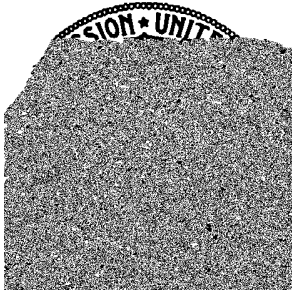# WORKING
PAPERS

Branding, Cannibalization, and Spatial Preemption:
An Application to the Hotel Industry

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Abstract

In many settings where spatial preemption might be expected to produce tightly concentrated industry structures, rms share the market instead. Using a strategic investment

1 Introduction

Increasingly, many industries feature large firms targeting a national market with their advertising and marketing programs. However, product competition in such industries often still appears to occur at a local level, with firms' relative positions differing significantly across geographic areas. Such situations pose important questions to researchers and practitioners interested in competition. For example, can assessments of local product market competition effectively ignore the national character of firms? Should researchers focus only on nation-wide competition? Do the answers to these questions vary across industries, and if so, under what conditions? To date, the industrial organization literature does not have good or comprehensive answers to these questions.

The hotel industry provides an interesting opportunity to investigate these issues empirically. On the one hand, the industry is dominated by a moderately small number of large firms, which cultivate national reputations. On the other, local hotel markets bear a close resemblance to the setting considered in Eaton and Lipsey (1979), who showed that incumbents could preserve market power by \spatially preempting" through the early introduction of new products. In isolation, this would suggest that local markets should be quite concentrated as a result of entry-deterrence by first-movers. However, casual examination of local hotel markets suggests they are rarely concentrated.

In this paper, I argue that heterogeneity in consumers' impressions of the national firms { such as might be created by the endogenous sunk cost (Shaked and Sutton, 1987, Sutton, 2007) of nation-wide marketing campaigns or loyalty programs { can explain the comparatively un-concentrated nature of local hotel markets. I begin by presenting a game-theoretic model of strategic product entry, which I have tailored to fit the stylized facts of the hotel industry. Prominent amongst these facts are consumers' brand preferences, which industry insiders emphasize for their economic significance. The model shows that a national firm becomes less able to credibly engage in spatial preemption in a local market as consumers' preferences about firms' products grow more heterogeneous. This occurs because more varied preferences make it profit-maximizing for firms to concentrate on those consumers who especially like their products. However, such a focus exacerbates

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within-firm cannibalization, limiting the appeal of spatial preemption.

The model also extends easily to accommodate several other important characteristics of the hotel industry. First, most of the major hotel firms own multiple brands, even within a given quality tier (e.g. Marriott owns both the Fairfield Inn and Courtyard brands in the mid-market tier).[1] The model shows that such brand-proliferation strategies soften cannibalization and intra-firm competition. As a result, they make spatial preemption more credible on the margin.

Second, like many other retail industries (e.g. fast food, gasoline sales), many hotel firms use franchise arrangements that empower local managers in order to efficiently elicit hard-to-monitor effort. Unlike most other such industries, however, the major hotel firms do not make their franchisees sign exclusive contracts. This allows an individual property owner to have, for example, both a Marriott- and Hilton-affiliated hotel in the same market. The model shows that these non-exclusive arrangements soften inter-firm competition as they facilitate more concentrated { in terms of local ownership { markets. Having more local hotels controlled by the same price-setting decision-maker raises prices, benefiting franchisors insofar as franchise contracts typically allocate them a share of their affiliated franchisees' revenues (Blair and Lafontaine, 2005). However, it means that firms are less likely to retain monopoly power in local markets via spatial preemption.

Using rich data on Texas lodging markets, I test the model's predictions. Overall, the results strongly support the model. First, examining the revenues of individual hotels, I find that new hotels cannibalize a significant amount of their revenue from existing hotels affiliated with the same firm. However, this effect is softened if the two hotels do not share a national brand. In other words, the revenues of a Courtyard by Marriott are more negatively imp(the)-i-410(o3st2e)-336(moread4 -23aAcpe9(pred

contracts effectively softens inter-firm competition. These effects are not estimated with a high degree of precision but are consistent in relative magnitudes with the predictions of the theoretical model. Third, examining how existing markets grow, I find evidence that the lodging companies in the branded segment do not engage in entry deterrence. Instead, my baseline estimates show that conditional on growth taking place, a new hotel is almost 50 percent more likely to be associated with a firm that did not previously operate a hotel in that market than an incumbent firm with one hotel. Thus, in equilibrium, local market growth occurs on the extensive margin through entry rather than on the intensive margin through incumbents' expansion. Unfortunately, the data are not rich enough to identify what impact — if any — franchising or brand proliferation plays in the evolution of market structure.

The paper contributes to an emerging literature considering how brand preferences influence local market structures in endogenous sunk cost industries. Like Bronnenberg et al. (2009), who consider the long-run implications of being a first mover in local branded consumer goods markets, I investigate how consumer opinion affects market structure. Whereas Bronnenberg et al. (2009) find that first movers retain their dominance for long periods in local markets, my results show that incumbency provides no long-run advantage to branded hotel firms. I believe our different findings reflect the fact that whereas consumers in Bronnenberg et al. (2009) are highly local, the hotels in my study cater to a customer base drawn from a wide area. Thus, the initial experience effects documented in Bronnenberg et al. (2010) do not systematically affect the firms in my sample.

The paper also provides insight into why the empirical evidence for spatial preemption has been equivocal. The model rationalizes why in industries where brand affiliations play a large role in determining consumer interest, such as fast-food (Thomadsen, 2005) or personal computers (Hui, 2004), cannibalization appears particularly significant, making spatial preemption less likely.[2] By contrast, when it is likely that branding is opaque or consumers are driven more by product

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[2] Toivanen and Waterson (2005) present evidence of network economies in fast food, which may lead to more aggressive expansion strategies. Stavins (1995) finds evidence consistent with spatial preemption by incumbent computer makers; however, the firms in her study separate their products widely, forcing entrants into tight clusters. This is consistent with concerns about intra-firm cannibalization.

characteristics { as for movie theaters (Davis, 2006), radio markets (Berry and Waldfogel, 2001), or consumer product marketing (Smiley, 1988) { revenue stealing and/or preemption strategies have been documented.

Finally, the paper contributes to a small but growing literature examining the relationship between vertical contracting and local market structure. Using data on retail gasoline markets, Wilson (2011) shows how the use of vertically separated contracts (such as franchising) can lead to moral hazard problems both in terms of pricing and the maintenance of reputational assets. Similarly, Thomadsen (2005) shows that fast food outlets a liated with the same franchisee engage in softer price competition than those a liated with di erent franchisees. Kalnins (2004) also relies on data on the Texas lodging industry to assess di erences in the extent of cannibalization between brands that utilize franchising and those that rely on company-owned local outlets. He nds that cannibalization is larger among franchisor brands. Thus, the prior literature also implies that separating ownership of a liated outlets in local markets can lead to moral hazard problems for franchisors. However, the present paper is the rst, to my knowledge, to consider how inter- rm franchising can relax overall competition.

The paper proceeds as follows. Section 2 discusses the characteristics of the hotel industry. Section 3 presents the theoretical model. Section 4 discusses the data used in the empirical analysis. Section 5 analyzes the impact of market structure on individual hotel revenues, while Section 6 examines whether or not incumbent hotel rms engage in spatial preemption. Section 7 concludes.

2 The Lodging Industry

In many ways, the characteristics of the lodging industry are consistent with Sutton's theory of endogenous sunk costs (Shaked and Sutton, 1987, Sutton, 2007). The intuition is quickly sketched: Most individual hotel tra c is non-repeat. This makes it di cult for any given hotel to credibly signal quality, because customers enticed by false promises of a high quality experience cannot \punish" the o ending hotel by withholding future business. However, a rm a liated with multiple

hotels can escape this trap. Since consumers are likely to travel somewhere again, they can credibly threaten a national firm by withholding future business. Thus, the ability to be collectively punished allows multi-hotel firms to credibly commit to higher levels of quality. If there are scale economies to advertising and varying consumer tastes for quality, firms that choose to incur the endogenous sunk cost of alerting consumers to their network of properties will constitute a concentrated high quality segment and can earn higher price-cost margins. Meanwhile, a fragmented low-quality, independent segment will cater to more price sensitive consumers.[3]

Consistent with this framework, the lodging industry is highly vertically differentiated by the quality and amenities available to guests. Indeed, research indicates that the degree of differentiation across vertical segments is so large that competition across the different quality segments is extremely weak (Freedman and Kosova, forthcoming); there may even be cross-segment agglomeration economies (Kalnins and Chung, 2004). Moreover, despite the fact that hotel construction costs are modest, which might imply an atomistic industry structure, the industry is moderately concentrated. For example, data compiled by Hotel and Motel Management (2004) show that 50% of all hotels in the country are affiliated with 10 large firms. However, this understates the level of concentration, for { consistent with Sutton's theory { the bulk of the corporate hotels are of relatively high quality (i.e. 2 or more stars according to AAA) while the bulk of independent hotels tend to be low-quality. Finally, the large firms' marketing efforts are large and sophisticated, featuring prominently in executives' discussion of strategy. For example, Accor's 2008 Annual Report (p. 16) discusses how brand development and revitalization are a large part of its strategy in the hotel sector.[4]

Importantly, the details of the lodging industry also depart from canonical endogenous sunk cost models in important respects. First, individual local hotel markets have many of the character-

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[3]With the rise of sites like TripAdvisor and Yelp, where consumers can leave public evaluations of hotels' quality, it is possible that the character of the lodging industry will change. One might imagine that branding would become less important as a signal of quality. However, this possibility relies on the credibility of online reviews, and recent reporting suggests there is ample evidence of gaming (Streitfeld, 2011).

[4]Further evidence of the size and sophistication of hotel firms' marketing efforts can be found in the fact that many hotel brands appear in *Brandweek*'s annual \Superbrands" issues listing the world's most valuable brands.

istics of those considered in the canonical work of Eaton and Lipsey (1979) on spatial preemption. They are often small and geographically distinct. This suggests that there is scope for dynamic interaction between incumbents and potential entrants, which the past literature has found evidence of (Mazzeo, 2002, Conlin and Kadiyali, 2006). Moreover, it suggests that local markets should be quite concentrated.

Second, and also seeming to point towards highly concentrated local markets, the national lodging rms often own multiple brands within, as well as across, quality segments. For example, Marriott Hotels controls the Fair eld Inn and Courtyard brands, both of which are in the mid-level segment. Nor is it the case that the existence of multiple brands within a given segment is accidental, perhaps as a result of rms' acquisition strategies. For example, Marriott created both its Fair eld and Courtyard brands itself. Canonical oligopoly models of horizontal di erentiation suggest that rms can strategically di erentiate their products in order to deter competitors and ensure softer price competition (Schmalensee, 1978). Such brand proliferation capabilities might be thought to further heighten rms' abilities to spatially preempt in local hotel markets. However, anecdotal evidence suggests that it is very rare for one rm to dominate a given local market.

Third, while little may objectively di erentiate hotel brands within a segment, it is conventional wisdom in the industry that individual consumers perceive di erent brands quite di erently.[5] Moreover, consumers' heterogeneous, horizontally-di erentiated preferences are believed to be of large economic signi cance. An industry professional explained to me that while consumers may not exactly know why they prefer certain rms' hotels, their choices indicate they will pay a signi cant premium to stay in a hotel a liated with their preferred rm. Such behavior is consionswith

1999, Bechard, 2011). The existence of brand-di erentiated preferences also helps to explain the decision to own multiple brands that compete within the same market segment. In order to exploit consumer preferences over the long run, hotel rms are also focused on fostering and maintaining them. For this reason, they pursue sophisticated marketing campaigns designed not only to sep-

reasons not to expect such exclusive territory clauses to bind. This is because franchisors can address the encroachment problem directly either through the use of company-ownership of hotels or by utilizing the same franchisee at all local outlets. As Krueger (1991) notes, while franchisees can propose locations, the franchisor ultimately has veto power. Thus, ultimately, it is the hotel firms who have the final say in whether or not multiple affiliated hotels are introduced in a single market.

Fifth, and finally, unlike many other industries where multi-outlet franchising is widespread (Kalnins and Lafontaine, 2004), it is not the case in lodging that a franchisee is restricted to working with just one firm.[8] This may stem from the strong degree of intra-segment standardization, which means that there are fewer trade secrets. Alternatively, it could indicate that hotel franchisees have greater leverage because they own their hotels whereas fast-food franchises are typically owned by the franchisor.[9]

3 A Strategic Model of Hotel Market Growth

3.1 Model Overview

In this section, I present a strategic growth model based on the stylized facts of the lodging industry, which I use to understand how the various factors discussed above interact to influence local market structure.

In the model, there are two rational hotel firms competing in the branded segment of a hotel market: incumbent I and entrant E. I assume that a market where the incumbent has one hotel has grown and can now support two hotels. Although the entrant does not yet have a hotel in the market, it is a well-known company about which consumers already have (mixed) opinions. As mentioned above, competition across segments has been shown to be extremely weak, so I abstract

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[8]Gasoline retailing represents another such industry insofar as a jobber may have contracts with multiple refiners.

[9]For example, McDonald's website states, \The site selection process is separate from our franchisee selection process. We make the decision to develop a location because we believe it will be a success. McDonalds manages all the site evaluation, acquires the property and constructs the building. After making the decision to develop a site, McDonalds awards the franchise to the most qualified candidate." See www.aboutmcdonalds.com/mcd/franchising/us_franchising/franchising_faqs.html (accessed October 21, 2011).

from the presence of the low quality fringe segment.

A sequential game determines which rm introduces the new hotel. Figure 1 shows the timeline of events. First, the incumbent decides whether to add a second hotel. Second, the entrant has the option of opening a single hotel of its own. Third, and nally, the incumbent has the option of closing its new hotel. The market structure is xed once the incumbent has made its disinvestment decision, and rms engage in Bertrand-Nash competition.

In order to assess preemption, I make certain simplifying assumptions about the costs involved in changes to the market structure. In particular, I assume that the entrant's xed costs are too high to o set in a three hotel market. Building in potentially random entry and/or exit costs would be straightforward; however, I believe no additional insight would be gained from their inclusion.
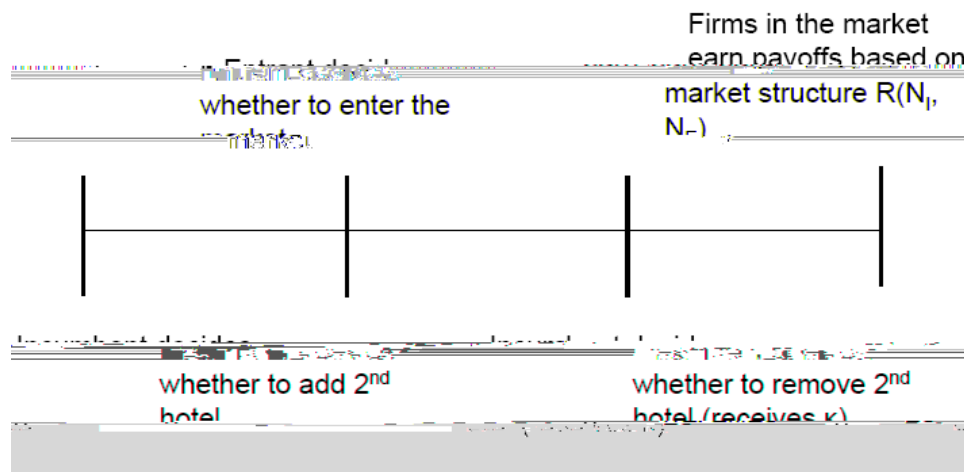
Figure 1: Timing of events in the game

3.2 Consumer Demand and Firm Pro ts

To account for consumer heterogeneity, I assume that individual hotels' payo s stem from a random utility model (RUM) of consumer demand, which has become the standard approach in empirical demand modeling (Berry et al., 1995, Nevo, 2001). This approach implies that individual consumers decide which (if any) of the existing hotels to stay at based on the utility it would provide.

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hotels in the market (p_j).

As noted in Kalnins (2006), marginal costs are very low in the hotel industry relative to fixed

where $R^B()$ represents the revenues earned by firm B conditional on the market's structure. The first term inside the parentheses in $R^B()$ indicates the number of hotels affiliated with the incumbent, and the second indicates the number affiliated with the entrant.

Equation (3) shows that entry deterrence will not occur when the profits of sharing the market equally plus the scrap value are greater than the profits from operating two hotels in a three hotel market net of the fixed cost of operating one hotel. The magnitude of f thus affects the viability of entry-deterrence in a straightforward way. As the fixed cost of operating a hotel increases, the incumbent is less able to credibly deter the entrant.

Due to the model of consumer demand employed here, also affects the viability of entry deterrence. Unfortunately, the use of the RUM framework means there are no analytic solutions for elements of interest (e.g. optimal prices, profits) with respect to ^{2}. Nevertheless, the consequences of the demand system (explored through numerical simulations) are intuitive. Rewriting Equation (3) as $R^I(2;1) - R^I(1;1) < f$ shows that as the difference between the incumbent's total revenues when it has 2 hotels versus 1 hotel while competing with a hotel affiliated with the entrant falls, preemption becomes less credible. In other words, the more the incumbent's second hotel simply cannibalizes sales from the first, the less credible spatial preemption becomes.

My numerical results demonstrate that as increases, the cannibalization effect increases in magnitude. This occurs because as increases there are more consumers with very strong feelings about each firm's products. The presence of such partisan consumers allows firms to earn higher profits by increasing prices and catering more to the segment of the population that really likes them, even if this drives away consumers who were on the margin. However, as the firms focus more on the segments of the population that have strongly favorable feelings about their firm, there is significantly less inter-firm competition. This makes it less likely that spatial preemption will be credible, because the incumbent gains few additional consumers when it adds a second hotel.

Figure 2 illustrates the relationship between the heterogeneity of firm preferences and the viability of spatial preemption. The X-axis shows the ratio of ^{2} to , representing the relative

Figure 2: The Variance of Consumer Preferences and the Credibility of Preemption: Base Case

importance of consumer heterogeneity, while the Y-axis is the ratio of the per period fixed cost f to the per-hotel revenues received by the incumbent in a market with 2 incumbent hotels and 1 entrant.[10] The changing frontier of Region I illustrates that as the relative importance of firm preferences increases, the magnitude of the per period fixed costs (relative to per hotel variable profits) needed to make preemption non-credible falls.

3.4 Extension: Brand Proliferation

The model presented above can straightforwardly extend to account for the common industry practice of brand proliferation. If firms differentiate their hotels using different brands, Equation (1) becomes:

$$V_{i;j;B} = p_j + \beta_{i;B} + \gamma_{i;j} + \epsilon_{i;j};$$

$$(4)$$

where β indicates the effect on consumer i's utility of brand j.

Because the di er for each consumer across products, rms can more easily expand their product lines. This is because the relative impact of the rm preferences are diluted, reducing cannibalization. Now, rms can extract surplus from a larger population, targeting a wider variety of consumers with strong feelings about the rm and/or its products' speci c characteristics. As noted elsewhere, this implies that in industries where rms are able to distinguish their products from each other in the product space, larger product portfolios should be expected. Moreover, on the margin, spatial preemption by the hotel-property-owner should be more likely since the extent

with the same rm again or open a hotel a liated with a di erent company. If they partner with the same rm, then the implications for cannibalization and spatial preemption are unchanged from the baseline model results presented above.

However, if the franchisee partners with a new lodging rm, which will have a separate , then the implications are quite di erent. The common manager has no incentive to reduce price at either of the hotels it controls to try to poach sales from the other. They will set prices to extract as much surplus as possible from the di erent consumer \types", much as the monopolist studied in Mussa and Rosen (1978) does for vertically-di erentiated products. This has the opposite e ect on the franchisee's propensity to engage in spatial preemption relative to the baseline model.
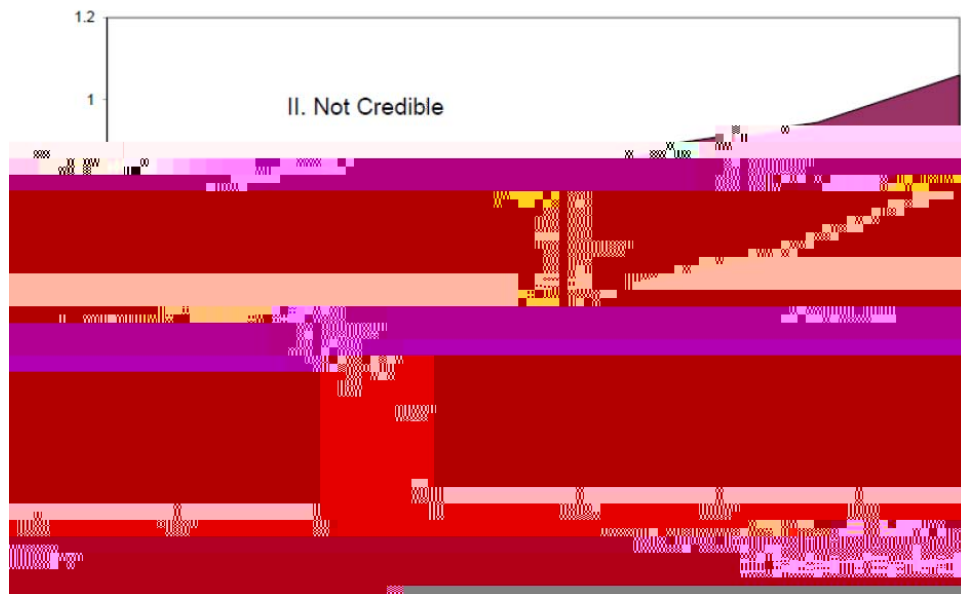
Figure 3: The Variance of Consumer Preferences and the Credibility of Preemption: Franchising Case

I illustrate this relationship graphically in Figure 3 by varying ^{2}. All other parameters are set at the same level as before. Intuitively, the Figure shows that as hotel owners are able to more di erentiate their products by a liating with other rms, the viability of preemption increases. This is consistent with the results found in Conlin and Kadiyali (2006), which suggested that within individual markets hotel owners (as opposed to rms or brands) appear to engage in entry-deterring

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capacity building.

It is worth emphasizing that if the franchisee rebu s its original partner, that franchisor is unlikely to wish to try to preempt by nding a new local franchisee to open a second hotel. (I ignore the possible issue of exclusive territory clauses.) This is because of the resulting incentive con ict between the two local franchisees. Each would be focused on their own hotel's pro ts, and would set price accordingly. In an e ort to win consumers from each other, both of the highly empowered local managers would cut prices signi cantly. Moreover, because of the importance of branding, the lower prices at the franchisor's a liated hotels would not attract many new customers that would not have gone with the original hotel at a higher price. Insofar as franchising contracts give franchisors a cut of a local hotel's revenues, an additional hotel might thus actually lead to lower overall pro ts for franchisors.

Moreover, while the commonality of franchising and the lack of exclusive contracts means that the hotel rms are unlikely to maintain monopoly power, they nevertheless bene t from the ar-rangement. This is because spatial preemption by local franchisees raises prices and pro ts within the market. Insofar as franchisors receive a de ned portion of the franchised hotel's revenues, the strategic behavior of multi-unit franchisees bene t their brand-owning franchisor partners as well as themselves. In future work, I, 6'(3nranc27(hes.)sna3-365(p)1(zes.)sna3- [(as)-4')1(s-365(pswningoterrt3rprice

in conjunction with information on the importance of branding in that industry to consumers. Unfortunately, such data are di cult to nd. Moreover, such a study would su er from the need to ensure that the nature of competition across the di erent industries was broadly similar. Because of these problems, I pursue a narrower approach, exploiting data on one industry that seems to have

depending on the hotel's characteristics. I aggregate the monthly submissions up to quarterly level. Between 2000 and 2008, my sample of the CPA data identifies each hotel in the state by name, city of location, and address. It also provides each hotel's owner, capacity (in rooms), and revenues. In order to focus on the hotel and motel market (as opposed to the boutique and bed and breakfast segments), I exclude hotels with less than 30 rooms. To control for variation in corporate affiliation and branding, I matched the hotel names to an author-constructed data set containing the names of the national brands and their parent firms. To control for quality, I follow Kalnins and Chung (2004) in assuming that hotels have the average quality rating of their brand, which I determine using AAA Texas Tourbooks.

Like Mazzeo (2002), I use cities rather than zip-codes as the relevant market definition as even cities of modest size often have more than one zip code. Moreover, focusing on cities follows the convention adopted by the industry insofar as hotels advertise themselves based on their city of location, and guidebooks organize their reviews around cities.

As in Bresnahan and Reiss (1987, 1991a,b), I focus on isolated markets to minimize concerns about spillovers from nearby markets. I select isolated markets in the following manner. First, I use Google Earth to determine the \centrum" of each city in the CPA data, where the centrum is defined as the latitude-longitude point that the software converges to when the city is entered into the search bar. Second, I calculate the distance between each of the centrums using the Great Circle methodology. Third, I discard those cities whose centrums are less than 10 miles from that of their nearest neighbor or less than 50 miles from the major economic hubs of San Antonio, Austin, Dallas, El Paso, and Houston. Then, I drop the cities that never had a population of more than 1,000 people during the sample period according to U.S. Census data; I also drop the resort cities of South Padre and Corpus Christi. These restrictions leave a total of 183 cities, none of which is large enough to pose a concern that location within the city is likely to dramatically affect competition. Figure 4 shows the locations in Texas of all markets in the sample.[13]

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[13]The Census data can be downloaded at factfinder.census.gov. I exclude the coastal resort cities as they had vastly more hotels than other markets of similar size. As in Bresnahan and Reiss (1987), I explored whether cities near the

The restriction of the sample to geographically isolated markets means that the very high end of the quality spectrum is largely absent.[14]

of similarity is even higher within individual markets as the average within-market coe cient of variation is 0.18.

Table 1 summarizes the level of concentration in terms of rm-a liation for those market-periods with at least two branded hotels. In some senses, it provides insight into the average market structure. The Table examines the extent of concentration using Her ndahl-Hirschman Indices (HHI) computed in three di erent ways: by rms' shares of the total number of branded hotels, by rms' shares of the total number of rooms in branded hotels, and by rms' shares of branded revenues. It is useful to compare these gures to the reference value that assumes a perfectly symmetric division among rms in all markets as well as to a score of 10000, which would indicate that all hotels in all market-periods are associated with just one rm.

Overall, I believe that the Table is consistent with what my theoretical model predicts about market structures in local hotel markets. While the HHI values always are greater than the reference column, this necessarily occurs if market shares are ever other than perfectly symmetric; there is no possibility of a score lower than the reference category that would serve to \balance" out the average. Thus, I believe that the Table indicates that the equilibrium market con gurations are inconsistent with spatial preemption or other forms of entry deterrence by the large lodging companies in the branded segment. Instead, they are in line with what my theoretical model predicts based on the anecdotal evidence about the importance of consumer opinion. In addition, it is worth noting how similar the di erent HHI measures are, supporting the inference that hotels within a market have roughly the same size and perform similarly.

Table 1: HHI Summary Statistics by Market Size

# Branded	Equal Share	Obs	HHI of Properties	HHI of Revenues	HHI of Rooms
2	5000	359	5836	6536	6014
3	3333	291	4166	4478	4282
4	2500	250	3735	4070	3922
5	2000	241	3291	3298	3430
6	1667	96	2581	2536	2641

Notes: The Table shows how concentration varies with the number of hotels a liated with the large rms.

Further insight into the possible presence of spatial preemption can be gained through an analysis of changes to market structure. After reducing the sample to just annual observations { to account for construction delays { I consider whether growth in expanding markets came about as a result of hotels a liated with incumbent rms or not. Speci cally, Table 2 looks at markets whose total number of branded, high-quality hotels increased by one, and did not see any of the six large hotel rms reduce their stock of hotels. The Table suggests that it is overwhelmingly likely that market growth occurs on the intensive margin via entry by \new" rms, even when there are many more incumbents capable of expanding than potential entrants.

While the descriptive results shown in Tables 1 and 2 support the model's implications about an industry where consumer heterogeneity in rm preferences is important, they do not account for important factors that might vary across markets. Nor do they speak to the incumbents' incentives for expansion (or lack thereof). To obtain a more precise understanding of cannibalization and spatial preemption, it is necessary to employ formal econometric frameworks, which I do in the following sections.

Table 2: Origin of New Hotels in Growing Markets

Number of Incumbents	Incumbent	Entrant	Total
1	3	12	15
	20	*80*	*100*
2	4	13	17
	23.53	*76.47*	*100*
3	5	9	14
	35.71	*64.29*	*100*
4	5	7	12
	41.67	*58.33*	*100*
5	3	4	7
	42.86	*57.14*	*100*
Total	33	69	102
	32.35	*67.65*	*100*

Notes: Entries in *italics* represent percentages of observations within the row.

5 Cannibalization and Revenue Stealing

5.1 Econometric Approach and Identi cation

In this section, I assess the empirical relationship between branding and cannibalization, which

pro ts of an individual hotel h in market m at time t can be represented as:

$$v_{h;m;t} = X_{m;t} \quad f(\; ; N) + \quad _{h;m} + \quad _{h;m;t}; \tag{5}$$

where X are market-level characteristics a ecting demand and supply, $f(\; ; N)$ is the function mapping local market structure N to hotel revenues, is persistent unobserved hotel and/or market level heterogeneity, and is information unobserved to the econometrician.

I take a hybrid approach to identifying the impact of local market structure (i.e. $f(\; ; N)$). Like Davis (2006), I account for di erentiation among market participants using linear parameterizations of di erent types of market participants to allow for e ects of di erent magnitudes. However, whereas Davis (2006) addressed geospatial di erentiation of homogeneous products, I exploit a focus on small markets as in Mazzeo (2002) and Bresnahan and Reiss (1987) to abstract from geospatial elements. Instead, I account for horizontal di erentiation stemming from variation in corporate ties, branding, and/or franchisee-a liation. It is necessary to account for such heterogeneity insofar as the theoretical model predicts that hotels closer together in the characteristic space or under

and, again, any market-growing influence of hotels affiliated with the other possible categories.[17]

It is important to remember that the market structure variables represented by the Ns in Equation (6) represent the outcome of choices made in the aforementioned first stage of the entry

market structure, and hence, in theory, make for appropriate instruments. However, one might reasonably worry about serial correlation of errors. I believe that the market xed e ects included in all models (implicitly in the hotel- xed e ects models) will control for this to a large extent; nevertheless, I explore the implications of varying the lag order. Further details are provided below.

5.2   Results

Table 3 shows descriptive statistics for the variables used in the revenue analyses. Consistent with the previously described choices made in de ning the sample markets, the Table shows that the majority of observations are in small cities, which have only a few branded hotels for travelers to choose from. Moreover, the vast majority of hotels in any given market are a liated with di erent brands, which is not surprising given the market concentration results shown in Table 1. Furthermore, in these small markets, the Table shows that it is rare that the same owner has more than one hotel in a given market. This may re ect that franchisees are capital constrained, leaving them unable to pursue pro table expansion. Alternatively, it may stem from the fact that the same decision-maker may register legally distinct entities as the owner of the di erent properties, which might be bene cial for tax or liability reasons.[20]

Table 4 shows the results of six di erent models of market structure impact revenues that exploit between- and within-hotel variation to identify competitive e ects. Models 1-3 pool observations within markets, and address the possibility of rm or brand level di erences using rm or brand e ects. In addition, time invariant market di erences are addressed through the use of market-level xed e ects. Column 1 focuses on the competitive e ects of hotels a ected with the same and di erent rms. Column 2 considers the impact of brand-proliferation strategies, while Column 3 addresses the possible impact of franchising. Models 4-6 are analogous but identify e ects based solely upon within-hotel variation. In all cases, I include quarter-year e ects and cluster the standard

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[20]In addition, the Table suggests that in the few cases of an owner having two separate properties, it is more common for

Table 3: Descriptive Statistics

	Obs	Mean	Std. Dev.	Min	Max
Sales ('000)	9341	315.41	236.84	1.94	2547.46
Log (Sales ('000))	9341	5.50	0.75	0.66	7.84
Same Firm	9341	1.07	1.47	0.00	8.00
- Same Brand	9341	0.10	0.35	0.00	2.00
- Diﬀ. Brand, Same Firm	9341	0.97	1.31	0.00	8.00
Diﬀerent Firms	9341	5.95	5.58	0.00	24.00
Premium Independent	9341	2.86	2.93	0.00	12.00
Budget Independent	9341	6.97	5.70	0.00	21.00
Own Same Firm	9341	0.04	0.21	0.00	1.00
Own Diﬀerent Firm	9341	0.02	0.15	0.00	2.00
Own Independent	9341	0.02	0.15	0.00	2.00
Population ('000)	9341	68.59	70.42	1.68	223.18
Income ('000)	9341	44.24	8.99	22.05	93.61

errors. In the pooled models, I cluster at the market level, while in the ﬁxed eﬀects models I cluster at the hotel level.

Overall, the diﬀerent models' results are strikingly consistent with each other and with the core prediction of the theoretical model that in an industry where consumers value brands heterogeneously, there will be signiﬁcant cannibalization following a ﬃliated product entry. For example, Columns 1 and 4 show that if a new hotel is opened that is a ﬃliated with the same ﬁrm it reduces revenues by 10-12 percent. B-27(erccT27(me)28(t)rast,T27(me)-288(B-27(4p8.5-t71)-251-314(ﬁrm)16(ved)-427936

Table 4: Revenue Cannibalization and Market Structure

	OLS b/se	OLS b/se	OLS b/se	FE b/se	FE b/se	FE b/se
Same Brand		-0.132**			-0.140**	
		0.06			0.06	
Diff. Brand, Same Firm		-0.120***			-0.093***	
		0.02			0.02	
Same Firm	-0.119***		-0.119***	-0.097***		-0.097***
	0.01		0.01	0.02		0.02
Different Firms	-0.048***	-0.049***	-0.048***	-0.049***	-0.049***	-0.049***
	0.01	0.01	0.01	0.01	0.01	0.01
Own Same Firm			0.049			0.039
			0.19			0.05
Own Different Firm			0.075			0.011
			0.06			0.09
Premium Independent	-0.034*	-0.033**	-0.033*	-0.019	-0.018	-0.019
	0.02	0.02	0.02	0.01	0.01	0.01
Budget Independent	0	-0.003	-0.001	-0.018*	-0.017*	-0.017*
	0.01	0.01	0.01	0.01	0.01	0.01
Own Independent			0.146			-0.04
			0.16			0.1
Population ('000)	0.003	0.002	0.004	0.005	0.005	0.004
	0.01	0.01	0.01	0.01	0.01	0.01
Income ('000)	0.021***	0.019**	0.021***	0.022***	0.022***	0.022***
	0.01	0.01	0.01	0.01	0.01	0.01
Firm Effects	Yes	No	Yes	No	No	No
Brand Effects	No	Yes	No	No	No	No
Market Effects	Yes	Yes	Yes	No	No	No
Hotel Effects	No	No	No	Yes	Yes	Yes
Quarter-Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9341	9341	9341	9341	9341	9341

* p<0.10, ** p<0.05, *** p<0.01 in two-sided tests. Standard errors clustered at market-level for OLS models and hotel level for FE models.

these effects from. Nevertheless, the implication of only a minor effect from sub-brand proliferation is interesting. It could reflect the increasing importance of firm loyalty programs relative to the greater ease of expansion enabled by sub-brand proliferation. I hope to explore these issues further in future research.

Turning to the possible impact of non-exclusive franchising, Columns 3 and 6 show that if an incumbent is the owner of the of the new outlet, it substantially offsets its cannibalization effect. This is particularly true if the hotel is affiliated with a branded competitor (or independent hotel), which is in line with the prediction of the model. However, none of these effects are precisely identified. Again, this is not terribly surprising given the low frequency of such events in the data.

The impacts of the control variables are broadly in line with intuition, theory, and previous empirical work. Supporting the idea that they are further away in the product space than other branded hotels, I consistently find that independent hotels have smaller revenue-stealing effects than branded hotels, and that low-quality independents have smaller effects than high quality independents. Intuitively, both population and household income are positively correlated with revenue, although only income's effect is statistically significant.

Despite the consistency of the revenue results, concern may remain about the endogeneity of the market structure variables. If, for example, the market, firm, and hotel-level controls do not sufficiently take account of unobservable factors favoring market development by certain firms, then the coefficients would be biased.[22] To address such concerns, I re-estimated the models shown in Table 4 via instrumental variables using one period lags of the market structure variables as

order to leverage as much data as possible. Table 5 shows the results of these IV models. Columns 1-6 represent the analogues to Columns 1-6 of Table 4.

Table 5: Revenue Cannibalization and Endogenous Market Structure

	IV-OLS b/se	IV-OLS b/se	IV-OLS b/se	IV-FE b/se	IV-FE b/se	IV-FE b/se
Same Brand		-0.076			-0.110*	
		0.05			0.06	
Di . Brand, Same Firm		-0.115***			-0.108***	
		0.02			0.03	
Same Firm	-0.105***		-0.104***	-0.108***		-0.108***
	0.01		0.01	0.03		0.03
Di erent Firms	-0.041***	-0.045***	-0.042***	-0.054***	-0.054***	-0.054***
	0.01	0.01	0.01	0.01	0.01	0.01
Own Same Firm			0.046			0.028
			0.2			0.06
Own Di erent Firm			0.04			-0.021
			0.07			0.11
Premium Independent	-0.028*	-0.026*	-0.025	-0.011	-0.011	-0.005
	0.02	0.02	0.02	0.01	0.01	0.01
Budget Independent	0.003	-0.002	0.004	-0.015*	-0.015*	-0.013
	0.01	0.01	0.01	0.01	0.01	0.01
Own Independent			0.178			0.022
			0.18			0.1
Population ('000)	0	-0.001	0.001	0.005	0.005	0.005
	0.01	0.01	0.01	0.01	0.01	0.01
Income ('000)	0.021***	0.019**	0.020**	0.020***	0.020***	0.020***
	0.01	0.01	0.01	0	0	0
Firm E ects	Yes	No	Yes	No	No	No
Brand E ects	No	Yes	No	No	No	No
Market E ects	Yes	Yes	Yes	No	No	No
Hotel E ects	No	No	No	Yes	Yes	Yes
Quarter-Year E ects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8887	8887	8887	8872	8872	8872

* $p<0.10$, ** $p<0.05$, *** $p<0.01$ in two-sided tests. Standard errors clustered at market-level for OLS models and hotel level for FE models.

The models controlling for the possibility of endogenous market structure more directly through instrumental variables methods remain consistent with the baseline results. Only in the instance of Column 3 is there a marked divergence. In that case, the IV model shows a smaller e ect of

hotels a liated with the same brand than simply hotels sharing a rm a liation. However, this anomalous result disappears when used in conjunction with xed e ects in Column 6. Ultimately, the consistency of the results between the two tables both in terms of signs and magnitudes supports the idea that there is little concern about endogeneity after including market and hotel-level controls for time-invariant heterogeneity.

Overall, I interpret the revenue model results as o ering strong support for the idea that strong brand preferences exacerbate intra- rm cannibalization. Firms can reduce these e ects via strategies

where consumers' preferences for di erent rms are important, growth is expected to occur via entry. I exploit these insights, and test as close an analogue to the theoretical model as I can,

form estimates of the net impact of all factors, including rms' capacity for brand proliferation and sharing of franchisees, on hotel rms' expansion strategies.

markets were larger in both population and number of pre-existing hotels.

Table 7: Summary Statistics for Firm Behavior Models

a) Non-shrinking Markets

Variable	Obs	Mean	Std. Dev.	Min	Max
Change in Stock	8394	0.02	0.14	0.00	1.00
1(Entrant)	8394	0.86	0.35	0.00	1.00
Stock of Hotels	8394	0.20	0.59	0.00	7.00
Other Branded	8394	1.01	2.25	0.00	21.00
Premium Independent	8394	0.60	1.10	0.00	10.00
Budget Independent	8394	2.10	2.79	0.00	21.00

existing stock of hotels is negative, which means that the larger an incumbent's stock of hotels, the less likely they are to expand. Both results run counter to what would be observed if firms engaged in spatial preemption. Furthermore, in most of the models, both effects are statistically as well as economically significant. These results indicate that contrary to what initial intuition might suggest about oligopolistic behavior in individual differentiated product markets, growth in the branded hotel segment is more likely to occur on the extensive margin as new entrants build new hotels than on the intensive margin via expansion by incumbent.

The economic significance of the key explanatory variables is larger in Columns 3 and 4. This is intuitive as these regressions are conditional on growth having taken place. The fixed effects models return coefficients of significantly larger magnitude, which is consistent with their better accounting for unobserved market level factors favoring individual firms. Therefore, I believe those results are preferable. They indicate that an entrant is 30 percent more likely to account for market expansion in non-shrinking markets, and approximately 50 percent more likely to account for growth in growing markets.

The results for Texas hotel firms provide an interesting contrast to those of Bronnenberg et al. (2009), who document significant first-mover advantages in many consumer packaged goods industries. Bronnenberg et al. (2010) present evidence suggesting that this effect stems in large part from consumers' initial experiences. My different results for Texas hotel markets may reflect that the firms are mature with nation-wide presences. As a result, any given hotel's potential customers are likely randomly drawn from much of the country. Thus, while any individual consumers' preferences may be quite influenced by their initial hotel experiences, none of the major hotel firms in Texas are likely to benefit systematically. I hope to explore these ideas further in future research.

The coefficients on the other explanatory variables in the market growth models are broadly in line with intuition and past research. The coefficient on the stock of other branded firms is usually more positive (and in one case actually positive) than the coefficient on the stock of a firms' own hotels. This is consistent with the cannibalization results presented above. I find effects of

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inconsistent sign and significance for the independent hotels variables. This could be due to the high degree of collinearity among the explanatory market structure variables and the comparatively small sample size. The findings for population are of small magnitude and inconsistently signed, which is consistent with the fact that the sample markets were selected because they grew.

Table 8: Analyses of Market Structure and Expansion

	OLS b/se	FE b/se	OLS b/se	FE b/se
1(Entrant)	0.035**	0.069	0.164***	0.180*
	0.02	0.06	0.06	0.11
Stock of Hotels	-0.037*	-0.238***	-0.047	-0.390***
	0.02	0.05	0.04	0.06
Other Branded	-0.043***	0.001	-0.012	0.057*
	0.01	0.01	0.03	0.03
Premium Independent	0.026**	0.026**	0.001	0.001
	0.01	0.01	0.03	0.05
Budget Independent	-0.006	-0.006	-0.021**	-0.022
	0	0.01	0.01	0.03
Population ('000)	0.013***	0.012***	-0.006	-0.006
	0	0	0.01	0.01
Income ('000)	0	0	0.006	0.006
	0	0	0	0.02
Firm Effects	Yes	No	Yes	No
Market Effects	Yes	No	Yes	No
Firm-Market Effects	No	Yes	No	Yes
Year Effects	Yes	Yes	Yes	Yes
Observations	8394	8394	762	762

* $p<0.10$, ** $p<0.05$, *** $p<0.01$ in two-sided tests. Standard errors clustered at market-level for OLS models and market-firm level for FE models.

Overall, I find that the results for market growth strongly support the theoretical model's predictions about the viability of spatial preemption in industries where consumers are highly affected by branding. Consistent with the model's predictions, I find that growth is much more likely to take place on the extensive margin via entry by new (albeit nationally recognized firms) rather than via expansion by incumbents. Moreover, like my findings for hotel revenues, these results are highly robust. For example, Table A-4 in the Appendix shows the results of models

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when I impose stricter limits on the proximity between markets. In addition, the Table also shows the results of IV models of the larger non-shrinking markets sample. In both cases, the results are quite similar to those of my baseline models.

My results also are qualitatively robust to reparameterizing the representation of market structure in more non-linear fashion. Furthermore, although not shown, the results are qualitatively robust to di erent assumptions about the timing of market structure changes. In particular, I explored simply looking at one year changes in market structure for all quarters rather than simply one quarter per year. Intuitively, this did not lead to substantially di erent results. Finally, controlling for whether or not an incumbent is a monopolist does not fundamentally change the results. Details are available upon request.

7 Conclusion

In many settings where spatial preemption might be expected to produce tightly concentrated industry structures, rms share the market instead. I explore these issues in the context of the hotel industry, whose local markets resemble the stylized set-up of Eaton and Lipsey (1979), but also are characterized by strong brand preferences. I develop a strategic investment model that suggests that strongly varied consumer opinions about rms, such as might be created by the nationwide marketing campaigns common in the hotel industry, inhibit spatial preemption by exacerbating intra- rm cannibalization. Extensions to the model accommodate stylized facts in the hotel industry such as brand proliferation and multi- rm franchising arrangements, which relax intra- and inter- rm competition, respectively. I test the model's predictions using rich longitudinal data on Texas hotels. These data strongly support the model's predictions insofar as I nd very large intra- rm revenue cannibalization e ects, which can be mitigated via the use of di erent brands. Moreover, the intensity of inter- rm competition appears to be relaxed when two hotel rms both use the same local franchisee. Finally, I nd that growth in the sample markets is much more likely to occur on the extensive margin through entry rather than on the intensive margin through incumbents'

expansion.

Overall, the paper contributes to an emerging literature focusing on how factors relating to a national rm's identity may impact local competitive interaction. My results suggest that when consumers are nationally drawn, being a local rst-mover provides no long-term advantages. By contrast, the results in Bronnenberg et al. (2009, 2010) indicate that when consumers are drawn locally, advertising can help rms retain their dominant status. In future work, I hope to integrate greater consideration of the determination and preservation of brand preferences into an analysis of dynamic product market competition.

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Appendix A

Table A-1: Qualities of Nationally Branded and Unbranded Hotels

	Quality Tier		
	Low	High	Total
Accor	931	106	1,037
AmericInn International	0	24	24
America's Best Franchising	0	61	61
Budget Host	120	0	120
Candlewood Hotel Co.	0	3	3
Carlson Hotels Worldwide	0	104	104
Choice Hotels	0	2,340	2,340
Continent	0	1,685	1,685
Drury Hotels	0	9	9
Extended Stay Hotels	0	90	90
Hilton Hotels Corporation	0	827	827
Hyatt	0	125	125
La Quinta	0	828	828
Marriott International	0	638	638
Starwood	0	55	55
Vantage	0	343	343
Wyndham	0	3,505	3,505
Independent	13,730	3,488	17,218
Total	14,781	14,231	29,012

Table A-2: Brands Affiliated with each Firm

Firm	Chain	Observations
Choice Hotels	Clarion Inns & Suites	50
	Comfort Inn	721
	Comfort Suites	428
	Econo Lodge	591
	Quality Inns & Suites	383
	Rodeway Inn	83
	Sleep Inn	84
Continent Hotels	Candlewood Suites	27
	Crowne Plaza	2
	Holiday Inn	436
	Holiday Inn Express	1,211
	Staybridge Suites	9
Hilton Hotels	Embassy Suites Hotels	39
	Hampton Inn	671
	Hilton	36
	Hilton Garden Inn	5
	Homewood Suites by Hilton	76
La Quinta	La Quinta Inns	828
Marriott International	Courtyard	135
	Fairfield Inn	320
	Residence Inn	123
	Ritz-Carlton	15
	Springhill Suites	11
	Towneplace Suites	34
Wyndham	Baymont Inn & Suites	40
	Days Inn Worldwide	1,488
	Hawthorn Suites	7
	Howard Johnson International	243
	Knights Inn	1
	Microtel Inns & Suites	2
	Ramada	594
	Super 8 Motels	928
	Travelodge Hotels	170
	Wingate	32

Table A-3: Robustness Revenue Regressions: Markets at least 20 miles apart.

	OLS b/se	FE b/se	IV-FE b/se
Same Firm	-0.076	-0.187***	-0.248***
	0.06	0.06	0.06
Di erent Firms	-0.140***	-0.099***	-0.126***
	0.02	0.02	0.02
Premium Independent	-0.073	-0.063	-0.051
	0.05	0.04	0.04
Budget Independent	0.016	-0.009	-0.015
	0.02	0.02	0.01
Population ('000)	0.008*	0.009	0.016**
	0	0.01	0.01
Income ('000)	0.016	0.015	0.016*
	0.01	0.01	0.01
Firm E ects	Yes	No	No
Market E ects	Yes	No	No
Hotel E ects	No	Yes	Yes
Quarter-Year E ects	Yes	Yes	Yes
Observations	3263	3263	3096

* $p<0.10$, ** $p<0.05$, *** $p<0.01$ in two-sided tests. Standard errors clustered at market-level for OLS models and hotel level for FE models.

Table A-4: Robustness Entry Regressions

	IV		distance > 20		distance > 20	
	OLS b/se	FE b/se	OLS b/se	FE b/se	OLS b/se	FE b/se
1(Entrant)	0.038**	0.134	0.004	-0.061	0.116	0.017
	0.02	0.12	0.04	0.08	0.12	0.19
Stock of Hotels	-0.019	-0.260***	-0.062**	-0.368***	-0.01	-0.458***
	0.03	0.1	0.03	0.06	0.05	0.09
Other Branded	-0.029	0.029	-0.051***	0	0.02	0.084
	0.02	0.02	0.01	0.01	0.03	0.05
Premium Independent	0.02	0.019	0.004	0.008	-0.090**	-0.067
	0.02	0.02	0.02	0.01	0.04	0.08
Budget Independent	-0.007	-0.008	-0.011***	-0.011*	-0.043**	-0.058
	0	0.01	0	0.01	0.02	0.04
Population ('000)	0.011	0.009	0.017***	0.020***	-0.01	-0.004
	0.01	0.01	0	0	0.01	0.02
Income ('000)	0.001	0.001	0	0	0.027	0.011
	0	0	0	0	0.02	0.03
Firm Effects	Yes	No	Yes	No	Yes	No
Market Effects	Yes	No	Yes	No	Yes	No
Firm-Market Effects	No	Yes	No	Yes	No	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7326	7326	7669	7669	529	529

* p<0.10, ** p<0.05, *** p<0.01 in two-sided tests. Standard errors clustered at market-level for OLS models and hotel level for FE models.

Appendix B

In this section, I provide the results of numerical solutions to the theoretical model. In these simulations, I assume that the   are all drawn from normal distributions with mean 0 and standard deviation   . I show the relationship between heterogeneous brand preferences and cannibalization by varying the parameters affecting the variance of consumers' heterogeneous brand preferences ( ) and the baseline benefit to staying in one of the hotels in the market ( ). Code for the simulations is written in Matlab 7.8 by the author and is available upon request.

Table B-1

Table B-1: Numerical Results of Theoretical Model for One Hotel Under Di erent Market Structures

			2 Hotels		3 Hotels	
			Monopoly	Competition	Incumbent	Entrant
		Price	3.00	1.77	2.04	1.63
= 0 &	= 3	Revenue	1.00	0.77	0.52	0.63
		Mkt Share	0.33	0.44	0.26	0.39
		Price	3.26	2.16	2.44	2.05
= 1 &	= 3	Revenue	0.94	0.86	0.56	0.75
		Mkt Share	0.29	0.40	0.23	0.37
		Price	3.93	2.87	3.13	2.78
= 2 &	= 3	Revenue	0.93	0.98	0.61	0.90
		Mkt Share	0.24	0.34	0.19	0.33
		Price	4.81	3.68	3.92	3.60
= 3 &	= 3	Revenue	0.97	1.12	0.67	1.05
		Mkt Share	0.20	0.30	0.17	0.29
		Price	5.75	4.53	4.76	4.45
= 4 &	= 3	Revenue	1.05	1.27	0.73	1.22
		Mkt Share	0.18	0.28	0.15	0.27
		Price	6.73	5.37	5.60	5.33
= 5 &	= 3	Revenue	1.14	1.42	0.80	1.38
		Mkt Share	0.17	0.26	0.14	0.26
		Price	7.75	6.32	6.54	6.23
= 6 &	= 3	Revenue	1.24	1.60	0.89	1.54
		Mkt Share	0.16	0.25	0.14	0.25
		Price	2.73	1.95	2.19	1.86
= 1 &	= 2	Revenue	0.67	0.66	0.45	0.58
		Mkt Share	0.25	0.34	0.21	0.31

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