PRICING RESPONSE TO ENTRY AND AGGLOMERATION EFFECTS

BRIAN T. MCCANN*
Ph.D. Candidate – Strategic Management
Purdue University
Krannert School of Management
403 W. State Street
West Lafayette, IN 47907
Tel: (765) 494-7616
Fax: (765) 494-9658
e-mail: btmccann@purdue.edu

GOVERT VROOM
Assistant Professor of Strategic Management
University of Navarra
IESE Business School
Avenida Pearson, 21
08034 Barcelona, Spain
Tel: +34.932534200
Fax: +34.932534343
e-mail: vroom@iese.edu

Forthcoming *Strategic Management Journal*
Version: March 8, 2009

* Corresponding author

The authors would like to thank Javier Gimeno, Arturs Kalnins, Francisco Ruiz-Aliseda, participants at the AOM and SMS annual conferences, and seminar participants at Purdue University, University of Illinois, IESE Business School, and London Business School for their comments and suggestions. We would also like to thank Associate Editor Rudi Bresser and two anonymous reviewers for their valuable feedback and suggestions, which helped improve the article significantly, and acknowledge Purdue University for financial support through the project and Source Strategies, Inc. for their support with data-related issues.

PRICING RESPONSE TO ENTRY AND AGGLOMERATION EFFECTS

ABSTRACT

In contrast to the traditional approach that typically views entry solely as a threat, we argue that our understanding of this important phenomenon will remain incomplete until we consider the possibility that entry may also provide opportunity for incumbent firms. Drawing from agglomeration theory, which describes the benefit from co-locating with competitors, and using a unique data set of Texas hotels, we explicitly examine the combined impact of the competitive and agglomeration effects of entry. We find that incumbent establishments price higher when facing entrants whose agglomeration benefits are more likely to outweigh their competitive effects. This association is stronger for incumbents that have greater experience with entry. Our results bring a new perspective to the entry response literature helping clarify inconsistent empirical results. Further, we apply agglomeration theory to a new question, incumbent behavior, and demonstrate that experience appears to play an important role in recognizing situations that generate agglomeration externalities.

Keywords: entry; incumbent response; pricing; agglomeration; competition.

INTRODUCTION

One of the key forces in the evolution of an industry and competition within an industry is the entry of new firms. Entrants add capacity to an industry and attempt to gain market share, often at the expense of existing firms. While entry may benefit consumers by bringing higher rates of innovation and increases in efficiency, entry is typically seen as a *threat* to the profitability of incumbents.

In the traditional economic perspective, entry is expected to occur when incumbent firms possess above-normal returns. With entry, the intensity of rivalry is anticipated to increase, eroding profitability up to the point at which new entry is no longer worthwhile. This traditional perspective, however, has been criticized, and the empirical record of entry has been found to be "a little surprising" (Geroski, 1995: 421). For example, entry seems not to be highly correlated with industry profitability, and entry seems not to significantly affect industry price-cost margins. Moreover, incumbents appear to respond selectively to new entry.[1] From these findings, it seems clear that viewing entry solely as a threat to incumbent profitability might oversimplify the phenomenon. In this paper, we address the question of whether incumbents might also see *opportunity* in new entry.

An incumbent must decide whether and how to respond to the entry of a new competitor, electing to either accommodate, fight, or essentially ignore the new entrant. As detailed by literature on competitive dynamics (e.g., Chen, 1996; Smith, Ferrier, and Ndofor, 2001), a variety of competitive tools are available to a firm facing a competitive move such as entry by a rival, including product changes, promotion increases, and pricing responses. Pricing, in particular, has been the subject of much theoretical and empirical work; however, the results have been mostly inconclusive. Empirical tests have found a variety of results with prices

[1] These observations refer to stylized results 1, 4, and 6 in Geroski (1995).

dropping in response to entry in some studies and not changing in others. Recent work (Simon, 2005) suggests that a potential resolution to these inconsistent results lies with the realization that whether a firm is likely to cut price in response to entry depends on the firm's incentives to respond aggressively. This contingent approach shows much promise, but it shares a common viewpoint of much of the prior theoretical views and empirical tests in this area: a focus on entry as a *negative* event for incumbents. Although rarely discussed in detail, a number of studies show an *increase* in incumbent price coincident with entry (see for example, Thomas, 1999; Yamawaki, 2002) implying that entry may not have solely negative consequences for incumbents. We suggest that pricing response to entry may not be fully understood until we recognize and investigate how entry may have both negative *and* positive impacts on incumbents.

Agglomeration theory, which describes the benefits that organizations receive from co-locating or agglomerating with their competitors, can help us understand why firms might view entry in a positive light. When the "net benefits to being in a location together with other firms increase with the number of firms in the location" (Arthur, 1990: 237), firms need not view entry negatively but rather see it as an opportunity to increase performance.

This study examines the response of incumbent organizations facing entry into their local markets, showing that incumbents take actions that allow them to benefit from entrants who generate positive agglomeration externalities that outweigh their negative competitive effects. We also find evidence of additional circumstances under which this response will be enhanced, namely when incumbent firms have greater experience with entry.

Creating an intersection between the literatures of entry response and agglomeration, this research provides contributions to both areas. First and most importantly to the area of entry response, the present study demonstrates the value of adding the perspective of agglomeration

theory, helping to bring further clarity to inconsistent empirical findings. By recognizing that entry may also have positive aspects, it enriches our understanding of this important phenomenon. We provide a clear theoretical explanation for a seemingly counterintuitive empirical result, that firms sometimes raise prices in response to entry, helping explain why incumbents might respond "selectively" to entry (Geroski, 1995: 431). To the literature of agglomeration theory, this study adds a more nuanced view of the agglomeration effects while adding a more explicit consideration of the competitive effects of new entrants. It also extends prior work that demonstrates the existence of agglomeration externalities by examining the pricing behavior of incumbent firms. Much of the prior agglomeration literature focuses on how agglomeration externalities influence *entrant* behavior; in contrast, we investigate the impact of potential externalities on *incumbent* decision making in the face of entry.

Using quarterly price data from an extensive panel data set, we demonstrate that incumbents act in a manner consistent with their being aware of and capitalizing upon agglomeration benefits. We also show that experience with entry appears to play an important role in recognizing opportunities to exploit agglomeration externalities, a new insight that adds greater richness to explanations of the agglomeration phenomenon.

THEORETICAL AND EMPIRICAL BACKGROUND

Pricing response to entry: theory

One of the early theories of incumbent pricing behavior in response to potential or actual entry is limit pricing. Limit pricing models (Bain, 1956; Modigliani, 1958; Sylos-Labini, 1962) posit that incumbent firms may keep their prices sufficiently low such that new entrants believe entry would not be profitable. This is a rational strategy for incumbents as long as the forgone profits from limit pricing are smaller than the profit losses that would occur in the event of entry.

Limit pricing models assume that potential entrants use current industry profit levels to predict future profit levels (Masson and Shaanan, 1982), believing that incumbent firms will maintain pre-entry price and quantity levels after entry occurs. As later game-theoretic models (e.g., Milgrom and Roberts, 1982) showed, however, maintaining low prices post-entry is not a credible threat. Once entry occurs, it is not a profit-maximizing strategy for the incumbent to maintain these lower prices and higher quantity levels. A potential entrant who forecasts that the incumbent will raise prices after entry will not be deterred, thus questioning the utility of limit pricing explanations.

Models motivated by game theory suggest that incumbents need to credibly commit to pricing low post-entry in order to deter entry. Credibility is gained by making commitments that are difficult to reverse. In contrast to limit pricing explanations, low pre-entry prices might be considered a credible threat of low post-entry pricing in the presence of asymmetric information. In the case of an entrant who is unsure of the cost structure of an incumbent, the incumbent can signal its "type" (low-cost) by maintaining low prices (Milgrom and Roberts, 1982). Similarly, Kreps and Wilson (1982) demonstrate that it may be rational for incumbents to cut price in response to entry to establish a tough reputation. Incumbents with reputations for low costs or for toughness should face less entry. Thus, firms would have an incentive to respond aggressively, especially if they compete in multiple markets, all of which are impacted by their reputation.

Pricing response to entry: empirics

Limit pricing models have found weak empirical support. Masson and Shaanan (1982) found no support for static limit pricing and only weak support for dynamic limit pricing.[2] In a

[2] Static limit pricing involves the incumbent setting and maintaining a uniform limit price over time. With dynamic limit pricing, however, the incumbent reduces the limit price over time to manage the

survey of U.S. manufacturers, Smiley (1988) found limit pricing strategies to be the least used of seven potential entry-deterring approaches. A survey of U.K. firms also found little evidence that firms keep prices low in an effort to affect the decisions of potential entrants (Singh, Utton, and Waterson, 1998). Similarly, Geroski (1995) provided evidence that incumbent response is very selective, citing four studies that showed incumbent response in less than one-half of entry cases (Biggadike, 1976; Cubbin and Domberger, 1988; Robinson, 1988; Yip, 1982).

Related empirical work has focused on identifying particular industry characteristics associated with more aggressive pricing response to entry and has generated a mix of findings. Evidence of price-cutting in response to entry has been found in tire retailers (Bresnahan and Reiss, 1991), airlines (Joskow, Werden, and Johnson, 1994), and grocery stores (Marion, 1998). Other industry studies have provided evidence of varied responses. In the pharmaceutical industry, Frank and Salkever (1997) found that name-brand prescription drug producers raised price while generic drug producers cut price following entry by generic producers.[3] In a study of the cereal industry, Thomas (1999) found that incumbents accommodate other incumbents on price and new products while using advertising to limit the scale of entry. *De novo* entrants, in contrast, were more likely to be met with an aggressive price response as were entrants who entered with greater scale. Thomas (1999) also found a number of cases where prices actually rose after entry occurred. Finally, Yamawaki (2002) also showed that firms respond differently to entry using a sample of luxury automotive companies from 1986-1997. Following the entry of Lexus, German firms cut price while US firms raised price.

---

rate of entry. For a more detailed explanation of dynamic limit pricing models, see Gaskins (1971), Flaherty (1980), and Judd and Petersen (1986).

[3] Frank and Salkever (1997) are among the few researchers who offer an explanation for certain firms raising price following entry. They argue that price-sensitive buyers switch to generic drugs when those drugs enter the market, leaving the price-insensitive buyers to purchase brand-name drugs. The demand function facing brand-name firms becomes less elastic, and the profit-maximizing brand-name firm raises price.

In an attempt to explain variation among responses by incumbents, Simon (2005) suggested a more general explanation for the price response to entry phenomenon, one in which incumbents respond aggressively based on their *incentives* to respond. This view is consistent with theoretical explanations in competitive dynamics research (e.g., Chen, 1996) in which one of the main predictors of competitor response to a rival's competitive move is the focal firm's *motivation* to respond. In the context of entry response, Simon (2005) argues that newer firms are more vulnerable to entry and will therefore have more of an incentive to respond. This prediction is supported by his findings that newer incumbents cut prices more in response to entry than do older incumbents. Incumbents with less incentive, such as those who compete in fewer and in more competitive markets, cut prices less following entry.

We agree with the utility of examining firms' incentive or motivations to respond to entry but extend Simon's (2005) general explanation with the consideration that not only might firms have incentives to react more negatively, they might also have incentives to react more positively. Furthermore, the reasons and mechanisms explaining why firms respond more or less *aggressively* may be quite different from mechanisms that explain more or less *positive* responses. Focusing only on the negative aspects of entry results in an incomplete explanation of the phenomenon because it ignores the opportunity aspects of entry. We turn next to an overview of agglomeration theory to explain when firms might benefit from entry.

Agglomeration theory

Agglomeration theory suggests two distinct classes of benefits available from locating near competitors: production economies and increased demand (Marshall, 1920).[4] Much of the

[4] These factors are in addition to any benefits the firm might draw from the exogenous characteristics of the particular location. Marshall (1920) posits that unique physical conditions are the chief cause for localization of industries; however, Ellison and Glaeser (1999) found identifiable natural advantages

research that has investigated agglomeration economies and the benefits of clusters has focused on the production externalities of increased access to specialized inputs, specialized labor, and knowledge spillovers. Production externalities are often most relevant in manufacturing and high-technology industries while demand externalities are more relevant in retail and consumer services industries. These firms require fewer specialized inputs and labor, and technical knowledge is less critical, leaving a reduced role for knowledge spillovers. Our interest in price response to entry suggests a focus on demand-side externalities, which are more likely to manifest themselves through the ability to charge higher prices than are supply-side benefits. We next describe these demand-side benefits.

Similar businesses may clump together for the convenience of the consumer (Marshall, 1920). These clumps aid buyers by reducing their search costs (Stuart, 1979; Stahl, 1982) – geographical concentration facilitates the discovery and evaluation of the variety of options available from multiple firms. This increases the probability of purchase, thus heightening the demand of co-located firms. This type of agglomeration benefit will be particularly salient when product traits require visual inspection by consumers (Stahl, 1982) and when product heterogeneity is high (Fischer and Harrington, 1996). Under these conditions, consumer search costs are higher, and firms can increase their individual demands by clumping together.

Canina, Enz, and Harrison (2005) argue that firms may receive a separate demand-related benefit from agglomeration, an effect they label "differentiation spillover." Firms who sell products or services that are consumed at the firm location may benefit from the investments of competitors that make a location more attractive (e.g., external landscaping or area infrastructure). Location-based investments are not always firm-specific and hence can spill

---

in only twenty percent of the clusters they studied. Agglomeration theory tends to focus on the endogenous benefits created by the fact of co-location.

over to the benefit of all of the firms in a particular geographic location. Furthermore, by adopting a fast follower approach, firms can copy the differentiation investments of their competitors at a lower cost. As more firms co-locate and invest in the market, differentiation spillovers grow.

Views from population ecology (e.g., Hannan and Freeman, 1989; Hannan and Carroll, 1992) also suggest that firms within a population may receive demand-related legitimation benefits when additional firms join that population. The density-dependence model, which has been investigated in a variety of contexts (e.g., Baum, 1995), posits that survival of organizations depends on legitimation and competition, two forces related to the density of the population. Legitimation effects increase survival rates while competition decreases survival. Legitimation effects are realized as organizational forms increase in a population – potential customers and resource providers view a form to be more legitimate as it proliferates. Hence, they are more willing to transact with population members, increasing members' performance levels. The first firm in a market gains additional legitimacy in the eyes of buyers when a similar firm opens in that same market. Increased legitimacy in turn leads to increased demand.

Tests of agglomeration theory

Investigation of the potential benefits of agglomeration has spurred a wealth of empirical investigation. Rather than providing a broad review of this literature available elsewhere (e.g., McCann and Folta, 2008), we focus on specific findings related to demand-side externalities. First, it is clear that firms that might benefit from demand externalities do agglomerate. Fischer and Harrington (1996) found that firms offering heterogeneous products that consumers wish to inspect prior to purchase, such as shoe stores, antique dealers, and automobile dealers, exhibited high levels of spatial concentration. Second, a number of studies have demonstrated positive

relationships between agglomeration and firm performance and have found that larger firms and higher quality firms seem to generate the strongest agglomeration benefits. For example, Chung and Kalnins (2001) discovered that rural hotels had higher revenues when their local market was made up of a greater fraction of hotels larger than them and of higher quality. Canina *et al.* (2005) similarly demonstrated greater revenue for hotels located within agglomerations of larger numbers of high-end hotels and found positive size-based effects in the economy, upscale, and luxury segments of their hotel sample. While both of these studies interpreted these results as evidence of positive agglomeration effects, we believe that they indicate more than just positive agglomeration effects. Although not explicitly addressed in either study, we contend that these results indicate that the *net* effect (agglomeration less the negative effects of competition) of being surrounded by a higher proportion of larger or higher quality hotels is positive. We develop this distinction in greater detail below and argue that explicit consideration of both the agglomeration and competitive effects associated with size lead to a richer understanding of this relationship.

A final set of empirical tests demonstrates that agglomeration appears to impact the entry decisions of firms. Baum and Haveman (1997) found that new entrants tend to select locations proximate to similarly priced competitors while Kalnins and Chung (2004) demonstrated that new hotels are more likely to enter into markets with larger concentrations of upscale hotels. Both of these findings are consistent with the idea that firms make entry decisions, at least in part, in order to take advantage of the presence of agglomeration externalities.

Despite these sets of empirical tests, however, a few issues remain unexamined. First, while many studies have investigated how agglomeration externalities influence *entrant* behavior, few consider the impact on *incumbent* decision making in the face of entry. Researchers have

commented on this potential noting the possibility that entrants may "confer an external benefit to the sellers already there" (Stahl, 1982: 98). Stuart (1979: 17) also acknowledged this potential in his work on the benefits of agglomeration noting that "the addition of a new seller to a marketplace might increase the drawing power of the marketplace sufficiently to increase the demands faced by the sellers already there." Thus, a next logical step is to examine how incumbent firms are affected when they face entry from firms who may generate agglomeration benefits. An important part of this extension is to more fully consider *both* the agglomeration and competitive effects of new entrants. We suggest that a clearer understanding of the nature of agglomeration effects will clarify the nature of the relationship between geographic co-location and performance. Furthermore, while recent work has primarily focused on the agglomeration side, we argue that to clearly understand the impact of entry, we must consider both the positive *and* negative aspects. This seems particularly important in the case of demand-related agglomerations as Fischer and Harrington (1996) note that the main cost to location within a demand-side agglomeration is the intensified competition created by the close proximity of firms.

A second natural extension of the previous work is to investigate how firms actually capitalize on agglomeration benefits. Previous cross-sectional studies have demonstrated the static existence of increased revenue in cases of agglomeration but do not inform us as to how those higher revenues are realized. Longitudinal studies are necessary to demonstrate how the realization of these benefits unfolds. Do incumbents appear to recognize and act upon agglomeration opportunities by raising prices?

Our approach in investigating this particular type of competitive interaction relates strongly to the emerging theoretical framework in competitive dynamics research that rests on three implicit drivers of competitive action or response – a firm's awareness of a competitive

relationship and/or competitors' initiatives, its motivation or incentive to do so, and its capability to act or respond (Chen, 1996; Chen, Su and Tsai, 2007; Smith *et al.*, 2001). We first consider the motivation driver, which is consistent with Simon's (2005) argument that an incumbent's response to entry is driven by the incentive to respond. We also consider the capability driver and argue that firms with the most experience facing prior entries will be best able to predict the consequence of a rival's entry move and therefore be most likely to respond appropriately.[5]

HYPOTHESIS DEVELOPMENT

In order to address our research questions, we must first turn to prior research to identify the types of organizations that generate demand-related agglomeration externalities. It is for these entrants that agglomeration benefits are most likely to outweigh any negative effects of additional competition, providing the incentive to respond more positively. Based on the theoretical discussion above, those organizations that are most likely to reduce consumer search costs, create differentiation spillovers, or contribute to legitimation effects should be the firms that deliver the largest positive demand-side externalities. If agglomeration externalities exist and firms recognize the entrants most likely to produce them, they should set higher prices when facing these types of entrants relative to other types of entrants, supporting our notion that organizations may react more positively to certain types of entry situations.

Size-related agglomeration effects

As we noted above, establishment size has been used as an indicator of the existence of agglomeration benefits. Both Chung and Kalnins (2001) and Canina *et al.* (2005) utilize a measure of the proportion of firms larger than the focal firm in a particular market to demonstrate that firms benefit from being co-located with larger firms. Their use of a linear

[5] In the context of response to entry, the relevance of the awareness driver is markedly diminished by the obvious nature of this particular competitive move.

measure and the associated findings are most consistent with an interpretation of a positive linear relationship between establishment size and net co-location benefits. We argue below, however, that the relationship between entrant size and the net benefits to a focal firm will be curvilinear. The positive agglomeration effect is subject to diminishing returns while the negative competitive effect is increasing in entrant size. Combining these two leads to a net effect that is curvilinear and concave. We begin by discussing the positive aspects of increasing entrant size.

Larger size may confer more agglomeration benefits for two distinct reasons, related to legitimation and advertising respectively. First, larger organizations deliver stronger legitimation effects. "Large size tends to legitimate organizations, to the extent that large size is interpreted by stakeholders as an outcome of an organization's prior success and an indicator of future dependability" (Baum, 1996: 79). Customers view larger organizations as having higher legitimacy, and this increased legitimacy spills over to the organization's market. The presence of larger establishments in a market, with their greater investment, larger commitment to the market, and higher perceived future dependability, provide evidence to customers of the legitimacy and appropriateness of the market.

Second, larger organizations also invest more in advertising, and advertising increases with entrant size (Shankar, 1999). Advertising is important to agglomeration externalities because one of the key links to heightened demand is reduction in search costs realized through informing potential customers (Stahl, 1982; Stuart, 1979). The more advertising done by companies in a geographic location, the greater the amount of information available to consumers not only about specific firms but also about the particular location. This could include factual information about the location, a signal of the appropriateness of the location, or the awareness of the existence of the location. Advertising is particularly significant for

"experience goods" (Nelson, 1970), which buyers must actually consume in order to evaluate. So, the more advertising related to a particular product market, the more aware and better informed consumers will be of the potential market, and their associated search costs will be lower.[6] Moreover, advertising may also have an additional, positive moderating effect on the relationship between legitimacy and demand – advertising makes customers more aware of the legitimacy of the market. In the context of demand-related agglomeration, Chung and Kalnins (2001) argue that the establishment size-advertising link is one of the key drivers of the association they noted between larger establishments and the existence of agglomeration benefits. With both their greater propensity to advertise and the stronger legitimacy effects, larger entrants should deliver greater agglomeration benefits than smaller entrants.

We contend, however, that these size-based agglomeration effects will be subject to diminishing marginal returns essentially flattening out as entrant size becomes sufficiently large. First, sales response functions exhibit diminishing marginal returns to advertising (Simon and Arndt, 1980). As Lambin (1976: 97-98) notes, "the efficiency of increased advertising exposures always decreases beyond the threshold level." Thus, we might expect that advertising spending flattens out once an establishment reaches a certain threshold level. Second, legitimation effects are likely subject to the same effect. Legitimacy increases as size increases but only up to a certain threshold size. Beyond that level, legitimation returns to size diminish as consumers are unlikely to continue to ascribe similar increases in perceived organizational dependability as size increases. While we are unaware of literature that specifically examines the exact shape of the competitor size – legitimation relationship, related literature examining legitimation effects does

[6] While there may be less of a tendency to personally inspect products prior to purchase in particular industries (e.g., hotels) compared to other industries that exhibit demand-related agglomeration, the search costs argument would still be applicable because of consumers' efforts to gather information prior to purchase. We believe that whether that search occurs personally or virtually, agglomeration facilitates lower search costs.

support the idea that legitimation benefits are subject to diminishing returns over the range of a number of size measures. For example, Barron, West and Hannan (1994: 400) argue that: "the benefits that accrue to an organization in terms of declining risk of failure with increasing size are likely to increase at a decreasing rate." Similarly, Hannan and Carroll (1992) state that legitimacy increases with density (population size) but at a decreasing rate, and Cohen and Dean (2005) argue that legitimacy increases at a decreasing rate with team size.

Diminishing marginal returns to size-based agglomeration effects imply that the relationship between establishment size and the net effect of agglomeration and competition effects is curvilinear, and not linear as was suggested by the previous literature. And, while the theme of the present research argues for a focus on the positive aspects of entry, this consideration highlights the importance of also explicitly considering the relationship between entrant size and competitive effects. Larger entrants add more supply creating downward pressure on prices and potentially greater business stealing. Furthermore, increased advertising spending by these larger entrants can shift greater amounts of market share from incumbents to entrants, the business-stealing effect of advertising. The larger the entrant, then, the greater the competitive effect incumbents will experience. While theory thus strongly suggests that the relationship between entrant size and competitive effects is monotonically decreasing, we do not believe that there are strong *ex ante* reasons to assert that the *marginal* effect of this relationship is either constant or diminishing.[7]

Overall, the combination of increasing agglomeration effects with diminishing returns and increasingly negative competitive effects (either constant or marginally diminishing) implies that the relationship between size and the net effect is not simply a positive linear relationship as

[7] A diminishing marginal effect of entrant size on incumbent price would mean that the negative effect of an additional unit of capacity would be less at the upper end of entrant capacity. A constant marginal effect implies similar competitive effects across the whole range of entrant capacity.

suggested by the prior literature. We expect that this positive net effect will diminish over the range of entrant size leading to a curvilinear relationship.

Hypothesis 1: The relationship between entrant size and incumbent price will be curvilinear and concave.

The exact interplay between the agglomeration benefits and competitive effects will determine whether this curvilinear relationship is monotonic or non-monotonic. A constant marginal competitive effect combined with a positive, diminishing agglomeration effect would imply that the net effect is curvilinear and non-monotonic, i.e., inverted-U shaped. The positive effect of co-locating with larger competitors, as found by the previous literature, would decrease at the point where the competitive effect starts to outweigh the diminishing agglomeration effect, resulting in a net effect that is first increasing and later decreasing. The same inverted-U shaped relationship would obtain as long as the marginal competitive effect is not diminishing too strongly. In contrast, if the marginal competitive effect diminishes more strongly than the marginal agglomeration effect does, the relationship between entrant size and the net effect would be monotonically increasing. As the exact shape of the net effect over the range of a particular data set is ultimately an empirical issue, we do not offer specific hypotheses about the shape of the curvilinear effect but will let the empirical analysis determine it.

Resource-related agglomeration effects

A second determinant of agglomeration benefits discussed in the literature is the relative magnitude of firms' resource endowments. Greater resources may produce higher agglomeration benefits due to the presence of resource spillovers, increased legitimation, and higher rates of advertising that lead to heightened demand.

For example, Kalnins and Chung (2004) argue that high-resource firms are more likely to

produce resource spillovers. High-quality businesses invest in product and organizational attributes to differentiate themselves from the competition, and these differentiators provide spillover benefits to geographically proximate competitors. In one such example, Canina *et al*. (2005: 568) state, "The presence of luxury and higher-end hotels, because of their service quality, architectural features, and reputations ... increases the attractiveness of an area as a destination." Increased attractiveness helps build the legitimacy of a particular agglomeration of firms as an acceptable location. Upscale firms also provide signals about the quality of the area, such as safety in the context of hotels (Kalnins and Chung, 2004). Moreover, high-end establishments may provide public facilities that can be used by the customers of other establishments in the area that do not possess these resources. Finally, upscale businesses are also more likely to engage in advertising as they must signal their quality advantage to potential customers, and this advertising can be seen as a credible signal of product quality (Milgrom and Roberts, 1982). As just one example drawn from a 2007 study of the hospitality industry, high-end hotels spent $5,336 per available room on sales and marketing compared to an average of $1,959 for low-end hotels (PKF Consulting, 2008).

Given their generation of differentiation spillovers, greater propensity to advertise, and positive signals, high-quality entrants should thus deliver greater agglomeration benefits than low-quality entrants. Again, however, we must consider the relative competitive impact. Unlike the case of size-based agglomeration effects, there is no particular expectation whether low-quality firms impose higher or lower supply-based pressures than similar sized, high-quality firms do. Therefore, we do not anticipate differential competitive effects from the entry of these two entrant types.

Overall, then, relative to the case in which a low-end firm enters a market, an incumbent

firm facing entry of a high-end firm may benefit from heightened demand while experiencing a similar competitive effect. Thus, the net relative effect will be positive.

Hypothesis 2: Incumbents experiencing entry by a high-quality establishment will set a higher price than those experiencing entry by a low-quality establishment.

The effect of experience on response to agglomeration opportunities

Increasing prices in the face of entry by competitors delivering agglomeration benefits requires incumbents to recognize the opportunity and respond appropriately.[8] As Smith, Grimm, Gannon, and Chen (1991) note, response capability requires that firms must be able to predict the consequences of a rival's move and develop, analyze, and evaluate response options. Firms that want to consistently capitalize on agglomeration opportunities must possess knowledge of the optimal responses to different types of entrants, which will require an understanding of the agglomeration and competitive effects generated by these different entrants. This knowledge can be developed through a learning process. One process of organizational learning that has been the subject of much study is *experiential* learning, which represents learning from direct first-hand experience. The literature on experiential learning focuses on the processes by which the experience gained with organizational actions leads to knowledge and better performance.

In their classic article on organizational learning, Levitt and March (1988) argue that organizations can be seen as learning by encoding inferences from history into routines that guide behavior. Cyert and March (1963) and Nelson and Winter (1982) both discuss the importance of routines in shaping organizational behavior, where actions involve receiving and interpreting messages from the environment and then selecting and performing an appropriate routine. These routines have an evolutionary component, as they tend to change and develop

[8] In an oligopolistic setting of price competition in differentiated goods, the optimal response to an increase in residual demand created by a positive net effect of entry is to increase prices even if other, less experienced incumbents do not respond with similarly high prices.

over time. Levitt and March (1988: 320) observe that routines "adapt to experience incrementally in response to feedback about outcomes." Variations in routines develop in response to firms' experience, often through experimentation, and the likelihood that particular routines will be used increases with successful outcomes and decreases with unsuccessful outcomes (Cyert and March, 1963). Increasing experience fosters adaptation, helping firms modify routines to improve performance.

The value of experience in helping improve performance has been demonstrated in a number of contexts. Learning curve studies have documented the decrease in manufacturing costs associated with cumulative production experience (e.g., Yelle, 1979). Darr, Argote, and Epple (1995) demonstrated that experience also has value in service organizations, as they found greater experience associated with declining production costs in their sample of franchised pizza stores. In the context of the hotel industry, Baum and Ingram (1998) showed that higher levels of operating experience tend to decrease the failure rates of hotels.[9]

Overall, the firms with higher levels of experience are most likely to have learned and developed routines to respond appropriately to an agglomeration-generating entrant. Experience with entry allows incumbents to develop a better understanding of the underlying agglomeration and competitive effects. As they face more entry, incumbents have the ability to experiment with different responses. They can learn what works and what does not and develop an understanding of the mechanisms underlying these relationships. In contrast, firms with less entry experience are more likely to react suboptimally when new firms enter their market. In particular, inexperienced firms may underestimate the benefit larger and higher quality firms could bring into the market, focusing too much on the negative aspects of entry and neglecting

[9] The authors did note a U-shaped relationship with very high levels of experience being associated with higher risk of failure.

the potential positive effects of entry. We thus expect that experienced firms, realizing the benefits of larger and higher quality entrants, react more positively to these kinds of entrants than inexperienced firms, which might regard all entry as intrinsically negative.

Hypothesis 3: The curvilinear association between an incumbent's price and entrant size will be accentuated for incumbents with more experience with entry.

Hypothesis 4: The association between an incumbent's price and entry by a high-quality entrant will be more positive as incumbents' experience with entry increases.

METHODS

Data and sample

The empirical context of our industry is the hotel industry, which is part of the services sector of the economy. We selected this industry because our interest in price response to entry motivated a study of demand-side agglomeration effects. These effects are often more salient in the services sector than production-side externalities, which are generally more relevant to producers of industrial goods, especially those in high technology industries. Prior agglomeration studies such as Baum and Mezias (1992), Baum and Haveman (1997), Chung and Kalnins (2001), Kalnins and Chung (2004), and Canina *et al.* (2005) have all used samples drawn from the hotel industry to investigate the operation of demand-related externalities.

The hotel industry in the state of Texas served as our empirical setting. The Texas hotel market provides a rich setting for empirical research because of its large size, the diversity of the state in terms of rural, suburban, and urban regions, and availability of reliable data. Local competition characterizes this industry, as hotels compete with hotels in the same geographic area but not with hotels in other parts of the state or country (Baum and Mezias, 1992). Hotels compete on a variety of dimensions, including quality, location, service levels, the range of

product offerings, and price.

We used two primary sources of data for our analysis: a public hotel tax file from the State of Texas Comptroller's Office and a private database from Source Strategies, Inc., a leading hotel consultant that maintains data on Texas hotels from 1976 through the present. The former database has been used among others by Chung and Kalnins (2001) and Vroom and Gimeno (2007). The latter database has been used in previous studies such as Conlin and Kadiyali (2006) and Vroom and Gimeno (2007).

All hotels in Texas must collect a Hotel Occupancy Tax from customers and report its collections to the State of Texas Comptroller's Office. For the purposes of the tax, a hotel is considered to be any building in which members of the public rent sleeping accommodations for $15 or more per day. The tax covers hotels, motels, and bed and breakfasts, as well as condominiums, apartments, and houses rented for less than 30 consecutive days. The Comptroller's Office makes these data publicly available. This data set included the hotel name, hotel location, owner name/address, hotel capacity, and quarterly revenues. The Source Strategies, Inc. database included the same hotels and also reports quarterly. In addition to the hotel name, their data also included the average quarterly occupancy rate, price, and revenue per available room.[10] To avoid inclusion of firms such as bed and breakfasts and recreational vehicle parks, independent hotels with average room capacities under ten were dropped from the data set. The complete data set spanned 24 quarters (mid-1999 through mid-2005). We focused on market-periods in which entry occurred, resulting in a data set of 6,365 observations.[11] To

[10] The average room price (average daily rate or ADR), the occupancy rate, and the average revenue per available room (RevPAR) are the three most commonly used performance indicators in the hotel industry. The relationship between these three measures is as follows: revenue per available room = occupancy rate * average room price.

[11] We augmented the data set with the quarter immediately prior to the first quarter in order to calculate variables that required prior information (for example, lagged variables and entry). Observations from

ensure that our results were not driven by a corporate effect, that is incumbents reacting more positively to entrants of the same corporate parent, we excluded 290 observations in which the incumbent shared a corporate parent with the entrant.[12] Miscellaneous missing data points reduced the final sample to 5,778 observations.

Our model specification used the zip code as the definition of the boundaries of an establishment's local market. This market definition is consistent with previous studies of the Texas hotel industry (Chung and Kalnins. 2001; Kalnins and Chung, 2004; Vroom and Gimeno, 2007). While some researchers have used broader county/city-level definitions (e.g., Conlin and Kadiyali, 2006), we believe that narrowing to the zip code level better approximates the choice set consumers review when selecting a hotel. Within our sample, the average number of hotels per zip code is just under 11. Over the six years of the study, mid-1999 to mid-2005, approximately 4,100 hotel establishments operated in more than 850 local Texas markets, and the number of hotels grew by just over 3.3 percent annually. The number of branded units grew from 1,698 to 2,126 (annualized growth of 3.8 percent) while the number of independent units grew from 1,431 to 1,680 (annualized growth of 2.7 percent).

We utilized the Smith Travel Research Chain Scales to classify hotels into segments. Smith Travel Research is the lodging industry's leading information and data provider, with the most comprehensive database of hotel performance information available.[13] We classified hotels into segments for two main purposes, to create segment level controls and to determine entrants' quality levels, as described in detail below.

---

this prior quarter, however, do not enter any of the regression equations. We also ensured that all of the substantive conclusions of our analyses were robust to the inclusion of non-entry observations.

[12] Our substantive results do not change with the inclusion of these cases.

[13] While Smith Travel Research has the most comprehensive data, the company will not release performance data that may be identified at the individual hotel level per contract with their hotel customers. This makes the database unsuitable for research requiring detailed information at the establishment level.

Dependent variable

The dependent variable was the average daily price of an individual hotel room, known in industry terms as the average daily rate or ADR. We transformed this variable using the natural logarithm, as hotel prices tend to follow an approximately lognormal distribution. The price measure utilized was the hotel's average price over the particular quarter. The availability and use of quarterly price data allows us to capture shorter-term price reactions that may be less apparent when using annual price data as in some previous pricing response to entry studies (Simon, 2005; Yamawaki, 2002). Average daily rates do fluctuate across the quarter depending on factors like length of stay, room quality, season, and the day of the week. As our dependent variable is an average over the quarter, it does not capture this intra-quarter variability; however, we do not believe this limitation systematically biased any of the findings. We also note that in contrast to previous studies of agglomeration externalities in the hotel industry (e.g., Canina *et al*., 2005; Chung and Kalnins, 2001), we used price instead of revenue per available room (RevPAR). As noted earlier, revenue per available room is a function of both price and occupancy; therefore, the individual factor driving revenue changes can not be isolated when using RevPAR. As we were interested in the decisions made by establishments in response to entry, price was chosen as the dependent variable.

Independent variables

Entry was defined by the initial quarter in which a new hotel reported non-zero revenue. A total of 909 new hotels entered over the course of the data set. [14]

For testing our first hypothesis related to entrant size, we used the room capacity in

[14] We excluded one outlying case of entry. This hotel entered with a total of 1,511 rooms. The next largest entrant size was 474 rooms. Including this outlier might skew results in such a way that they are less representative of typical hotels. Whether this data point is included or excluded, however, did not change any of the signs or significance levels of the results.

hundreds of rooms added through entry (*Entrant Size*) in a focal hotel's zip code in the quarter in which entry occurred. In the case of multiple entrants in a particular market-period, this measure reflects the capacity of all entrants. For testing alternative shapes of the relationship, we also investigated the inclusion of a quadratic term (*Entrant Size Squared*) and a log-transformed version of the variable (*Log Entrant Size*).

To determine which entering hotels should be considered upscale or high quality, we used the Smith Travel Research Chain Scales, which classify chains into six categories (Economy, Midscale without Food and Beverage, Midscale with Food and Beverage, Upscale, Upper Upscale, and Luxury). Consistent with prior research in this area (e.g., Kalnins and Chung, 2004) and with the logic of our hypotheses, we utilized two categories of hotels, high- and low-quality. We defined a hotel to be high-quality if it operated in the Upscale, Upper Upscale, or Luxury segments. Examples of brands that qualify as high-quality include Ritz-Carlton, Marriott, Hilton, and Radisson. We also included upscale independents (i.e., non-branded) in our definition of high-quality hotels. Independents were classified as high-quality if their average price over the life of the data set was within the range of average prices that defined the branded high-quality segments. Low-quality hotels include midscale and economy chain hotels along with low-priced independents. Of the 909 entrants, 165 were classified as high-quality and 744 as low-quality. A hotel was classified as facing a high-quality entrant (*Facing High-Quality Entrant*) in a particular quarter if a new high-quality hotel opened in its zip code during the quarter.

We recognize that if a high correlation existed between the two types of entrant classifications, e.g., entrants who are larger also tend to be exclusively high-quality, our separate effects could in reality represent two manifestations of the same phenomenon. Table 1 presents

some descriptive statistics that argue against this interpretation; for example, only approximately 28 percent of high-quality entrants are classified as either mid-sized or large, using size category definitions from the American Hospitality and Lodging Association. We also ensure that the effects are distinct by including them together in our analysis.

---------- Insert Table 1 about here ----------

Entry experience (*Establishment Experience*) is a count of the number of entries a particular hotel has faced since the beginning of the data set with values ranging from zero to eleven. Because some prior research (e.g., Darr, Argote and Epple, 1995) suggests that knowledge transfers across commonly owned units, we also calculated the number of entries a particular owner has faced (*Owner Experience*), which captures the fact that a particular owner may own multiple hotels. Because of the highly skewed nature of the owner experience variable, we log-transformed it.

Control variables

Our data is a panel of multiple establishments from multiple branded chains and independent hotels, observed across multiple periods and markets. To control for potential sources of heterogeneity that we could not measure, we used fixed effects for establishments, periods, and segments. Establishment fixed effects control for unobserved, stable hotel attributes such as quality and location in an attractive area. We utilized groupwise demeaning in the full sample to control for fixed establishment effects.[15] Dummy variables for each period control for unobserved time-varying factors such as seasonal and macroeconomic trends in the economy. Including time dummies is important to control for potential contemporaneous correlation, and these dummies reduce the bias of coefficient estimates in fixed effects regression (Certo and

[15] We demeaned the data first (using the full sample), and then performed pooled OLS on the demeaned variables (Wooldridge, 2003), restricting the sample to only observations in which entry occurred in the hotel's market.

Semadeni, 2006).

We also included dummies for the segments in which each incumbent hotel operated, providing controls for the average quality, reputation, and profile of hotels within a given segment.[16] We utilized the six segments of branded hotels defined from the Smith Travel Research Chain Scales along with a separate segment for all independents. Classifying independents separately is consistent with the approach of Smith Travel Research and with previous research in this industry (Chung and Kalnins, 2001).[17] We also control for the age of each incumbent hotel as age may affect price response to entry (Simon, 2005).

We also controlled for time-varying market supply and demand conditions affecting each hotel. We utilized the logarithm of one-period lagged market capacity (the total number of rooms of all hotels in the zip code excluding the focal hotel) to control for variations in supply conditions. We utilized the mean occupancy rate (the percentage of occupied rooms) in the focal hotel's zip code to control for local market demand conditions. We also lagged this control one period, and we again excluded the focal hotel from this calculation to avoid potential endogeneity given that the firm's own price might influence its occupancy level. To control for the level of market competition, we included a lagged measure of market concentration, calculated as the sum of the squared, sales-based market shares of all hotels in the zip code. Finally, we also include a measure of total entrants in each period to control for multi-entry cases and a dichotomous measure indicating whether the incumbent and the entrant compete against

[16] We include segment dummies because hotels may compete in multiple segments across the data set. This may occur, for example, by a hotel changing its brand from an economy to a midscale brand.

[17] Classifying independent hotels is difficult because the same types of rating data are not available for independents. Some hotel tour books, such as the one published by the American Automobile Association, report a "star" rating, but these turn out to cover only 15 percent, or less, of the hotels in Texas (Chung and Kalnins, 2001). Whether we classified independents separately or grouped them within the branded segments based on their price did not change any of the signs or significance levels of the results.

each other in multiple markets. We include the multi-market control because the multi-market literature (e.g., Gimeno, 1999) suggests that rival firms that have a foothold in each other's markets may refrain from aggressive behavior (mutual forbearance) because of the fear of reciprocal retaliation in other markets.[18]

Method

We tested the hypotheses with hierarchical regression analyses. The dependent variable in each model is the log of the hotel's average daily rate (price). All models included robust standard errors clustered at both the unit and the owner level to correct for the fact that errors may be correlated within groups of observations. The variance estimates produced by clustered robust standard errors are robust to correlation within the observations of each panel/group.[19]

RESULTS

The final sample consisted of an unbalanced panel of 2,373 hotels totaling 5,778 observations. Table 2 provides descriptive statistics for the variables. In addition to the means, we also include both the overall and within-establishment correlations and standard deviations.

---------- Insert Table 2 about here ----------

Table 3 presents the results of our analysis. For presentation purposes, the coefficients for the period and segment dummies are excluded from the tables. We begin by reviewing the results for the hypothesis concerning the relationship between pricing response and entrant size. Models 1, 2, and 3 include three alternative specifications that represent linear, curvilinear and non-monotonic, and curvilinear and monotonic shapes, respectively. The results support Hypothesis 1, which stated that the relationship between incumbent pricing and entrant capacity

[18] Our substantive results are the same whether we use a dichotomous or continuous measure of multi-market contact.

[19] To accomplish the multi-way clustering within Stata, version 9.2, we used the *cluster2* approach as described in Thompson (2006). We verified that our results were robust to an alternative approach to two-way clustering by using the *cmgreg* approach described in Cameron, Gelbach, and Miller (2006).

would be curvilinear and concave. Furthermore, the analysis indicates that the particular shape of this curvilinear relationship is inverted-U-shaped: Model 2 includes a significant positive linear term (*Entrant Size)* and a significant negative quadratic term (*Entrant Size Squared).* The results do not support a simple linear relationship nor a curvilinear, monotonic relationship: the linear term in Model 1 and the logged term in Model 3 both generated insignificant results. To ensure that the inverted U-shape occurs within the range of the data we are examining, we graph the relationship between incumbent price and entrant scale. As shown in Figure 1, the shape is as predicted and the maximum price response occurs at an entrant capacity of approximately 204 rooms. The results have a meaningful economic impact as well. Comparing the predicted response to a small entrant versus a mid-sized entrant, the predicted price response to a mid-sized entrant is approximately one percent higher.[20] For the average hotel in our data set with a capacity of 101 rooms and an occupancy level of 55 percent, a one percent higher price holding quantity constant translates into an annual revenue increase of just under $10,000.

---------- Insert Table 3 about here ----------

---------- Insert Figure 1 about here ----------

Model 4 introduces the comparison between facing high-quality entrants and facing low-quality entrants. The excluded category in this model is facing low-quality entry. Thus, the coefficient on *Facing High-Quality Entrant* indicates the differential impact on price when facing a high-quality entrant relative to facing a low-quality entrant and provides a test of Hypothesis 2, which predicts a positive differential. Model 4 supports this hypothesis indicating a positive marginal effect on prices when hotels face high-quality entrants relative to facing low-quality entrants. The coefficient on *Facing High-Quality Entrant* of 0.0168 indicates that the

[20] To generate the comparison, we used the midpoint of each size category (50 rooms for small and 200 rooms for mid-sized).

increased marginal effect on price is approximately 1.7 percent.

Models 5 and 6 contain the tests of the experience interaction hypotheses with experience aggregated at the establishment level. Given the conclusion about the shape of the relationship generated by Models 1-3, we interacted the experience measure with the linear and quadratic terms to test Hypothesis 3. The coefficients of *Establishment Experience * Entrant Size* and *Establishment Experience * Entrant Size Squared* in Model 5 support Hypothesis 3. The significant positive coefficient of 0.0099 on the linear interaction term and the significant negative coefficient of -0.0016 on the quadratic interaction term indicate that the inverted U-shaped relationship between incumbent price response and entrant size is accentuated as experience with entry increases. Figure 2 depicts the impact of the interaction effect with a comparison of the relationship between incumbent pricing and entrant size for a relatively experienced incumbent versus a relatively inexperienced incumbent. We see that the relatively inexperienced incumbent appears not to recognize the opportunity to capitalize on entry by certain entrant types. The coefficients of the two main effects in Model 5 are of interest as well. With the interaction terms in the model, these coefficients represent the effect of entrant capacity on price when the focal hotel has *zero* recent experience with entry. The insignificant coefficients confirm that inexperienced hotels do not appear to distinguish among entrants of different sizes.

---------- Insert Figure 2 about here ----------

Model 6 tests the interaction between experience and facing high-quality entry. The positive coefficient on *Establishment Experience * Facing High-Quality Entrant* provides support for Hypothesis 4, indicating that the marginal effect of facing a high-quality entrant increases significantly as an incumbent has greater experience with entry. The coefficient on the

main effect of *Facing High-Quality Entrant* in Model 6 (- 0.0137) indicates that hotels with zero recent experience with entry do not recognize the benefits of high-quality entrants. They appear to view these entrants as more threatening, reacting more negatively to the entry of a high-quality hotel relative to a low-quality hotel. We finally present a full model with all effects included in Model 7. While the coefficients of the interaction terms are slightly reduced, they remain significant providing support for our hypothesized relationships. In this model, the coefficients of the main effects of *Entrant Size*, *Entrant Size Squared*, and *Facing High-Quality Entrant* represent the effects for an incumbent with zero recent experience with entry. Again we see that incumbents with no experience with entry do not distinguish among entrant types.

We also note that the results for the remaining variables are fairly consistent across the models. The significant positive sign on mean occupancy is consistent with our expectations of hotels' pricing higher when demand is higher. The sign on our supply (market capacity) and concentration controls are in the predicted direction but are insignificant. The significant, positive sign on the coefficient of *Establishment Experience* in our models may be a reflection of the underlying attractiveness of the market, that is, good markets have both rising prices and high levels of recent entry. Consistent with theorizing about the effects of multi-market competition, we find that incumbents have a marginally significant positive response to entrants with whom they share multi-market contact.

Table 4 presents our analysis of aggregating the experience with entry measure at two different levels, the establishment and the owner. Model 8 adds interactions of *owner* experience with the linear and quadratic entrant size measures. While the establishment experience interactions maintain their signs and significance, the owner experience interactions do not generate significant results. The interactions of *Owner Experience * Entrant Size* and *Owner*

*Experience * Entrant Size Squared* are both insignificant. In Model 9, we see similar results for interacting owner experience with facing a high-quality entrant. The establishment experience interaction maintains its sign and significance, while the interaction of *Owner Experience * Facing High-Quality Entrant* is insignificant. Model 10, which includes all of the interactions, supports the earlier results. The experience interactions are driven by experience at the establishment level and not at the owner level.

---------- Insert Table 4 about here ----------

DISCUSSION

Additional analyses

Prior agglomeration and competition literature suggests that our relationships might vary depending on the nature of the incumbent. For example, Chung and Kalnins (2001) found that small hotels and independent hotels appeared to benefit most from agglomeration externalities in rural markets. Canina *et al.* (2005) argue that the lowest-end providers with the greatest strategic distance from the norm of an agglomeration benefit most from co-locating with high-quality firms. We might also expect that firms of similar size (e.g., Baum, 1995; Baum and Mezias, 1992) and resource base (e.g., Chen, 1996) compete more heavily. Given the theoretical support for these ideas, we did investigate whether our effects varied based on incumbent type. While we found that interactions with incumbent type were generally in the direction predicted by the prior literature, none of the effects were significant. We offer a few speculations as to why we did not find significant relationships here. First, the lack of agreement with prior agglomeration literature may be driven by differences in samples. For example, Chung and Kalnins' (2001) findings of differential benefits for small and independent hotels were generated from a sample of only rural hotels while our sample includes rural, suburban, and urban hotels. Second, it may

be that those who benefit more from agglomeration externalities (small, independent, or low-cost firms) do not quickly recognize these opportunities. Because we focus on short-term reactions to discrete entry events, our tests would not detect effects that develop over a longer period of time. Finally, it may be that incumbents do react more strongly to similar entrants but with weapons other than price changes. We believe that further research investigating the role of incumbent heterogeneity would be valuable.

We also considered whether experience across other levels of aggregation (in addition to the establishment or owner level) might be relevant. In the context of the hotel industry, individual units may be part of a larger chain/brand or corporate entity. The corporate level differs from the brand level because a number of hotel companies own multiple brands. These relationships could imply that, apart from unit-specific experience, chain-wide or even corporate-wide experience with entry might contribute to unit-level learning. We focused at the unit and owner levels because of a concern that learning would not diffuse broadly at higher levels of aggregation given the varying ownership at these levels. As just one example, Days Inn had a total of 132 different owners in the last quarter of the data set, leading to a concern that information would not be shared across these different owners. This interpretation is supported by Darr, Argote and Epple's (1995) findings that knowledge did not appear to transfer across stores owned by different franchisees.

Potential limitations

One possible concern with this study is the potential for endogeneity of the entry variable. Although Yamawaki (2002) and Frank and Salkever (1997) both found that controlling for endogeneity of entry did not markedly impact their results, investigation of this potential seemed prudent. One source of endogeneity is the possibility that omitted variables may be correlated

with both entry and pricing of incumbents. For example, attractive markets where prices are rising might be more likely to draw a larger scale or certain types of entry. Incumbent prices in these markets would have risen regardless of whether entry occurred. Thus, the association we see between certain types of entry and higher prices may simply be due to the underlying, unmeasured attractiveness of the market. For this to be true, however, we would have to believe that more attractive markets are more likely to attract mid-sized entrants versus smaller or larger entrants and more likely to attract high-quality entrants versus low-quality entrants. We do not believe this to be especially likely. We did investigate whether the data appeared to support the idea that certain types of entrants were more likely to enter higher-growth markets. We calculated the growth in average zip code occupancy rate in the quarter immediately prior to entry, proxying for market attractiveness. We found no support for the idea that higher growth markets were uniquely attractive to mid-sized and high-quality entrants. Overall, the relative effects that we investigate will be unbiased as long as unobserved factors that are correlated with incumbent price and entry have an equal impact across different entrant types.

We also control for other sources of endogeneity. Fixed establishment effects and market-level control variables control for endogeneity due to time-invariant establishment heterogeneity and time-varying market characteristics, respectively. Time dummies control for other unobserved effects that vary from quarter to quarter, such as changes in the overall economy.

Another potential concern with the findings of this study is the possibility that firms fight entry with non-price weapons. As noted by the competitive dynamics literature (e.g., Smith et al., 2001), price is but one weapon in a firm's competitive repertoire. For example, in the face of entry hotels may not cut price but rather increase advertising. Alternatively, they may elect to

invest in upgrading their facilities or by offering additional services. Thus, our findings of a positive response to certain types of entry may not tell the complete story. This concern is partially mitigated by our comparison of responses to two distinct types of entry. In order for the above concern to be valid, firms would have to be more likely to respond to mid-sized entrants (versus large or small) and high-quality entrants (versus low-quality) with non-price weapons. While this seems unlikely, our study does not specifically address this possibility.

A potential limitation stemming from the use of quarterly data is the restricted possibility to carefully examine response lags, i.e., the time between the entry and the incumbent's response. For example, with the data we have, we cannot distinguish between responses that occur days or weeks after the new entry from those that take place only one or two months after the new entry. While the data fit our interest of understanding the relative price response to different kinds of entrants, data with shorter periodicity would allow for a better understanding of the timing of actions and responses, suggesting an interesting avenue for future research.

We have also considered alternative explanations for our findings. One alternative explanation for our quality-based findings is that high-quality entrants create a price reference effect by entering with higher prices. A reference price is a price that consumers use to evaluate other prices, and if high-quality entrants enter with prices higher than incumbents, these prices could create higher reference points allowing incumbents to increase their prices. High-quality entrants could create a price reference if they price higher than existing high-quality incumbents or in the case where they enter a market with no high-quality incumbents. To investigate the first case, we compared high-quality incumbent pre-entry prices with high-quality entrant prices in those cases in which high-quality hotels entered a market that included high-quality incumbents. We found that the entrants' average daily rate was just under $102 versus an incumbent pre-entry

rate of $112. Thus, newly entering high-quality hotels did not price higher than incumbents; however, we can not totally rule out the price reference explanation because we have a number of cases in which high-quality hotels entered markets with only low-quality incumbents. Nevertheless, if we exclude these cases, our results still hold indicating that the results can not be explained by higher reference prices alone.

An additional concern that is applicable to any single-industry study is the issue of generalizability. With the large investment required to open a hotel, it may be unlikely that incumbents believe they will be able to drive entrants out by responding aggressively. Regardless of the large sunk investment, however, exit does occur in the industry. During the six years of our study, over 300 establishments exited their respective markets (compared to 909 entrants). Nevertheless, our findings might be less applicable in industries where entry and exit is more frictionless. The hotel industry is also distinctive with its constraints on capacity. Hotels are unable to rapidly change their supply in response to market conditions. Responses to increased demand in such industries may be more likely to manifest themselves as price changes as opposed to quantity changes. We do note, however, that the capacity constraint may not have been widely binding for hotels in our study. The average occupancy rate across our sample was approximately 55 percent, indicating that the hotels had at least some flexibility to change quantity as well as price in response to increased demand.

Finally, we recognize that our findings may appear to be in conflict with a prior study of entry in the Texas hotel industry. Kalnins (2004) analyzed the revenue consequences of entry and found generally negative effects of entry on revenues. Entry by hotels from the same chain, same quality tier, and different quality tiers were all associated with lower revenue. In examining this study more closely, though, we see that the empirical sample included only the

ten largest chains in Texas. While this sample was well-designed to investigate the author's main interest of comparing same-chain entry effects on franchised versus company-owned incumbents, the sample utilized here is much broader. More importantly, the ten chains studied would all be classified as low-quality in the context of our study. Thus, the findings of negative consequences of entry from these hotels are consistent with our results of incumbents' responding positively to high-quality entrants relative to low-quality entrants.

CONCLUSION

As noted in the introduction to this paper, a great deal of research has addressed the issue of how organizations might respond to new entrants into their markets. While a number of sound theoretical arguments have been offered both from a traditional economics perspective and from the more recent game-theoretical approach, empirical results have failed to uniformly support any theory. As summarized by Geroski (1995: 431), incumbent response may be best described as "selective," thus creating a need to explain how and why responses are selective. A variety of explanations have been offered as to why incumbents do not uniformly react *negatively* in response to entry; however, many of these rely on sample-specific factors to explain the relationship.

In his study of the breakfast cereal industry, Thomas (1999) found little incumbent aggression in response to new entrants. He noted that this, however, might have been due to the unique nature of the industry at that time, when price competition rarely occurred. Thanks to the leadership of a dominant competitor, Kellogg's, manufacturers had been able to increase the real price of cereal over a number of years.

Simon (2005) also noted that the particular facets of the industry he studied (US consumer magazines) may provide an explanation for the lack of incumbent price cuts on

average. He noted that the high rate of entry in the industry may result in a constant threat of entry keeping prices consistently low. In effect, incumbents may set low prices in anticipation of entry rather than in response. While this explanation may be true for the industry on average, he did find a number of cases where response was more aggressive. For example, both newer incumbents and multi-market incumbents cut price more in response to entry.

In an effort to move beyond industry-specific explanations, Simon (2005) offered a general explanation for selective incumbent response, positing that response depends on the incentives of the incumbent to fight entry, a view consistent with the competitive dynamics literature that argues one of the drivers of competitive action is the motivation to act. We agree with this approach but believe that no general explanation will be complete without considering the possibility that incumbents might have an incentive to respond *positively* to certain types of entry.

Agglomeration theory provides a potential explanation for why firms might view entry positively. While this theory provides such an explanation, this particular question has not been given much theoretical attention nor subjected to empirical testing. Studies have shown the existence of agglomeration economies and investigated how their existence impacts the decisions of entrants; however, the present research is unique in its consideration of how these potential benefits impact incumbent decision making in the face of entry.

By linking these two areas of inquiry, we have been able to investigate unresolved issues in both. Our finding that hotels tend to set higher prices when facing entrants who are more likely to generate agglomeration economies provides an explanation why firms might actually *increase* price in the face of additional competition. When the positive agglomeration benefits outweigh the negative competitive effects, entry can be seen as more of an *opportunity* than a

threat. Our research also presents a finer-grained view of these two opposing effects by, for example, noting the diminishing nature of size-based agglomeration effects coupled with the increasing negative competitive effects. Our arguments were supported by our empirical results of incumbent hotels' taking advantage of these opportunities by setting higher prices when facing mid-sized and high-quality entrants.

These findings also extend the previous empirical agglomeration work by looking at the other side of the entry equation. Previous research has shown that *entrants* appear to consider agglomeration opportunities in their decisions (Kalnins and Chung, 2004; Shaver and Flyer, 2000); this research indicates that *incumbents* appear to consider these opportunities as well. Furthermore, experience with entry appears to play a key role. Hotels with zero experience appear not to recognize the opportunity created by entrants of different sizes and quality levels. Only as they experience more entry do they appear to learn the best response to agglomeration-generating entrants.

We also conducted interviews with industry participants, such as owner/managers of hotels, top-level and mid-level management of hotel corporations, and industry consultants to validate our findings and conclusions. One specific topic of these interviews was entry response. Industry participants seemed quite aware of the potential benefits to be derived from agglomeration. One manager of an independent hotel mentioned the opening of a larger, more upscale hotel in his market. Rather than viewing this as a threat, he saw it as an opportunity to "bump rates up since they are bringing something extra to the market."

While our research context was co-locating organizations in the services industry that draw benefits from demand-related agglomeration economies, we believe that these findings would extend to geographically proximate establishments that benefit more from production-

related agglomeration economies. Further research could examine this proposition by determining the types of entrants more likely to generate production-related externalities (better access to inputs, labor, and technology spillovers) and then testing whether incumbents seem to benefit from entry of these types of organizations.

Traditional views portray the storms of competition and the gales of destruction blowing hardest when entry occurs. Successful organizations draw new entrants to their markets, resulting in supply increases that eventually drive prices down to competitive levels and superior performance disappears. Entry is a force that demands the construction of "barriers" to avoid its inevitable negative impact. The literature of limit pricing and game theoretic models grew to attempt explanation of why and how firms rage against this storm. Yet despite these theories' predictions, islands of apparent tranquility persistently pop up in empirical studies where organizations do not react hostilely to entry. Taking a complementary perspective offered by agglomeration theory allows us to see that companies may welcome the storm rather than rage against it. Instead of seeing profits erode, knowledgeable organizations can take the opportunity to improve performance when facing new competitors that increase the attractiveness of a market.

REFERENCES

Arthur W. 1990. Silicon Valley locational clusters: When do increasing returns imply monopoly? *Mathematical Social Sciences*, **19** (3): 235-273.

Bain J. 1956. *Barriers to New Competition*. Harvard University Press: Cambridge, MA.

Barron DN, West E, Hannan MT. 1994. A time to grow and a time to die: Growth and mortality of credit unions in New York City, 1914-1990. *The American Journal of Sociology* **100** (2): 381-421.

Baum JAC. 1995. The changing basis of competition in organizational populations: The Manhattan hotel industry, 1898-1990. *Social Forces*. **74** (1): 177-204.

Baum JAC. 1996. Organization ecology. In *Handbook of organization studies*, Clegg SR, Hardy C, Nord WR (eds). Sage: London; 77-114.

Baum JAC, Haveman HA. 1997. Love thy neighbor? Differentiation and agglomeration in the Manhattan hotel industry, 1898-1990. *Administrative Science Quarterly* **42** (2): 304-338.

Baum JAC, Ingram P. 1998. Survival-enhancing learning in the Manhattan hotel industry, 1898-1980. *Management Science* **44** (7): 996-1016.

Baum JAC, Mezias SJ. 1992. Localized competition and organizational failure in the Manhattan hotel industry, 1898-1990. *Administrative Science Quarterly* **37** (4): 580-604.

Biggadike R. 1976. *Entry, Strategy and Performance*. Graduate School of Business Administration, Harvard University

Bresnahan TF, Reiss PC. 1991. Entry and competition in concentrated markets. *Journal of Political Economy* **99** (5): 977-1009.

Cameron AC, Gelbach JB, Miller DL. 2006. Robust inference with multiway clustering. Working paper, University of California-Davis, Davis, CA.

Canina L, Enz CA, Harrison JS. 2005. Agglomeration effects and strategic orientations: Evidence from the US lodging industry. *Academy of Management Journal* **48** (4): 565-581.

Certo ST, Semadeni M. 2006. Strategy research and panel data: Evidence and implications. *Journal of Management* **32** (3): 449-471.

Chen MJ. 1996. Competitor analysis and interfirm rivalry: Toward a theoretical integration.

Academy of Management Review. **21** (1): 100-134.

Chen MJ, Su KH, Tsai W. 2007. Competitive tension: The awareness-motivation-capability perspective. *Academy of Management Journal* **50** (1): 101-118.

Chung W, Kalnins A. 2001. Agglomeration effects and performance: A test of the Texas lodging industry. *Strategic Management Journal* **22** (10): 969-988.

Cohen BD, Dean TJ. 2005. Information asymmetry and investor valuation of IPOs: top management team legitimacy as a capital market signal. *Strategic Management Journal* **26** (7): 683-690.

Conlin M, Kadiyali V. 2006. Entry-deterring capacity in the Texas lodging industry. *Journal of Economics & Management Strategy* **15** (1): 167-185.

Cubbin J, Domberger S. 1988. Advertising and post-entry oligopoly behavior. *Journal of Industrial Economics* **37** (2): 123-140.

Cyert RM, March JG. 1963. *A Behavioral Theory of the Firm*. Prentice Hall: Englewood Cliffs, NJ.

Darr E, Argote L, Epple D. 1995. The acquisition, transfer, and depreciation of knowledge in service organizations: productivity in franchises. *Management Science* **41** (11): 1750-1762.

Ellison G, Glaeser EL. 1999. The geographic concentration of industry: Does natural advantage explain agglomeration? *American Economic Review* **89** (2): 311–316.

Fischer JH, Harrington Jr. JE. 1996. Product variety and firm agglomeration. *The Rand Journal of Economics* **27** (2): 281.

Flaherty MT 1980. Dynamic limit pricing, barriers to entry, and rational firms. *Journal of Economic Theory* **23** (2):160-82.

Frank RG, Salkever DS. 1997. Generic entry and the pricing of pharmaceuticals. *Journal of Economics & Management Strategy* **6** (1): 75-90.

Gaskins Jr. DW 1971. Dynamic limit pricing: Optimal pricing under threat of entry. *Journal of Economic Theory* **3** (3):306-22.

Geroski PA. 1995. What do we know about entry? *International Journal of Industrial Organization* **13** (4): 421-440.

Gimeno J. 1999. Reciprocal threats in multimarket rivalry: Staking out ‘spheres of influence’ in

the U.S. airline industry. *Strategic Management Journal*, 20(2): 101–128.

Hannan MT, Carroll GR. 1992. *Dynamics of Organizational Populations: Density, Competition, and Legitimation*. Oxford University Press: New York.

Hannan MT, Freeman JH. 1989. *Organizational Ecology*. Harvard University Press: Cambridge, MA.

Joskow AS, Werden GJ, Johnson RL. 1994. Entry, exit, and performance in airline markets. *International Journal of Industrial Organization*, **12** (4): 457-471.

Judd KL, Petersen BC. 1986. Dynamic limit pricing and internal finance. *Journal of Economic Theory* **39** (2):368-99.

Kalnins A. 2004. An empirical analysis of territorial encroachment in franchised and company-owned branded chains. *Marketing Science* **23** (4): 476-489.

Kalnins A, Chung W. 2004. Resource-seeking agglomeration: A study of market entry in the lodging industry. *Strategic Management Journal* **25** (7): 689-699.

Kreps DM, Wilson R. 1982. Reputation and imperfect information. *Journal of Economic Theory* **27** (2): 253-279.

Lambin JJ. 1976. *Advertising, Competition and Market Conduct in Oligopoly over Time*. New Holland: Amsterdam.

Levitt B, March JG. 1988. Organizational learning. *Annual Review of Sociology* **14** (1988): 319-340.

Marion BW. 1998. Competition in grocery retailing: The impact of a new strategic group on BLS price increases. *Review of Industrial Organization*, **13** (4): 381-399.

Marshall A. 1920. *Principles of Economics* (8th ed.). Macmillan: London.

Masson RT, Shaanan J. 1982. Stochastic-dynamic limiting pricing: An empirical test. *The Review of Economics and Statistics* **64** (3): 413-422.

McCann BT, Folta TB. 2008. Location matters: Where we have been and where we might go in agglomeration research. *Journal of Management* **34** (3): 532-565.

Milgrom P, Roberts J. 1982. Limit pricing and entry under incomplete information - an equilibrium analysis. *Econometrica* **50** (2): 443-459.

Modigliani F. 1958. New developments on the oligopoly front. *Journal of Political Economy* **66**

(3): 215-232.

Nelson P. 1970. Information and consumer behavior. *Journal of Political Economy* **78** (2): 311-329.

Nelson RR, Winter SG. 1982. *An Evolutionary Theory of Economic Change*. Harvard University Press: Cambridge, MA.

PKF Consulting. 2008. Trends in the Hotel Industry USA Edition – 2008. PKF Consulting, Inc.: Atlanta, GA.

Robinson WT. 1988. Marketing mix reactions to entry. *Marketing Science* **7** (4): 368-385.

Shankar V. 1999. New product introduction and incumbent response strategies: Their interrelationship and the role of multimarket contact. *Journal of Marketing Research* **36** (3): 327-344.

Shaver JM, Flyer F. 2000. Agglomeration economies, firm heterogeneity, and foreign direct investment in the United States. *Strategic Management Journal* **21** (12): 1175-1193.

Simon D. 2005. Incumbent pricing responses to entry. *Strategic Management Journal* **26** (13): 1229-1248.

Simon JL, Arndt J. 1980. The shape of the advertising response function. *Journal of Advertising Research* **20** (4): 11-28.

Singh S, Utton M, Waterson M. 1998. Strategic behaviour of incumbent firms in the UK. *International Journal of Industrial Organization* **16** (2): 229-251.

Smiley R. 1988. Empirical evidence on strategic entry deterrence. *International Journal of Industrial Organization* **6** (2): 167-180.

Smith KG, Ferrier WJ, Ndofor H. 2001. Competitive dynamics research: Critique and future directions. In *Blackwell Handbook of Strategic Management*, Hitt MA, Freeman ER, Harrison JS (eds). Blackwell Publishing: Malden, MA: 315-361.

Smith KG, Grimm CM, Gannon MJ, Chen MJ. 1991. Organizational information processing, competitive responses, and performance in the U.S. domestic airline industry. *Academy of Management Journal* **34** (1): 60-85.

Stahl K. 1982. Differentiated products, consumer search, and locational oligopoly. *Journal of Industrial Economics*. **31** (1/2): 97-113.

Stuart C. 1979. Search and the spatial organization of trading. In *Studies in the economics of search*, Lippman SA, McCall JJ (eds.). North Holland: Amsterdam: 17-34.

Sylos-Labini L. 1962. *Oligopoly and Technical Progress*. Harvard University Press: Cambridge, MA.

Thomas LA. 1999. Incumbent firms' response to entry: Price, advertising, and new product introduction. *International Journal of Industrial Organization* **17** (4): 527-555.

Thompson SB. 2006. Simple formulas for standard errors that cluster by both firm and time. Working paper, Harvard University, Boston, MA.

Vroom G, Gimeno J. 2007. Ownership form, managerial incentives, and the intensity of rivalry. *Academy of Management Journal* **50** (4): 901-922.

Wooldridge JM. 2003: Cluster-sample methods in applied econometrics. *American Economic Review* **93** (2): 133-138.

Yamawaki H. 2002. Price reactions to new competition: A study of US luxury car market, 1986-1997. *International Journal of Industrial Organization* **20** (1): 19-39.

Yelle LE. 1979. The learning curve: Historical review and comprehensive survey. *Decision Sciences* **10** (2): 302-328.

Yip G. 1982. *Barriers to Entry: A Corporate Strategy Perspective*. Lexington Books: Lexington, MA.

APPENDICES

Table 1. Descriptive Statistics of Entrant Types

Entrant Size	*Low-Quality*	*High-Quality*	*Total*
Small (≤ 100 rooms)	698	119	817
Mid-Sized (101 – 300 rooms)	44	39	83
Large (>300 rooms)	2	7	9
Total	744	165	909

Note: Size category definitions adopted from the American Hotel and Lodging Association. Quality definitions adopted from the Smith Travel Research Chain Scales.

Table 2. Descriptive Statistics

	Variable	Mean	Standard Dev.		Correlations*									
			Overall	Within	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1)	ln(Price)	4.048	0.513	0.108		*0.036*	*0.061*	*-0.023*	*-0.053*	*0.287*	*0.027*	*0.022*	*0.041*	*-0.027*
(2)	Entrant Size (100s of Rooms)	0.649	0.640	0.601	0.162		*0.218*	*-0.193*	*-0.175*	*0.040*	*0.084*	*0.376*	*0.110*	*-0.095*
(3)	Facing High-Quality Entrant	0.267	0.442	0.404	0.289	0.234		*-0.023*	*0.006*	*-0.008*	*-0.075*	*0.087*	*0.010*	*-0.011*
(4)	Establishment Experience	2.522	1.858	1.407	0.274	-0.053	0.093		*0.459*	*-0.226*	*-0.290*	*0.031*	*-0.033*	*0.240*
(5)	Lagged Market Capacity	6.858	1.143	0.166	0.375	0.241	0.256	0.421		*-0.081*	*-0.669*	*-0.102*	*-0.020*	*0.149*
(6)	Lagged Mean Market Occupancy	0.542	0.121	0.086	-0.036	0.162	-0.032	-0.213	0.078		*-0.032*	*-0.195*	*0.032*	*-0.086*
(7)	Lagged Market Concentration	0.177	0.129	0.041	-0.200	-0.058	-0.180	-0.386	-0.748	-0.018		*0.066*	*0.003*	*-0.103*
(8)	Total Entrants	1.113	0.372	0.367	0.122	0.380	0.126	0.168	0.145	-0.173	-0.098		*0.087*	*-0.017*
(9)	Multi-Market Contact	0.080	0.272	0.248	-0.028	0.105	0.004	-0.059	0.060	0.125	-0.017	0.044		*0.003*
(10)	Age	6.344	6.229	2.324	0.085	-0.051	0.070	0.221	0.092	-0.144	-0.108	0.034	-0.039	

* All correlations larger than 0.026 in absolute value are significant at the p = 0.05 level

Italicized correlations are within establishments; the other entries are zero-order Pearson correlations. The values for the within standard deviations and correlations are calculated after transformation of each variable to the deviation relative to the establishment mean. This procedure allows for examination of the standard deviation and correlation of variables *within* a particular establishment over time. Descriptive statistics are calculated within the limited sample of hotels facing entry in a particular period (n=5,778).

Table 3. Fixed Effects Regression Results

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Entrant Size (100s of rooms)	0.0011	0.0158**		0.0127*	-0.0127	0.0089	-0.0035
	(0.0024)	(0.0056)		(0.0056)	(0.0076)	(0.0056)	(0.0079)
Entrant Size Squared		-0.0039**		-0.0038**	0.0007	-0.0025	-0.0000
		(0.0014)		(0.0014)	(0.0021)	(0.0014)	(0.0021)
Log Entrant Size			0.0021				
			(0.0020)				
Facing High-Quality Entrant				0.0168***	0.0138***	-0.0137*	-0.0090
				(0.0032)	(0.0032)	(0.0057)	(0.0062)
Establishment Experience					0.0099***		0.0053*
*** Entrant Size**					(0.0019)		(0.0021)
Establishment Experience					-0.0016*		-0.0012
*** Entrant Size Squared**					(0.0007)		(0.0007)
Establishment Experience						0.0113***	0.0090***
*** Facing High-Quality Entrant**						(0.0015)	(0.0019)
Establishment Experience	0.0115***	0.0110***	0.0113***	0.0109***	0.0068**	0.0075**	0.0062*
	(0.0024)	(0.0024)	(0.0024)	(0.0024)	(0.0024)	(0.0025)	(0.0025)
Lagged Segment Capacity	-0.0096	-0.0120	-0.0090	-0.0112	-0.0114	-0.0074	-0.0089
	(0.0149)	(0.0149)	(0.0149)	(0.0150)	(0.0149)	(0.0148)	(0.0149)
Lagged Mean Segment Occupancy	0.3369***	0.3276***	0.3342***	0.3300***	0.3329***	0.3343***	0.3343***
	(0.0236)	(0.0237)	(0.0238)	(0.0236)	(0.0236)	(0.0237)	(0.0237)
Lagged Market Concentration	0.0462	0.0347	0.0447	0.0543	0.0622	0.0626	0.0613
	(0.0598)	(0.0597)	(0.0594)	(0.0594)	(0.0611)	(0.0595)	(0.0611)
Total Entrants	0.0086*	0.0058	0.0073	0.0061	0.0065	0.0061	0.0068
	(0.0042)	(0.0043)	(0.0045)	(0.0042)	(0.0044)	(0.0042)	(0.0043)
Multi-Market Contact	0.0091	0.0080	0.0085	0.0083	0.0090	0.0083	0.0087
	(0.0048)	(0.0049)	(0.0048)	(0.0049)	(0.0048)	(0.0049)	(0.0048)
Age	0.0003	0.0003	0.0003	0.0003	0.0003	0.0004	0.0004
	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0007)	(0.0008)	(0.0007)
Constant	3.7030***	3.7206***	3.6949***	3.7073***	3.7126***	3.6850***	3.6969***
	(0.1038)	(0.1041)	(0.1046)	(0.1044)	(0.1048)	(0.1035)	(0.1047)
Fixed Establishment Effects	YES	YES	YES	YES	YES	YES	YES
Fixed Segment Effects	YES	YES	YES	YES	YES	YES	YES
Fixed Period Effects	YES	YES	YES	YES	YES	YES	YES
Observations	5,778	5,778	5,778	5,778	5,778	5,778	5,778
Number of Hotels	2,373	2,373	2,373	2,373	2,373	2,373	2,373
R-Squared	0.2202	0.2216	0.2204	0.2251	0.2296	0.2317	0.2325
F-Value	30.33***	30.74***	30.56***	29.89***	29.61***	30.69***	29.41***

Clustered robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Dependent variable = natural log (price)

Table 4. Fixed Effects Regression Results – Alternative Experience Measure

	Model 8	Model 9	Model 10
Entrant Size (100s of rooms)	-0.0096	0.0088	-0.0010
	(0.0086)	(0.0056)	(0.0087)
Entrant Size Squared	-0.0003	-0.0025	-0.0010
	(0.0025)	(0.0014)	(0.0025)
Facing High-Quality Entrant	0.0140***	-0.0133*	-0.0089
	(0.0032)	(0.0068)	(0.0073)
Establishment Experience	0.0058*	0.0068**	0.0051
	(0.0026)	(0.0026)	(0.0026)
Owner Experience	0.0060	0.0045	0.0058
	(0.0058)	(0.0056)	(0.0057)
Establishment Experience	0.0112***		0.0065**
*** Entrant Size**	(0.0020)		(0.0021)
Establishment Experience	-0.0021**		-0.0016*
*** Entrant Size Squared**	(0.0007)		(0.0007)
Owner Experience	-0.0048		-0.0042
*** Entrant Size**	(0.0028)		(0.0028)
Owner Experience	0.0016		0.0015
*** Entrant Size Squared**	(0.0009)		(0.0009)
Establishment Experience		0.0114***	0.0089***
*** Facing High-Quality Entrant**		(0.0015)	(0.0019)
Owner Experience		-0.0005	0.0002
*** Facing High-Quality Entrant**		(0.0025)	(0.0026)
Lagged Segment Capacity	-0.0117	-0.0078	-0.0092
	(0.0149)	(0.0148)	(0.0149)
Lagged Mean Segment Occupancy	0.3324***	0.3339***	0.3338***
	(0.0237)	(0.0238)	(0.0239)
Lagged Market Concentration	0.0591	0.0611	0.0582
	(0.0609)	(0.0593)	(0.0609)
Total Entrants	0.0062	0.0060	0.0066
	(0.0043)	(0.0042)	(0.0042)
Multi-Market Contact	0.0136*	0.0090	0.0124*
	(0.0056)	(0.0051)	(0.0057)
Age	0.0000	0.0001	0.0001
	(0.0008)	(0.0008)	(0.0008)
Constant	3.7155***	3.6886***	3.7003***
	(0.1049)	(0.1033)	(0.1048)
Fixed Establishment Effects	YES	YES	YES
Fixed Segment Effects	YES	YES	YES
Fixed Period Effects	YES	YES	YES
Observations	5,778	5,778	5,778
Number of Hotels	2,373	2,373	2,373
R-Squared	0.2301	0.2319	0.2330
F-Value	27.76***	29.40***	27.05***

Clustered robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Dependent variable = natural log (price)

Figure 1. Relationship between Incumbent Price and Entrant Size

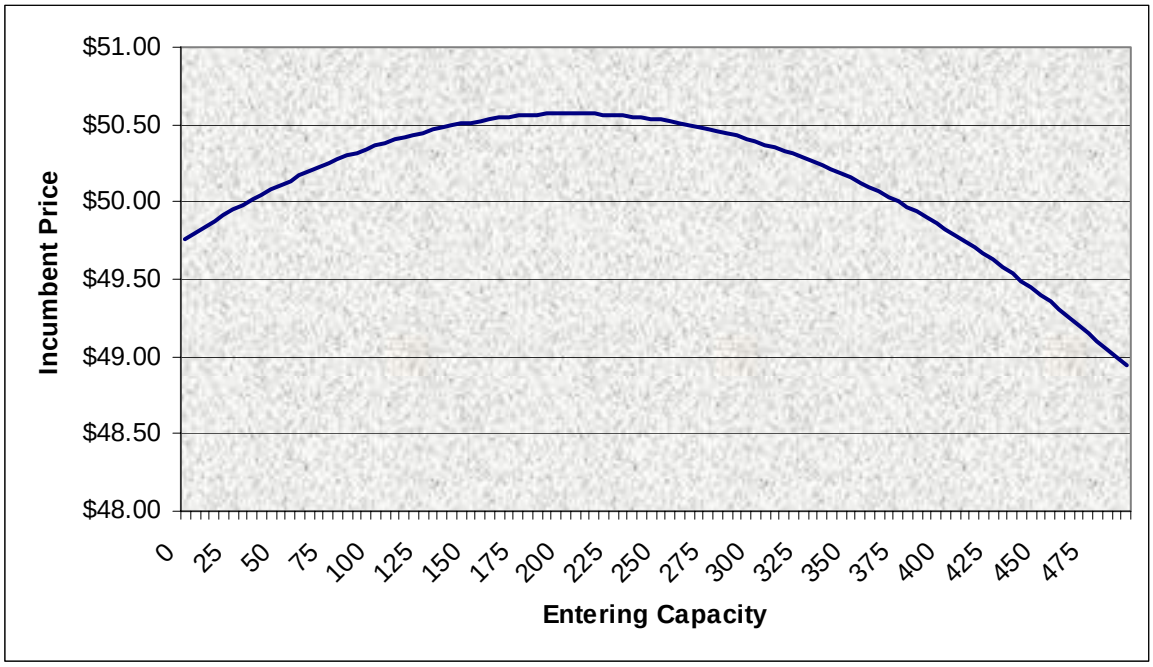

Figure 2. Relationship between Incumbent Price and Entrant Size at Different Establishment Experience Levels