

IS AIRBNB IMPACTING HOME PRICES? EVIDENCE FROM FORT LAUDERDALE

by

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ABSTRACT

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Airbnb has attracted significant attention from municipal governments due to its potential to influence housing affordability. This paper assesses the role of Airbnb concentration on home prices in Fort Lauderdale from October 2021 to December 2022 using a first difference fixed effect model and data scraped from the Airbnb website via InsideAirbnb. The results from the model suggest higher Airbnb concentration leads to higher home prices. For a home priced between the 35th and 65th percentile, an additional one percentage point of Airbnb concentration causes prices to increase by 3.2 percent.

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Introduction

Airbnb's role in the housing market has become a subject of debate for many academics, residents, and government officials (Horn & Merante, 2017; Perry, 1 February 2024). As the first major peer-to-peer home sharing marketplace, Airbnb created new revenue streams by allowing homeowners and landlords to easily list their properties on the short-term rental market (Deboosere et al., 2019). Horton and Zeckhauser (2016) describe how Airbnb substantially lowered the bringing-to-market costs related to turning a property into a short-term rental, which led to substantial growth in the short-term home rental market. Airbnb continues to grow, between 2017 and 2023, the number of annual Airbnb listings increased from 4 million to 7.7 million, while bookings increased from 115 million to 448 million, and gross bookings value increased from \$20.9 to \$73.3 billion (Curry, 15 Mar. 2024).

The growth of short-term home rentals through Airbnb and similar platforms has provided benefits for many cities and states. In San Francisco, the Budget and Legislative Analyst's Office (2015) notes Airbnb helps accommodate tourism demand and provides supplemental income for hosts, citing surveys that reported between 42 and 56 percent of hosts use income from their Airbnb rental to pay part of their rent or mortgage. Another benefit of Airbnb is the influx of money from tourism. Xu and Xu (2021) found an increase in Airbnb listings in Chicago increased the number of residential renovation projects, the value of retail renovation investment, and the net growth of liquor, retail food, and entertainment business licenses. In Florida, Croes et al. (2019) estimates that the short-term vacation home rental market generated roughly 27.4 billion in sales in 2018.

There are also drawbacks to short-term rentals. Szabo (2017) suggests that Airbnb listings led to increased evictions under Los Angeles' Ellis Act, pushing out poorer residents and leading to

gentrification in some communities. Filippas and Horton (2018) argue that without regulation individuals will “overhost”, leading to negative externalities borne by their neighbors. Espinosa (2016) points out Airbnb rentals can cause issues such as noise, traffic, and transients. Other research suggests Airbnb listings increase property crime such as robbery, burglary, and theft (Cheung et al. 2022, Xu et al., 2017). There is also a growing body of research that suggests Airbnb listings play a role in rising home prices around the world (Barron et al., 2021; Garcia-López et al., 2020; Liang et al., 2022; Sheppard and Udell, 2016; Todd et al., 2021).

Although there are many sides to the Airbnb debate, this paper will solely focus on the effect of Airbnb listings on home prices. Empirical evidence for this aspect of the debate is especially important since the impact of Airbnb listings on the housing market varies from city to city (Coyle and Yeung, 2016). Additionally, the impact of Airbnb listings on home prices is particularly relevant to Fort Lauderdale since home prices outpaced the national average over the time period of this study, October 2020 to December 2022. The median listing price increased 32.5 percent in the Fort Lauderdale area over that time, while increasing only 24.6 percent in the United States as a whole (FRED). During that time period, Airbnb listings nearly doubled in Fort Lauderdale, which could be exacerbating the increase in home prices (AirDNA).

City officials around the world have taken different approaches to regulate Airbnb and similar platforms (Pandy et al., 5 Apr. 2023). Irvine, Barcelona, and New York City have all implemented strict regulations on short-term rentals. In 2019, Irvine, California became one of the first cities to prohibit any advertisement or operation of short-term rentals in all residential zones (City of Irvine). Seiler et al. (2023) found that banning short-term rentals in Irvine led to prices of long-term rentals to decrease, most noticeably among units with similar property characteristics to Airbnb rentals and in areas with previously high Airbnb exposure.

In 2021, Barcelona prohibited short-term private room rentals and required Airbnb to share hosts' names, addresses and national identification numbers (McClanahan, 22 Sep. 2021). More recently, New York City adopted Local Law 18, which Airbnb called a “de facto ban” on Airbnb rentals in the city (Airbnb Help Center, 2023). This law requires that hosts must be physically present while their unit is being rented and that hosts and visitors must leave all doors unlocked. Every property must also register with New York City's Office of Special Enforcement (Sachs, 1 Sep. 2023). There is currently no research on the impact these prohibitions had on home prices in either New York City or Barcelona.

On the other hand, the Florida Senate and House of Representatives recently passed a bill, Senate Bill 280, limiting cities' abilities to regulate local short-term rentals. The bill limits what local governments can do to regulate short-term rentals and limits what they can do to penalize violators. Local governments can only require registration, tax information, and the telephone number of a person responsible for the property, accessible 24 hours a day, seven days a week. For hosts violating registration, the fine is set at \$500. Occupancy limits can also be enforced, but they must allow at least two people per bedroom and an additional two people in a common area. Additionally, a city can issue a 90-day suspension on a rental property, but only after the property has been suspended first for one or more violations on five separate days within a 60-day period and then suspended again for one or more violations on five separate days within a 30-day period (Florida Senate Bill 280, 2024).

Given the regulatory environment and the lack of existing empirical evidence on the impact of short-term rentals on home prices in Florida, this research can provide valuable insights to inform policy going forward. Fort Lauderdale is also particularly interesting to study due to its second largest industry being tourism (City of Fort Lauderdale). This suggests Airbnb

would thrive there, possibly at the expense of its permanent residents. Additionally, this is the first study, to my knowledge, that uses data from after the Covid-19 pandemic. Research has suggested the pandemic reduced Airbnb bookings and increased the sense of risk for renters using the platform (Lee, 2021; Hu, 2020). In Melbourne, Li et al. (2023) found that after pandemic restrictions were eased, demand for short-term accommodations quickly recovered, but supply was slow to recover. Furthermore, Dey (2023) found that, in Orlando, Airbnb listings near tourist attractions remained popular after Covid, but other areas in the city had lower reservation rates. Updating the literature after a worldwide event that significantly impacted Airbnb and the tourism industry may offer new insights.

Literature review

Over the last decade, empirical studies on how Airbnb impacts home prices have slowly grown. In Wisconsin, Gárate Alvarez and Pennington-Cross (2022) found that the doubling of Airbnb properties in a neighborhood increased the price of housing by approximately 11 percent. Barron et al. (2020) found a 1 percent increase in Airbnb listings caused a 0.026 percent increase in home prices in the United States. Sheppard and Udell (2016) found that home prices in New York City increase 6 to 11 percent when Airbnb listings double.

In addition to providing empirical results, Sheppard and Udell (2016) and Barron et al. (2021) laid out the different mechanisms that could cause Airbnb to influence home prices. They argue that Airbnb rentals could decrease the supply of long-term housing as long-term housing units are converted to short-term rentals, causing home prices to rise. Airbnb rentals could also provide a new revenue stream for residents, increasing incomes and causing prices to rise. Additionally, Airbnb rentals could increase home prices if neighborhood quality improves due to

the localized economic impact of guests. Airbnb also allows people to buy long-term housing for the purpose of converting it to a short-term rental, introducing new buyers into the market and increasing the demand for homes, causing home prices to rise. However, short-term home rentals could also decrease the value of the neighborhood by introducing negative externalities such as noise and frequent unfamiliar guests, causing home prices to fall.

Other research, such as Lee (2016) and Budget and Legislative Analyst's Office (2015), found that Airbnb listings likely worsen housing affordability. Their research provided descriptive statistics but did not perform any empirical analysis on how Airbnb impacted housing affordability or home prices. They also distinguished between commercial and casual hosts. Commercial hosts use the property solely as a short-term rental, while casual hosts use the property as their primary residence and may occasionally rent but not with the same frequency as commercial hosts. This distinction can provide insight on which mechanisms mentioned above are likely influencing home prices. Since casual hosts only use their primary residence as a short-term rental they are not expected to detract from the supply of long-term housing or represent new buyers in the local housing market. However, they can still influence home prices through increased income, increased economic activity from their guests, and negative externalities from their guests. In contrast, commercial hosts and their properties can influence home prices through any of the mechanisms described above.

Outside of the United States, research has also found an increasing Airbnb presence leads to increasing prices. Eliasson and Ragnarson (2018) found Airbnb activity caused roughly a 6% rise in home prices from 2014 to 2017. An interesting finding from their research was that 1,676 apartments withdrew from the residential housing segment, supporting the idea that Airbnb incentivizes long-term housing units to be converted to short-term rentals. Todd et al. (2021)

found a significant positive association between the frequency of Airbnb and home prices in London, suggesting that each additional listing would increase home prices by £11.59 to £15.27 per m². Garcia-López (2020) estimated transaction prices increased up to 19 percent due to Airbnb in Barcelona. Thackway et al. (2022) found a 1 percent increase in Airbnb density is associated with approximately a 2 percent increase in property sales price in Sydney. They also noted Airbnb density varied widely throughout the city. Franco and Santos (2021) found a 1 percentage point increase in a municipality's Airbnb share results in a 3.7 percent increase in house prices in Portugal and in the main cities of Lisbon and Porto a 1 percentage point increase led to a 3.2 percent price increase.

Research on how Airbnb impacts rents has also been performed. Horn and Merante (2017) found that a one standard deviation increase in Airbnb concentration led to a 0.4 percent increase in asking rents in Boston. They also considered Airbnb concentration, the ratio of Airbnb listings to total housing units, as a primary independent variable instead of listings alone. Liang et al. (2022) found the arrival of Airbnb in Hong Kong caused the rent rate to increase 3.6 to 4 percent. They also determined that arrival and expansion of short-term homesharing would increase housing unaffordability in Hong Kong, using a 30 percent rent-to-income ratio as a benchmark of affordability. Coyle and Yeung (2016) found that in the United Kingdom a 1 percent increase in Airbnb activity was associated with an increase in the rental index of 0.22 but failed to find a significant relationship between Airbnb activity and rents in Germany.

There is also research on how Airbnb regulations and prohibitions affect housing affordability. As mentioned earlier, Seiler et al. (2023) found a 3 percent decrease in long-term rental prices approximately two years after enforcement of the short-term rental prohibition in Irvine. The effect was most pronounced for long-term rental units with similar characteristics to

Airbnb listings and in areas with greater Airbnb exposure before the enforcement of the short-term rental ban, suggesting that prohibition of short-term rentals can lower home prices. In New Orleans, Valentin (2020) found that property values decreased by 30 percent in areas with the strictest regulations against short-term rentals. The author suggests that this is a result of homeowners factoring the option to participate in short-term rental market in their purchasing decision, which is consistent with the mechanism described by Barron et al. (2020) that new buyers purchasing homes as short-term rentals causes home prices to increase. Bibler et al. (2023) found that home prices decreased by roughly 10 percent in the most Airbnb-dense census tracts. However, they also found an increase in foreclosures in those same tracts, suggesting that revenue generated from Airbnb rentals may help some hosts afford their homes.

While these papers generally found a statistically significant and positive relationship between Airbnb and the cost of housing, the size of the economic impact can vary widely. For example, Barron et al. (2020) found that a 1 percent increase in Airbnb listings led to a 0.026 percent increase in home prices in the United States while Garcia-López et al. (2020) found a 1 percent increase in Airbnb listings in Barcelona led to 5.3 percent increase in home prices. The variation in impact between locations highlights the importance of continuing to study Airbnb's effect on housing prices and focusing on the geographic area of interest. This paper aims to provide results relevant to the Fort Lauderdale housing market using data from after the COVID-19 pandemic.

Methods and Data

This study uses a fixed-effects model because the data is panel, observed monthly and cross-sectioned by ZIP codes. Although a random-effects model has the benefit of allowing time-invariant variables, it would not be an appropriate estimator since the data are not a random sample. The data consist of all ZIP codes in Fort Lauderdale rather than a random sample of ZIP codes, therefore a fixed-effects model is preferable. Additionally, the p-value of the Hausman test between the fixed-effects and random-effects model was 2.2×10^{-16} . Therefore, I rejected the null hypothesis that a random effects model is preferable. Furthermore, due to autocorrelation among key variables, such as Airbnb concentration and home value, a fixed-effects first differences model is best suited to the data (Dougherty, 2011).

The fixed-effects first differences specification used to determine the impact of Airbnb concentration on home prices will follow the form:

$$\begin{aligned} \text{Home Price}_{itm} = & \alpha + \beta_1(\text{Airbnb Concentration}_{itm}) + \mu_1(\text{Neighborhood Characteristics}_{it}) \\ & + \mu_2(\text{National Economic Conditions}_{tm}) + \varepsilon_{itm} \end{aligned}$$

where α is the coefficient term, β is a scalar coefficient, μ is a vector coefficient, ε is the error term, i is the zip code, m is the month, and t is the year. This research uses all ZIP codes starting with 333, which USPS and AirDNA define as comprising Fort Lauderdale. This allows data from AirDNA to be used alongside the InsideAirbnb data.

For the dependent variable, I used the Zillow Home Value Index (ZHVI) as a measure of home prices. The ZHVI uses data collected by Zillow to provide the value of the typical home in each ZIP code. Zillow defines typical as having a price between the 35th and 65th percentile, whereas they have separate data for “low-end” and “high-end”, which cover the 5th to 35th percentile and 65th to 95th percentile, respectively. This paper’s goal is to understand how

Airbnb impacts the average home price, so it uses data that Zillow provides for the 35th to 65th percentile rather than any low-end or high-end data.

The primary independent variable is Airbnb concentration, which is the number of active Airbnb listings divided by the number of housing units. As noted in the regression, this is monthly and at the ZIP code level. This metric is similar to what Franco and Santos (2021) and Horn and Merante (2017) used in their research and has the benefit of scaling Airbnb listings to the number of houses, which is particularly relevant for this dataset since the number of housing units in a ZIP code ranges between 2,157 and 27,714.

To determine when an Airbnb listing entered the short-term rental market and whether the listing is still active on the market, most researchers use a listing's review dates since Airbnb does not provide data whether a listing has been booked or if it was blocked off by the host for other reasons such as personal use or maintenance. For this paper, I use methodology similar to Garcia-López et al. (2020) and consider an Airbnb listing to have entered the short-term rental market two months before its first review and no longer active in the short-term rental market two months after its last review. An alternative measure for a listing's market entry is the host's join date, which Barron et al. (2020) argue is closest to when the host's listing was first posted. However, 70.5% percent of hosts in Fort Lauderdale have two or more entire home listings, these hosts could have added an additional listing at any time after their initial listing, making a listing's first review a preferable measure of market entry for this study.

Additionally, using methodology similar to Horn and Merante (2017) and Garcia-López et al. (2020) I estimate the percentage of commercially-hosted listings. The determination of whether an Airbnb listing is commercially-hosted is if the listing's host has more than one "entire home" listing. A host cannot use multiple entire homes as a primary residence, so a host

with multiple listings signifies that the listings are likely commercially-hosted. Using this methodology, I found 4,173 of the 5,920, roughly 70.5%, of the “entire home” listings in Fort Lauderdale were commercially-hosted properties, suggesting Airbnb is mostly a commercial activity in Fort Lauderdale.

To determine which ZIP code the individual Airbnb listings were in, I used a short script of code to input the coordinates of each Airbnb listing in the InsideAirbnb dataset into the reverse geocoding feature of the Google Maps API, which provided the corresponding address for each set of coordinates. The script of code isolated the ZIP code from each address and attached it to the corresponding Airbnb listing. A screenshot of the code can be found in the appendix.

The data on the Airbnb listings is from InsideAirbnb, a website that scrapes the Airbnb website and obtains information on listings including the host, geographic coordinates, and reviews. The Airbnb data from InsideAirbnb covers October 2021 to December 2022. This data is well after Fort Lauderdale reopened from the COVID-19 pandemic in September 2020, which should minimize any direct effects pandemic restriction had on Airbnb rentals. The timeframe of the InsideAirbnb data also lines up with data from the American Community Survey (ACS), the primary source of neighborhood level controls, which is only available through 2022.

While other online short-term rental platforms, such as VRBO, are used in Florida, only data from Airbnb is used in this paper due to availability. However, Airbnb is by far the largest marketplace for short-term home rentals, with over seven million active listings worldwide, while VRBO has over two million listings around the world (Airbnb Newsroom, VRBO). Between Airbnb and VRBO, only 16 percent of Fort Lauderdale listings were on VRBO alone, meaning 84 percent of home-sharing rentals are on Airbnb (AirDNA). Although Airbnb

dominates the Fort Lauderdale market, the number of listings in this paper does not include all active short-term home rental listings in Fort Lauderdale.

In addition to the main dependent and independent variables, there are two sets of controls: neighborhood characteristics and national economic conditions. The selected controls are similar to the controls used by Liang et al. (2022) and Garcia-López et al. (2020). All data in neighborhood characteristics is at the ZIP code level, as that is the smallest unit with data available and is a natural proxy for a neighborhood. The data for neighborhood characteristics are from the American Community Survey (ACS) yearly estimates using both the 2021 and 2022 estimates. These data are used to control unique neighborhood-level factors that can influence home prices. This includes age, education, employment status, and income of the ZIP code's residents as well as the number of total homes, vacant homes, population, and home ownership rates in the ZIP code. These factors are meant to reflect the desirability of a ZIP code as well as the supply of housing within the ZIP code. Potential omitted variables at the neighborhood-level include whether a ZIP code was urban or suburban as well as if it was beach adjacent. However, these are time-invariant variables for the time-period observed in this paper and the fixed-effects model eliminates bias from time-invariant variables (Dougherty, 2011).

The other set of controls is the broader economic conditions, which consist of factors that influence the entire South Florida housing market. This includes supply factors such as the number of active home listings in South Florida and factors that can impact demand such as mortgage rates, inflation in South Florida, consumer sentiment, unemployment rates, disposable income, and the performance of the S & P 500. Income tax, at both the federal and state level, as well as property tax are not included. They did not change over the time period of this study and therefore any bias from not including them is eliminated by the fixed-effects model (Dougherty,

2011). All data is reported on the first day of each month, the last day of each month, or weekly. Since most data in this paper, including the dependent variable, is reported on the first day of each month all data was transformed to reflect this as well. Data reported on the last day of the month was instead used as the first day of the next month. For data reported weekly, the reported value closest to the beginning of the month was used. The Bureau of Labor Statistics' (BLS) data on the percent change of the consumer price index for all urban consumers in Miami-Fort Lauderdale-West Palm Beach was reported every other month, so missing data was linearly imputed.

Descriptions of all variables can be found in Table 1. Table 2 includes summary statistics for each variable. The means and standard deviations of all variables are in line with expected values.

Table 1*Description of Variables*

Type of Variable	Variable	Description	Data Source
Dependent	ZHVI	Monthly typical value of a home in the 35th to 65th percentile range for a given ZIP code	Zillow
Main Independent	Airbnb Concentration	Ratio of Airbnb listings divided by Number of Housing Units in each ZIP code	InsideAirbnb, ACS
Economic Factors	SF CORE CPI	Percent change of Consumer Price Index less Food and Energy in Miami-Fort Lauderdale-West Palm Beach	BLS
	MORTGAGE30US	30-year fixed rate mortgage average in the United States*	FRED
	UNRATE	Nationwide unemployment rate	FRED
	DSPI	Real disposable income (in \$1,000s)	FRED
	ACTLISCOU33100	Number of active home listings in Miami-Fort Lauderdale-West Palm Beach (in 1,000s)	FRED
	Consumer Index	Value of University of Michigan's Consumer Sentiment	FRED
	SP500	Closing value of S and P 500 at the start of each month (in \$100s)	Yahoo Finance
	Snowbird Season	October to April, months when “snowbirds” (travelers from colder states) come to Florida for warmer weather	Florida Smart
ZIP level Factors	Owner Occupancy	Percent of homes in a given ZIP code occupied by owner	ACS
	Median Household Income	Median household income for a given ZIP code (in \$10,000s)	ACS
	Median Age	Median age of residents in a given zip code	ACS
	Percent College Educated	Percent of residents over 25 years old with at least a bachelor's degree	ACS
	Unemployment Rate	Unemployment rate of residents 16+ in a given ZIP code	ACS
	Percent Vacant	Ratio of Vacant Units to Housing Units in a given ZIP code	ACS
	Housing Units	Number of housing units in a given zip code (in 1,000s)	ACS
	Population	Population of given ZIP code (in 1,000s)	ACS

*Data reported weekly, value closest to the start of each month was used as monthly value

Table 2*Summary Statistics of Variables*

Type of Variable	Variable	Unit	Mean	Standard Deviation	N
Dependent	ZHVI	USD	485,827	203,158	405
Main Independent	Airbnb Concentration	Percentage	1.09	1.49	405
Broader Economic Factors	SF CORE CPI	Number	8.873	1.34	15
	MORTGAGE30US	Percentage	4.77	1.36	15
	UNRATE	Percentage	3.75	0.28	15
	DSPI	USD (in \$1,000s)	18.638	0.350	15
	ACTLISCOU33100	Count (in 1,000s)	18.870	4.357	15
	Consumer Index	Number	61.16	6.13	15
	SP500	USD (in \$100s)	41.91	3.40	15
	Snowbird Season	Binary	0.667	0.472	15
ZIP level Factors	Owner Occupancy	Percentage	65.14	15.45	54
	Median Household Income	USD (in \$10,000s)	8.722	3.081	54
	Median Age	Number	42.91	6.33	54
	Percent College Educated	Percentage	42.43	14.62	54
	Unemployment Rate	Percentage	4.845	1.88	54
	Percent Vacant	Percentage	12.82	8.57	54
	Housing Units	Count (in 1,000s)	13.960	7.162	54
	Population	Count (in 1,000s)	31.361	17.030	54

Results

The results on the estimated impacts on home prices from the previously mentioned regression equation can be found in Table 3. The coefficient on the independent variable of interest, Airbnb concentration, is positive and significant at the one percent level. Specifically, the value of the coefficient is 0.032, suggesting that a 1 percentage point increase in Airbnb concentration leads to a 3.2 percent increase in home prices. Since the average Airbnb concentration in Fort Lauderdale was 1.09 percent, the results imply Airbnb concentration was responsible for an approximate 3.5 percent increase in home prices. At the mean home price of \$485,827 in Fort Lauderdale during the timeframe of this study, a one percentage point increase in Airbnb concentration equates to an approximate \$15,546 increase for the mean home price. Furthermore, Fort Lauderdale's 1.09 percent average Airbnb concentration roughly equates to a \$17,004 increase in the mean home price.

The finding that an increase in Airbnb activity leads to increased home prices is consistent with the pre-Covid literature. Despite the differences in geographic location and time period, the size of the impact is similar to Franco and Santos' (2021) finding that a one percentage point increase in Airbnb share led to a 3.7 percent increase in home prices in Portugal.

Table 3

Regression Results

Variable	log ZHVI
Airbnb Concentration	0.032*** (0.005)
SF CORE CPI	-0.002*** (0.001)

MORTGAGE30US	0.005***	(0.001)
UNRATE	0.006*	(0.003)
DSPI	0.046***	(0.009)
ACTLISCOU33100	-0.001	(0.0004)
Consumer Index	-0.0001	(0.0001)
SP500	-0.001***	(0.0002)
Snowbird Season	-0.013***	(0.001)
Owner Occupancy	-0.002	(0.001)
Median Household Income	0.016***	(0.004)
Median Age	0.002	(0.002)
Percent College Educated	-0.00004	(0.001)
Percent Vacant	-0.002**	(0.001)
Housing Units	-0.001	(0.007)
Population	0.001	(0.002)
Constant	0.010***	(0.001)
Observations	378	
R²	0.460	
Adjusted R²	0.437	
Note:	*p<0.1; **p<0.05; ***p<0.01	

However, the impact of Airbnb rentals is not evenly distributed throughout Fort Lauderdale. Figure 1 shows all Airbnb listings that were active during the time period of this study and that the majority of these listings are in the eastern half of the city. Figure 2 represents Airbnb concentration for each ZIP code. Certain ZIP codes have substantially higher Airbnb concentration. ZIP code 33304 has the highest average Airbnb concentration at 6.3 percent and 6 of the 27 ZIP codes have an average Airbnb concentration of two percent or more. On the other hand, 11 of the 27 ZIP codes have an Airbnb concentration below 0.2 percent. The drastic differences in Airbnb activity between ZIP codes implies that certain neighborhoods in Fort Lauderdale are barely affected by Airbnb while other neighborhoods experience substantial impacts.

Figure 1

Active Airbnb Listings in Fort Lauderdale

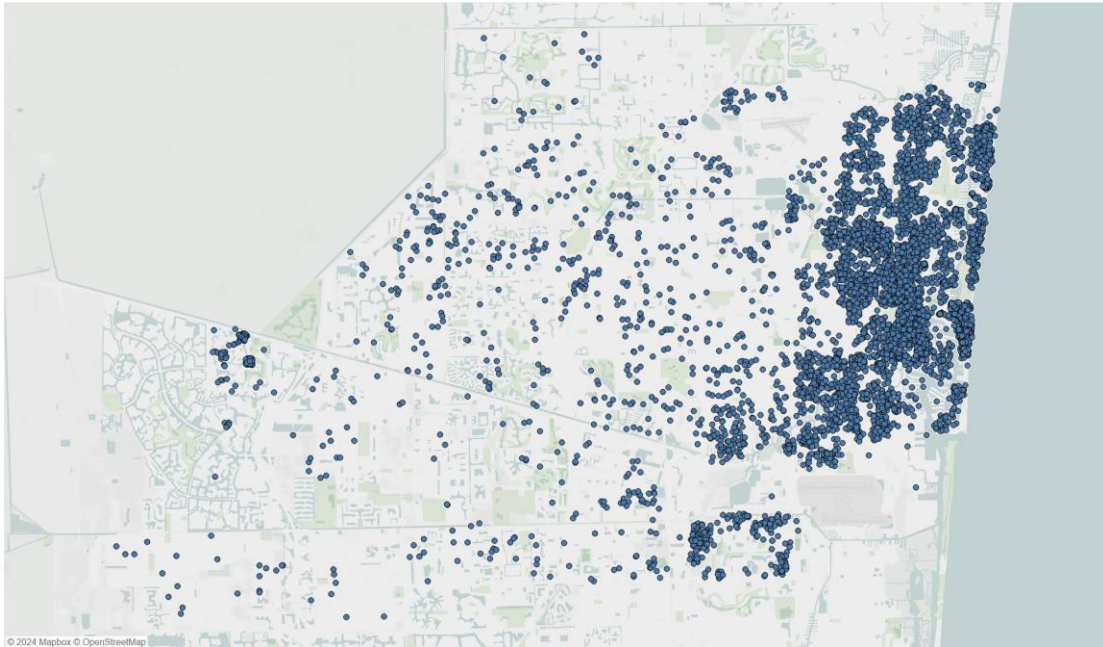
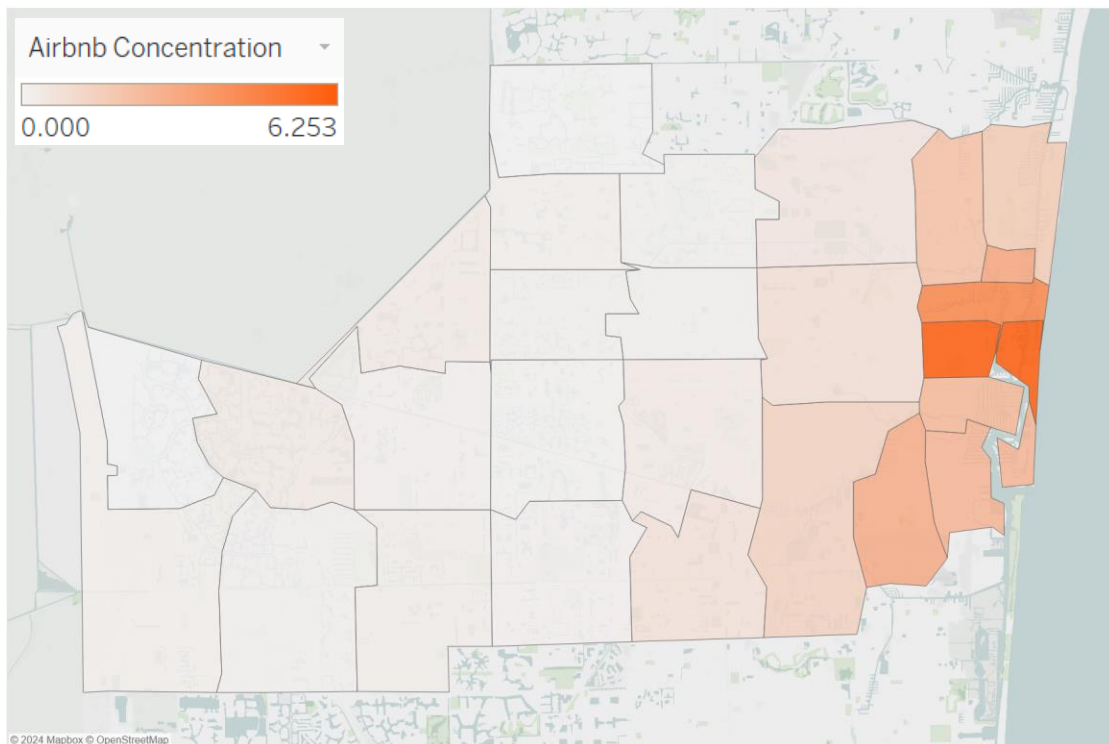


Figure 2

Average Airbnb Concentration by ZIP Code



Robustness Checks

For robustness, I consider alternative measures of Airbnb activity. Two of the alternative measurements provide different approximations of when an Airbnb listing is active on the short-term rental market since estimates of how often visitors leave a review varies; San Francisco's Budget and Legislative Analyst's Office (2015) used estimates of 30.5 percent and 67 percent, while Garcia-López et al. (2020) and Barron et al. (2020) used 72 percent as their estimate. Given the range of review frequency in the literature, one alternative measure considers a listing active three months before its first review and no longer active three months after its last review. The next alternative measure considers a listing active one month before its first review and no longer active one month after its last review.

Another alternative measure will be the number of Airbnb listings in hundreds of listings. The number of listings are a common measure of Airbnb activity used by Garcia-López et al. (2020), Barron et al. (2020), and Sheppard and Udell (2016). This is not preferred for this study due to the variation in the number of housing units in each ZIP code, however, using Airbnb listings for robustness demonstrates that there is an effect driven by the number of listings and not just Airbnb concentration.

The final alternate measure will be a regression excluding ZIP code 33304 since 33304 is the ZIP code with the highest average Airbnb concentration and average number of listings over the time period of the data. Removing it ensures that the findings are not driven solely by one ZIP code. The table includes the results of the original regression alongside the alternative measures for comparison. Only the coefficients of the main independent variables are included in the table, all controls are repressed.

Table 4*Robustness Checks*

	ZHVI
Airbnb Concentration (baseline)	0.032*** (0.005)
Three Month Buffer	0.011*** (0.004)
One Month Buffer	0.044*** (0.005)
Number of Listings	0.026*** (0.004)
Removed 33304	0.037*** (0.006)
<i>Note:</i> *p<0.1; **p<0.05; ***p<0.01	

Overall, the findings of the primary regression are robust to alternative measurements of Airbnb activity. All alternative measures have positive coefficients and are highly significant. Additionally, there were no significant changes among the controls while performing robustness checks.

Discussion and Conclusion

This paper aims to investigate the impact of Airbnb rentals on Fort Lauderdale home prices after the Covid-19 pandemic. It provides insight on how Airbnb may influence home prices and where Airbnb listings are most prominent. The results from this paper suggest that a 1 percentage point increase in Airbnb concentration is responsible for approximately a 3.2 percent increase in Fort Lauderdale home prices, these findings are consistent with pre-Covid research from other cities such as Franco and Santos (2021) in Lisbon and Garcia-López et al. (2020) in Barcelona.

The increase in home prices is likely a result of a combination of all the mechanisms described by Barron et al. (2020) and Sheppard and Udell (2016). Given the high rate of commercially-hosted listings in Fort Lauderdale, the entry of new buyers into the housing market and reduction in supply of long-term housing due to conversion to short-term listings are expected to play a prominent role alongside the other mechanisms of increased income and tourism spending. Future research empirically determining the effect of each mechanism can provide further insight on the size of each mechanism's influence on home prices.

As mentioned earlier, the data reveals that Airbnb concentration in Fort Lauderdale is not equal between ZIP codes. The results suggest that areas with larger Airbnb concentration experience a larger increase in home prices. Other researchers such as Garcia-López et al. (2020) and Thackway et al. (2020) have observed similarly uneven distributions of Airbnb activity and impact in their respective cities of study. The magnitude of the Airbnb rentals' impact warrants a closer investigation in regions with high Airbnb concentration.

The limitations of this paper include the shorter length of time covered by the data compared to other research and only having data from Airbnb. Additional studies using data collected over a longer period of time and data from all short-term rental platforms in Fort Lauderdale can expand on the findings of this paper.

Appendix

Code Determining ZIP Code of Airbnb Listings

```
#get ZIP codes for every coordinate pair in dataframe
ziplist <- list() #empty list to store ZIP codes
for(i in 1:15791){
  # get full address of each listing using Google Maps reverse geocode tool
  address <- revgeocode(c(df[i,]$longitude, df[i,]$latitude), output = "address")
  # isolate ZIP code from address by selecting last 5 digit number
  zip <- str_extract(address, "[d]{5}(?![d])(?!.*\\d)")
  # add ZIP code to list
  ziplist <- append(ziplist, zip)
}
```

The script of code above was executed in Rstudio and used to identify each listing's ZIP code. Comments on the code explaining each step are in green.

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