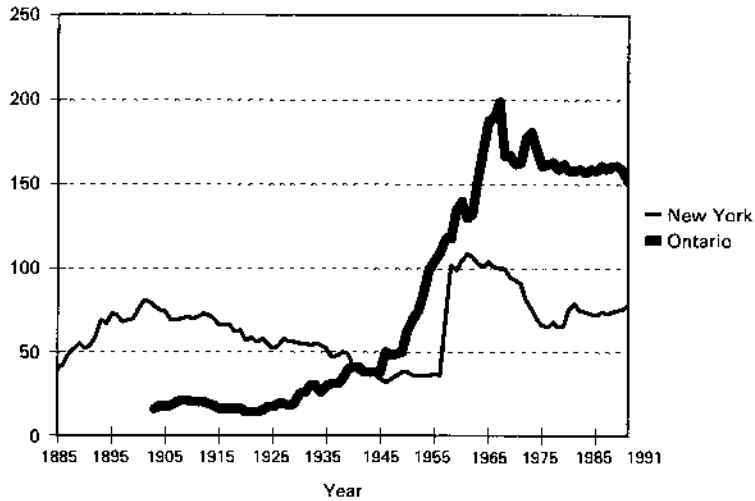
Interpretation: Embedded interests, inertia, and environmental control. Institutional evolution tends to be path dependent (North, 1990: 94): "The consequences of small events and chance circumstances can determine solutions that, once they prevail, lead one to a particular path." For the parks at the falls, the initial funding arrangements interacted with unforeseen events, and the result was eventually an elaborate, wealthy, and powerful park in Ontario, facing a smaller, more government-dependent park in New York. The potential for electricity generation at the falls was the key factor in this process. The Ontario park has the right to rent out the water of the Niagara River for electric generation, but in New York, the state holds that right.

Given the engagement of hotels and others in collective action to create the parks, it is notable that there were not subsequent efforts to revise the institutions. New York tourist organizations could have lobbied for a change in the funding system, or both tourist communities could have tried to change the parks to be more responsive to tourism. In her examination of institutional solutions to common-pool resource problems, Ostrom (1990) noted that although appropriators (those who use the common-pool resources) are capable of supplying their own institutions, they do not always change institutions when it would be beneficial to do so. Ostrom argued that appropriators are biased by a short-term perspective on the creation of institutions. Costs of institution building are immediate and calculable, but benefits often are long-term and uncertain. Add to this the fact that potential losses carry more cognitive weight than potential gains (Kahneman and Tversky, 1979), and the result is that unless the common-pool resource problem can convincingly be presented as a crisis, collective action is difficult to motivate. So the chronic hucksterism of the nineteenth century could rally tourist organizations, but the slow invasion of heavy industry in the twentieth century did not.

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The differential development of the parks that were created by cooperative action is related to the differential development of the tourism and hotel communities in New York and Ontario. At the time the parks were created, New York received 300,000 visitors annually and had about 45 hotels. Ontario received 200,000 visitors annually and had fewer than a dozen hotels. Now the positions of the two communities are reversed. In 1991, Ontario had 12 million visitors and 170 hotels; New York had 8 million visitors and 80 hotels. Figure 1 shows the number of hotels in Ontario and New York over time. Next, we quantitatively examine the relationship between the parks and the evolution of these two hotel populations.

Figure 1. Number of hotels at Niagara Falls, 1885–1991.



THE EVOLUTION OF HOTEL POPULATIONS

The evolution of organizational populations is studied by estimating rates of founding and failure (Hannan and Freeman, 1989). Organizations become more common as their founding rate increases and as their failure rate decreases. Benefits of the parks to the evolution of the hotel populations would be represented by a decrease in the failure rate and an increase in the founding rate. We expect that as the parks develop, failure rates will decrease and founding rates will increase (hypothesis 2) and that these effects will be stronger for the park on the same side of the river as the focal hotel population (hypothesis 3).

Data for these analyses came from a number of archival sources and represent the population of New York hotels from 1885 to 1991 and the population of Ontario hotels from 1904 to 1991. We relied primarily on city directories in both Ontario and New York and used phone directories, travel directories (*Where to Stay in Ontario*, 1945–1965 and *Accommodations*, 1966–1989, both published by the Ontario Department of Tourism), the *Hotel Redbook*, (Official Hotel Red Book and Directory Co., 1896–1927; American Hotel Association Directory Company, 1928–1991) and the *Directory of Hotel and Motel Systems* (American Hotel Association Directory Company, 1931–1991) to check the primary data source and provide additional information about the hotels.

Analysis of Hotel Failure

The unit of analysis here is the individual hotel, and our goal was to determine the risk of a hotel failing in any given year, as affected by the influence of the parks, population density, hotel characteristics such as distance from the falls, and control variables. We define hotel failure as occurring when the hotel ceases operation, but not when it changes ownership or changes name (Baum and Mezias, 1992). One reason for not classifying changes of ownership and name as the failure of one organization and the founding of another is that there is no reason to conclude that the "organization" changes at all. Names and ownership can change while the same participants continue to carry out the same routines. We have reason to believe that this definition of failure is the most appropriate one to use in investigating the influence of the parks on the evolution of the hotel population at Niagara Falls. Outright failures are clearly negative events for the population, while name and ownership changes are difficult to interpret and may even be more likely when the population is thriving.

We modeled hotel 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 hotel was operating at t , calculated over Δt :

$$r(t) = \lim_{\Delta t \rightarrow 0} Pr \frac{(\text{failure } t, t + \Delta t \mid \text{operating at } t)}{\Delta t}. \quad (1)$$

Parametric estimates of the hazard rate require assumptions about the effect of time (in these models, age) on failure. There is disagreement about appropriate parameterizations of age dependence in organizational mortality, so we used a piecewise exponential model, which allows the rate of failure to vary in an unconstrained way over preselected age ranges (Tuma and Hannan, 1984; Barron, West, and Hannan, 1994). The age range in the model is divided at k points $\{a_1, a_2, \dots, a_k\}$, which, with $a_{k+1} = \infty$, creates k age periods: $I_l = \{t \mid a_l \leq t < a_{l+1}\}$, $l = 1, \dots, k$. Constants (baseline mortality rates) are estimated for each age period. So the piecewise exponential model we estimate is of the form:

$$r(t) = e^{\beta X} e^{\alpha_l}, \text{ if } t \in I_l, \quad (2)$$

where X represents the vector of covariates, β the associated vector of coefficients and α_l is a constant coefficient associated with the l th age period. The life histories of each hotel were broken into one-year spells to incorporate time varying covariates, yielding 14,280 spells. The reported results are maximum-likelihood estimates obtained using the statistical package TDA (Rohwer, 1993). Besides the institutional and density variables that are needed to test our hypotheses, we included variables in our models that we expected to influence the risk of hotel failure significantly. These include hotel size and age, type, and variables capturing spatial distribution.

Park Development Variables

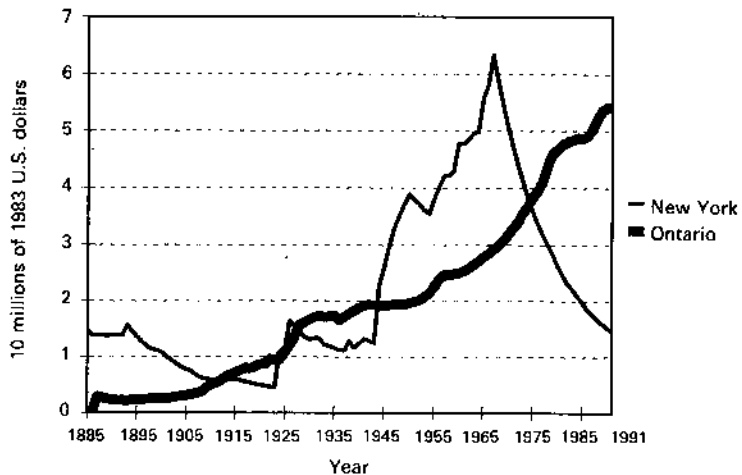
To operationalize the development of the parks, we used expenditure data for the Ontario Niagara Park, from the an-

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nual reports of the commissioners (Ontario Legislative Assembly, *Annual Report of the Commissioners of the Queen Victoria Niagara Falls Park, 1885–1926*, and *Report of the Niagara Parks Commission, 1927–1991*) and for the State Reservation in New York, both from the *Laws of New York (1886–1974)* and directly from the Niagara Falls State Reservation in Niagara Falls, New York. To make the expenditure figures comparable, they were converted to constant 1983 U.S. dollars. The expenditures were accumulated over time and depreciated to represent in each year the current value of past capital investments in a park. We were not able to identify the capital investment component of expenditures in all years, so we calculated the proportion (52 percent) of expenditures that were for capital investment in the years in which we could make the distinction and applied this to all years to estimate capital expenditures. We chose an annual depreciation rate of 10 percent, which was reasonable given the range of capital investments that the parks made; 10 percent would be fast depreciation for buildings but slow for roads and landscaping.

Figure 2 shows park development over time for both the Ontario and New York parks and is consistent with our understanding of the influences on the growth of the parks. The U.S. park has three intense periods of growth, 1923–1925, 1943–1950, and 1955–1967, bracketed by periods of neglect. Since reaching its peak in 1967, the park has atrophied. This pattern of sequential attention and neglect reflects the political nature of the New York park's funding. The Ontario park exhibits consistent growth from its founding in 1888 to the present. This reflects the increasing power and resources that accrued to the Ontario park as it continuously gained control over its environment.

Figure 2. Park development at Niagara Falls, 1885–1991.



Density and Population Dynamics

Hypothesis 1 predicts two subpopulations of hotels that compete. To determine, for the purposes of density dependence and population dynamics, whether there is one undifferentiated population of Niagara Falls hotels or two subpop-

ulations, we began by modeling "own" subpopulation and "other" subpopulation effects for the relevant variables. Then we tested to see if the coefficients for own and other variables are the same to determine the appropriate level of aggregation at which to model density and population dynamics. A number of studies have found that density and population dynamics results differ over levels of aggregation, often with competition being more intense at the local level (Barnett, 1990; Carroll and Wade, 1991; Swaminathan and Wiedenmayer, 1991; Baum and Singh, 1994).

The theory of density dependence holds that population density, defined as the number of organizations in the population, influences the vital rates of organizations through the processes of legitimation and competition (Hannan and Carroll, 1992). Legitimation, in the sense of taken-for-grantedness, increases with density but at a decreasing rate. Rates of organizational failure decrease and rates of organizational founding increase with legitimation. Competition increases with density at an increasing rate. Organizational failure increases and organizational founding decreases with competition. The prediction that density will have a nonmonotonic effect on failure and founding has been supported in a number of empirical tests (Hannan and Carroll, 1992). We expect that density will operate according to the theory within the subpopulations of hotels at Niagara Falls. We predict that the failure rate will decrease with *own density* (density within the focal hotel's subpopulation) and increase with *own density*². While hypothesis 1 predicts that competition extends across the border, it is less likely that there will be cross-border legitimation. The history of the rivalry between the two tourism communities includes repeated attempts to delegitimize the rival community. Therefore, although we include *other density* and *other density*² to test for a possible nonmonotonic effect, we predict that the influence of other density will be to increase the failure rate.

Carroll and Hannan (1989) suggested an extension of density dependence theory to include density at the time of the focal organization's founding. They argued that high density at the time of organizational founding will permanently increase the risk of failure. If organizations are founded in environments of intense competition, they may be forced into unattractive niches and may lack the initial resources necessary to establish the organization properly. For example, Niagara Falls hotels founded at times of high density may be forced to locate farther from the falls and away from train stations and highway interchanges. Unlike tourists, the resources necessary for founding a Niagara Falls hotel (e.g., bank financing, legal permission, and managers) have historically been partitioned by the border, and much of the relevant strategic space (particularly geographic location) also exist in two distinct sets (i.e., a hotel can be close to the falls on either the Canadian or the American side). Therefore, we expect that the influence of founding density will be from founding density in the hotel's subpopulation and predict that *own founding density* will increase the failure rate, but *other founding density* will not influence failure.

The rate of failure (or founding) may depend on the number of recent failures (or foundings) (Delacroix and Carroll, 1983).

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Like density, recent events have been found to have a non-monotonic effect on vital rates. The number of recent failures in a population provides a signal that the environment may be less hospitable for the organizational form, but recent failures also liberate resources that can increase the survival chances of other organizations. A recent review found that most tests for a nonmonotonic effect of past failures on the failure rate showed that the rate either simply increased, or first increased, then decreased with failures in the previous period (Baum, 1996: Table 4). Further, past foundings usually had the same pattern of first increasing then decreasing the founding rate. We predict that *own failures* at $t-1$ will increase and *own failures*² at $t-1$ will decrease the failure rate. Both signaling and resource implications of past events should extend across the border, so we predict the same pattern for *other failures* at $t-1$, and *other failures*² at $t-1$.

Hotel-level Variables

Size. Organizational size usually decreases failure. It may represent slack resources and economies of scale. In preliminary analysis, we explored alternative functional forms for the size variable and found the number of rooms to be best for explaining the failure of Niagara Falls hotels, which is how we measured size in the models we report. We also estimated models using the natural logarithm of the number of rooms as the size measure, and the results of the two operationalizations are very similar.

Finding the number of rooms for Niagara Falls hotels was difficult. We often had to rely on advertisements or listings in selective directories. Ultimately, we found size data for 85 percent (6356/7516) of Ontario hotels but only 31 percent (2126/7065) of New York hotels. We reasoned that the hotels for which we were unable to find size data were likely to be smaller, since they advertised less and were not listed in selective directories. Therefore, we assigned a size of 30 rooms to the hotels that left no record of their size, which is about half the average size (58.1 rooms) of other Niagara Falls hotels. We have some support for the accuracy of our assignment from a test we conducted on New York hotels that existed in 1991. In that year, our archival sources provided size data for 24 hotels, and their average size was 81.21 rooms. We were able to contact 13 of the hotels for which we had no size data to ask them their size, and the average was 31.38 rooms. We have run models without the size variable, and the results for other variables, including those associated with the parks, are the same as when the size variable is included.

Age. Although the initially accepted position was that there is a liability of newness, and organizations become more robust as they age, more recent evidence indicates that the failure rate increases with organizational age and that earlier findings supporting the liability of newness were due to the omission of organizational size as a covariate (Barron, West, and Hannan, 1994). We predict failure will increase with age, but confidence in any result for age in our models has to be tempered because we had to estimate size for many spells.

Type variables. Several types of hotels have existed during our period of observation. The major types include the "house" (now a virtually extinct type), "hotel," "motel," and "inn"; other types, such as the "lodge," have so few instances that we categorized them all together as "other." Dittmer and Griffin (1993: 215) stated that "the public tends to associate different characteristics with the various terms used and to select or avoid lodging establishments on the basis of their interpretation of the terms." The stated goal and marketing strategy of each firm is distinctly linked to its particular form.

Firms that end their name with *house* (e.g., The International House) are more similar to firms with the same naming strategy in their pricing and services offered than they are to other firms. Houses link themselves to a tradition of European hostelries that traditionally have served guests of wealth and nobility for extended stays (serving as a "house" away from home). At Niagara Falls, until relatively recently, houses operated as expensive summer resorts for wealthy North Americans and Europeans. Likewise, firms that use a *hotel* naming strategy are more similar in form to firms with the same naming strategy than they are to other firms. They have typically operated year-round and are usually larger in terms of numbers of rooms than any other lodging form. Similar distinctions are found for *inns* (small and inexpensive) and *motels* (inexpensive and geared toward automobile travelers). We classified lodging firms that do not use any of these naming strategies (e.g., a firm simply called McNulty), and therefore have no clearly categorizable form, as having a form that is *other*. We expect that being one of the four categorizable types of establishment decreases the failure rate of the firm relative to those that choose an alternate, less well-known type.

Economies of Geography and Agglomeration, and Localized Competition

"Economies of geography result from proximity to activities from which the need or demand for an organization's services are derived" (Baum and Mezias, 1992: 585). Proximity to relevant attractions should help hotels, so we expect that the failure rate of Niagara Falls hotels will increase with distance from the falls. To test this, we used the variable *distance to the falls*, which is the Euclidian distance in miles between the hotel and the falls. We also expect that the advantage of proximity to the falls will decrease with time, because proximity to the falls should be less important as transportation becomes easier over the years. To test this idea, we included an interaction between *distance to the falls* and *calendar time*.

Although proximity to the falls should help hotels, it is also associated with proximity to other hotels. Consideration of the location of competitors suggests two predictions for hotel failure. First, the degree of competition between two organizations should be a negative function of the distance between them. The idea that organizations that are closer to each other in some way are more competitive than more distant organizations is referred to as localized competition and was tested for physical space by Baum and Mezias

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Table 1

Comparison of Geographic Structure of the Hotel Populations in Ontario and New York*

	<i>N</i>	Distance from falls	Average distance to hotels on own side of falls	Average distance to all hotels	Distance to main bridge	Number of other hotels within half-mile
New York	6909	2.073 (1.35)	1.371 (.756)	1.881 (1.11)	1.346 (1.28)	16.498 (11.55)
Ontario	7373	1.769 (.914)	1.452 (.526)	1.944 (.609)	1.073 (.741)	16.10 (13.91)
Difference of means test†		35/88	29/88	57/88	39/88	83/88
Temporal pattern of significant differences		1957–1991 NY > ONT	1905, 1942–1956 ONT > NY	1904–1926, 1928–1929 ONT > NY	1918–1919, 1925–1926 ONT > NY	1904–1963 NY > ONT
			1978, 1980–1991 NY > ONT	1957, 1959–1960, 1963–1991 NY > ONT	1957–1991 NY > ONT	1967, 1970–1991 ONT > NY

* Distances are in miles. Standard deviations are in parentheses.

† Number of years, 1904–1991, in which the means of Ontario and New York are different at $p < .05$.

(1992). They found that the failure rate of Manhattan hotels decreased with the average of the Euclidian distance between the focal hotel and all other Manhattan hotels. To test for localized competition, we use the variable *distance to competitors*, which is the average of the Euclidian distance in miles between the focal hotel and all other hotels that existed in the year. For hotels on different sides of the Niagara River, we calculated the distance between them by way of the major bridge.² Like proximity to the falls, we expect the advantage of distance from competitors will decrease with time, since transportation became easier during the period of observation, so we included an interaction between *distance to competitors* and *calendar time*, for which we predict a positive coefficient.

The second way that the locations of competitors matter is in the production of agglomeration economies. There may be advantages to locating within a cluster of similar organizations. For example, tourists in Niagara Falls may minimize search costs when looking for a hotel by going first to an area with a high concentration of hotels. Baum and Mezas (1992) found that the failure rate of Manhattan hotels decreased with the number of other hotels within three avenues and 25 streets of the focal hotel. We test for agglomeration economies using the variable *half-mile agglomeration*, which is the number of other hotels within a half-mile of the focal hotel. We expect that the failure rate will decrease as half-mile agglomeration increases.

Table 1 summarizes the spatial evolution of hotels at Niagara Falls. The means of the distance measures for New York and Ontario hotels are similar, indicating that the spatial structures of the two areas were comparable. Difference of means tests done in each year in which a comparison was possible (1904–1991), however, indicate a number of significant differences. New York hotels were significantly farther from the falls, the bridge, and competitors starting in 1957. New York hotels had larger agglomerations from 1904 to

2

We also investigated a localized competition measure based only on distances to hotels on the same side of the river, and the results were comparable to those using distances between all hotels.

Table 2

Basic Statistics and Correlation Matrix for Failure Analysis

Variable	Mean	S.D.	1	2	3	4	5	6	7	8
1. Hotel failed	0.04	0.19								
2. Age	19.03	18.73	-.03							
3. Size	45.84	53.63	-.04	.26						
4. Hotel	0.29	0.45	.02	.24	.09					
5. Motel	0.44	0.50	-.07	-.22	-.16	-.57				
6. House	0.10	0.30	.00	.19	.13	-.21	-.29			
7. Inn	0.07	0.25	.00	-.02	.13	-.17	-.24	-.09		
8. Distance to falls	1.92	1.16	.01	-.13	-.18	-.11	.20	-.11	.04	
9. Distance to falls × time	139.0	115.7	-.01	-.08	-.14	-.30	.42	-.23	.07	.87
10. Distance to competitors	1.91	0.89	.00	.06	-.11	-.18	.29	-.19	.08	.89
11. Distance to competitors × time	142.3	100.8	-.01	-.02	-.09	-.35	.49	-.28	.10	.72
12. Half-mile agglomeration	16.29	12.82	-.02	-.07	.02	-.16	.22	-.04	-.04	-.25
13. Total park development	5591	2635	-.02	-.04	-.08	-.47	.64	-.37	.05	.19
14. Own park development	2854	1585	-.01	.04	-.03	-.36	.52	-.31	.11	.14
15. Other park development	2738	1704	-.01	-.10	-.10	-.39	.51	-.29	-.02	.17
16. Own density	102.5	50.74	-.01	-.05	-.07	-.44	.56	-.21	.02	-.02
17. Own density ² /1000	13.08	11.06	-.01	-.04	-.07	-.41	.53	-.21	.03	-.05
18. Other density	77.77	50.88	-.01	-.06	-.05	-.32	.50	-.30	.04	.34
19. Other density ² /1000	8.64	9.6	.00	-.07	-.04	-.25	.40	-.24	.02	.35
20. Own founding density	79.36	50.06	.01	-.39	-.11	-.43	.56	-.30	.05	.11
21. Other founding density	61.24	48.96	-.02	-.35	-.08	-.47	.61	-.31	.06	.32
22. Own failures	3.74	4.52	-.01	-.02	-.02	-.13	.18	-.06	.01	-.01
23. Own failures ²	34.48	127.8	-.01	-.03	-.02	-.08	.13	-.04	-.01	-.02
24. Other failures	2.98	4.03	-.02	-.05	-.04	-.16	.27	-.16	.00	.14
25. Other failures ²	25.08	101.1	.00	-.03	-.02	-.06	.11	-.07	.00	.08
26. Ontario	0.52	0.5	-.03	-.06	-.08	-.29	.28	-.16	.04	-.13
27. Calendar time	68.6	28.76	-.02	.04	-.04	-.46	.62	-.39	.12	.23
28. Left censored	0.04	0.19	-.01	.11	-.03	.15	-.17	.10	.02	-.02
Variable	9	10	11	12	13	14	15	16	17	18
10. Distance to competitors	.89									
11. Distance to competitors × time	.94	.89								
12. Half-mile agglomeration	-.13	-.38	-.19							
13. Total park development	.52	.36	.64	.16						
14. Own park development	.41	.27	.51	.23	.78					
15. Other park development	.43	.31	.51	.03	.82	.28				
16. Own density	.24	.12	.37	.30	.71	.60	.54			
17. Own density ² /1000	.20	.10	.33	.28	.68	.56	.53	.98		
18. Other density	.57	.44	.62	.06	.76	.58	.64	.25	.20	
19. Other density ² /1000	.53	.41	.53	.04	.61	.47	.51	.07	.01	.96
20. Own founding density	.32	.20	.40	.26	.53	.50	.35	.63	.61	.28
21. Other founding density	.57	.42	.62	.11	.66	.51	.55	.32	.28	.75
22. Own failures	.06	.04	.10	.10	.23	.17	.19	.27	.23	.13
23. Own failures ²	.02	.02	.05	.05	.18	.06	.22	.19	.18	.08
24. Other failures	.25	.19	.26	.06	.40	.30	.34	.21	.21	.43
25. Other failures ²	.11	.08	.10	.04	.19	.21	.10	.05	.03	.24
26. Ontario	.04	.04	.17	-.02	.41	.29	.37	.62	.69	-.07
27. Calendar time	.60	.43	.74	.10	.90	.76	.68	.64	.61	.69
28. Left censored	-.09	-.02	-.10	-.17	-.16	-.16	-.10	-.19	-.13	-.06
Variable	19	20	21	22	23	24	25	26	27	
20. Own founding density	.17									
21. Other founding density	.69	.56								
22. Own failures	.09	.20	.09							
23. Own failures ²	.04	.12	.05	.88						
24. Other failures	.36	.16	.35	.04	.05					
25. Other failures ²	.24	.05	.18	.01	.00	.85				
26. Ontario	-.28	.31	.08	.13	.14	.05	-.08			
27. Calendar time	.52	.56	.68	.17	.10	.33	.12	.43		
28. Left censored	-.09	-.28	-.17	-.09	-.03	.00	-.02	.19	-.14	

1963, while agglomerations were larger in Ontario in 1967 and from 1970 to 1991.

Control Variables

Ontario is coded one for hotels on the Ontario side of the border. This variable will capture any basic differences in the

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failure rate resulting from, for example, a better view of the falls from the Ontario side. *Left censored* is coded one for hotels that were founded before the beginning of our observation period, to control for the possibility that these hotels may be different in an unobserved way because they had survived selection before our analysis begins. *Calendar time* is the year of the observation minus 1885. This variable is included to capture trends in the failure rate that are a function of historical time. Table 2 shows basic statistics and a correlation matrix for the variables used in the failure models.

FAILURE RESULTS

Table 3 shows the results of the failure analysis. Model 1 includes age, size, and the variables capturing density and population dynamics. The model is a significant improvement over the baseline model that posits a constant rate of failure (not shown), ($\lambda^2 = 163.44$, 21 d.f., $p < .01$). To test for the presence of subpopulations, we estimated a version of model 1 in which the coefficients of own and other variables were constrained to be equal [e.g. $\beta(\text{own density}) = \beta(\text{other density})$]. If a log-likelihood test indicated that the unconstrained model was not better than the constrained model, it would mean that density and population dynamic effects are the same regardless of which subpopulation they occur in and, therefore, that they should be modeled at the aggregate level. The test indicated that there was a difference between the constrained and unconstrained models ($\lambda^2 = 41.43$, 5 d.f., $p < .01$), indicating that there are two subpopulations, as predicted by hypothesis 1.

Size had a negative coefficient, indicating that larger hotels are less likely to fail, as predicted. Also as predicted, own density had a negative coefficient and own density² had a positive coefficient. At the subpopulation level, the theory of density dependence is supported. The effects of the other subpopulation's density change slightly in the full model, so we will wait to comment on them. Own founding density has the predicted positive coefficient. Surprisingly, the coefficient of other founding density actually decreased the failure rate. We had reasoned it would have no effect. Failures in the previous period in the own subpopulation had the predicted nonmonotonic effect, first increasing then decreasing the rate of failure. Failures in the previous period in the other subpopulation had the opposite effect, first decreasing then increasing the failure rate. The failure rate was lower for Ontario hotels and increased with calendar time. The control for left-censored observations is not significant.

Figure 3 shows the estimated baseline failure rates for the age ranges. We estimated constrained models to test the significance of differences in the age coefficients. At the .05 level, the initial increase at two years ($\lambda^2 = 4.02$, 1 d.f., $p < .05$), the subsequent decrease at five years ($\lambda^2 = 18.06$, 1 d.f., $p < .01$), and the increase at sixty years of age ($\lambda^2 = 5.52$, 1 d.f., $p < .05$) are significant. Different from our prediction and past findings, the failure rate first increases then decreases with age, remains constant for a large range of ages, then increases again for organizations over sixty years of age. This unusual pattern of age dependence is fascinat-

Table 3

Piecewise Exponential Models of Hotel Failures ($N = 562$; 14,280 spells)*

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Age (in years)†						
0-2	-1.784 (.310)	-1.953 (.336)	-1.983 (.417)	-1.881 (.417)	-2.034 (.405)	-2.010 (.415)
2-5	-1.476 (.30)	-1.553 (.322)	-1.571 (.407)	-1.466 (.407)	-1.622 (.394)	-1.598 (.404)
5-10	-2.065 (.299)	-2.066 (.323)	-2.074 (.409)	-1.988 (.409)	-2.127 (.399)	-2.104 (.408)
10-20	-2.294 (.293)	-2.216 (.321)	-2.225 (.403)	-2.162 (.401)	-2.300 (.392)	-2.277 (.401)
20-40	-2.530 (.304)	-2.423 (.339)	-2.445 (.416)	-2.425 (.414)	-2.566 (.405)	-2.544 (.413)
40-60	-2.559 (.339)	-2.586 (.386)	-2.612 (.456)	-2.567 (.454)	-2.704 (.445)	-2.684 (.452)
>60	-1.948 (.364)	-2.034 (.410)	-2.087 (.476)	-2.034 (.473)	-2.172 (.464)	-2.151 (.470)
Size	-.008*** (.002)	-.008*** (.002)	-.008*** (.002)	-.008*** (.002)	-.008*** (.002)	-.008*** (.002)
Hotel		-.486*** (.136)	-.574*** (.140)	-.597*** (.139)	-.610*** (.139)	-.616*** (.140)
Motel		-1.552*** (.134)	-1.569*** (.134)	-1.588*** (.134)	-1.592*** (.134)	-1.597*** (.135)
House		-.413** (.190)	-.465*** (.194)	-.503*** (.193)	-.509*** (.193)	-.514*** (.194)
Inn		-.756*** (.188)**	-.819*** (.189)	-.874*** (.190)	-.872*** (.190)	-.881*** (.193)
Distance to falls			.588*** (.237)	.571*** (.237)	.619*** (.236)	.610*** (.239)
Distance to falls × time			-.008*** (.003)	-.007** (.003)	-.008*** (.003)	-.007*** (.003)
Distance to competitors			-.557** (.318)	-.518* (.317)	-.602** (.314)	-.592** (.316)
Distance to competitors × time			.007** (.004)	.006* (.004)	.007** (.004)	.006* (.004)
Half-mile agglomeration			-.009** (.005)	-.010** (.005)	-.010** (.005)	-.010** (.005)
Total park development				-.179*** (.066)	-.176*** (.066)	
Own park development						-.168*** (.072)
Other park development						-.182*** (.070)
Own density	-.020*** (.006)	-.016*** (.006)	-.017*** (.006)	-.016*** (.006)	-.014*** (.006)	-.014*** (.006)
Own density ² /1000	.102*** (.027)	.096*** (.026)	.100*** (.026)	.113*** (.027)	.100*** (.025)	.102*** (.026)
Other density	-.010* (.006)	-.008* (.006)	-.006* (.006)	-.002 (.006)	0.007*** (.002)	0.007*** (.002)
Other density ² /1000	.066** (.028)	.053** (.030)	.043* (.030)	.047* (.031)		
Own founding density	.003** (.002)	.004*** (.002)	.004*** (.002)	.004** (.002)	.004** (.002)	.004** (.002)
Other founding density	-.009*** (.002)	-.004** (.002)	-.005** (.002)	-.005*** (.002)	-.005*** (.002)	-.005*** (.002)
Own failures	.040** (.023)	.038** (.023)	.040** (.023)	.029 (.023)	0.030 (.024)	.029 (.024)
Own failures ²	-.002** (.001)	-.002** (.001)	-.002** (.001)	-.001 (.001)	-.001* (.001)	-.001 (.001)
Other failures	-.068*** (.026)	-.062** (.026)	-.061** (.026)	-.065*** (.026)	-.074*** (.025)	-.073*** (.025)
Other failures ²	.002*** (.001)	.002** (.004)	.002** (.001)	.002*** (.001)	.002*** (.001)	.002*** (.001)
Ontario	-.461*** (.178)	-.649*** (.182)	-.739*** (.190)	-.664*** (.191)	-.765*** (.178)	-.766*** (.178)
Calendar time	.010** (.004)	.012*** (.004)	.014*** (.005)	.022*** (.006)	.019*** (.006)	.019*** (.006)
Left censored	-.035 (.306)	.102 (.305)	.114 (.307)	-.078 (.316)	-.099 (.317)	-.105 (.318)
Log-likelihood	-2298.49	-2236.18	-2228.85	-2225.14	-2226.28	-2226.24

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

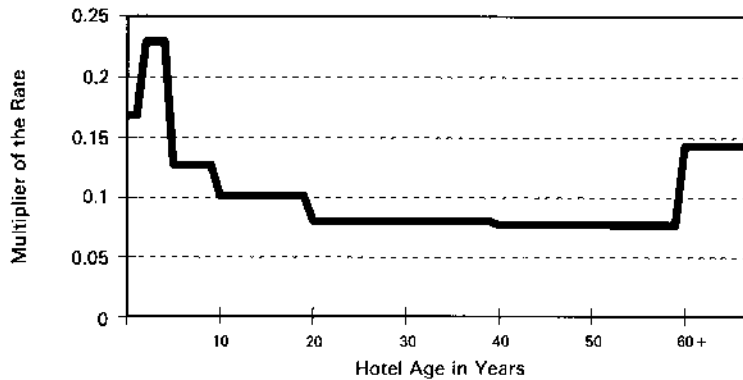
* Coefficients represent the effect on the log-hazard. Standard errors are in parentheses.

† Estimates of significance are not shown for age dummies, as we are not testing the hypothesis that these coefficients are different from zero.

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ing, but the fact that we had to estimate size for a large percentage of spells makes it unadvisable to put high investment into interpreting the pattern. Briefly, the pattern of age dependence may be due to the fact that hotels represent large capital investments: If the hotel passes an early hurdle of feasibility (i.e., if it is not an immediate flop), then heavy sunk costs may facilitate its persistence until the physical asset begins to break down, apparently at around sixty years of age.

Figure 3. Age-specific baseline failure rates of hotels.*



*Using coefficients of model 1.

Model 2 adds the type variables. The model was a significant improvement over model 1 ($\chi^2 = 124.62$, 4 d.f., $p < .01$). As predicted, each of the modeled types, Hotel, Motel, House and Inn was less likely to fail than the omitted category of Other. Tests for differences between the estimated coefficients indicate that the ordering of types by failure rate, from highest to lowest, was as follows: Other > House = Hotel > Inn > Motel.

Model 3 adds the variables that test for economies of geography and agglomeration and for localized competition and was a significant improvement over model 2 ($\chi^2 = 14.64$, 5 d.f., $p < .05$). As predicted, distance to falls increased the failure rate and the interaction of distance to falls and calendar time showed that the disadvantage of being far from the falls decreases with time. The interaction overwhelms the basic coefficient in the 77th year ($.588/.0076 = 77$). Distance to competitors had the predicted effect of decreasing failure, and this effect also lessens with time. Coincidentally, the interaction with time overwhelms the basic coefficient in exactly the same year as it does for distance to the falls ($.557/.0072 = 77$). Initially, hotels that were close to the falls and far from competitors were less likely to fail, but these advantages decayed with time, and starting around 1962 ($1885 + 77$) hotels were less likely to fail if they were farther from the falls and closer to competitors. Half-mile agglomeration had the predicted effect of lowering the failure rate. So, although for most of the history of the population, hotels are less likely to fail if they are on average far from other hotels, they are also less likely to fail if they are located in a cluster of hotels. We tested and found no evidence for a nonmonotonic effect of half-mile agglomeration (model not shown).

Model 4 introduced park development and improved significantly over model 3 ($\lambda^2 = 7.42$, 1 d.f., $p < .01$). Park development had the effect predicted by hypothesis 2 of reducing the failure rate of Niagara Falls hotels. Because the effect of the density of the other subpopulation was monotonic in model 4, model 5 was estimated without the second-order term, other density². Model 5 was not significantly less powerful than model 4 ($\lambda^2 = 2.28$, 1 d.f., $p \approx .13$). Other density is positive in model 5, so, as hypothesis 1 predicted, there are two hotel subpopulations at Niagara Falls, and there is competition between them, but no legitimation.

Model 6 breaks park development into own and other to test hypothesis 3 that hotels will benefit more from development of their own park than they will from the development of the other park. The difference between the coefficients for own park development and other park development was not significant ($\lambda^2 = .08$, 1 d.f., $p \approx .78$), so hypothesis 3 was not supported. The failure rate of Niagara Falls hotels was lowered by the development of the parks, but the effect was the same for development of the hotel's own park as it was for development of the other park. Coefficients of other variables remained the same in models that included the park development variables, except the variables representing own failures, which were no longer significant.

Analysis of Hotel Founding

Since there is no identifiable organization before a founding, an aggregate unit of analysis is necessary to study processes of organizational founding. The dependent variable is the number of foundings in a year in one of the hotel subpopulations at Niagara Falls, to be explained by park development, density and population dynamics, and control variables. We considered modeling founding processes using Poisson regression, which is applicable when the dependent variable is a count of events in a discrete period (King, 1988). Poisson regression requires that the mean and variance of Y_i given X_i are equal. In many models, the variance exceeds the conditional mean, a situation referred to as overdispersion. Overdispersion has an effect similar to heteroscedasticity in the linear regression model, allowing for consistent estimations of parameters but inconsistent estimates for standard errors, invalidating hypothesis testing. We performed Cameron and Trivedi's (1990) tests for overdispersion on Poisson regressions using the variables described below and found evidence of it. Apparently, there is some unobserved heterogeneity—variance in the founding rates that our covariates are unable to account for. A negative binomial model responds to this problem by adding a parameter to model overdispersion. The overdispersion we found was of a variance-mean ratio that is linear in the mean: $\text{var}(y_i) = \mu_i + \alpha \cdot (\mu_i^2)$. We used Cameron and Trivedi's (1986) type of negative binomial model, referred to as Negbin II, for this form of overdispersion and estimated negative binomial models using the statistical package LIMDEP (Greene, 1992).

All of the variables used in the failure analysis that are independent of a focal hotel can be used in the founding analysis. The accepted position is that founding and failure are

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antipodal, so we predict that density variables will have the opposite effect on founding as they do on failure. Own density should increase and own density² should decrease the founding rate, and other density should decrease the founding rate. As noted, studies of the effects of past foundings on the founding rate have found a nonmonotonic effect, with founding first increasing then decreasing, so we predict that for both own and other subpopulations, foundings will increase and foundings² will decrease the founding rate. Ontario and calendar time are included as controls. Table 4 shows basic statistics and a correlation matrix for the variables used in the founding analysis.

Table 4

Basic Statistics and Correlation Matrix for Founding Analysis															
Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Foundings	3.72	5.23													
2. Total park development	4.39	2.67	.26												
3. Own park development	2.24	1.51	.17	.85											
4. Other park development	2.15	1.60	.27	.87	.47										
5. Own density	72.2	47.0	.26	.69	.62	.57									
6. Own density ² /1000	7.41	9.09	.21	.65	.59	.53	.97								
7. Other density	68.2	50.5	.07	.75	.61	.68	.29	.26							
8. Other density ² /1000	7.19	9.38	.05	.68	.55	.61	.24	.16	.96						
9. Own foundings	3.72	5.23	.48	.28	.18	.30	.37	.32	.09	.06					
10. Own foundings ²	41.1	135.7	.44	.21	.15	.20	.22	.19	.12	.08	.90				
11. Other foundings	3.30	5.21	.19	.37	.38	.26	.13	.10	.42	.37	.16	.18			
12. Other foundings ²	37.7	135.1	.23	.23	.23	.17	.13	.09	.23	.21	.18	.14	.90		
13. Ontario	0.45	0.50	.09	.10	.04	.13	.19	.36	-.05	-.24	.08	.03	-.04	-.01	
14. Calendar time	57.1	29.1	.15	.92	.76	.82	.61	.58	.73	.63	.17	.12	.30	.16	.15

Results

Table 5 presents the results of negative binomial models. Model 7 is a basic model to test whether density and population dynamics should be modeled at the subpopulation level. It was a significant improvement over the baseline model of a constant rate of founding (not shown) ($\chi^2 = 55.08$, 9 d.f., $p < .01$). A log-likelihood test leads to a rejection of the null hypothesis that own and other coefficients are the same ($\chi^2 = 23.2$, 4 d.f., $p < .01$). As with failure, in founding models there is evidence of the subpopulation distinction predicted by hypothesis 1. Model 8 dropped own foundings², other foundings, and other foundings², which were not significant in model 7. Own density and own density² had the predicted effects. Own foundings had a monotonic effect of increasing the founding rate, while other variables were not significant.

Model 9 added park development to test hypothesis 2 for foundings. The model was a significant improvement over

Table 5

Negative Binomial Models of Hotel Founding (196 Observations)*

Variable	(7)	(8)	(9)	(10)	(11)
Constant	-.385 (.555)	-.490 (.542)	-.334 (.582)	-.158 (.355)	-.123 (.399)
Total park development	-	-	.424*** (.101)	.425*** (.093)	-
Own park development	-	-	-	-	.400*** (.098)
Other park development	-	-	-	-	.448*** (.117)
Own density	.027** (.014)	.031*** (.012)	.026** (.013)	.022*** (.009)	.022** (.010)
Own density ² /1000	-.123** (.066)	-.141** (.062)	-.140** (.065)	-.124*** (.047)	-.121*** (.050)
Other density	.001 (.011)	.004 (.009)	-.003 (.011)	-.008*** (.003)	-.009*** (.003)
Other density ² /1,000	-.019 (.059)	-.028 (.046)	-.028 (.050)	-	-
Own foundings	.079* (.052)	.057*** (.022)	.044** (.019)	.463*** (.018)	.046*** (.018)
Own foundings ²	-.001 (.002)	-	-	-	-
Other foundings	.014 (.071)	-	-	-	-
Other foundings ²	-.000 (.003)	-	-	-	-
Ontario	.109 (.271)	.146 (.209)	.127 (.219)	.169 (.218)	.147 (.236)
Calendar time	.003 (.007)	.002 (.007)	-.018** (.008)	-.017** (.008)	-.017** (.008)
α	.770*** (.125)	.775*** (.123)	.668*** (.118)	.672*** (.120)	.669*** (.120)
Log-likelihood	-449.73	-450.16	-439.38	-439.53	-439.38

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

* Standard errors are in parentheses.

model 8 ($\chi^2 = 21.56$, 1 d.f., $p < .01$), and total park development had the predicted effect of increasing the founding rate. Since other density and other density² both had negative coefficients in model 9, we dropped the second-order term and estimated model 10. In model 10, other density was negative and significant. As predicted by hypothesis 1, and as we found in the failure models, there is a competitive effect of the density of the rival subpopulation, but no legitimating effect.

Model 11 breaks park development into own and other to test hypothesis 3 for foundings. As in the failure models, in founding models the difference between the coefficients of other park development and own park development was not significant ($\chi^2 = .30$, 1 d.f., $p \approx .58$). Hypothesis 3 is not supported. As the parks develop, the founding rate of Niagara Falls hotels increases, but it does not matter on which side of the river the development takes place.

DISCUSSION

The results of the failure and founding models are in perfect correspondence with respect to our hypotheses. In both founding and failure, there is evidence of two subpopulations of hotels, and there is competition, but not legitimation, be-

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tween the subpopulations. Thus, Niagara Falls hotels satisfied the preconditions for commensalism, with organizations sharing reliance on resources but differentiated such that it was possible for a group of organizations engaging in commensalism to derive a relative advantage over other organizations. The parks that were established in response to the tragedy of the commons at the falls benefited the hotel populations by lowering the failure rate and raising the founding rate. This evidences the potential of institutions to promote the growth of populations by regulating the self-interested action of individual organizations. Surprising to us, the effect of the parks on both founding and failure rates is the same despite the border. A park benefits hotels across the river as much as it does those in its own community. We consider this finding compelling in light of the historical evidence that the parks were supported as a means to provide relative competitive advantage to their communities and that inter-community rivalry was a critical motivation in the collective action project to create the parks.

The nondifferentiated effect of the parks suggests that expectations of the institutional entrepreneurs about the competitive implications of the institutions were not accurate and that by contributing to the establishment of the parks, institutional entrepreneurs were not providing a relative advantage to their group. Actors operate in response to their expectations, but when their actions are based on complicated predictions such as what effect institutions will have on organizations, the results are often not what they expected. Errors in the expectations actors have for the effect of institutions may be systematic. Perhaps actors systematically underestimate the response rival groups will make to institutional developments of the focal group. Actors may also tend to do a poor job of extrapolating institutional structures into the future, failing to account fully for path dependence. Our interpretation of the role of inaccurate expectations in the institution-building process reinforces the importance of considering the context in which institution building occurs, and not just the outcomes of institutions. This is one way that the historical study of the creation of the parks complements the quantitative study of their effect. The best evidence of the expectations of the interested actors is what they said and did at the time the parks were created, not the ultimate outcome of their actions.

It is also possible that the parks did provide a relative advantage that our models failed to capture. It could be that the Ontario park provided a benefit to Ontario hotels that was a constant over the period we studied and is reflected in the dummy variable for Ontario hotels in the failure models. Another explanation for the coefficient of the Ontario variable is the popular belief that the view of the falls is better from the Ontario side, but it is interesting to note that before the creation of the parks, the popular perception was that the view was better from the New York side (*Times of London*, November 22, 1876). The survival advantage of Ontario hotels could also be a function of greater industrialization on the New York side. The relationships between the tourism and heavy industry sectors at Niagara Falls could form the basis for a fascinating study of community ecology.

The institutional history of the falls supports the arguments of economists such as North (1990) and organizational theorists such as DiMaggio (1988) that organizations in the pursuit of their interests are a driving force behind institutional creation and change. The institutional history of the falls also demonstrates the limitations of a simple rational model of behavior for explaining institutional creation and change. Organizational actors at the falls were motivated by nonpecuniary interests such as intergroup rivalry, were overly influenced by the temporal near-term, and may have miscalculated how the institutions they established would develop and operate. The interests of organizational actors with regard to institutions are often ignored within organizational theory and are treated as a standard rational feature of actors within the institutional economics framework, so these findings move our understanding of organizational action forward.

Relatedly, the examination here of cross-border competition is the first that we are aware of in organizational theory. We predicted and found cross-border competition, but not cross-border legitimation. This adds a new dimension to the active debate on the nature of legitimacy in the theory of density dependence (Baum and Powell, 1995; Hannan and Carroll, 1995). Historical accounts and the results of failure and founding analyses support the idea that attacking the legitimacy of rival groups was a strategy for tourist organizations at Niagara Falls.

Finally, some of the other variables from our failure analysis generate notable results. Our findings on economies of agglomeration and geographically localized competition are consistent with Baum and Mezias (1992). We extend their study of geographic space and competition in two ways. First, the falls are a clear center of attraction, allowing us to test economies of geography in a way that was not possible in the Manhattan hotel industry studied by Baum and Mezias (1992). Second, we find that the relevance of spatial location changes with historical time, which we attribute to improved transportation. We also found significant differences in the failure rates of Niagara Falls hotels as a function of their type. We are fascinated that such strong results could be obtained from a variable operationalized from the information in the names of the organizations we studied. Clearly, hotel organizations do better if they take the form of one of the legitimated types—house, hotel, inn, or motel—rather than represent some other, less known form. Additionally, it is compelling that at Niagara Falls the humble forms of motel and inn were more robust than the grander forms of hotel and house, after controlling for size and other features of the organizations.

The overall findings here do more, though, than simply illustrate the dynamics of hotel populations or the complexities associated with organizational collective action. The structural conditions that led to commensalism at the falls are generalizable and can be used to predict the occurrence of commensalism in other contexts. Intergroup rivalry may facilitate collective action in the many circumstances in which differentiated groups of organizations are in competition with each other. This study shows that competing organizations

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can be affected by the same ingroup-outgroup effects that are fundamental to understanding individuals in groups. One testable prediction of this is that commensalism is more common in industries with greater levels of foreign competition. As international trade increases, institutions may become the principal weapons in a competitive environment in which the level of selection moves from the organization to the commensalistic group.

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