

# The Price of Hate: Household Finance and Non-Pecuniary Preferences\*

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## Abstract

Airbnb hosts in college towns increase their listing prices more than hotels on home football games against rival teams. By setting listing prices too high as a result of their non-pecuniary preferences against rival fans, hosts experience a 30% reduction in rental income. The overestimation of demand, the cost (inconvenience) of having to temporarily relocate, and the expected cost of damage cannot explain the inverse relation between listing price increases and rental incomes on games against rival teams. Instead, greater financial constraints are associated with smaller listing price increases and higher rental incomes on rival games, suggesting that non-pecuniary preferences are a luxury.

Keywords: Non-Pecuniary Preference, Household Finance, Sharing Economy

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# 1 Introduction

The “sharing economy” allows households to monetize their assets. Whether its their house (Airbnb.com), car (GetAround.com) or spare cash (Prosper.com), participation in the sharing economy is increasing rapidly.<sup>1</sup> Our study involves Airbnb, one of the largest firms in the sharing economy with over 150 million current users in the United States and a valuation exceeding \$31 billion. Airbnb, which provides a marketplace for rental accommodation, enables households to monetize the real estate assets that comprises more than 70% of their portfolio.<sup>2</sup> Case, Quigley, and Shiller (2013) highlight real estate’s importance to household finance by documenting that real estate prices impact consumption more than stock prices.<sup>3</sup>

However, success in the sharing economy and Airbnb in particular requires households to make an important financial decision: how to set listing prices? One might think households set listing prices on Airbnb to maximize rental income. After all, households list their property on Airbnb for precisely the purpose of generating rental income. Nevertheless, there is ample evidence that household financial decisions exhibit peculiar preferences (e.g., Hirshleifer (2001), Campbell (2006)). We provide evidence that, while households generally set listing prices to maximize rental income, non-pecuniary preferences confound this financial decision on a predictable set of dates.

Airbnb listings in college towns provide an ideal laboratory to study the impact of non-pecuniary preferences on household financial decisions for several reasons. First, college football rivalries create a mutual disdain between rival fans that is persistent. Cikara, Botvinick, Fiske (2011) find that “us versus them” behavior spreads beyond competitors

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<sup>1</sup>The international sharing economy is on track to reach \$335 billion by 2025. <https://www.pwc.com/us/en/industry/entertainment-media/publications/consumer-intelligence-series/assets/pwc-cis-sharing-economy.pdf>

<sup>2</sup>Nearly six times the amount allocated to financial assets such as stocks, bonds, and mutual funds according to the Federal Reserve’s 2016 Survey of Consumer Finances.

<sup>3</sup>Barron, Kung, Proserpio (2018), Horn and Merante (2017), Sheppard and Udell (2018) find that Airbnb usage exerts upward pressure on housing prices, with financial intermediaries such as Loftium financing home purchases in exchange for a portion of the subsequent Airbnb rental income.

to fans. Therefore, a non-pecuniary preference against rival fans may be embedded into Airbnb listing prices. Second, governance mechanisms and regulatory oversight constrain hotels from incorporating non-pecuniary preferences into hotel prices. Therefore, we can compare the price-setting behavior of households on Airbnb to benchmark hotel prices that better reflect demand. Third, we can observe the same household’s listing price and rental income on home games against rival teams and non-rival teams. Therefore, our empirical design enables us to hold the household fixed and vary their non-pecuniary preference toward fans of the visiting team. In contrast to typical deviations between utility and wealth maximization, we study the extent to which households compromise wealth due to a non-pecuniary preference that is distinct from risk aversion.

Our data consist of 1,320 entire units on Airbnb in 26 college towns encompassing 236 games during the 2014 and 2015 football seasons. Entire units resemble hotel rooms, and provide self-contained accommodations that physically separate guests from hosts. Thus, rental transactions for entire units typically do not involve any interaction or reciprocity between hosts and guests. Over 60% of the total rental income earned by Airbnb hosts during the football season occurs on six home-game weekends (Friday and Saturday nights). We create a rival indicator variable that equals one on home games against a “rival” visiting team.<sup>4</sup> This list of rivals is obtained from the sports media (e.g., ESPN and Sports Illustrated) and include well-known examples such as Florida-Florida State, Notre Dame-USC, Ohio State-Michigan, and Alabama-LSU.

After controlling for unit-level heterogeneity and the demand for accommodations, we find that Airbnb hosts set higher listing prices on games against rival teams.<sup>5</sup> Nearly two thirds of units have higher listing prices on games against rivals, with an average increase of 22%. As listing prices reflect demand, we find a positive unconditional relation between

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<sup>4</sup>Our list of rivals parallels the within-conference rivals obtained from Sports Illustrated in Quintanar, Deck, Reyes, and Sarangi (2015). However, their list excludes independent teams such as Notre Dame that are not members of any conference.

<sup>5</sup>Unit fixed effects account for variation in the quality and average listing price of individual units.

listing prices and rental incomes for individual units. More important, we find that the interaction between unit-level listing prices and the rival indicator variable exerts a negative impact on rental incomes. Consequently, the high listing prices set by households on games against rivals reduce rental income. This inverse relation between listing price increases and rental incomes on games against rivals is confirmed after orthogonalizing listing price increases to multiple proxies for demand.

As an illustration, Florida State had home games in Tallahassee against Notre Dame and the University of Florida during the 2014 college football season. For the home game against the fifth ranked team, Notre Dame, Airbnb units in Tallahassee were listed for an average listing price of \$201. Each unit was booked for this game, resulting in an average rental income of \$201. However, five weeks later, on the home game against the unranked but rival University of Florida team, the average listing price in Tallahassee was increased to \$267 but an average rental income of only \$67 materialized.<sup>6</sup> Across the full sample, for every dollar in rental income earned by Airbnb hosts on games against highly ranked non-rival teams, only \$0.71 is earned on games against rivals. For comparison, hotels obtain \$0.96 in revenue on games against rivals relative to their revenue on games against highly ranked non-rival teams.

Figure 1 illustrates the listing price differences for Airbnb units relative to hotel room prices on games against rivals. This figure also illustrates that hotel prices increase more than Airbnb listing prices on homecoming, which corresponds to a large influx of home team fans (Alumni). Therefore, Airbnb hosts do not systematically increase their listing prices more than hotel prices on home games. Instead, Airbnb hosts target rival fans with high listing prices.<sup>7</sup> Placebo tests confirm that rival games are unique as we find no evidence of an inverse relation between listing price increases and rental incomes on homecoming games

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<sup>6</sup>Individual Airbnb hosts can experience a larger loss than the average loss on rival games since each unit's occupancy is binary and zero rental income is the consequence of setting too high a listing price.

<sup>7</sup>Although hosts without a booking may be more likely to attend a home game, this possibility cannot explain the inverse relation between listing price increases and rental incomes that is unique to rival games.

or home games against highly ranked non-rival visiting teams.

A further analysis reveals that the financial constraints of hosts influence listing prices and consequently rental incomes. We divide the zip codes within each college town into areas where residents are either financially unconstrained and financially constrained based on their utilization of available credit. Higher listing prices on games against rivals are concentrated among financially unconstrained hosts. Indeed, financially unconstrained hosts and financially constrained hosts earn similar rental incomes; averaging \$189 and \$187 per night, respectively, on games against highly ranked non-rival visiting teams. However, on games against rivals, the average rental income of financially unconstrained hosts declines by over 20% to \$149, while the average for financially constrained hosts is nearly unchanged at \$183. This evidence indicates that financial constraints reduce the impact of non-pecuniary preferences on household financial decisions. Intuitively, animosity toward rival affiliations is a luxury that financially constrained hosts cannot afford to incorporate into their listing prices.

In contrast to entire units, shared units on Airbnb have common facilities (bathroom, kitchen, etc) and are suitable for visiting fans of the home team such as Alumni. Thus, self-selection in the real estate market (Longhofer and Peters (2005)) enables Airbnb hosts to infer whether prospective guests are fans of the rival team or home team based on their choice of an entire unit or shared unit, respectively. We find that both financially unconstrained hosts and financially constrained hosts of shared units do not increase their listing prices on games against rivals. This finding is consistent with rival visiting fans avoiding shared units to avoid interactions with the local population.

Finally, we examine two alternative hypotheses for the high listing prices on games against rivals. First, we find no evidence that high listing prices are needed to compensate hosts for the cost (inconvenience) of having to vacate their Airbnb unit and temporarily relocate. This compensation would apply to any booking, including those on away games. However, as low listing prices on away games do not decrease the supply of Airbnb units, high listing

prices are not necessary to compensate hosts for having to temporarily relocate.<sup>8</sup> Second, we find no evidence that higher listing prices on games against rivals is compensation for higher expected property damage. Indeed, the influence of financial constraints on listing prices is difficult to reconcile with hosts expecting greater damage on games against rivals. While financial constraints can reduce the impact of non-pecuniary preferences on listing prices, financial constraints are unlikely to influence host expectations regarding damage. Airbnb hosts are also less likely to block their unit from being rented on games against rivals compared to other home games. Furthermore, the probability that units booked on games against rivals subsequently become unavailable for rent is not higher compared to units booked on games against non-rivals. This result suggests that providing accommodations to rival fans is not associated a higher likelihood of damage that subsequently prevents the unit from being rented. Airbnb also provides hosts with a million dollars in property insurance.<sup>9</sup>

In terms of economic significance, the inability to obtain a booking on the Saturday night of a home game against a rival team results in an average rental loss of \$325.06 or 33.9% of the unit's monthly mortgage payment. Similarly, the failure to obtain a booking for both Friday and Saturday night results in a \$662.37 loss, or 68.8% of the unit's monthly mortgage payment. The magnitude of this dollar-denominated loss parallels Agarwal, Ben-David, and Yao (2017)'s finding that poor mortgage decisions cost households an average of \$700 per refinancing. However, in contrast to these infrequent financial decisions, the failure to obtain bookings on home games during to a non-pecuniary preference represents a *recurring* loss.

Our study documents the considerable influence that non-pecuniary preferences exert on household financial decisions. While non-pecuniary preferences have been found to affect the returns to wine, art, stamps, and socially responsible investments (Dimson, Rousseau, Spaenjers (2015), Dimson and Spaenjers (2011), Hong and Kacperczyk (2015), and Mandel (2009)), the advantage of studying real estate is this asset's importance to household finance

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<sup>8</sup>Intuitively, the Airbnb units in our sample are unlikely to have full time occupants.

<sup>9</sup>The website [www.airbnb.com/guarantee](http://www.airbnb.com/guarantee) details the insurance provided by Airbnb to its hosts.

and the sharing economy. Furthermore, our results suggest that financial constraints weaken the influence of non-pecuniary preferences on household financial decisions. Our results also identify a geographic component to non-pecuniary preferences as college affiliations arise from personal experience. Thus, our findings are consistent with those in Kaustia and Knupfer (2008) and Choi, Laibson, Madrian, and Metrick (2009) that find households overweight personal experience when making financial decisions.

More broadly, our study contributes to both the household finance literature and the growing literature on the sharing economy that includes the studies of peer-to-peer online lending markets by Duarte, Siegel, and Young (2012) and Iyer, Khwaja, Luttmer, and Shue (2015). Compared to lenders setting interest rates, Airbnb hosts have more discretion when setting listing prices due to the uniqueness of their rental unit. Our results indicate that household financial decisions manifest taste-based price discrimination against specific affiliations that is more subtle than discrimination against a specific race or gender (Ge, Knittel, MacKenzie, and Zoepf (2016), Bertrand and Mullainathan (2004), King and Mieszkowski (1973)). Consequently, taste-based price discrimination may be more difficult to identify and eradicate in the sharing economy. Moreover, the importance of non-pecuniary preferences to household financial decisions is unlikely to be limited to college affiliations. Instead, our results motivate further research on the economic implications of non-pecuniary preferences involving political affiliations.

## **2 Data**

Using the Airbnb platform, guests can book accommodations at the listing prices specified by hosts on specific dates. Our analysis uses Airbnb information obtained from AIRDNA ([www.airdna.co](http://www.airdna.co)), which specializes in collecting and processing Airbnb data. Our sample of Airbnb units are located in college towns during the 2014 and 2015 college football seasons. In this sample, Airbnb bookings are concentrated on home football games and typically

involve two nights of accommodation. The start of the sample period ensures an adequate supply of Airbnb units in each college town, while the end of the sample period predates listing price recommendations provided by Airbnb. Thus, our results are less likely to be influenced by pricing algorithms that subsequently became available to hosts.

Variation in listing prices during the football season is dramatic for Airbnb units located in college towns since home games represent large anticipated demand increases for accommodations. We examine units whose listing price changes at least once during the football season to ensure the Airbnb hosts in our sample are active. Requiring at least one price change during the football season removes inactive hosts whose listing prices fail to account for the difference between home games versus away games. Initially, we focus on entire units that resemble large hotel rooms with self-contained facilities. Entire units are appropriate for visitors who prefer being physically separate from fans of the home team, although a later empirical test examines shared units.

We examine the top 30 ranked college football programs for the 2014 and 2015 football seasons. In alphabetical order, these teams include: Arizona State University, University of Alabama, University of Arkansas, Auburn University, University of California-Los Angeles, Clemson University, University of Florida, Florida State University, University of Georgia, University of Iowa, University of Kentucky, Louisiana State University, University of Michigan, Michigan State University, Mississippi State University, University of Nebraska, University of Notre Dame, Ohio State University, University of Oklahoma, University of Oregon, Oregon State University, Stanford University, University of Southern California, University of South Carolina, Texas Christian University, University of Tennessee, University of Texas, Texas Tech University, University of Utah, and University of Wisconsin.

To identify pairs of rivals, we require at least 50 prior games between the two teams. If a team does not have at least one home game against a rival, the team's entire season is eliminated from the sample. Our final sample consists for 236 unique home games, of which 42 games are against a rival. Appendix A contains a complete list of rivals. We identify

two determinants of a college football rivalry: rival teams have played each other for many years and have a won-loss record near parity. As the first game between rivals often occurred before long-distance travel was made convenient by interstate highways and aviation, rivals are often located in the same state or contiguous states. However, our empirical results are robust to controlling for the distance between college football stadiums.<sup>10</sup> This robustness is consistent with many visiting fans being Alumni who do not reside in the visiting team's college town after graduation.

We limit our main analysis to college towns with fewer than 1,000 entire unit listings on Airbnb per football season to exclude home games in urban areas such as Los Angeles (teams excluded: USC, UCLA, Stanford, and Texas). We also restrict our sample of Airbnb listings to units located within 15 miles from the stadium.

A unit-level Airbnb Listing Premium is calculated as the listing price on a specific game minus the unit's average listing price across all home games. A later robustness test computes the Airbnb Listing Premium as a percentage deviation rather than a dollar-denominated deviation. However, prospective guests are more likely to be concerned with dollar-denominated quantities than percentages since the former are posted on Airbnb. Our study also utilizes average hotel prices, occupancy rates, and income from STR, formerly known as Smith Travel Research, within a 15 mile radius of each college football stadium. A college town-level Hotel Premium is then computed as the average hotel price on a specific game minus the average hotel price across all home games, with a later robustness test also computing the Hotel Premium as a percentage deviation.

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<sup>10</sup>To clarify, there is little variation in stadium attendance across home games, although the composition of home team versus visiting team fans may vary if, for example, lower ranked visiting teams have fewer fans in attendance.

### 3 Empirical Results

To illustrate our testable joint-hypothesis regarding unit-level listing price increases and rental incomes, the absence of non-pecuniary preferences implies the host sets the listing price to maximize their unit's rental income

$$\text{Rental Income} = \text{Listing Price} \times \text{Probability}(\text{Occupancy}|\text{Listing Price}) . \quad (1)$$

For simplicity, assume occupancy is determined by the following decreasing linear function

$$\text{Probability}(\text{Occupancy}|\text{Listing Price}) = 1 - \alpha P$$

where  $\alpha > 0$  defines the demand curve for accommodations. In our empirical estimation, variation in  $\alpha$  across home games is captured by hotel prices, team rankings, and game characteristics. With  $P$  denoting the unit's listing price, the maximization in equation (1) is equivalent to maximizing  $P \times [1 - \alpha P]$ , which obtains its maximum at  $\frac{1}{4\alpha}$  by setting  $P = \frac{1}{2\alpha}$ .

To incorporate non-pecuniary preferences against rival fans, let  $P_R = P + D$  denote a host's listing price on games against rivals.  $D$  differs from  $\alpha$  along two dimensions. First, our empirical implementation only allows  $D$  to be non-zero on games against rivals, while  $\alpha$  can vary across home games due to differences in demand. Second, in contrast to  $\alpha$ ,  $D$  can vary across hosts. As non-pecuniary preferences against rival fans increase listing prices beyond levels justified by demand, rental income is reduced to  $\frac{1}{4\alpha} - \alpha D^2$  on games against rivals.<sup>11</sup>

Overall, evidence that non-pecuniary preferences confound household financial decisions requires both higher listing prices and lower rental incomes on games against rivals. This

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<sup>11</sup>The constraint  $D \leq \frac{1}{2\alpha}$  prevents the host's occupancy, and rental income, from being negative by preventing the host from setting a listing price that is twice the amount justified by demand.

inverse relation occurs when listing price increases induce a sufficiently large reduction in occupancy.

### 3.1 Summary Statistics

Table 1 reports the average number of units listed, listing price, rental income, listing premium, and occupancy rate on different home games for entire units listed on Airbnb. For comparison, the average price, revenue, hotel premium, and occupancy rate of hotels are also reported. The average Airbnb listing price of \$277.06 across home games is highest on games against rival visiting teams, which corresponds to the highest Airbnb listing premium of \$28.77 but the lowest occupancy rate of 65.03%. As a consequence of the low occupancy on games against rivals, these home games fail to generate the highest average rental income.

In contrast to Airbnb units, hotel prices are not the highest on games against rivals. Instead, hotel price increases are largest on games against top-ranked visiting teams (both incoming rankings and pre-season rankings), whereas Airbnb hosts only marginally increase their listing prices on games against top-ranked visiting teams. The occupancy rate of Airbnb units and hotels are both highest for games against top-ranked visiting teams, suggesting that these games are associated with the highest demand for accommodations.

Table 1 also reports that the supply of entire units listed on Airbnb is stable across both home and away games. Consequently, lower rental income on games against rivals cannot be attributed to an increased supply of Airbnb units. Moreover, the supply of Airbnb units does not decrease on away games when listing prices are low. If hosts required compensation for the cost (inconvenience) of having to temporarily relocate, this compensation would apply to all bookings, including bookings on away games that are transacted at low listing prices. Thus, the stable supply of Airbnb units at low listing prices indicates that high listing prices are not necessary to compensate hosts for the cost (inconvenience) associated with having to temporarily relocate. Hosts can block their unit from being rented on dates they intend

to occupy the unit. Blocking reflects demand by hosts for a unit, rather than the demand by guests. While blocking lowers the supply of Airbnb units, games against rivals correspond with the least amount of blocking. Instead, among home games, blocking is highest on homecoming.

In addition, the occupancy rate of hotel rooms is consistently below 100%, especially on games against rivals. Therefore, as Airbnb listing prices are not set in an environment where hotel rooms are unavailable. Instead, later results indicate that hotel room and Airbnb units are substitutes.<sup>12</sup>

### 3.2 Listing Price

While ex-post sporting outcomes (Edmans, Garcia, and Norli (2007)) can affect sentiment, the listing prices we study are set by hosts before the game. Specifically, the high average listing premium on games against rivals in Table 1 motivates an analysis of listing premiums using the following panel regression

$$\text{Airbnb Listing Premium}_{i,t} = \beta_1 \text{Rival}_{i,t} + \gamma X_t + \epsilon_{i,t}, \quad (2)$$

in which standard errors are clustered at the team level. This specification includes unit fixed effects that control for the each unit’s quality, including its location (distance to the stadium). The additional control variables that define  $X$  are proxies for demand. These proxies include an indicator variable for games during prime time, which equals one if the game occurs after 5pm local time, and an indicator variable for homecoming games. The rank of the home team and the rank of the visiting team before the game are also included (specifically the natural log of both ranks), along with an indicator variable for whether the opponent was

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<sup>12</sup>Unreported results examine a subset of Airbnb units that accommodate between one and four adults, which is comparable to a standard hotel room. As few Airbnb units accommodate more than four adults, our results are similar for this “matched” subset.

ranked among the top 25 teams in college football before the season started. The number of entire units listed on Airbnb accounts for the supply of Airbnb accommodation. A full list of variable definitions is contained in Appendix B.

To clarify, a unit's Airbnb Listing Premium varies across different home games. While the inclusion of unit fixed effects also converts listing prices into a similar premium, our next analysis has rental income as the dependent variable and conditions on the Airbnb Listing Premium in order to examine the unit-level relation between listing price increases and rental incomes. Nevertheless, a later robustness test replaces the price premium with unadjusted listing prices as the dependent variable in equation (2) and finds similar results.

The  $\beta_1$  coefficient for Rival in equation (2) determines whether games against rivals are associated with a larger listing premium after controlling for a multitude of demand proxies. The positive  $\beta_1$  coefficients in Panel A of Table 2 indicate that Airbnb hosts significantly increase their listing prices on games against rivals. For example, the 23.578 coefficient ( $t$ -statistic of 5.486) in the last specification indicates that listing prices are nearly \$24 higher on games against rivals compared to the average home game, after accounting for demand.

The results in Panel A of Table 2 indicate that Airbnb listing prices co-move with hotel prices. This finding is consistent with hotel rooms and entire units on Airbnb being substitutes. The negative coefficients for the Prime Time Game indicator variable are at odds with the positive coefficients in Panel B of Table 2 for hotels. Intuitively, prime time games are important, although the interpretation of this indicator function's coefficient is complicated by its correlation with the Hotel Premium since this premium is higher on prime time games according to our next analysis.

Hotel prices are unlikely to be influenced by non-pecuniary preferences regarding team affiliations due to governance mechanisms that ensure their pricing maximizes income. With hotel prices providing a proxy for demand, we repeat the estimation of equation (2) using Hotel Premium as the dependent variable.<sup>13</sup> Panel B of Table 2 reports that hotel prices

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<sup>13</sup>To clarify, hotel prices refer to transaction prices. An alternative demand benchmark based on hotel

are consistently higher on homecoming games but not on games against rivals since the  $\beta_1$  coefficient for the Rival indicator variable is only marginally significant in a subset of specifications. Thus, games against rivals are not necessarily associated with greater demand.

In contrast to games against rivals, the positive coefficient for the Homecoming indicator variable signifies higher demand for accommodations. The positive coefficient for the Prime Time Game indicator variable also signifies that hotels increase prices for games that are likely to attract a large television audience. As the rank variable is larger for lower quality teams, a negative coefficient for Opponent's Rank would signify smaller price increases on games against lower quality opponents. Conversely, the positive coefficient for the Pre-Season Top 25 Opponent indicator variable signifies that highly-ranked opposing teams increase prices. This increase can be attributed to the greater willingness of fans to travel with a highly-ranked team, which increases the demand for accommodations. Compared to the insignificant coefficient for Opponent's Rank, the positive coefficient for Pre-Season Top 25 Opponent indicator function indicates that these fans book accommodation far in advance of the game.

### 3.3 Rental Income

Conditional on a unit being booked, the unit's rental income equals its respective listing price. Without a booking, rental income equals zero. Our next analysis examines the impact of unit-level listing premiums on rental incomes using the following panel regression

$$\begin{aligned} \text{Rental Income}_{i,t} = & \beta_1 \text{Airbnb Listing Premium}_{i,t} + \beta_2 \text{Rival}_{i,t} \\ & + \beta_3 \text{Airbnb Listing Premium}_{i,t} \times \text{Rival}_{i,t} + \gamma X_t + \epsilon_{i,t}, \end{aligned} \quad (3)$$

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listing prices produces identical findings.

with unit fixed effects. A negative  $\beta_3$  coefficient for the interaction variable (Airbnb Listing Premium  $\times$  Rival) signifies that listing price increases on games against rivals are inversely related to rental income.

The positive  $\beta_1$  coefficients in Table 3 are consistent with hosts earning higher rental incomes by setting higher listing prices. This finding captures the relation between higher listing prices and greater demand. According to Table 3, the  $\beta_1$  coefficient equals 0.753 ( $t$ -statistic of 14.255) in the specification with all control variables. However, the insignificant  $\beta_2$  coefficients and negative  $\beta_3$  coefficients in Table 3 indicate that hosts increase listing prices on games against rivals to levels that lower their respective rental incomes. In the specification with all control variables, the  $\beta_3$  coefficient equals -0.289 ( $t$ -statistic of -2.311). This reduction in rental income indicates that preferences regarding team affiliations confound the listing prices set by households, and consequently reduces household income.<sup>14</sup> The inverse relation between listing prices and rental incomes captured by the  $\beta_3$  coefficient is unlikely to be explained by inexperience or a lack of information regarding demand on rival games. Indeed, Airbnb hosts have months to lower their listing price and have access to both the occupancy status as well as the listing price of other Airbnb units.

The economic significance of our results are comparable to those of Agarwal, Ben-David, and Yao (2017). These authors find that poor mortgage decisions cost households approximately \$700 per financing. Failure to secure a guest booking on a game against a rival due to a high listing price translates into a similar dollar-denominated loss (over three nights). However, this recurring loss would typically occur each year, while a mortgage refinancing is less frequent. Furthermore, our results may underestimate the economic importance of college football rivalries in the total population since “superfans” are unlikely to rent their units on home games.<sup>15</sup>

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<sup>14</sup>Although equation (1) indicates that rental income is a quadratic function of a unit’s listing price, unreported results confirm that our empirical results are robust to the inclusion of squared and cubed listing premiums that capture this non-linearity.

<sup>15</sup>Across all Airbnb hosts with entire units, unreported results indicate that 11.75% block their unit from

The positive coefficients for the Homecoming and Pre-Season Top 25 Opponent indicator variables indicate that higher demand for accommodations on these games leads to higher rental income. Later placebo tests replace the Rival indicator variable with an indicator variable for homecoming games and another indicator variable for games against opponents ranked among the top 25 teams before the start of the season.

### 3.4 Extensions

Several robustness tests confirm the impact of rival games on the listing prices and rental incomes of Airbnb hosts. The first robustness test jointly estimates equations (2) and (3) using a Seemingly Unrelated Regression (SUR) procedure. The results in Panel A of Table 4 are consistent with our earlier results as the  $\beta_1$  coefficient is positive and the  $\beta_3$  coefficient is negative in the analysis of listing prices and rental incomes, respectively. In particular, the joint estimation of these coefficients does not alter our earlier conclusion that hosts increase listing prices on games against rivals to a level that reduces their rental incomes.

The second robustness test replaces the dollar-denominated Airbnb Listing Premium and the dollar-denominated Hotel Premium with premiums that are expressed as percentage deviations before re-estimating equations (2) and (3). The results in Panel B of Table 4 confirm that Airbnb hosts increase listing prices on games against rivals to a level that reduces their respective rental income. Specifically, after expressing the Airbnb Listing Premium and Hotel Premium as percentage deviations instead of dollar-denominated deviations, we continue to find a positive  $\beta_1$  coefficient in equation (2) and a negative  $\beta_3$  coefficient in equation (3).

The third robustness test replaces the Airbnb Listing Premium in equation (2) with unadjusted Airbnb listing prices. In this specification, unit-fixed effects capture listing price deviations from the average listing price across all home game. The  $\beta_1$  coefficient in Panel 

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being rented on every home game. These “superfans” may attend each home game, although their units do not have listing prices on home games to analyze.

C of Table 4 equals 25.996 ( $t$ -statistic of 5.783) when the dependent variable is unit-level listing prices. This coefficient's magnitude parallels its counterpart in Panel A of Table 2 for the Airbnb Listing Premium.

Overall, three robustness tests confirm that our main results regarding listing prices and rental incomes on home games against rival visiting teams is insensitive to different econometric implementations.

### 3.5 Residual Airbnb Listing Premium

To ensure our results are not driven by demand, we construct a unit-level Residual Listing premium by regressing the original Airbnb Listing Premium on the Hotel Premium of each college town. This Residual Listing Premium is defined by the residual from this regression and captures listing price increases that are orthogonal to demand. Equations (2) and (3) are then re-estimated using the Residual Listing Premium.

The results in Table 5 parallel our earlier results as the  $\beta_3$  coefficient for the interaction between the Residual Listing Premium and the Rival indicator variable is negative. Therefore, after controlling for demand using hotel prices, the results in Table 5 confirm that non-pecuniary preferences offer the most likely explanation for the inverse unit-level relation between listing price increases and rental incomes on games against rivals.

### 3.6 Placebo Tests for Demand

Homecoming games coincide with an influx of home team fans. Therefore, homecoming games are associated with a high demand for accommodation and a friendly atmosphere.

We then re-estimate equation (3) after replacing the Rival indicator variable with the indicator variable for Homecoming. Panel A of Table 6 reports insignificant  $\beta_3$  coefficients for the interaction variable defined as Airbnb Listing Premium  $\times$  Homecoming. Thus, there does not appear to be an inverse unit-level relation between listing prices and rental incomes

on homecoming games, despite the high demand for accommodations on homecoming.

Games against highly ranked visiting teams that are not rivals are also associated with a high demand for accommodation. Thus, our second placebo test replaces the Rival indicator variable with an indicator variable for games against opponents that were ranked in the top 25 before the start of the college football season. Panel B of Table 6 reports insignificant  $\beta_3$  coefficients for games against top ranked teams.

Overall, our placebo tests indicate that Airbnb hosts do not set suboptimal listing prices on homecoming games and games against top ranked opponents. Thus, we do not find evidence that Airbnb hosts systematically overestimate demand. Instead, the inverse relation between listing price increases and rental incomes is limited to games against rivals.

### 3.7 Distance to Stadium

Although unit fixed effects are included in our empirical specifications, we estimate equations (2 and (3) separately for units whose distance from the stadium is within 15 miles, 10 miles, 5 miles, and 1 mile, respectively. These separate estimations determine whether the inverse unit-level relation between listing price increases and rental incomes on games against rivals is sensitive to the location of Airbnb units. For example, one may conjecture that units nearer to the stadium have hosts who are either more devout fans of the home team or are more concerned about their unit being damaged.

The results in Table 7 illustrate the robustness of our main finding with respect to the location of Airbnb units. Specifically, the  $\beta_1$  coefficients in equation (2) are consistently positive and the  $\beta_3$  coefficients are consistently negative in equation (3) within each of the four distance subsets. Therefore, the inverse relation between listing price increases and rental incomes on games against rivals that identifies the impact of non-pecuniary preferences is insensitive to an Airbnb unit's location.

## 4 Financial Constraints

Financial constraints can explain heterogeneity across the financial decisions of households (Campbell, 2006). To examine the impact of financial constraints, we collect the average credit utilization score of individual zip codes from Experian. The credit utilization score divides outstanding credit card debt by the total available credit, with the availability of credit reflecting household income. Zip codes where the average credit utilization score is above a college town's median credit utilization score are classified as having financially constrained hosts, while zip codes where the average credit utilization score is below this median are classified as having financially unconstrained hosts.<sup>16</sup>

A household's credit utilization score is determined by its credit card debt, not mortgage debt. Thus, financial constraints are not necessarily higher for households who utilize the tax deductibility of mortgage interest. Indeed, the average credit utilization score in a zip code is independent of the average mortgage payment. Zip-code level credit utilization scores range from 15 to 37 percent, with right skewness indicating that residents in several zip codes have significantly less available credit.

Equation (2) and equation (3) are re-estimated separately for financially constrained and financially unconstrained hosts. According to Panel A Table 8, financially unconstrained hosts have larger listing premiums on games against rivals than financially constrained hosts. In particular, according to equation (2), the  $\beta_1$  coefficient for financially unconstrained hosts is 31.885 ( $t$ -statistic of 4.312) compared to 19.099 ( $t$ -statistic of 4.116) for financially constrained hosts. This difference is significant at the 5% level. Thus, financially unconstrained hosts set listing price that are 60% larger than financially constrained hosts on games against rivals.

In terms of rental income, Panel B of Table 8 indicates that among financially uncon-

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<sup>16</sup>Results are similar if the median credit utilization score across all zip codes is used to distinguish financially constrained hosts from financially unconstrained hosts.

strained hosts, the  $\beta_3$  coefficient in equation (3) for the interaction between the Airbnb Listing Premium and the Rival indicator variable equals -0.506 ( $t$ -statistic of -3.336). This coefficient is significantly more negative than its counterpart in Table 3 for the entire sample. In contrast, the  $\beta_3$  coefficient is insignificant among financially constrained hosts.

Although financially constrained hosts set higher listing prices on games against rivals, these hosts are likely to be aware of the suboptimal listing prices set by their financially unconstrained counterparts on these games since this information is readily available on Airbnb. Thus, financially constrained hosts can increase their listing prices less dramatically and obtain bookings to take advantage of the suboptimal listing prices set by financially unconstrained hosts on games against rivals.

The following in-sample averages summarize the economic implications of financial constraints. The average rental income of financially unconstrained hosts is similar to financially constrained hosts on games against highly ranked non-rival teams; \$189.42 compared to \$187.23, respectively. Thus, financial constraints do not affect the average rental income of Airbnb hosts on games against non-rival teams. However, on games against rival teams, the average rental income of financially unconstrained hosts declines by over 20% to \$149.24, while the average rental income of financially constrained hosts is almost unchanged at \$182.56.

Although the exact location of Airbnb hosts is unknown, our analysis assumes that hosts have a credit utilization score that parallels the average score near their Airbnb listing. In support of this assumption, we define professional hosts as those with more than one property listed on Airbnb. Of the 155 professional hosts in our sample, 133 have Airbnb listings in areas with the same financial constraint classification. Furthermore, professional hosts typically manage properties in the same zip code since these hosts have an average of 2.85 units in 1.34 zip codes. This geographic concentration is consistent with the need for hosts to actively manage their short-term rentals. In unreported results, the inverse relation between listing prices and rental incomes strengthens after removing 317 observations where

the financial constraints of professional hosts are ambiguous since the misidentification of financial constraints weakens their relation with listing prices and rental incomes.

An additional analysis confirms that zip codes with higher average incomes have less financially constrained hosts.<sup>17</sup> Moreover, after estimating equation (3) separately for high income and low income zip codes within each college town, an unreported robustness test finds a negative  $\beta_3$  coefficient for high income zip codes and an insignificant  $\beta_3$  coefficient for low income zip codes. Therefore, the inverse relation between listing price increases and rental incomes on games against rivals is limited to high income zip codes. Intuitively, animosity toward rival team affiliations is a luxury that low income hosts cannot afford to incorporate into their listing prices.

Overall, financial constraints appear to reduce the impact of non-pecuniary preferences on household financial decisions. This evidence is difficult to reconcile with the over-estimation of demand since this alternative explanation requires financially unconstrained hosts, whose low credit card balances are presumably a signal of financial sophistication, to be less sophisticated at setting listing prices.

If financially unconstrained hosts are more likely to attend home games and occupy their unit, then blocking is predicted to be higher for financially unconstrained hosts. However, in unreported results, blocking is insensitive to the financial constraints of hosts.<sup>18</sup> Furthermore, the average guest rating assigned to hosts is insensitive to financial constraints. As the majority of guest ratings are favorable, accommodating rival fans once or twice a year is unlikely to significantly lower a host's average rating. Consequently, the high listing premium on games against rivals is not compensation for the risk of receiving a poor review. If rival fans did systematically assign lower ratings to their host, this risk would apply to all hosts.

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<sup>17</sup>In contrast to income and credit utilization, mortgage payments exhibit less variability across the zip codes in a college town.

<sup>18</sup>In contrast to blocking, which essentially sets an infinite listing price, setting a high listing price on games against rivals provides the host with an opportunity to obtain the satisfaction of "price-gouging" a rival fan (despite lowering the host's expected rental income). This satisfaction is consistent with a non-pecuniary preference against rival fans.

Therefore, the risk of being assigned a low rating by rival fans cannot explain variation in the Airbnb Listing Premium across financial constraints.

## 4.1 Professional Hosts

Every host on Airbnb is assigned a unique host identification number that is linked with each of their property listings. We classify an Airbnb host as a professional if they have multiple properties listed on Airbnb. Professionals comprise 13.7% of hosts and are responsible for managing 25.5% of the listings in our sample.

As professionals may have stronger incentives to maximize their rental income, we divide our sample of financially unconstrained hosts into professionals and non-professionals. Within each of these two subsets, we then determine whether the non-pecuniary preferences of professional financially unconstrained hosts differ from their non-professional counterparts.

According to Table 9, the inverse relation between unit-level listing price increases and rental incomes among financially unconstrained hosts is limited to non-professionals. Specifically, the  $\beta_3$  coefficient for the Airbnb Listing Premium  $\times$  Rival interaction is -0.527 ( $t$ -statistic of -2.786) for non-professional hosts. In contrast, this coefficient is insignificant for professional hosts. Overall, despite their relative lack of financial constraints, the financial decisions of professional hosts appear to be unaffected by non-pecuniary preferences toward fans of the rival team.

## 4.2 Shared Units

Taste-based discrimination (Becker, 1957) can explain why Airbnb hosts accept lower rental incomes on games against rivals. Longhofer and Peters (2005) connect taste-based discrimination with self-selection in the real estate market. Motivated by this self-selection, we extend our empirical analysis to examine shared units on Airbnb.

The physical separation from the local population offered by entire units is important for

visiting fans of the rival team but not for visiting fans of the home team such as Alumni. Thus, while visiting fans of the rival team are expected to avoid shared units in favor of entire units, shared units are suitable for visiting fans of the home team. Intuitively, although hosts cannot discriminate against guests by denying their bookings due to the Instant Book feature, the team affiliation of prospective guests can be inferred through their choice of either entire units or shared units. Thus, we predict that hosts of shared units do not have a non-pecuniary preference against potential guests on games against rivals since these units are more likely to appeal to fans of the home team.

To examine the difference between entire units and shared units on Airbnb, we re-estimate equation (2) for shared units. Table 10 reports that rival games are not associated with higher listing prices for shared units, regardless of financial constraints. The insignificant  $\beta_1$  coefficient is consistent with shared units appealing to fans of the home team (alumni) rather than fans of the rival team. Observe that shared units are as likely to have a financially unconstrained host as a financially constrained host, and the insignificance of the  $\beta_1$  coefficient for shared units is not attributable to financial constraints.

## 5 Robustness of the Rival Designations

Any error in the classification of rival teams would weaken our empirical support for the joint-hypothesis that listing prices are higher and rental incomes are lower on games against rivals. Nevertheless, to ensure our classification of rival teams is capturing the mutual disdain between rival fans, we compile data on disorderly conduct violations and ejections (incidents) occurring at the stadium.<sup>19</sup> Stadium incidents are available for a subset of colleges, typically state-funded institutions, that provide these statistics. We then estimate a team fixed effects model where the dependent variable is the number stadium incidents, and control for game

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<sup>19</sup>Rees and Schnepel (2009) report increased crime surrounding the location of college football games, while Card and Dahl (2011) link unexpected losses in the National Football League to increased domestic violence.

characteristics such as the opponent's rank, home team's rank, homecoming, and whether the game began at 5pm or later (Prime Time Game).

In Table 11, our main variable of interest, Rival, has a positive coefficient of 16.064 ( $t$ -statistic of 2.675) in the full specification. Thus, consistent with the mutual disdain between rival fans, there are more stadium incidents on games against rivals. In contrast, homecoming games, which are typically associated with a friendly opponent, have fewer stadium incidents as indicated by Homecoming's negative coefficient of -5.998 ( $t$ -statistic of -2.244).

The positive coefficient of the Prime Time Game indicator variable is consistent with more important college football games eliciting stronger emotions. Similarly, higher ranked opponents lead to more stadium incidents. In particular, the Pre-Season Top 25 Opponent indicator variable has a positive coefficient, while Opponent's Rank has a negative coefficient. These coefficients are consistent with fans of higher ranked teams being more willing to travel with the visiting team, thereby increasing the likelihood that opposing fans interact at the stadium.

## 6 Expected Damage

Several results indicate that the high listing prices on games against rivals are not compensating hosts for higher expected damage. Thus, the inverse relation between unit-level listing price increases and rental incomes on games against rivals captures the impact of non-pecuniary preferences on household financial decisions, not the higher cost of providing accommodations to rival fans.

Besides the insurance provided by Airbnb to hosts, unreported results confirm that Airbnb hosts do not increase their required damage deposits on games against rivals. Furthermore, hotel rooms are also susceptible to damage but hotel prices are not significantly higher on rival games. In addition to retaining the credit card information of guests, Airbnb hosts rate guests. This rating provides a further incentive for guests to act responsibly.

Moreover, variation in listing prices attributable to financial constraints is unlikely to explain the likelihood that a unit is damaged. Finally, Airbnb hosts can block their unit from being booked on specific dates. However, in unreported results, units booked on rival games are not more likely to be blocked during the following week. Consequently, we do not find evidence that units booked by rival fans are more likely to require repairs.

Furthermore, the results in Table 11 for stadium incidents cannot explain the high listing prices on games against rivals. For example, Panel B of Table 2 indicates that homecoming games are associated with high hotel prices, while Table 11 indicates that homecoming games are associated with fewer stadium incidents. Similarly, games against a higher ranked opponent have more stadium incidents but a lower listing prices than games against rivals. Therefore, incidents at the stadium that arise from interactions between opposing fans do not imply higher expected damage for Airbnb units (and hotel rooms) that physically separate fans of the rival team from the local population.

## 7 Conclusion

We study the impact of non-pecuniary preferences on household financial decisions and find that non-pecuniary preferences against fans of a rival college team lead Airbnb host to set listing prices that are too high. Specifically, listing price increases on games against rival teams lower the rental incomes of Airbnb hosts. This inverse relation between listing price increases and rental income is concentrated among financially unconstrained hosts. Thus, financial constraints reduce the impact of non-pecuniary preferences on household financial decisions.

While our results are specific to a certain laboratory setting, namely rental accommodations in college towns, they highlight an important issue in the rapidly expanding sharing economy. Price-setting by households may differ substantially from price-setting by corporations. Specifically, we find that the listing prices set by Airbnb hosts are altered by

non-pecuniary preferences. Our results also identify the importance of professional management in “rationalizing” the sharing economy as the pricing decisions of professional Airbnb hosts, some of which are rental management companies, are less affected by non-pecuniary preferences.

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Table 1: Summary Statistics

This table reports the average number of units in each college town listed on Airbnb as well as the average listing price, rental income, Airbnb listing premium, occupancy, and the number of blocked units on games against rival and non-rival teams. The listing premium for Airbnb units is computed at the unit level as the listing price on a specific game minus the average listing price for all home games during the season. The number of units blocked refers to units that hosts prevent from being booked. For comparison, the average price, revenue, hotel premium, and occupancy rate of hotels is also reported. Hotel Premium is computed at the city level as the average hotel price minus the average hotel price for all home games during the season. The Airbnb sample consists of entire units located in college towns whose listing price changes at least once during the football season. The average price, rental income, listing premium, and occupancy rate are also reported for hotels within a fifteen mile radius of the football stadium. Rival teams are identified in Appendix A. Pre-Season Top 25 opponents are teams classified as a top 25 football program at the start of the season by the Associated Press Poll. Incoming Top 25 Opponents are teams among the top 25 teams before the game. Homecoming refers to games on homecoming weekend.

Airbnb	Number of Units	Listing Price	Rental Income	Airbnb Listing Premium	Occupancy Rate	Units Blocked
Rival	31	\$277.06	\$176.36	\$28.77	65.03%	4.85
Pre-Season Top 25 Opponent (Non-Rival)	33	\$259.57	\$185.05	\$7.06	68.01%	6.19
Incoming Top 25 Opponent (Non-Rival)	32	\$260.55	\$198.35	\$8.87	69.15%	5.94
Homecoming (Non-Rival)	31	\$247.13	\$144.54	\$2.90	65.06%	6.53
Away Games	31	\$201.68	\$54.23	-\$34.48	37.13%	

Hotel	Price	Revenue	Hotel Premium	Occupancy Rate
Rival	\$160.17	\$138.20	\$13.51	83.72%
Pre-Season Top 25 Opponent (Non-Rival)	\$172.59	\$154.97	\$19.56	88.61%
Incoming Top 25 Opponent (Non-Rival)	\$162.73	\$146.06	\$16.18	88.48%
Homecoming (Non-Rival)	\$149.68	\$131.87	\$5.77	87.09%



Panel B: Determinants of the Hotel Premium

	Hotel Premium					
Rival	16.440*** (-3.299)	10.031* (-1.874)	10.092* (-1.873)	7.466 (-1.538)	7.697* (-1.728)	9.393* (-1.982)
Opponent's Rank	-11.974*** (-4.101)	-12.000*** (-4.073)	-4.193 (-1.501)	-4.606* (-1.819)	-4.34 (-1.819)	-4.34 (-1.655)
Home Team's Rank		1.004 (-0.951)	1.117 (-0.979)	1.32 (-1.103)	1.32 (-1.103)	1.115 (-0.960)
Pre-Season Top 25 Opponent			22.546*** (-5.686)	19.489*** (-5.086)	19.489*** (-5.086)	20.314*** (-5.351)
Prime Time Game				9.916*** (-3.411)	9.916*** (-3.411)	9.868*** (-3.515)
Homecoming						11.985*** (-3.626)
Observations	236	236	236	236	236	236
R-squared	0.054	0.157	0.158	0.243	0.272	0.296



Table 4: Additional Results

This table reports the coefficients from three robustness tests that modify the unit fixed effects panel regressions in Equation (2) and Equation (3). In Panel A, the results from a Seemingly Unrelated Regression (SUR) that jointly estimates the two equations are recorded. In Panel B, the Airbnb Listing Premium and the Hotel Premium are expressed as percentage deviations from their respective benchmark rather than as dollar-denominated deviations. In Panel C, the Airbnb Listing Premium is replaced with unadjusted Airbnb listing prices as the dependent variable in Equation (2). The sample consists of entire units on Airbnb and hotels located in college towns. Rival is an indicator variable that equals one if the home game is against a rival opponent, and zero otherwise. Opponent's Rank is the incoming rank of the opponent prior to the start of the game, and equals 50 if the team is unranked. Home Team's Rank is the rank of the home team prior to the start of the game, and equals 50 if the team is unranked. Prime Time Game is an indicator variable equal to one if the game occurs at 5pm or later, and zero otherwise. Pre-Season Top 25 Opponent is an indicator variable equal to one if the incoming opponent was ranked a top 25 team on the Associated Press Poll at the start of the season, and zero otherwise. Homecoming is an indicator variable equal to one if the game takes place on the homecoming weekend, and zero otherwise. Distance refers to the number of miles separating the location of the home team and the visiting team. Appendix A contains the list of rival teams and Appendix B contains a description of each variable. *t*-statistics are reported in parentheses. Standard errors are clustered at the team level. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

	Panel A: SUR Regression		Panel B: Percentage Premiums (Airbnb and Hotel)		Panel C: Listing Price	
	Airbnb Listing Premium	Rental Income	Airbnb Listing Premium	Rental Income	Airbnb Listing Price	Airbnb Listing Price
Airbnb Listing Premium		0.757*** (33.791)		217.634*** (4.892)		
Rival	24.328*** (7.232)	-5.853 (-1.113)	0.077*** (5.537)	3.295 (0.261)	25.996*** (5.783)	
Airbnb Listing Premium × Rival		-0.294*** (-5.900)		-133.540*** (-2.826)		
Opponent's Rank	-8.082*** (-3.363)	-14.024*** (-3.817)	-0.010 (-0.532)	-21.324* (-1.845)	-6.001 (-0.968)	
Home Team's Rank	-2.819 (-1.380)	-6.168** (-1.976)	-0.011 (-1.397)	-4.562 (-0.508)	-2.542 (-0.855)	
Prime Time Game	-14.159*** (-5.629)	13.900*** (3.605)	-0.046*** (-3.612)	18.497* (1.807)	-12.912*** (-3.008)	
Pre-Season Top 25 Opponent	0.419 (0.136)	15.471*** (3.296)	0.004 (0.188)	22.621* (1.791)	1.698 (0.266)	
Homecoming	-1.355 (-0.436)	-4.880 (-1.026)	0.006 (0.290)	-4.933 (-0.684)	-1.263 (-0.217)	
Distance	0.498 (0.292)	-2.711 (-1.040)	-0.004 (-0.837)	-1.714 (-0.378)	2.385 (0.979)	
Number of Units	228.573** (2.356)	-91.463 (-0.617)	0.049** (2.698)	19.399** (0.085)	365.849 (1.502)	
Hotel Premium	0.805*** (15.710)	1.560*** (19.514)	0.345*** (3.030)	194.836*** (4.259)	0.804*** (4.124)	
Observations	6,564	6,564	6,564	6,564	6,564	
R-squared	0.082	0.635	0.105	0.209	0.078	
Number of Unique Units	1,320	1,320	1,320	1,320	1,320	

Table 5: Residual Listing Premium

This table reports the coefficients from the unit fixed effects panel regression where the rental income of Airbnb units is the dependent variable. Residual Listing Premium is computed by regressing the Airbnb Listing Premium onto the Hotel Premium. Airbnb Listing Premium is computed at the unit level as the listing price on a specific game minus the average listing price for all home games during the season. Hotel Premium is computed at the city level as the average hotel price on a specific minus the average hotel price for all home games during the season. Rival is an indicator variable that equals one if the home game is against a rival opponent, and zero otherwise. Opponent's Rank is the incoming rank of the opponent prior to the start of the game, and equals 50 if the team is unranked. Home Team's Rank is the rank of the home team prior to the start of the game, and equals 50 if the team is unranked. Prime Time Game is an indicator variable equal to one if the game occurs at 5pm or later, and zero otherwise. Pre-Season Top 25 Opponent is an indicator variable equal to one if the incoming opponent was ranked a top 25 team on the Associated Press Poll at the start of the season, and zero otherwise. Homecoming is an indicator variable equal to one if the game takes place on the homecoming weekend, and zero otherwise. Distance refers to the number of miles separating the location of the home team and the visiting team. Appendix A contains the list of rival teams and Appendix B contains a description of each variable. *t*-statistics are reported in parentheses. Standard errors are clustered at the team level. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

	Airbnb Listing Premium	Rental Income		
Hotel Premium	0.891*** (4.472)			
Rival		30.942* (1.846)	23.345 (1.543)	23.072 (1.540)
Residual Listing Premium		0.720*** (7.264)	0.712*** (9.993)	0.711*** (10.057)
Residual Listing Premium × Rival		-0.203** (-2.267)	-0.174** (-2.217)	-0.174** (-2.208)
Opponent's Rank			-25.638* (-1.885)	-25.445* (-1.923)
Home Team's Rank			-11.654 (-1.604)	-11.985 (-1.579)
Prime Time Game			35.444*** (3.485)	35.979*** (3.521)
Pre-Season Top 25 Opponent			53.948*** (2.968)	53.808*** (2.981)
Homecoming			35.266*** (2.890)	34.685*** (2.881)
Distance			7.336 (0.916)	7.823 (0.934)
Number of Units			30.025*** (4.520)	39.473 (1.490)
Observations	6,564	6,564	6,564	6,564
R-squared	0.061	0.152	0.219	0.219
Number of Unique Units	1,320	1,320	1,320	1,320





Table 7: Distance from Stadium

This table reports the coefficients for the unit fixed effects panel regressions in Equation (2) and Equation (3) where the sample consists of entire units on Airbnb located with a specific distance (15 miles, 10 miles, 5 miles, and 1 mile) of the football stadium. Airbnb Listing Premium is computed at the unit level as the listing price on a specific game minus the average listing price for all home games during the season. Hotel Premium is computed at the city level as the average hotel price minus the average hotel price for all home games during the season. Rival is an indicator variable that equals one if the home game is against a rival opponent, and zero otherwise. Opponent's Rank is the incoming rank of the opponent prior to the start of the game, and equals 50 if the team is unranked. Home Team's Rank is the rank of the home team prior to the start of the game, and equals 50 if the team is unranked. Prime Time Game is an indicator variable equal to one if the game occurs at 5pm or later, and zero otherwise. Pre-Season Top 25 Opponent is an indicator variable equal to one if the incoming opponent was ranked a top 25 team on the Associated Press Poll at the start of the season, and zero otherwise. Homecoming is an indicator variable equal to one if the game takes place on the homecoming weekend, and zero otherwise. Distance refers to the number of miles separating the location of the home team and the visiting team. Appendix A contains the list of rival teams and Appendix B contains a description of each variable. *t*-statistics are reported in parentheses. Standard errors are clustered at the team level. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

	Airbnb Listing Premium			Rental Income			
	15 miles	10 miles	5 miles	15 miles	10 miles	5 miles	1 miles
Airbnb Listing Premium							
Rival	23.758*** (5.486)	21.802*** (4.240)	23.400*** (3.138)	0.753*** (14.255)	0.760*** (17.420)	0.816*** (12.212)	0.959*** (10.208)
Airbnb Listing Premium × Rival							
Opponent's Rank	-8.539 (-1.172)	-9.153 (-1.221)	-6.162 (-0.885)	-14.766 (-1.631)	-14.807 (-1.571)	-13.601* (-1.844)	9.469 (0.917)
Home Team's Rank	-3.398 (-1.204)	-3.923 (-1.267)	-1.217 (-0.268)	-7.070 (-1.097)	-7.532 (-1.178)	-0.222 (-0.057)	-10.601 (-0.808)
Prime Time Game	-13.840*** (-3.174)	-12.655** (-2.383)	-6.611 (-1.514)	14.519* (1.884)	13.157 (1.510)	9.208 (0.850)	38.281 (1.446)
Pre-Season Top 25 Opponent	0.148 (0.025)	0.943 (0.147)	1.228 (0.205)	14.988 (1.628)	17.723* (1.809)	6.770 (0.818)	-1.712 (-0.053)
Homecoming	-1.839 (-0.308)	-1.304 (-0.211)	-0.026 (-0.004)	-5.465 (-0.860)	-2.175 (-0.303)	-2.550 (-0.274)	-3.846 (-0.157)
Distance	0.591 (0.324)	0.192 (0.089)	-1.658 (-0.628)	-2.522 (-0.625)	-2.730 (-0.625)	1.690 (0.361)	18.736** (2.345)
Number of Units	14.279** (2.069)	14.657** (2.138)	9.288* (1.971)	15.707* (3.148)	15.285 (1.664)	8.313 (0.543)	48.695 (1.185)
Hotel Premium	0.788*** (4.151)	0.766*** (3.848)	0.806*** (3.789)	1.542*** (4.691)	1.503*** (4.456)	1.424*** (6.616)	2.193*** (5.378)
Observations	6,564	5,974	3,862	6,564	5,974	3,862	899
R-squared	0.083	0.082	0.099	0.299	0.306	0.314	0.391
Number of Unique Units	1,320	1,181	776	1,320	1,181	776	185

Table 8: Financial Constraints

Panel A reports the coefficients from the unit fixed effects panel regression in Equation (2), while Panel B reports the coefficients from the unit fixed effects panel regression in Equation (3). A low credit utilization score corresponds with financially unconstrained hosts, while a high credit utilization score corresponds with financially constrained hosts. Airbnb Listing Premium is computed at the unit level as the listing price on a specific game minus the average listing price for all home games during the season. Rival is an indicator variable that equals one if the home game is against a rival opponent, and zero otherwise. Opponent's Rank is the incoming rank of the opponent prior to the start of the game, and equals 50 if the team is unranked. Home Team's Rank is the rank of the home team prior to the start of the game, and equals 50 if the team is unranked. Prime Time Game is an indicator variable equal to one if the game occurs at 5pm or later, and zero otherwise. Pre-Season Top 25 Opponent is an indicator variable equal to one if the incoming opponent was ranked a top 25 team on the Associated Press Poll at the start of the season, and zero otherwise. Homecoming is an indicator variable equal to one if the game takes place on the homecoming weekend, and zero otherwise. Hotel Premium is computed at the city level as the average hotel price on a specific game minus the average hotel price for all home games during the season. Distance refers to the number of miles separating the location of the home team and the visiting team. Appendix A contains the list of rival teams and Appendix B contains a description of each variable. *t*-statistics are reported in parentheses. Standard errors are clustered at the team level. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Airbnb Listing Premium

	Financially Unconstrained	Financially Constrained
Rival	44.816*** (3.025)	33.765** (2.748)
Opponent's Rank	31.835*** (4.312) -4.205	19.099*** (4.116) -11.839
Home Team's Rank	(-0.487) -2.081	(-1.041) -5.898
Prime Time Game	(-0.817) -13.660***	(-1.191) -11.384
Pre-Season Top 25 Opponent	(-5.690) 2.477	(-1.297) 0.119
Homecoming	(0.305) -2.264	(0.021) -2.062
Distance	(-0.288) 1.249	(-0.353) -0.171
Number of Units	(0.418) 13.916*	(-0.074) 16.062
Hotel Premium	(1.919) 0.806** (2.851)	(1.469) 0.709*** (4.324)
Observations	2,854	2,639
R-squared	0.041	0.019
Number of Unique Units	572	536

Panel B: Rental Income

	Financially Unconstrained	Financially Constrained
Airbnb Listing Premium	0.742*** (5.558)	0.854*** (9.906)
Rival	-6.370 (1.358)	22.695* (2.078)
Airbnb Listing Premium × Rival	-0.409*** (-3.783)	0.153 (0.814)
Opponent's Rank	-23.327 (-1.712)	(0.527) (-8.630)
Home Team's Rank	-10.447 (-1.360)	(-0.697) (-6.478)
Prime Time Game	9.893 (1.136)	17.876 (1.460)
Pre-Season Top 25 Opponent	11.291 (1.002)	22.486* (1.933)
Homecoming	-8.375 (-0.958)	6.564 (0.840)
Distance	-8.226 (-1.400)	-0.816 (-0.135)
Number of Units	17.019* (2.085)	15.335 (0.936)
Hotel Premium	1.637*** (4.201)	1.354*** (3.545)
Observations	2,854	2,639
R-squared	0.143	0.272
Number of Unique Units	572	536

Table 9: Rental Income of Professional Hosts

This table reports the coefficients from the unit fixed effects panel regression where unit-level rental income is the dependent variable. The sample consists of entire units listed on Airbnb in college towns. Professional hosts have more than one active property listed on Airbnb. High credit utilization corresponds with financially constrained hosts, while low credit utilization corresponds with financially unconstrained hosts. Airbnb Listing Premium is computed at the unit level as the average listing price on a specific game minus the average listing price for all home games during the season. Rival is an indicator variable that equals one if the home game is against a rival opponent, and zero otherwise. Opponent's Rank is the incoming rank of the opponent prior to the start of the game, and equals 50 if the team is unranked. Home Team's Rank is the rank of the home team prior to the start of the game, and equals 50 if the team is unranked. Prime Time Game is an indicator variable equal to one if the game occurs at 5pm or later, and zero otherwise. Pre-Season Top 25 Opponent is an indicator variable equal to one if the incoming opponent was ranked a top 25 team on the Associated Press Poll at the start of the season, and zero otherwise. Homecoming is an indicator variable equal to one if the game takes place on the homecoming weekend, and zero otherwise. Hotel Premium is computed at the city level as the average hotel price on a specific game minus the average hotel price for all home games during the season. Distance refers to the number of miles separating the location of the home team and the visiting team. Appendix A contains the list of rival teams and Appendix B contains a description of each variable. *t*-statistics are reported in parentheses. Standard errors are clustered at the team level. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

	Financially Unconstrained	
	Professional	Non-Professional
Airbnb Listing Premium	0.645** (2.588)	0.628*** (12.126)
Rival	-29.034 (-1.731)	-0.662 (-0.060)
Airbnb Listing Premium × Rival	-0.393 (-1.564)	-0.527** (-2.786)
Opponent's Rank	-19.554 (-0.975)	-24.972* (-1.814)
Home Team's Rank	-13.600 (-0.802)	-9.179 (-1.151)
Prime Time Game	-4.857 (-0.442)	12.703 (1.295)
Pre-Season Top 25 Opponent	-8.558 (-0.924)	17.736 (1.329)
Homecoming	-28.829* (-1.860)	-1.888 (-0.210)
Distance	-17.068* (-2.044)	-6.005 (-0.963)
Number of Units	50.071* (1.785)	6.113 (0.768)
Hotel Premium	1.739*** (3.570)	1.605*** (3.794)
Observations	700	2,154
R-squared	0.256	0.251
Number of Unique Units	146	426

Table 10: Listing Premium for Shared Units

This table reports the coefficients from the unit fixed effects panel regression for shared units listed on Airbnb whose listing price changed at least once during the football season. For shared units, Airbnb Listing Premium is computed at the unit level as the listing price on a specific game minus the average listing price for all home games during the season. A low credit utilization score corresponds with financially unconstrained hosts, while a high credit utilization score corresponds with financially constrained hosts. Rival is an indicator variable that equals one if the home game is against a rival opponent, and zero otherwise. Homecoming is an indicator variable equal to one if the game takes place on the homecoming weekend, and zero otherwise. Opponent's Rank is the incoming rank of the opponent prior to the start of the game, and equals 50 if the team is unranked. Home Team's Rank is the rank of the home team prior to the start of the game, and equals 50 if the team is unranked. Pre-Season Top 25 Opponent is an indicator variable equal to one if the incoming opponent was ranked a top 25 team on the Associated Press Poll at the start of the season, and zero otherwise. Prime Time Game is an indicator variable equal to one if the game occurs at 5pm or later, and zero otherwise. Hotel Premium is computed at the city level as the average hotel price on a specific game minus the average hotel price for all home games during the season. Distance refers to the number of miles separating the location of the home team and the visiting team. Appendix A contains the list of rival teams and Appendix B contains a description of each variable. *t*-statistics are reported in parentheses. Standard errors are clustered at the team level. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

	Financially Unconstrained	Financially Constrained
Rival	-0.119 (-0.021)	4.431 (1.570)
Opponent's Rank	0.567 (0.196)	1.362 (0.469)
Home Team's Rank	-0.727 (-0.263)	0.808 (0.335)
Prime Time Game	-3.156 (-1.215)	-0.552 (-0.396)
Pre-Season Top 25 Opponent	1.852 (0.588)	0.734 (0.320)
Homecoming	-1.316 (-0.891)	-0.495 (-0.151)
Distance	-1.039 (-1.445)	-0.045 (-0.031)
Number of Shared Units	0.041 (0.015)	0.599 (0.299)
Hotel Premium	0.241** (2.580)	0.155 (1.081)
Observations	972	958
R-squared	0.065	0.043
Number of Unique Units	202	200

Table 11: Stadium Incidents

This table reports the coefficients from a team fixed effects regression explaining the number of stadium incidents, defined as the sum of disorderly conduct violations at the stadium and stadium ejections on each home game. Rival is an indicator variable that equals one if the home game is against a rival opponent, and zero otherwise. Homecoming is an indicator variable equal to one if the game takes place on the homecoming weekend, and zero otherwise. Prime Time Game is an indicator variable equal to one if the game occurs at 5pm or later, and zero otherwise. Opponent's Rank is the incoming rank of the opponent prior to the start of the game, and equals 50 if the team is unranked. Home Team's Rank is the rank of the home team prior to the start of the game, and equals 50 if the team is unranked. Pre-Season Top 25 Opponent is an indicator variable equal to one if the incoming opponent was ranked a top 25 team on the Associated Press Poll at the start of the season, and zero otherwise. Distance refers to the number of miles separating the location of the home team and the visiting team. Appendix A contains the list of rival teams and Appendix B contains a description of each variable. *t*-statistics are reported in parentheses. Standard errors are clustered at the team level. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

	Stadium Incidents					
Rival	25.292*** (3.491)	24.009*** (3.422)	24.401*** (3.486)	18.974*** (2.966)	17.801** (2.789)	16.064** (2.675)
Homecoming		-8.893** (-2.308)	-7.943** (-2.128)	-7.443** (-2.263)	-6.634** (-2.442)	-5.998** (-2.244)
Prime Time Game			21.746** (2.872)	19.427** (2.772)	18.886** (2.877)	16.145** (2.749)
Opponent's Rank				-14.312** (-2.543)	-13.876** (-2.583)	-8.846** (-2.155)
Home Team's Rank					-6.764 (-1.371)	-6.862 (-1.455)
Pre-Season Top 25 Opponent						15.638** (2.655)
Observations	214	214	214	214	214	214
R-squared	0.506	0.512	0.563	0.613	0.621	0.637

## Appendix A: List of Home Games Against Rivals

Home Team	Opponent	Year	Home Team	Opponent	Year
South Carolina	Georgia	2014	South Carolina	Clemson	2015
Georgia	Georgia Tech	2014	Clemson	Georgia Tech	2015
Florida State	Florida	2014	Georgia	South Carolina	2015
Florida	LSU	2014	Florida State	Miami	2015
Tennessee	Kentucky	2014	Florida	Florida State	2015
Kentucky	Vanderbilt	2014	Alabama	LSU	2015
Ohio State	Michigan	2014	Auburn	Alabama	2015
Iowa	Iowa State	2014	Tennessee	Vanderbilt	2015
Iowa	Wisconsin	2014	Mississippi State	LSU	2015
Wisconsin	Minnesota	2014	Mississippi State	Alabama	2015
Nebraska	Minnesota	2014	Kentucky	Tennessee	2015
LSU	Mississippi State	2014	Notre Dame	USC	2015
LSU	Alabama	2014	Michigan	Michigan State	2015
Arkansas	LSU	2014	Michigan	Ohio State	2015
Arkansas	Ole Miss	2014	Michigan St.	Indiana	2015
Oklahoma	Oklahoma State	2014	Iowa	Minnesota	2015
TCU	Texas Tech	2014	Wisconsin	Iowa	2015
Texas Tech	Texas	2014	LSU	Florida	2015
Oregon State	Oregon	2014	LSU	Arkansas	2015
Oregon	Washington	2014	Texas Tech	TCU	2015
			Utah	Colorado	2015
			ASU	Arizona	2015

## Appendix B: Variable Description

Variable	Description
Rival	An indicator variable that equals one if the home game is against a rival opponent, and zero otherwise.
Airbnb Listing Premium	An Airbnb unit's listing price on a specific game minus the average listing price for all home games in the same football season.
Prime Time Game	An indicator variable that equals one if the home game occurs at 5pm or later, and zero otherwise.
Homecoming	An indicator variable that equals one if the home game coincides with the homecoming weekend, and zero otherwise.
Opponent's Rank (Log)	The visiting team's ranking prior to the game. If the opponent is unranked, this rank is set to 50.
Home Team's Rank (Log)	The home team's ranking prior to the game. If the home team is unranked, this rank is set to 50.
Pre-Season Top 25 Opponent	An indicator variable that equals one if the opponent was ranked a top 25 team before the start of the season, and zero otherwise.
Pre-Season ranking	Pre-Season ranking is obtained from the AP Poll.
Number of Units (Log)	The number of entire units listed on Airbnb in a college town.
Hotel Premium	The average hotel price on a specific game minus the average hotel price across all home games in the same football season.
Financially Unconstrained	Units listed in a zip code whose average credit utilization score is below the median score of all zip codes in the college town.
Financially Constrained	Units listed in a zip code whose average credit utilization score is above the median score of all zip codes in the college town.
Professional Hosts	Professional Hosts have more than one property listed on Airbnb.
Distance (Log)	Distance is measured as the log number of miles between the location of the home team's stadium and the location of the visiting team's stadium.