

Industry Structure, Segmentation and Quality Competition in the U.S. Hotel Industry

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This paper examines how quality competition affects the relationship between market size and industry structure at the product level using evidence from the U.S. hotel industry. We document that starting in the early 1980s, quality competition for business travelers became more based on variable costs and less on fixed costs, and therefore became less scale intensive at the hotel level. We show that industry structure evolved differently since then in business and personal travel destinations. Market size increases have been met by more, but smaller, hotels in business travel destinations but continued to be met by larger hotels in personal travel destinations. Our results illustrate how the way consumers benefit from increases in market size depends on how firms compete.

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1. Introduction

A general implication of a broad class of models of imperfect competition is that consumers benefit as market size increases. But how they benefit depends on how firms compete. For example, in monopolistic competition models – models of horizontal differentiation -- the extent to which consumers benefit through lower prices versus a greater variety of products depends on whether product space is fixed (as in Hotelling-style models such as Salop (1979)) or not (as in Chamberlin-style models such as Dixit and Stiglitz (1978)). In both, increases in market size lead to entry. However, in the former entry leads product space to become more crowded but in the latter it does not, so the benefits come more in the form of lower prices in the former but more in the form of greater variety in the latter. In vertical differentiation models, the extent to which consumers benefit from better products versus more products depends on the extent to which quality is produced by fixed costs versus variable costs. As illustrated in Sutton (1991), when quality is produced by fixed costs, firms have an incentive to invest more as market size increases. Quality competition becomes increasingly scale-intensive, and consumers tend to benefit in the form of better products, but not necessarily from either more products or a wider variety of products. In contrast, when quality is produced by variable costs, quality competition is not scale intensive. As discussed in Berry and Waldfogel (2010), like in the horizontal differentiation cases, increases in market size tend to lead to more products that “fill up” the product space, and consumers benefit from the wider variety of offerings.¹

This paper examines how quality competition affected the relationship between market size and industry structure at the product level in the U.S. hotel industry over the past fifty years, especially since the early 1980s. We focus on the extent to which the industry adjusted to increases in market size in the form of larger hotels or more hotels, and how this depended on how firms competed on quality at the hotel level. Figure 1 shows some broad patterns that motivate our inquiry. The top panel shows the number of hotels; the bottom panel shows the average employment size of hotels. The left parts of these charts show a central fact from Hubbard and Mazzeo (2019): the U.S. hotel industry experienced a shake-out between the 1960s and early 1980s, even though demand for hotels increased substantially during this time. The industry had fewer but much larger hotels in the early 1980s than the mid-1960s. This previous work tested whether shake-outs in local markets were associated with increases in quality competition in the form of fixed cost investments – primarily, swimming pools – and found evidence consistent with this proposition. The right part of these charts shows, however, that these trends did not continue past the early 1980s, at least at the national level. Unlike in the earlier period, the number of hotels has increased steadily since the

¹ A common feature of this class of models is that supply is elastic in the long run due to free entry. If supply were not elastic, consumers need not benefit when market size increases because products could become more scarce.

early 1980s, and the average employment size of hotels has only marginally increased, and in fact is nearly constant since around 1990. This paper examines what changed starting in the early 1980s, and how differences in how hotels compete on quality for different types of customers have shaped product-level industry structure since then.

We first provide documentary evidence that this change was catalyzed by a form of an information shock: the realization by firms that many business travelers did not value out-of-room amenities such as full-service restaurants, lobbies, or meeting space as much as firms believed, and valued in-room amenities such as larger and better-appointed rooms more than they thought. In the case of Marriott, this insight is well-documented, and was the result of new market research and methods that not only identified that Marriott's and its competitors' offerings were not satisfying these travelers' needs – they were competing on the wrong dimensions for these travelers – but also indicated what amenities these travelers valued. Responding to incentives offered by these insights about the nature of demand, hotel firms changed their strategic approach and the form of quality competition at the hotel level especially for business travelers, shifting away from better out-of-room amenities and toward better in-room amenities (including larger rooms). One manifestation of this change is that, while a medium-to-high quality hotel without a restaurant was very uncommon in the early 1980s, it has become increasingly common ever since, and is the format used by several of the largest U.S. hotel chains.²

Differentiation strategies based on either out-of-room amenities or in-room amenities are both forms of vertical differentiation, but the implications for industry structure of competing along these different lines differ. The cost of supplying out-of-room amenities such as swimming pools, restaurants, and meeting rooms, if not entirely fixed, has a significant fixed component in the sense that it does not increase proportionately with the number of rooms in a hotel. In contrast, the cost of supplying in-room amenities such as higher quality chairs or desks, better appointed rooms, or simply larger rooms, varies directly with the number of rooms. Scale is less advantageous when quality competition takes this form than when it takes the form of more or better out-of-room amenities. It then follows that when quality competition shifts from the former to the latter, one would expect the industry to consist of more, but smaller, hotels. In addition, one would expect increases in market size to be met more by increases in the number of hotels, and less by increases in the size of hotels, once quality competition takes the form of better in-room amenities rather than out-of-room amenities.

We test this proposition about the industry's adjustment to increases in market size, and how it varies with the form of quality competition, by contrasting the long-run evolution of industry structure in

² These include “limited service” chains such as Holiday Inn Express, Hampton Inn, and Fairfield Inn, among others. None of these chains existed in the early 1980s.

different local markets, comparing counties that tend to be destinations for business travel to those which tend to be destinations for personal travel (for example, counties in Georgia versus Florida). We find that industry structure at the product level evolved similarly in these areas before the early 1980s, but very differently ever since the early 1980s.³ Since the early 1980s, demand has increased in personal travel destinations and the industry's adjustment continued to come in the form of larger hotels, as well as more hotels. Looking at changes in hotels' size distribution, we find that this increase in average size reflected, in part, increases in the number of very large hotels. Quality competition continued to be scale-oriented in these areas. However, in business travel destinations, the industry evolved very differently. Here, the average size of hotels decreased, and there were many more hotels. Unlike in personal travel destinations, the expansion in the number of hotels was exclusively in small to medium sized hotels, not in very large hotels. These patterns are consistent with the proposition that changes in the way hotel firms competed on quality for business travelers changed the relationship between market size and industry structure, and led this relationship to differ in these different segments.⁴

We then examine alternative explanations of these patterns. One important class of alternative explanations also has to do with scale, but not quality competition: the idea that hotels' "setup" costs such as those associated with land may have changed starting in the early 1980s, and decreased in business travel destinations relative to personal travel destinations. In some of these explanations, such changes reflect systematic, county-wide changes in land prices; in others, they reflect a "suburbanization" of the hotel industry whereby starting in the early 1980s, hotels in business travel destinations were located increasingly outside of urban areas relative to those in personal travel destinations. We do not find that these alternative explanations explain our results. While we do find evidence that differences in setup costs influence industry structure – hotels tend to be larger where land costs are higher – variation in land costs does not explain our main empirical results. Our central facts persist when controlling for county-level changes in land prices, and within counties, the size of new hotels decreased in both urban and non-urban locations starting in the early 1980s, especially in business travel destinations. Furthermore, we provide ancillary evidence that the suburbanization of the hotel industry did not start suddenly in the early 1980s, but rather started earlier and took place gradually, and took place not only in business travel destinations but also in personal travel destinations.

³ With respect to this part of our analysis, our empirical approach is a difference-in-difference-in-differences research design with a continuous treatment (i.e., intensity of business travel), where the very similar evolution of the industry structure before the 1980s provides support for the "parallel trends" assumption required of this research design.

⁴ Our main data source for this exercise allows us to construct employment-based measures of hotel size, but not room size-based measures. Below, we provide evidence using other data that our main results hold when assessing changes in hotels' room size.

We then provide evidence on quality differentiation and segmentation in this industry recently. Our cross-sectional analysis of these data shows different patterns than our analogous study of the industry in 1982, and illustrates how changes in quality competition have led hotels' amenities to be different now than then, particularly in business travel destinations. Among other things, the relationship between a hotel's price and its size is weaker now than then, and it is now not unusual for a medium-to-high quality hotel to not have a restaurant. Areas that tend to be business travel destinations are no longer more likely to be served by hotels with restaurants; instead, they are more likely to be served by all-suites hotels, which tend to be relatively small and compete mainly on the attributes of their rooms rather than amenities that are outside of the room. All of these cross-sectional patterns, combined with our evidence on long-run changes in the size and number of hotels in different areas, are consistent with the broad hypothesis that the way that firms compete on quality shapes industry structure, along with the narrower hypothesis that when firms compete on quality on variable rather than fixed costs, this will tend to lead to a more fragmented industry structure at the product level. Business travelers have benefitted from increases in market size from a wider variety of hotels – at the very least in the form of more locations and probably other dimensions as well. In contrast, the benefits to personal travelers appear to continue to be more related to scale, and less in the form of greater variety than those to business travelers.

Our paper builds on and contributes to an existing empirical literature on quality competition and the relationship between market size and industry structure. Much of this work stems from the seminal work of Sutton (1991), which showed through a series of cross-country case studies that scale-intensive quality competition leads many industries to remain concentrated in large markets. These cross-country comparisons, however, left open the possibility that many things were changing across countries other than market size. Consequently, important follow-up work focused on within country but still cross-sectional and cross-industry comparisons to show that industries where quality is primarily provided through fixed costs like grocery stores (through distribution channels; Ellickson (2007)), and newspapers (through editorial staff; Berry and Waldfogel (2010)), remain concentrated as market size increases. These authors show as well that in contrast, other industries where quality provision comes mostly in the form of variable costs, like barbers/salons (Ellickson (2007)) and restaurants (Berry and Waldfogel (2010)), become more fragmented as market size grows. In each case, the primary variation in market size has remained purely cross-sectional, while the primary variation in the form of quality competition has been *across* industries. This has left open the possibility of systematic differences across markets as well as industries to affect inferences. Hubbard and Mazzeo (2019) use an alternative identification strategy by leveraging local demand shocks induced by highway completions, and the long-run *within* market changes in industry structure to show that increases in demand might even lead to “shakeouts” for industries, when quality provision comes through fixed costs.

This paper also utilizes within market changes in market size to trace out how quality competition affects the evolution of industry structure. This is advantageous because the theoretical predictions of how industry structure evolves with changes in market size concern *within* market changes rather than cross-market differences. Moreover, by focusing on the different customer segments within the hotel industry—that is, personal versus business travelers -- and well-documented differences in what amenities they tend to value, we are able to provide *within* industry empirical evidence of how the form of quality competition influences the relationship between market size and industry structure. Our empirical results indicate the form of quality competition has an important impact on how industry structure evolves with, and how consumers benefit from, increases in market size.

The rest of the paper is organized as follows. Section 2 briefly summarizes our theoretical framework, which relates quality competition to industry structure. Section 3 provides an overview of the U.S. hotel industry at the beginning of the 1980s and analyzes how hotel amenities varied with whether areas are business or personal travel destinations. We then describe how and why quality competition for business travelers began to change during this period, and relate this to Marriott’s well-documented and novel (to the industry) use of segmentation analysis. Our main empirical propositions, which connect these events to changes in the relationship between market size and product-level industry structure, follow. Section 4 investigates the evolution of industry structure before and after the early 1980s in light of these empirical propositions and tests the alternative hypotheses described above. Section 5 investigates current patterns in the industry, and shows how the relationship between hotel size and amenities differs greatly from the early 1980s, reflecting in part the development of new business formats – limited service and all-suites hotels -- where quality is less dependent on scale. Section 6 concludes.

2. Quality Competition and Industry Structure

In this section, we outline our analytical framework. We focus on the relationship between market size and industry structure at the product level, and how this differs depending on the form of product-level quality competition. Our starting point is Sutton (1991), which also focuses on the market size-industry structure relationship.⁵

Consider first a homogeneous product industry consisting of single-product firms. Suppose firms compete in two stages: in the first, they decide whether to enter, and in the second, entering firms then

⁵ See also Shaked and Sutton (1987), Motto (1993), Berry and Waldfogel (2010), and Van Long and Miao (2020)).

compete on price. Assume, as in Sutton’s “exogenous sunk cost” case, that entering firms incur an exogenous setup cost, which one might interpret as a “ticket to admission” to the industry, or as the fixed cost of operating a technologically efficient plant. Firms must incur this fixed setup cost to enter but have no incentive to incur any additional fixed costs. These setup costs, by definition, do not affect the real or perceived quality of the good that the firm produces. Under these assumptions, as market size increases, the industry consists of more firms (and products) in equilibrium.⁶ This result holds as well in well-known models where firms produce horizontally differentiated products, such as Dixit and Stiglitz (1977), Prescott and Vischer (1977), and Salop (1979).

Now assume that these single product firms can compete on quality, as in models of vertical differentiation. First consider the case where quality competition comes in the form of fixed costs, as in Sutton’s “endogenous sunk cost” case. In this case, entering firms not only incur an exogenous setup cost, but can also choose to make fixed-cost investments that increase the real or perceived quality of their offerings. Sutton’s central result is that the standard relationship between market size and industry structure weakens or breaks down in this case: increases in market size need not lead an industry to consist of more firms and more products in equilibrium. The reason for this is that as market size increases, this increases individual firms’ incentives at the margin to increase their quality-enhancing fixed cost investments because such investments can potentially attract more customers in a larger market than in a smaller market. That is, firms have a greater incentive to compete in scale-intensive ways. However, firms’ stronger incentives to make such investments mean that their fixed costs – including both the exogenous setup costs and these endogenous investments – will be higher, and this limits the number of firms and products that can be viable in equilibrium, even when market size is arbitrarily large. Sutton shows the weakening of the relationship between market size and industry structure holds not only in the case where there is only vertical product differentiation, but also when firms and their products are also horizontally differentiated. In the latter, for example, there exist different horizontal segments, but increases in market size lead to more fixed-cost-based quality competition within each of these segments.

As Berry and Waldfogel (2010) emphasize and exploit, this result depends critically on the assumption that quality is produced through higher fixed costs, not variable costs. Consider now the case where quality is produced through higher variable costs (i.e., labor, materials). In this case, quality enhancements are not scalable across customers, so increases in market size do *not* enhance firms’ incentive to compete on quality in scale intensive ways. Similar to the “exogenous sunk cost” case discussed above,

⁶ The exception is the polar case of Bertrand competition in a homogeneous product market, in which case there is no equilibrium market structure with more than one firm (or product), even as market size becomes arbitrarily large.

increases in market size will lead to more firms and products, and in differentiated product industries, a greater variety of products.

The theoretical predictions of the relationship between market size and industry structure are sharpest in the case of single product firms. That is, predictions about the relationship between market size and the number of *products* are sharper than that between market size and the number of *firms*. There are at least two reasons for this. One is emphasized by Sutton: in a game-theoretic framework, “multiple equilibria are endemic within models of this kind,”⁷ and two identical markets could be supplied either by a small number of firms each offering many products or a large number of firms each offering one. Another, which is emphasized in Hubbard (2004), has to do with the theory of the firm and the organization of chains and is particularly important in cases like the hotel or restaurant industry where different products are different establishments with different locations. Whether a chain consists of one or many firms depends critically on how control rights are allocated between the operator of the chain, the operators of the establishments, and perhaps other entities. An industry that is concentrated in terms of chains, perhaps due to chain-level endogenous fixed costs, need not be concentrated in terms of the number of firms; chains can consist of many firms. Theoretical predictions regarding the relationship between the number of firms and market size are possible but hinge on market-specific details such as the timing of play or other strategic asymmetries (in game theoretic models) or the relationship between control rights, incentives, and value creation (in theory of the firm models).⁸ Such details are less important if one instead is concerned only with the number of products or establishments, because these details concern the mapping between products or establishments to firms, not directly the number of products or establishments.

We thus follow Berry and Waldfogel (2010) in focusing on the relationship between market size and industry structure at the product level.⁹ We examine how the relationship between market size and the size and number of hotels changes with changes in how hotels compete on quality. We exploit the principle that increases in market size increase hotel operators’ incentive to compete in scale intensive ways more when quality is produced with fixed costs than variable costs. A robust prediction of the theory is that as market size increases, the industry should adjust more in terms of the number of hotels and less in terms of the size of hotels when quality competition involves variable costs than when it involves fixed costs.

⁷ Sutton (1991), p. 40.

⁸ The boundaries of the firm issues in our context are particularly complex. While some hotels have a unique identity and are owned and operated by a single entity, others’ organization is much more complicated. For example, different entities may own a hotel’s brand, be its franchisee, manage the hotel, and own the hotel. Furthermore, it is common for individual franchisee, hotel management companies, and owners to be franchisee, managers, or owners across multiple hotel chains and for multiple hotel chains’ brands. What determines these organizational patterns is an interesting question but beyond the scope of this paper, in part because our data do not allow us to investigate it.

⁹ Throughout the rest of the paper, we mean *product-level* industry structure when we reference “industry structure.”

3. Hotels and Changes in Quality Competition in the Early 1980s

By the early 1980s, the U.S. hotel industry had largely adjusted to one important transportation-related change in the U.S. economy. The Interstate Highway System was built mostly in the 1960s and early 1970s, and had been almost entirely completed by the mid-1970s. Hotels had entered and exited the industry as these new highways were completed.¹⁰ It was beginning to adjust to a more recent change that would ultimately spur travel: the deregulation of the airline industry. While deregulation promised to increase demand at hotels in the long run, the industry was not growing during this period because of an economic recession: hotel employment was close to flat between 1980 and 1982.

Many hotels were part of chains, and some of the largest were Holiday Inn, Best Western, Quality Inn, and Sheraton. By 1982, 35% of industry revenues were accounted for by hotels that were part of chains.¹¹ Hotels within chains tended to be operated by franchisees. Most, with Best Western a prominent exception, applied a consistent though not uniform format across their properties. For example, nearly all Holiday Inns had pools and restaurants, though their architecture and size were not identical. Unlike today, few companies operated multiple chains, or had brand extensions. The most prominent example of a company operating multiple chains was Quality Inn, which first established its Comfort Inn hotels in 1981.

To provide a sense of competitive conditions in the industry during this time, we collected data from 1983 AAA TourBooks (which likely reflect data collected in 1982). Our sample includes all hotels in the continental U.S. listed in these books, except in the states of Alabama, Louisiana, and Mississippi.¹² In all, our sample includes data on 12,360 hotels, which have 1.36 million guestrooms; comparing these to 1982 Economic Census reports, these account for 35% of U.S. hotels, and 58% of U.S. guestrooms. For each hotel, we collected data on their location (e.g., city and county), the list price of a room with one bed and two persons, amenities (e.g., a restaurant, a pool), and AAA's rating of the hotel in "diamonds." This rating ranges from one to five and represents "a combination of the overall quality, range of facilities, and level of hospitality offered by a property."¹³

¹⁰ Hubbard and Mazzeo's (2019) estimates indicate that about 90% of the long-run adjustment to highway openings takes place within 8 years after highways open.

¹¹ 1982 Census of Service Industries, SC82-I-3, Hotels, Motels and Other Lodging Places. Table 4.

¹² We have not yet acquired a TourBook for these states.

¹³ See "Approval Requirements and Diamond Rating Guidelines." http://aaa.biz/approved/assets/diamond_rating_guidelines_lodging.pdf

Figure 2 shows the average price and size distribution of hotels within chains with more than 10 hotels in our AAA sample, and among hotels in this sample that are not affiliated with a chain. The grey bar in the number of rooms distribution depicts the 10th and 90th percentiles; the blue bar depicts the 25th and 75th percentile; the dark line depicts the 50th percentile. The average price across hotels in each chain is shown in parentheses. This figure shows several patterns. First, there is a strong relationship between price and hotel size, suggesting a relationship between quality and scale. Hotels in higher-priced chains tend to be larger than hotels in lower-priced chains, especially when looking across chains with an average price above \$45.00. There is considerable variation in hotel size within the higher priced chains, but the relationship between price and size shows up not only in the median, but also at the 10th and 25th percentiles as well. Second, even mid-price, medium-quality chains tended to consist of fairly large hotels. The median size of Holiday Inns and Ramada Inns in our sample is about 150 rooms. Howard Johnson's are smaller, but the average size in our sample is still 100 rooms.¹⁴ Finally, there is only one "brand extension" chain in the figure: Comfort Inn, which had only 25 hotels listed in AAA guides in 1983.

Figure 3 plots the share of hotels in major chains with a restaurant and pool, and reports the average AAA rating (number of "diamonds") among hotels in the chain that are listed in AAA TourBooks. This figure shows that most medium and high quality chains (those with an average AAA rating of at least 2.5) have hotels with both pools and restaurants. The three largest medium-quality chains – Holiday Inn, Ramada Inn, and Howard Johnson's – consist almost entirely of hotels with both restaurants and pools. Chain hotels without restaurants tend to be low-quality hotels. There are two exceptions to this -- Drury and La Quinta -- which have 22 and 100 hotels listed in the AAA guides. From Figure 2, hotels in these chains are somewhat smaller and have more uniform sizes than their larger competitors.

The descriptive evidence in Figures 2 and 3 supports the notion that hotels in this era competed on quality through scale intensive ways. To set the stage for the rest of our analysis we explore whether hotels at the time appeared to compete on quality differently for business travelers versus personal travelers. We examine geographic patterns in amenities among hotels in our AAA sample, assessing the extent to which the likelihood hotels have pools or restaurants varies with local climate and the extent to which the hotel is located in an area that tends to be a destination for business travel (as opposed to personal travel).

We obtain data on temperatures by county from the North America Land Data Assimilation System and construct average temperatures by taking the mean of the average high and low daily temperatures. Average temperatures range from about 40 to 75 degrees across our sample, and the mean is about 55

¹⁴ Best Western hotels and motels tend to be smaller; the size distribution and average price of Best Westerns are similar to the hotels in our sample that are not affiliated with chains. This likely reflects that, unlike other chains, Best Westerns were not required to have a consistent format.

degrees. We construct a measure of the share of travel to counties that is business travel using data from the 1995 American Travel Survey, which surveyed 80,000 households on the origin, destination, and purpose of trips of 100 miles or more, and programs supplied by Severin Borenstein.¹⁵ A full description of how we construct this measure is in the Appendix. This share varies predictably across states; for example, the “business travel share” tends to be low in Florida and Colorado counties, and high in Georgia and Texas counties.¹⁶ Most counties’ business travel share is between 15%-35%. Counties with large cities, and which tend to receive a high *volume* of business travel tend to be in the upper half of the distribution, but not at the very top because they also are important personal travel destinations. For example, the business travel share of New York, NY (i.e., Manhattan) is 36%. See Figure A1 in the Appendix for a map depicting the business travel share of each county in our sample.

Table 1 summarizes the results of our analysis. In the left panel, the dependent variable is a dummy variable that indicates whether the hotel has a swimming pool. In the first column, we regress this against the average temperature in the hotel’s county. As expected, the probability that a hotel in our sample has a swimming pool is higher, the warmer the temperature is. Moving from 45 to 65 degrees is associated with a 30 percentage point increase in the probability that a hotel listed in our 1983 AAA guides has a pool. The second column also includes the business travel share as an independent variable. The coefficient on this variable is small and not statistically significant. The third and fourth columns report results that include only hotels in chains and include chain fixed effects. These thus indicate the extent to which, within chains, the temperature and business travel share of the area is associated with whether individual hotels have pools. Like in the first two columns, hotels in warmer places are more likely to have pools, but whether hotels have pools is not associated with whether the business travel share is high. This suggests that, at this point in time, whether hotels had pools was related to the local climate, but not whether they were in areas that were business or personal travel destinations.

The right panel reports results from analogous regressions where the dependent variable is a dummy that indicates whether the hotel has a restaurant. The first two columns indicate that hotels are more likely to have a restaurant in warmer places, though this relationship is weaker than the relationship between temperature and pools.¹⁷ The second column indicates that hotels in business travel destinations

¹⁵ See Borenstein (2010); we thank Severin for his help with respect to these data. Using survey data from 1995 is not ideal for our purposes, either here or later in the paper. However, to our knowledge, this is the only year for which an extensive survey of intercity travel exists. These data were collected in the middle of the period we study in this paper; we assume that the measures that we construct are highly correlated with the measures that we would obtain from years earlier and later in the period that we study.

¹⁶ The county with the highest share of business travel in our sample is El Paso, TX (69%); the county with the lowest is Volusia, FL (5%).

¹⁷ A 20-degree temperature difference is only associated 10 percentage point greater likelihood of having a restaurant.

are more likely to have a restaurant than those in personal travel destinations; increasing the business travel share from 15% to 35% is associated with a 10 percentage point increase in the likelihood a hotel has a restaurant. However, both of these relationships disappear when looking only at chain affiliated hotels and including chain fixed effects. Within chains, whether a hotel has a restaurant is independent of both the local temperature and whether it is primarily a business travel destination. Thus, the relationship between whether a hotel has a restaurant and the business travel share reflects that chains whose format included a restaurant are more prevalent in business travel destinations than personal travel destinations.

In sum, this descriptive evidence indicates that in the early 1980s an important form of quality competition among hotels was in the form of scale intensive amenities that appeared out of the room, such as restaurants and pools. Importantly, such competition was at least as prevalent among hotels in business travel destinations as in personal travel destinations. There was a strong association between a hotel having a restaurant and being of high quality, and that hotels in business travel destinations were if anything slightly *more* likely to have a restaurant than those in personal travel destinations. In both types of destinations, hotels competed in a way reminiscent of Sutton's "endogenous sunk cost" case.

Much of the rest of our analysis concerns how this changed after new market research and methods led firms to change the way they competed for business travelers. We discuss this change next.

Customer Insight and Changes in Quality Competition For Business Travelers

The patterns in the previous subsection indicate that quality competition tended to be scale-intensive, including competition for business travelers, and included competition in the form of out-of-room amenities. But while it was rare for hotels to compete for business travelers primarily on the quality of their rooms (instead of out-of-room amenities) in the early 1980s, some hotels did so. As noted earlier, La Quinta was one of the rare mid-quality chain operators whose hotels did not have restaurants. This was part of the way that its hotels competed for business travelers. One account reports that:

"La Quinta's unique recipe for attracting travelers to its hotels allowed the chain to prosper during the 1970s and 1980s. La Quinta Inns were designed for male business travelers, especially those employed in sales jobs. Rather than striving to entertain guests, as [CEO] Sam Barshop believed many of his competitors were trying to do, La Quinta simply provided its patrons with clean, comfortable rooms at low prices. Visitors enjoyed comparatively large rooms with large beds and ample space to work. The Barshops were able to undercut competing hoteliers, such as Holiday Inn and Rodeway, by eschewing

such amenities as swimming pools, elaborate lounges, and restaurants that were of negligible interest to bustling businessmen.”¹⁸

Competing in this way was thus neither a new idea nor required a new technology. However, competition along these lines increased greatly after other hotel operators, including especially Marriott, began to realize that they were competing on inefficient dimensions for many business travelers.

Early in the 1980s, Marriott operated a chain of large, higher-end full-service hotels that typically had 300-500 rooms. It was concerned, however, that its hotels were not attractive to some segments of travelers, including business travelers seeking medium-quality hotels, and considered developing a new chain that could better serve these customers.¹⁹ Its executives became aware of how segmentation analysis being developed in academic research in marketing was beginning to be applied in various consumer product contexts, and hired two prominent marketing professors (Jerry Wind and Paul Green from Wharton) to conduct customer surveys and apply such an analysis toward informing the features and pricing of hotels in this new chain.

The results of this analysis were a surprise to Marriott executives, who thought that hotels in the new chain would simply be smaller versions of existing Marriott hotels.²⁰ The results indicated that some out-of-room amenities that many hotels offered were not valued by business travelers and as a result certain features, which were “often provided based on traditional hotel management beliefs were not retained [in the new chain], for example, an ‘action’ lounge, a more upscale restaurant and room service, and more meeting space.”²¹ Based on this survey, Marriott also decided that the new chain would not offer several typical out-of-room services such as bellmen or concierges.²² Instead, hotels in the new chain (Courtyard by Marriott) emphasized features of the room itself. The rooms were somewhat larger than standard rooms, with room for a large desk and sofa, and had nicer décor and larger bathtubs than mid-range competitors’ rooms had. These hotels did have pools and restaurants, but the pools were mainly functional and did not have slides or diving boards, and the restaurants were small and offered only a limited menu – in part because Marriott’s customer survey indicated that the business travelers they were targeting valued having a good restaurant nearby, but not necessarily in the hotel itself.

¹⁸ International Directory of Company Histories, Vol. 11. St. James Press, 1995. Also available on <http://www.fundinguniverse.com/company-histories/la-quinta-inns-inc-history/>.

¹⁹ Much of this and the following paragraphs are based on Wind, et al. (1989), which provides an account of Marriott’s early use of conjoint analysis to develop Courtyard by Marriott. We thank Jerry Wind and Lee Pillsbury, an executive at Marriott who helped catalyze this analysis and Courtyard’s launch, for several valuable discussions. See also Goldberg, et. al. (1984), which describes and publishes results from this conjoint analysis.

²⁰ Wind, et al, p. 39.

²¹ Wind, et al, p. 39.

²² They also offered customers the ability to check out without stopping at the front desk, by issuing a bill under the customer’s door.

Wind, et al. report that hotels in the new chain were not only successful, but their innovative format was imitated by competitors: “The success of the effort has caused a restructuring of the midprice level of the lodging industry...[a]t least five new *Courtyard by Marriott* clone chains have been initiated by other hotel groups. They all offer a high-end hotel room at a midlevel price.”²³ Changes in how Marriott competed on quality at the individual hotel level led to changes in how other hotel operators did as well. Along with La Quinta and Marriott’s followers, these changes led to the “limited services” segment of the hotel industry.²⁴

We treat Marriott’s insight as an innovation: a form of an information shock. This innovation was highly visible and changed how hotel operators competed, orienting them toward competing more for business travelers on in-room amenities and away from competing on out-of-room amenities.²⁵ In terms of the economics, it changed the form of the investments that firms made to vertically differentiate their hotels in the eyes of business travelers. The cost of supplying out-of-room amenities such as restaurants and pools has an element that is fixed in the sense that it does not vary with the size of the hotel, and can be scaled across many customers at once. In contrast, the cost of supplying in-room amenities, including simply a larger room, varies directly with the number of rooms. Quality competition for business travelers thus increasingly came in the form of variable costs, and less in the form of fixed costs.²⁶

Drawing from the theory summarized in Section 2, one would expect such a change in the form of quality competition to affect the relationship between market size and product-level industry structure.²⁷ First, the industry should evolve differently starting in the early 1980s than it did before the early 1980s.

²³ Wind, et al, p. 40.

²⁴ Later, this in turn led to the emergence of an all-suites segment, where even fewer amenities were “out-of-room” and quality competition was almost exclusively on the rooms themselves.

²⁵ For example, see By (1985), Wysocki (1989), Hotel & Motel Management (1995), Koss-Feder (1996a, 1996b).

²⁶ Consistent with the analytical framework presented earlier, we define variable costs as *long-run* variable costs. In the short run, the costs associated with rooms, restaurants, and other hotel infrastructure are fixed, because a hotel that chooses to sell fewer room-nights does not avoid these costs. However, in the long run, a firm that wishes to sell fewer room-nights can choose to build fewer rooms and avoid the costs associated with the incremental floor space, amenities, and fixtures associated with additional rooms. This interpretation of capacity as a long-run variable cost is consistent with a model of Cournot competition where any costs associated with producing additional quantity are variable costs. Interpreting Cournot competition as the result of a two-stage game where firms first choose capacities, then compete on price conditional on these capacities indicates that any costs associated with increasing capacity would be long run variable costs even if they are fixed at the time of pricing decisions.

²⁷ How firm-level measures of concentration in the hotel industry would be expected to change following this information shock is less clear, because as discussed above the theory is less clear about firm level concentration when there are multi-product firms (e.g., a firm owning multiple hotels). How things have played out empirically in the hotel industry is also unclear. On one hand, Leisten (2019) reports that major hotel chains divested their hotel properties during this period, and now own a very small share of the hotels that are part of their chains. On the other hand, as Kalnins (2006) reports, the largest hotel operators now include large franchisee and hotel management companies that sometimes operate hotels across different chains, and it may have become more common for such firms to operate multiple hotels in the same geographic market during our sample period.

Starting then, it should adjust to increases in market size more in the form of more hotels, and less in the form of larger hotels, than it did before then. Second, this should be particularly the case in regions that tend to be business travel destinations, and not as much in areas that tend to be personal travel destinations.²⁸

We test these propositions empirically in the following section, where we exploit geographic variation in the share of long-distance travel, and thus hotel demand, that is business related. If the propositions above are true, the industry should evolve differently in different areas because the “shock” should change how firms compete more in areas where the business travel share is higher.

4. The Evolution of Industry Structure

This section examines empirically the evolution of hotel employment, number of hotels, and employment per hotel in the U.S. since the mid-1970s, and tests whether that evolution differed in business versus personal travel destinations in the U.S. starting in the early 1980s. The empirical patterns we uncover provide evidence on how the industry adjusted to increases in market size, particularly in the long run, and whether and how this changed in the early 1980s following the information shock. We focus in particular on the degree to which increases in hotel employment are accounted for by changes in employment per hotel versus the number of hotels, whether this changed at that time, and how it has differed since then in business and personal travel destinations. We also conduct an analogous analysis that examines the degree to which increases in the number of hotel rooms are accounted for by rooms per hotel versus the number of hotels, though this part of the analysis is based on less detailed data and over a shorter time period.

Our main analysis in this section relies on the Bureau of the Census’ County Business Patterns (CBP) data. Our sample years include 1974-2015.²⁹ Our series come from SIC Code 7010 (Hotels and Motels) from 1974-1994, and NAICS Code 72110 (Hotels (Except Casino Hotels) and Motels) from 1995-2015.³⁰ CBP provides county-level annual data on the number of hotels overall, and the number of hotels

²⁸ Marriott and other hotel firms also began to introduce loyalty programs around this time. To the extent such programs affected competition by creating new product differentiation, one would expect them to have such effects in business and personal travel destinations, because enrollees who travel for business also travel for personal reasons (i.e., being in a loyalty program would affect their preferences not only when traveling to Atlanta during the week, but also when traveling to Florida on vacation).

²⁹ Starting in 1974, CBP reported the number of hotels in a county. Before then, it reported the number of firms operating hotels in a county, and thus a firm that operated two hotels was counted once rather than twice. Starting in 1974 provides us with a consistent measure.

³⁰ Casino hotels are only tracked separately after the movement to NAICS codes in 1995. We drop counties in Nevada, the Atlantic City-Cape May, NJ MSA, and the Shreveport-Bossier City, LA MSA, counties where casino hotels were prevalent before the mid-1990s, so that our sample does not include the vast majority of casino hotels throughout our time period.

within various employment size categories (e.g., 1-4 employees, 5-9 employees, and so on). These data are available in all years for all counties. CBP also reports hotel employment by county. However, when there are a small number of hotels in a county, the Census does not publish the total number of employees to prevent disclosure of individual hotel information. For these counties and years, we estimate the number of hotel employees in the county by multiplying the number of hotels in each employment size bin by its midpoint and taking the sum.³¹ Our final sample includes 3087 counties for 42 years.³²

We begin by showing the evolution of hotel employment, the number of hotels, and employees/hotel in the United States, and how this evolution has differed in business versus personal travel destinations, using annual data. The left panel of Figure 4 shows these variables between 1974 and 2015, the time period that is the focus of our analysis. The top chart shows that hotel employment increased steadily during this period. The bottom two charts, like Figure 1, show that the number of hotels decreased between the mid-1970s and the early 1980s, then has steadily increased ever since then; in contrast, the average employment size of hotels increased until around 1990 but has been roughly constant at 35 employees/hotel ever since. Thus, increases in hotel employment are accounted for by increases in average hotel size early in our sample period, but increases in the number of hotels later in our sample period.

These national trends hide significant differences in how the industry has evolved in different areas of the country, in particular between areas that are mainly business travel versus personal travel destinations. We depict this in the right side of Figure 4. In these charts, and those that follow, we define a “business travel county” as a county that has a business travel share that is in the highest quartile among United States counties, and a “personal travel county” as a county that has a business travel share that is in the lowest quartile among United States counties. In these charts, we normalize each quantity to their 1974 levels, so that we focus on changes over time. These charts show several important facts.

First, up until the early 1980s, all three of these variables evolved very similarly in business and personal travel counties. However, after the early 1980s, these series diverged. The top chart shows that hotel employment increased more in personal travel counties than in business travel counties. By 2015, hotel employment was three times 1984 levels in personal travel counties, but only twice 1984 levels in business travel counties. The middle chart shows that even though hotel employment expanded by more in personal travel counties, the number of hotels did not: the increase in the number of hotels was greater in business travel counties, especially after 2000.

³¹ For the largest employment size bin, hotels with 1000+ employees, we use 1000 employees.

³² 89% of our county-years have a positive number of hotels, and in 50% of our county-years there are at least five hotels.

The bottom chart shows a striking pattern. After tracking each other closely through the early 1980s, the average employment size of hotels continued to increase in personal travel counties, but flattened out and then decreased in business travel counties. By 2015, the average employment size of hotels in business travel counties was about 25% smaller than it was at its 1990 peak. The fact that the average number of employees/hotel – as depicted in the left panel – has been roughly constant since 1990 masks very different trends in counties that are business and personal travel destinations.

These trends provide broad support for the hypotheses described above. On average, industry structure has evolved differently since the early 1980s than before then. Furthermore, the evolution of industry structure in business travel and personal travel destinations differed since the early 1980s, after having evolved similarly before then. In the former, increases in hotel employment are accounted for entirely by increases in the number of hotels and not increases in hotel size; in fact, average hotel size decreased in the long run. In the latter, increases in hotel employment are accounted for primarily with increases in average hotel size, and not as much by increases in the number of hotels.

Figure 5 shows the evolution of the number of hotels in different employment size bins, and how this differed in business and personal travel counties. The left panel shows that, among these size bins, the increase in the number of hotels was greatest among those between 10-19 and 20-49 employees; for each of these bins, there were about 10,000 more hotels in 2015 than 1974. The right panel shows that changes in these numbers were greater in business travel counties than in personal travel counties. In contrast, there were smaller increases in the number of larger and smaller hotels, and less of a difference in the changes between business and personal travel counties for these other size bins.^{33, 34}

Long Difference Regression Results

We next utilize a series of regressions to assess these long-run relationships more formally. To emphasize the contrasting trends in industry structure that occurred before and after the customer insight “shock” in the early 1980s, we conduct our long difference regressions on two separate parts of our sample: the period prior to the shock, 1974 to 1982; and the period following the shock, 1982 to 2015.³⁵ We present

³³ The main exception to this is the greater decrease in the number of hotels with 1-4 employees in personal travel counties after the mid-1990s.

³⁴ As we discuss further below, the County Business Patterns data describes hotel size in terms of employment rather than the more natural measure of hotel size, the number of rooms. However, the Economic Census, which is conducted every five years, asks hotels their size in terms of number of rooms and publishes estimates of the distribution of hotels in the United States by room size categories. In the Appendix, we compare the size distributions in terms of employment (CBP) and room size (EC) for the United States in 2012 to get a sense of how the two correspond. We estimate that hotels with 10-19 employees tend to have 60-100 rooms, while hotels with 20-49 employees tend to have 100-250 rooms. Thus, the expansion in the number of hotels in our sample period is largely accounted for by increases in these two room size categories.

³⁵ By segmenting the sample in this way, this set of results implements a difference-in-difference-in-differences research design with a continuous treatment (i.e., intensity of business travel). Furthermore, our findings

the regression results for both periods in Table 2. In each regression, the unit of observation is the county. We use changes in the (natural) logs of hotel employment, the number of hotels, and employees per hotel between these two years as our dependent variables. The latter two variables are a decomposition of the first. Our independent variables are the county's business travel share and its average temperature.³⁶ We use de-meaned versions of our independent variables; thus, the constant in this and our other regressions represents changes in the dependent variable for a county with an average business travel share and temperature.

The results for the 1974-1982 period are reported in the left panel. The results in the first column indicate that, on average, hotel employment grew during this period, but this growth was smaller in areas with a greater business travel share. The results in the second column show that, on average, the number of hotels declined during the 1974-1982 period, and there was no difference in this decline between counties with a high and low business travel share. The results in the third column together with our estimates of the change in $\ln(\text{employment}/\text{establishment})$ at different points in the distribution of business travel share indicate that not only on average—but also at most points in the distribution of business travel share -- there was a large increase in hotel size, which was somewhat greater where the business travel share was lower. Thus, these results provide evidence that increases in market size during this time were met entirely by increases in hotel size, not increases in the number of hotels, and that this was true irrespective of the county's business travel share.

The results for the 1982-2015 period, the period after the customer insight “shock” that changed the way hotels competed—especially for business travelers, are reported in the right panel. The coefficient estimates in the first column (of the panel) indicate that, like in the earlier period, hotel employment grew on average, and grew more in counties where the business travel share was lower. However, the coefficient estimates in the rest of the table indicate very different patterns than in the 1974-1982 regressions. In the second column, the estimate on the constant is large and positive, not negative: on average, the number of hotels increased during this period. Furthermore, the positive and significant estimate on the business travel share coefficient indicates that this increase was larger for counties with high business travel shares than those with low business travel shares. In the third column, the estimate of the business travel share

of the evolution of the industry structure in the 1974 to 1982 period (e.g., see Table 2), provides support for the “parallel trends” assumption required of this research design.

³⁶ We include average temperature to control for climate-related differences in the returns to outdoor amenities. Hubbard and Mazzeo (2019) show that in the 1960s-early 1980s, increases in demand related to the opening of interstate highways had different implications for the number and size of hotels in cold and warm places, and attribute this to differences in the returns to investments in outdoor amenities such as swimming pools. Including average temperature as a control here allows us to compare the evolution of the industry in business and personal travel destinations with similar climates, and thus where climate-related differences in firms' competitive incentives are minimal. However, our results are similar when do not include temperature as a control.

coefficient is negative and significant, indicating that the increase in average hotel size (denoted by the positive and significant estimate of the constant) is smaller, the higher the county's business travel share.

Table 3 summarizes our estimates of the change in the log of hotel employment, and how these changes are accounted for by changes in the number and size of hotels, in these two periods. In the early period, the increase in employment varied moderately across counties with their business travel share, and the increase is (more than) accounted for entirely by increases in hotel size irrespective of the business travel share. In contrast, after 1982, the increase in employment is primarily accounted for by increases in the number of hotels – even in counties that tend not to be business destinations – but the extent to which it is accounted for by increases in the number of hotels is much greater, the greater the county's business travel share.³⁷

These regressions provide statistical evidence consistent with the hypothesis that changes in how hotels competed in the early 1980s led to changes in how the industry adjusted to increases in market size. Consistent with the propositions described at the end of the previous section, it adjusted very differently in business travel destinations than personal travel destinations starting in the early 1980s. Increases in hotel employment are accounted for more by more hotels, and less by larger hotels, the greater a destination's "business travel share." In contrast, before the early 1980s, increases in hotel employment are accounted for entirely by larger hotels, and not by more hotels, and this was true irrespective of whether an area was a business or personal travel destination.

We next turn to long difference estimates of changes in the number of hotels in different size bins. This allows us to examine changes in terms of hotel size distributions, and later to connect them to other evidence on the current characteristics of different sized hotels.

Table 4 reports the results from long difference regressions from our later period where the dependent variable is the change in the number of hotels in the employment size bins reported in the CBP data. The positive and significant estimates of all of the constants indicate that, for the average county, the number of hotels in each of these size bins increased.³⁸ The increase was greatest for 10-19 and 20-49 employee hotels (which correspond roughly to 60-100 and 100-250 room hotels, as noted above). The coefficient on business travel share is positive and significant for several of the regressions examining size

³⁷ The fact that a greater share of the increases in hotel employment in personal travel destinations are accounted for by an increase in the number of hotels after 1982 than before 1982 is evidence that while quality competition remained scale intensive in this segment, it was less scale intensive than in the previous period. This potentially reflects that horizontal differentiation within this segment diminished firms' incentives to compete in this way, even though they diminished much more in business travel segments.

³⁸ Note that our regressions weight observations by hotel employment in the county. Thus, the average county is defined by where the average employee works. Here, the average county, weighted by employment, is approximately the size of Marion County, IN, the county containing the city of Indianapolis, IN.

categories with fewer than 100 employees, and is negative and significant for the two categories with 500 or more employees. In counties where the business travel share is higher, there was a greater increase in the number of smaller hotels, but a smaller increase in the number of very large hotels.

Figure 6 depicts these results in two charts. The top one shows our estimates of the increases in the number of hotels by employment size category for counties with business travel shares 10 percentage points above and below the average. This shows that while the number of hotels with 10-19 and 20-49 employees (or, roughly 60-100 and 100-250 rooms) increased in both business and personal travel destinations, the increase was greater in business travel destinations. The bottom chart is analogous, but weights the estimates by the midpoint of the employment size categories (using 1000 employees for our top category). It thus depicts our results in terms of changes in the distribution of hotel employment across employment size bins rather than changes in the distribution of hotels across these bins. Doing so allows one to see more clearly the effect of the estimated increases in the number of large hotels and how they differ with the business travel share. In particular, the estimates imply large increases in the number of employees working at very large hotels in personal travel destinations, but not business travel destinations. In contrast, the opposite is true when looking at smaller hotels. Changes in the size distribution of hotels between 1982-2015 took place at different points in the distribution, depending on the extent to which hotels tended to serve business versus personal travelers.

Evidence From State-Level Data on Hotels' Room Size

A shortcoming of the County Business Patterns data is that it describes hotel size in terms of employment rather than the more natural measure of hotel size, the number of rooms. This measurement issue might affect our analysis to the extent that hotels competing on different dimensions of quality (e.g., in-room vs. out-of-room) utilize labor differently. For instance, if as hotels in business travel areas became less likely to have restaurants, this led them to have fewer employees per room, then employment per hotel would decline but rooms per hotel need not. Our results above therefore need not reflect differential trends in hotels' room size.

We investigate this alternative interpretation by leveraging state-level data on the number of guestrooms published as part of the Economic Census. The Economic Census, which is conducted every five years, has published such estimates since 1987. These data are more limited than what we use above because they cover a shorter time period and are far more aggregated, which attenuates the geographical variation in the business travel share. However, they allow us to analyze whether the post-1982 patterns we uncover when looking at the employment size of hotels appear as well when looking at the room size of hotels.

Table 5 reports the results using this alternative measure of hotel size. We run state-level regressions where the dependent variables are the changes (in logs) in the number of guestrooms, the

number of rooms per hotel, and the number of hotels between 1987 and 2012. For consistency with our previous analysis, we drop Nevada and New Jersey to focus on non-casino hotels.³⁹ The independent variables are business travel share and temperature, measured at the state rather than county level.

The results in the first column indicate that in these data, there is no statistically significant relationship between the change in the number of guestrooms in the state and the business travel share. The results in the next two columns indicate that, consistent with the employment-based evidence, the industry adjusted differently to increases in market size in personal versus business travel destinations. The positive and significant coefficient on business travel share in the number of hotels regression, and the negative and significant coefficient in the rooms per hotel regression, provides evidence consistent with the hypothesis that the industry adjusted to market size increases differently in different areas: with more, but smaller, hotels in business travel destinations than personal travel destinations. Incorporating state-level information on the number of rooms indicates that our evidence from post-1982 decompositions of changes in hotel employment is similar to decompositions of changes in the number of rooms, and thus that it is unlikely that the former reflect only systematic changes in factor intensity (e.g., employment) between business and personal travel locations.

Variation in Setup Costs as an Alternative Explanation

The previous subsections establish the following patterns. First, in the run-up to the early 1980s, there was little or no systematic difference in how the industry adjusted to increases in market size in business and personal travel destinations. Second, starting in the early 1980s, the industry evolved very differently than in the previous period: increases in market size were met more by increases in the number of hotels, and less by increases in hotel size, than in the previous period. Third, this change is more pronounced in areas that are business travel destinations than personal travel destinations. Combined with documentary evidence from the early 1980s that new insights on what business travelers valued in hotels began to change how hotels competed at the time, we hypothesize that these changes in the evolution of industry structure reflect changes in how hotels competed on quality.

However, as we discuss in Section 2, the relationships we observe alternatively could reflect other changes: most importantly, changes in setup costs. If hotels' setup costs (the "exogenous" fixed costs in Sutton's and others' models) decreased in business travel destinations relative to personal travel destinations, starting in the early 1980s, then one could observe the three patterns described above, even if the nature of quality competition did not change and/or did not differ between business and personal travel destinations.

³⁹ A handful of other (mostly small) states also are dropped because they have missing values for the number of guestrooms in 2012 for disclosure-related reasons.

Part of a hotel's setup costs reflects the cost of land. All else equal, if land costs are higher, one would expect to observe larger hotels that utilize land more intensively (for example, by having multiple stories). If land costs decreased in business travel destinations relative to personal travel destinations between the early 1980s and mid-2010s, then one could observe the patterns we describe above even if quality competition had no impact on the relationship between market size and industry structure during this time.⁴⁰

We first investigate this alternative hypothesis by adding to our specifications a control for changes in local land value. We collected the U.S. Housing and Urban Development (HUD)'s county- and metro-level estimates for the fair market rent (FMR) of a two-bedroom apartment in 1983 and 2015, and included the (log) change in these estimates between these two years as an additional control variable. Although this variable captures the changes in land value that are most relevant for our analysis imperfectly – for example, such changes reflect changes in the value of land used for residential housing, not commercial properties such as hotels – cross-sectional variation and time series relationships suggest that it is correlated with the fixed costs hotel operators face. It is highest in regions such as San Francisco and Honolulu, lowest in regions such as western Tennessee and eastern Kentucky, and increased the most between the early 1980s and the mid-2010s in areas around the Washington, D.C. metro area and the least in parts of North Dakota. Furthermore, there is a strong cross-sectional relationship between this measure and average hotel size; on average, hotels are larger in counties where this measure is greater.

Table 6 shows our results, which have two important features. First, the coefficients of interest on the business travel share in each of these regressions are almost identical to those in Table 2 – including the fair market rent variable does not change our main results, and if anything, makes them stronger. Second, the coefficients associated with this variable are statistically significant, and have the patterns that one would expect if it captured changes in fixed costs well. In areas where increases in this measure are greater, there is a greater increase in the size of hotels and a smaller increase in the number of hotels: where setup costs increased more, one saw fewer, but larger hotels. We conclude that it is unlikely that our results above reflect county-level differences in changes in land value during our sample period.

A second, related, alternative hypothesis has to do with within-county differences in setup costs, and changes in the locations of hotels within counties. Land costs are not uniform within counties, and one well-known phenomenon in the hotel industry during our sample period is that it became increasingly common for hotels to be located in suburbs, and less common for hotels to be located in urban areas. If

⁴⁰ This alternative explanation would not explain the significant reduction in the likelihood of hotels in business travel areas to have restaurants (since the 1980s), nor explain the advent of an entirely new limited service all-suite format which were more likely to be opened in business travel areas. We present both of these empirical results in the next section.

business travelers' tastes shifted, starting in the early 1980s, from staying downtown to staying in the suburbs, and setup costs are lower in the suburbs than downtown because land is cheaper, then one would expect the industry to evolve in the ways that we have documented, even if the way that hotels compete in both the downtown or suburban segments was unchanged. Our results would simply reflect a change in the composition of hotels across two geographic segments within which competition did not change.

Our County Business Patterns data are not well-suited to investigate this alternative hypothesis, because many counties include both a city and its suburbs. We therefore introduce another dataset into our analysis, the 2014 Smith Travel Research ("STR") U.S. Hotel Census database. This database contains information on the location, room size, and some amenities for a very high percentage of hotels in the U.S. Although these data are a cross-section, they have several features that allow us to use them to examine this alternative hypothesis. First, they indicate where hotels are located within counties, and in fact, include a "location type" variable that indicates whether individual hotels are located in an urban or non-urban area.⁴¹ Second, these data report individual hotels' vintage: the year each hotel was originally constructed. We exploit these features by examining how hotels' size varies with their vintage within urban and non-urban areas, comparing in particular hotels built in the period before and after the early 1980s. If changes in the composition of hotels between urban and non-urban locations – suburbanization effects – explain our results, then one would not expect hotel size to differ between these periods when looking only at hotels in urban (or non-urban) locations. Finding instead that, within these location types, hotels built after the early 1980s were smaller than those built before then suggests that our main results are not merely due to compositional effects.⁴² Finding in addition that this is particularly true when looking at areas that are business travel destinations provides additional evidence that our main results reflect changes in how firms competed on quality for business travelers.

In Figure 7, we depict the average room size of hotels of different vintages in 2014 among hotels in STR-defined urban and non-urban locations. We distinguish among ten approximately equally balanced vintages. The black line shows that, among hotels in operation in 2014, those built in urban locations during the 1970s and early 1980s are much larger on average than hotels built either before the 1970s or after the

⁴¹ STR defines an "urban" location as a "[d]ensely populated location in a large metropolitan area." For example, in Cook County, IL the distinction between urban and non-urban corresponds closely to whether the hotel has a Chicago, IL address; in Los Angeles, locations near downtown are considered "urban" while hotels in other Los Angeles neighborhoods (e.g., in Brentwood or west Los Angeles) are not. STR has several other location types, including "suburban," "airport," "interstate," "small metro/town," and "resort." Distinctions among these types appear to be more subjective. Though we exploit the "suburban" distinction below, we report them collectively as "non-urban" here.

⁴²As we discuss below, differences in the average size across vintages could potentially reflect differential exit rates rather than differences in the average size of hotels at the time they were built. We provide evidence below that this is not likely to be the case.

early 1980s. Those built in the 1970s and early 1980s have a bit more than 200 rooms on average; those built since then have about 160 rooms on average. The red line shows an analogous, but much less pronounced pattern, for other locations. Hotels built in these areas in the 1970s or early 1980s have roughly 105 rooms on average, whereas those built after the early 1980s have about 85 rooms on average. The differences between average room sizes between 1970s and early 1980s vintage bins and those of each of the more recent vintage bins are statistically significant, and are much larger when looking within urban locations than non-urban locations.

Figure 8 is analogous, but comes from regression results where we include county fixed effects; these results therefore reflect within-county differences among hotels of different vintages and locations. The patterns are similar. They indicate that within counties, hotels located in urban locations that were built since 1985 are about 80 rooms smaller than those that were built in the 1970s and early 1980s; those in non-urban locations that were built since 1985 are about 15-20 rooms smaller than in the previous period.

Figures 9 and 10 look only at business travel areas and personal travel areas, respectively.⁴³ These figures show that the patterns in Figure 8 are more pronounced when looking at business travel destinations. In urban locations in business travel destinations, hotels built in the 1970s and early 1980s are more than 100 rooms larger than those that were built more recently. Looking at hotels in non-urban locations in business travel destinations, the difference is about 30 rooms. Figure 11 shows that these patterns are muted when looking at personal travel destinations. Looking at urban locations, the difference in size between hotels built before the mid-1980s and more recently is much smaller (and, in fact, not statistically significant). In non-urban locations, there is little relationship between vintage and room size.

The fact that hotels in the 2014 STR sample that were built after the early 1980s were smaller than those that were built earlier need not reflect that the average size of newly-built hotels decreased during this period; in principle, they could instead reflect differences in exit rates (or, “differential attrition”). If 1970s-early 1980s hotels that exited the industry between then and now were systematically smaller than more recently-built hotels that did so, then the patterns that we observe in Figures 7-10 would reflect differential exit rates rather than differences in the average room sizes at the time hotels were built. We examine this possibility in the Appendix by exploiting data from the U.S. Bureau of the Census’ Economic Census that provide evidence on patterns in the average room size of hotels entering during Census years (i.e., every five years). We find that the patterns in these data, which reflect all hotels entering in these years, are similar to average room size patterns in our STR data, which only reflect hotels still in operation in 2014. We conclude from this that the results in Figures 7-10 are not likely to be driven by differential attrition patterns.

⁴³ We show here only the results which control for county; the patterns in the raw means are similar.

Combined, we conclude that the evidence from our main long difference regressions in the previous subsection does not reflect alternative hypotheses related to systematic differences in setup costs. Our evidence indicates that setup costs do affect industry structure, but we do not find that they explain our main results involving the influence of the form of quality competition.

Two other facts provide additional support for this conclusion. First, the suburbanization of hotels likely started well before the early 1980s and was gradual rather than a sudden change. Figure A2 in the Appendix shows the 2014 within-vintage room shares of hotels in STR-defined suburban locations. If there was a sudden shift in tastes for suburban hotels starting in the early 1980s, one would expect to observe the share of hotels in suburban locations to be steady in earlier periods, but jump in the early 1980s. This is not what one observes in this figure. There is a steady increase in this share between throughout the 1960s-1980s, but not a jump in the early 1980s. Second, the suburbanization of hotels does not appear to be confined to business travel destinations. We examined this by looking at whether setup costs were more dispersed within counties that are business travel destinations than personal travel destinations, using zip-code level HUD FMR data. We computed the within-county coefficient of variation of HUD FMRs in each county (in 2014), weighting zip codes by the number of hotels in our STR sample. We then examined whether the coefficient of variation varies with the business travel share and found no such relationship.⁴⁴ Although hotels became increasingly located in the suburbs, this phenomenon appears to have been gradual and independent of whether areas were business or personal travel destinations. In contrast, our main results show that how the industry adjusted to increases in market size changed suddenly in the early 1980s, and especially business travel destinations.

5. Hotels and Quality Competition in the 2010s

We close our analysis by considering hotel-level data from late in our sample period to show the consequences of changes in how hotels have competed, in particular on the types of amenities offered at the hotel. We establish four facts. First, the relationship between a hotel's price (or quality) and size is not as sharp as it was forty-odd years ago; today, there are far more medium-to-high quality hotels that do not have hundreds of rooms than there were then. Second, it is common for a medium-to-high quality hotel to not have a restaurant; La Quinta was an exception four decades ago, but this is no longer the case. Third, it is no longer the case that hotels are more likely to have restaurants in areas where the business travel

⁴⁴ The estimated coefficient from a regression of the coefficient of variation of zip code level fair market rent (FMR) within a county on the business travel share of that county is -0.003 with a standard error of 0.025.

share is higher. Fourth, there is a strong, positive relationship between the business travel share in an area and whether a hotel in the area is an “all-suites” hotel – a format which, with one notable exception (Embassy Suites), rarely has an accompanying restaurant. Along with the descriptive evidence in Section 3 from early 1980s AAA Guidebooks, these facts bookend our long-difference regressions by showing where the industry landed in terms of hotel-level amenities in the mid-2010s.

Our analysis in this section uses the 2014 STR database described in the previous section, which includes information on hotel amenities (e.g., whether it has a restaurant, whether it is an all-suites hotel).⁴⁵ The data also include the upper and lower price range for a daily rate for a room with two double beds; we use the midpoint as the hotel’s price. Finally, the STR classifies hotel chains into six bins according to their quality, from Luxury to Economy.⁴⁶ For consistency with the rest of our analysis, we include only hotels in the continental United States, and drop all hotels with casinos. Our final sample includes 52,167 hotels; for comparison, the 2012 Economic Census reports there were 49,543 non-casino hotels in the United States.

Figure 11 shows the average price and size distribution within chains with at least 100 hotels in our STR sample, and among hotels in this sample that were categorized by STR as independent. This figure reveals several differences from what we observed in Figure 2’s summary of the 1982 data. First, while there remains an association between price and hotel size, it is weaker now than it was then. Hotels in low-price chains tend to be small, but it is not unusual for hotels in medium-high priced chains to be smaller than lower-priced competitors. For example, Homewood Suites (a Hilton brand extension), Springhill Suites (a Marriott brand extension), Staybridge Suites (an Intercontinental Hotels Group brand), Residence Inn (a Marriott brand extension), and Hyatt House (a Hyatt brand extension) all consist of all-suites hotels that are substantially smaller than Radissons, Crowne Plazas, DoubleTrees, or even Holiday Inns. The figure also shows Holiday Inn Express, Fairfield Inn, Hampton Inn, and other large limited service hotel chains that did not exist in the early 1980s, all of which typically consist of hotels with fewer than 100 rooms.

Figure 12 depicts major chains according to the share of their hotels that have a restaurant and the share that are all-suites. We label the largest of these chains and include their STR rating in parentheses. Unlike in 1982, it is now common for a medium-high quality hotel not to have a restaurant. Several of these are the all-suites hotels in the lower right part of the chart, but others in the lower left of the chart,

⁴⁵ The timing of these data means that our analysis examines the industry at a point where it was unlikely that AirBnB was having any important economic impact as the industry’s “competitive fringe.” The STR data do not have an indicator for whether the hotel has a pool.

⁴⁶We assign a rating to each of these classifications that, like AAA ratings, ranges from one to five: Luxury=5, Upper Upscale=4.5, Upscale=4, Upper Midscale=3, Midscale=2, and Economy=1. We use this below when we depict these chains’ amenities.

including Hampton Inn and Holiday Inn Express, are limited services hotels that, like all-suites hotels, also compete primarily on what is inside the room rather than what is outside of the room.

We also note in passing Embassy Suites, which in some ways is the exception that proves the rule. Unlike all of the other all-suites chains, Embassy Suites hotels almost always have a restaurant. They are also far larger than any of the other all-suites chains: the median Embassy Suites has nearly 240 rooms, which is more than double that of nearly all of the other all-suites chains in our data. This suggests that it is not the all-suites format *per se* that is leading quality competition to become less scale-intensive, but rather the fact that hotels with all-suites tend not to also compete on scale-intensive, outside-of-the-room amenities. If more business travelers placed a significant premium on both outside-of-the-room amenities and suites, quality competition, and how industry structure evolved over time, would likely have been different.⁴⁷

Table 7 provides additional evidence, depicting the share of hotels with a restaurant, by quality rating, in our 1982 AAA sample and our 2014 STR data. This table shows that this share is similar at the top and bottom of the quality distribution. Few low-quality hotels (one-diamond AAA hotels and “Economy” STR hotels) had restaurants in both years, and most high-quality (four- or five-diamond AAA hotels and “Upper Upscale” or “Luxury” STR hotels) had restaurants in both years. There is a large difference, however, in the middle of the quality distribution. Hotels in the other two STR categories were about half as likely to have restaurants in 2014 as hotels in the other two AAA categories did in 1982, consistent with the form of quality competition shifting away from out-of-room amenities for medium to medium-high quality hotels during this time.

Finally, Table 8 reports results from hotel-level regressions that relate whether a hotel has a restaurant or has all suites to the local climate and the business travel share. In the first specification, we regress whether the hotel has a restaurant on average county level temperature. The regression coefficient of -0.002 is not only statistically significant but has the opposite sign from that in our earlier analysis of 1982 data. Then, it was more common for a hotel in a warmer place to have a restaurant; now, it is less common. Moving from 45 to 65 degrees is associated with a 4 percentage point decline (off an average of 22 percent) in the likelihood a hotel has a restaurant. The second column also includes the business travel share as an independent variable. The coefficient on this variable is small and not statistically significant. In 1982, hotels were more likely to have a restaurant if they were located in a county where the business travel share was high. In 2014, this was no longer true.

⁴⁷ Business travelers who value both, of course, are well-served by hotels that have suites as well as standard rooms, along with out-of-room amenities – hotels such as Marriotts and Westins that are in the upper left of this figure.

The right panel reports results from a similar set of regressions where the dependent variable is a dummy that indicates whether the hotel is an all-suites hotel. The first two columns indicate that hotels are more likely to have an all-suites format in warmer places, though this effect is still weak compared to the effects we found for temperature and pools in the 1980s. The second specification of this panel indicates that hotels in business travel destinations are much more likely to adopt the all-suites format. In particular, increasing the business travel share from 15% to 35% is associated with just over a 3 percentage point increase (or 24%, off an average of 13 percent) in the likelihood a hotel is an all-suites format. We view this effect as economically large given the relative frequency of this format nationally; it is also statistically significant. Both of these relationships disappear when looking exclusively at chain affiliated hotels and including chain fixed effects—indicating that the patterns found in the previous two specifications occur at the chain level. The estimates in the fourth column indicate that within chains, whether a hotel is an all-suites hotel is uncorrelated with both the local temperature and the business travel share. This is unsurprising, given that chains generally either consist of hotels that are all of the all-suites format or not (e.g., see Figure 12).

Together with our earlier results, these patterns are consistent with the hypothesis that changes in the nature of quality competition affected how product level industry structure evolved as market size increased. In the 1980s quality competition in the form of pools and restaurants—amenities that are outside of the room and involve largely fixed costs—tended to be greater in warmer places and areas that are disproportionately business travel destinations (for restaurants). By the mid-2010s the latter pattern had reversed. Hotels in high business travel share areas are no longer significantly more likely to have restaurants, and instead are much more likely to have an all-suites format. This format, as described above, involves competing on the basis of amenities that tend to be inside the room—including more square footage, desks, sofas and kitchenettes. Increasing the quality of these features involves costs that vary considerably – probably close to proportionately – with the number of rooms.

To close this section, we note that comparing the segment of the industry that we have to here excluded from our analysis – casino hotels – with the rest of the industry reinforces the point that the form of quality competition shapes industry structure. As of 2014, twenty-nine of the thirty-four largest hotels, including the seventeen largest hotels, in the U.S. were casino hotels, most of which were located in Las Vegas.⁴⁸ These extremely large hotels have an amenity (a casino) where quality competition comes in the form of fixed costs. Competition in this segment, especially in Las Vegas, has led to an outcome where

⁴⁸ The other five of the top thirty-four are large hotels connected to a resort. The largest non-casino, non-resort hotel in the U.S. in 2014 was the Hyatt Regency in Chicago, with just over 2000 rooms.

casino hotels are far larger than in the rest of the industry, and increases in demand in this segment have been met significantly by larger hotels.

6. Conclusion

In this paper, we provide evidence on the relationship between market size and industry structure, and how shifts in the form of quality competition can lead to changes in this relationship broadly as well as across customer segments. Quality competition between the 1960s and early 1980s centered on fixed cost investments like pools and restaurants which largely affect quality outside of the room. Since the 1980s, hoteliers have competed less on out-of-room amenities, and more on in-room amenities, particularly for business travelers. We conclude that these changes in the form of quality competition have led to changes in how industry structure has responded to increases in market size, and changes in how consumers benefit from such increases.

Our evidence indicates that, before the early 1980s, increases in market size were primarily met by larger hotels irrespective of whether an area was a business or personal travel destination. After the early 1980s, this was not true. In personal travel destinations, increases in market size continued to be met by larger hotels. But in business travel destinations, increases in market size were met entirely by more, smaller hotels. This differential change in the market size-industry structure relationship is consistent with the well-documented shift in how hotels competed on quality, especially in areas mostly serving business travelers. Changes in quality competition in these areas meant that hotels competed in less scale intensive ways that involved better rooms rather than more or higher-quality out-of-room amenities. The development of “limited services” and “all-suites” hotel formats — which were rare before the early 1980s but very common now — are a manifestation of this change in the form of quality competition. Consumers, especially business travelers, benefitted from increases in market size through a greater variety of locations and hotel formats.

Moving beyond hotels, our results indicate that caution should be exercised when drawing conclusions about changes in industry structure before the forces driving those changes are understood.⁴⁹ The welfare implications of such changes, especially as it relates to the benefits from product quality and variety, depend critically on whether changes in industry structure are the consequence of a change in the strength of competition or else a change in the *form* of quality competition.

⁴⁹ Berry, et al.’s (2019) recent perspectives piece recommends this as well. See also, Shapiro (2018, 2019).

7. Appendix

Room Size and Employment Size Distributions

In Table A1, we compare the room size distribution and employment size distribution for U.S. hotels in 2012; the former comes from the Economic Census while the latter comes from County Business Patterns.

The bottom row reports our estimates of “equivalent room size” intervals for seven employment size bins. We derive these estimates by summing the share of hotels in successive room size bins until the cumulative share of hotels in the number of employees distribution for that size bin is matched. For example, to obtain the room size interval that is equivalent to the 33.2% share of hotels with 1-4 employees, we first bring in the 23.4% of hotels with 1-24 rooms. This leaves a deficit of 9.8% ($33.2\% - 23.4\%$) in that cell. This, in turn is 51.5% ($9.8\% / 19.0\%$) of the share of hotels with 25-49 rooms. Assuming that the room size distribution is uniform within this interval, we estimate that hotels with 25-37 rooms ($37 = 25 + 51.5\% * (49 - 25)$) account for 51.5% of hotels with 25-49 rooms, and thus hotels with 1-37 rooms account for the same share of hotels as hotels with 1-4 employees. We then apply the same procedure to estimate equivalent room size intervals for the remaining employee size categories. While inexact, this provides a rough sense of the correspondence between the two distributions.

Construction of a Business Travel Index for Hotels

This section provides more of the details on our construction of the business travel index for hotels that we built using the responses from the American Travel Survey (ATS) from 1995. The ATS was a survey that collected the travel history of individuals at 80,000 U.S. addresses regarding all of their trips above 100 miles taken in 1995.

The business travel indices we built from this survey are intended to be reflective of the share of trips involving a hotel stay to a destination that are for business purposes. In constructing this index, we largely adopted the approach of Borenstein (2010) with minor revisions to reflect the accommodation focus (instead of air-travel) of our research.

The primary variables in the ATS for our purposes are the trip’s destination and the reason for travel. The ATS reports the state and MSA (if the destination is in an MSA) for each trip, and asks respondents to select one of sixteen possible reasons for their trip (see Table A2). We classify trips where the response is “business” as a business trip, and “combined business/pleasure” as half business, half personal, following Borenstein. As a robustness check, we also constructed and applied an alternative business travel index in which the trips associated with a “convention, conference, and seminar” were also included as a business trip. These account for only about 3% of trips in our sample, and our results do not materially change when we do so.

Starting with the ATS sample, we keep only trips that involve a hotel stay. As Table A2 illustrates, the reason for travel is different for such trips than either trips in the ATS in general or only trips with air travel. While business trips make up about 15 percent of all trips in the ATS survey, they make up over 25 percent of trips conditional on staying at a hotel. Furthermore, conditioning on a hotel stay eliminates trips where individuals stay only at a relative's or friend's house, and thus reduces the share of trips where the reason is to visit relatives or friends.

We compute business travel shares for each MSA, and for non-MSA regions within each state, weighting each trip by the number of travelers in the party. We assign the MSA's business travel share to each county in the MSA, and the non-MSA business travel share for a state to each county in the state that is not part of an MSA.⁵⁰ The MSAs with the highest business travel shares tend to be cities that tend not to be tourist destinations (e.g., El Paso, TX; Worcester, MA; Wichita, KS). The states with the highest business travel shares are Illinois, Georgia, Ohio, and Kansas.

Differential Attrition Patterns

We examine the possibility that the patterns in Figures 8-11 reflect differential attrition patterns (or, differential exit rates) by analyzing data from the U.S. Bureau of the Census' Economic Census, which provide some evidence on the room size of new hotels.⁵¹ Reports from the Economic Census between 1977 and 1997 report the number of hotels and guestrooms in U.S. hotels, splitting the sample between hotels that were in operation throughout the year, and those that were not in operation throughout the year, but were in business as of the end of the year ("entrants"). The latter category is of particular interest for this exercise because it includes hotels that opened during the year.⁵² Finding that the time patterns in average room size among these hotels – which are reported only every five years – are similar to the time patterns in average room size in our STR sample provides evidence that the patterns in Figures 8-11 reflect changes in the size of new hotels and are not only due to differential attrition.

Table A3 shows our results. In both series, average room size increases before 1982 and decreases after 1982, indicating that our results above are not merely due to differential attrition. The first column reports that average room size among "entrants" in the EC data increased from 36 to 55 between 1977 to

⁵⁰ In contrast, Borenstein (2010) mapped MSAs to airports, because he used his indices to research air travel.

⁵¹ These are reported on a national basis, and do not allow us to compare across locations in the way we can with the STR data.

⁵² This category also includes seasonal hotels that do not operate during the winter months – hotels that are "in business" but not open for guests as of December 31. Seasonal hotels tend to be smaller on average than hotels that operate all year round, and the tables below show that average room sizes in our EC data series are much smaller than those in our STR data. However, the results that we report below are unlikely to reflect only time series patterns in seasonal hotels. The Economic Census reports figures separately for hotels with 25 or more rooms, and the time patterns for this subset (a subset that where relatively few of the hotels are seasonal) are similar to those for the overall category.

1982, declined to 45 in 1987, and remained below 50 in 1992 and 1997. The second column reports the vintage-level averages for the 2014 STR sample. This average increased from 119 to 128 between 1977 and 1982, then fell to 114 in 1987, then further to 84 in 1992 and 1997. The bottom panel normalizes these series to 1982 levels, the peak year in both series. The EC series indicate a decline of about 15% between 1982 and 1992, and about a 25% decline between 1982 and 1997. The STR series report a somewhat larger decline of 35% between 1982 and either 1992 or 1997. The fact that the decline in the EC series is somewhat smaller than that in the STR series could imply that some of the decline in the STR series may reflect differential attrition patterns. However, one would expect the decline in the EC series to understate the actual trends in the size in new entrants because the EC series also includes seasonal hotels, whose average size may not be decreasing during this period.

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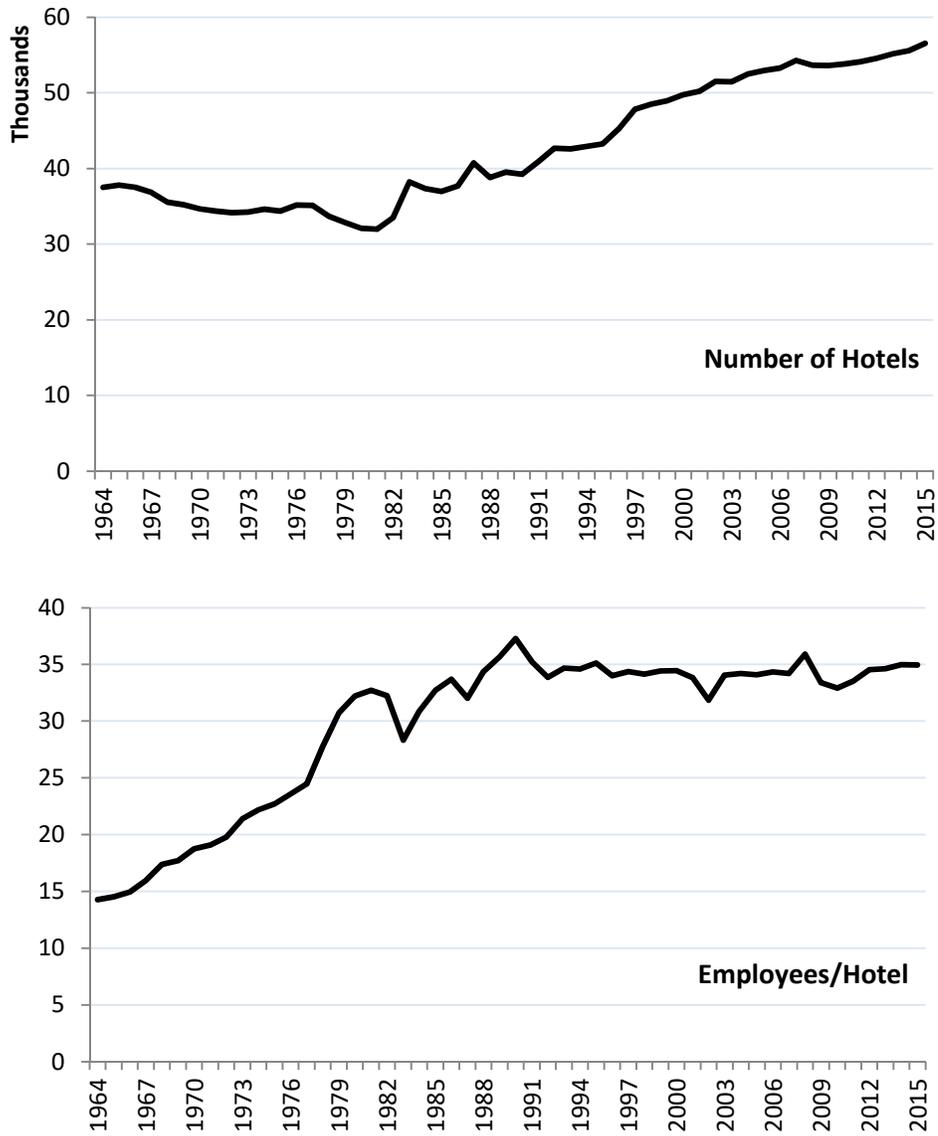


Figure 1. Number of Hotels, Employees/Hotel, United States, 1964-2015.

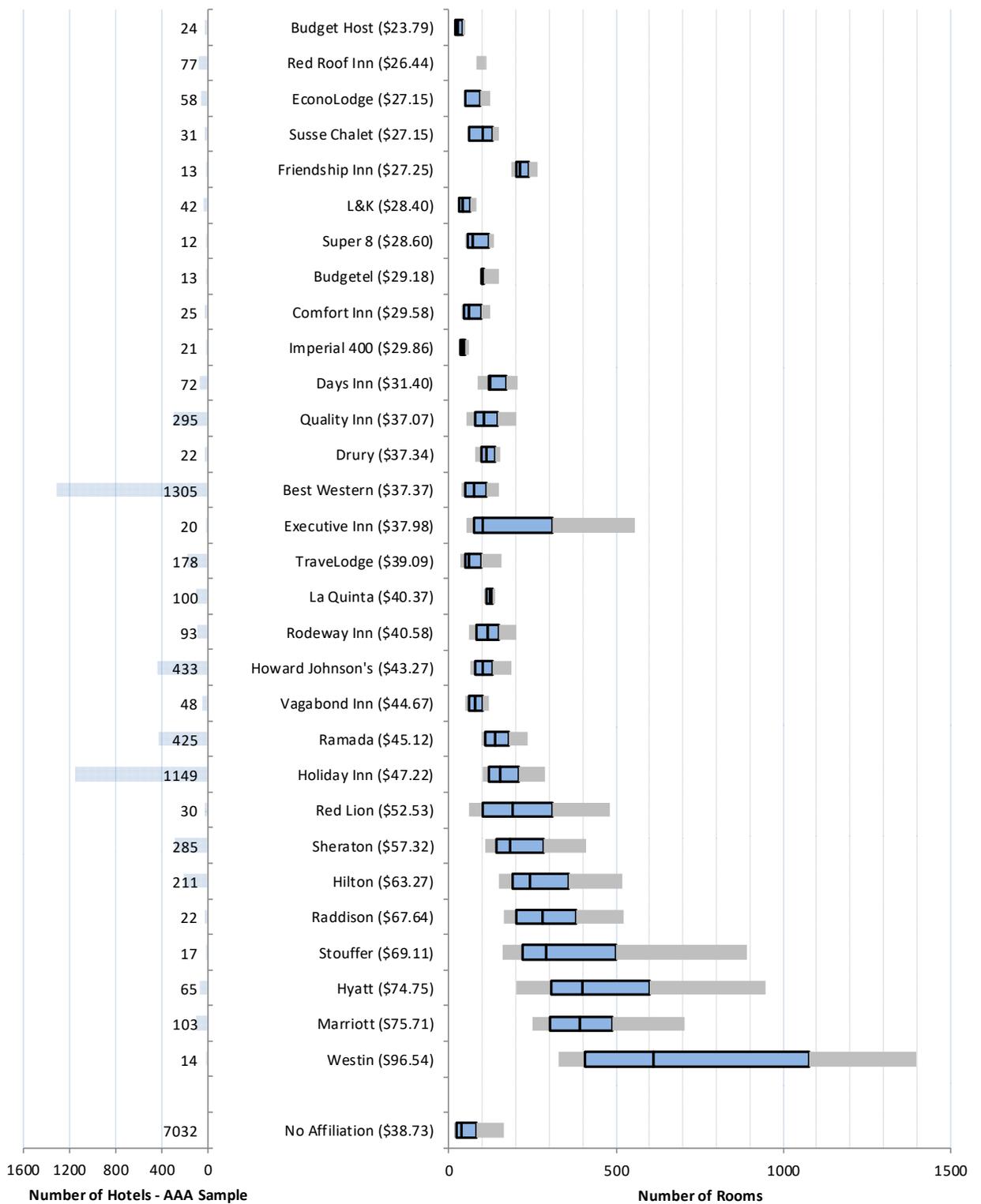


Figure 2. Average Price and Size Distribution of Hotels in Major Chains, 1982.

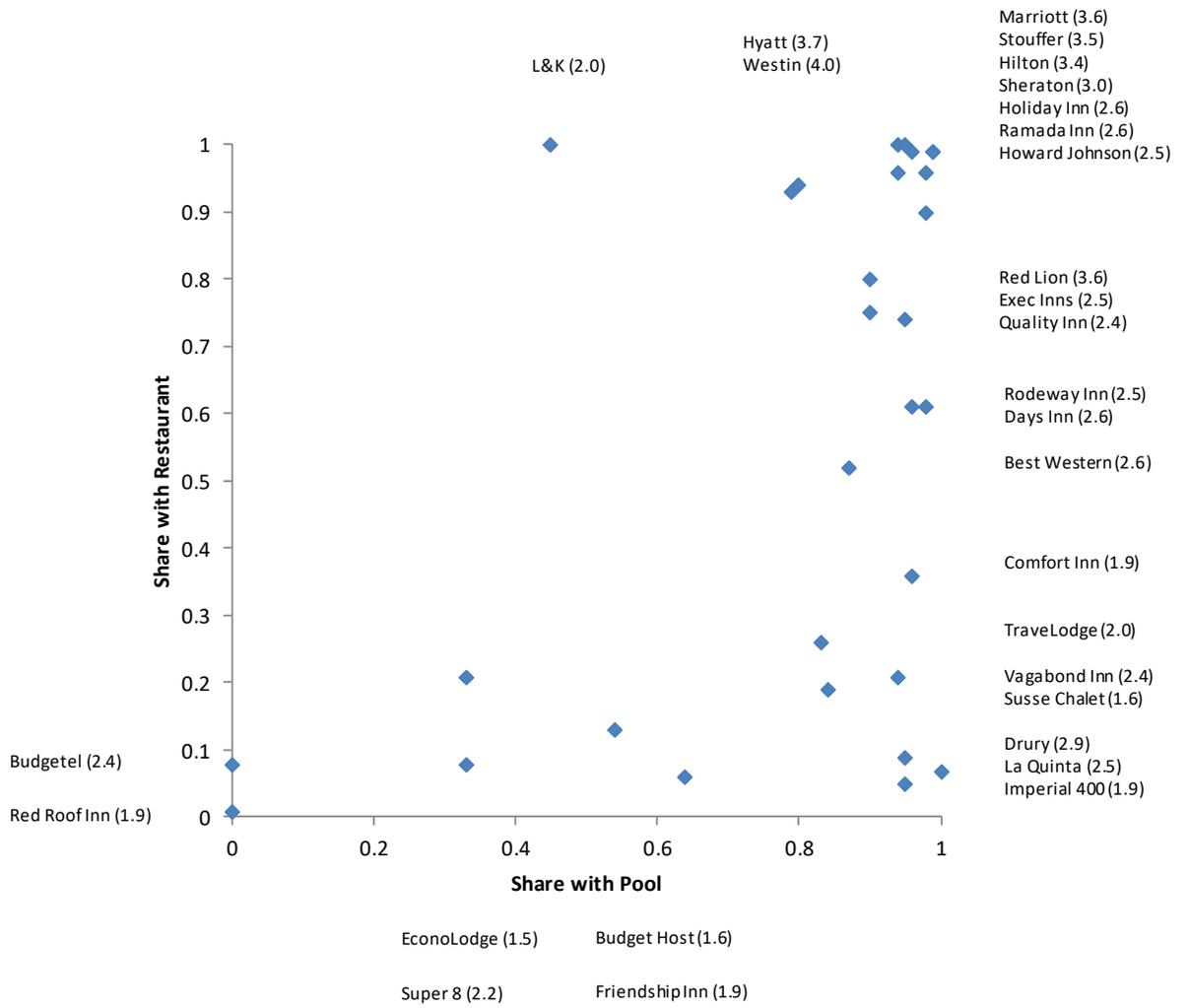


Figure 3. Amenities and Average AAA Rating of Hotels in Major Chains, 1982.

Dependent Variable	Hotel Has Pool				Hotel Has Restaurant			
Temperature	0.015 (0.001)	0.015 (0.001)	0.005 (0.000)	0.005 (0.000)	0.006 (0.001)	0.005 (0.001)	0.001 (0.001)	0.001 (0.001)
Bus Travel Share		0.050 (0.061)		-0.052 (0.034)		0.508 (0.089)		0.033 (0.053)
Chains Only?			Y	Y			Y	Y
Chain Fixed Effect			Y	Y			Y	Y
N	12301	12119	5303	5262	12301	12119	5303	5262

Standard errors are clustered by county.

Table 1. Estimates of Relationships Between Hotels' Amenities, Temperature, and Business Travel Share. 1982 AAA Sample

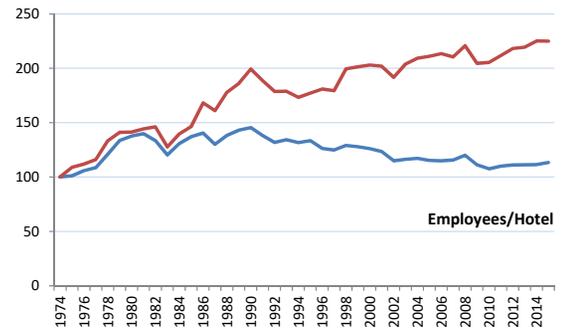
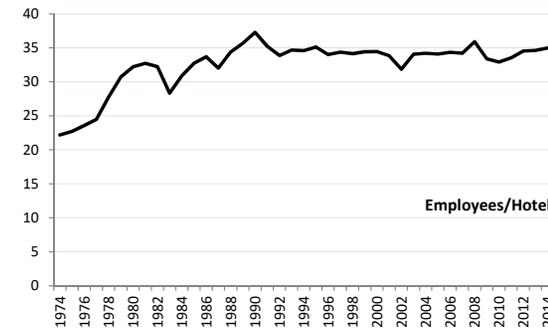
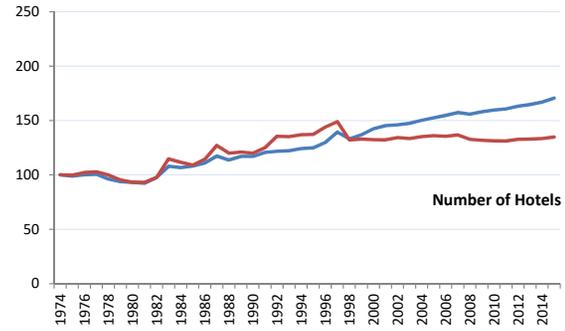
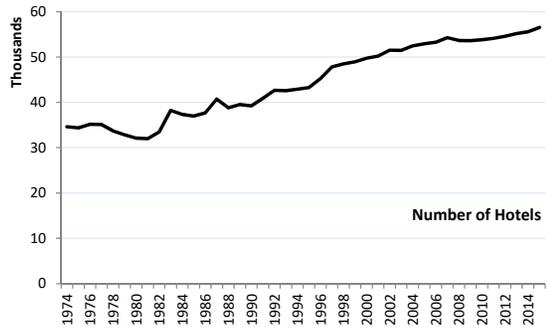
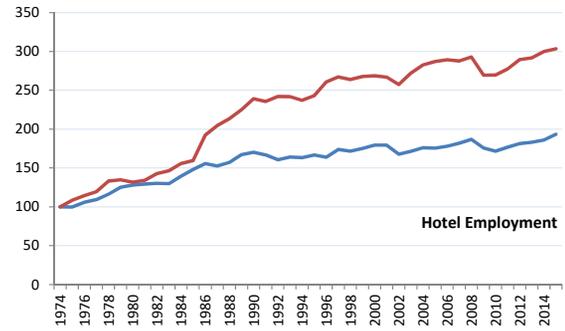
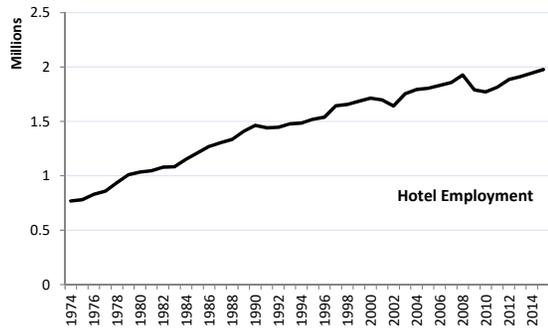


Figure 4. Hotel Employment, Number of Hotels, Employees/Hotel, United States (black); Business (blue) and Personal (red) Travel Counties (1974=100).

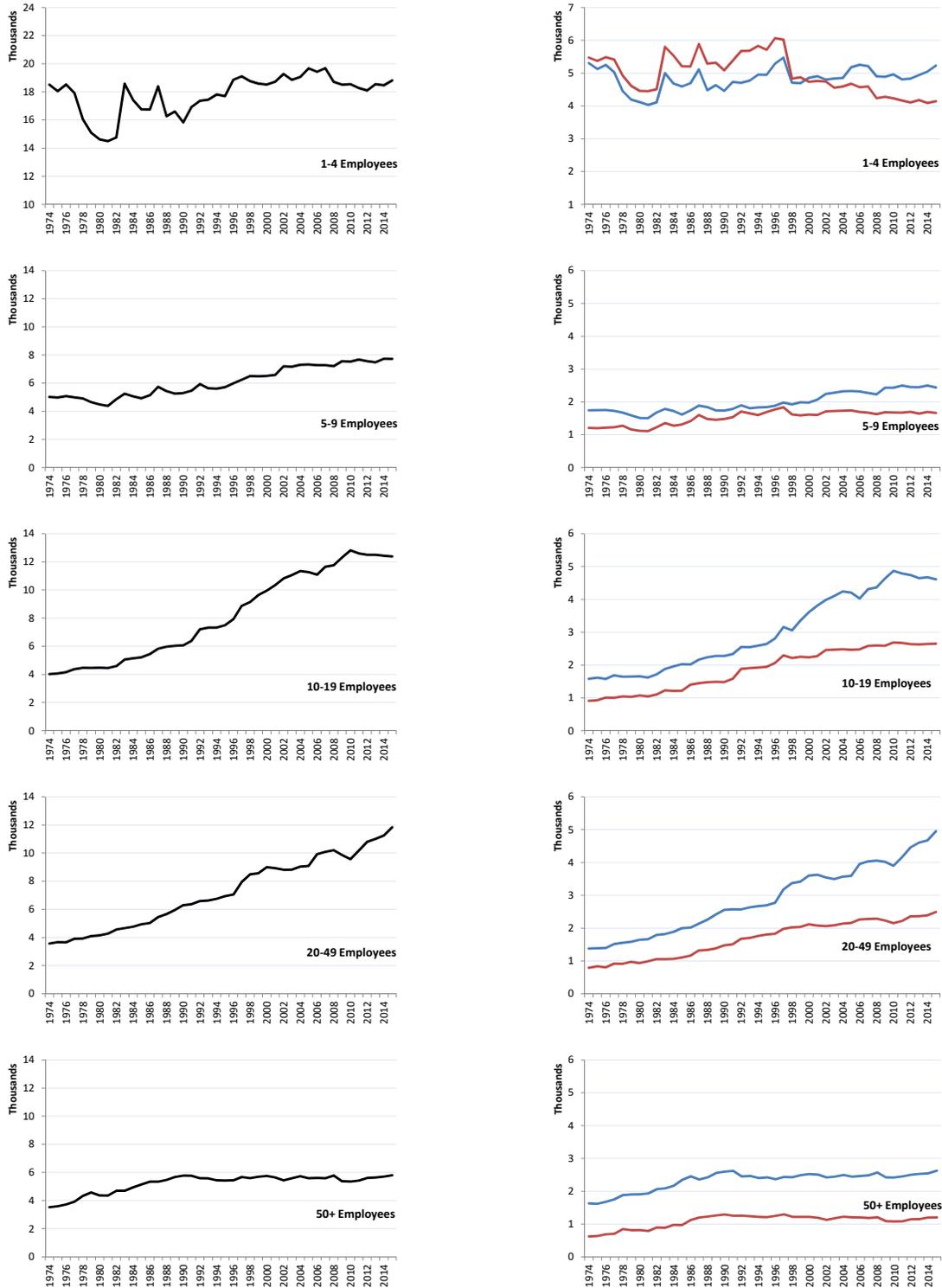


Figure 5. Number of Hotels by Employment Size Category, United States, 1974-2015. All counties (black), and business (blue) and personal (red) travel counties.

<i>Coefficient estimates</i>	<i>1974-1982 Sample</i>			<i>1982-2015 Sample</i>		
	<i>dln(emp)</i>	<i>dln(hotels)</i>	<i>dln(emp/hotel)</i>	<i>dln(emp)</i>	<i>dln(hotels)</i>	<i>dln(emp/hotel)</i>
Bus. Travel Share	-0.416 (0.082)	-0.009 (0.043)	-0.407 (0.072)	-0.706 (0.117)	0.542 (0.079)	-1.249 (0.101)
Temperature	0.003 (0.001)	0.001 (0.001)	0.002 (0.001)	0.007 (0.001)	0.009 (0.001)	-0.002 (0.001)
Constant	0.307 (0.010)	-0.024 (0.005)	0.331 (0.009)	0.510 (0.014)	0.478 (0.010)	0.032 (0.012)
<i>Predicted Changes, Evaluated at Percentiles of Business Travel Share</i>						
10th (BTS=15.6%)	0.357 (0.016)	-0.023 (0.008)	0.380 (0.014)	0.596 (0.023)	0.413 (0.015)	0.183 (0.019)
25th (BTS=22.1%)	0.330 (0.012)	-0.024 (0.006)	0.354 (0.011)	0.549 (0.017)	0.448 (0.012)	0.101 (0.015)
50th (BTS=27.6%)	0.307 (0.010)	-0.024 (0.005)	0.331 (0.009)	0.511 (0.014)	0.478 (0.010)	0.033 (0.012)
75th (BTS=31.6%)	0.290 (0.010)	-0.025 (0.005)	0.315 (0.008)	0.482 (0.014)	0.500 (0.009)	-0.018 (0.012)
90th (BTS=38.7%)	0.261 (0.011)	-0.026 (0.006)	0.286 (0.010)	0.432 (0.017)	0.538 (0.011)	-0.106 (0.014)

Business travel share and temperature variables are deviations from means. Observations for 1974-1982 sample (N=2517) weighted by hotel employment in 1978. Observations for 1982-2015 sample (N=2472) weighted by hotel employment in 1999.

Table 2. Long Difference Estimates. Hotel Employment, Number of Hotels, Employees per Hotel.

Business Travel Share	Estimated change in $\ln(\text{emp})$	Percent of estimated change in $\ln(\text{emp})$ accounted for by estimated change in...	
		$\ln(\text{hotels})$	$\ln(\text{emp}/\text{hotel})$
<i>1974-1982 Estimates</i>			
15.6% (10th percentile)	0.357	-7 %	107 %
22.1% (25th percentile)	0.330	-7 %	107 %
27.6% (50th percentile)	0.307	-8 %	108 %
31.6% (75th percentile)	0.290	-9 %	109 %
38.7% (90th percentile)	0.261	-10 %	110 %
<i>1982-2015 Estimates</i>			
15.6% (10th percentile)	0.596	69 %	31 %
22.1% (25th percentile)	0.549	82 %	18 %
27.6% (50th percentile)	0.511	94 %	6 %
31.6% (75th percentile)	0.482	104 %	-4 %
38.7% (90th percentile)	0.432	124 %	-24 %

Table 3. Estimated Change in Hotel Employment, Decomposition of Change. 1974-1982, 1982-2015.

	Change in Number of Hotels....									Total
	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	1000+	
Bus. Travel Share	44.718 (4.371)	0.259 (2.623)	31.425 (3.750)	40.661 (4.048)	11.129 (2.101)	1.544 (1.814)	1.969 (0.766)	-5.971 (0.491)	-5.755 (0.370)	119.981 (14.800)
Temperature	0.414 (0.051)	0.354 (0.031)	0.837 (0.044)	1.166 (0.047)	0.070 (0.024)	0.014 (0.021)	0.076 (0.009)	0.112 (0.006)	0.078 (0.004)	3.121 (0.174)
C	3.820 (0.532)	3.620 (0.319)	15.178 (0.457)	20.914 (0.493)	5.409 (0.256)	5.098 (0.221)	1.572 (0.093)	1.241 (0.059)	0.378 (0.044)	57.232 (1.802)

Business travel share and temperature variables are deviations from means.
Observations weighted by hotel employment in 1999. N=2741.

Table 4. Long Difference Estimates 1982-2015. Number of Hotels in Different Employment Size Categories.

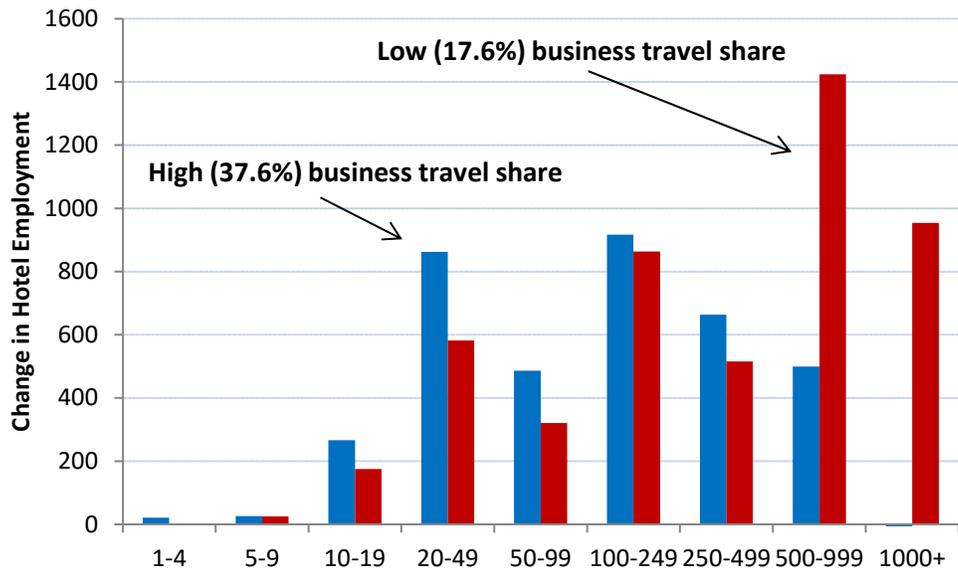
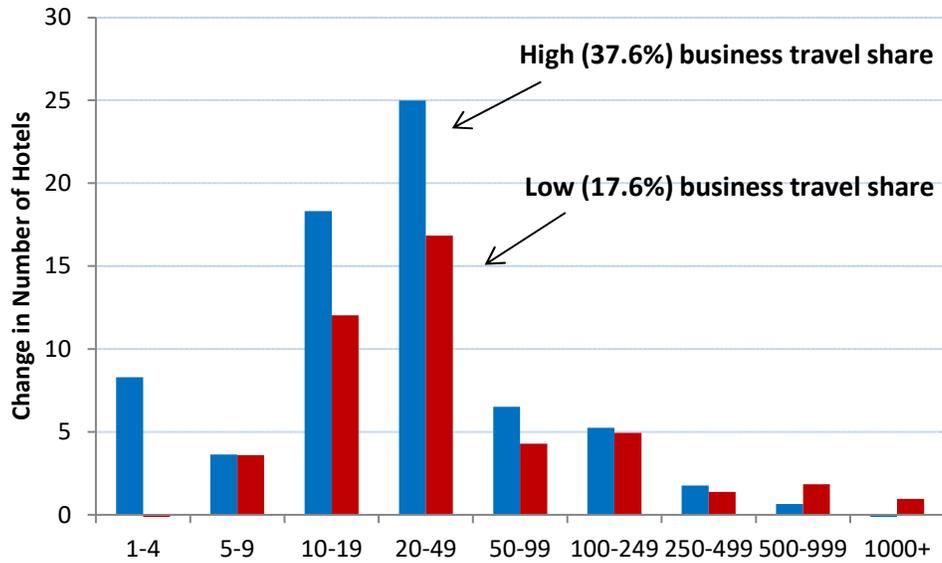


Figure 6. Estimated Change in Number of Hotels and Hotel Employment in County, 1982-2015, by Employment Size Category.

	dln(rooms)	dln(estab)	dln(rooms/estab)
Bus. Travel Share	0.109 (0.257)	1.098 (0.411)	-0.988 (0.338)
Temperature	0.003 (0.002)	0.015 (0.004)	-0.012 (0.003)
C	0.416 (0.019)	0.163 (0.031)	0.253 (0.026)

Business travel share and temperature variables are deviations from means.
Observations weighted by hotel employment in 1999. N=40

Table 5. Long Difference Estimates 1987-2012. Hotel Rooms, Hotels, Rooms per Hotel. State-Level Analysis, Economic Census Data.

	dln(emp)	dln(hotels)	dln(emp/hotel)
Bus. Travel Share	-0.738 (0.116)	0.547 (0.079)	-1.284 (0.099)
Temperature	0.008 (0.001)	0.009 (0.001)	-0.002 (0.001)
Fair Market Rent	0.592 (0.076)	-0.121 (0.052)	0.712 (0.065)
C	0.454 (0.016)	0.492 (0.011)	-0.038 (0.014)

Business travel share, temperature and fair market rent variables are deviations from means. Observations weighted by hotel employment in 1999. N=2468

Table 6. Long Difference Estimates 1982-2015. Hotel Employment, Hotels, Employees per Hotel. Includes County-Level Controls For Changes in Land Value.

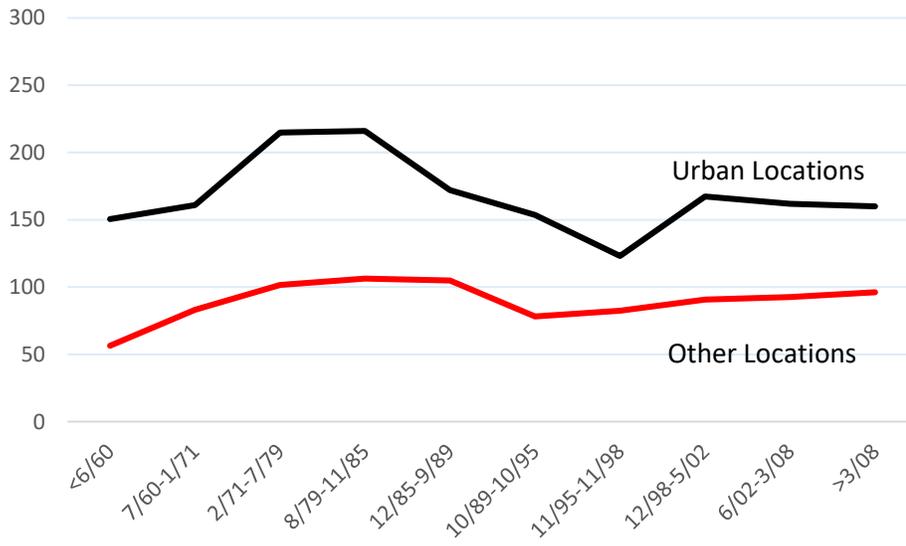


Figure 7. Average Room Size of 2014 Hotels, By Date of Construction

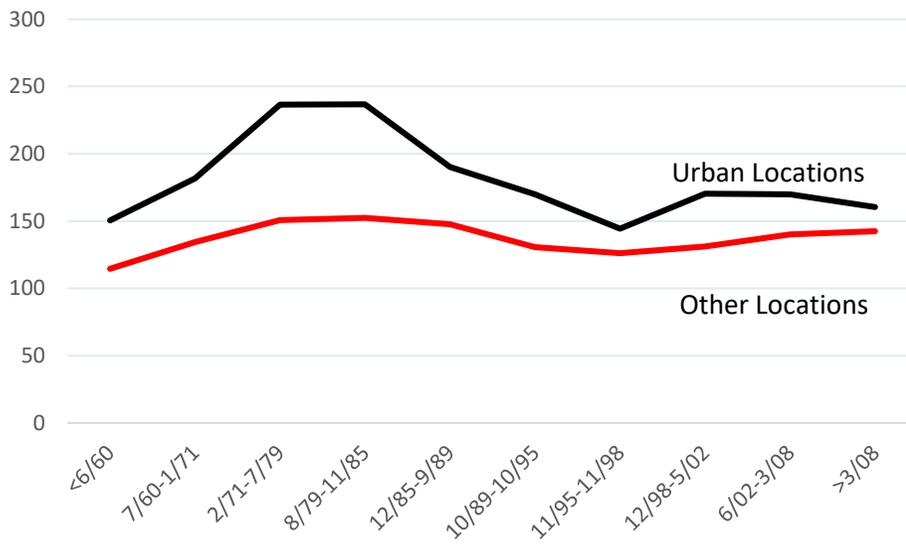


Figure 8. Average Room Size of 2014 Hotels, By Date of Construction. Controls for County Fixed Effects.

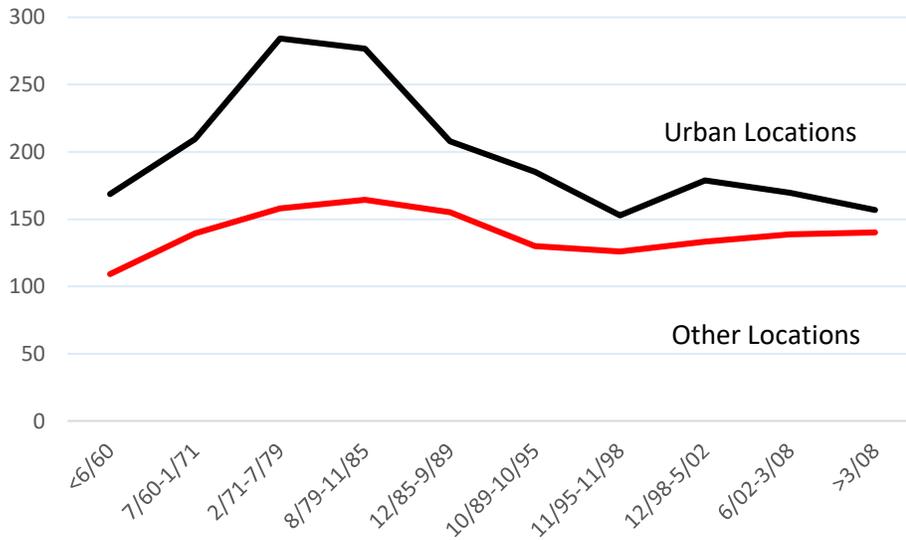


Figure 9. Average Room Size of 2014 Hotels, By Date of Construction. Business Travel Destinations. Controls for County Fixed Effects.

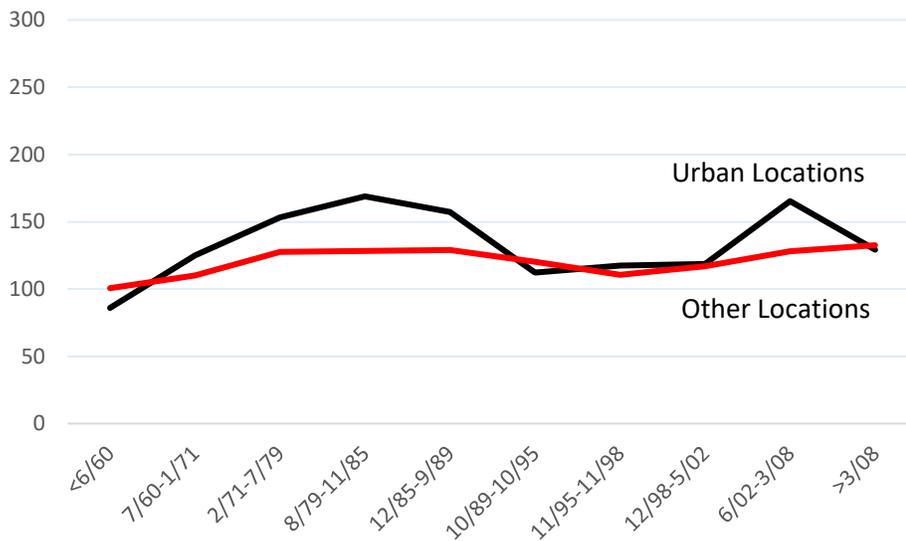


Figure 10. Average Room Size of 2014 Hotels, By Date of Construction. Personal Travel Destinations. Controls for County Fixed Effects.

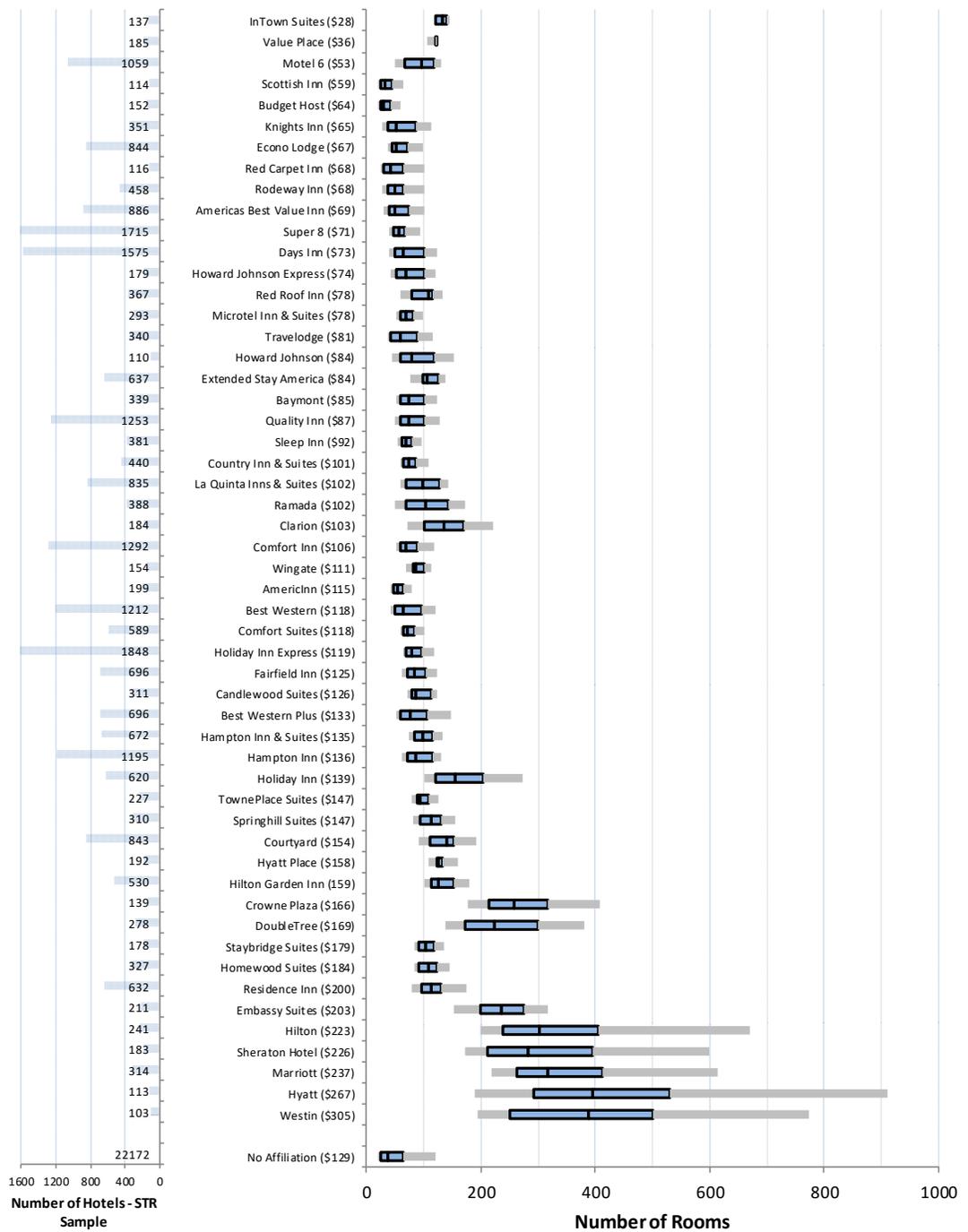


Figure 11. Size Distribution of Hotels in Major Chains, 2014.

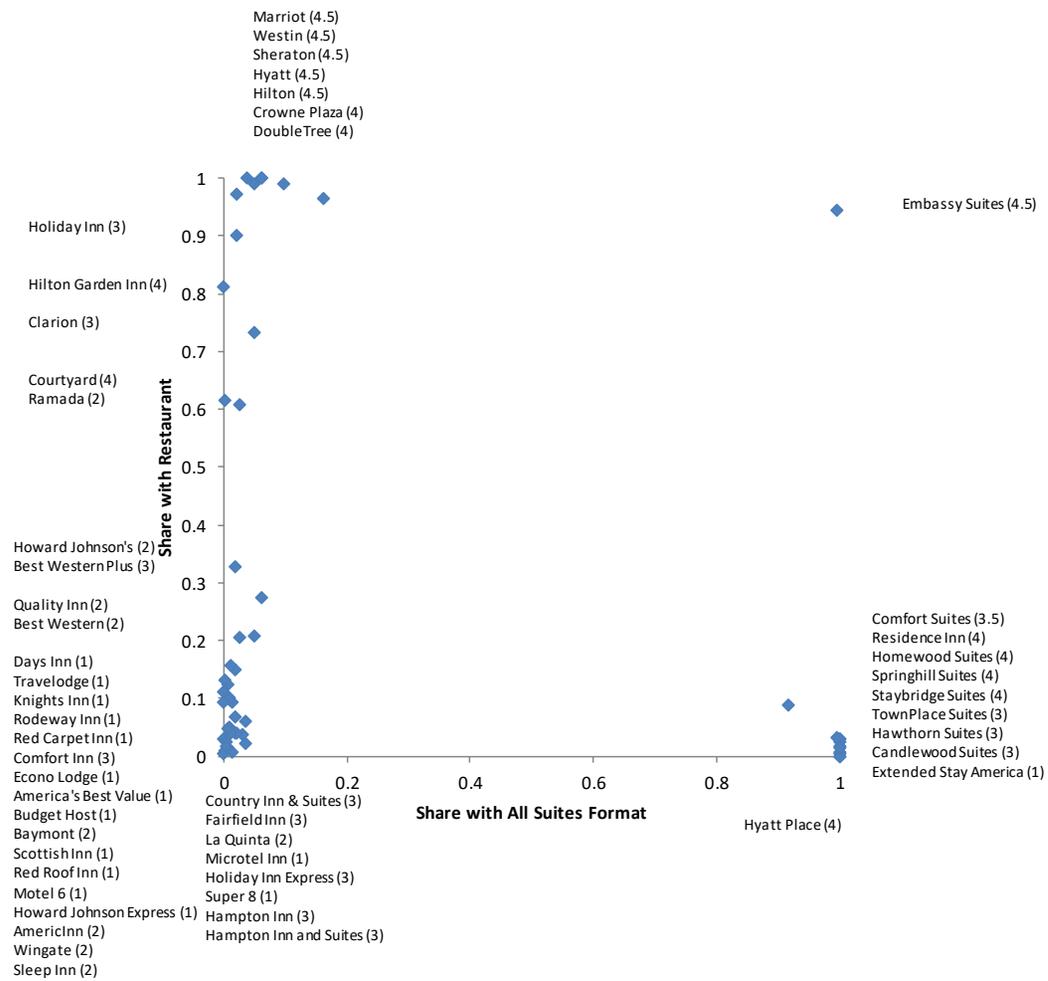


Figure 12. Amenities and Average STR Rating of Hotels in Major Chains, 2014.

Rating	Share With Restaurant	Representative Chain
<i>AAA Sample, 1982</i>		
1 diamond	0.19	EconoLodge
2 diamond	0.41	Quality Inn, TraveLodge
3 diamond	0.65	Holiday Inn, Best Western (nicer ones)
4 diamond	0.86	Marriott, Hyatt
5 diamond	0.94	Fairmont
<i>STR Sample, 2014</i>		
Economy	0.11	EconoLodge, Motel 6, Super 8
Midscale	0.23	Quality Inn, Ramada
Upper Midscale, Upscale	0.29	Holiday Inn Express, Hilton Garden Inn, Homewood Suites
Upper Upscale	0.80	Marriott, Hyatt
Luxury	0.74	Four Seasons, Park Hyatt, Peninsula

Table 7. Share of Hotels with Restaurant by Quality Rating. 1982 AAA Sample, 2014 STR Sample.

Dependent Variable	Hotel Has Restaurant				Hotel is All Suites Format			
Temperature	-0.002 (0.001)	-0.002 (0.001)	-0.001 (0.000)	-0.001 (0.000)	0.002 (0.000)	0.002 (0.000)	0.001 (0.000)	0.001 (0.000)
Business Travel Share		0.081 (0.061)		-0.013 (0.022)		0.155 (0.034)		0.019 (0.013)
Chains Only?			Y	Y			Y	Y
Chain Fixed Effect			Y	Y			Y	Y
N	52167	52167	30301	30301	52167	52167	30301	30301

Standard errors are clustered by county.

Table 8. Estimates of Relationships Between Hotels' Amenities, Temperature, and Business Travel Share. 2014 STR Sample

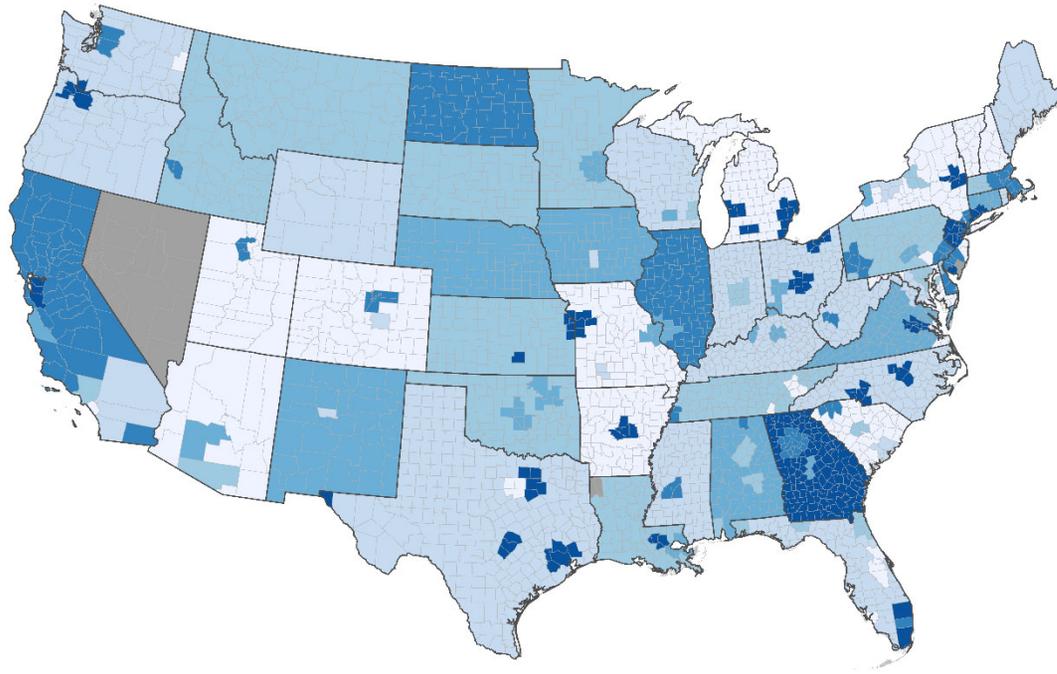


Figure A1. Business Travel Share by County, 1995.

This map depicts the share of travel to each county that is for business. Darker blue denote areas with higher business travel share. Counties that have been dropped from our sample are displayed in gray.

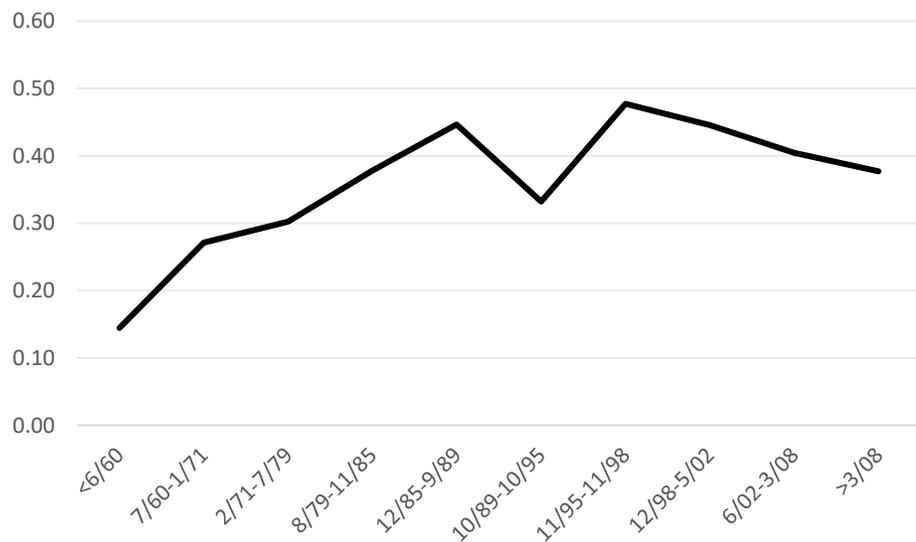


Figure A2. 2014 Room Share of Suburban Hotels, by Date of Construction.

	Number of Rooms						
	1-10	10-24	25-49	50-99	100-299	300-499	500+
Number of Hotels	3805	7072	8816	12970	11654	1407	745
Share of Hotels	8.2%	15.2%	19.0%	27.9%	25.1%	3.0%	1.6%
Cumulative Share of Hotels	8.2%	23.4%	42.4%	70.3%	95.4%	98.4%	100.0%
	Number of Employees						
	1-4	5-9	10-19	20-49	50-99	100-249	250+
Number of Hotels	18102	7561	12502	10795	2482	2009	1108
Share of Hotels	33.2%	13.9%	22.9%	19.8%	4.5%	3.7%	2.0%
Cumulative Share of Hotels	33.2%	47.0%	70.0%	89.7%	94.3%	98.0%	100.0%
Equivalent Room Size Interval	1-37	38-58	59-98	99-254	255-290	291-470	471+

Table A1. Room Size and Employment Size Distribution of Hotels in the United States, 2012.

Reason	All Trips	Trips on Airplane	Trips with a Hotel Stay
Business	16.4	31.7	25.5
Combined business/pleasure	2.0	3.4	2.7
Convention, conference, or seminar	1.9	2.4	3.6
School related activity	7.2	4.9	8.5
Visit relatives or friends	24.1	19.6	6.3
Rest or relaxation	12.5	11.6	13.8
Sightseeing, or to visit a historic/scenic attraction	6.7	8.9	10.9
Outdoor recreation	8.4	4.0	7.5
Entertainment	9.6	6.0	13.7
Shopping	1.8	0.2	1.2
Personal, family, or medical	9.6	7.5	6.4
Num. Observations	337,520	65,096	101,878

Frequencies are travel party-household weighted averages, both of which are provided by the American Travel Survey (1995).

Table A2. American Travel Survey (1995) Reasons for Trip Across Trips with Airline and Hotel Stay.

	EC	STR
<i>Rooms</i>		
1977	36	119
1982	55	128
1987	45	114
1992	48	84
1997	41	84

Normalized Rooms (1982=100)

1977	66	93
1982	100	100
1987	81	88
1992	87	65
1997	74	65

The Economic Census (EC) averages are calculated among hotels in business at the end of the year, but not in operation the entire year ("entrants").

The Smith Travel Research (STR) averages are calculated among hotels in operation as of 2014.

Table A3. Average Room Size, 1977-1997.