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BEYOND MANHATTAN: LOCALIZED COMPETITION AND ORGANIZATIONAL FAILURE IN URBAN HOTEL MARKETS THROUGHOUT THE UNITED STATES, 2000–2014

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Research summary*: I conducted a nationwide replication of Baum and Mezias' (1992) pioneering single-market study of localized competition by pooling the populations of 90 urban U.S. hotel markets. Consistent with Baum and Mezias' three hypotheses, I demonstrate a negative market-level effect on survival duration of size-based, geographic-based, and price-based localized competition. When analyzing submarket "windows," I found support for size-based and geographic-based localized competition. In contrast, Baum and Mezias find support for only size-based localized competition at the market level, but for all three forms of localized competition when analyzing submarket windows. I extend their analysis by (1) using standardized measures of localized competition, and (2) showing separate results for key subpopulations. I conclude that there are indeed firm-level benefits of avoiding localized competition.*

Managerial summary*: This paper demonstrates that—at a broad level of analysis such as a city—hotels are more likely to survive if there are fewer other properties (1) in their geographical vicinity, (2) of similar size, and (3) at their price point. Thus, prospective owners should be leery of location in the more crowded niches even if these may be plausibly more lucrative for some. Sparsely populated niches appear to be less risky on average. When we study this phenomenon within a narrower geographic scope such as a part of the city, the least crowded niches in terms of geography, price or size no longer appear to provide benefits in terms of survival. Thus, it is possible that only the most sparsely populated niches citywide improve a hotel's likelihood of survival.*

INTRODUCTION

In 1992, Baum and Mezias published an unassuming study on location and competition using an industry that had previously received little academic attention: the lodging industry. The paper has proven to be influential for scholars in the areas of organization theory and strategic management because of its intuitive hypotheses and impactful conclusions: Based on an analysis of failure rates, firms appear to compete most intensely with others with similar characteristics, hence the term *localized competition*. The dimensions of localized competition investigated by Baum and Mezias (1992, henceforth, Baum and Mezias) are compelling because they are easily understood and measured. They are (1) size in terms of number of rooms, (2) geographic location, and (3) price-point.

Baum and Mezias' study was one of the first to empirically demonstrate firm-level performance-based evidence of localized competition, particularly in dimensions other than geography. Economists had long theorized about localized competition in simple mathematical models, but the conclusions were dependent on assumptions: proximity to others benefits firms indirectly if

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firms are located on a line (Hotelling, 1929), but hurts firms located on a circle (Salop, 1979). When studies in the economics tradition have tested the concept empirically, they have analyzed cross-firm correlations of market shares (e.g., Schmalensee, 1985) or prices (e.g., Kalnins, 2003; Pinkse, Slade, and Brett, 2002). The focus on establishment-level performance variables such as survival duration originated in studies in the ecological tradition, and among those, the specific link to localized competition originated with Baum and Mezias.

Thus, Baum and Mezias found favor among scholars doing research on strategic groups (Desarbo and Grewal, 2008; Li, 2008; Nair and Filer, 2003; Nath and Gruca, 1997; Pouder and John, 1996) and segmented environments (Carroll and Wade, 1991; Lomi, 1995; Usher, 1999). These perspectives had previously suggested that all firms within a population did not compete equally, but the quantification of specific dimensions was a clear step forward for the various literatures that consider localized competition, differentiation, and competitive dynamics within organizational populations.

As the original paper noted, the research design had "the potential to provide a point of contact between researchers in organizational ecology and those in strategy and organization" (Baum and Mezias: 580). This has, in fact, happened, and probably to a greater degree than the authors had anticipated. The paper has received substantial attention in the strategy field and at the *Strategic Management Journal* in particular, which has cited Baum and Mezias 35 times, more frequently than any other journal including the paper's home journal, the *Administrative Science Quarterly*.[1] Further, the paper has been prominently featured in heavily cited texts such as Aldrich (1999), Scott and Davis (2015), and Shane (2003), leading to its arguable place in the organizational theory canon.

In addition to the work cited above on strategic groups, the paper has proven useful for the framing of strategic management studies regarding location and localized competition (Baum and Korn, 1999; Fabrizio and Thomas, 2012; McNamara, Deephouse, and Luce, 2003; Zaheer and Zaheer, 2001), demand-side agglomeration (Belderbos, Olffen, and Zou, 2011; Canina, Enz, and Harrison, 2005; Chung and Kalnins, 2001; Kalnins and Chung, 2004; McCann and Vroom, 2010), organizational learning and spillovers (Chang and Park, 2005; Chang and Xu, 2008; Garcia-Pont and Nohria, 2002; Ingram and Baum, 1997b; Shaver and Flyer, 2000), and studies of firm scale and scope (Bercovitz and Mitchell, 2007; Dobrev and Carroll, 2003; Dowell, 2006). While the purpose of the invocation of Baum and Mezias differs from study to study, the modal usage is that it is good for firms to be different, or relatedly, that the middle of the distribution is a bad place to be for firms in any strategic dimension such as size, location, and price. Other studies astutely use the paper as a key example when contrasting the implications of localized competition with opposing forces, namely, those of legitimacy (Deephouse, 1999; Semadeni, 2006) and of agglomeration (Di Stefano, King, and Verona, 2014; Shaver and Flyer, 2000).

Despite the support that the Baum and Mezias paper has provided to others, the paper (1) tested only one market, (2) demonstrated consistent empirical effects only at one of two levels of analysis, (3) used measures of localized competition that are not standardized in the dimension of market size, and (4) had not been thoroughly replicated in the 24 years since its publication. First, I do agree that, on the one hand, Manhattan has structural characteristics that made the market a compelling one for the study. The market has a long established history of lodging businesses, allowing a 90-year longitudinal study. The rectangular street/avenue structure makes measures of distance easy to assess. And the large number of hotels present at any point in time make Manhattan ideal for a single-market study. But, on the other hand, it is only a single market and an idiosyncratic one. Manhattan is unique in many ways relevant to a study of lodging, including its status as a worldwide center of wealth and finance, its status as an international tourist destination, and its island geography. There may be concern that what applies to Manhattan does not apply to urban markets throughout the United States. Baum and Mezias were cognizant of this latter point and candidly stated "Thus, 'good' hotel locations for Manhattan hotels were not necessarily those that were further away from other hotels. This implies that some of the results reported here are not necessarily generalizable to other populations … " (p. 504).

[1] As of March 2016, the research has been cited a total of 305 times in the Web of Science (published papers only) and 741 times in Google Scholar (published papers and working papers). See Appendix S1 for more detail.

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Second, Baum and Mezias found little support for their hypotheses at the market level, that is, Manhattan as a whole, their primary level of analysis. Instead, the supportive results came from submarket "windows." Baum and Mezias were commendably forthcoming in presenting both the nonsupportive and supportive results, but the combination did suggest a possible lack of robustness or some unexamined boundary conditions of the localized competition concept.

Third, the distance-based measures of localized competition used by Baum and Mezias were not independent of market size. The actual level of localized competition was confounded in their study with the market's population density (number of hotels) at a given point in time. I present results using standardized measures of localized competition that are independent of population density, have a straightforward interpretation, and allow the estimation of magnitudes of the effects. These measures are discussed in detail below.

Fourth, while many studies build on the idea of localized competition, few have retested the concept in its basic form. Greve (2002) came close by demonstrating the presence of geographical density dependence (higher failure rates in locations with many banks). Similarly, Carroll and Wade (1991) published a study contemporaneously to Baum and Mezias that found some evidence of density-dependence at a regional level within the United States, where a region consists of multiple U.S. states, but such geographic areas are so broad that it is difficult to interpret the results as effects of competition. Finally, Sorenson and Audia (2000), and Shaver and Flyer (2000) found similar results in the geographic domain, but attributed them to very specific processes of founding and agglomeration, respectively, rather than localized competition.

In this article, I conduct a replication analysis of Baum and Mezias' single-market study across an aggregation of 90 urban markets throughout the United States. Any results obtained by this aggregation and key subpopulations should be capable of eliminating the vagaries associated with any one market or one level of analysis. Success in this endeavor should give the strategy field confidence in the validity of the localized competition concept.

To conduct this replication, I gained access to U.S. population-level hotel data that allows broader testing than that conducted by Baum and Mezias. Access to the full population of hotels allowed me not only to generate pooled nationwide results, but also allowed comparisons of results across brand-affiliated and unaffiliated subpopulations and hotel age categories. A downside of this data is that it spans only a 15-year period, from 2000 to 2014, relative to Baum and Mezias's 90 years. Nonetheless, a substantial number of hotel failures have taken place in the new millennium, allowing meaningful inference to take place. Further, I possess founding date information for most properties, even if the foundings took place before 2000. Thus, I can appropriately control for age and left censoring in the same fashion as did Baum and Mezias.

This article proceeds as follows. First, I review the three hypotheses of Baum and Mezias and then compare my research design to theirs, emphasizing efforts to replicate the study as closely as possible. Next, I discuss the results of this article, and their similarity and differences to those in Baum and Mezias. Finally, I conclude with a brief discussion about the localized competition concept and how it can continue to be relevant for future work.

HYPOTHESES ON LOCALIZED COMPETITION

Baum and Mezias' three hypotheses

Baum and Mezias deduced all three hypotheses from a basis in organizational ecology, with the basic insight coming from Hannan and Freeman (1977). Those authors proposed that the intensity of competition among organizations was positively related to the similarity in organizational resource requirements. Organizations with the same resource requirements will likely end up in a state of perfect competition, while those with distinct resource requirements are unlikely to compete even if they appear superficially similar.

I first consider Baum and Mezias' Hypothesis 1: The intensity of size-localized competition will be positively related to the Manhattan hotel failure rate.

Going beyond Hannan and Freeman (1977), Baum and Mezias argued that a smaller "size distance" between a hotel and other properties in the market (i.e., too many properties of roughly the same size) should lead to size-localized competition. Competition, in turn, leads to differentiation (Hawley, 1950), in this case, in the size dimension. Finally, Carroll's (1985) resource-partitioning model suggests that many of the nondifferentiated organizations will fail. Hypothesis 1 follows from this combination of logics.

What Baum and Mezias did not explain in this regard was exactly how size of a hotel serves as a means of differentiation. Customers typically are looking for one room, so might not care about the total number of rooms in the establishment. Nonetheless, size may provide value to some customers, particularly among those who prefer small establishments. Further, size provides economies of scale and scope for properties and allows them to provide amenities such as swimming pools, restaurants, and ballroom and conference space. Regarding the latter, large size also allows properties to compete for conferences and other group events (see, e.g., Chung and Kalnins, 2001; Kalnins, 2006; on these issues). A general version of Hypothesis 1 follows:

Hypothesis 1 (H1): A hotel's likelihood of failure will be positively associated with a smaller size distance to other properties within the same urban market.

I now turn to Baum and Mezias' second hypothesis: The intensity of geographically localized competition will be positively related to the Manhattan hotel failure rate.

Baum and Mezias based this argument on a trade-off of (1) the localized competition argument of Hannan and Freeman (1977): geographically proximate firms will likely share a need for the same resources, and thus, will be more intense competitors, with the arguments of (2) the benefits of hotel "clusters," such as reduced search costs for consumers, and (3) the benefits of proximate demand generators, such as natural or historic sites, museums, or shopping districts. The first argument would lead to a greater likelihood of failure for hotels within clusters, while the second and third suggest that properties within clusters might well out-survive hotels with no proximate competitors. As Baum and Mezias concluded, "under conditions of intense geographically localized competition, 'good' hotel locations may not necessarily be those that are further away from other hotels" (p. 493).

Baum and Mezias did not clarify why the geographically localized competition argument should outweigh the benefits from agglomeration and demand generators. Based on their presentation, whether the relationship would be positive or negative remains an empirical question. Nonetheless, they favored the localized competition argument, and a general version of the hypothesis can be stated as:

Hypothesis 2 (H2): A hotel property's likelihood of failure will be positively associated with a smaller geographical distance to other properties within the same urban market.

Finally, I discuss Baum and Mezias' third hypothesis: The intensity of price-localized competition will be positively related to the Manhattan hotel failure rate.

Baum and Mezias argued that price-point acts as a proxy for a set of hotel characteristics. They evoked the basic service-level categories that exist throughout the United States, and highlighted the fact that each of these categories usually clusters around a particular price-point and includes a particular set of amenities. The common breakdown of quality tiers in lodging from low to high quality is: budget, economy, mid-tier (or mid-price), upscale, and luxury (or upper-upscale). These correspond roughly to American Automobile Association ratings of one to five diamonds (see Kalnins, 2006, for more on the quality tier classifications of hotels). As a result of the relative proximity of the price-point and the amenity set within each service-level category, Baum and Mezias argued that luxury and economy hotels both likely compete with the property categories in between them such as the upscale and mid-price hotels, but that luxury and economy do not compete directly with each other. Thus, mid-price hotels may exhibit the lowest price-point distance from other properties in the market and feel the greatest effects of localized competition from both luxury and economy hotels. I state a more general version of Hypothesis 3:

Hypothesis 3 (H3): A hotel property's likelihood of failure will be positively associated with a smaller price-point distance to other properties within the same urban market.

RESEARCH DESIGN AND METHODS

Data

Baum and Mezias' study included life history information on 614 hotels that operated in Manhattan at any time between 1898 and 1990. Their data source was the Hotel Red Book, published annually since 1887, which contains the name, number of rooms, location, and room rates of hotels throughout the United States. Despite the availability of nationwide data in the Red Book, Baum and Mezias likely chose only one market because of the extensive manual data entry that would have been required 25 years ago to analyze additional markets. An electronic version of the 1903 Red Book can be found at https://archive.org/details/officialhotelred00amer.

Baum and Mezias defined founding of a hotel in the year it first appeared in an archival source. Failure was defined as the cessation of hotel services for short-term visitors. Changes in a hotel's "doing-business-as" name, its brand affiliation, or ownership were not included as failures because the property continued to provide hotel services. Baum and Mezias defined the year of failure as the year a hotel was permanently delisted from the Red Book.

Baum and Mezias excluded 21 hotels because their ages were not known, but information on these hotels was included in the measures of localized competition, population density, and population mass. Their final sample for the analysis included 593 hotels, of which 394 failed between 1898 and 1990.

This study analyzes data provided by industry research firm Smith Travel Research (STR), which collects census data from all lodging properties in the United States, urban and rural. In the 90 urban markets, complete information exists for 23,875 hotels, of which 1,869 failed, between 2000 and 2014. I had to exclude 3,638 urban hotels as observations because founding dates were unavailable. However, these hotels are included among the population when the localized competition measures are calculated just like in Baum and Mezias—the absence of the founding date is irrelevant for these calculations, and these hotels were present between 2000 and 2014. I estimated robustness tests in which all these no-founding-date hotels were assigned the average opening date for their market. Signs remain the same, and *p*-values and magnitudes of all variables of interest remain similar to those in the results below.

For all U.S. properties of 15 rooms or more, STR collects, for every calendar quarter, the following information: number of rooms, street address, opening date, and price-point (five categories). STR groups hotels into contiguous tracts and markets, geographical areas within which STR believes hotels may be, to some degree, competitors. For urban areas, STR's markets often map on to city boundaries. Tracts are always smaller than their corresponding markets. For example, STR splits Manhattan into three tracts, "Lower Manhattan," "Times Square Area," and "Uptown/Midtown East." Other major city markets contain anywhere from three to twelve tracts. A list of all 90 urban markets, along with their hotel count in December 2014 and the number of tracts that the market contains, can be found in Table 1.

Baum and Mezias' measures of localized competition

Following a standard approach in ecology, Baum and Mezias measured localized competition using the Euclidean distance of a given hotel i from other properties j in the same market k.

$$D_{ikt} = \sqrt{\left[\sum_{j} \left(L_{it} - L_{jt}\right)^2 \textit{for all } j \neq i\right]},$$

evaluated across market k at time t.

D_{ikt} increases with the distance between the focal organization and all others on dimension L, where L can be the number of rooms to calculate $D_{ikt}{}^{size}$ or a price variable to calculate $D_{ikt}{}^{price}$. Large values for D_{ikt} suggest less intense competition. Given that localized competition is hypothesized to be associated with greater failure rates, D_{ikt} should be negatively related to failure, and the coefficients would have negative signs in exponential hazard regressions. Regarding size, I use room count to measure the size of each hotel, as did Baum and Mezias.

Regarding price, Baum and Mezias (p. 589) used "the average advertised daily room rate (in constant dollars)." These are known in the industry as "rack-rate" prices. The STR data is different. In the new millennium, hotels often charge a wide variety of prices for the same room based on weekday/weekend, single room versus group, transient traveler versus corporate customer, and so on. STR estimates the average price actually received by every hotel in the United States, and sorts the prices into five categories for each market, 5 = the lowest price category and 1 = the highest. STR's stated goal is for the data user to be able to distinguish the properties' varying levels of amenities and differentiation based on the five price-point categories. They define a price category of 1 as "Luxury," 2

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Table 1. Ninety U.S. urban markets with counts of hotels (December 2014) and submarket tracts

Rank	Urban market	Tracts	Hotels	Rank	Urban market	Tracts	Hotels
1	Los Angeles/Long Beach, CA	10	994	46	Myrtle Beach, SC	2	218
2	Houston, TX	10	799	47	Richmond/Petersburg, VA	4	215
3	Atlanta, GA	12	793	48	Oakland, CA	3	203
4	Chicago, IL	8	731	49	Greensboro/Winston Salem, NC	3	199
5	Washington, DC-MD-VA	10	693	50	Cleveland, OH	4	193
6	Dallas, TX	9	628	51	McAllen/Brownsville, TX	2	189
7	New York, NY	5	628	52	Salt Lake City/Ogden, UT	3	182
8	Riverside/San Bernardino, CA	5	522	53	Daytona Beach, FL	2	178
9	Orlando, FL	7	484	54	Louisville, KY-IN	4	174
10	San Diego, CA	7	474	55	Charleston, SC	4	173
11	Tampa/St Petersburg, FL	6	452	56	Savannah, GA	4	170
12	Phoenix, AZ	8	451	57	Birmingham, AL	2	168
13	Anaheim/Santa Ana, CA	5	434	58	Greenville/Spartanburg, SC	3	168
14	San Antonio, TX	5	412	59	Albuquerque, NM	3	165
15	San Francisco/San Mateo, CA	5	397	60	Scranton/Wilkes-Barre, PA	2	160
16	Miami/Hialeah, FL	4	390	61	Buffalo, NY	3	158
17	Philadelphia, PA-NJ	6	382	62	Harrisburg, PA	2	158
18	Detroit, MI	6	380	63	Tucson, AZ	3	153
19	Las Vegas, NV	3	380	64	Little Rock, AR	2	152
20	Norfolk/Virginia Beach, VA	5	362	65	Tulsa, OK	2	152
21	Boston, MA	6	356	66	Milwaukee, WI	3	147
22	Knoxville, TN	3	352	67	West Palm Beach/Boca Raton, FL	2	138
23	San Jose/Santa Cruz, CA	5	344	68	Albany/Schenectady, NY	2	136
24	Seattle, WA	6	342	69	Newark, NJ	2	136
25	St Louis, MO-IL	5	331	70	Fort Myers, FL	2	134
26	Nashville, TN	6	327	71	Mobile, AL	2	133
27	Fort Worth/Arlington, TX	5	322	72	Omaha, NE	2	131
28	Minneapolis/St Paul, MN-WI	5	320	73	Hartford, CT	2	130
29	Denver, CO	6	309	74	Macon/Warner Robbins, GA	2	130
30	Charlotte, NC-SC	6	299	75	Rochester, NY	2	127
31	Sacramento, CA	4	294	76	Dayton/Springfield, OH	3	126
32	Kansas City, MO-KS	4	292	77	Grand Rapids, MI	2	125
33	Indianapolis, IN	5	277	78	Jackson, MS	2	125
34	Fort Lauderdale, FL	4	275	79	Columbia, SC	2	124
35	New Orleans, LA	3	275	80	Sarasota/Bradenton, FL	2	123
36	Austin, TX	5	274	81	Augusta, GA-SC	2	120
37	Portland, OR	5	268	82	Colorado Springs, CO	2	118
38	Baltimore, MD	5	266	83	Chattanooga, TN-GA	2	117
39	Jacksonville, FL	4	265	84	Lexington, KY	3	113
40	Cincinnati, OH-KY-IN	4	255	85	Des Moines, IA	2	108
41	Oklahoma City, OK	4	248	86	Allentown/Reading, PA	2	107
42	Raleigh/Durham/Chapel Hill, NC	6	247	87	Syracuse, NY	2	105
43	Columbus, OH	5	244	88	Madison, WI	2	87
44	Memphis, TN-AR-MS	4	241	89	Melbourne/Titusville, FL	2	82
45	Pittsburgh, PA	4	226	90	Bergen/Passaic, NJ	2	74

as “Upscale,” 3 as “Mid-price,” 4 as “Economy,” and 5 as “Budget.” While STR’s five price-point categories are coarser than the Red Book price data in Baum and Mezias, they capture exactly the key aspect of price—the association of a price-point with a particular set of amenities and differentiating characteristics—that is the central tenet of Baum and Mezias’ third hypothesis.

Regarding geography, Baum and Mezias used street addresses and the Manhattan street-avenue grid to measure properties’ distance from each other. The regular rectangular street grid of Manhattan is an appealing feature of the island from the perspective of conducting geographical analyses. I geocoded the locations of all properties using complete street addresses, and thus, was able to pinpoint

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the location of all properties. I determined latitudes and longitudes by using the Texas A&M University Department of Geography GeoServices Web Client (https://geoservices.tamu.edu/Services).

In place of the Cartesian, Baum and Mezias measured for geographic distance, namely:

$D_{ikt}^{Location} = \sqrt{[\sum_j((Lat_{it} - Lat_{jt})^2 + (Lon_{it} - Lon_{jt})^2)\ for\ all\ j \neq i]}$,

I calculated the mileage distances between all individual property pairs based on their longitudes (Lon) and latitudes (Lat), both expressed in radians rather than degrees, using the great circle distance (GCD) formula that finds the distance between two points on a sphere the size of the earth (Weisstein, 2002).

Calculation of the geographically localized competition measure then proceeds similarly to Baum and Mezias, with the GCD formula within the parentheses.

$$D_{ikt}^{Location} = \sum_j \left[arccos\ \left(sin\ Lat_{it} sin\ Lat_{jt} + cos\ Lat_{it} cos\ Lat_{jt} cos\ |Lon_{it} - Lon_{jt}|\right)\ for\ all\ j \neq i\right],$$

$$evaluated\ across\ market\ k\ at\ time\ t.$$

The measure is then multiplied by 3,956 to approximate the mileage radius of the earth.

Standardized localized competition measures independent of market size

While the Baum and Mezias measures are ideal for an analysis of a single cross section, they do not provide an apples-to-apples comparison of localized competition across time periods. The issue arises because the measures are positively increasing in the number of units, in this case, the hotels. In other words, a time period in which more hotels exist will exhibit greater values of $D_{ikt}^{Location}$ than a time period with fewer hotels, even if the actual distances are the same. For example, imagine a market k with one time period t = 1 with j = 82 hotels total, 81 of them all one mile from focal hotel i. Nineteen new hotels are then built at the same distance from i such that in time period t = 2, j = 101 hotels, with 100 of them all one mile from focal hotel i. $D_{ik1}^{Location} = \sqrt{81} = 9$ and $D_{ik2}^{Location} = \sqrt{100} = 10$. The D measure is actually *greater* in period 2 than period 1 because of the additional hotels. But, in Baum and Mezias, the greater D is meant to proxy for *less* localized competition, relative to a smaller D value. Additional hotels should imply more, not less, competition. Even though the example is contrived for illustrative purposes, the issue is broadly applicable and emerges also for D_{ikt}^{size} and D_{ikt}^{price}.

I propose an alternative where the value of D is standardized by dividing by the square root of j − 1. After this standardization, $D_{ik1}^{Location} = D_{ik2}^{Location} = 1$ using the numbers from the example above. This measure standardizes the concept of localized competition such that it only reflects the average distance to other hotels, but is independent of their number. The fact that number of hotels might well increase competition can then be handled by population density variables, as discussed below. This approach also allows a straightforward interpretation of the variable: The standardized $D_{ikt}^{Location}$ is the average distance in miles from hotel i to all other hotels in the same urban market. D_{ikt}^{size} and D_{ikt}^{price} can be similarly interpreted as the average room count difference and price-point difference, respectively, from hotel i to all other hotels in the same urban market k at time t.

Control variables

Market-level control variables. Like Baum and Mezias, I control for population density and population mass. I measure population density as did Baum and Mezias: the total number of hotels existing at the start of each calendar quarter within each urban market. Baum and Mezias included density squared in one regression; I include it throughout because its *p*-value was never >0.1. Robustness tests without the squared term did not change any results.

Moving beyond the density measure, Baum and Mezias argued that larger organizations are stronger, thus hotels with more rooms would be more powerful competitors. They included a population mass variable, measured as the sum of all rooms of all hotels in all areas. They argued

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that, if larger properties cause greater competitive effects, then, after accounting for the effects of hotels throughout the urban area, increases in population mass should further hasten failure of weaker competitors.

Environmental control variable. Baum and Mezias captured the demand for hotel services using the annual count of visitors to New York City. While the Baum and Mezias' visitors variable included arrivals by sea, rail, and air, such a variable is not available for many urban areas of the United States. However, in the new millennium, air travel has largely eclipsed the other two means of travel, and sea arrivals make little sense for most urban areas in the interior of the United States. For air travel, the U.S. Bureau of Transportation Statistics releases monthly arrivals for all major airports in the United States. For this study, this variable is aggregated by market in those cases where more than one major airport serves the market. I include this sum of passengers by calendar quarter in all regressions.

An obvious additional variable would be passenger car counts from visitors outside of each urban area. Unfortunately, no one appears to collect such data even if it were possible to collect. The tourism literature has stated that the only three commonly available proxies for city-level or regional-level visitors are the numbers of hotel occupants, air passengers, and festival attendees (Tyrrell and Johnston, 2002).

Hotel-level control variables. I also follow Baum and Mezias and control for several hotel-specific characteristics, including the standard age and size variables, and price-point as well. A hotel's age is defined as the number of years since the date of a hotel's founding. Organizational size and price are measured as defined above. In all regressions, I follow Baum and Mezias, and use the natural logarithms of age and size.

Baum and Mezias used dummy variables for several geographic locations within Manhattan and several time periods. They created five location dummy variables to assess baseline failure rates of hotels located in Uptown, above 110th Street; Upper East Side, 59th to 110th streets, east of Central Park; Upper West Side, 59th to 110th streets, west of Central Park; Midtown, 23rd to 59th streets; and Downtown, below 23rd Street. In a similar fashion, Baum and Mezias included time-period dummies representing key environmental shocks. The first two dummy time periods were World War I (1914–1918) and World War II (1938–1945), periods during which New York City served as a major port. The third dummy variable represented the Great Depression years (1930–1938).

Because this study pools 90 urban markets, I add a dummy variable for each market, so that distances in Manhattan are not directly compared to those in Los Angeles, for example. Similarly, I add a separate dummy variable for every calendar year so that nationwide shocks can be taken into account, such as the 2001 and 2008 market downturns, which had noticeable effects on the lodging industry. Dummy variables for every year eliminate the need to control for GNP growth as did Baum and Mezias. As this variable is constant across all observations within a given year, its effect is completely subsumed within the effects of the yearly dummies.

Finally, just like Baum and Mezias, I add a left-censored dummy variable, coded 1 for hotels founded before the beginning of the study period in 2000, and 0 otherwise.

Model and analysis

Like Baum and Mezias, I estimate the effects of localized competition and the control variables using r(t), the instantaneous rate of failure, as the dependent variable. The hazard rate is modeled using the same specification as in Baum and Mezias:

$$r_i(t) = exp\left(X_i(T)\,\beta\right), T < t < T + 1,$$

where X_t is a vector of covariate values at time T, and β is a vector of coefficients. To incorporate time variation in the covariates, I follow Baum and Mezias, and use a multiple-spells formulation. In contrast to Baum and Mezias' annual data, the STR data is reported quarterly. Each hotel's history is broken into quarterly spells in which the hotel is at risk of failure. Each quarterly spell is treated as right-censored unless the hotel fails. This allows the values of the time-varying independent variables to be updated quarterly with each new STR census. All variables are recalculated for every quarterly spell. Stata version 13 was used to estimate the vector of parameters β by the method of maximum likelihood.

RESULTS

Descriptive statistics

Means, standard deviations, and correlations among the independent variables are presented in Table 2. I compare descriptive statistics with those of Baum and Mezias' Appendix, Table A1. The national mean of ln (size) is 4.55, or 95 rooms when exponentiated, while Baum and Mezias reported a mean of 5.63, or 278 rooms. Because mean hotel size in Manhattan is larger than in most urban markets—the STR mean hotel size in Manhattan is 264 rooms—this discrepancy is to be expected. The large maximum value for room size comes from a casino with more than 6,000 rooms. The mean of ln(age) in days is 8.62, or 15.2 years when exponentiated and divided by 365. Baum and Mezias reported an average age of 21 years based on the logged value of 3.07. The price variables are difficult to compare because (1) Baum and Mezias appear to hold their dollar values constant at values from the beginning of the twentieth century—their mean price is $e^{1.62} = \$5.05$, and (2) the STR variable is a set of five price-point categories. STR provides the mean dollar values of each price-point; thus, the mean of the five categories of 2.97 translates into a mean of \$105.

Regarding the three hypothesis-testing variables, the standardized D_{ikt}^{Size}, when divided by 100, has a mean of 1.57, which implies an average size distance of 157 rooms to other properties within the same market. Baum and Mezias reported a mean of 70 (when divided by 100) for this variable, but their variable has no direct interpretation because it is partially based on the number of hotels in a market. The version of the unstandardized Baum and Mezias variable in this study has a mean of 30.63, which appears roughly consistent with their value given the fact that, nationally, hotels are on average only 36 percent the size of those in Manhattan.

The mean of the national, standardized $D_{ikt}^{Location}$ variable, that is, the average distance from one hotel to all others in the market, is 4.24 miles. This variable is not comparable to that used by Baum and Mezias because their base distance is the street block rather than the mile and because their measure is partly driven by total number of hotels. The national mean value in Table 2 for the unstandardized measure is 79.82. Given the Baum and Mezias mean for Manhattan of 140, based on street blocks which are roughly 1/20 of a mile, suggests that hotels in Manhattan are much closer to each other than those in most urban markets.

The mean of the national, standardized D_{ikt}^{Price} variable, that is, the average price-point distance from one hotel to all other hotels, is 1.83 price-points on the five-point scale. The national mean for the unstandardized variable is 33.85 in Table 2.

The windows numbers are smaller, given that only hotels more similar in terms of size, geography and price are included. For the windows, the standardized average size, location, and price differences are 40 rooms, 2.88 miles, and 0.6 of a price-point, respectively. The minimum of zero for the size window occurs because one hotel is so large there is no one else within the window. Removing this outlier changes no results.

Table 3 shows bivariate correlations for all variables. Importantly, the market-level D_{ikt} standardized variables (9b, 10b, 11b) are not highly correlated with any other variables that appear in the same regressions (i.e., variables 1–8). In contrast, the market-level D_{ikt} Baum and Mezias (unstandardized) variables (9a, 10a, 11a) are highly correlated with Density, its squared term, and ln (Mass). These high correlations reflect the fact that the Baum and Mezias measures are partially based on the number of hotels in a market.

The windows D_{ikt} variables are more highly correlated. The standardized, and Baum and Mezias (unstandardized) size windows $D_{ikt}^{Size/2}$ variables are correlated 0.72 and 0.81 with the baseline ln(Size) variable, respectively. The standardized and unstandardized price windows $D_{ikt}^{Price/2}$ variables are correlated 0.95 and 0.87, respectively, with the baseline Price variable. Baum and Mezias had similar issues with bivariate correlations above 0.9 of the windows variables and the corresponding hotel-level controls. I discuss this issue in more detail below.

Market-level results

Table 4 reports maximum-likelihood estimates from the analyses of market-level localized competition among the urban U.S. hotel markets. The first four columns use the exact same D_{ikt} measures as Baum and Mezias, while the last four use the standardized D_{ikt} measures.

Table 4, Columns 1 and 5 present results from all U.S. urban hotel markets using the three D_{ikt} measures of localized competition and all control

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Table 2. Descriptive statistics (N = 1,207,571 quarterly observations)

Variables	Mean	Std. Dev.	Minimum	Maximum
(1) ln (size)	4.55	0.75	2.77	8.73
(2) Price (five categories)	2.97	1.32	1	5
(3) ln (age)	8.62	1.11	0.69	11.47
(4) Density/1,000	0.36	0.22	0.06	1.01
(5) Density^2/1,000,000	0.18	0.22	0.00	1.02
(6) ln (mass)	10.45	0.75	8.78	12.05
(7) Air arrivals/1,000,000	2.42	2.37	0.00	10.91
(8) Left censored (binary)	0.81	0.39	0	1
Baum and Mezias measures				
Market-level				
(9a) D_{it}^{Size}/100	30.63	35.81	3.80	113.4
(10a) $D_{it}^{Location}$	79.82	36.62	20.02	287.04
(11a) D_{it}^{Price}	33.85	13.32	9.85	94.63
"*Windows*"				
(12a) $D_{it}^{Size/2\ Window}$/100	3.62	3.40	0.00	85.48
(13a) $D_{it}^{Location\pm w\ (Tract)}$	25.18	14.58	3.65	167.15
(14a) $D_{it}^{Price/2\ Window}$	9.98	8.64	0.00	37.92
Standardized measures				
Market-level				
(9b) D_{it}^{Size}/100	1.57	1.74	0.33	58.2
(10b) $D_{it}^{Location}$	4.24	1.15	2.06	13.88
(11b) D_{it}^{Price}	1.83	0.45	1.09	3.02
"*Windows*"				
(12b) $D_{it}^{Size/2\ Window}$/100	0.39	0.56	0.00	21.60
(13b) $D_{it}^{Location\pm w\ (Tract)}$	2.88	1.33	0.68	12.77
(14b) $D_{it}^{Price/2\ Window}$	0.60	0.50	0.00	1.54

variables. Supporting Hypothesis 1, the coefficient of D_{ikt}^{Size} is in the predicted negative direction with $p < 0.001$. Baum and Mezias reported a negative coefficient with a p-value of 0.0125. This result shows that hotels in sparsely occupied regions of the size distribution have lower failure rates. Because the unit of the size measure in Column 5 is the average "distance" in number of rooms to other hotels in the market (divided by 100), I interpret the coefficient as follows: in exponential hazard models, the coefficient becomes a hazard ratio when exponentiated, so $e^{-0.127} = 0.88$. A hotel with 174 rooms (one standard deviation) of size distance above the mean will have an instantaneous failure rate of $e^{-0.127\times1.74} = 0.80$ of that of an equivalent hotel with a size distance at the mean. There exists no such interpretation for the coefficient in Column 1 because of its unstandardized nature.

In contrast to Baum and Mezias' finding for the Manhattan hotel market as a whole, I also find support for Hypothesis 2 with the national urban data. The estimates for $D_{ikt}^{Location}$ in Columns 1 and 5 are both negative with $p < 0.001$. Hotels located in regions of their urban market populated by many other hotels have higher failure rates. Given the coefficient of -0.187 in Column 5, a hotel that is 1.15 miles (one standard deviation) of average geographic distance to other hotels above the mean will have an instantaneous failure rate of $e^{-0.187\times1.15} = 0.81$ of that of an equivalent hotel with an average distance to other hotels at the mean.

Finally, unlike Baum and Mezias, I find negative estimates for the D_{ikt}^{Price} coefficient with $p < 0.001$. Thus, Hypothesis 3 is supported. Mid-price hotels will have higher failure rates than the budget and luxury hotels at opposite ends of the five-point scale. Given the coefficient of -0.204, a hotel that is 0.47 price-points (one standard deviation) of average price-point distance to other hotels above the mean will have an instantaneous failure rate of $e^{-0.204\times0.47} = 0.91$ of that of an equivalent hotel with an average price-point distance to other hotels at the mean. I conclude that the magnitudes of the localized competition variables are strategically meaningful in magnitude; in other words, managers should actively pay attention to these issues when formulating strategy.

Regarding the control variables in Table 4, Columns 1 and 5, I find positive estimates for a property's age coefficient, which indicates that

Table 3. Correlations (N = 1,207,571); All correlations greater than 0.01 have p-values < 0.01.

	Control variables								Baum and Mezias measures						Standardized measures					
									Market-level			"Windows"			Market-level			"Windows"		
	1	2	3	4	5	6	7	8	9a	10a	11a	12a	13a	14a	9b	10b	11b	12b	13b	14b
	ln (size)	Price (five categories)	ln (age)	Density	Density^2	ln (mass)	Air arrivals	Left censored	D_{it}^{Size}	$D_{it}^{Location}$	D_{it}^{Price}	$D_{it}^{Size/2\ Window}$	$D_{it}^{Location \pm w\ Tract}$	$D_{it}^{Price/2\ Window}$	D_{it}^{Size}	$D_{it}^{Location}$	D_{it}^{Price}	$D_{it}^{Size/2\ Window}$	$D_{it}^{Llocation \pm w\ Tract}$	$D_{it}^{Price/2\ Wwindow}$
1	1.0																			
2	−0.38	1.0																		
3	−0.05	0.17	1.0																	
4	0.06	−0.01	0.03	1.0																
5	0.03	−0.02	0.03	0.96	1.0															
6	0.15	−0.01	0.02	0.86	0.72	1.0														
7	0.10	−0.01	−0.02	0.73	0.68	0.71	1.0													
8	0.03	0.19	0.72	0.02	0.03	0.01	−0.04	1.0												
9a	0.40	−0.12	0.06	0.35	0.29	0.56	0.35	0.06	1.0											
10a	−0.06	0.04	0.01	0.79	0.72	0.73	0.57	0.01	0.33	1.0										
11a	0.18	−0.14	0.04	0.74	0.69	0.69	0.55	0.05	0.36	0.58	1.0									
12a	0.81	−0.30	0.01	0.35	0.29	0.44	0.32	0.06	0.63	0.21	0.40	1.0								
13a	−0.25	0.12	0.00	0.10	0.09	0.13	0.04	−0.01	0.13	0.49	0.01	−0.16	1.0							
14a	−0.31	0.87	0.15	0.31	0.28	0.29	0.23	0.16	0.01	0.31	0.14	−0.16	0.15	1.0						
9b	0.41	−0.13	0.06	0.17	0.11	0.42	0.23	0.07	0.97	0.20	0.22	0.58	0.12	−0.04	1.0					
10b	−0.17	0.08	−0.02	0.26	0.21	0.27	0.17	−0.01	0.17	0.77	0.16	−0.03	0.69	0.17	0.13	1.0				
11b	0.19	−0.20	0.03	0.00	0.00	0.00	0.01	0.05	0.10	−0.05	0.63	0.16	−0.10	−0.14	0.11	−0.08	1.0			
12b	0.72	−0.28	0.04	0.07	0.04	0.18	0.10	0.08	0.75	0.01	0.20	0.82	−0.14	−0.22	0.78	−0.07	0.19	1.0		
13b	−0.28	0.15	−0.04	−0.04	−0.04	−0.03	−0.04	−0.04	0.00	0.39	−0.11	−0.24	0.92	0.12	0.02	0.70	−0.12	−0.18	1.0	
14b	−0.35	0.95	0.17	−0.01	−0.01	−0.01	0.00	0.18	−0.11	0.04	−0.11	−0.28	0.11	0.90	−0.11	0.08	−0.16	−0.25	0.14	1.0

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Table 4. Exponential hazard regressions: 23,875 hotels in 90 U.S. urban markets 2000–2014[a]

Market-level analysis	Market measurements of D_{ikt} as per Baum and Mezias Table 1 Model 3				Standardized market measurements of D_{ikt} (Baum and Mezias measures divided by square root of density, i.e., total hotels in market, minus one)			
ln (size)	0.144	0.183	0.0745	0.131	0.143	0.186	0.0725	0.131
	(0.0359)	(0.0351)	(0.0324)	(0.0319)	(0.0362)	(0.0353)	(0.0325)	(0.0319)
Price-point five categories	0.247	0.232	0.244	0.252	0.247	0.231	0.243	0.254
	(0.0205)	(0.0195)	(0.0195)	(0.0205)	(0.0206)	(0.0196)	(0.0195)	(0.0207)
ln (age)	1.004	1.013	0.967	1.006	1.008	1.015	0.968	1.007
	(0.0411)	(0.0408)	(0.0404)	(0.0407)	(0.0412)	(0.0408)	(0.0404)	(0.0407)
Density	9.741	8.737	10.19	10.28	7.449	7.851	9.217	9.537
	(4.881)	(4.880)	(4.877)	(4.876)	(4.890)	(4.894)	(4.877)	(4.875)
Density^2	−7.378	−7.474	−7.834	−8.316	−6.731	−7.061	−7.709	−8.076
	(3.825)	(3.821)	(3.824)	(3.822)	(3.828)	(3.826)	(3.823)	(3.822)
ln (mass)	1.108	1.018	0.803	0.816	1.113	1.097	0.753	0.810
	(0.927)	(0.928)	(0.925)	(0.925)	(0.928)	(0.929)	(0.924)	(0.925)
Air arrivals (millions)	−0.275	−0.278	−0.279	−0.282	−0.273	−0.276	−0.278	−0.283
	(0.0749)	(0.0749)	(0.0750)	(0.0750)	(0.0749)	(0.0749)	(0.0749)	(0.0750)
Left censored	−0.123	−0.124	−0.0921	−0.129	−0.128	−0.125	−0.0924	−0.133
	(0.143)	(0.143)	(0.143)	(0.142)	(0.143)	(0.143)	(0.143)	(0.142)
D_{ikt}^{Size} (H1)	−0.065	−0.079			−0.127	−0.159		
	(0.019)	(0.020)			(0.037)	(0.039)		
$D_{ikt}^{Location}$ (H2)	−0.0097		−0.0099		−0.187		−0.191	
	(0.0018)		(0.0018)		(0.0351)		(0.0351)	
D_{ikt}^{Price} (H3)	−0.0101			−0.0117	−0.204			−0.229
	(0.0030)			(0.0029)	(0.0557)			(0.0552)
N (quarters)	1,207,571	1207571	1,207,571	1,207,571	1,207,571	1,207,571	1,207,571	1,207,571
Hotels	23,875	23,875	23,875	23,875	23,875	23,875	23,875	23,875
Failures	1,869	1,869	1,869	1,869	1,869	1,869	1,869	1,869
Chi squared	1954.9	1912.5	1919.7	1903.2	1956.2	1912.5	1919.9	1904.9

[a] All regressions include fixed-effects for markets and for year of operation.
Standard errors in parentheses.

hotel failure rates increased with age. As noted in Baum and Mezias, this suggests a liability of obsolescence rather than a liability of newness. This finding is consistent with past work using other data sets (e.g., Chung and Kalnins, 2001; Kalnins and Chung, 2006). I agree with Baum and Mezias' interpretation that, "in capital-intensive industries such as the hotel industry, where the investment is in a property that is not easily broken up or sold off piecemeal, there is an implicit endowment that takes the form of a sunk cost, and consequently, liability of newness arguments may not hold. Thus, a hotel is an expensive physical asset that may be subject to obsolescence independent of the organization operating it" (p. 595).

Also consistent with Baum and Mezias, I find that hotel failure rates exhibit negative size dependence. And, failure rates are lower among luxury and upscale hotels based on price-point categories 1 and 2, relative to lower quality properties in categories 4 and 5, just like Baum and Mezias' results with average rack-rate prices. Further, greater numbers of visitors to the urban markets lower the hotel failure rate, similar to Baum and Mezias. Finally, I find that the estimates for population density effects are inverse U-shaped, indicating a competitive effect of increasing density at the lower densities in contrast to Baum and Mezias' strictly negative, beneficial effect of increasing density.

In Table 4, Columns 2–4 and 6–8, I estimate regressions with all control variables, but with only one variable of theoretical interest in each column. I observe consistent results with those in Columns 1 and 5. All D_{ikt} coefficients have similar *p*-values and are slightly larger in absolute magnitude when included individually instead of when included as a group.

Competitive windows

So far, the urban market results of this study are more supportive of localized competition

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hypotheses than are the original market-level results of Baum and Mezias. When I measure the three D_{ikt} localized distance variables at the level of the market all three hypotheses are supported, while Baum and Mezias only found support for one, the size hypothesis.

However, Baum and Mezias found support for all three hypotheses by measuring the distance variables using only a subpopulation of possible competitors, in particular, those that are most similar to the hotel under observation in each dimension. While Baum and Mezias relied on one-tailed *p*-values, I report two-tailed *p*-values throughout.

Baum and Mezias defined their competitive "windows" as follows:

$$D_{ikt}^{\text{Size}/2} = \sqrt{\left[\sum_j \left(L_{it} - L_{jt}\right)^2 \textit{for } j \neq i \textit{ if } {}^1\!/_2 \times Size_i \leq Size_j \leq {}^3\!/_2 \times Size_i\right]}, \textit{ eval. across mkt k at time t.}$$

$$D_{ikt}^{\text{Price}/2} = \sqrt{\left[\sum_j \left(L_{it} - L_{jt}\right)^2 \textit{for } j \neq i \textit{ if } {}^1\!/_2 \times Price_i \leq Price_j \leq {}^3\!/_2 \times Price_i\right]}, \textit{ eval. across mkt k at time t.}$$

For example, this definition implies that a 100-room hotel competes with hotels ranging in size from 50 to 150 rooms, while a 1,000-room hotel competes with hotels ranging in size from 500 to 1,500 rooms. Further, a luxury hotel with a \$300 room rate competes with hotels priced between \$150 and \$450, while an economy hotel charging \$50 per night competes with hotels ranging in price from \$25 to \$75.

Because this study's price variable consists only of five categories, I cannot define the $D_{ikt}^{\text{Price}/2}$ window variable in the same way as Baum and Mezias. I define the variable as:

$$D_{ikt}^{\text{Price}/2} = \sqrt{\left[\sum_j \left(L_{it} - L_{jt}\right)^2 \textit{for } j \neq i \textit{ if } Price_i - 1 \leq Price_j \leq Price_i + 1\right]}, \textit{ eval. across mkt. k. at time t.}$$

For their geographic window variable $D_{ikt}^{\text{Location}\pm\text{w}}$, Baum and Mezias created a location variable based not on all of Manhattan, but only on parts, beyond which the hotels are assumed not to compete. The window measure in this study for location is based on the same logic in that it is measured at the level of the tract instead of the market. Table 1 shows that several tracts typically make up a market. Thus, the competitive window measure for geography is: $D_{ikt}^{\text{location} \pm \text{w}} = \sum_j [arccos(sin\ Lat_{it} sin\ Lat_{jt} + cos\ Lat_{it} cos\ Lat_{jt} cos|Lon_{it} - Lon_{jt}|)\quad for\ all\ j \neq i]$, *evaluated across* ***tract*** *k at time t*.

For all three measures, I use both unstandardized and standardized variations just as in the market-level regressions. The unstandardized variables are as similar to the original Baum and Mezias measures as possible. In the standardized measures, the sum is divided by the square root of the total number of hotels in the window/tract, minus one. Standardization allows the coefficients to be interpreted as average distances in terms of rooms, miles, and price-points.

The nationwide competitive window results are shown in Table 5. In Columns 1–4, when using competitive window formulations of the D_{ikt} variables and the original Baum and Mezias (unstandardized) measures, the location variable, $D_{ikt}^{\text{Location}\pm\text{w}}$ is negative with $p < 0.001$. When the standardized measures are used, in Columns 5 and 6, the $D_{ikt}^{\text{Size}/2}$ variable is negative with $p < 0.001$ as well. Thus, Hypotheses 1 and 2 are supported, but Hypothesis 3 is not.

Baum and Mezias' results supported all three hypotheses when using a competitive window subpopulation in Manhattan, while this study loses its support for Hypothesis 3. While I cannot explain this discrepancy definitively, I note that, in Baum and Mezias, the bivariate correlation between the hotel-level ln(size) variable and the $D_{ikt}^{\text{Size}/2}$ window variable is 0.922, and both are in the same regression—Model 4 in their Table 1. Baum and Mezias' correlation between the hotel-level

Table 5. Exponential hazard regressions: 23,875 hotels in 90 U.S. urban markets 2000–2014[a]

Window-level analysis	Window measurements of D_{ikt} as per Baum and Mezias Table 1 Model 4				Standardized window measurements of D_{ikt} (Baum and Mezias measures divided by square root of density, i.e., total hotels in each window, minus one)			
ln (size)	0.117 (0.0526)	0.141 (0.0530)	0.0772 (0.0327)	0.116 (0.0315)	0.201 (0.0490)	0.243 (0.0488)	0.0714 (0.0327)	0.118 (0.0316)
Price-point five categories	0.195 (0.0499)	0.241 (0.0195)	0.243 (0.0195)	0.197 (0.0496)	0.305 (0.0669)	0.236 (0.0196)	0.246 (0.0195)	0.309 (0.0669)
ln (age)	0.978 (0.0404)	0.989 (0.0404)	0.975 (0.0403)	0.987 (0.0402)	0.989 (0.0409)	1.008 (0.0408)	0.967 (0.0404)	0.989 (0.0403)
Density	9.431 (4.878)	9.754 (4.876)	9.661 (4.874)	9.553 (4.880)	8.860 (4.874)	9.579 (4.875)	9.151 (4.876)	9.677 (4.876)
Density^2	−7.928 (3.821)	−8.149 (3.822)	−8.042 (3.821)	−8.080 (3.822)	−7.562 (3.820)	−8.051 (3.821)	−7.759 (3.821)	−8.090 (3.822)
ln (mass)	0.863 (0.925)	0.751 (0.925)	0.839 (0.925)	0.740 (0.925)	0.875 (0.924)	0.779 (0.924)	0.820 (0.925)	0.747 (0.925)
Air arrivals (millions)	−0.279 (0.0749)	−0.282 (0.0750)	−0.280 (0.0749)	−0.282 (0.0750)	−0.278 (0.0749)	−0.281 (0.0749)	−0.280 (0.0749)	−0.282 (0.0750)
Left censored	−0.104 (0.142)	−0.110 (0.142)	−0.104 (0.142)	−0.107 (0.142)	−0.114 (0.143)	−0.123 (0.143)	−0.0993 (0.143)	−0.109 (0.142)
$D_{ikt}^{\text{Size/2 Window}}$ (H1)	−0.0115 (0.0119)	−0.0069 (0.0121)			−0.267 (0.081)	−0.265 (0.083)		
$D_{ikt}^{\text{Location}\pm\text{ w Tract}}$ (H2)	−0.0090 (0.0020)		−0.0087 (0.0020)		−0.108 (0.0211)		−0.106 (0.0210)	
$D_{ikt}^{\text{Price/2 Window}}$ (H3)	0.0088 (0.0083)			0.0079 (0.0083)	−0.171 (0.174)			−0.188 (0.174)
N (quarters)	1,207,571	1,207,571	1,207,571	1,207,571	1,207,571	1,207,571	1,207,571	1,207,571
Hotels	23,875	23,875	23,875	23,875	23,875	23,875	23,875	23,875
Failures	1,869	1,869	1,869	1,869	1,869	1,869	1,869	1,869
Chi squared	1909.1	1887.6	1906.7	1888.2	1929.1	1900.9	1913.1	1888.4

[a] All regressions include fixed-effects for markets and for year of operation.
Standard errors in parentheses.

ln(price) variable and the $D_{ikt}^{\text{Price/2}}$ window variable was 0.901. Here, in Table 3, the correlation between the hotel-level ln(size) variable and the $D_{ikt}^{\text{Size/2}}$ window variable is 0.72 and the correlation between the hotel-level five-category price-point variable and the $D_{ikt}^{\text{Price/2}}$ window variable is 0.95.

With such high bivariate correlations, Gujarati (1999) stated that "OLS estimators and their standard errors become very sensitive to small changes in the data; that is, they tend to be unstable" (p. 321). He also noted a problem of "wrong signs for regression coefficients" (p. 321) resulting from high multicollinearity. Baum and Mezias acknowledged the high multicollinearity between these variables in their discussion stating that "Combined with the insignificant estimates for the geographic location dummy variables, this suggests that the effects of size, geographic location, and price on hotel survival may result entirely from the position of the values in the distribution of Manhattan hotels in terms of size, geographic location, and price. The inflated standard errors for the size and price coefficients, however, suggest multicollinearity as an alternative explanation" (Baum and Mezias, p. 503). As I noted above, multicollinearity is less likely to be a problem for any of the standardized, market-wide versions of the localized competition variables, because of their moderate correlations within the matrix of Table 3.

Subpopulation results: endogeneity and brand affiliation

Endogeneity is a concept that was not a common part of the discussion in strategic management until Shaver (1998); indeed, Baum and Mezias did not formally consider the possibility of endogeneity in their original paper. Endogeneity could possibly create the illusion of a localized competition result in the following fashion: Hotels that occupy the more commonly held positions in a market in dimensions such as size or geography could be qualitatively different than those who occupy the sparser domains within each dimension. As hypothesized

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by Shaver and Flyer (2000) for the case of production agglomeration (i.e., firms learn better production processes by being close to others), and Kalnins and Chung (2004) for the demand-side counterpart (firms can attract more customers when close to others), firms seeking more crowded niches might be those with the poorest resource stocks. While their failure rate might be higher than the norm due to the lack of resources, entering crowded niches may nonetheless be the best opportunity for resource-poor firms. A noncausal association of high failure rates and small distances to other firms might result.

To reduce the likelihood of this possibility, I analyze separately older properties, specifically those built before 1970, 30 full years before the beginning of the period of observation. The firms opening these properties may have been enticed to locate proximately to, or distantly from, others open at the time based on their initial resource stocks. However, 30 years later, the landscape of properties has likely changed so much that the landscape is no longer indicative of which entrants did or did not have resources more than a generation before the onset of the study period.

The first two columns of Table 6 show the age-based split results for the market-level analyses. The results in the first column show that the hotels founded before 1970 are particularly sensitive to localized competition with all three hypotheses supported: ${D_{ikt}}^{\mathrm{Size}}$ and ${D_{ikt}}^{\mathrm{Price}}$ have p-values <0.01 and for ${D_{ikt}}^{\mathrm{Location}}$ $p = 0.0012$. Further, two-sample t-tests (not shown) confirm that the ${D_{ikt}}^{\mathrm{Size}}$ and ${D_{ikt}}^{\mathrm{Price}}$ coefficients are more negative in Column 1 than in Column 2, at $p = 0.029$ and $p = 0.071$, respectively. If endogeneity of the proposed form was driving the results, the opposite would be more likely—failure would be more likely associated with localized competition for the more recent foundings. The results suggest one of two possibilities: (1) properties are more susceptible to localized competition in the size and price dimensions as they approach obsolescence, or (2) if it is assumed that those hotels that survived for at least 30 years are the most capable, then I could conclude that the localized competition results apply primarily to this group. The windows' analyses in Columns 3 and 4 show similar results to those in Columns 1 and 2, respectively.

A second issue not considered by Baum and Mezias is that of franchised hotels affiliated with major national brands. In a later study that analyzes the Baum and Mezias data set, Ingram and Baum (1997a) stateed that only 396 of 20,344 hotel-years (2%) were associated with a (typically national-level) franchisor or franchisee in Manhattan between 1898 and 1990. In contrast, in Columns 5–8 of Table 6, 866,427 of 1,207,571 hotel-quarters (72%) are associated with a franchisee or franchisor. In addition, there are far fewer failures among brand-affiliated establishments despite their large majority in terms of hotel-quarters, with only 656 failures relative to 1,213 for the unaffiliated hotels.

For these reasons, in Table 6, Columns 5–8, I analyze subpopulations based on brand affiliation. Column 5 presents market-level results for affiliated hotels, and Column 6 for the unaffiliated. These two regressions contain some hotels in common because hotels may operate under brand affiliation for a period of time and may be unaffiliated at a different period of time. All brand-affiliated spells are analyzed in Column 5 and unaffiliated spells in Column 6. If a hotel switches from one to the other, it is not counted as a failure; it merely drops out of one subpopulation and enters the other. All three hypotheses are supported in both columns with p-values <0.001 save one: the size coefficient for brand-affiliated hotels has $p = 0.051$. The hotel-level control variables of size, age, and price are all consistent in sign. The windows results in Columns 7–8 are weaker for the brand-affiliated properties: Only geographical localized competition appears relevant for the subpopulation. I conclude that—at the market level—localized competition is relevant for both brand-affiliated and unaffiliated hotels.

The results regarding unaffiliated properties are of additional interest because (Kalnins and Chung, 2004) found that the presence of branded competitors increased the likelihood that new, unaffiliated properties entered a zip code, while new, branded properties avoided locations with the unaffiliated. Those authors suggested that agglomeration benefits were the drivers of their results, that is, unaffiliated firms likely believed that proximate location to branded competitors would provide benefits that outweighed localized competition. One possibility of reconciling the findings here and in Baum and Mezias with those of Kalnins and Chung (2004) is that the negative effects of geographically localized competition may operate primarily at the level of a large area such as a market. Consistent with anecdotal evidence presented by Kalnins (2006), the identification of beneficial

Table 6. Exponential hazard regressions of subpopulations[a]

	Split by age (before and after January 1, 1970)				Split by brand affiliation			
	Market-level		Windows		Market-level		Windows	
	Founded Before	Founded After	Founded Before	Founded After	Major Brand	Not Affiliated	Major Brand	Not Affiliated
ln (size)	0.389	−0.163	0.562	−0.184	0.226	0.374	0.224	0.542
	(0.0539)	(0.0513)	(0.0784)	(0.0634)	(0.0822)	(0.0416)	(0.106)	(0.0593)
Price-point five categories	0.298	0.170	0.454	0.163	0.412	0.142	0.427	0.249
	(0.0340)	(0.0274)	(0.104)	(0.0885)	(0.0385)	(0.0247)	(0.116)	(0.0824)
ln (age)	0.439	1.063	0.356	1.059	1.372	0.350	1.339	0.335
	(0.131)	(0.0717)	(0.130)	(0.0716)	(0.0776)	(0.0505)	(0.0765)	(0.0504)
Density	−1.289	12.43	1.672	12.87	−14.04	14.13	−13.09	16.17
	(7.524)	(6.542)	(7.477)	(6.524)	(9.434)	(6.010)	(9.450)	(5.984)
Density^2	−0.345	−9.464	−2.086	−9.813	5.341	−10.33	4.688	−11.29
	(5.987)	(5.042)	(5.963)	(5.034)	(6.606)	(5.017)	(6.611)	(5.005)
ln (mass)	1.488	1.362	0.936	1.326	5.511	−0.170	5.299	−0.582
	(1.431)	(1.237)	(1.420)	(1.234)	(1.781)	(1.115)	(1.781)	(1.108)
Air arrivals (millions)	−0.127	−0.385	−0.133	−0.390	−0.325	−0.238	−0.330	−0.243
	(0.110)	(0.103)	(0.110)	(0.103)	(0.120)	(0.0962)	(0.120)	(0.0962)
Left Censored		−0.220		−0.233	−0.600	0.231	−0.567	0.257
		(0.159)		(0.159)	(0.209)	(0.207)	(0.208)	(0.207)
D_{ikt}^{Size} (H1)	−0.251	−0.041	−0.630	−0.071	−0.114	−0.221	−0.213	−0.590
	(0.065)	(0.042)	(0.152)	(0.083)	(0.059)	(0.051)	(0.137)	(0.115)
$D_{ikt}^{Location}$ (H2)	−0.155	−0.235	−0.0858	−0.140	−0.215	−0.189	−0.117	−0.130
	(0.0527)	(0.0474)	(0.0326)	(0.0280)	(0.0659)	(0.0419)	(0.0389)	(0.0254)
D_{ikt}^{Price} (H3)	−0.322	−0.0246	−0.473	0.0351	−0.349	−0.270	−0.118	−0.279
	(0.0866)	(0.0736)	(0.269)	(0.229)	(0.0992)	(0.0676)	(0.299)	(0.217)
N (quarters)	211,076	996,495	211,076	996,495	866,427	341,144	866,427	341,144
Hotels	3,943	19,932	3,943	19,932	19,227	9,291	19,227	9,291
Failures	820	1,049	820	1049	656	1,213	656	1,213
Chi squared	527.7	1025.1	507.1	1,021.4	956.3	804.6	936.1	796.6

[a] All regressions include fixed-effects for markets and for year of operation.
Standard errors in parentheses.

agglomeration effects likely requires subtler measures that interact proximity with price, brand, and amenity characteristics of the relevant hotels. A more precise disentangling of localized competition and agglomeration effects represents a fertile area for future research.

Additional tests

I conducted several additional *tests*:

First, I estimated "windows" regressions like those of Table 5 that also included out-of-window competitive measures, as per Baum and Mezias' Table 1, Column 5. These are shown in Appendix S1, Table S2. In contrast to the coefficients of the windows D_{ikt} variables in Table 5, when the out-of-window variables are added, the standardized size windows Hypothesis 1 is no longer supported ($p = 0.242$). Also, in contrast to Baum and Mezias, all three of the out-of-windows coefficients are negative with meaningful p-values, in all columns of Table 6. These results suggest that localized competition indeed exists across all hotels in a market, not just those closest in terms of size, location, or price-point.

Second, based on Baum and Mezias' suggestion that "in highly segmented geographic environments, such as the Manhattan hotel industry, it may be useful to examine specifications in which localized competition on organizational dimensions such as size and price is treated as nested within a competitive window based on geographic location" (Baum and Mezias, p. 504), I recalculated the size and price competitive distance variables using geography as the competitive window instead of the size and price themselves.

$$D_{ikt}^{\text{Size Tract}} = \sqrt{\left[\sum_{j} \left(L_{it} - L_{jt}\right)^2 \textit{for } j \neq i\right]},$$

$$\textit{evaluated across } \textbf{\textit{tract}} \ k \textit{ at time } t,$$

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$$D_{ikt}^{\text{Price Tract}} = \sqrt{\left[\sum_j \left(L_{it} - L_{jt}\right)^2 for\ j \neq i\right]},$$

evaluated across ***tract*** *k at time t*,

With both variables standardized by dividing by the square root of the number of hotels in the tract, minus one, at each point in time. Hypothesis 2 is supported and Hypothesis 3 is marginally supported. Hypothesis 1 is not supported. The results for submarket tracts are weaker than those for markets; this suggests a boundary condition for at least the size-based localized competition: When the geographic areas become small, the effect of localized competition appears less likely to manifest itself. Indeed, many of the submarket tracts, particularly in small markets, are small, with only 50 or 60 hotels per tract, and fewer than 10 failures. In addition, as discussed above, positive agglomeration benefits (e.g., Kalnins and Chung, 2004) arising from the presence of proximate competitors may be more likely to exist in more tightly circumscribed areas. Such benefits might mitigate the presence of localized competition. This finding complements the findings from the first robustness test regarding the out-of-windows variables.

Third, I split the population geographically by market. Market-level regressions of urban hotels in the Eastern Time Zone states yielded support for Hypotheses 1–3 when estimating the equivalent of Table 4, Columns 5–8, as did combined regressions of the Central, Mountain, and Pacific Time Zone states. I chose this particular split because each subpopulation has a nearly equal number of failures. Despite the fact that the two sets of regressions did not contain a single hotel in common, the results are consistently similar at the market level. At the level of submarket "windows," the results of the Central, Mountain, and Pacific Time Zone states show support for all three hypotheses, just like Model 4 of Baum and Mezias. Thus, while the pooled national windows subpopulation results in this study do not line up perfectly with Baum and Mezias' single-market results, at least results from one half of the nation do so.

Fourth, I split the population based on the size of the urban market. Regressions of hotels in the 30 largest urban markets yielded strong support for Hypotheses 1–3, again estimating the equivalent of Table 4, Columns 5–8. For the remaining 60 markets, Hypotheses 2–3 are strongly supported, while Hypothesis 1 is not supported.

Fifth, as mentioned above I estimated regressions in which I included all hotels without founding date information by assigning them the average opening date for their market. Signs are the same, and p-values and magnitudes of all variable coefficients of interest remain similar to those in Table 4, Columns 5–8: Hypotheses 1–3 receive strong support.

Finally, I could not replicate Baum and Mezias' findings for Manhattan alone. There were only 37 failures in Manhattan in the 2000–2014 period, not enough to generate low p-values. However, at least the signs of the three localized competition variables were negative, consistent with Hypotheses 1–3.

DISCUSSION AND CONCLUSION

In this article, I attempt a replication of Baum and Mezias' single-market study across an aggregation of 90 U.S. urban markets in order to establish the generalizability of their findings that, based on an analysis of failure rates, firms appear to compete most intensely with others with similar characteristics. They termed this phenomenon "localized competition." At the market level, I find statistical support for all three dimensions of localized competition proposed by Baum and Mezias: (1) size in terms of number of rooms, (2) geographic location, and (3) price-point. In contrast, Baum and Mezias only found support in one dimension, size, at the market level. However, when analyzing submarket "windows" Baum and Mezias found support for all three hypotheses, while I find support for only two of three: size-based and location-based competition, when the standardized localized competition measures are used.

One possible explanation for the discrepancy is that nationally, most markets are smaller than Manhattan; thus the even-smaller submarket windows might be too small to effectively capture localized competition in terms of price. Another issue discussed above is that the windows results, both in this study and in Baum and Mezias, are plagued by multicollinearity. The bivariate correlations of over 0.9 in the original study and in this replication study between the Price variable and the $D_{ikt}^{\text{Price/2 Window}}$ variable suggest these coefficients may be unstable, even to the point of being the

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wrong sign. The market-based results do not suffer from this issue, and are thus likely to be the more reliable set of results.

Moving beyond Baum and Mezias' research design, the separate analysis in this study of pre-1970 foundings reduces the chance that endogeneity is playing a role in the results of Baum and Mezias. Hotels founded 30 years before the start of the study period are likely located where they are in terms of geography, size, and price-point because of what was most profitable given the resource stocks the owner firms had at the time. However, the great changes to the hotel landscape from 1970 to 2000 has likely eliminated most benefits of initial strategic location vis-à-vis competitors in the new millennium. For these older hotels, then, locating proximately to others more likely has strictly negative, competitive effects, and I find that to be the case.

Finally, I find that both brand-affiliated and brand-unaffiliated hotels are subject to localized competition. In Baum and Mezias' data, a vast majority of properties were unaffiliated with branded chains. Thus, the localized competition effect appears to be more broadly applicable than what one could conclude based only on Baum and Mezias' original analysis.

I conclude that what Baum and Mezias hypothesized about Manhattan applies to urban markets throughout the United States. At least at the market level, being different may be good as many strategic studies have assumed, based in part on the results of Baum and Mezias' original work.

This study has served not only as a replication, but it also suggests fruitful avenues for research. Dimensions such as size and price-point can be altered over time. The onset of dynamic pricing, revenue management, and Internet reservation systems in the new millennium have likely increased hotels' ability and motivation to alter price to find the most optimal level (see, e.g., Anderson and Xie, 2010). This price-point movement cannot be costless; if it were, localized competition in price-point would be unlikely to increase failure rates. So the questions important to firm strategy become: how, and to what extent, can and do organizations tied to a geographic location move away from the overly competitive positions in dimensions such as price-point and size in their industries in order to avoid failure?

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix S1. Journal Citations and Supplementary Results.

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