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**IN THE CIRCUIT COURT OF COOK COUNTY, ILLINOIS
COUNTY DEPARTMENT, CHANCERY DIVISION**

LEILA MENDEZ and ALONSO ZARAGOZA,)	
)	
Plaintiffs,)	5515202
)	Case No. 16 CH 15489
v.)	
)	Judge Sanjay T. Tailor
)	
CITY OF CHICAGO, et al.,)	
)	
Defendants.)	
)	

PLAINTIFFS' MOTION FOR SUMMARY JUDGMENT

Jeffrey Schwab (#6290710)
Liberty Justice Center
Cook County No. 49098
190 S. LaSalle Street, Suite 1500
Chicago, Illinois 60603
(312) 263-7668
(312) 263-7702 (fax)
jschwab@libertyjusticecenter.org

Jacob Huebert (#6305339)
Timothy Sandefur
(#6325089/pro hac vice #61192)
Christina Sandefur
(#6325088/ pro hac vice #61186)
Goldwater Institute
500 E. Coronado Road
Phoenix, Arizona 85004
(602) 462-5000
(602) 256-7045 (fax)
litigation@goldwaterinstitute.org

Attorneys for Plaintiffs

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The City of Chicago imposes a 4.5% tax on rentals of “hotel accommodations,” a term that includes, among other things, hotels, bed-and-breakfasts, and home-sharing through online platforms such as Airbnb. The City has also enacted additional surcharges of 4% and 2% that apply only to home-sharing. The City attempts to justify this discrimination against home-sharing primarily by arguing that home-sharing tends to reduce the supply of long-term housing and therefore tends to increase rents and, in turn, homelessness.

That justification fails. In fact, many properties used for home-sharing do not remove property from the long-term housing market, while virtually all hotel accommodations occupy property that could otherwise be used for long-term housing—so it is arbitrary and unreasonable to impose surcharges intended to address problems related to affordable housing and homelessness exclusively on home-sharing. Further, the City has provided no reason to believe that home-sharing significantly increases long-term rents or increases homelessness at all.

The City also arbitrarily imposes varying fees on different forms of accommodations, including home-sharing—fees that are not based on real and substantial differences between the accommodations and are not reasonably related to their supposed purpose or to public policy.

The Court should therefore grant summary judgment in favor of Plaintiffs on their claim that the surcharges and fees violate the Uniformity Clause of the Illinois Constitution.

STATEMENT OF FACTS

Chicago’s home-sharing taxes and fees

The Chicago Municipal Code regulates two categories of home-sharing arrangements: “vacation rentals” and “shared housing units.” The Code’s definitions of these terms are nearly identical, except that they are mutually exclusive. *See* Ex. A., Defs.’ Resp. To Plfs.’ First Set of Interrog. (“Defs.’ 1st Int. Resp.”) No. 20. In other words, the Code defines a “vacation rental”

as “a dwelling unit that contains 6 or fewer sleeping rooms that are available for rent or for hire for transient occupancy by guests,” but excludes from that definition “(1) single-room occupancy buildings or bed-and-breakfast establishments ... ; (2) hotels ... ; (3) a dwelling unit for which a tenant has a month-to-month rental agreement and the rental payments are paid on a monthly basis; (4) corporate housing; (5) guest suites; or (6) shared housing units registered pursuant to Chapter 4-14 of this Code.” Chi. Muni. Code § 4-6-300. On the other hand, the Code defines a “shared housing unit” as “a dwelling unit containing 6 or fewer sleeping rooms that is rented, or any portion therein is rented, for transient occupancy by guests,” and excludes from that definition “(1) single-room occupancy buildings; (2) hotels; (3) corporate housing; (4) bed-and-breakfast establishments, (5) guest suites; or (6) vacation rentals.” *Id.* § 4-14-010. The term “transient occupancy” used in these definitions means “occupancy on a daily or nightly basis, or any part thereof, for a period of 31 or fewer consecutive days.” *Id.* §§ 4-6-290, 4-6-300, 4-14-10.

The Code includes vacation rentals and shared housing units in its definition of “hotel accommodations.” *Id.* § 3-24-020(A)(4). As a result, guests who stay in vacation rentals and shared housing units must pay the 4.5% tax that the City imposes on all gross rental or leasing charges for any “hotel accommodation” in the City. *Id.* § 3-24-030.

The Code also imposes additional taxes of 4% and 2% (for a total of 6%) on gross rental or leasing charges for any vacation rental or shared housing unit but not on rentals of any other “hotel accommodations.” *Id.* The Code states that the purpose of the 4% surcharge is to “fund supportive services attached to permanent housing for homeless families and to fund supportive services and housing for the chronically homeless.” *Id.* § 3-24-030(B). The Code states that the purpose of the 2% surcharge is to “fund housing and related supportive services for victims of domestic violence.” *Id.* § 3-24-030(C).

The Code imposes different licensing fees on different categories of hotel accommodations:

- A license for a hotel costs \$250, plus \$2.20 per room, *id.* § 4-5-010(3), and must be paid every two years, *id.* § 4-5-010.
- A license for a vacation rental or a bed-and-breakfast costs \$250, *id.* § 4-5-010(2), and must be paid every two years, *id.* § 4-5-010.
- The owner or tenant of a single “shared housing unit” is not required to obtain a license or pay a licensing fee to the City; instead a “short term residential rental intermediary” (i.e., a platform such as Airbnb on which the unit is listed) must register with the City on the tenant or owner’s behalf, *id.* § 4-13-230(a), and pay a \$10,000 license fee plus \$60 for each unit listed on its platform, *id.* § 4-5-010(36).
- Any person who is a “shared housing unit” host for more than one dwelling unit (“Shared Housing Unit Operator”) must obtain a license, *id.* § 4-16-200, which costs \$250, *id.* § 4-5-010(38), and must be renewed every two years, *id.* § 4-5-010.

Procedural history and Plaintiffs’ Uniformity Clause claim

Plaintiffs filed the operative Second Amended Complaint in September 2018. After the Court’s orders partially dismissing Plaintiffs’ original complaint and first amended complaint, the only surviving claim¹ in Plaintiffs’ Second Amended Complaint is Count VII, brought under the Uniformity Clause (Art. IX, § 2) of the Illinois Constitution. (2d Am. Compl. ¶¶ 128-150.) Specifically, Plaintiffs allege that the Code’s home-sharing surcharges violate the Uniformity Clause because: (1) “there is no real and substantial difference between vacation rentals and shared housing units,” whose guests are subject to the surcharges, and “other establishments

¹ Plaintiffs have preserved their dismissed counts for appeal.

included in the [Code's] definition of 'hotel accommodations,'" whose guests are not subject to the surcharges; and (2) the surcharges' stated purposes bear no reasonable relationship to the object of the legislation. (*Id.* ¶¶ 130-144.) Plaintiffs also allege that the Ordinance's differing fees for different categories of "hotel accommodations" violate the Uniformity Clause because they are not based on real and substantial differences between the different types of accommodations and are not reasonably related to the object of the Ordinance. (*Id.* ¶¶ 145-154.)

The City's purported justifications for the surcharges

To justify the 4% surcharge used to fund services for the homeless, the City asserts that home-sharing, unlike other "hotel" accommodations, makes long-term housing less affordable, which in turn increases homelessness. Ex. A, Defs.' 1st Int. Resp. Nos. 10-16. To support that argument, the City and its expert witness, Bryan Esenberg, have cited several publications that purport to find a link between home-sharing and increased long-term rents, including:

- Dayne Lee, *How Short-Term Rentals Exacerbate Los Angeles's Affordable Housing Crisis*, 10 Harv. L. & Pol'y Rev. 229-253 (2016) (purporting to find a correlation between home-sharing and rising rents in Los Angeles) (attached as Exhibit B);
- Mark Merante & Keren Mertens Horn, *Is Home Sharing Driving Up Rents? Evidence from Airbnb in Boston* (Univ. of Mass. Boston Dep't of Econ., Working Paper No. 2016-03) (purporting to find a relationship between home-sharing and rising rents in at least some parts of Boston) (attached as Exhibit C);
- Stephen Sheppard & Andrew Udell, *Do Airbnb Properties Affect House Prices?* (Jan. 1, 2018) (unpublished manuscript) (purporting to find a relationship between home-sharing and rising rents in New York City) (attached as Exhibit D);

- Office of the New York City Comptroller, *The Impact of Airbnb on NYC Rents* (April 2018) (unpublished manuscript) (attached as Exhibit E);
- David Wachsmuth, et al., McGill Univ. Sch. Of Urban Planning Urban Politics & Governance Research Group, *The High Cost of Short-Term Rentals in New York City* (2018) (unpublished manuscript) (attached as Exhibit F);
- Kyle Barron et al., *The Sharing Economy and Affordable Housing: Evidence from Airbnb* (Apr. 1, 2018) (unpublished manuscript) (nationwide study finding that home-sharing causes an average increase in rents and housing prices of less than 0.1%) (attached as Exhibit G);
- Josh Bivens, Econ. Policy Inst., *The Economic Costs and Benefits of Airbnb* (2019) (attached as Exhibit H)
- DC Working Families, *Selling the District Short* (2017) (addressing home-sharing in Washington, D.C.) (attached as Exhibit I)

Ex. J, Report of Bryan Esenberg (minus exhibits) (“Esenberg Report”)² 3–5.

The City also premises its justification for the 2% surcharge on the supposed link between home-sharing and a lack of affordable housing. That surcharge’s stated purpose is to “fund housing and related supportive services for victims of domestic violence.” Chi. Muni. Code § 3-24-030(C). The City asserts that the 2% surcharge relates to this purpose because a “lack of safe and affordable housing is one of the primary barriers [that victims of domestic violence] face in choosing to leave an abusive partner” and “house sharing has a tendency to reduce the availability of affordable housing, thereby contributing to the problem of domestic

² For ease of reference, Plaintiffs have attached the articles that Esenberg attached to his report as separate exhibits to this motion. Contemporaneously Plaintiffs are filing a Motion to Exclude Defendants’ Expert, which seeks to exclude Esenberg’s report and testimony. Plaintiffs cite the report and testimony here only for the City’s justifications and related admissions.

abuse victims lacking affordable housing.” Ex. K, City of Chicago’s Resp. to Plfs.’ 2d Set of Interrogs. (“Defs.’ 2d Int. Resp.”) 28.

To refute the City’s justifications, Plaintiffs retained an economist, Dr. Adrian Moore, as their expert witness. In summary, Dr. Moore’s report (“Moore Report,” attached as Exhibit L) and testimony (“Moore Dep.,” attached in relevant part as Exhibit M) establish the following undisputed facts:

- The publications the City relies on do not establish, or even attempt to establish, any link between home-sharing and homelessness. Ex. L, Moore Report at 10; Ex. M, Moore Dep. at 29:24-30:6.
- One cannot draw general conclusions from studies focused on a single city, as most of the publications the City relies on are. Ex. M, Moore Dep. at 25:22-27:1.
- The only nationwide study on the relationship between home-sharing and housing costs found only a minimal effect. Ex. L, Moore Report at 8; Ex. M, Moore Dep. at 48:17-49:6.
- A lack of affordable housing is overwhelmingly the result of other factors within the city’s control, particularly restrictions on land use and building. Ex. L, Moore Report at 9-15.
- Homelessness is overwhelmingly the result of other factors, including low incomes and a lack of housing supply due to restrictions the City has imposed. *Id.* at 15-21.

The City’s purported “real and substantial” differences for tax classifications

The City makes several assertions to show that there are “real and substantial” differences among different types of hotel accommodations that justify applying the surcharges to home-sharing alone. The purported differences include:

- Zoning differences, which prohibit hotels and bed-and-breakfasts in residential areas

where home-sharing is allowed;

- “[H]otels and B&Bs have owners or employees who are present when guests stay at those establishments, while shared housing units generally do not.”
- “[S]hared housing units are widely dispersed and often anonymous, with only a limited amount of information provided on web site listings, thereby making enforcement and regulation more difficult, time consuming, and expensive.”

Ex. A, Defs.’ 1st Int. Resp. No. 11.

The City’s purported “real and substantial” differences for fee classifications

To identify the (supposed) real and substantial differences that could justify the differing licensing fees, the City has stated that there are relatively few hotels and B&Bs in Chicago—about 199 hotels, with about 51,600 rooms, and 20 B&Bs—but a large number (“over 6,369”) of shared housing units available for rent. Ex. A, Defs.’ 1st Int. Resp. No. 18. “Since there are relatively few [hotels and B&Bs], it is relatively easy and inexpensive for the City to perform license checks, building inspections and other required activities” with respect to them, the City states, but “licensing and inspecting all of the available shared housing units would be administratively inconvenient and expensive.” *Id.*

The City’s purported justifications for the differing fees

The City states that it imposes a licensing fee on shared housing intermediaries (i.e., platforms such as Airbnb) rather than the owners of individual shared housing units, because it is easier “to deal primarily with just a few intermediaries rather than a large number of individual unit owners.” Ex. A, Defs.’ 1st Int. Resps. No. 21. It further states that “[o]wners of multiple shared housing units are more likely to be real estate developers or investors who are in the business of renting out hotel accommodations,” so requiring them to be licensed gives the City

“some control over their activities” and allows it to “put a hold on—or refuse to renew—the license of an operator that is causing problems.” *Id.*

STANDARD

Summary judgment is appropriate where the pleadings, affidavits, depositions, admissions, and exhibits on file, when viewed in the light most favorable to the non-moving party, reveal that there is no genuine issue as to any material fact and the movant is entitled to judgment as a matter of law. 735 ILCS 5/2-1005(c).

ARGUMENT

The City’s home-sharing surcharges violate the Uniformity Clause because they arbitrarily and unreasonably discriminate against home-sharing and in favor of other “hotel” accommodations. Neither the surcharges nor the fees are based on real and substantial differences between home-sharing and other “hotel accommodations, and neither are reasonably related to their purported purpose or to public policy.

The Uniformity Clause states:

In any law classifying the subjects or objects of non-property taxes or fees, the classes shall be reasonable and the subjects and objects within each class shall be taxed uniformly. Exemptions, deductions, credits, refunds and other allowances shall be reasonable.

Ill. Const. Art. IX, § 2. To be reasonable under the Uniformity Clause, a classification must (1) be “based on a real and substantial difference between those who are taxed and those who are not taxed” and (2) “bear some reasonable relationship to the object of the legislation or to public policy.” *Primeco Pers. Commc’ns, L.P. v. Ill. Commerce Comm’n*, 196 Ill. 2d 70, 84 (2001). When a plaintiff presents a good-faith challenge to the reasonableness of a tax classification, “the taxing body ... must first justify the tax classification.” *Id.* at 85. Then “the challenging party

must persuade the court that the taxing body’s justification is unsupported by the facts or insufficient as a matter of law.” *Id.* This test does not merely “duplicate the limitation on the taxing power contained in the equal protection clause” but rather is “meant to insure that taxpayers receive added protection in the state constitution based on standards of reasonableness which are more rigorous than those developed under the federal constitution.” *U.S.G. Italian Marketcaffe, L.L.C. v. City of Chi.*, 332 Ill.App.3d 1008, 1014 (1st Dist. 2002) (internal marks and citations omitted). The classifications Plaintiffs challenge fail this test.

I. The home-sharing surcharges are not justified by real and substantial differences between home-sharing and other “hotel accommodations.”

The City’s home-sharing surcharges violate the Uniformity Clause because there is no real and substantial difference between the service provided to home-sharing guests and the service provided to hotel guests: all receive lodging on a “transient” basis for a nightly rate. *Cf. Satellink of Chi., Inc. v. City of Chi.*, 168 Ill. App. 3d 689, 694 (1st Dist. 1988) (no real and substantial difference between cable TV providers and satellite subscription TV providers because they “provide essentially the same service to [consumers]”). Indeed, the City Code recognizes that vacation rentals, shared housing units, hotels, motels, inns, and similar places all provide the same thing: “hotel accommodations.” Chi. Muni. Code § 3-24-020(4).

The City primarily justifies its different treatment of home-sharing by asserting that home-sharing removes housing from the long-term housing market, which supposedly increases long-term rents, which, in turn, supposedly increases homelessness. Ex. A, Defs.’ 1st Int. Resp. Nos. 10-16. Even assuming *arguendo* that home-sharing has those consequences, that does not distinguish home-sharing from other types of hotel accommodations. In fact, *every* type of hotel accommodation occupies space that could otherwise be devoted to long-term housing—and therefore any type of hotel accommodation should, under the City’s theory, have the same

effects. Indeed, much *existing* hotel space could be converted to long-term residences even without a zoning change because the City Code allows residential dwelling units above the first floor as a matter of right in almost all business, commercial, and downtown districts. *See* Chi. Muni. Code §§ 17-3-0207, 17-4-0207. For example, there are buildings in Chicago partially used as hotels and partially used for long-term residences. There is no reason why those buildings could not be devoted, partially or entirely (at least above the ground floor), to long-term residential use; their owners' decision to use them partly as a hotel therefore logically results in less available long-term housing than would otherwise exist, just as short-term rentals supposedly do. Yet the City treats them differently.

Moreover, unlike virtually all other hotel accommodations, many shared housing units do *not* displace long-term housing. The City argues that shared housing units are different from hotels and B&Bs because, unlike hotels and B&Bs, they “are permitted in residential single-unit districts (RS1, RS2, RS3)” and “low density multi-unit districts (RT3.5).” Ex. A, Defs.’ 1st Int. Resp. No. 11. Therefore, the City argues, “shared housing units limit the market for housing available for long term use while hotels and B&Bs do not.” *Id.* But, under the City Code, a person may only rent out a “single-unit” home, or a unit in a building with two to four residential units, if it is his or her primary residence. Chi. Muni. Code §§ 4-6-300(h)(8), 4-14-060(d). Therefore, home-sharing in such homes does *not* remove those homes from “housing available for long term use.”

The City also asserts that “hotels and B&Bs have owners or employees who are present when guests stay at those establishments, while shared housing units generally do not.” Ex. A, Defs.’ 1st Int. Resp. No. 11. It is not apparent whether the City knows how often shared housing units have an owner or employee present, nor is it apparent how this is a substantial difference

between the service provided to home-sharing guests and the service provided to guests of other hotel accommodations. To the contrary, the Appellate Court has held that, for Uniformity Clause purposes, the character of the service that a business provides does *not* change based on the participation (or non-participation) of an owner or employee of the business when the service is provided. *See Nat'l Pride of Chi., Inc. v. City of Chi.*, 206 Ill. App. 3d 1090, 1097, 1104 (1st Dist. 1990) (no real and substantial difference between self-service car washes and car washes with “machines operated and controlled by the owner or manager of such machines”).

Finally, the City asserts that shared housing units are different from other hotel accommodations because they “are widely dispersed and often anonymous, with only a limited amount of information provided on web site listings, thereby making enforcement and regulation more difficult, time consuming, and expensive.” Ex. A, Defs.’ 1st Int. Resp. No. 11. In fact, shared housing units can never be “anonymous” because their intermediaries must register them with the City, providing the owners’ or operators’ names, addresses, and other details. *See Chi. Muni. Code* § 4-14-020. Further, the City elsewhere states that it has addressed the problem of shared housing units being widely dispersed, with different owners, by requiring intermediaries (i.e., platforms such as Airbnb) to register and monitor them. Ex. A, Defs.’ 1st Int. Resp. No. 21. And, in any event, the City has not explained how this is a difference between the services provided to home-sharing guests and services provided to guests of other hotel accommodations.

II. The home-sharing surcharges violate the Uniformity Clause because they are not reasonably related to their stated purpose or public policy.

In addition, the City’s home-sharing surcharges violate the Uniformity Clause because their classification is not reasonably related to their stated purposes of addressing the problems of homelessness and domestic violence.

A. The surcharges' classifications are not reasonably related to the surcharges' purpose because they do not apply to other types of hotel accommodations that keep property out of the long-term housing market.

As an initial matter, even if one accepts the City's premise that keeping properties out of the long-term rental market will tend to increase long-term rents and, in turn, homelessness, it is not reasonable to apply the surcharges to all vacation rentals and shared housing units while not applying it to any other hotel accommodations. As discussed above, many shared housing units are not removed from the long-term housing market at all, because the law requires that they remain their owners' primary residences. These units therefore cannot contribute to rising rents and homelessness even under the City's theory.

On the other hand, other types of hotel accommodations are virtually *never* used as long-term housing, and they occupy space that could otherwise be devoted to long-term housing. It is not reasonable to combat homelessness, by imposing a surcharge on many units that (under the City's theory) do not even arguably contribute to that problem, while simultaneously not imposing that surcharge on other hotel accommodations that (under the City's theory) *do* contribute to the problem at least as much as any vacation rental or shared housing unit. *Cf. Milwaukee Safeguard Ins. Co. v. Selcke*, 179 Ill. 2d 94, 103 (1997) (tax on foreign, but not domestic, insurance companies was not reasonably related "to protecting the interests of Illinois policyholders because the tax [was] imposed on all foreign companies regardless of their financial strength or their level of compliance with [statutory criteria that allowed domestic insurers to avoid the tax]"); *U.S.G. Italian Marketcaffe*, 332 Ill. App. 3d at 1017 (ordinance cannot reasonably serve to prevent litter when it "taxes items that are not likely to cause litter, while not taxing items that are very likely to cause litter").

B. The studies the City has cited do not establish that home-sharing leads to increased homelessness.

In addition, the City's theory that home-sharing tends to increase homelessness is not well founded. None of the studies the City has cited even addressed homelessness, much less found that home-sharing increases it. Ex. L, Moore Report at 10; Ex. N, Deposition of Bryan Esenberg ("Esenberg Dep.") 71:5-9, 76:4-7, 77:19-21, 83:12-15, 87:11-14. In fact, Dr. Moore's survey of the academic literature found *no empirical research* on that question. Ex. M, Moore Dep. 29:24-30:6.

Rather than address homelessness, the City's studies only found, at most, that home-sharing led to modest increases in long-term rents in some parts of some cities. And all but one of the City's studies connecting home-sharing to increased rents focused on a single city. None of these studies provides a basis for concluding that home-sharing in general causes long-term rents to rise, or that it will do so in Chicago. As Dr. Moore has explained, one cannot draw general conclusions from a study of a single city; no economist would do so. Ex. M, Moore Dep. 25:22-27:1. Rather, results from a single city only suggest a hypothesis—a "research question"—that economists would want to investigate. *Id.* at 26:3-19.

There are additional reasons why the City's studies do not provide a basis for concluding that home-sharing tends to lead to increased rents, let alone a basis to conclude that home-sharing tends to increase homelessness.

The article about Los Angeles—a law review student note, not a peer-reviewed research paper by a trained scholar—does not even purport to show that home-sharing causes increased rents. In fact, the note employs no economic or statistical analysis. Rather, it only looks at comparative statics showing that certain Los Angeles neighborhoods with the most home-sharing also saw increased rents. Ex. M, Moore Dep. 50:16-51:2. The note argues from correlation; it

does not show any *causal* relationship between home-sharing and increases in rents. *Id.* at 51:2-7. And, as another article the City has cited has noted, and the City's proffered expert has acknowledged, without evidence of causation, home-sharing could be correlated with increased rents simply because it tends to be popular in places that are already gentrifying. Ex. N, Esenberg Dep. at 99:13-24.

As for the studies focused on New York City, they do not provide a basis for drawing general conclusions because New York is, as a rule of thumb, "always an outlier" due to its unique characteristics. Ex. L, Moore Report at 10. New York's data is not representative because that city's density is "orders of magnitude higher than any other city in America," with "developable space ... extremely limited ... in a way that it isn't in other major US cities." Ex. M, Moore Dep. 22:16-23:4. New York's extraordinary density and lack of developable space make its housing market "less flexible" and thus less able to adapt to changes. *Id.* at 23:15-24:5.

Chicago's market is more flexible than New York's for two reasons: because it scores as more flexible on the "Wharton Index" that measures housing market flexibility, and because Chicago's suburbs are not as dense as New York's. *Id.* at 24:6-22. Dr. Moore explained that "that density profile [] has a big influence on where development can occur, where people move in anticipation of changes in the market, where jobs locate in anticipation of access to workers, all of these things. Chicago has a lot more opportunity for things to shift in appreciable ways than the much denser and almost over-developed New York profile does." *Id.* at 24:23-25:7. Chicago's suburbs' greater flexibility allows for additional housing to be created, for properties to shift from commercial to residential use (or vice versa), and for people to move in and out more readily. *Id.* at 25:8-21. Thus, "[t]here is no clear reason to think the effects of home sharing

on rents would [be] as strong [in other cities]”—or in Chicago in particular—“as in New York City.” Ex. L, Moore Report at 10.

As for the study focused on Boston, Dr. Moore testified that, even assuming its methodology is sound and there were no confounding factors the authors failed to account for, that study provides no basis “to conclude that short-term rentals generally or in Chicago in particular would tend to increase rents or increase homelessness” in Chicago. *Id.* at 46:5-12. “[T]o draw conclusions ... on overall availability [of affordable housing]” based on that study “would be a stretch way beyond what the data actually shows.” *Id.* 46:13-47:12.

The authors’ data only showed that, for census tracts in the highest decile of Airbnb listings relative to total housing unit—i.e., the 10% of Boston census tracts with the greatest density of Airbnb listings—home-sharing caused an increase in asking rents ranging from 1.3% to 3.1%. *Id.* at 46:1-4, 47:13-48:6. This means, for example, that if average rents were \$750, the average increase would be between \$9.75 and \$23.25. But landlords do not generally actually raise rents by such small amounts; instead, the data suggest that approximately “one out of every hundred or one out of fifty landlords is raising their rents by [a larger amount such as] a hundred dollars,” while other tenants do not see an increase. *Id.* at 46:20-47:5. Thus, the Boston data does not suggest that home-sharing has led to a “widespread shock,” but shows only “a tiny effect [on] the margin affecting ... only a small percentage of [housing] units.” *Id.* at 47:6-8. And of course, this effect was limited to the top decile, so “the most extreme effect [the authors] could find was [approximately] 1 to 3 percent using the most extreme situation.” *Id.* at 47:20-48:6. Thus, even assuming the authors’ analysis is correct as far as it goes, it cannot allow one to draw broader conclusions about home-sharing’s effects on rents generally in Boston—much less its effects on rents in Chicago, much less its effects on homelessness in Chicago. *Id.* at 47:9-12.

The publication focused on Washington, D.C., does not even *purport* to prove that home-sharing causes rents to increase. It only reported that rents rose more quickly in D.C.’s top 20 Airbnb neighborhoods from 2011 through 2016, with a median increase of 14.9% compared to the citywide average of 11.0%. Ex. I, DC Working Families, *Selling the District Short* at 19. And it acknowledged that this “*does not prove* Airbnb caused the increase” and that “it is possible that commercial [short-term rental] operations are most viable in gentrifying neighborhoods, and that they locate in such neighborhoods for that reason.” *Id.* (emphasis added).

Finally, the only nationwide study found that home-sharing had a *minimal* effect on rents. It found that a 1% increase in Airbnb listings in a given zip code leads to an increase in long-term rents of just 0.018% to 0.024%—18 to 24 *cents* per \$1,000—and an increase in house prices of just 0.026% to 0.037%. Ex. G, Barron, et al., *The Sharing Economy and Housing Affordability: Evidence from Airbnb* at 27; Ex. L, Moore Report at 8. And, as Dr. Moore testified, this nationwide study, combined with the others the City relies on, suggests that “the more comprehensive the data . . . , the *smaller* the effect [on home-sharing on rents] is,” Ex. M, Moore Dep. 48:17-49:6 (emphasis added), providing a further reason to discount the single-city studies that suggest that home-sharing has a more-than-negligible effect on housing prices.

C. The economic literature shows that high rents and affordable housing shortages are overwhelmingly caused by factors other than home-sharing.

As Dr. Moore’s report explains, high rents and affordable housing shortages are overwhelmingly caused by factors other than home-sharing—factors that are within the City’s control, primarily land use restrictions and housing regulations. *See* Ex. L, Moore Report at 10-15.

Harvard’s Joint Center for Housing Studies’ definitive survey of America’s rental housing market in 2017 thoroughly discussed the challenges facing the rental housing market

“with no mention of Airbnb or the rise of home sharing.” *Id.* at 10. “Home sharing is simply not a problem that even shows up on the radar screen relative to long running major factors that shape the rental market.” *Id.* Indeed, in general, “[a]nalyzes of the housing market, and particularly of rental housing markets, do not consider home sharing to be even worth mentioning as a factor influencing the market.” *Id.* at 21.

In fact, land-use and growth restrictions, zoning, and housing regulations account for “roughly 90% of the home price differentials between markets with similar amenities.” *Id.* at 10. “In other words, most of the problem with lack of affordable housing in Chicago and high rents is attributable to decisions by the city that raise the cost of housing.” *Id.* at 10-11. Dr. Moore supported this conclusion with a “rich literature digging in to what drives high housing costs in some cities,” including, among other things, reports from the Harvard Joint Center for Housing Studies; the California Legislative Analyst’s Office; Jason Furman, chairman of President Obama’s Council of Economic Advisors; and Harvard economist Edward Glaeser, who has published dozens of articles on this issue. *Id.* at 11-15. In summary, this literature states that, to the extent that housing is unaffordable in cities, it is because those cities have enacted land use, zoning, and building restrictions that make it difficult to expand the supply.

Chicago is no exception. As Moore testified, the “Wharton Residential Land Use Regulatory Index”—which measures how stringently cities regulate land use—“puts Chicago in the middle of the pack with respect to land use regulations.” *Id.* at 13. “This means that while the housing market in Chicago is not as restricted as in, say, Boston, there are nearly 100 points in the Housing Affordability Index between Chicago and the least restrictive cities like St. Louis, Indianapolis, and Kansas City. This shows that Chicago has many policy options available to loosen up the housing market and lower home prices and rents.” *Id.*

Moreover, Chicago has a well-documented history of aldermen using “aldermanic prerogative”—through which an alderman may block proposed zoning changes in his or her ward—to prevent the development of affordable housing. *See, e.g.,* Tanvi Misra, *How Chicago’s Aldermen Help Keep It Segregated*, CityLab, Aug. 2, 2018³; Patricia Fron, et al., *Aldermanic Prerogative is the Grease That Oils the Machine*, Chi. Trib., Feb. 7, 2019.⁴

As for the other 10% of home price differentials, Dr. Moore opines that “most of it” would likely be attributable to economic growth, not home-sharing, because “[g]rowing areas have very different housing markets from shrinking [or steady] areas.” Ex. M, Moore Dep. at 37:16-38:9.

D. There is no basis for concluding that increased rents in neighborhoods with home-sharing will lead to increased homelessness.

In addition, the City has no basis for its assumption that increased long-term rents that (supposedly) result from home-sharing will lead to increased homelessness because renters on the margin will no longer be able to afford housing.

The claim is implausible on its face because there is no reason to believe that home-sharing occurs in any significant amount in neighborhoods where people are on the verge of homelessness. Home-sharing tends to occur in relatively upscale neighborhoods close to business centers and tourist attractions. People who rent homes through Airbnb do not look for apartments at the bottom of the market. Ex. L, Moore Report 9-10; Ex. M, Moore Dep. 43:6-22. This is confirmed by a report the City itself cites, that lists the five Chicago zip codes with the most Airbnb listings (accounting for more than 41% of Airbnb’s revenue in the Chicago metropolitan

³ <https://www.citylab.com/equity/2018/08/how-chicagos-aldermen-help-keep-it-segregated/564983/>.

⁴ <https://www.chicagotribune.com/opinion/commentary/ct-perspec-aldermanic-prerogative-zoning-political-corruption-0208-20190207-story.html>.

area): 60657 (Lakeview, Boystown); 60611 (Magnificent Mile, Streeterville); 60614 (Lincoln Park, Sheffield Neighbors, Old Town Triangle); 60610 (Old Town, Gold Coast); 60622 (Wicker Park, West Town). Ex. O, John W. O’Neill & Yuxia Ouyang, Penn State Univ. Sch. of Hospitality, *From Air Mattresses to Unregulated Businesses* 33 (2016). It is also confirmed by a map of Chicago home-sharing listings produced by the City’s proffered expert, which shows listings heavily concentrated downtown and on the north side, and shows that vast areas of Chicago’s south side, including some of the city’s poorest neighborhoods, have no listings at all. Ex. J Esenberg Report at Ex. E; Ex. N, Esenberg Dep. at 105:16-107:9.

Thus, even if home-sharing marginally increases rents in some neighborhoods where it occurs, “it’s unlikely that those effects are sufficiently strong among the population of renters most vulnerable to disruption to push them into homelessness.” Ex. L, Moore Report at 10. Again, even studies that found that home-sharing increases rents in some cities or neighborhoods found only a modest effect, and the only nationwide study found a minimal effect. It is implausible that such small rent increases in the upscale neighborhoods where home-sharing is most concentrated could force people out of their homes in neighborhoods where people are so impoverished that a rent increase of several percent would render them homeless—and where Airbnb listings do not even occur.

Further, Dr. Moore has explained that one cannot conclude that there is a simple causal chain through which home-sharing increases rents, which in turn affects the total housing supply, which in turn affects the number of people who are homeless. “[I]n each of the steps of that causal chain, there are many other influences, orders of magnitude stronger.” Ex. M, Moore Dep. 49:10-19. The City’s attempt to connect home-sharing to domestic violence requires yet another step in the causal chain, making that relationship even more attenuated.

In fact, homelessness is overwhelmingly the result of factors *unrelated* to home-sharing. The greatest factor affecting homelessness is not housing supply but lack of income. Ex. L, Moore Report at 20-21. Restrictions on housing supply do affect homelessness; one study of 40 large U.S. cities found about 42 percent of the variation in homelessness explained by differences in median home prices. *Id.* at 15. But, again, high housing costs are driven by city policies that restrict the supply of housing, not by home-sharing. *See id.* at 10-15. Academic literature shows that the restricted supply that results from these policies results in greater homelessness. *See id.* at 16-20.

In particular, homelessness is exacerbated by building restrictions that inhibit the creation of low-quality housing—i.e., the type of housing used by “people at high risk for homelessness, not the higher end apartments typically demanded by middle class vacation travelers and sometimes converted to home sharing.” *Id.* at 17-18. Empirical research shows that most cities with less housing regulation have between 50 and 100 percent less homelessness than cities with the median amount of regulation such as Chicago. *Id.* at 19.

In summary, even if one assumes the City’s studies are correct as far as they go, “problems with income are much more important for explaining homelessness than are housing supply and costs, while land use and housing regulations lead to nearly all housing supply and cost issues, leaving home sharing with very little impact on homelessness.” *Id.* at 21. And that only means that there is little *room* for home-sharing to have an impact; again, there is *no evidence* that home-sharing actually increases homelessness at all.

III. The varying fees for different hotel accommodations violate the Uniformity Clause because there is no real and substantial difference between hotels, bed-and-breakfasts, vacation rentals, and shared housing units.

The City has also failed to show that there are real and substantial differences between

the various types of “hotel accommodations”—hotels, bed-and-breakfasts, vacation rentals, and shared housing units—that could justify imposing different fees on them.

Asked to identify the real and substantial differences that could justify this differential treatment, the City stated that there are relatively few hotels and B&Bs in Chicago—about 199 hotels, with about 51,600 rooms, and 20 B&Bs—but a large number (“over 6,369”) of shared housing units available for rent. Ex. A, Defs.’ 1st Int. Resp. No. 18. “Since there are relatively few [hotels and B&Bs], it is relatively easy and inexpensive for the City to perform license checks, building inspections and other required activities” with respect to them, the City states, but “licensing and inspecting all of the available shared housing units would be administratively inconvenient and expensive.” *Id.*

That explanation makes little sense, given that the City imposes identical fees on B&Bs and vacation rentals, even though vacation rentals are permitted everywhere that shared housing units are permitted and therefore are also numerous and widely dispersed. It also makes little sense given that the City imposes a *lower* per-unit registration fee on shared housing units (paid by Shared Housing Unit Operators) than on hotels. If shared housing units were really and substantially different from other hotel accommodations because they are costlier to regulate, as the City claims, one would expect them to pay higher licensing fees than other hotel accommodations, but they do not.

IV. The home-sharing fees violate the Uniformity Clause because their purpose does not bear any reasonable relationship to the object of the City’s home-sharing ordinance.

The City cannot justify imposing different fees on shared housing units and vacation rentals because, as the City admits, “the ordinance definitions of vacation rentals and shared housing units are virtually identical.” Ex. A, Defs.’ 1st Int. Resp. No. 20. Imposing different fees

on identical things can only be arbitrary and a violation of the Uniformity Clause.

The City also cannot justify imposing no fee on owners of a single shared housing unit while imposing a \$250 “Shared Housing Unit Operator” license on owners of more than one shared housing unit. The City explains that it imposes a fee on shared housing intermediaries (platforms such as Airbnb) rather than the owners of individual shared housing units because it is easier “to deal primarily with just a few intermediaries rather than a large number of individual unit owners.” *Id.* No. 21. But that does not explain why owners of more than one shared housing unit have to pay an additional fee, even though they, too, must register with an intermediary, which must pay a registration fee on their behalf. *See* Chi. Muni. Code §§ 4-5-010(36), 4-13-230(a). The City states that “[o]wners of multiple shared housing units are more likely to be real estate developers or investors who are in the business of renting out hotel accommodations,” and licensing gives the City “some control over their activities” and allows it to “put a hold on—or refuse to renew—the license of an operator that is causing problems.” Ex. A, Defs.’ 1st Int. Resp. No. 21. But that (if true) only explains (at most) the separate license requirement; it does not explain the added \$250 *fee* in addition to the \$60 per-unit fee that an intermediary pays on an operator’s behalf. It also does not explain why the operator of two units should pay the same licensing fee as the operator of 100 or more units, when all other hotel licensing fees are greater or lesser depending on the number of buildings or units operated.

CONCLUSION

The City has failed to justify imposing surcharges on home-sharing that do not apply to other hotel accommodations, and it has failed to justify its arbitrary scheme of fees. The Court should therefore grant summary judgment in Plaintiffs’ favor and declare that the City’s home-sharing surcharges and fees violate the Uniformity Clause of the Illinois Constitution.

Dated: June 21, 2019

Respectfully submitted,

LEILA MENDEZ and ALONSO ZARAGOZA

By: _____
One of their Attorneys

Liberty Justice Center
Cook County No. 49098
Jeffrey Schwab (#6290710)
190 S. LaSalle Street, Suite 1500
Chicago, Illinois 60603
(312) 263-7668
(312) 263-7702 (fax)
jschwab@libertyjusticecenter.org

Goldwater Institute
Jacob Huebert (#6305339)
Timothy Sandefur (#6325089 / pro hac vice #61192)
Christina Sandefur (#6325088 / pro hac vice # 61186)
500 E. Coronado Road
Phoenix, Arizona 85004
(602) 462-5000
(602) 256-7045 (fax)
litigation@goldwaterinstitute.org

Attorneys for Plaintiffs

CERTIFICATE OF SERVICE

I, Jeffrey Schwab, an attorney, hereby certify that on June 21, 2019, I served the foregoing Plaintiffs' Motion for Summary Judgment via electronic filing service provider FileTime Illinois to Weston Hanscom (Weston.Hanscom@cityofchicago.org), Richard Danaher (Richard.Danaher@cityofchicago.org), and Jason Rubin (Jason.Rubin@cityofchicago.org).

Under penalties as provided by law pursuant to Section 1-109 of the Code of Civil Procedure, the undersigned certifies that the statements set forth in this instrument are true and correct, except as to matters therein stated to be on information and belief and as to such matters the undersigned certifies as aforesaid that he verily believes the same to be true.



Jeffrey M. Schwab

**IN THE CIRCUIT COURT OF COOK COUNTY, ILLINOIS
COUNTY DEPARTMENT, CHANCERY DIVISION**

LEILA MENDEZ and ALONSO ZARAGOZA,)	
)	
Plaintiffs,)	Case No. 16 CH 15489
)	
v.)	Judge Sanjay T. Tailor
)	
CITY OF CHICAGO, et al.,)	
)	
Defendants.)	
)	

**LIST OF EXHIBITS
TO PLAINTIFFS' MOTION FOR SUMMARY JUDGMENT**

- Exhibit A – Defendants’ Responses To Plaintiffs’ First Set of Interrogatories.

- Exhibit B – Dayne Lee, *How Short-Term Rentals Exacerbate Los Angeles’s Affordable Housing Crisis*, 10 Harv. L. & Pol’y Rev. 229-253 (2016).

- Exhibit C – Mark Merante & Keren Mertens Horn, *Is Home Sharing Driving Up Rents? Evidence from Airbnb in Boston* (Univ. of Mass. Boston Dep’t of Econ., Working Paper No. 2016-03).

- Exhibit D – Stephen Sheppard & Andrew Udell, *Do Airbnb Properties Affect House Prices?* (Jan. 1, 2018) (unpublished manuscript).

- Exhibit E – Office of the New York City Comptroller, *The Impact of Airbnb on NYC Rents* (April 2018) (unpublished manuscript).

- Exhibit F – David Wachsmuth, et al., McGill Univ. Sch. Of Urban Planning Urban Politics & Governance Research Group, *The High Cost of Short-Term Rentals in New York City* (2018) (unpublished manuscript).

- Exhibit G – Kyle Barron et al., *The Sharing Economy and Affordable Housing: Evidence from Airbnb* (Apr. 1, 2018) (unpublished manuscript).

- Exhibit H – Josh Bivens, Econ. Policy Inst., *The Economic Costs and Benefits of Airbnb* (2019).

- Exhibit I – DC Working Families, *Selling the District Short* (2017).

- Exhibit J – Report of Defendants’ Expert, Bryan Esenberg (exhibits omitted, except Exhibit E – Map of Chicago Home-Sharing Listings).

Exhibit K – City of Chicago’s Response to Plaintiffs’ Second Set of Interrogatories.

Exhibit L – Report of Plaintiffs’ Expert, Dr. Adrian Moore.

Exhibit M – Transcript of Deposition of Dr. Adrian Moore (excerpts).

Exhibit N – Transcript of Deposition of Bryan Esenberg (excerpts).

Exhibit O – John W. O’Neill & Yuxia Ouyang, Penn State Univ. Sch. of Hospitality, *From Air Mattresses to Unregulated Businesses* 19 (2016).

Exhibit A

**IN THE CIRCUIT COURT OF COOK COUNTY, ILLINOIS
COUNTY DEPARTMENT, CHANCERY DIVISION**

LEILA MENDEZ, et al.,)	
)	
Plaintiffs,)	Case No. 2016-CH-15489
)	
v.)	Judge Sanjay T. Tailor
)	
CITY OF CHICAGO, et al.,)	
)	
Defendants.)	
)	

**DEFENDANTS' RESPONSES
TO PLAINTIFFS' FIRST SET OF INTERROGATORIES**

Defendant City of Chicago ("City") responds to Plaintiffs' First Set of Interrogatories as follows:

INTERROGATORY NO. 1

Identify all persons with knowledge of any of the events alleged or referred to in Paragraphs 1 through 21 and 129 through 151 of Plaintiffs' Amended Complaint, including the nature and substance of each person's knowledge.

RESPONSE: The City objects to this Interrogatory as vague, overbroad and unduly burdensome. Subject to and without waiving these objections, the City states that Stefan Schaffer, Deputy Policy Director, Mayor's Office, has knowledge of the policy reasons behind the imposition of the surcharge at issue, including the analysis that was conducted prior to its imposition. Other persons with knowledge of these subjects include:

- Beth Beatty, Deputy Director, Financial Policy, Finance
- Rosa Escareno, Commissioner, Department of Business Affairs & Consumer Protection
- Maria Guerra, Director of Legislative Counsel & Government Affairs, Mayor's Office
- Samantha Fields, Budget Director, Office of Budget & Management

- Steven Valenziano, Assistant Zoning Administrator, Department of Planning & Development
- Members of the Chicago City Council

Investigation continues. The City will supplement this Response as appropriate.

INTERROGATORY NO. 2

Identify all witnesses you may rely on in defense of this case, including the nature and substance of each person's knowledge and anticipated testimony.

RESPONSE: The City anticipates that it will rely on Mr. Schaffer as a witness, who can testify about the policy reasons behind the imposition of the surcharge at issue, including the analysis that was conducted prior to its imposition. The City has not yet identified who else it may be calling as witnesses in this case. Once that determination is made, the City will duly supplement its response.

INTERROGATORY NO. 3

With respect to each and every person who may be used to present expert evidence regarding this action pursuant to Illinois Supreme Court Rule 213(f), identify:

- a. all opinions to be expressed, with a description sufficiently complete to include all of the information in your possession or control about such opinions;
- b. the specific allegations of the parties' pleadings to which such opinions are relevant, identified by pleading title and paragraph number;
- c. the basis, reasons, underlying data, and other information considered and relied on by the witness in forming the opinions to be expressed;
- d. all publications authored by the witness within the preceding ten years;
- e. all correspondence between the witness and the City;
- f. all drafts of the report produced for this litigation.

RESPONSE: The City has not yet identified who, if anyone, it will be calling as an expert witness in this case. Once that determination is made, the City will duly supplement its response.

INTERROGATORY NO. 4

Identify any and all meetings in which any member or agent of the City participated relating to the drafting and consideration of the Ordinance, specifically including those related to the addition of §§ 3-24-030(B) and 4-5-10(36), (37), and (38) to the Chicago Municipal Code.

RESPONSE: The City objects to this Interrogatory on the grounds that it seeks information that is neither relevant nor likely to lead to the discovery of relevant information. The surcharge and registration fees added by the Ordinance are either valid or invalid as written, and what was said in oral or written communications prior to passage of the Ordinance has no bearing on that issue. See Empress Casino Joliet Corp. v. Giannoulis, 231 Ill. 2d 62, 76 (2008) ("The reasons justifying the classification ... need not appear on the face of the statute, and the classification must be upheld if any state of facts reasonably can be conceived that would sustain it."). The City also objects that this Interrogatory is overbroad and unduly burdensome. The City further objects to the extent that the Interrogatory seeks information that is protected from disclosure by the attorney-client privilege, the work product privilege and/or the legislative privilege.

INTERROGATORY NO. 5

Identify any other meeting of any members of the City Council, a City Council committee, the City's Finance Department, or the City's Department of Business Affairs and Consumer Protection relating to the consideration or imposition of any tax or fee on vacation rentals, shared housing units, or shared housing unit operators from 2015 through the present.

RESPONSE: The City objects to this Interrogatory on the grounds that it seeks information that is neither relevant nor likely to lead to the discovery of relevant information. The surcharge and registration fees added by the Ordinance are either valid or invalid as written, and what was said in oral or written communications prior to passage of the Ordinance has no bearing on that issue. See Empress Casino Joliet Corp. v. Giannoulis, 231 Ill. 2d 62, 76 (2008) ("The reasons justifying the classification ... need not appear on the face of the statute, and the classification must be upheld if any state of facts reasonably can be conceived that would sustain it."). The

City also objects that this Interrogatory is overbroad and unduly burdensome. The City further objects to the extent that the Interrogatory seeks information that is protected from disclosure by the attorney-client privilege, the work product privilege and/or the legislative privilege.

INTERROGATORY NO. 6

Identify each and every short term residential rental intermediary that has paid the license fee imposed by Chi. Muni. Code § 4-5-010(37).

RESPONSE: The City objects to this Interrogatory on the grounds that it seeks information that is neither relevant nor likely to lead to the discovery of relevant information. Subject to and without waiving this objection, the City responds that, as of the date of this Response, the following short term residential intermediaries have paid the license fee: AIRBNB ACTION, LLC d/b/a Airbnb; HOMEAWAY.COM, Inc.

INTERROGATORY NO. 7

Identify the number of shared housing unit operators that have paid the license fee imposed by Chi. Muni. Code § 4-5-010(38).

RESPONSE: The City objects to this Interrogatory on the grounds that it seeks information that is neither relevant nor likely to lead to the discovery of relevant information. Subject to and without waiving this objection, the City responds that, as of the date of this Response, 26 shared housing unit operators have paid the license fee.

INTERROGATORY NO. 8

Identify each and every fact that forms the basis for the City's denial, in its Answer, of Paragraph 133 of the Amended Complaint, which states that "some individuals stay (and pay taxes) only at vacation rentals or shared housing units in Chicago, and some individuals stay (and pay taxes) only at hotels, bed-and-breakfasts, or other 'hotel accommodations' that are not vacation rentals or shared housing units."

RESPONSE: The City objects to this Interrogatory on the grounds that it lacks foundation. Paragraph 133 of the Amended Complaint alleged that "[t]here are individuals who are members of the first class of taxpayers who are not members of the second class of taxpayers ..." While

the City does not deny that there may be some individuals who stay (and pay taxes) only at vacation rentals or shared housing units in Chicago (hereafter collectively "shared housing units"), and some individuals who stay (and pay taxes) only at hotels, bed-and-breakfast establishments ("B&Bs"), or other hotel accommodations that are not shared housing units, the City denies that there is an identifiable "class of taxpayers" who stay only in shared housing units or an identifiable "class of taxpayers" who stay only at hotels or B&Bs.

INTERROGATORY NO. 9

Identify each and every fact supporting the City's position, reflected in its Answer to Paragraph 137 of the Amended Complaint, that the home-sharing surcharge's stated purpose — to "fund supportive services attached to permanent housing for homeless families and to fund supportive services and housing for the chronically homeless," Chi. Muni. Code § 3-24-030 — bears a reasonable relationship to the object of the Ordinance.

RESPONSE: The City objects to this Interrogatory on the grounds that it is vague and lacks foundation. Subject to and without waiving these objections, the City states that the surcharge's stated purpose is the same as the object of the Ordinance and therefore by definition bears a reasonable relationship to it.

INTERROGATORY NO. 10

Identify each and every fact supporting the City's position, reflected in its Answer to Paragraph 138 of the Amended Complaint, that guests of vacation rentals and shared housing units affect homelessness, or that vacation rentals and shared housing units have any greater connection to homelessness than other commercial and non-commercial traveler housing accommodations, such as hotels, bed-and-breakfasts, and the houses of friends or relatives.

RESPONSE: The City objects to this Interrogatory on the grounds that it lacks foundation. Subject to and without waiving this objection, the City states that studies indicate that house sharing has a tendency to reduce the availability of affordable housing, thereby contributing to the problem of homelessness. Each housing unit that is used for short-term house sharing rentals is a unit that is not available for use as permanent housing for residents. Hotels and B&Bs are

generally located in non-residential districts and therefore do not have that effect. There are only about 199 hotels in Chicago, with a total of about 51,600 rooms available for rent, and there are only about 20 B&Bs. By contrast, there are listings for over 6,369 shared housing units available for rent, largely in residential neighborhoods, so they use up much more housing that would otherwise be available for permanent housing. Investigation continues. The City will supplement this Response as appropriate.

INTERROGATORY NO. 11

Identify each and every real or substantial difference between vacation rentals and shared housing units, on the one hand, and other establishments included in the definition of hotel accommodations, on the other, asserted by the City and that the City relied on in denying Paragraph 134 of the Amended Complaint in its Answer.

RESPONSE: There are real and substantial zoning differences among the different types of hotel accommodations. While neither hotels nor B&Bs are permitted in residential single-unit districts (RS1, RS2, RS3), shared housing units are permitted in such districts. Similarly, only shared housing units are permitted in low density multi-unit districts (RT3.5). Consequently, shared housing units limit the market for housing available for long term use while hotels and B&Bs do not. Also, hotels and B&Bs have owners or employees who are present when guests stay at those establishments, while shared housing units generally do not. Furthermore, regulators and public safety officials know where hotels and B&Bs are located, and they know who to contact if needed. By contrast, shared housing units are widely dispersed and often anonymous, with only a limited amount of information provided on web site listings, thereby making enforcement and regulation more difficult, time consuming, and expensive. Investigation continues. The City will supplement this Response as appropriate.

INTERROGATORY NO. 12

Identify each and every object of the home-sharing surcharge.

RESPONSE: The purpose of the surcharge is to fund supportive services attached to permanent housing for homeless families and to fund supportive services and housing for the chronically homeless.

INTERROGATORY NO. 13

Identify any and all public policies that the City alleges support the home-sharing surcharge.

RESPONSE: One public policy consideration supporting the house sharing surcharge is caring for the less fortunate, including the homeless. Homelessness is a significant problem in Chicago and nationwide. Addressing that problem is an important public policy consideration, and addressing the problem requires revenue, which the house sharing surcharge helps provide. Studies indicate that house sharing has a tendency to reduce the availability of affordable housing, thereby contributing to the problem of homelessness. Each housing unit that is used for short-term house sharing rentals is a unit that is not available for use as permanent housing for residents. In addition, it is an important and long-standing public policy consideration to keep residential neighborhoods relatively quiet, peaceful and uncongested. This is one reason that house sharing was not allowed before the ordinance at issue went into effect, and it is a reason why hotels and B&Bs must generally be located in areas that are zoned for non-residential uses. Investigation continues. The City will supplement this Response as appropriate.

INTERROGATORY NO. 14

Identify each and every way that the City asserts that the home-sharing surcharge bears a reasonable relationship to any object of the legislation or to any public policy.

RESPONSE: See Responses to Interrogatory Nos. 10 - 13.

INTERROGATORY NO. 15

Identify the ways in which vacation rentals and shared housing units disrupt the desired physical character of Chicago's residential neighborhoods, and how the City believes the home-sharing surcharge prevents this type of disruption.

RESPONSE: In general, shared housing units are located in residential neighborhoods. Guests of shared housing units are not permanent residents of those neighborhoods and have no particular stake in the well-being of the neighborhood. They are transient guests, generally from out of town, and they often take up parking spaces that would otherwise be available to residents. In some cases, they are there to "party," which can mean noise and other disturbances for neighbors. There is no requirement that an owner, or an employee of the owner, be present to supervise their activities, as there is at a hotel or B&B. The surcharge does not necessarily prevent disruption, but there is no legal requirement that a tax have such an effect – only that it meet the requirements of the Uniformity Clause, which the surcharge does. Investigation continues. The City will supplement this Response as appropriate.

INTERROGATORY NO. 16

Identify the ways in which vacation rentals and shared housing units decrease the number of units of affordable housing, and how the home-sharing surcharge mitigates these effects.

RESPONSE: Studies indicate that house sharing has a tendency to reduce the availability of affordable housing, thereby contributing to the problem of homelessness. Each housing unit that is used for short-term house sharing rentals is a unit that is not available for use as permanent housing for residents. The proceeds of the surcharge are used to fund supportive services attached to permanent housing for homeless families and to fund supportive services and housing for the chronically homeless. The City will produce documents providing additional details about the programs that the surcharge funds. Investigation continues. The City will supplement this Response as appropriate.

INTERROGATORY NO. 17

Identify the ways in which vacation rentals and shared housing units cause or increase guest-created disturbances in the City, and how the home-sharing surcharge mitigates these effects.

RESPONSE: See Response to Interrogatory No. 15.

INTERROGATORY NO. 18

Identify each and every fact on which the City relies to justify its denial of Paragraph 142 of the Amended Complaint, which states that "for the purpose of licensing fees, there is no real and substantial difference between hotels, bed-and-breakfast establishments, vacation rentals, and shared housing units."

RESPONSE: There are only about 199 hotels in Chicago, with a total of about 51,600 rooms available for rent, and there are only about 20 B&Bs. By contrast, there are listings for over 6,369 shared housing units available for rent. Hotels are licensed, are in non-residential zoning districts, and have employees on site. Since there are relatively few of them, it is relatively easy and inexpensive for the City to perform license checks, building inspections and other required activities. The same is generally true of B&Bs. By contrast, licensing and inspecting all of the available shared housing units would be administratively inconvenient and expensive. In fact, when the City first allowed house sharing, by the same ordinance that imposed the surcharge, it had to spend over \$1.1 million to set up a system for registering and regulating shared housing units. Investigation continues. The City will supplement this Response as appropriate.

INTERROGATORY NO. 19

Identify each and every alleged real or substantial difference between hotels, bed-and-breakfast establishments, vacation rentals, and shared housing units that the City believes justifies the imposition of different fees under Chi. Muni. Code § 4-5-010.

RESPONSE: See Response to Interrogatory No. 18.

INTERROGATORY NO. 20

Identify each and every fact that the City alleges supports its Answer to paragraph 148 of the Amended Complaint, which denies that the Code's definitions of vacation rentals and shared housing units are virtually identical.

RESPONSE: The City objects to this Interrogatory on the grounds that it lacks foundation. The City does not deny that the ordinance definitions of vacation rentals and shared housing units are virtually identical. The City denies the allegation, of paragraph 148 of the Amended Complaint, that the different fee systems for vacation rentals and shared housing units are unjustifiable. Pursuant to the pertinent Code provisions, a unit owner may choose which licensing system to use, and this will have an effect on which regulations and procedures will apply.

INTERROGATORY NO. 21

Identify each and every object of Chi. Muni. Code § 4-5-010, which imposes no license fee on the owner or tenant of a single shared-housing unit but does impose license fees on hotels, bed-and-breakfasts, vacation rentals, and shared housing unit operators.

RESPONSE: The owner of a single shared housing unit is generally an individual who is not otherwise in the business of renting out hotel accommodations. By listing their units through intermediaries, the owners of such units allow the City to deal primarily with just a few intermediaries rather than a large number of individual unit owners. The intermediaries help monitor the rentals of such units, and they pay much larger license fees, based in part on the number of units they list. Owners of multiple shared housing units are more likely to be real estate developers or investors who are in the business of renting out hotel accommodations. It is important for the City to be able to have some control over their activities, and requiring them to obtain a license helps provide that control because, among other things, the City can put a hold on - or refuse to renew – the license of an operator that is creating problems. Investigation continues. The City will supplement this Response as appropriate.

INTERROGATORY NO. 22

Identify any and all public policies that the City alleges support its decision to exempt owners and tenants of a single share-housing unit from the license fees that apply to hotels, bed-and-breakfasts, vacation, rentals, and shared housing unit operators under Chi. Muni. Code § 4-5-010.

RESPONSE: The City objects to this Interrogatory on the grounds that it lacks foundation. See Response to Interrogatory No. 21.

INTERROGATORY NO. 23

State the factual basis for the City's denial of Paragraph 149 of the Amended Complaint.

RESPONSE: See Response to Interrogatory No. 21.

INTERROGATORY NO. 24

Identify all documents and other tangible items Defendants may use in defense of this action.

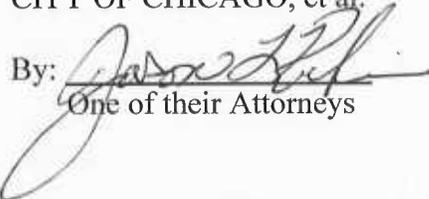
RESPONSE: The City will produce documents responsive to Plaintiffs' First Set of Requests for Documents. The City has not yet identified which documents it will use in defense of this action. The City will duly supplement its response to this Interrogatory.

INTERROGATORY NO. 25

Identify each person who provided information needed to respond to any interrogatory or request herein, including which interrogatory (by number) was addressed by each such person respectively.

RESPONSE: Stefan Schaffer provided information needed to respond to all of the Interrogatories herein. Joy Adelizzi provided information needed to respond to Interrogatory Numbers 6, 7, 10 and 18. Steven Valenziano provided information needed to respond to Interrogatory Numbers 10, 11, 13, 15, 16, 18 and 21.

CITY OF CHICAGO, et al.

By: 
One of their Attorneys

Weston Hanscom
Jason Rubin
City of Chicago Law Department
Revenue Litigation Division
30 N. LaSalle Street, Suite 1020
Chicago, Illinois 60602
(312) 744-9077/4174
(312) 744-6798 (fax)
Weston.Hanscom@cityofchicago.org
Jason.Rubin@cityofchicago.org
Attorney No. 90909

CERTIFICATION

On this day, July 6th, 2018, under penalties as provided by law pursuant to Section 1-109 of the Code of Civil Procedure, the undersigned certifies that the answers to interrogatories as set forth in this document are true and correct to the best of his knowledge, information and belief.



Stefan Schaffer
Deputy Policy Director for City of Chicago

CERTIFICATE OF SERVICE

I, Jason L. Rubin, an attorney, hereby certify that on July 10, 2018, I served the foregoing **DEFENDANTS' RESPONSES TO PLAINTIFFS' FIRST SET OF INTERROGATORIES** on Defendants' counsel by electronic mail sent to Jacob Huebert, jhuebert@libertyjusticecenter.org, Jeffrey Schwab, jschwab@libertyjusticecenter.org, Timothy Sandefur, tsandefur@goldwaterinstitute.org, and Christina Sandefur, csandefur@goldwaterinstitute.org.

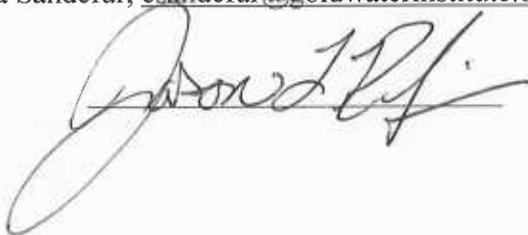
A handwritten signature in black ink, appearing to read "Jason L. Rubin", is written over a horizontal line. The signature is fluid and cursive, with a large loop at the beginning and end.

Exhibit B

10 Harv. L. & Pol'y Rev. 229

Harvard Law & Policy Review

Winter, 2016

Student Note

Dayne Lee ^{a1}

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HOW AIRBNB SHORT-TERM RENTALS EXACERBATE LOS ANGELES'S AFFORDABLE HOUSING CRISIS: ANALYSIS AND POLICY RECOMMENDATIONS

I. INTRODUCTION

Los Angeles, California, is in the midst of an affordable housing crisis. Rents have increased by 7.3% in 2014 alone, and the median renting household already spends 47% of its income on housing.¹ This crisis has added fuel to the contentious debate over Airbnb, a startup technology company that facilitates short-term rentals (STRs) of residential homes to tourists. Whereas Airbnb and its users tout its positive effects on tourism, cultural exchange, and the environment, its critics contend that Airbnb harms neighborhoods, distorts the housing market, undermines labor unions, and exacerbates Los Angeles's affordable housing crisis. In regulating Airbnb, policymakers seek to curb Airbnb's impacts on neighborhood character and housing while harnessing the economic activity it brings.²

Employing legal, statistical, and secondary source analysis, this article explores how STRs affect the price and aggregate supply of affordable housing rentals in Los Angeles, and how municipal policymakers can best regulate Airbnb. In Section I, I briefly outline the contours of Los Angeles's affordable housing crisis, and describe Airbnb and its growth in Los Angeles. The topics of Section II are the effects that STRs have on rents and Los Angeles's aggregate supply of affordable housing. Section III of this article analyzes how and to what extent Airbnb leads to displacement, gentrification, and segregation in Los Angeles's residential neighborhoods. In Section IV, I assess strategies, regulations, and policies that municipal policymakers and stakeholders can use to regulate Airbnb. Finally, in the Conclusion, I recommend a set of regulations, taxes, and community-benefits agreements that will force Airbnb to be a partner that promotes, rather than impedes, the goals of affordable housing advocates.

***230** Airbnb likely reduces the affordable housing supply by distorting the housing market in two interconnected mechanisms. The first such mechanism is one of simple conversion: any housing unit that was previously occupied by a city resident, but is now listed on Airbnb year round, is a unit that has been removed from the rental market and has essentially been added to Los Angeles's supply of hotel rooms. This leads to a real, but likely mild, increase in citywide rents, an effect that is concentrated in affluent or gentrifying neighborhoods along the city's central core. More disconcertingly, conversion reduces Los Angeles's already-limited supply of affordable housing. The second mechanism is "hotelization." So long as a property owner or leaseholder can rent out a room on Airbnb for cheaper than the price of a hotel room, while earning a substantial premium over the residential market or rent-controlled rent, there is an overpowering incentive to list each unit in a building on Airbnb rather than rent to Los Angeles residents, thereby creating "cottage hotels." This decreases the supply of housing and spurs displacement, gentrification, and segregation.

These two mechanisms distort the rental housing market, which traditionally does not overlap with the hospitality sector. Tourists stay in hotels that are specifically permitted for and developed in commercially zoned neighborhoods. Residential housing is zoned and built through a wholly different process. Airbnb facilitates the inappropriate merging of the residential and tourist markets on an unprecedented scale, and unlike with a shortage of, say, shoes or oranges, neither the market nor the public sector can swiftly replace the housing units that Airbnb removes from the marketplace. Thus, city officials regulating Airbnb--and regulating STRs generally--must address conversion and hotelization head on.

As detailed in Section IV and the conclusion of this article, policymakers should pursue targeted bans and regulations that discourage conversion and hotelization. A simple tax on STRs alone will likely be insufficient to fund the replacement of converted units, and may serve to further incentivize hotelization. In exchange for Airbnb's cooperation with enforcement, city officials could allow Airbnb to participate directly in expanding the hospitality market.

A. Background: Los Angeles's Affordable Housing Crisis

Los Angeles, California, has become America's least affordable rental housing market. In 2014, the average renter in Los Angeles County³ paid *231 \$1,716 per month.⁴ And within the city, where most residents rent, the median renting household earned less than \$40,000 and spent 47% of its income on housing.⁵ One in two middle-income families and nine in ten families from the bottom income quintile are rent burdened, spending at least 30% of their income on rent.⁶

The city's affordability crisis has developed because of declining real wages, population growth, and zoning policies that favor single-family and luxury housing.⁷ The foreclosure crisis of 2010 exacerbated the affordability crisis by pushing over 100,000 former homeowners into the rental market.⁸ At the same time, wealthier residents repopulated the city core, rapidly gentrifying low-income immigrant enclaves such as Chinatown and Highland Park.⁹ As a result, rents increased by 7.3% in 2014 alone.¹⁰ Over the past decade, 143,000 market-rate apartments that were once "affordable" (meaning that rent constituted 30% or less of a resident's monthly income) to families earning under \$44,000 per year became unaffordable.¹¹

Los Angeles's public housing infrastructure is ill equipped to protect low-income renters. Experts consider the city's Rent Stabilization Ordinance (RSO) to be weaker than comparable regulations in San Francisco or New York, largely because its 3% cap on annual rent increases does not apply to units built after 1978, and because it does not prevent landlords from exceeding the cap in between tenancies.¹² California's Ellis Act exempts from local rent control provisions landlords who purchase a rent-controlled unit from a prior owner, provided that the prior owner is selling in order to exit the business.¹³ As neighborhoods gentrify, evictions of RSO-protected tenants rose by 235% in 2014 as landlords sold their protected units to commercial developers, who are in turn exempted from rent control obligations *232 pursuant to the Ellis Act.¹⁴ Meanwhile, the Section 8 voucher waitlist has been closed for nearly a decade due to limited funding.¹⁵

City officials have been similarly unable to increase the stock of affordable housing. Since 2006, the city has been able to build only a fifth of the 5,300 affordable units that Los Angeles needed to add each year.¹⁶ This is largely because funding has plummeted; the Los Angeles Affordable Housing Trust Fund fell from \$100 million in 2008 to just \$19 million in 2015, while \$1.7 billion in state funds have been cut from the California Redevelopment Agency and the Community Development Block Grant program.¹⁷ For renters, an affordability crisis is the downside to Los Angeles's ubiquitous *taquerias*, Korean barbeque restaurants, and perennial beautiful weather.

B. Airbnb and the Short-term Rental (STR) Phenomenon

Los Angeles's affordability crisis has developed alongside the transformation of its tourism sector by STRs--rentals of entire apartments to tourists for fewer than thirty days--arranged through Airbnb. A pair of art students founded Airbnb in 2008 to help travelers bypass expensive hotels and gain local experiences by "couch surfing" with strangers.¹⁸ Tourists use the Airbnb website or mobile application to browse and reserve accommodations in a city or neighborhood of their choice; instead of staying at a hotel or motel, a tourist can "couch surf" with, or rent an empty apartment from, a stranger in another city during their vacation.

For "hosts," Airbnb is a platform through which apartment owners or lease-holders can rent out anything from a spare living room couch to entire apartment units, with Airbnb collecting "host service"¹⁹ and "guest service" fees from each transaction.²⁰ On its platform, Airbnb allows both hosts and tourists to exchange pictures of the units, "review" apartments and guests on a five-star system, communicate privately, and securely exchange money.

*233 Now worth thirteen billion dollars, Airbnb is among the most lucrative poster-children of the so-called "sharing economy," in which technology companies circumvent business regulations and well-established competitors by facilitating direct, peer-to-peer exchanges of goods and services.²¹ Similar cottage-scale rentals have been possible since the dawn of the Internet, but Airbnb's unique success stems from its secure and exceptionally well-designed website, and from its users' positive experiences.

Airbnb has transformed Los Angeles's hospitality industry. In 2014, Los Angeles city residents listed 11,401 units on Airbnb, including 7,316 whole-unit STRs.²² By comparison, Los Angeles has 97,000 hotel rooms, though these are dispersed throughout the county.²³ Approximately 135,000 of the forty-five million tourists to visit the city in 2014 stayed in an Airbnb unit.²⁴

Airbnb reports that in 2014, it generated \$314 million in economic activity in Los Angeles, and that by redistributing revenue from corporate hotels, it helps everyday *Angelenos* cope with rising rents and economic instability.²⁵ Airbnb touts its positive effects on cultural exchange, and 37% of surveyed guests state that they would not have been able to travel to Los Angeles for as long a period of time without the service.²⁶ Finally, Airbnb presents home-sharing as a sustainable, energy-efficient, and environmentally conscious alternative to hotels.²⁷

But criticism of Airbnb's business practices has mounted at a rapid pace. The Venice Neighborhood Council contends that STRs are illegal because they blatantly violate zoning codes banning sub-thirty-day rentals in residential or multifamily zones.²⁸ Hosts' neighbors allege that rowdy tourists undermine public safety.²⁹ And unions and hotels complain that Airbnb unfairly competes with hotels by avoiding occupancy taxes and zoning laws, skirting public health regulations, and undercutting unionized hotel workers by connecting its hosts with independently contracted cleaners.³⁰

Los Angeles's "Airbnb economy" does not match the idyllic image Airbnb promotes, in which artistic, young professionals couch surf from Los Angeles to New York to Madrid, exchanging apartments through Airbnb with their fellow travelers. In practice, 64% of Airbnb listings in Los Angeles are for STRs of units that are never occupied by their owners or leaseholders, and operate year-round essentially as independent, unlicensed hotel rooms.³¹ Chances are, an apartment booked through the service is managed by a full-time investor or company that also owns or leases dozens of other Airbnb listings.³² Such companies contract in bulk with decorators and cleaners, manage reservations, and negotiate above-market rent leases with building landlords in exchange for the privilege of renting units out on Airbnb.³³

Airbnb's emergence has significant political and policy implications for Los Angeles's tourism sector, sustainability efforts, and labor movement. As a bona fide cultural phenomenon, Airbnb has galvanized opposition among

neighborhood organizations, labor unions, and affordable housing advocates. Yet it has also mobilized a groundswell of support from hosts and guests alike. The narrow focus of this article, however, is the effects that Airbnb STRs have on Los Angeles's affordable housing market.

II. AIRBNB INCREASES RENTS, INCENTIVIZES HOTELIZATION, AND REDUCES THE AFFORDABLE HOUSING STOCK

An Airbnb-affiliated economist claims that Airbnb is a scapegoat for broader economic trends in Los Angeles, and that it has increased monthly rents by just six dollars over five years.³⁴ Rental pricing is certainly a complicated topic, but there is a simple underlying dynamic between STRs and the rental market. Tourists and renters are non-overlapping populations with different needs, traditionally served by non-overlapping markets. But because 64% of its listings are STRs for tourists, Airbnb brings an increasing number of the forty-five million tourists who visit Los Angeles each year into direct competition with renters, distorting the housing market.³⁵

Each apartment or home listed year-round on Airbnb is a home that has been removed from the residential housing market and added to the city's aggregate stock of hotel rooms; I label this phenomenon "conversion." So long as a property owner or leaseholder can earn a substantial premium from Airbnb rather than renting to city residents, there is an overpowering incentive to "hotelize" entire buildings, further reducing the aggregate housing *235 stock. Compounding these market distortions, neither the market nor the public sector can swiftly replenish the housing stock, given the time, cost, and legal barriers to developing affordable housing in Los Angeles. In light of this basic dynamic, the following sections detail how this market-mixing function raises rents and reduces the supply of affordable housing in Los Angeles.

A. Airbnb Increases Rents in Neighborhoods with a High Density of Airbnb Listings

Airbnb listings are concentrated in just seven of the city's densest, most expensive neighborhoods: Venice, Downtown, Miracle Mile, Hollywood, Hollywood Hills, Echo Park, and Silver Lake.³⁶ These tourist destinations account for nearly half of Airbnb listings, and 69% of all Airbnb-generated revenue in Los Angeles.³⁷ In 2014, rents in these neighborhoods were 20% higher, and increased 33% faster, than rents citywide.³⁸

*236 **FIGURE 1:**

RENTAL HOUSING AVAILABILITY IN TOP 7 AIRBNB NEIGHBORHOODS³⁹

NEIGHBORHC	POPULATION (2010)	% OF RESIDENTS THAT RENT	RENTERS (ESTIMATE)	AVG. HOUSEHOLD SIZE	VACANCY RATE	TOTAL UNITS (ESTIMATE) ⁴⁰	AIRBNB WHOLE UNIT LISTINGS
Venice	40,885	68.80%	28,128	1.9	4%	15,422	882
Downtown	34,811	93.40%	32,413	1.6	4%	21,168	220
Miracle Mile	6,197	59%	3,656	2.5	3%	1,508	543 ⁴¹
Hollywood	85,489	92.40%	78,992	2.1	3.50%	38,979	646

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Hollywood Hills	22,988	46.50%	10,689	1.8	3.50%	7,154	315
Echo Park	43,832	76%	10,689	3	3.50%	11,507	230
Silver Lake	32,890	64.30%	21,148	2.3	3.50%	9,528	268
Totals	267,092	78.04%	208,440			104,266	3,104

*237 Figure 1 shows that 3,104 whole-units are listed on Airbnb in these neighborhoods, which have a rental stock of 104,265 units.⁴² To the extent that whole-unit STRs are listed throughout the year, as much as 3% of the apartments in these districts--which have a low 3.5% vacancy rate--have been removed from the market and converted to tourist accommodations. This distortion is particularly acute in beachside Venice, where, according to one study, 12.5% of the neighborhood's apartments are listed on Airbnb.⁴³

In tight housing markets with near-zero vacancy rates, a sudden reduction in supply naturally increases rents, particularly because neither the market nor the public sector can swiftly add to the housing stock. Unlike with most commodities, a shortage in housing supply cannot be ameliorated by importing or quickly building additional units. Assuming that a given neighborhood permits and can physically accommodate the construction of new housing, building an average unit of rental housing in Los Angeles requires an investment of \$315,000, three years just for permitting, and additional time for construction.⁴⁴ Thus, a sudden removal of between 3% and 12.5% of a neighborhood's housing stock constitutes a supply shock.

The price effect of a supply shock in Los Angeles is compounded by annual increases in residential demand, and by the upward pressure that the allure of STR profits puts on property values, which in turn affect property taxes and rents. Even under a simple economic model holding the demand for rental housing constant against a relatively flat supply curve that has a price-elasticity coefficient of 0.200, each 1% decrease in supply would lead to a 0.2% rent increase.⁴⁵ Under this model, the rent on a \$2,680 one-bedroom apartment in Venice would increase by an additional sixty-seven dollars per month from the reduction in local supply alone.⁴⁶

In addition to a supply-related rent increase, the market could be affected by demand pressures from the allure of STR profits, and from accelerated *238 inflation at the tail-end of the distribution in a housing market with near-zero vacancies. Put simply, a renter in an Airbnb-saturated neighborhood seeking to occupy one of the handful of available apartments is no longer bidding against the local residential rent price, but is instead bidding against the extra profit that STRs can bring.

By incentivizing the conversion of residential units to tourist housing, Airbnb causes a small, but notable, increase in citywide rents. In the neighborhoods with the greatest concentration of Airbnb listings, this rent-increasing effect is much greater; Airbnb accounts for a significant portion of the accelerated rent inflation seen in neighborhoods such as Venice and Silver Lake.

B. Airbnb Reduces Supply by Encouraging Illegal Conversion, Hotelization, and Evictions

In addition to causing a small increase in rents, Airbnb substantially reduces Los Angeles's aggregate supply of housing. Thus, as residents bid for a smaller number of available units, an increasing number of residents are priced out of their neighborhoods, or even the city, entirely. The phenomenon of "hotelization" accelerates this process. Airbnb creates a strong incentive for property owners and renters to permanently "hotelize" entire buildings by renting each unit to

tourists through Airbnb rather than finding long-term tenants. This reduces the housing supply, and places demand-side pressure on Los Angeles's dwindling stocks of subsidized and unsubsidized affordable housing.

Although Airbnb claims that it mostly provides middle-class renters and homeowners with supplemental income, it generates 89% of its revenue in Los Angeles from whole-unit STRs without on-site hosts.⁴⁷ To the extent that such units are listed on Airbnb year-round, these figures suggest that Airbnb's business model is based on encouraging hotelization and evictions, not on helping renters lease out spare rooms to make ends meet.⁴⁸ Although it is unclear what percentage of full-time Airbnb listings whole-building "hotels" constitute, news reports paint a vivid portrait of the hotelization phenomena in action.

Entrepreneurs approach landlords in popular neighborhoods expressing their intent to list rental units year-round on Airbnb.⁴⁹ Investors in Silver Lake and Venice have also bought homes and apartments for this purpose.⁵⁰ In the Ellison Suites building in Venice, where the average monthly rent is \$1,500, one woman rents fourteen units and lists them on Airbnb for \$200 *239 per night, for a monthly profit of up to \$63,000.⁵¹ When investors turn entire residential buildings into unlicensed cottage hotels, their Airbnb listings are doubly illegal. First, residential neighborhoods prohibit the rental of apartments for fewer than thirty days. Second, these investors do not obtain zoning licenses or hotel permits, do not purchase hotelier's insurance, and do not follow the myriad city regulations that govern hotels.

Landlords have joined the gold rush: one landlord in Venice converted ten of his building's thirty units into Airbnb listings, though he says that his rentals are legal because the units are leased for more than thirty days at a time.⁵² Furthermore, according to local activists, Ellis Act evictions have increased the most in the very neighborhoods where Airbnb listings are concentrated, "in a 'Nike' swoosh shape across Los Angeles ... from Venice, cut through Hollywood and Koreatown, and encompass[ing] parts of Silver Lake and Echo Park."⁵³

C. Airbnb Likely Leads to a Citywide Reduction in Affordable Housing

Housing advocates believe that Los Angeles needs 490,340 more affordable homes,⁵⁴ and Los Angeles mayor Eric Garcetti hopes to construct 16,000 new units annually by 2020.⁵⁵ But in 2014, STRs removed 7,316 units from the city's rental market, a number that seems poised to grow.⁵⁶ It is easy to imagine a future in which Airbnb's growth--and the corresponding removal of rental units from the residential market--outpaces the construction of affordable housing in Los Angeles.

Although there is currently no data on how many of these removed units were affordable, full-time Airbnb STRs can affect the affordable housing stock in two ways. First, affordable units are particularly attractive targets for conversion, directly reducing the stock of affordable housing.⁵⁷ Through the Ellis Act, investors can relieve landlords from the administrative burdens of administering rent-controlled or voucher-subsidized housing, and convert newly-purchased, formerly affordable apartments into Airbnb listings, particularly in newly gentrifying neighborhoods. Thus, Airbnb incentivizes the direct conversion of subsidized or rent-controlled units into lucrative Airbnb listings. Absent regulation, this incentive will continue to influence the marketplace so long as hotel rates sufficiently exceed residential rents.

*240 Second, Airbnb indirectly reduces the affordable housing supply by reducing the overall housing supply. As a result, the pressure that STRs place on rent prices pushes units out of the margins of affordability for low- and middle-income residents, an effect that cascades throughout the city. In 2014, Airbnb removed 1% of the units from Los Angeles's rental market--and substantially more in some neighborhoods--while monthly rents increased by 7.3%.⁵⁸ And by reducing the overall housing supply, Airbnb is partially responsible for the citywide rent increases that further reduce the supply of affordable housing.

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III. AIRBNB IS CORRELATED WITH GENTRIFICATION AND MAY EXACERBATE RESIDENTIAL SEGREGATION AND INEQUALITY

Airbnb harms the goals of affordable housing advocates in ways beyond its numerical impact on rents or the housing stock. Although these harms are difficult to measure, they extend beyond the fact that tourists do not sleep at reasonable hours and do not recycle beer cans properly. Airbnb STRs impede integration and exacerbate socioeconomic inequality.

A. Airbnb is Correlated with Gentrification in Adjacent Neighborhoods

Gentrification occurs when rising rents displace a neighborhood's lower income households, who are replaced by wealthier residents that change the district's "essential character."⁵⁹ Lower-income residents who are displaced can face longer commutes and lose access to essential community services and institutions.⁶⁰

Airbnb STRs are concentrated in expensive neighborhoods that have long-since or have never been gentrified. But when middle-income renters are displaced from these neighborhoods, they are pushed into cheaper neighboring communities, which they subsequently gentrify. For example, former Venice resident Roman Barrett says he moved to Koreatown--a gentrifying, low-income Asian and Latino enclave--after being priced out of Venice by Airbnb rentals.⁶¹

Figure 2 illustrates the relationship between Airbnb-dense communities and their poorer, gentrifying neighbors. These neighborhoods tend to have high poverty rates, yet their rents have risen more rapidly than in Los Angeles overall. This effect is particularly dramatic in Chinatown, where rents have doubled in just two years. More data is needed to determine whether, *241 say, residents displaced from Silver Lake actually move to Koreatown, but the prevalence of STRs seems to correlate with rent hikes and gentrification in adjacent districts.

***242 FIGURE 2:**

GENTRIFYING DISTRICTS ADJACENT TO AIRBNB-DENSE NEIGHBORHOODS⁶²

ARBNNB DENSE NEIGHBORHOOD	INCOME (\$)	ADJACENT GENTRIFYING NEIGHBORHOOD (AGN)	INCOME (\$)	INCOME DIFFERENTIAL (\$)	JAN 2013 RENT (\$) IN AGN	JAN 2014 RENT (\$) IN AGN	JAN 2015 RENT (\$) IN AGN	1 YEAR RENT INCREASE IN AGN (%)	2 YEAR RENT INCREASE IN AGN (%)
Downtown ⁶³	15,003	Boyle Heights	33,235	18,232	1639	1750	1881	7.49%	14.77%
Echo Park	37,708	Chinatown	22,754	-14,954	1200	2150	2400	11.63%	100.00%
Hollywood	33,694	East Hollywood	29,927	-3,767	1581	1661	1710	2.95%	8.16%
Hollywood Hills	69,277	East Hollywood	29,927	-39,350	1581	1661	1710	2.95%	8.16%
Miracle Mile	61,767	Koreatown	30,558	-31,209	2166	2288	2482	8.48%	14.59%
Silver Lake	54,339	Koreatown	30,558	-23,781	2166	2288	2482	8.48%	14.59%
Venice	67,647	Culver City	70,774	3,127	2659	2668	3193	19.68%	20.08%

Los Angeles	\$49,497			\$2,321	\$2,362	\$2,534	7.28%	9.18%
Average								

***243 B. Airbnb Might Reduce Integration by Displacing Lower-income Tenants**

Economic and racial neighborhood integration can lead to a range of positive educational, vocational, and health outcomes for low-income tenants. But Airbnb reduces neighborhood integration by incentivizing hotelization, encouraging Ellis Act conversions of rent-controlled units, and driving out lower-income renters.⁶⁴ Furthermore, some landlords of buildings protected by the city's Rent Stabilization Ordinance choose to list vacant units on Airbnb rather than deal with the eviction and rent protections that a full-time tenant would enjoy.⁶⁵

Because Airbnb STRs are such a nascent phenomenon, further research is needed to measure Airbnb's impact on annual changes in racial and economic diversity in high-demand neighborhoods. Researchers should also track the displacement of lower income residents from neighborhoods where Airbnb listings are prevalent.

C. Unequal Access to Airbnb Exacerbates Racial and Socioeconomic Inequality

Airbnb creates winners and losers; it facilitates cultural exchange and provides economic benefits to hosts and tourists, but distributes these benefits unequally. Hosts need an Internet connection and cultural savvy just to access the platform. And the fact that just seven of Los Angeles's most expensive neighborhoods, in which approximately 8% of the city's residents live, generate over two thirds of the city's Airbnb revenue suggests that there is little tourist demand for STRs in lower- and middle-income neighborhoods.⁶⁶

According to Airbnb, 38% of its hosts are of low-to-moderate income, and more than half are renting out couches and spare bedrooms.⁶⁷ But these hosts only make 11% of the city's Airbnb-supported income.⁶⁸ Instead, largescale operators reap the lion's share of the revenue; 6% of Airbnb hosts list multiple units, earning 35% of all Airbnb revenue.⁶⁹ One such company, Global Homes and Condo, lists seventy-eight units on Airbnb through a pair of friendly, but fake, "front" women.⁷⁰ These figures suggest that whereas individual "hosts" set their rates based on the value of their apartments, commercial Airbnb operators set their prices against prevailing hotel prices, leading to profits for operators and Airbnb alike.

***244** In addition, although most Airbnb STRs blatantly violate city laws prohibiting sub-thirty-day apartment rentals, landlords seem to enforce these laws more diligently against renters--particularly those with rent-controlled or subsidized housing--than against apartment or condo owners.⁷¹ It would probably be unfair for publicly subsidized tenants to profit from listing STRs on Airbnb. But the benefits of Airbnb overwhelmingly accrue to relatively wealthy renters and property owners, not to average *Angelenos*.

Finally, Airbnb is based on an amorphous "trust" and "sense of community" endemic to the sharing economy, a trust that extends only to some social groups. A recent study found that African American hosts earn 12% less than white hosts for equivalent rental listings.⁷² And minority guests are systematically denied lodging by Airbnb hosts.⁷³ If Airbnb hosts are offering a public accommodation, minority Airbnb guests may even have a *prima facie* case against Airbnb hosts for discrimination in violation of the *Fair Housing Act* of 1968, which prohibits refusal to rent to a person on the basis of a protected class, such as racial minorities.⁷⁴ Airbnb facilitates systemic discrimination and reduces racial integration.

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IV. REGULATING AIRBNB TO PROMOTE EQUITABLE HOUSING

A. Criteria for Evaluating Proposals: Solutions Must Address All Problems

Because Airbnb STRs are a new and rapidly growing phenomenon, local and state lawmakers and regulators are just beginning to deal with this problem.⁷⁵ The author's view is that Los Angeles should prioritize the housing needs of residents over the needs of tourists when the two aims conflict. However, there are ways to harness the benefits of Airbnb, while regulating it so that it promotes affordable housing, integration, and equity in Los Angeles. But, any policy reforms must directly address the distortive effects that conversion and hotelization have on affordable housing.

Ideally, STR regulations should address as many of Airbnb's negative effects on affordable and fair housing as possible. Ideally, they would also address the underlying causes of Los Angeles's housing crisis, including the *245 lack of funding for developing affordable housing. Before signing on to a deal, policymakers and community stakeholders should ask whether a proposal:

- 1. Addresses and combats neighborhood and city-wide rent increases;*
- 2. Reduces or adds to the city's market-rate and affordable housing stock;*
- 3. Discourages the "conversion" of existing affordable units into STR listings;*
- 4. Eliminates incentives that encourage "hotelization" of rental units;*
- 5. Protects residents from displacement and eviction;*
- 6. Addresses cultural and economic gentrification;*
- 7. Exacerbates socioeconomic disparities or increases access to Airbnb's benefits;*
- 8. Promotes socioeconomic integration.*

B. Evaluating Mayor Garcetti's Plan to Tax STRs in Order to Fund Affordable Housing

On April 16, 2015, Mayor Garcetti announced a deal he had proposed to Airbnb. Under his proposal, Los Angeles would levy a 14% occupancy tax on all Airbnb facilitated rentals.⁷⁶ This is expected to generate at least \$5 million annually, although this static projection does not take into account expected increases or tax-induced decreases in Airbnb

activity.⁷⁷ These funds would be allocated each year to Los Angeles's Affordable Housing Trust Fund, which has been reduced from \$100 million in 2008 to just \$19 million in 2015.⁷⁸

Without taking matching funds into account, \$5 million could fund the development of sixteen affordable units at an average cost of \$315,000 per unit.⁷⁹ However, Airbnb rentals remove 7,316 units--which does not include units that are listed only intermittently on Airbnb--year-round from Los Angeles's rental market. Even if Airbnb stops expanding, it would take 457 years for occupancy taxes to fund the full replacement of the units that Airbnb removes from the city's rental market. To use another rough calculation, a single studio apartment in Silver Lake that is booked on Airbnb for an average of \$132 per night at a remarkable 60% rate--219 days a year-- *246 yields \$28,908 for its host, generating \$4,047 in occupancy tax revenue for Los Angeles each year.⁸⁰ Such a unit would take seventy-eight years to fund the construction of its own replacement.

This may not be an apples-to-apples comparison because Airbnb should not shoulder the entire burden of replacing a converted unit of affordable housing when, presumably, an affordable housing developer would recoup its costs through tenants' rent payments. Take, then, the hypothetical Silver Lake apartment in the paragraph above and assume that it was an affordable unit of housing for a median-income city resident. Perhaps it would be reasonable at least to expect STR taxes to cover the costs of construction during the period that Airbnb leaves Silver Lake with one fewer unit of housing.

Assume that a developer spends four years building (three years of permitting, one year of construction) a unit of affordable housing in Silver Lake, and that the unit will be habitable for fifty years. At a cost of \$315,000, the unit will cost the developer \$6,300 per year in construction costs alone over the 50-year period. If Airbnb was responsible for covering the costs of four years of construction, it would still have to generate \$25,200 in taxes over four years, requiring a daily tax rate of 21.8%. The back-of-the-envelope calculations in this hypothetical demonstrate the complications involved in trying to fund the replacement of converted or hotelized units of housing through an occupancy tax on STRs. An occupancy tax of 14% might be insufficient to meet Mayor Garcetti's stated policy goals.

Furthermore, Garcetti's plan would not address gentrification or rent increases in neighborhoods where Airbnb listings are prevalent. And depending on where new units are built, it is unclear whether the neighborhoods most affected by Airbnb would benefit from new housing construction. After all, the city may build in lower-income neighborhoods that offer taxpayers a better "bang for your buck" than Venice or Silver Lake. This could concentrate poverty, and decrease economic integration in affluent neighborhoods, unless the funds were used to fund mixed-use or affordable developments in higher income neighborhoods at higher cost to the Trust Fund.

Garcetti's plan may spread demand and help lower income and minority hosts. But this could backfire by contributing to gentrification in those neighborhoods, especially if taxes push STR demand into the already gentrifying districts adjacent to the neighborhoods that are popular on Airbnb. One final concern is that such a deal would formally excuse Airbnb from a wide range of liability, from safety-related issues to STR regulation. Legalization may also spur STR growth. And Garcetti should specify how his plan would address evictions, illegal conversions, and discrimination by Airbnb hosts and renters during the time period when replacement housing is being constructed.

***247 C. Evaluating Alternative Tax and Redistribution Schemes**

Mayor Garcetti's plan directly addresses Los Angeles's affordable housing shortage, but might not replace the units that Airbnb removes from the rental market. Allocating STR taxes to construct affordable housing also does not address segregation and gentrification. There may be more effective ways to tax and redistribute the revenue that STRs generate.

The city can be ambitious about tax rates and tax Airbnb at a rate higher than the 14% occupancy fee levied on licensed hotels. As a matter of policy, it is desirable that the brunt of any taxes levied on Airbnb would be borne by two relatively

wealthy populations: tourists and property owners. Furthermore, whereas hotel guests are ostensibly paying for city services with their taxes, Airbnb guests could also be paying to replenish the housing stock. If Airbnb tourists are looking to avoid paying a premium to stay in hotels, Los Angeles could tax hosts to any extent such that the price of an Airbnb is less than the price of an equivalent hotel room without de facto banning STRs. Although there are political limits to tax levels, officials need not set a 14% pre-negotiation upper tax limit on Airbnb listings.

Los Angeles could promote economic diversity and integration by directing tax revenue towards a municipal housing voucher program, which would increase economic integration. And if these vouchers were given to low-income residents of Airbnb-dense buildings or neighborhoods, it would allow them to stay in their homes. However, like Mayor Garcetti's plan, such taxation and redistribution schemes may not be able to replace all of the units that Airbnb removes from the residential market. Other measures are necessary to complement these tax schemes and promote integrated, affordable neighborhoods throughout Los Angeles.

D. Evaluating a Ban or Targeted Restrictions on Airbnb STRs

STRs increase rents for residents and reduce the supply of affordable housing by removing units from the housing market through conversion and hotelization. Given Los Angeles's low vacancy rate, it is likely that thousands of residents have been displaced due to the 7,316 year-round listings on Airbnb. On the other hand, Airbnb's economists claim that in 2014, Airbnb helped add \$314 million in economic activity and 2,600 jobs to Los Angeles's economy.⁸¹ Although this does not take into account losses to renters and other community stakeholders, it is plausible that Airbnb simultaneously produces economic benefits while exacerbating the city's affordability crisis. This article approaches the issue of Airbnb from the lens of weighing its effect on Los Angeles's affordable housing crisis, and is not an attempt to quantitatively measure the net economic gains or losses produced by Airbnb. Policymakers seeking to regulate Airbnb must make both economic and *248 value-driven decisions in order to weigh the importance of promoting affordable housing.

A blanket ban on STRs would end Airbnb's role in exacerbating Los Angeles's affordability crisis. For residents displaced by Airbnb, a blanket ban would likely be preferable to any solution that insufficiently addresses the corrosive effects of STRs. Enforcing anti-STR laws could also halt the evictions, displacement, and gentrification that follow when Airbnb saturates a neighborhood. That said, a ban would not add to Los Angeles's affordable housing stock itself, and would deprive the city of Airbnb's benefits. Furthermore, bans that deprive property owners of Airbnb's benefits implicate Constitutional protections for property owners under the three-pronged *Penn Central* takings test, which assesses: (1) the economic impact of a regulation on affected parties, (2) the extent to which a regulation frustrates investor expectations, and (3) the extent to which a regulation is tailored to promote general welfare or is arbitrary.⁸²

Property law scholar Jamila Jefferson-Jones suggests that New York's anti-STR regulations may violate legitimate investor-backed expectations, and are not "roughly proportional," meaning that the severity of existing laws banning STRs are not commensurate to the value of the regulations: protecting public safety, hotels, and neighborhood property values.⁸³ However, Professor Jefferson-Jones's analysis underestimates the public's legitimate interest in protecting affordable housing.⁸⁴ These arguments demonstrate how outright bans may become increasingly untenable given Airbnb's prevalence. At the moment, however, most of the STRs listed on Airbnb in Los Angeles's residential and mixed-use (business and residential) zones are illegal.

Alternatively, city officials could legalize STRs but place targeted restrictions on them rather than enforce the existing blanket ban. Such an approach could reasonably prevent Airbnb from distorting the housing market while allowing tourists and residents to benefit from it. However, such a strategy would have to address conversion and hotelization, or otherwise ameliorate Airbnb-induced reductions in affordable housing supply.

For example, enforcement agencies could choose to target unlicensed hotels and prevent hotelization. Perhaps purchasers of property could be banned from using Airbnb for a one-year “cool-down” period. This would put a check on price hikes and discourage hotelization. Such a ban would protect the existing affordable housing stock. However, such a requirement may invite scrutiny under the investor expectations prong of the *Penn Central* test where investors, prior to enactment of the rule, bought a building for the purpose of hotelization. But the city can assert that the restriction is ***249** necessary to prevent public nuisances and protect the affordable housing stock. And because it would not constitute rent control, a cool-down requirement would not trigger the intervention of the Ellis Act if a purchased property was previously rent-controlled.

Similarly, policymakers could discourage “conversion” by prohibiting landlords who have evicted a tenant without fault--meaning that the tenant is not evicted for violating his or her lease--from listing the unit in question on Airbnb for a one-year cool-down period. This cool-down period can be imposed on all landlords, or just landlords of subsidized units. Either approach would discourage wanton conversion of rental stock into tourist accommodations.

Another approach would be to assign STR permits and restrict the number of permits per square mile or neighborhood. However, geographically targeted restrictions on STRs would be difficult to enforce, and it would be difficult to administer a permit system that is equitable to all prospective hosts. Furthermore, this might encourage the spread of STRs into newly gentrifying neighborhoods. For example, such a policy could restrict the culling of Echo Park's affordable housing supply while exacerbating the affordability crisis in neighboring Chinatown.

Another solution would be to mandate that Airbnb STRs be allowed only in buildings that meet a target affordability threshold. For example, the city could promote inclusionary housing by only allowing STRs in neighborhoods or buildings where 30% of the units are affordable, which would incentivize property owners to subsidize apartments that are currently priced at the market rate in order to “free up” units for Airbnb listings. This would directly address STRs' effects on neighborhood socioeconomic integration. But such solutions would be cumbersome to calculate and difficult to enforce. Furthermore, such a benchmark may be considered exactions that are not roughly proportional to the actual affordability and public safety problems that STRs create.⁸⁵ Finally, such an approach would increase the stock of affordable housing, but simultaneously reduce Los Angeles's overall stock of residential housing.

Lastly, city officials could prevent hotelization by legalizing STRs, but limiting the number of days per year that a host can list a unit without going through the hotel permitting process. This would disincentivize the conversion and removal of units from the housing market, protect the housing stock, and tamp down speculation and rent inflation. Such an approach would be subject to an investor-backed expectations takings challenge, but the city could argue that the limitation is necessary to protect the residential housing stock.

Should Los Angeles decide to adopt some sort of enforcement strategy towards Airbnb, policymakers should empower regulators to enforce zoning and hotel licensing laws. Regulations on Airbnb STRs are municipal in nature, concerning issues such as zoning and hotel licensing. California counties ***250** have not coordinated to regulate STRs on a county or statewide basis. Although Los Angeles has not committed resources to enforcing STR laws, the City Attorney's office has asked hosts to pay occupancy taxes.⁸⁶ But it is unclear whether these warnings were symbolic or whether the City Attorney has the resources to enforce these laws.⁸⁷

Policymakers should empower regulators to enforce zoning and hotel licensing laws. Although resources are limited, this should be a priority given the havoc that STRs wreak on the residential housing market. And rather than targeting single-unit hosts, regulators can target the cottage industry of “Airbnb leasing companies” that are rapidly removing units from the rental housing market, thereby discouraging hotelization.⁸⁸

Perhaps taxes can fund enforcement officers or a regulatory body within the city planning department. In the absence of a new regulatory agency, Airbnb should at least make it possible for the city to track STRs and crack down on the most egregious activities. Perhaps hosts who post listings more than once a month--which indicates that a host has converted a unit--should have to register with the city. Los Angeles should also crack down on large-scale operators who manage "virtual hotels" with multiple rooms across the city. And investors should be prevented from converting entire buildings into cottage hotels. Airbnb's cooperation is critical to any effective enforcement scheme that prevents conversion and hotelization. Perhaps city officials can negotiate with Airbnb and exchange greater cooperation with targeted enforcement efforts for a general legalization of noncommercial-scale STRs.

E. Promote Affordable and Fair Housing Through Community Benefits Agreements

In addition to regulating and taxing Airbnb, Los Angeles should adopt the community benefits agreement (CBA) model that local industries have negotiated with unions and affordable housing advocates.⁸⁹ Under a typical CBA, developers of large projects are given tax credits and the permission to build lucrative developments such as luxury apartments, malls, or sports stadiums in exchange for a commitment to hire local residents, set aside affordable housing, or donate to public projects.⁹⁰ So too here, policymakers, advocates, unions, and developers would come together and bring Airbnb in as a partner, helping Los Angeles's low-income and minority communities share in Airbnb's benefits.^{91 92}

***251** First, Airbnb should ban racially discriminatory hosts and users and make the approval process race-blind. Airbnb could also use its platform, market penetration, and technology to connect hosts with cleaning services that pay living wages. Additionally, Airbnb could apply its proprietary technology to help low-income renters find low-cost or public housing.

Airbnb and developers could also be given incentives to concurrently expand the supply of housing and the supply of tourist accommodations, removing tourists from the residential housing market. Developers could be given permits to construct sanctioned "Airbnb hotel" apartments in neighborhoods with a high density of Airbnb listings. Qualifying newly constructed buildings could be exempt from the bans, taxes, or restrictions on STRs that would govern existing residential housing. These permits could be contingent upon Airbnb or the developer signing a CBA that ensures workers are fairly paid, and require that at least 15% of a hotel's units be rent-controlled or subsidized for low-income residents.⁹³ The remaining units could be rented at market-price, or listed on Airbnb. An even better ratio of "hotel" units to affordable residential units would be one that directs hotel developers to reserve as many affordable units as possible while earning market-rate returns. In any combination, an "Airbnb hotel" would directly expand the affordable housing stock, expand the aggregate housing stock, increase Los Angeles's supply of hotel rooms, and promote integration.

V. CONCLUSION: REFORMING STRS TO ADDRESS THE HOUSING CRISIS

As gentrification transforms Los Angeles's urban core, policymakers must adapt to better regulate new technologies such as Airbnb. The best regulation comes from precise data, so additional research is needed on how STRs affect evictions and rents. To an extent, Airbnb is a response to, not a cause of, gentrification and Los Angeles's affordable housing crisis. But policymakers must understand that Airbnb profits from illegal rentals that cause rent increases, reduces the housing supply, and exacerbates segregation. Even an outright ban on STRs would be better for low-income residents than the unregulated status quo. Airbnb must become a responsible partner and facilitate, not hinder, the goals of affordable housing advocates.

In preparing to negotiate with Airbnb, Los Angeles can learn from the approaches that other cities have taken to regulate Airbnb. San Francisco, Chicago, and Washington, D.C. negotiated with Airbnb lobbyists to legalize STRs and apply hotel occupancy taxes to STRs.⁹⁴ Aside from New York, ***252** policymakers have avoided suggesting outright

bans, perhaps because Airbnb has mobilized grassroots support and formed sophisticated lobbying and advocacy organizations.⁹⁵ Airbnb spent \$100,000 in 2014 alone to lobby Los Angeles officials.⁹⁶

After proposing and evaluating various reforms, my recommendation is that Los Angeles adopt a three-pronged strategy. First, the city should prevent the hotelization and conversion of existing residential buildings and units of housing. Airbnb provides a tremendous benefit to tourists and residents alike when it allows tourists to travel off the tourist-beaten path. Such adventures are a win-win for hosts who are merely using Airbnb for a month per year to subsidize their own travels, or who are using Airbnb to earn enough money to keep their home after losing a job.

But given the inelasticity of the housing supply, it is inappropriate for investors to permanently remove units from the residential housing stock in order to cater to tourists. Fundamentally, I would argue that the *raison d'être* of Los Angeles's housing stock is to serve its residents. Thus, Los Angeles should ban year-round listings of apartments on Airbnb and similar websites, perhaps by emulating San Francisco's proposed "Ballot Measure F" and setting a seventy-five-day limit on the number of days that a unit can be listed.⁹⁷ Bona fide homeowners or leaseholders who occasionally host guests through Airbnb can be exempted from any taxes that would otherwise be levied on STR transactions.

Furthermore, Los Angeles should institute a one-year cool-down period before any formerly subsidized or rent-controlled home can be listed on Airbnb. To prevent hotelization and professional Airbnb management, Los Angeles should set a hard cap on the number of units that any individual or business can list on Airbnb in a given year. Finally, Los Angeles should set a hard cap on the number of units in a building that property owners and managers can list on Airbnb.

In order to incentivize developers and Airbnb itself to build additional affordable and market-rent housing, Los Angeles should apply these restrictions to existing residential buildings and units, but allow newly-developed building managers and owners to set aside a greater number of units for STRs. The city can also grant additional exemptions for developers who set aside newly-constructed units for low-income residents, thereby directly increasing the affordable housing stock and promoting economic integration. Along this line, the city can bring developers, unions, advocates, and Airbnb--the parent company--together to sign Community Benefits Agreements. The parties can agree to build "Airbnb hotels" in tourist destinations *253 that set units aside for low-income residents, provide good jobs, and ban discrimination.

Finally, Los Angeles should implement a 14% occupancy tax on any unit that is listed on Airbnb for greater than the seventy-five-day cap mentioned above. This would prevent Airbnb hosts from gaining an unfair competitive advantage over hotels. The city can allocate this revenue towards code enforcement, and for funding mixed-income housing in Airbnb-dense neighborhoods, thereby promoting integration and preventing displacement.

Airbnb is organizing constituents and mobilizing political support.⁹⁸ This is why political stakeholders must regulate Airbnb STRs now, before the industry calcifies into Los Angeles's political and economic structure. At the moment, local politics are favorable to increased regulations. Unions and neighborhood associations have united with their political adversaries--hotels and developers--to speak out against Airbnb.⁹⁹ By framing the public narrative around the displacement that STRs cause, regulators can also win the support of influential faith leaders, as well as of the public. If the city brings Airbnb together with community stakeholders, the city can eliminate Airbnb's corrosive effects on fair and affordable housing, and help all communities benefit from safe, integrated, and affordable neighborhoods.

Footnotes

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2 *See, e.g.*, Steven Leigh Morris, *Airbnb is Infuriating the Neighbors. Is it Time for New Rules?*, LOS ANGELES WEEKLY (Jan. 22, 2015), <http://www.laweekly.com/news/airbnb-is-infuriatingthe-neighbors-is-it-time-for-new-rules-5343663> [<http://perma.cc/4JG2-KAJM>].

3 Los Angeles is a city located within the County of Los Angeles, California. Approximately one-third of Los Angeles County residents live within Los Angeles. Unless stated otherwise, the statistics and neighborhoods referenced in this article refer to the city of Los Angeles, not the overall county. County-wide statistics are used as they are here when city-specific statistics are unavailable.

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5 Ray, *supra* note 1, at 8.

6 *Id.* at 9 (citing US Census American Community Survey data from 2009-2011).

7 *Id.* at 6, 13.

8 *How Los Angeles County's Housing Market Is Failing to Meet the Needs of Low-Income Families*, CALIFORNIA HOUSING PARTNERSHIP COALITION REPORT, May 2014, at 2, http://www.chpc.net/dnld/Housing_Need_LA_Final_060414.pdf [<http://perma.cc/7BVZ-TCXT>].

9 *See, e.g.*, *York & Fig*, AMERICAN PUBLIC MEDIA (2014), <http://yorkandfig.com> [<http://perma.cc/UYK9-RA46>]; *see also infra* Fig. 2.

10 *See* ZILLOW, *supra* note 1.

11 Ray, *supra* note 1, at 8 (acknowledging that the authors' affordability benchmark is 30% of income).

12 *See Economic Study of the Rent Stabilization Ordinance and the Los Angeles Housing Market*, LOS ANGELES HOUSING DEPARTMENT, 2009, at 8-9; *see also* Ben Bergman, *Has Rent Control Been Successful in Los Angeles?*, SOUTHERN CALIFORNIA PUBLIC RADIO, (Sept. 12, 2014), <http://www.scpr.org/news/2014/09/12/45988/la-rent-has-rent-control-been-successfulinlos-an/> [<http://perma.cc/H5G3-P24R>].

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16 *Id.*

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- 26 *Id.*
- 27 *Id.*
- 28 Morris, *supra* note 2.
- 29 *Id.*
- 30 Samaan, *supra* note 22, at 15, 22-26.
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- 36 Kudler, *supra* note 32.
- 37 *Id.*
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- 39 Top cities and vacancy rates are from Samaan, *supra* note 22, at 18. Population and household data are from *Mapping L.A. Neighborhoods*, L.A. TIMES, <http://maps.latimes.com/neighborhoods/> [<http://perma.cc/U3XF-FRUM>].
- 40 Estimate: $(\text{Estimated Renters} / \text{Household Size}) / (1 - \text{Vacancy Rate})$.
- 41 Miracle Mile STRs estimated from $(\text{total units}) \times (\text{LA average whole unit STR}\%)$.

- 42 Estimated using household size data from *Mapping L.A. Neighborhoods*, *supra* note 39.
- 43 Samaan, *supra* note 22, at 3. Like the Samaan report, Section II.A of this article assumes that whole-unit listings are listed year-round on Airbnb. However, it is likely that the whole-unit STR figures cited from the Samaan report include some housing units that are in fact occupied by the owner or leaseholder for most of the year, and are not listed year-round on the service. Such units are not removed from the residential housing market.
- 44 Cost per unit from California Department of Housing and Community Development, see *Affordable Housing Cost Study: Analysis of the Factors that Influence the Cost of Building Multi-family Affordable Housing in California*, CAL. DEP'T OF HOUS. & CMTY. DEV. ET AL. 32 (2014), <http://www.hcd.ca.gov/housing-policy-development/docs/finalaffordablehousingcoststudyreportwit-coverv2.pdf> [<http://perma.cc/A98W-WG6T>] [hereinafter *Affordable Housing Cost Study*]. See also Ben Bergman, *LA Rent Crisis: Why Aren't There More Affordable Apartments?*, SOUTHERN CALIFORNIA PUBLIC RADIO (June 12, 2014), <http://www.scpr.org/blogs/economy/2014/06/12/16821/la-rent-crisis-why-aren-t-there-more-affordable-ap/> [<http://perma.cc/6N8L-Q3UE>].
- 45 See, e.g., John M. Quigley & Steven Raphael, *Regulation and the High Cost of Housing in California* 26 (Berkeley Program on Housing & Urban Policy, Working Paper No. W04-008, 2004) (finding that the price elasticity coefficient to supply is .360 for non-rent controlled rental markets). A regression analysis would be needed to specifically determine the Los Angeles housing market's price elasticity.
- 46 See *Venice Home Prices & Values*, ZILLOW, <http://www.zillow.com/venice-los-angelesca/home-values/> [<http://perma.cc/87J8-3TJE>].
- 47 Samaan, *supra* note 22, at 9.
- 48 The rental of spare bedrooms may also distort the housing market by pushing up prices.
- 49 Tim Logan, Emily Alpert Reyes & Ben Poston, *Airbnb and Other Short-term Rentals Worsen Housing Shortage, Critics Say*, L.A. TIMES (Mar. 11, 2015), <http://www.latimes.com/business/realestate/la-fi-airbnb-housing-market-20150311-story.html> [<http://perma.cc/48BRCRFN>].
- 50 Morris, *supra* note 2.
- 51 Lepore, *supra* note 34.
- 52 *Id.*
- 53 Duran, *supra* note 14.
- 54 CALIFORNIA HOUSING PARTNERSHIP COALITION REPORT, *supra* note 8.
- 55 *Plan: Transforming Los Angeles*, CITY OF LOS ANGELES 52 (2015), <https://d3n8a8pro7vhmx.cloudfront.net/mayorofla/pages/17002/attachments/original/1428470093/pLAN.pdf?1428470093> [<https://perma.cc/RW4Q-ZT6D>].
- 56 Samaan, *supra* note 22, at 3.
- 57 *Id.* (describing how trade publications advise landlords on how to convert units to STRs).
- 58 See ZILLOW, *supra* note 1. Total number of apartments in LA estimated by dividing census population data by household size data from *Mapping L.A. Neighborhoods*, *supra* note 39.
- 59 Maureen Kennedy & Paul Leonard, *Dealing with Neighborhood Change: a Primer on Gentrification and Policy Choices*, BROOKINGS INSTIT. CTR. ON URBAN & METRO. POLICY, Apr. 2001, at 5.
- 60 *Id.* at 22, 43.
- 61 Logan et al., *supra* note 49.

- 62 Income data and adjacent districts were determined from *Mapping L.A. Neighborhoods*, *supra* note 39. Rent statistics are from Zillow.com.
- 63 The Downtown income figure is likely distorted by the high concentration of homeless individuals in “Skid Row.” Boyle Heights residents are likely lower income than Downtown renters.
- 64 *See, e.g.*, Duran, *supra* note 14.
- 65 Samaan, *supra* note 22, at 12.
- 66 The population-share of Downtown, Echo Park, Hollywood, Hollywood Hills, Miracle Mile, Silver Lake, and Venice calculated from *Mapping L.A. Neighborhoods*, *supra* note 39.
- 67 *Id.*
- 68 Samaan, *supra* note 22, at 13.
- 69 Kudler, *supra* note 32.
- 70 *Id.*
- 71 *See, e.g.*, Samaan, *supra* note 22, at 18.
- 72 Benjamin Edelman & Michael Luca, *Digital Discrimination: The Case of Airbnb.com 2* (Harvard Bus. Sch., Working Paper No. 14-054, 2014), http://www.hbs.edu/faculty/Publication%20Files/14-054_e3c04a43-c0cf-4ed8-91bf-cb0ea4ba59c6.pdf [<http://perma.cc/S6EZABQX>]. *See also* Michael Todisco, Note, *Share and Share Alike? Considering Racial Discrimination in the Nascent Room-sharing Economy*, 67 STANFORD L. REV. ONLINE 121, 122 (Mar. 14, 2015) (discussing the study as proof of pervasive racial bias among Airbnb users).
- 73 Todisco, *supra* note 72, at 123.
- 74 *Id.* at 126. However, only hosts, and not Airbnb itself, could be held liable.
- 75 Ben Bergman & Alice Walton, *Los Angeles Officials Crack Down on “Sharing Economy” Rides, Rental Companies*, SOUTHERN CALIFORNIA PUBLIC RADIO (Dec. 9, 2014), <http://www.scpr.org/news/2014/12/09/48569/los-angeles-officials-crack-down-on-sharing-econom/> [<http://perma.cc/HA8N-TJTH>].
- 76 Bergman, *Garcetti Wants Airbnb to Help Solve L.A.'s Affordability Crisis*, *supra* note 17.
- 77 *Garcetti's Airbnb Tax Plan Does Little to Increase Affordable Housing*, S. CAL. PUB. RADIO (Apr. 16, 2015), <http://www.scpr.org/programs/take-two/2015/04/16/42416/garcetti-sairbnbtax-plan-does-little-to-increase/> [<http://perma.cc/Y8CW-435Z>].
- 78 Bergman, *supra* note 17.
- 79 Average cost per Los Angeles County publicly built affordable housing unit from California Department of Community Development, see *Affordable Housing Cost Study*, *supra* note 44, at 31.
- 80 *See* Airbnb, <https://www.airbnb.com/s/Los-Angeles?neighborhoods%5B%5D=Silver+Lake> (last visited Dec. 2, 2015). Occupancy rate figure from Martin, *supra* note 23.
- 81 Owens, *supra* note 24.
- 82 *See Penn Cent. Transp. Co. v. City of New York*, 438 U.S. 104, 152-53 (1978).
- 83 Jefferson-Jones, *Airbnb and the Housing Segment of the Modern “Sharing Economy”*: *Are Short-Term Rental Restrictions an Unconstitutional Taking?*, 42 HASTINGS CONST. L.Q. 557, 566-68 (Spring 2015).

- 84 [Pennell v. San Jose](#), 485 U.S. 1, 13 (1988) (affirming public's right to preserve affordability through measures such as rent control).
- 85 Jamila Jefferson-Jones, *supra* note 83, at 568.
- 86 Bergman & Walton, *supra* note 75.
- 87 *Id.*
- 88 *See, e.g.*, Kudler, *supra* note 32.
- 89 *See, e.g.*, Harold Meyerson, *L.A. Story*, AMERICAN PROSPECT (Aug. 6, 2013), <http://prospect.org/article/la-story-0> [<http://perma.cc/2J9H-NLB4>].
- 90 *Id.*
- 91 *Id.*
- 92 If Airbnb signs a CBA with community stakeholders, rather than the city, a CBA would likely not violate the *Penn Central* exactions test.
- 93 This is the same percentage that is required for other developments that seek density bonuses from the city. *LA Affordable Housing Incentives Guidelines 2014*, http://cityplanning.lacity.org/Code_Studies/Housing/DRAFTUPDATEDAffordHousingGuide.pdf [<http://perma.cc/ZKJ4-7JUH>].
- 94 Bergman, *Garcetti Wants Airbnb to Help Solve L.A.'s Affordability Crisis*, *supra* note 17.
- 95 Logan et al., *supra* note 49.
- 96 *See, e.g.*, Short Term Rental Advocacy Center, <http://www.stradvocacy.org/> [<http://perma.cc/A996-EWRB>].
- 97 S.F., Cal., Admin. Code § 41.A.4, 41.A.5 (2015), http://sfgov2.org/ftp/uploadedfiles/elections/candidates/Nov2015/ShortTermRentals_Text.pdf [<http://perma.cc/LTS4-4RP6>].
- 98 Logan et al., *supra* note 49.
- 99 *See, e.g.*, Keep Neighborhoods First, <http://www.keepneighborhoodsfirst.com/> [<http://perma.cc/6YHE-A7HJ>] (coalition of labor and neighborhood councils).

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Is Home Sharing Driving up Rents? Evidence from Airbnb in Boston

Mark Merante and Keren Mertens Horn

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UNIVERSITY OF MASSACHUSETTS BOSTON



Is Home Sharing Driving Up Rents?

Evidence from Airbnb in Boston

Mark Merante

UMass Boston, MA Economics 2016

Keren Mertens Horn

UMass Boston, Assistant Professor of Economics

Introduction

The growth of the sharing economy has received increasing attention from economists. Some researchers have examined how these new business models shape market mechanisms (Einav, Farronato and Levin, 2015) and, in the case of home sharing, economists have begun to examine how the sharing economy affects the hotel industry (Zervas, Proserpio and Byers, 2016). However, economists have not yet empirically tested whether home sharing affects the housing market, despite the obvious overlap between these two markets. As a result, policy makers grappling with the effects of the rapid growth of home sharing have inadequate information on which to make reasoned policy decisions. In this paper, we add to the small but growing body of knowledge on how the sharing economy is shaping the housing market by focusing on how the growth of Airbnb in Boston neighborhoods affects the rental market.¹ We examine whether the increasing presence of Airbnb raises asking rents and, then, examine whether the change in rents may be driven by a decline in the supply of housing offered for rent.

¹ We distinguish the “rental housing market,” housing occupied by or offered for rent only for more than 30 consecutive days, from the “home sharing market,” housing offered for rent for as little as one day.

Supporters of Airbnb argue that home sharing allows residents to earn extra income, enabling some to continue to live in rapidly appreciating housing markets and defray other costs of living.² Critics of Airbnb claim that in large cities where the majority of residents are renters, home sharing is increasing rents for tenants.³ In a recent curated debate on this issue hosted by the New York Times, Nicole Gelinas of the Manhattan Institute argues that once landlords become aware that tenants use Airbnb to earn additional income they can quickly ‘cut out the middleman’ and directly rent out units on a short term basis.⁴ Both sides of the argument are lacking unbiased empirical evidence on this new market phenomenon, a gap that we propose to fill.

This paper makes three primary contributions to the existing economic literature. First, we provide the first rigorous empirical investigation of how Airbnb is affecting the rental market, focusing on Boston, a city where rents have been growing recently at an average of 5% annually and are among the highest in the nation.⁵ Second, we conduct this investigation by combining two new sources of big data: weekly rental listings, available only recently as a result of the shift of rental listings to the internet, and data on Airbnb listings made available through web scraping technology. Third, we take advantage of the frequency of the observations available from these large data sets to use a fixed

² <https://www.airbnbaction.com/wp-content/uploads/2015/10/Middle-Class-Economic-Report-FINAL.pdf>

³ “San Francisco is ground zero for an Airbnb freakout,” Davey Alba, Wired.com, November 2, 2015

⁴ <http://www.nytimes.com/roomfordebate/2015/06/16/san-francisco-and-new-york-weigh-airbnbs-effect-on-rent/airbnb-is-a-problem-for-cities-like-new-york-and-san-francisco>

⁵ <http://www.bostonmagazine.com/property/article/2016/02/21/boston-expensive/>

effects model to control for unobserved variables allowing for the calculation of precise estimates of the impacts of Airbnb on rents.

The characteristics of Airbnb listings in Boston provide some evidence supporting both sides of the Airbnb debate. For instance, our analysis shows that in Boston on October 5, 2015, 82% of hosts had only one simultaneous listing on Airbnb, suggesting that most Airbnb hosts are occupants seeking extra income by occasionally renting out their own homes. On the other hand, though only 18% of hosts had multiple properties listed simultaneously, their properties represented almost half of those listed on Airbnb (46%), suggesting that a large proportion of Airbnb's properties in Boston are leased by commercial operators listing properties that would, presumably, otherwise be occupied by residents. Ultimately, our analysis supports the contention that home sharing is increasing rents by decreasing the supply of units available to potential residents. Using a hedonic estimation, we show that a one standard deviation increase in Airbnb listings relative to the total number of housing units in a census tract, at the mean 12 Airbnb listings per tract, is associated with an increase in asking rents of 0.4%. For those census tracts in the highest decile of Airbnb listings relative to total housing units, this increase in asking rents ranges from 1.3% to 3.1%, which equates at the citywide mean monthly asking rent to an increase of as much as \$93. If Airbnb's growth rate in 2015, 24%, continues for the next three years, assuming constant mean rents and total number of housing units, Boston's mean asking rents in January 2019 would be as much as \$178/month higher than in the absence of Airbnb activity. We further find evidence that Airbnb is increasing asking rents through its suppression of the supply of rental units

offered for rent. Specifically, a one standard deviation increase in Airbnb listings relative to total housing units is correlated with a 5.9% decrease in the number of rental units offered for rent. At the mean number of rental units offered for rent in a given census tract, 75.8, this equates to 4 fewer units offered for rent.

This paper proceeds as follows. The following section provides background on home sharing and reviews the relevant economic literature on rental markets to provide a theoretical basis for this paper's model and method. We then discuss theoretical models that illustrate home sharing's potential effect on the rental housing supply and on asking rents. Next we describe the method we use to estimate these effects on rental housing supply and rents. In the following section we present the data on Airbnb in Boston and provide descriptive statistics of our rental housing data. We then present results. Finally, we conclude and provide thoughts on some of the policy implications of this research.

Background and Literature Review

The internet has enabled the creation of what has become known as the sharing economy, a host of firms based on the peer-to-peer business model (Einav, Farronato and Levin, 2015). This model is one form of a two-sided market, a term coined to describe businesses which provide a platform to connect market participants. Unlike some two-sided markets, such as credit card companies, sharing economy platforms are intended for nonprofessional users (Li, Moreno and Zhang, 2015). One of the most visible components of the sharing economy in the popular press is home sharing, web-based firms that provide a platform that charges both those seeking to lease and those seeking to

rent housing for periods as short as one night.

Founded in August 2008, Airbnb.com (“Airbnb”) is the largest home sharing enterprise in the world, having hosted more than 60 million guests to date; it currently features over 2 million properties for rent in 191 countries.⁶ It is growing rapidly; in New York City, for example, the number of Airbnb listings expanded tenfold from 2010 to 2014 (Schneiderman, 2014) and increased by 24% in Boston between January 2015 and January 2016. Airbnb markets itself to potential tenants as a way for visitors to have a more authentic travel experience by staying with local residents and to potential landlords as a way for local residents to earn extra income by renting out some or all of their home when they’re not using it.⁷ The speed with which this and similar “home sharing” businesses have changed consumer behavior has left researchers—as well as competitors in the traditional hospitality industry, government regulators,⁸ and courts—racing to understand its effects.⁹

Researchers have modeled how the existence of a sharing platform for a good changes both the demand for and the supply of that good (Muller, 2014; Horton and Zeckhauser,

⁶ “About us”, Airbnb.com, <http://www.airbnb.com/about/about-us>, last visited April 20, 2016.

⁷ “Airbnb Launches First Global Ad Campaign in Nine Markets,” Advertising Age, <http://adage.com/article/digital/airbnb-launches-global-ad-campaign-markets/293108/>, last visited April 20, 2016.

⁸ Pending legislation to regulate home sharing in MA include H 2618, An Act Regulating Short-Term Residential Rentals.

⁹ Home sharing’s legality varies between jurisdictions and relevant contractual obligations vary between buildings, and even within buildings from unit to unit (Lazarow, 2015). In Boston, some condominium documents forbid leasing units for less than a certain term, often one month, and the Greater Boston Real Estate Board’s Standard Form Apartment Lease (Fixed Term) forbids subletting. Despite these legal hurdles, both owners and tenants engage in home sharing, as evidenced by the many websites that offer advice to owners and tenants seeking permission to list on Airbnb, including Airbnb’s own site: <https://www.airbnb.com/help/article/806/how-should-i-talk-to-my-neighbors--homeowners-association--or-landlord-about-airbnb>.

2016). This body of research posits that some utility maximizing consumers who previously chose to own the good in the absence of the sharing marketplace, will choose instead not to own the good, but simply to rent it as needed, when given that option. On the other hand, some consumers that had chosen not to own the good will now buy it, given the opportunity to rent out a portion of it through the sharing marketplace. The net effect on demand is indeterminate and dependent on participants' utility functions for these goods. The demand in the newly created sharing market creates its own supply, as existing goods, either previously unutilized or utilized for other purposes, are offered into the newly created sharing marketplace. In the case of home sharing, to the extent that some of the housing offered in the home sharing market would have been offered instead in the housing market, the existence of the home sharing market will affect both the demand for and the supply of housing. Therefore, while these models of the effect of the sharing economy on the target market do not model the specific effects of home sharing on the housing market, they inform how home sharing might affect the demand for and supply of housing. A visitor looking for a room for a night or two in a city she'd like to visit may choose a home share rather than a hotel, thereby impacting the visiting city's hotel market. In addition, that demand for a home share may cause some owners of housing in that location to shift units from the housing market to the home sharing market, thereby reducing the supply of housing.

There has been little empirical research on the effect of home sharing on the housing market. A few researchers have attempted to test this effect indirectly. Partly relying on Airbnb data that is uniquely available for New York City as a result of a New York

Attorney General's investigation, researchers looked for simple correlations between Airbnb use and neighborhood mean rents, finding that those neighborhoods with the highest number of Airbnb listings were often those where rents were increasing fastest.¹⁰ Municipal officials in San Francisco estimated the number of housing units that they believed had been shifted from the housing market to the home sharing market by calculating which market offered the best return for each unit, disregarding the non-monetary considerations homeowners face when choosing between the two markets, such as personal convenience, risk of damage, legal risks, etc.¹¹ This analysis found a rough correlation between neighborhoods with high Airbnb use and those with tight housing markets. We hope to contribute to the literature by directly estimating the effect of home sharing listings on nearby rents.

Though there is little empirical research on the home sharing market, there is a broad literature in real estate and urban economics examining determinants of housing price, both purchase prices (Glaeser, Gyourko and Saks, 2005; Quigley, J. M., & Rosenthal, L. A. (2005); Ihlanfeldt, 2007) and rents (Pagliari, Webb and Lieblich, 1996; Ambrose, Coulson and Yoshida, 2015; Verbrugge, Dorfman, Johnson, Marsh, Poole and Shoemaker, 2016). Researchers typically use hedonic regressions to compare the predictive effect on rents of a variety of unit characteristics, from location to unit age. They have found evidence that though the ownership and rental markets are connected (Kashiwagi, 2014), home values adjust slowly to changes in market conditions (Riddel,

¹⁰ "Airbnb in NYC Housing Report, 2015," New York Communities for Change. Real Affordability for All, nyccommunities.org.

¹¹ *Policy Analysis Report*, Budget and Legislative Analyst's Office, Board of Supervisors, City and County of San Francisco, May 23, 2015, <http://www.sfbos.org/index.aspx?page=3703>.

2004), while rental data provide a more timely estimate of the flow price of housing (Ambrose, Coulson and Yoshida, 2015). High quality data on rents has historically been difficult to obtain, but with new sources of big data on rental markets it is easier to learn about this market segment. Researchers have further improved the timeliness of this measure of the flow price of housing by surveying only newly signed lease contracts, rather than the traditional surveys of all existing renters (Glaeser and Gyourko, 2007). Ambrose, Coulson and Yoshida (2015) found that movements in the widely used Bureau of Labor Statistics' rent index, which is based on a survey of all renters, trailed a rent index based solely on new leases with new tenants by about one year. We build on this approach and use asking rents, which were available at weekly intervals and with precise geographic coordinates.

Theory

Utility maximization theory dictates that if the utility of the owner of a residential housing unit is greater as a result of listing the unit in the home sharing market than as a result of renting in the long-term rental market or leaving the unit unrented, the owner will rent the property in the home sharing market (Muller, 2014).¹² If so, it can be assumed that some portion of the housing stock listed on Airbnb would otherwise have been occupied by tenants, thereby decreasing the supply and increasing the price of the rental housing units listed for rent. Similarly, this theory suggests that owners' or tenants' expectations of being able to earn income by subletting their unit through home

¹²Along with rent, relative market values of these two options would take into account transaction and operating costs such as cleaning the unit, depreciation from extra use, resolving disputes, etc., as well as the fee charged by a rental broker or by the marketplace, in this case, Airbnb. We call the residential real estate a housing unit, even though some spaces listed on Airbnb are rooms, not whole units.

sharing¹³ will increase the demand for long term rental housing.¹⁴ Some owners or tenants will obtain housing in excess of the amount that would have maximized their utility in the absence of the home sharing market and will value units based on the units' perceived marketability in the home sharing market.

Our hypothesis is that the existence of the home sharing market operates either through changes in the demand for or in the supply of housing, or likely both, to decrease the supply of rental units listed for rent and, thereby, to increase the asking rents of available units.¹⁵ In a partial equilibrium competitive model of rental housing, either the rightward shift of the demand curve for rental housing caused by the potential to earn income from listing a unit with a home sharing site or the leftward shift of the supply curve for rental housing caused by owners' removal of some units from the rental housing market for rent in the home sharing market increases the price of housing, *ceteris paribus*.

Modeling the effect of home sharing on mean residential asking rents, therefore, requires changing one of the assumptions commonly used by housing economists to study the effects of demand variation on price: that housing supply changes so slowly that it can be assumed to be static when studying short-term effects (Blank and Winnick, 1953). The emergence of the home sharing market represents a significant new source of short-term

¹³ In the case of tenants, they would be considering either listing a portion of the unit, or listing all of the unit when they are away.

¹⁴ This potential demand effect is not trivial: in New York City, for instance, Airbnb estimates that a typical host's annual earnings from using the service is equivalent to 21% of the rent due for the unit listed (Lazarow, 2015).

¹⁵ An increase in the demand for rental housing may decrease the number of rental units offered for rent by decreasing or eliminating the period a unit remains on the market. Where, as here, the number of units offered for rent is measured weekly, a shorter time on the market reduces the total multi-week count of units offered for rent.

housing supply variation, at least in some local markets. In fact, the velocity of the aggregate supply variation resulting from the decision of owners to list units for home share rather than rent may exceed that of the standard housing demand variation that results from changes in mean income, family size, etc. In this empirical study, we do not create a model to separately quantify the demand and supply effects of home sharing on the rental market. Instead, we briefly review vacancy rate and search-and-matching models of the housing market to illustrate the assumptions upon which our research is based and to suggest how the new market mechanisms represented by home sharing might fit into existing scholarship.

Models of the effects of changes in excess rental housing demand on mean rents, first developed by David Blank and Louis Winnick (1953) and refined by others (Rosen and Smith, 1983; Gabriel and Nothhaft, 2001; Hagen and Hansen, 2010), argue that the mechanism for this effect is the movement of the actual vacancy rate of rental housing relative to the equilibrium vacancy rate. This vacancy rate model relies on the assumption of static supply to derive the actual vacancy rate, AVR, solely from the housing demand function:

$$AVR_t = 1 - \frac{d_t(R, U, Y, P, Z)}{S}$$

Where demand for rental housing is a function of the price of housing per unit, R; the user cost of homeownership, U; real income per household, Y; the general price level, P; and demographic variables, Z, all at time t, and S is the supply of rental housing, assumed fixed.

We assume instead that both supply and demand are affected by home sharing:

$$AVR_t = 1 - \frac{(d_t(R, U, Y, P, Z + \theta \text{Airbnb}))}{(S_{t-1} + NC_t - \delta \text{Airbnb}_t)}$$

where θ is a proportion of Airbnb listings, reflecting the demand effects in the rental market of changes in demand in the home sharing market; δ is the proportion of Airbnb units offered in the home sharing market that would have been offered instead in the rental housing market; and Airbnb_t is the number of units listed with Airbnb at time t . With the addition of short-term supply variation to the model, we also believe it is necessary to account for changes in housing supply as a result of demolition or new construction since time $t-1$, represented in the model as NC .

Modeling the effect of home sharing on mean residential asking rents also requires accounting for market imperfections, so-called search frictions. The application of search theory, first developed by, among others, Diamond (1982), Mortensen (1982) and Pissarides (1985), to housing provided a theoretical basis for estimating the effect of market changes on price, which some considered insufficiently specified in the vacancy rate model (Wheaton, 1990). Researchers have used search theory to model the sensitivity of housing prices and sales volume to demand and/or supply conditions given imperfect information (Head, Lloyd-Ellis and Sun, 2014), as well as to account for the role of brokers (Yavas, 1994). Researchers have also extended this model to rental housing (McBreen, Goffette-Nagot and Jensen, 2009). Typically, this research suggests that market tightness, the ratio of vacant homes offered for sale/rent to those seeking to

buy/rent, is one of the mechanisms through which demand or supply changes affect price (Novy-Marx, 2009). A decrease in the number of homes offered for sale/rent, relative to the number of individuals seeking to buy/rent, for example, increases the rate of matching for sellers/landlords and decreases the rate of matching for buyers/renters. In this way, an increase in market tightness puts upward pressure on price. Again, we believe home sharing increases market tightness both by decreasing the number of homes offered for rent, as units are shifted from the rental to the home sharing market, and by increasing the housing demanded as a result of the income opportunity offered by home sharing.

Methodology

We are interested in estimating the impacts of Airbnb on both rents and the number of rental units available for rent, to see whether if Airbnb affects rents, might it do so by constraining the supply of available rental units. We create a measure of Airbnb ‘density’ for each census tract in Boston, by dividing the number of Airbnb listings in a census tract by the total number of housing units in that census tract. This approach follows that of Susin (2002) and Sinai and Waldfogel (2005) as they examine the impacts of public rental housing subsidies on the private rental market. In this way we are controlling for differences between tracts in both population and the rental housing market.

Researchers examining both housing supply and price changes have utilized many different geographies. While some researchers looking at the effect of vacancy rates on rents between cities rely on citywide data, those examining intracity effects often

compare neighborhoods, and define 'neighborhoods' to match available demographic, price, vacancy or other data (Dow, 2011; Fujii, Hozumi, Iida and Tsutsumi, 2012). Though some have argued that neighborhoods, as measured by census tracts, maybe be too small a geography at which to measure the full market response to a supply constraint (Glaeser and Ward, 2009; Sinai and Waldfoegel, 2005) we choose to focus on the census tract to better identify the immediate impacts of Airbnb, understanding that it may not capture the full impact. In addition, recent researchers have found price impacts of housing demand or supply changes at relatively small geographies such as census tracts and have ascribed this to the now widespread use of the internet for home search (Piazzesi, Schneider and Stroebel, 2015). They believe internet home search allows buyers or renters to more narrowly tailor searches to desired geographies.

Research examining the effect of changes in the demand for or supply of housing on residential rents had traditionally used a one year lag between demand/supply changes and changes in rent (Rosen and Smith, 1983; Saiz, 2007). More recently, researchers have examined shorter time frames, given the increased availability of rental data. For instance, Edelstein and Tsang (2007) used quarterly data, while Hagen and Hansen (2010) examined the effect of changes in vacancy rates on rents with a six-month lag. In the years since that research, however, the widespread adoption of the internet by landlords to advertise vacant apartments and by potential tenants to search for homes to lease¹⁶ has increased match efficiency, leading to shorter times on the market (Carillo, 2008), and may have shortened the time necessary for rents to adjust to changes in

¹⁶ Piazzesi, Schneider and Stroebel (2015) cite the National Association of Realtors in stating that 90% of homebuyers reported using the internet in 2013, a figure that seems likely to hold for renters as well and has likely continued to increase since that time.

housing supply. For example, Kashiwagi's (2014) recent model of U.S. housing market dynamics assumes rents adjust substantially in the month following a change in housing supply. With potential landlords widely determining market prices from on-line sites which continuously add new rental listings, we will test the effect of Airbnb use on the asking rents of units listed for rent since our last Airbnb measurement, one month on average.

To estimate the effect of home sharing on mean asking rents we use a hedonic estimation. Further, we include fixed effects at the census tract level to control for unobserved neighborhood effects, such as location and demographic characteristics. We estimate the following regression:

$$\text{LnR}_{it+1c} = b_1 \text{Airbnb}_{itc} + b_2 \text{Bed}_{it+1c} + b_3 \text{Bath}_{it+1c} + b_4 \text{Sqft}_{it+1c} + b_5 \text{NC}_{itc} + b_6 \text{Month}_{itc} + u_{itc} \quad (1)$$

Where i indexes each unit, t represents the period between Airbnb measurements and c the census tract. LnR_{it+1c} represents the natural log of the asking rent of the unit, in the period after the observed Airbnb listing. Airbnb_{itc} is the Airbnb density, calculated as the number of units listed on Airbnb divided by the total number of housing units in the given census tract. Bed_{it+1c} is the listing's number of bedrooms and Bath_{it+1c} is the listing's number of bathrooms. NC_{itc} is the number of newly constructed rental units which received their certificate of occupancy from the City of Boston in the same time period in which Airbnb units are measured. Month_{itc} represents dummy variables for each of the time periods between Airbnb measurements.

To estimate whether increases in rents were driven by constraints in the supply of rental housing, we test for a correlation between the mean weekly number of units listed for rent in a given Airbnb measurement period and the Airbnb density measured at the end of that period. The term of residential lease agreements in Boston generally end on the last day of the month and, therefore, require landlords to advertise their units weeks before the day the landlord desires to start a new tenancy. But the term of Airbnb rentals is daily, allowing owners to list their units much closer to the day the landlords' desire an Airbnb customer to occupy the unit. As a result, we anticipate that a landlord's decision to list her unit on Airbnb rather than in the rental market will likely affect the number of units listed for rent in the weeks leading up to listing the unit on Airbnb, not afterward.

Therefore, to estimate the effect of home sharing on the quantity of rental housing offered for rent, we employ the following tract level fixed effects model:

$$\text{LnCountR}_{itc} = b_1 \text{Airbnb}_{itc} + b_2 \text{NC}_{itc} + b_5 \text{Month}_{itc} + u_{itc} \quad (2)$$

where LnCountR_{itc} represents the mean weekly number of units in a census tract offered for rent in the same time period in which we observe Airbnb listings, and all other variables are as described above.

Our fixed effects model removes the effect of static rent differentials between census tracts. In addition, our use of asking rents from the period immediately following each measure of Airbnb density minimizes the risk of reverse causation that could result from simultaneity of Airbnb listings and rents. While relative changes across census tracts in

the net revenue differentials between renting and Airbnb listing are assumed to affect owners' decisions whether to rent or list on Airbnb, and thereby affect Airbnb density, this effect should appear in the subsequent Airbnb measure rather than the preceding Airbnb measure.

Data

We obtained rental data from Rainmaker Insights, Inc., a service that aggregates listings of housing for rent. These data include a weekly count of each housing unit offered for rent in Boston from September 2015 through January 2016. The dataset includes asking price, square footage, number of bedrooms and bathrooms, location and, in some cases, additional unit characteristics and is obtained from over 5,000 sources including websites that list homes for rent in the U.S. The total number of listings over the period was 265,241 (Table 1). Given the importance of including square footage in our regression, we have limited our sample to those observations where this information was available, which total 114,527 listings.¹⁷

To more accurately measure changes in housing supply we use data on new construction, specifically the number of new housing units, which we obtained from the Boston Redevelopment Authority ("BRA"). The BRA data records the date that the City of Boston issued a certificate of occupancy¹⁸ for a new housing unit or that an existing housing unit was deemed no longer available for occupancy as a result of construction.

¹⁷ The regression results remain substantively unchanged when run without this control variable.

¹⁸ Required prior to occupancy by Section 111.1 of the Massachusetts Building Code.

We use the 2010-2014 American Community Survey (ACS) to obtain the total number of housing units per census tract.¹⁹

We obtained data on Airbnb listings in Boston from September 2014 to January 2016 using web scrapes of Airbnb.com, some that we conducted ourselves and some conducted by InsideAirbnb.com and its researchers, who obtain and provide data to the public for research purposes and who provided the data for the San Francisco Board of Supervisors' 2015 report. These web scrapes provided the following data: the price and the type of real estate listed (either a room or an entire apartment/home), locational data, in the form of longitude and latitude coordinates, and the Airbnb-assigned identification code for the property and for the lessor. The October 2015 web scrape also provides additional details about listings and hosts. We have limited our regressions to the web scrapes conducted on July 7, August 22, September 25, October 3, November 31 and December 14, 2015 and January 21, 2016. Table 2 summarizes these data by census tract. We see that the average tract in our sample has 1,600 housing units, 74 rental units and 12 Airbnb listings, with an average daily asking price of \$161.

Airbnb entered the Boston market in 2009²⁰ and by the second half of 2015 it averaged over 2,000 listings. Table 3 provides monthly totals for Airbnb listings, measured on a single day each month, and the weekly averages of each month's housing units offered

¹⁹ We exclude from our analysis those census tracts within the 9800 code range, which the Census Bureau uses to designate areas with little or no residential population, mostly parks or open water. U.S. Census Bureau, 2010 Census Redistricting Data (Public Law 94-171) Summary File, http://www2.census.gov/geo/pdfs/reference/GTC_10.pdf.

²⁰ Airbnb.com. http://blog.airbnb.com/airbnbs-positive-impact-boston/?_ga=1.15, accessed on 11/9/2015.

for rent.²¹ As of January 2016, Airbnb listings were growing in Boston by 24%, year on year. Figure 1 shows that with the exception of outer neighborhoods, such as West Roxbury, listings were common across the city.

Airbnb listings, however, are unevenly distributed across census tracts, both in absolute terms and as measured in relation to total rental units.²² To illustrate this point, we present Airbnb density by decile in Table 4. We measure Airbnb density by dividing the number of Airbnb units listed by the total number of housing units in the tract. Across Boston, Airbnb listings by census tract ranged from zero listings to a maximum of 5% of all housing units.

Using the more detailed October 2015 data, Tables 5-7 describe the units and hosts for Airbnb listings in Boston, averaged across neighborhoods. Table 5 shows that most (58%) of the units listed on Airbnb in Boston that month offered the entire home for rent, either free standing house, apartment or condominium, while 39% offered a private room in a home and a mere 2% offered shared space, such as sleeping on a fold out couch in a living room. Even partial unit listings have some potential to impact the City's rental market, as a fraction of a unit might have been occupied by a tenant (an additional roommate) had it not been switched to the home sharing market.

²¹ We present weekly averages as November includes 5 weeks, whereas all other months include only 4 weeks.

²² Because the number of total rental units is surveyed between 2010 and 2014, a period of some renewed growth of residential housing in Boston after the 2008 recession, these ratios may be slightly overstated.

One of the most contentious points in the debate over home sharing's effect on housing has been whether these companies merely offer residents a chance to earn extra income by renting out all or a portion of their home that they would not otherwise rent to residential tenants or whether they offer residents a chance to earn more money than they would by leasing to residential tenants, thereby reducing the supply of rental housing. Table 6 shows that in Boston in October 2015, almost 82% of Airbnb hosts had only a single listing and a mere 3% of hosts had four or more listings. On the other hand, Table 7 shows that non-resident owners, some would call them commercial hosts, though they comprise a small share of all hosts listed nearly half, 46%, of all the units listed for rent on Airbnb. While the data cannot prove the point, it seems likely that a host with two homes for rent on Airbnb in the same city is listing at least some space which would otherwise be rented to residential tenants.

Results

We begin by presenting results for equation (1), estimating the impacts of Airbnb density on asking rents, in Table 8. Using the natural log of rental prices, we find that a one standard deviation increase in Airbnb density in a given census tract is correlated with a 0.4% increase in asking rents. For those census tracts in the highest decile of Airbnb listings relative to total housing units, this increase in asking rents ranges from 1.3% to 3.1%, which equates at the citywide mean monthly asking rent of \$2,972 to an increase of as much as \$93 in mean monthly asking rent. As expected, unit characteristics have large effects on asking rents, with each additional bedroom increasing asking rents by 17% and each additional bathroom increasing asking rents by 11%. We include both time and

tract fixed effects, in order to control for any time trends or tract level unobservable characteristics.

Next, we test the hypothesis that this direct correlation between Airbnb listings and asking rents is the result of a correlation between Airbnb listings and the supply of rental housing offered for rent. We regress Airbnb density on the natural log of the total number of rental units offered for rent in the period since the previous Airbnb measurement, again incorporating both time and tract fixed effects. We present results in Table 9. We find that a one standard deviation increase in Airbnb density is correlated with a 5.9% decrease in the number of rental units offered for rent. At the mean weekly number of units offered for rent per census tract, this represents a reduction of 4.3 units. This matches the reduction in rental units caused by Airbnb use that our breakdown of Airbnb units predicts. There, we found that 46.3% of the units on Airbnb are listed by owners with more than one unit listed for rent on Airbnb in Boston at the same time. If every one of those units would have been offered for rent in the absence of Airbnb, this would predict a mean reduction of 5.4 units.

These results confirm the correlations between Airbnb use and long-term housing supply suggested by the New York²³ and San Francisco²⁴ reports. They also show a correlation between Airbnb use and asking rents and, for the first time, quantify this price effect. In general, Airbnb use in Boston is smaller than that in New York and San Francisco, in

²³ "Airbnb in NYC Housing Report, 2015," New York Communities for Change. Real Affordability for All, nycommunities.org.

²⁴ *Policy Analysis Report*, Budget and Legislative Analyst's Office, Board of Supervisors, City and County of San Francisco, May 23, 2015.

both absolute terms and relative to each city's total housing supply. For example, in New York City, researchers found that the number of Airbnb listings in four of that city's zip codes exceeded 20% of the total number of housing units. In Boston, no census tract had Airbnb listings greater than 5% of that tract's total housing units. Given the more limited use of Airbnb in Boston, therefore, our results likely present a lower bound on the impacts of Airbnb on local rental markets for cities like San Francisco and New York where Airbnb use is greater as a share of total housing supply.

Conclusions

This paper makes three contributions to the existing literature. First, it provides one of the first rigorous empirical explorations of an interesting new feature of the housing market, home sharing. Second, it relies on a novel use of two forms of big data to examine the impacts of home sharing on the rental housing market, weekly rental listings and Airbnb listings. Third, it relies on the short time frames that are possible when using new sources of big data to use a fixed effect model to identify casual links between Airbnb use and the rental housing market.

We have found that almost half of the units listed on Airbnb in Boston are offered by those with more than one simultaneous listing in the city. In addition, we have a direct correlation between Airbnb density and the price of such housing. If Airbnb growth persists at current growth rates, use will double in Boston in a little more than three years. In a city where the demand for rental housing is outpacing supply and pushing up rents

quickly, home sharing is contributing to this dynamic and deserves both further research and policy attention.

As policy makers consider whether and how to respond to the rapid rise of home sharing, these findings provide evidence that home sharing is both a personal and a commercial enterprise and should be regulated and taxed as such. Several jurisdictions have recently adopted or considered legislation that seeks to differentiate between these categories of home sharing customers in order to regulate and/or tax commercial users. For cities particularly concerned about the availability and/or price of residential housing, these results will strengthen the arguments for using such regulation and/or taxation, or alternative methods, to limit home sharing activity in certain neighborhoods. On the other hand, these results emphasize the need for both further theoretical and empirical analysis of the social welfare implications of home sharing, such as whether Airbnb enables middle income families to remain in their homes in rapidly appreciating housing markets.

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Table 1. Descriptive Statistics on Rental Units

	Mean	Standard Deviation	Count
Price	\$2,972	\$1,130	113,409
Bedrooms	1.7	1.0	113,409
Bathrooms	1.2	0.4	113,409
Square Feet	1,005	471	113,409

Source: Data from Rainmaker Insights, Inc., February 2016.

Table 2. Descriptive Statistics on Airbnb and Rental Units by Census Tract

	Mean	Standard Deviation	Count
Total Housing Units	1,638	618	832
# of Airbnb Listings	11.7	13.5	832
Newly Constructed Units	1.4	16.4	832
# of Rental Units Listed for Rent (weekly)	75.8	100.5	832
Airbnb Density	0.007	0.007	832

Airbnb Density = # of Airbnb listings by census tract/# of housing units in that census tract.

By the authors from Airbnb data from [insideairbnb.com](http://www.insideairbnb.com/get-the-data.html), January 2016, <http://www.insideairbnb.com/get-the-data.html> and original data and from housing unit data from the United States Census Bureau/American FactFinder. B25001: Housing Units." 2010-2014 American Community Survey. U.S. Census Bureau's American Community Survey Office, 2015. Web. 31 January 2016. <http://factfinder2.census.gov>.

Table 3. Airbnb Listings and Housing Units Offered for Rent (by month)

<u>Date</u>	<u>Airbnb</u>	<u>Units for Rent</u> <u>(weekly average)</u>
July 2015	2,058	
August 2015	1,794	
September 2015	2,187	15,102
October 2015	2,316	12,957
November 2015	2,033	12,468
December 2015	1,803	11,740
January 2016	2,143	10,783

By the authors from Airbnb data from insideairbnb.com, January 2016, <http://www.insideairbnb.com/get-the-data.html> and from the authors.

The count for Units for Rent are the sums of four weekly readings each month.

Figure 1. Map of Airbnb Listings by Census Tract.

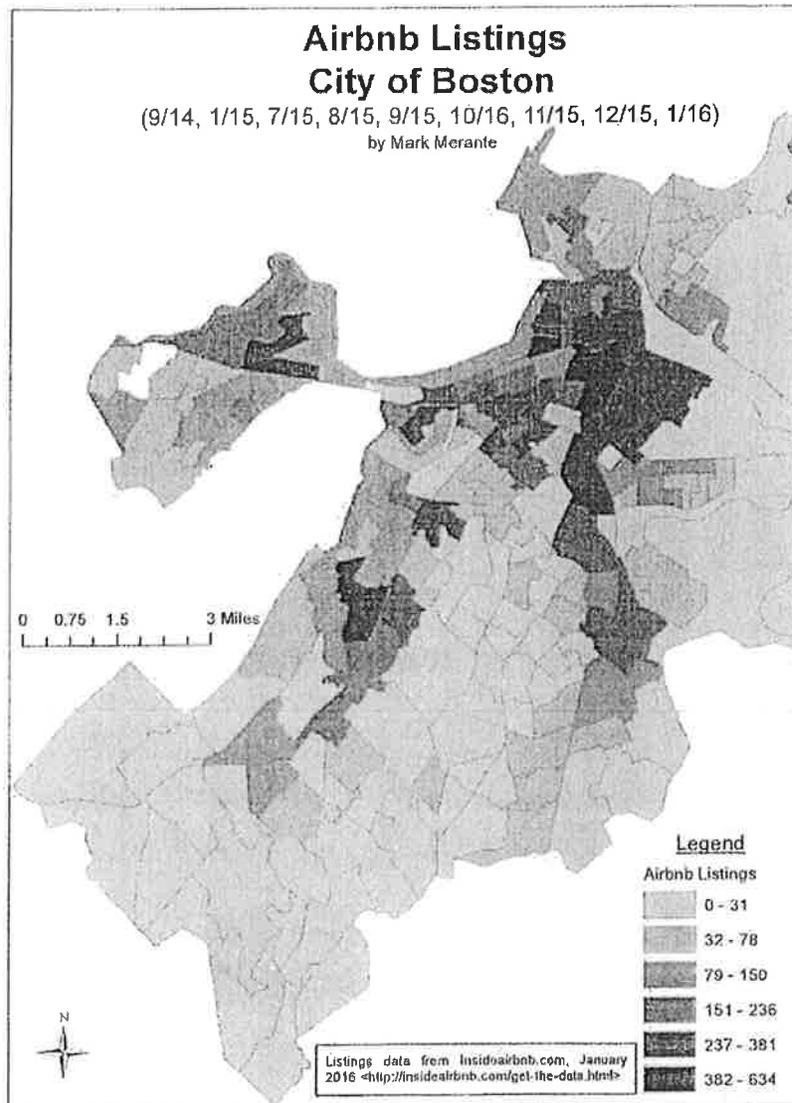


Table 4. Airbnb Density (by decile):

<u>Decile</u>	<u>Airbnb Density</u>
1 st	.003
2 nd	.005
3 rd	.007
4 th	.009
5 th	.011
6 th	.014
7 th	.016
8 th	.018
9 th	.021
10 th	.050

Airbnb Density = # of Airbnb listings by census tract/# of housing units in that census tract.
By the authors from Airbnb data from Insideairbnb.com, January 2016, <http://www.insideairbnb.com/get-the-data.html>
and original data and from housing unit data from the United States Census Bureau/American FactFinder. B25001:
Housing Units." 2010-2014 American Community Survey. U.S. Census Bureau's American Community Survey Office,
2015. Web. 31 January 2016. <http://factfinder2.census.gov>.

Table 5. Airbnb Listing by Room Type (October 2015):

Room type	Frequency	Column %
Entire home/apartment	1,345	58.4%
Private room	913	39.4%
Shared room	50	2.2%

By the authors from Airbnb data from Insideairbnb.com, January 2016, <http://www.insideairbnb.com/get-the-data.html>.

Table 6. Airbnb Host by Number of Simultaneous Listings in Boston (October 2015):

<u>Host's # of Listings</u>	<u># of Hosts</u>	<u>Column %</u>
1 listing	1,246	81.7%
2 listings	163	10.7%
3 listings	16	3.7%
≥ 4 listings	44	2.8%

By the authors from Airbnb data from Insideairbnb.com, January 2016, <http://www.insideairbnb.com/get-the-data.html>.

Table 7. Airbnb Listings by Types of Hosts (October 2015):

<u>Host's # of Listings</u>	<u># of Listings</u>	<u>Column %</u>
Host w/1 listing	1,246	53.8%
Host w/2 listings	326	14.1%
Host w/3 listings	171	7.4%
> 4 listings	574	24.8%

By the authors from Airbnb data from Insideairbnb.com, January 2016, <http://www.insideairbnb.com/get-the-data.html>.

Table 8. Airbnb Density and Log of Asking Rents

	Log of Asking Rents
Airbnb Density	0.627** (2.05)
Bedrooms	0.171*** (19.68)
Bathrooms	0.112*** (11.64)
Square Feet	0.000132*** (7.11)
Newly Constructed Units	-0.00000742 (-0.32)
Constant	7.373*** (484.94)
<i>N</i>	113409
Month Fixed Effects	X
Census Fixed Effects	X

t statistics in parentheses
 * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Sources: Airbnb data from Insideairbnb.com, January 2016, <http://www.insideairbnb.com/get-the-data.html> and from the authors. New construction data from the Boston Redevelopment Authority. Rental listing data from Rainmaker, Insights, Inc.

Table 9. Regression of Log of Number of Units for Rent on Airbnb Density.

	Log of Number of Units for Rent
Airbnb Density	-8.366** (-2.07)
Newly Constructed Units	0.00143** (2.54)
Constant	2.947*** (86.83)
<i>N</i>	832
Month Fixed Effects	X
Census Tract Fixed Effects	X

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Sources: Airbnb data from insideairbnb.com, January 2016, <http://www.insideairbnb.com/get-the-data.html> and from the authors. New construction data from the Boston Redevelopment Authority. Rental listing data from Rainmaker, Insights, Inc.

Exhibit D

Do Airbnb properties affect house prices?

Stephen Sheppard¹ and Andrew Udell²

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¹Williams College Department of Economics, 24 Hopkins Hall Drive, Williamstown, MA 01267

²Dropbox, Inc., 333 Brannan Street, San Francisco CA

Abstract

The growth of peer-to-peer markets has provided a mechanism through which private individuals can enter a market as small scale, often temporary, suppliers of a good or service. Companies that facilitate this type of supply have attracted controversy in cities around the world, with concerns regarding Uber and Airbnb in particular. Airbnb has been criticized for failing to pay taxes to local authorities, for avoiding regulatory oversight that constrains more traditional suppliers of short-term accommodation, and for the impact of short-term rental properties on the value of residential property. A report prepared by the Office of the Attorney General of the State of New York lists these impacts among a number of concerns: do Airbnb rentals provide a black market in unsafe hotels? Do short-term rentals make New York City less affordable? Is the influx of out-of-town visitors upsetting the quiet of longstanding residential neighborhoods?

These concerns pose difficulties because they imply different impacts on the values of residential properties. If short-term rentals provided via Airbnb create a concentration of what are effectively unsafe hotels or upsetting quiet residential neighborhoods, they would generate a local concentration of externalities that might be expected to depress property values rather than make housing less affordable. Alternatively, if negative externalities are modest relative to the impacts of space diverted from providing housing for residents to providing short-term accommodation for visitors, then local concentration of Airbnb properties may increase house prices. In this paper we present an evaluation of the impacts of Airbnb on residential property values in New York City.

1 Introduction

Since its founding in 2008, Airbnb's rapid growth has prompted the expression of concerns about its impact on cities and urban housing markets. These concerns have focused on a variety of issues, ranging from whether Airbnb clients are paying appropriate fees and taxes to the appropriateness of listing residential properties in the occupied territories of Israel. Perhaps no concern has been more vehemently expressed than the impact of Airbnb listings on housing affordability. This issue led to ballot initiative Proposition F in 2015 in San Francisco, with a group of protesters occupying Airbnb headquarters in San Francisco in advance of the vote. It has also led to bans or partial bans on advertising of short-term private rentals in Barcelona, Berlin and other cities around the world.

Airbnb is an internet-based peer-to-peer marketplace that allows individuals to "list, discover, and book" over 3,000,000 accommodations in over 65,000 cities across the world (Airbnb 2017). Airbnb acts as an intermediary between consumers and producers to reduce the risk and cost of offering a home as a short-term rental, which enables suppliers (homeowners) to flexibly participate in the commercial market for short-term residential housing. While Airbnb was not the first service to act as an intermediary in this way, and even today has competition in provision of these services, its success and rapid growth have made it the focus of concern for policy makers.

Airbnb is part of what has come to be known as the "Sharing Economy," a term that refers to peer-to-peer products, services, and companies. A large part of the motivation behind the Sharing Economy, according to the companies that self-define as part of the sector, is to make use of otherwise under-utilized goods.¹ In the case of housing, homes might not be utilized to their full extent (for example, during vacations or due to an unused bedroom). This allows homeowners to "share" (e.g., rent) parts or the entirety of their homes during these times and earn revenue. The potential for and ease of these types of transactions is greatly increased by better matching technologies, a trend which has been driven by the Internet (Horton & Zeckhauser 2016). Airbnb further reduces transaction costs for both consumers and producers by providing a feedback and reputation mechanism, allowing for a safer and more streamlined transaction.

Despite Airbnb's efficiency improvements and the ability it gives homeowners to generate revenue, there

¹See "The Sharing Economy: Friend or Foe?" (Avital, Carroll, Hjalmarsson, Levina, Malhotra & Sundararajan 2015) for a concise summary of the different viewpoints surrounding the future of the Sharing Economy.

are concerns about the economic and welfare effects of Airbnb's presence on the residential housing market.² The analysis belows presents an examination of some of those economic effects. The study is motivated by the following question: in a highly constrained and regulated housing market, where residential homes are both in high demand and located in dense neighborhoods, what is the impact of being able to transform residential properties into revenue streams and partly commercial residences?

In New York City, the question of impact on housing affordability has been raised explicitly, and the role of Airbnb has been at the center of a number of policy discussions at the municipal level. In 2014, the Attorney General of New York State, Eric Schneiderman, investigated Airbnb's presence in New York City (Schneiderman 2014). The subsequent report indicated that 72% of Airbnb listings in New York City violated property use and safety laws and were therefore illegal.³ The Attorney General's Office also found that over 4,600 units in New York City were booked for more than three months of the year, leading the Attorney General's Office to question the impact that Airbnb has on the supply of housing stock and the affordability of housing in New York City.

The prospect that Airbnb encourages violation of health and safety laws as well as reduces housing supply raises a puzzle regarding the likely effects on house prices. If short-term rentals provided via Airbnb create a concentration of what are effectively unsafe hotels, upsetting quiet residential neighborhoods with more traffic and persons who don't care about the neighborhood, they may generate a local concentration of externalities that might be expected to depress property values. Alternatively, if these externality effects are not present or are modest relative to the impacts of space diverted from providing housing for residents to providing short-term accommodation for visitors, then local concentration of Airbnb properties may increase house prices.

Perhaps because of this confusion, it is possible to find divergent viewpoints expressed about the impacts of Airbnb in the popular press and in consultant reports. Most policy makers appear to believe that Airbnb causes housing prices to increase. In October of 2016, New York Governor Andrew Cuomo signed into law a bill providing for a range of fines to be imposed on those who advertise entire apartments or dwellings

²There are several firms similar to Airbnb. As these types of companies become more prevalent and continue to expand, this area of research becomes increasingly important, as such firms mostly enter highly constrained and regulated markets, the dynamics of which often have welfare consequences. The analysis here is not directly applicable to, for example, understanding the economic impact of Uber on a city, a ride-sharing service. However, the research presented in this paper suggests that these companies can have a significant impact, one worthy of study.

³This is largely due to New York State's Multiple Dwelling Law, which imposes strict regulations on safety and health conditions that must be met as well as limits on business uses of homes.

for time periods of less than 30 days. The issue of the impact on house prices was presented as a central argument for passage of the law, as noted in Brustein & Berthelsen (2016):

Liz Krueger, the state senator who sponsored the bill, said in a statement that the passage was a "huge victory for regular New Yorkers over the interests of a \$30 billion corporation." She has argued that Airbnb has actively encouraged illegal activity, taking apartments off the rental market and **aggravating the city's affordable housing crisis**.

The response of Airbnb was to characterize the law as a policy designed to protect the hotel industry rather than concern over housing affordability. Brustein & Berthelsen (2016) go on to report that:

Airbnb says New York lawmakers had ignored the wishes of their constituents. "Albany back-room dealing rewarded a special interest – the price-gouging hotel industry – and ignored the voices of tens of thousands of New Yorkers," Peter Schottenfels, a spokesman for the company, said in a statement.

At the time of the Attorney General's investigation in 2014, Airbnb had experienced an increase of over 1000% in both listings and bookings from 2010 to 2014. To understand Airbnb's scale of growth, or at least the way their investors value its business, an oft cited statistic is that in its most recent funding round, Airbnb was valued at approximately \$31B. This suggests it is more valuable than Marriott International Inc., which has a market capitalization of \$17.9B and which owns over 4,000 hotels. In 2014, Marriott International Inc. had \$13.8B in revenue, over ten times Airbnb's *projected* revenue in 2015 (Kokalitcheva 2015) ⁴. That investors are still willing to purchase an equity stake in Airbnb at its current valuation suggests an expectation of continued, extraordinary growth. Their expected revenue for 2020 is \$10B, implying an annual growth rate of approximately +75% (Kokalitcheva 2015).

Confronted by such rapid growth, the New York Attorney General's investigation is typical of concerns about the presence of Airbnb in cities across the world. Central to this consideration, according to author Doug Henwood, is the potential of Airbnb's, "real, if hard-to-measure, impact on housing availability and affordability in desirable cities," (Henwood 2015). We will argue below that almost all of the welfare consequences (both positive and negative) of Airbnb circle around the question of its impact on housing

⁴Although Airbnb's total revenue for the third quarter of 2017 was estimated at more than \$1 billion, so its continued growth is making it a serious rival to major hospitality firms.

prices. Our analysis examines the question of Airbnb's impact in the context of New York City by presenting both empirical evidence and theoretical arguments that help us to understand Airbnb's impact on residential housing prices – an issue that has been raised frequently but rarely studied carefully. This paper seeks not to make a judgment on whether or not Airbnb is *good* or *bad* for cities (which in any event would depend critically on which population was being considered), but rather to provide the first quasi-experimental estimates of Airbnb's impact on neighborhood residential housing prices by focusing on the case of New York City.

In New York City, Airbnb activity tends to be heavily concentrated in the boroughs of Manhattan and Brooklyn, with some concentration in portions of Queens that are close to La Guardia airport or have good access to Manhattan. As of November 17th, 2015, there were a total of 35,743 active listings in New York City. These listings constitute a sizable portion of the accommodations industry in New York City, as there is a total of approximately 102,000 hotel rooms in the entire city (Cuozzo 2015).⁵ Airbnb has an apparently significant presence in New York City and many other cities across the world. The question is whether making these properties available to a population not normally resident in the city has an impact on prices and, if so, whether the effect is to increase or decrease prices.

2 Contemporary Policy Debates and Literature

Residents of cities and local governments across the world, both in favor and against Airbnb's presence, are growing increasingly vocal. The arguments against Airbnb focus primarily on three areas:⁶ 1) Airbnb's impact on decreasing affordability, 2) the negative externalities caused by Airbnb guests,⁷ and 3) the shadow

⁵There are 3,394,486 housing units in New York City measured in 2013 (Been, Capperis, Roca, Ellen, Gross, Koepnick & Yager 2015), meaning that over 1% of housing units were being actively listed on Airbnb on November 17th, 2015. Given that the distribution of Airbnb is not normally distributed throughout the city, we should expect that in some areas, the ratio of Airbnb listings to total units is significantly higher.

⁶An article on the impact of Airbnb in Los Angeles articulates these concerns clearly: "Airbnb forces neighborhoods and cities to bear the costs of its business model. Residents must adapt to a tighter housing market. Increased tourist traffic alters neighborhood character while introducing new safety risks. Cities lose out on revenue that could have been invested in improving the basic quality of life for its residents. Jobs are lost and wages are lowered in the hospitality industry" (Samaan 2015, p. 2).

⁷Horton describes this phenomenon well: "If Airbnb hosts bringing in loud or disreputable guests but, critically, still collect payment, then it would seem to create a classic case of un-internalized externalities: the host gets the money and her neighbors get the noise" (Horton 2014, p. 1). Recently Airbnb has even been criticized in Whyte (2017) for the problem of "overtourism" which we are assured is a "very real" problem, despite its similarity to the complaint that one's favorite restaurant now requires reservations. We can understand this as a problem in the sense that increasing tourists is effectively increasing urban population, which in a *closed-city* model reduces equilibrium utility levels.

hotel industry that allows commercial operators to use Airbnb in order to evade important safety regulations and taxes.⁸ On the other side, those who argue in favor of Airbnb's presence tend to focus on its positive economic impact on the city, including creating new income streams for residents as well as encouraging tourism and its associated economic benefits for a city (Kaplan & Nadler 2015).

The contemporary policy debates surrounding Airbnb can be summarized by the following question: should Airbnb be regulated and, if so, what is the appropriate type and level of regulation? This has been debated in New York City Council Hearings, protests have formed in support of and against Airbnb, and this past November (2015), Airbnb even made it onto the ballot in San Francisco through *Proposition F*.⁹ There is strong language on both sides; some are scared of Airbnb's impact on the affordability of neighborhoods and others suggest that its net welfare effects are positive. Additionally, the policy debates surrounding Airbnb and other sharing economy companies are concerned that these companies degrade important regulations. Arun Sundararajan argues that new regulations need to be developed to protect individuals, both consumers and workers, as a result of these companies: "As the scale of peer-to-peer expands, however, society needs new ways of keeping consumers safe and of protecting workers as it prepares for an era of population-scale peer-to-peer exchange" (Sundararajan 2014).

In the New York City Council hearings, as well as in protests and debates in the public sphere, there is a lack of data and analysis upon which people can rely. Because of this void, arguments are, to put it bluntly, mostly rhetorical and ideological rather than empirical. Thus, in addition to pursuing the analysis of Airbnb's impact on housing prices in New York City, the data collection work included in this paper will also hopefully begin to fill that void so that individuals can better understand Airbnb's impact in a way that is mathematically rigorous and econometrically robust.

To our knowledge there is only one other careful scientific study that estimates the direct impact of Airbnb rental availability on house prices. Barron, Kung & Proserpio (2017) examine the impacts of Airbnb listings on the value of house price and rent indices in US cities. Their analysis, working as it does with aggregate (zip-code level) price trends, must deal with the potential endogeneity of the number of Airbnb listings. They deal with this by constructing an instrument based on Google Trends searches for Airbnb.

⁸Much of the uproar in New York City concerns non-uniform taxation and regulation; hotels and motels face taxes which Airbnb is not currently subject to. In New York City, it is up to hosts to pay taxes on the revenue they generate from Airbnb. In some other cities, Airbnb has a "collect and remit" feature to collect taxes.

⁹*Proposition F* was ultimately rejected but would have limited the number of nights an Airbnb could be available each year.

Unfortunately, these are not accurately available at the zip code level, so to obtain an instrument that varies at the zip code level they interact these searches with a measure based on the number of food service and lodging establishments in the zip code area. Whatever objections might be raised concerning the instruments, they do find that an increase in Airbnb listings is associated with an increase in house prices and rents.

2.1 Research on Peer-to-Peer Platforms

Compared with research on housing markets and how their organization affects price outcomes, there is even less literature on the economics and impacts of peer-to-peer Internet markets. The existing literature provides a basis for addressing two main questions: 1) In what ways do peer-to-peer markets create economic efficiencies? 2) How do peer-to-peer platforms impact markets in auxiliary ways (e.g. over and above "normal" ways of doing business)? The remainder of the literature review will be devoted to understanding some of the most important contributions in this area and its application to this paper.

Einav, Farronato & Levin (2015) review some important considerations that allow these types of markets to exist. Among other things, they highlight the difficulties associated with designing these markets, such as search, trust and reputation, and pricing mechanisms. We will review a few of the important findings in the way they relate to Airbnb.

Einav et al. (2015) review some of the policy and regulatory issues that arise in the context of peer-to-peer markets, such as the dichotomy that local businesses are often subject to certain entry and licensing standards (such as limits on residential short-term rentals), while companies like Airbnb are often able to evade these regulations. There is not a clear solution to these issues. On the one hand, one might argue that these regulations are an important response to market failures (Einav et al. 2015, p. 19), while others might argue these regulations reduce competition by favoring incumbents. As has been expressed, an important motivation of this paper is filling the void in quantifying the impact of one peer-to-peer market. Einav et al. (2015) makes clear that grappling with these regulatory quandaries requires empirical work: "the effect of new platforms for ride-sharing, short-term accommodation or other services on prices and quality, and their consequences for incumbent businesses, are really empirical questions" (Einav et al. 2015, p. 19).

Peer-to-peer markets, like Airbnb, face tremendous obstacles in having to match buyers and sellers. One

of the difficulties is balancing a breadth of choice with low search and transaction costs. As such, Airbnb provides users (those looking for lodging) with a simple search mechanism with quick results, allowing these users to *then* filter more selectively based on desired criteria, like exact neighborhood, number of rooms, or price. In terms of pricing mechanisms, Airbnb allows its hosts to adjust their own prices, rather than set prices based on market conditions as is done for companies like Uber and Lyft.

An important question that Airbnb must grapple with is how to facilitate trust between users and hosts on the platform. The way Airbnb deals with this is through their reputation mechanism, which allows both hosts and guests to review each other. Trust in the platform depends on the success of the reputation mechanism.¹⁰

Levin (2011) highlights a few of the most distinctive characteristics of peer-to-peer markets and then delves into some of the economic theory applied to these types of markets. One particularly relevant feature that he highlights is the ability for these types of markets to facilitate customization, which has the potential to lead to a superior matching process between buyers and sellers. The paper reviews a wide body literature on different elements of internet markets. Varian (2010) also reviews the existing literature in this field and discusses the implications of markets moving online such as the ease of scalability, the unprecedented amount of data, and the ability for firms to experiment at significantly lower costs. Horton & Zeckhauser (2016) models a two-sided peer-to-peer market by examining the decision to own and/or rent as both short-run and long-run consumption decisions. In addition, they also conduct a survey to empirically evaluate consumers' decisions to own and rent different goods. Yet while each of these papers both review existing knowledge and provide theoretical frameworks (mostly around transaction costs), none ask the questions regarding the empirical impacts of such platforms on market values of underlying assets being used or traded in these markets.

The most relevant research to this paper is Zervas, Proserpio & Byers (2016). It is the only paper of which we are aware that attempts to quantify Airbnb's impact on local neighborhoods. Focusing on Airbnb usage in Texas, the main findings are that a 10% increase in the number of listings available on Airbnb is associated with a 0.34% decrease in monthly hotel revenues using, in their main model, a difference-in-differences design with fixed effects.¹¹ Their difference-in-differences design examines the difference in

¹⁰There exists literature on Airbnb's reputation mechanism, namely Andrey Fradkin's research, "Bias and Reciprocity in Online Reviews: Evidence From Field Experiments on Airbnb" (Fradkin, Grewal, Holtz & Pearson 2015).

¹¹In cities where there is higher Airbnb penetration, they find a significantly more pronounced effect. In Austin, they find

revenues "before and after Airbnb enters a specific city, against a baseline of changes in hotel room revenue in cities with no Airbnb presence over the same period time" (Zervas et al. 2016, p. 11). In order to make a causal claim based on their estimates, they test for and assume that there is no endogeneity that drives both Airbnb activity/entry as well as hotel revenues.¹² This paper has served as a helpful resource for how to estimate the impact of Airbnb activity on the housing market, though there are of course significant and notable difference in our analysis and that of Zervas et al. (2016), the biggest of which being that we are estimating the impact on residential housing prices (in New York City) rather than hotel revenue and that we consider both a hedonic model with fixed effects as well as a difference-in-differences strategy.¹³

3 Theoretical Perspectives

In this section we present an overview of theoretical arguments that could justify an *a priori* view that Airbnb listings might have an impact on residential property values. Where possible, we identify the direction of such impacts.

3.1 Overview

The intuition for expecting Airbnb to have an impact on residential property values is relatively straightforward. First, under many circumstances residences can be held as an asset and rented via Airbnb to produce an income stream. This can permit speculating for potential capital appreciation as well as generating rental income during the period of ownership. This potential income and capital gain might both draw investors to purchase residential property not for their own use and to hold onto properties for longer because rental income obtained via Airbnb reduces the cost of ownership. Either of these mechanisms would increase effective demand for housing and drive up the price of sales and rentals on these units. This would potentially affect both freehold sales price and rental price because the willingness-to-pay of both buyers and renters would be increased due to this potential increase in income.

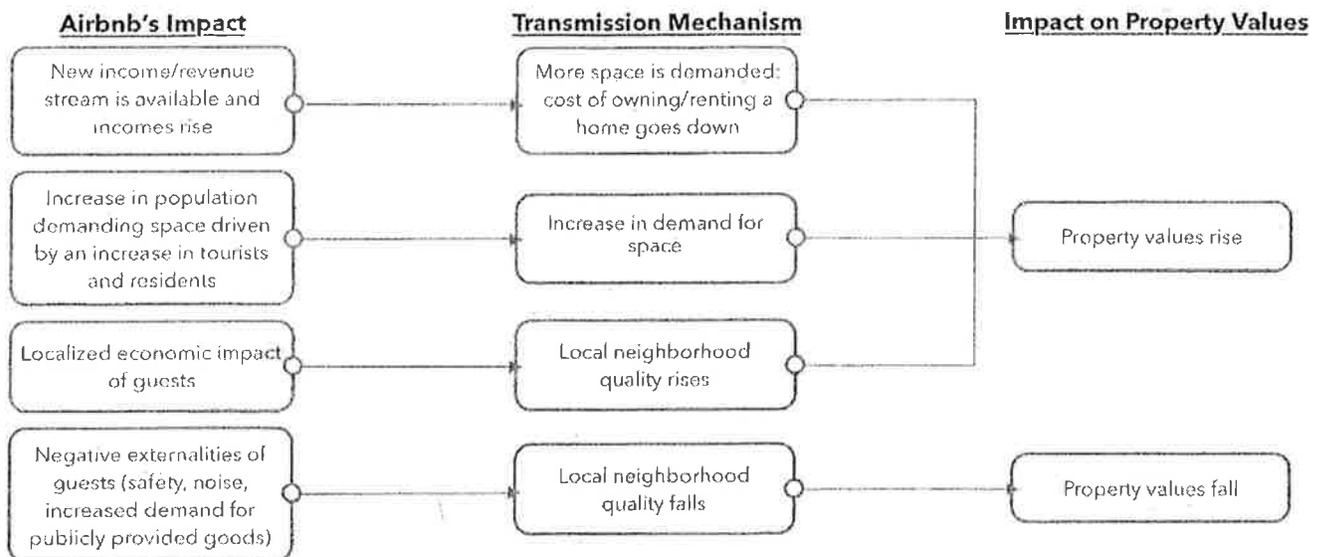
that Airbnb activity has decreased hotel revenues by 10%

¹²One thing to note about their difference-in-differences strategy is that their treatment group is defined after the first Airbnb listing enters that market. For a robustness check, they also change this treatment to be after ten and fifty Airbnb listings are available in a given location. To further test the robustness of their main specification, they also include different measures of Airbnb penetration, such as limiting their analysis to only include listings which have received at least one review.

¹³There is also ongoing research by Chiara Farronato and Andrey Fradkin, which seeks identify the impact of Airbnb activity on hotel revenues across many cities in the United States.

In terms of contemporary policy debate, this relates to the criticism that Airbnb allowed “commercial operators” on their service, a part of the findings of the New York State Attorney General's investigation,¹⁴ which might very well impact the supply of available housing.

Figure 1: Transmission Mechanisms for the Impact of Airbnb Activity on Housing Prices



There are additional potential transmission mechanisms. For example, Airbnb units could increase local population, especially local tourist population, and generate local economic impact on businesses by increasing the demand for local goods and services. This may cause incomes to rise as well increase localized provision of amenities that provide attractive goods and services to visitors. Property values may increase both because of increased demand for commercial (non-residential) space, as well as localized provision of amenities for visitors. Finally, it should be noted that there are mechanisms that may cause property values to decrease. The increase in densities that come from accommodating more people, or the negative externalities (such as noise, traffic and safety concerns) caused by Airbnb guests might make living near concentrations of Airbnb units unpleasant. Finally, a difficult-to-quantify but potentially behaviorally significant factor would be the signal that creating Airbnb availability might provide for neighborhood quality and subsequent gentrification. The emergence of concentrated provision of Airbnb units could itself induce speculative purchase of residential property in anticipation of subsequent capital gains.

¹⁴In the investigation, they found that 6% of short-term rentals were run by commercial operators, as defined by having more than two units on the platform, accounting for approximately 37% of revenue from New York City Airbnb listings.

In Figure 1, we outline some of these potential transmission mechanisms for how Airbnb might impact housing prices. As noted in the figure and mentioned above, there is the potential for the impacts to both increase and decrease house prices. While some of the arguments advanced in policy discussions seem to raise the possibility of impacts in both directions, impacts that increase property values and make housing less affordable are the primary focus of most discussion. In the subsections below we consider in greater detail two approaches that suggest the likelihood of this outcome.

3.2 Capitalization

Consider a city in equilibrium, with equilibrium welfare of residents is given by v . For a house located at distance x the annual rent that will be paid by a resident is then given by $R(v, x)$. Here we suppress other parameters such as transport costs t and parameters of the utility function that will obviously affect the equilibrium rent function at each location and for any given level of welfare.

There is a relationship between this annual rent at x and the structure price P which is given by:

$$P = \frac{R(v, x)}{u} \quad (1)$$

where u is the *user cost of housing*:

$$u = r_f + \omega - \tau \cdot (r_m + \omega) + \delta - g + \gamma \quad (2)$$

This model has been applied and discussed by Sinai & Souleles (2005) and Kuttner & Shim (2012). In the present context, we need to account for the fact that the Airbnb income is taxable income. If $\alpha > 0$ is the expected annual Airbnb rental as a percentage of house value, then we augment the expression for user cost of housing to:

$$u = r_f + \omega - \tau \cdot (r_m + \omega) + \delta - g + \gamma - (1 - \tau) \cdot \alpha \quad (3)$$

with:

Variable	Interpretation
r_{rf}	Risk free annual interest rate
ω	Property tax rate as a percent of market price
τ	Effective tax rate on personal income
r_m	Annual mortgage interest rate
δ	Maintenance costs as a percent of market price
g	Expected percent capital gain or loss
γ	Ownership risk premium
α	Airbnb rental as a percent of market price

Essentially, this defines (or is implied by) the process of capitalization, relating the rent, property tax, mortgage and risk-free interest rates, maintenance costs, expected capital gains and ownership risk premium to the price of the structure. We need to add to this an expression that allows for the use of Airbnb as a mechanism for earning revenue from the asset.

Assuming that at least partial capitalization takes place, and that $R(\cdot) > 0$ and $\tau < 1$ we will have $\frac{\partial P}{\partial \alpha} > 0$. Assuming that owners are forward-looking, face finite interest rates, and purchase properties in competitive markets we would expect at least partial capitalization so that property values would rise.

This is perhaps the simplest theoretical perspective that implies a positive relationship between the presence of Airbnb as a service that available to property owners and the freehold price of residential property. The Airbnb service provides the opportunity to earn additional income by virtue of ownership of a residence. The present value of this income stream, available contingent on ownership, would increase the market price of properties as long as capitalization takes place.

3.3 Simple monocentric model

What are the mechanisms through which Airbnb activity might impact housing prices? This section will explore this question using an extremely simple monocentric urban model, with residential space and consumption of other goods being perfect complements. Despite its simplicity, many of the essential comparative static impacts of increased Airbnb activity can be clearly demonstrated.¹⁵

¹⁵These types of models are based on the original Ricardian Theory of Rent (1817) (DiPasquale & Wheaton 1996).

As outlined in Figure 1, there are several ways in which Airbnb activity might impact housing prices. On the demand side, we might reasonably expect that the Airbnb service provides homeowners with an increase in income and as a result, more space would be demanded. Furthermore, as a result of Airbnb, there is an increase in the population of the city demanding space or equivalently an increase in the space demanded by each household.¹⁶ Local incomes and population may also increase if there is a localized economic impact caused by guests spending money in areas near their Airbnb listings. Finally, there might be a negative externality of guests, such as noise, decreased security, or simply additional demand for publicly provided goods (such as transportation).

These comparative-static results are formally derived and well-summarized in Brueckner (1987a). Within the context of a simple open-city model with all agents sharing a common utility function, he shows that an increase in population is associated with an increase in rents at all locations, and an increase in income is associated with a decline in rents for locations closer to the CBD and an increase in rents for locations further away. Because the analysis uses an arbitrary utility function, there is no single parameter that can represent an increase in demand.

In an effort to clarify these predictions while at the same time representing an environment that might better approximate the limited substitutability between space and other consumption that characterizes a thoroughly built-up area like New York City, we consider a special case of the more general model considered in Brueckner (1987a).

Consider a "perfectly complementary" city where all households regard "space" and "other goods" as perfect complements. The utility function will be of the form: $u(\alpha, s, o) = \min(\alpha \cdot s, o)$, where s represents the amount of space and o represents dollars spent on other goods.¹⁷ In this model, s can be understood as either land or interior living space; the same intuition holds. α is a preference parameter with demand for "other goods" increasing in α and the demand for space decreasing as α increases. r is the land-rent function, which refers to the cost of land.

Households have income, m , and all households are employed in the central business district (CBD)

¹⁶Indeed, a common anecdote among those purchasing homes is that they purchase a bigger home, one with more bedrooms for example, because they have the ability to rent out that bedroom during peak seasons like holidays to help cover the cost of a mortgage.

¹⁷The qualitative comparative statics, e.g. the sign of changes to r_a , m , s , α , o , and N , do not depend on this particular utility function. Its simplicity makes it an attractive choice for a model. A more general case is presented in Brueckner (1987b).

which is located in the center of the city. As is customary, the CBD is regarded as a point in space. This implies that there are no differences in where a household is employed within the CBD. If a household is located x distance from the CBD, they must pay $t \cdot x$ annual commuting costs. Thus, a household will have $m - t \cdot x$ remaining to spend on space (s) and other goods (o). Consider distance and space to be measured in the similar units (e.g. meters and square meters).

Solving for the demand for s and o at distance x , we have:

$$o = \frac{(m - t \cdot x)\alpha}{\alpha + r} \quad (4)$$

Equation 4 implies that s is given by $\frac{m-t \cdot x}{\alpha+r}$, and o is given by $\frac{(m-t \cdot x)\alpha}{\alpha+r}$. Because $\min(\alpha s, o) = u$ and $\alpha s = o$, we know that $\alpha s = u$, which implies that $s = \frac{u}{\alpha}$. Because a household can choose where to locate in the city and m is equal across the population, we know that every household with a given income, m , and α consumes the same amount of space. We can solve for rent as a function of utility and distance from the CBD.

Solving $\frac{m-t \cdot x}{r+\alpha} = \frac{u}{\alpha}$ for r , we obtain:

$$r = \frac{\alpha(m - t \cdot x - u)}{u} \quad (5)$$

Equation 5 presents the equilibrium land-rent function. At every point x (the distance to the CBD), r is determined by utility (u), income (m), transportation costs (t), and a preference parameter (α). As a natural component of spatial equilibrium, utility will be equal across all households and locations (otherwise households will move to maximize utility). This implies that property values fall as x (distance to the CBD) increases in order to equalize utility at every location. This must be the case because the farther away a household lives from the CBD, the more they spend on commuting costs (recall that commuting costs are equal to $t \cdot x$). Furthermore, in equilibrium all N households must be accommodated in the city, so property values must be sufficiently high in order to bid space away from alternative use.

With N total households, the total space bought by the households is $N \frac{u}{\alpha}$.¹⁸ In a classical urban model,

¹⁸This model could be expanded to multiple classes, but the intuition and forthcoming results hold and so for simplicity, we will assume a one-class model. A multi-class model could take the form of different levels of income, m , or of the α preference parameter, modeled by a distribution of $f(M, \alpha)$.

r_a represents the agricultural price of land, but we can consider r_a to simply represent the opportunity cost, or alternative use value, of land. The total land "bid away" from this use is the land area where the price of space is greater than r_a . The radius of the city, \bar{X} , is determined when the value of land becomes equal to the value of space in alternative uses, so it is therefore the maximum distance from the CBD. The equilibrium requires that $N\frac{u}{\alpha}$ is equal to $\pi(\bar{X})^2$. This is the case because the (circular) city needs to accommodate the entire population and all space in the city will be consumed. If we set these two equal, we can solve for the equilibrium level of utility.

$$\begin{aligned}\bar{X} &= \frac{(-Nt \pm \sqrt{N}\sqrt{Nt^2 + 4m\pi(r_a + \alpha)})}{2\pi(r_a + \alpha)} \\ \bar{u} &= \frac{\alpha(Nt^2 + 2m\pi(r_a + \alpha) - \sqrt{N}t\sqrt{Nt^2 + 4m\pi(r_a + \alpha)})}{2\pi(r_a + \alpha)^2}\end{aligned}\quad (6)$$

Because \bar{X} must be positive (it is a distance), applying 6, the equilibrium land rent function is:

$$\begin{aligned}r &= -\frac{(-m + u + t \cdot x)\alpha}{u} \\ r &= \frac{2m\pi r_a(r_a + \alpha) + t(-Nt\alpha - 2\pi x(r_a + \alpha)^2 + \sqrt{N}\alpha\sqrt{Nt^2 + 4m\pi(r_a + \alpha)})}{Nt^2 + 2m\pi(r_a + \alpha) - \sqrt{N}t\sqrt{Nt^2 + 4m\pi(r_a + \alpha)}}\end{aligned}\quad (7)$$

We can now look at the impact of three different exogenous variables that could change as the level of Airbnb activity increases, N , α , and m , on the land-rent function. These impacts are illustrated in Figures 2, 3, and 4. We can determine the impact of population by taking the derivative of the above land-rent function with respect to N .

$$\frac{\partial r}{\partial N} = \frac{2\pi t(-m + t \cdot x)(r_a + \alpha)^2}{(\sqrt{N}\sqrt{Nt^2 + 4m\pi(r_a + \alpha)})(-Nt^2 - 2m\pi(r_a + \alpha) + \sqrt{N}t\sqrt{Nt^2 + 4m\pi(r_a + \alpha)})}\quad (8)$$

A rise in N is associated with an unambiguous increase in the value of space r at all distances x , and an increase in the slope of the rent gradient. The land-rent function must rise to bid away additional residential space from alternative uses in more remote parts of the city (e.g. the urban periphery). Equation 6 implies that the increase in N results in reduced utility \bar{u} , and therefore reduced consumption of space by each household and higher population density. Spatial equilibrium requires that the value of space per unit area decline by just enough to compensate for the extra transportation costs of households residing in that area.

Increasing density implies an increase in total transport costs per unit area, so increasing x requires more compensation – i.e. the land rent function must be steeper.

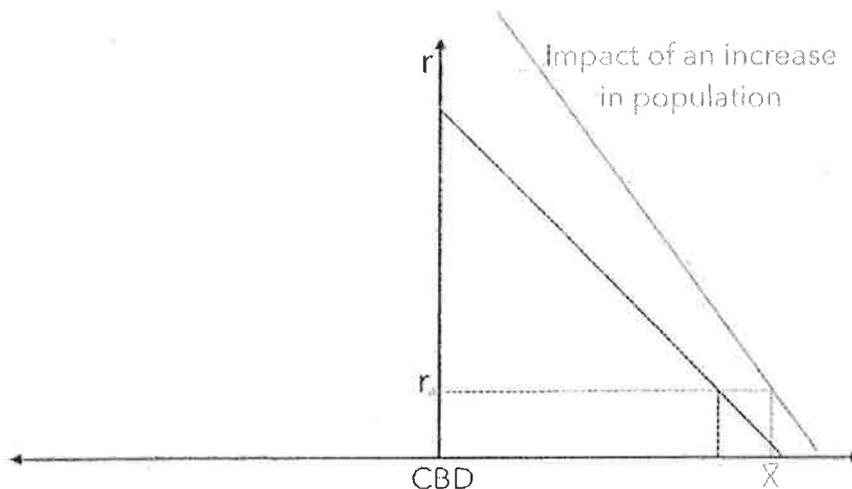
Why might the impact of Airbnb be modeled as an increase in N ? In this simple model, N is fixed and exogenously determined. Airbnb listings allow more people (e.g. tourists) to occupy the city. For example, if a city experiences z private room listings, filled each night, the city has experienced an increase of z in N .

We can also determine the impact of income by taking the derivative of the land rent function with respect to m :

$$\frac{\partial r}{\partial m} = -\frac{2\pi t(r_a + \alpha)^2(2m\sqrt{N}\pi(r_a + \alpha)(nt + 2\pi x(r_a + \alpha))(-\sqrt{N}t + \sqrt{Nt^2 + 4m\pi(r_a + \alpha)})}{\sqrt{Nt^2 + 4m\pi(r_a + \alpha)}(Nt^2 + 2m\pi(r_a + \alpha) - \sqrt{N}t\sqrt{Nt^2 + 4m\pi(r_a + \alpha)})^2} \quad (9)$$

Airbnb presents homeowners with a new revenue stream. We can model this as a rise in income. With an increase in income, households will spend more both on space and other goods, and in the process experience an increase in \bar{u} . As a result, the city must expand. Because land consumption increases, density is reduced so the rent gradient will get flatter, implying that rents will fall in more central parts of the city and rise in more remote parts of the city. Figure 3 illustrates this effect.

Figure 2: Theoretical Impact of a Rise in Population



Finally, we can determine the impact of α by taking the derivative of the above land-rent function with

Figure 3: Theoretical Impact of a Rise in Income

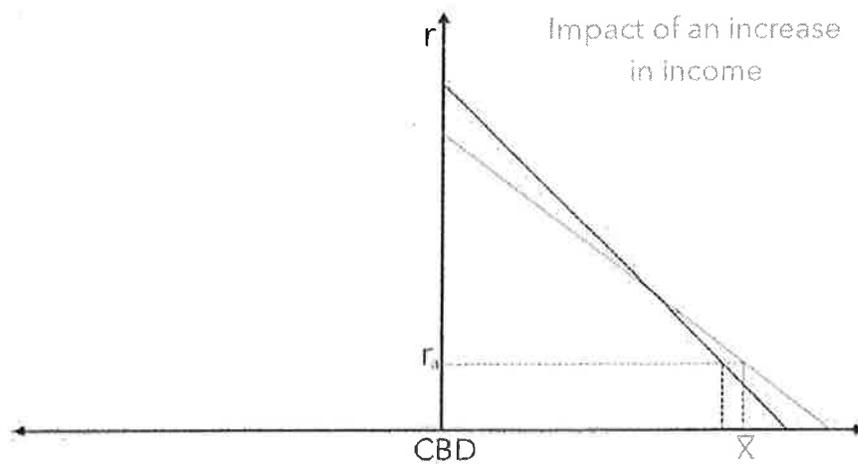
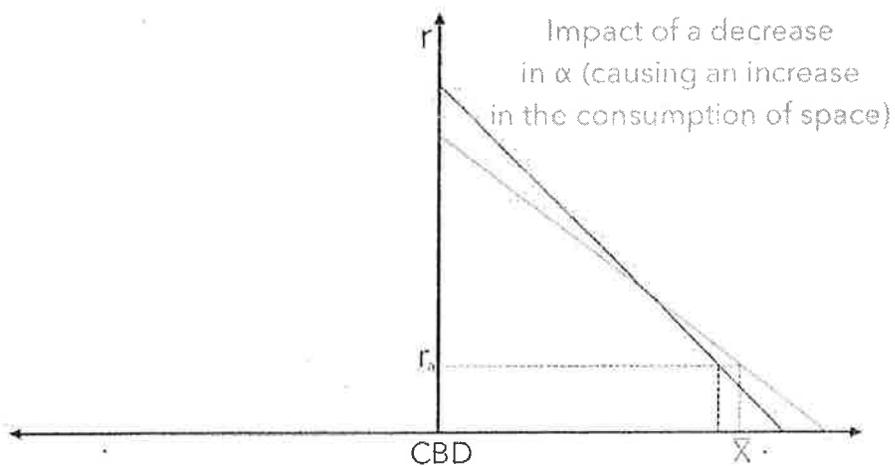


Figure 4: Theoretical Impact of a Decrease in α



respect to α , which gives:

$$\frac{\partial r}{\partial \alpha} = \frac{t(-m\sqrt{N} + x(\sqrt{N}t + \sqrt{Nt^2 + 4m\pi(r_a + \alpha)}))}{m\sqrt{Nt^2 + 4m\pi(r_a + \alpha)}} \quad (10)$$

An increase in α causes a decrease in the demand for space and vice versa. The impact we might expect as a result of Airbnb is a decrease in α , which would cause an increase in the consumption of space as residents purchased larger homes with seeking investment returns via short-term rentals. How does a decrease in α impact rent? Rent in the urban periphery, e.g. in more remote parts of the city, will rise by bidding away space from alternative uses to make available for residential housing consumption. The higher consumption of space will reduce density which in turn will reduce the slope of the rent function r (see Figure 4). As in the case of increasing income m , there would be a reduction in the cost of space in the city center and an increase at the periphery. Thus, the impact of changing α does not have a uniform impact.

If an increase in Airbnb activity in a city were equivalent to a rise in N we would therefore be justified in expecting an unambiguous rise in rent and property values, with a larger impact observed at more central locations. On the other hand, the theoretical impacts of α and m are ambiguous so that if an increase in Airbnb properties primarily affects the household demand for space or provides greater income there remains an empirical question to measure the actual impacts. This provides motivation for the empirical research presented below.

4 Data & Descriptive Statistics

Table 1 describes the different data sources used as well as their main uses. In total, there were eight main sources of data: 1) InsideAirbnb, 2) The Department of Finance Annualized Sales Data (January 2003-August 2015), 3) The Department of Finance "Places" or "Areas-of-Interest" Map, 4) Department of City Planning PLUTO™, 5) The 2010-2014 American Community Survey, 6) The New York Police Department Crime Statistics, 7) Census Geography Maps, and 8) the Metropolitan Transportation Authority Map of Subway Entrances.

Table 1: Data Sources and Use

Source	Description & Use
<i>InsideAirbnb</i>	InsideAirbnb (released by Murray Cox) contains information such as pricing, reviews, and location of each listing on Airbnb that was available on the date the Airbnb website was crawled (12 times in 2015-2016).
<i>Department of Finance Annualized Sales Data: January 2003 - August 2015</i>	The Department of Finance releases information on all sales in New York City. The data are available from 2003-2015 and contain information such as sale price, square footage, and sale date.
<i>Department of Finance "Places" or "Areas-of-Interest" Map</i>	The Department of Finance releases information on areas of interest, such as parks, cemeteries, and airports, available in GIS format.
<i>Department of City Planning Pluto™</i>	The Department of City Planning releases detailed information about each tax lot in New York City (of specific use for this analysis was square footage information).
<i>American Community Survey 2010-2014</i>	The American Community Survey contains information available at the Census Tract level such as education, racial and ethnic demographics, and employment-related measures.
<i>New York Police Department Crime Statistics</i>	The New York Police Department reports annual counts for different crimes (major felonies, non-major felonies, and misdemeanors) by precinct.
<i>Census Geography Maps</i>	In order to merge sales with local Census demographics, Census geographies needed to be identified and spatially joined to the sales dataset.
<i>Metropolitan Transportation Authority Map of Subway Entrances</i>	Information provided by the Metropolitan Transportation Authority was made into a map of subway entrances in New York City.

Table 2 and Table 3 document descriptive statistics for the variables used in this analysis. These data were aggregated and joined together using ArcGIS and Stata. Not all of these data are available at the same geographic scale. For example, crime statistics were only available to us at the geographic unit of precinct, which means that when controlling for crime for each sale, precinct is the level of granularity being used. In all, there were 1,252,891 observations (sales) from January 2003 through August 2015. We dropped 145,594 observations because they were non-residential sales, and 319,975 observations were dropped that had sales prices below \$10,000,¹⁹ We dropped 4,533 observations with sales prices above \$10,000,000, and 2,552 observations were dropped because they were missing square footage information (or if square footage was below 10ft or above 50,000ft), leaving a total of 780,237 observations. Approximately 16,000 observations were excluded because they could not be properly geocoded.

For each of the remaining observed sales, we have information on sale price, sale date, square footage, and property type, along with some other variables in the Department of Finance Annualized Sales Data. Before describing how we are calculating Airbnb activity that could influence each sale, it is important to note the other information that was joined to the sales data. Most of the data, such as crime, Census information, distance to subway entrances and areas-of-interest, could be spatially joined using a combination of ArcGIS and Stata.

In the Department of Finance sales data, square footage was missing for approximately 50% of the observations. The size of the residential property is obviously an important variable for a hedonic regression or as a control for matching observations in a quasi-experimental approach. Rather than simply dropping half of the observations or excluding square footage as a variable, we employed a technique using the PLUTO™ dataset. PLUTO™ contains information on residential area (measured in square feet) and the number of residential units by Tax Lot and Block, both of which are very small geographic units of area. There are 857,458 Tax Lots with a mean of 1.254051 buildings per Lot. We calculated square footage by dividing residential living area by the number of residential units in each Lot and we were then able to join the sales data with this information to have a measure of square footage for an average unit in the same Lot as the sale.²⁰ While this method is not perfect, units in the same building and Lot tend to have

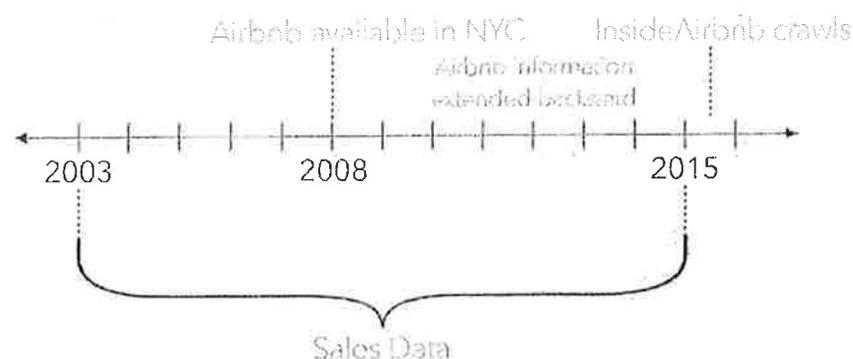
¹⁹Sales below \$10,000 do not represent the actual sales prices of properties in New York City. Rather, they are either missing appropriate data or are bequests from one generation.

²⁰For some sales, we were unable to join average square footage per Tax Lot. In these cases, we used average square footage per Tax Block.

roughly similar values and furthermore, where we had both square footage from the sales dataset and the calculated average square footage number from PLUTO™, the mean difference between these values for 379,673 observations was 41.68 square feet, which suggests that these measures are well within reasonable and expected levels of accuracy.

It is also worthwhile to review the Airbnb activity measures used to obtain the estimates presented in Section 5. InsideAirbnb scraped the Airbnb website to collect information on each listing available in New York City across several different crawl dates. Each crawl then presents a cross-section snapshot of data. Part of the information collected about each listing is the date of first review.²¹ We take the date of first review to refer to one of the first, if not the first, booking that a listing receives. In other words, it can proxy for a given listing's entry into the New York City Airbnb marketplace. In order to construct a dataset from the 12 different InsideAirbnb datasets used, we merged the datasets from different crawls, keeping only distinct listings, and created an observation for each month the Airbnb unit was available using its date of first review as the first month of this time period. For instance, if a listing was available in the June 1st, 2015 crawl and its date of first review was June 1st, 2014, we conclude that it has been (at least potentially) active for the 12 corresponding months between the date of first review and crawl date. This process is visually represented in Figure 5.

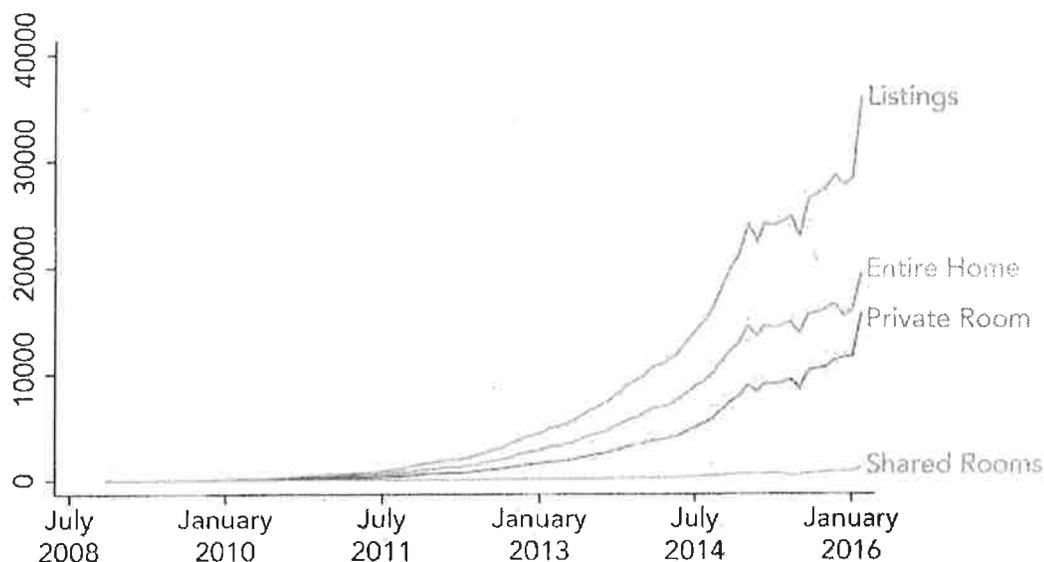
Figure 5: Construction of Airbnb Dataset



²¹In 2012, Brian Chesky, the founder and CEO of Airbnb, wrote on Quora that "72% of guests leave a review for hosts."

This allows us to get a clear picture of Airbnb activity going back to the appearance of the first listings when Airbnb entered the New York City market. In Figure 6, we include the number of listings over time generated through this process.

Figure 6: Airbnb Listings Over Time

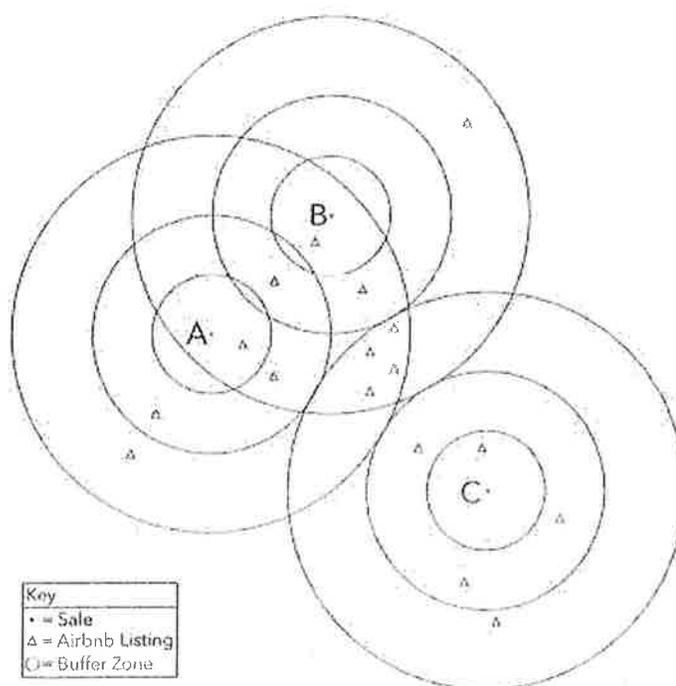


There is the possibility of measurement error with this methodology because there are hosts who enter the Airbnb marketplace, e.g. create a listing, and then exit the market. As a result, these hosts and listings would not be captured in our analysis unless their listing was available during one of the crawls used for the analysis. In addition, there may be owners who make their property available on Airbnb very rarely, and our assumption that these units are available to influence local house prices may overstate the actual number of Airbnb properties. These sources of noise in measuring Airbnb units could result in attenuation bias, reducing the absolute value of the estimated impact of Airbnb units on property prices.

In order to evaluate the potential impact of Airbnb activity for each sale, we created five different buffer zones around every property sale in ArcGIS, with a radius of 150, 300, 500, 1000, and 2000 meters, respectively. This is visually represented in Figure 7. More specifically, in Figure 7, Sale A has 1 Airbnb listing within the first buffer zone, 4 Airbnb listings within the second buffer zone, and 11 Airbnb listings within the third buffer zone. It is worth noting that in this calculation, we are only looking at Airbnb listings available at the time of sale; we are able to do this because we extended Airbnb listings information back

until entry of Airbnb into the New York market, as discussed above. In ArcGIS, we generated Airbnb activity measures for each sale in each of the five radii, such as number of listings, average price, and maximum capacity. These measures are documented in Table 2. In order to do so, in ArcGIS we had to select each sale, its corresponding Airbnb listings (available in the same month and year based on the Airbnb time series dataset created), perform a spatial join, and export this output to Excel to later read this into Stata for an econometric analysis. The code used for these data manipulations is available in Udell (2016).

Figure 7: Sales & Buffer Zones



Tables 2 and 3 include descriptive statistics; the first table details Airbnb activity measures and the second details information on each sale as well as other controls used.

In total, there are 780,237 observations with corresponding Airbnb activity.²² As expected, the mean number of listings increases with the radius of the buffer zone. There are significantly more entire home and private room listings than there are shared room listings. There are two reasons why many entries in the Airbnb data are recorded as zero: 1) there are sales observations from 2003 through much of 2008, which is prior to Airbnb's entry into the market, 2) even after Airbnb became available, there are still many

²²Because the number of observations is consistent across the entire table, it is not included.

Table 2: Descriptive Statistics: Airbnb Activity Measures

VARIABLES	(1) mean	(2) sd	(3) min	(4) max
Listing Counts, by Total and Type				
Listings Count (150m)	1.221	5.217	0	133
Listings Count (300m)	4.644	19.06	0	439
Listings Count (500m)	11.99	47.75	0	1,034
Listings Count (1000m)	40.99	157.5	0	2,899
Listings Count (2000m)	133.4	490.3	0	6,170
Entire Home Listings Count (150m)	0.855	3.821	0	101
Entire Home Listings Count (300m)	3.249	13.91	0	309
Private Room Listings Count (150m)	0.338	1.575	0	78
Private Room Listings Count (300m)	1.290	5.431	0	182
Shared Room Listings Count (150m)	0.0278	0.227	0	20
Shared Room Listings Count (300m)	0.104	0.577	0	35
Listing Capacity				
Avg. Capacity (150m)	0.423	1.147	0	16
Avg. Capacity (300m)	0.577	1.280	0	16
Max. Capacity (150m)	3.490	15.02	0	387
Max. Capacity (300m)	13.24	54.47	0	1,215
Avg. Bedrooms (150m)	0.158	0.430	0	10
Avg. Bedrooms (300m)	0.305	0.713	0	16
Sum Bedrooms (150m)	1.302	5.616	0	136
Sum Bedrooms (300m)	4.951	20.37	0	459
Sum Beds (150m)	1.819	7.841	0	294
Sum Beds (300m)	6.899	28.21	0	622
Listing Price				
Avg. Nightly Price (150m)	23.09	65.18	0	5,000
Avg. Nightly Price (300m)	29.34	69.00	0	5,000
Sum Price (150m)	213.744	989.79	0	25,308
Sum Price (300m)	813.8	3,617	0	74,874
Median Price (150m)	19.85	57.81	0	5,000
Median Price (300m)	24.69	60.49	0	5,000
Reviews				
Sum Reviews (150m)	31.77	140.4	0	4,396
Sum Reviews (300m)	122.0	499.6	0	11,5999

Table 3: Descriptive Statistics: Sales and Controls

VARIABLES	(1) mean	(2) sd	(3) min	(4) max	(5) N
Sales Unit					
Sale Price	683,922	913,580	10,000	1.000e+07	780,237
Square Footage of Unit	1,183	577.0	10.39	18,590	780,237
Walkup Building Indicator	0.0579	0.234	0	1	780,237
Presence of Elevator Indicator	0.368	0.482	0	1	780,237
Prewar Building Indicator	0.379	0.485	0	1	780,237
Demographics and Crime					
Median Household Income	75,240	35,874	11,012	250,001	776,027
Percentage White	0.549	0.300	0	1	779,975
Major Felonies	736.8	427.9	11	2,776	765,747
Non-Major Felonies	1,725	700.6	83	5,105	765,747
Misdemeanors	4,515	2,002	259	14,025	765,747
Geography and Time of Sales					
Indicator for Sale in Staten Island	0.0830	0.276	0	1	780,237
Indicator for Sale in Brooklyn	0.247	0.431	0	1	780,237
Indicator for Sale in the Bronx	0.0742	0.262	0	1	780,237
Indicator for Sale in Manhattan	0.283	0.450	0	1	780,237
Indicator for Sale in Queens	0.313	0.464	0	1	780,237
Year of Sale	2008	3.822	2003	2015	780,237

parts of New York City where Airbnb is not active. As shown in figure 6, Airbnb listings do not become a significant factor for the entire New York market until the beginning of 2010.

The different Airbnb measures represent different proxies for Airbnb activity.²³ It is worth noting here that the average nightly price within 300m of a sale is \$29.34. In many ways, Airbnb directly competes with hotels; the \$29.34 average price tag suggests that it also opens up a new market, which is a more affordable alternative to hotels. This is in line with Levin (2011), which suggests that these platforms have superior matching processes, creating a market for these transactions that otherwise might not have taken place. Airbnb represents an unbundling of the services hotels offer, which allows it to be cheaper in many cases.

In Table 3 we see that the average sale price is \$683,932 while the median sale price is \$450,000. 31.3% of sales occurred in Queens, 28.3% occurred in Manhattan, 24.7% occurred in Brooklyn, and the remaining 15.72% occurred in Staten Island and the Bronx.

²³Most of these Airbnb measures proxy for levels of availability, but we can also think about a measure such as the sum of nightly prices as an indication of the potential (nightly) income available due to Airbnb activity.

The descriptive statistics presented in tables 2 and 3 allow us to make a quick “back of the envelope” calculation of the potential impact on property values. Consider the income capitalization approach outlined in section 3. Airbnb imposes a host fee of 3% of the rental value, in addition to the guest fees that are added to the nightly rental. It seems reasonable to expect that there will be many nights when the property is not rented, but suppose an optimistic owner of an average property expects to be able to rent 330 nights per year. Then the total annual Airbnb income expected would be $\$29.34 \times 330 \times 0.97 = \9392 . Combining this figure with the mean property value of $\$683,922$ this implies a value of $\alpha = 0.01373$ for equation 3.

For other variables in equation 3, we assume that $g = \gamma$ (the expected capital gain equals the ownership risk premium) and apply reasonable estimates to other variables as follows:

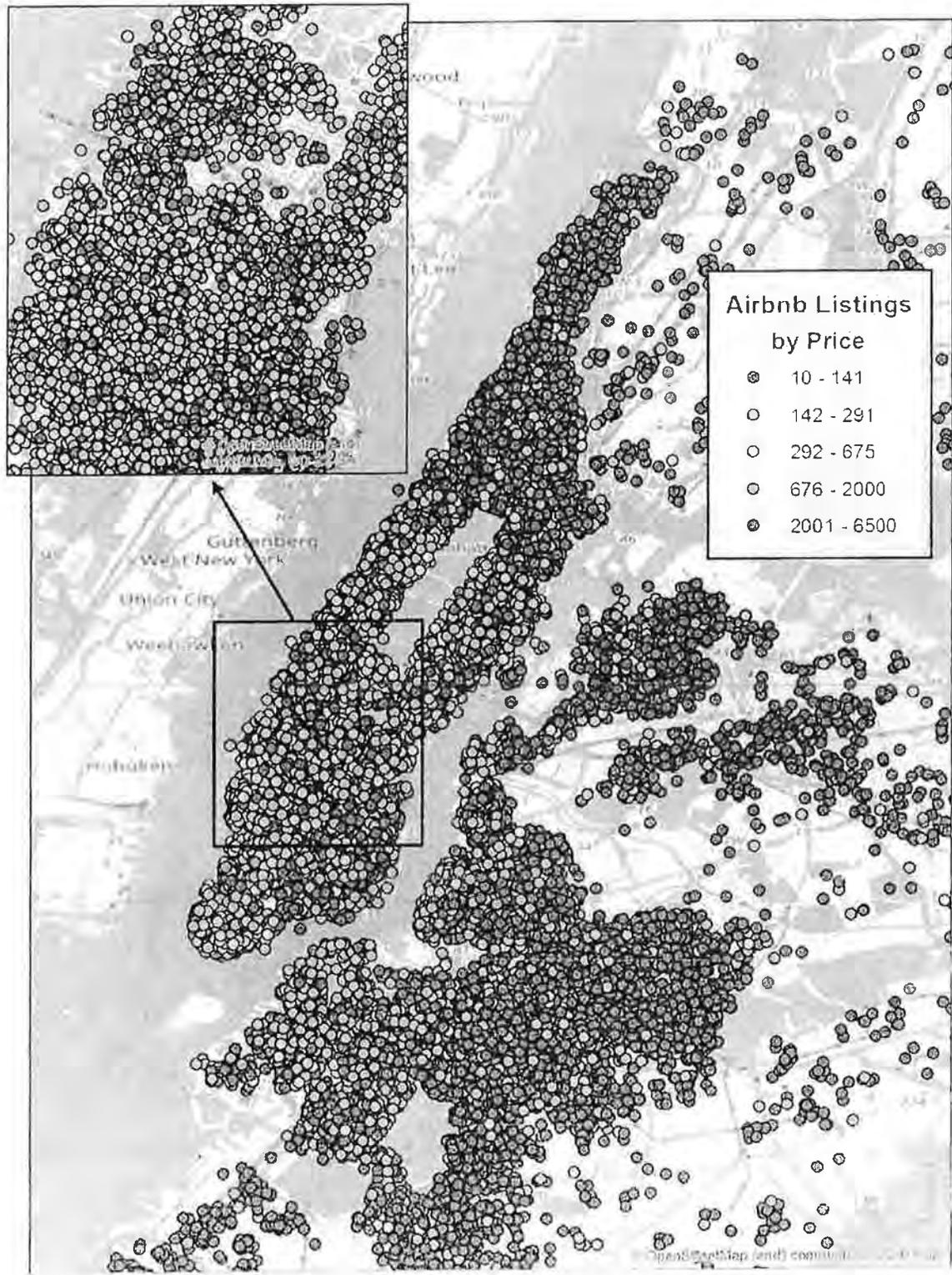
Variable	Value	Interpretation
r_{ff}	0.02	Risk free annual interest rate
ω	0.025	Property tax rate as a percent of market price
τ	0.29	Effective tax rate on personal income
r_m	0.04	Annual mortgage interest rate
δ	0.025	Maintenance costs as a percent of market price
α	0.01373	Airbnb rental as a percent of market price

Using these values in both equations 2 and 3, we can calculate that the availability of Airbnb rentals has diminished the user cost of housing by about 17.7%. If utility levels in the city remain constant (as would be expected in long-run equilibrium of an open city), and given unchanged transport costs and preferences, we would expect rents per unit of space to remain unchanged. This reduction in the user cost of housing would then imply, via equation 1 a **17.7% increase in the price of housing**.

These calculations are at best an approximation of what we might expect to observe. Not all portions of the city are equally exposed to Airbnb activity and market equilibrium may take years to be realized. Nevertheless, the calculation provides some intuition about the potential magnitude of price impacts.

Not all portions of the city have the same intensity of Airbnb listings. Figure 8 shows the distribution of Airbnb listings (from any time period) across the city, with dots color coded by daily price. It can be difficult from the map to tell how dense the coverage is, so an inset showing midtown Manhattan is provided. This suggests that as of late 2015, coverage in the areas of the city with greatest demand for lodging is very complete.

Figure 8: Airbnb listings in New York City, with inset showing midtown Manhattan



5 Empirical Estimates

We employ two distinct approaches to estimating the impacts of Airbnb properties on house prices. First, we employ a relatively traditional hedonic approach as presented and explained in Rosen (1974) or Sheppard (1999) and widely used to measure the importance of factors affecting property values. Second, we employ several quasi-experimental approaches to identify *treatment* and *control* groups within the observational data, and then estimate the average treatment effect generated by the Airbnb quasi-experiment.

The first approach provides a measure of the associational impact of Airbnb – the change in values that an observant buyer might detect as the housing market adapts and responds. It cannot, however, pretend to provide an analog to the causal impact obtained from a controlled experiment in which the sales price of identical (or very similar) structures are compared after one of them (the treated property) is subject to the impact of locally available Airbnb rentals while the other (the control) is not subject to these local impacts.

Because we are fortunate to have a very large number of individual sales observations, we can apply these techniques to identify the experimental data within the large observational data. This offers the prospect of measuring a causal impact, and it is worth distinguishing between this approach and the use of instrumental variables that are widely applied in response to concerns about endogenous variables. Instrumental variable approaches can (in ideal circumstances) reduce endogeneity bias in estimating associational relations, but cannot be relied upon to measure causal impacts.

Our unit of observation is an individual sale that took place in New York City (five boroughs) between January 2003 and August 2015. We therefore have a large number of sales both before and after Airbnb units become actively available.²⁴ For each sale, we include controls for the property itself, the building in which it is located, local amenities (such as access to public transportation), local neighborhood characteristics (demographics and crime), a year of sale fixed effect to capture a time trend of sales prices, and a local neighborhood fixed effect to capture time invariant neighborhood quality or desirability. For each sale, we calculate a level of local Airbnb activity, which is the main variable of interest, and corresponds to Airbnb activity at the time of sale. In most specifications, this Airbnb activity is proxied by the number of listings,

²⁴It is worth noting that the sales are nominal rather than real prices. we include year of sale fixed effects to deal with this problem. This is, in fact, preferable to using a house price index to determine “real prices” because available house price indices generally cover a different geographic area than our data.

We compare the index, which is constructed from the estimates on the year of sale fixed effects, to the S&P/Case-Shiller NY, NY Home Price Index to demonstrate its plausibility.

but we present estimates that use alternative indices of Airbnb activity as well.

There are two main assumptions of the hedonic identification strategy: 1) with regards to generating the Airbnb dataset, we are assuming that the date of first review indicates when a property became available on Airbnb and that once it became available, it never exited the Airbnb market. This allows us to construct a dataset of Airbnb activity over time and calculate local Airbnb activity at the time of sale and 2) local neighborhood fixed effects capture time-invariant local neighborhood quality. If these assumptions are valid, these estimates will reveal the impact of local Airbnb activity on sales prices. If these assumptions hold, because we are controlling for property, building, and neighborhood characteristics, the only thing that is changing is local Airbnb activity (as well as the overall level of the market, which is captured by year of sale fixed effects).

The specification we are using in the baseline model follows the form:

$$\begin{aligned} \ln(\text{Sale Price}_{icmt}) = & \alpha + \beta_1 \ln(\text{Airbnb Activity}_{im}) + \mu_1(\text{Property Characteristics}_i) + \\ & \mu_2(\text{Building Controls}_i) + \mu_3(\text{Demographic and Crime Controls}_{it}) + \\ & \mu_4(\text{Year of Sale FE}_{it}) + \mu_5(\text{Local Neighborhood FE}_{ic}) + \epsilon_{icmt} \end{aligned} \quad (11)$$

where $\ln(\text{Sale Price}_{icmt})$ is equal to the logarithm of property i 's sale price, in neighborhood c , in month m , and year t , and where β represents a scalar coefficient and μ represents a vector coefficient.

The independent variable is the natural log of sale price. The main variable of interest is Airbnb activity (proxied by different descriptive and proximate measures of Airbnb, as will be discussed in Section 5). For each sale, square footage, distance to the nearest subway entrance and area of interest are used as well as controls for the building, year of sale, local crime, and local demographics. In the model, a time-invariant local neighborhood fixed effect is included to capture unobservable or uncontrolled for local neighborhood quality and characteristics. There is significant evidence that housing prices are heavily influenced by the characteristics of a neighborhood as well as surrounding land use (DiPasquale & Wheaton 1996, p. 349).

As with most microeconomic estimation, there are natural concerns regarding endogeneity of right-hand side variables. We are not estimating the individual household demand for the characteristic of proximity to Airbnb properties or for listing a property on Airbnb, so the traditional concerns regarding endogeneity of individual household decisions discussed in Sheppard (1999) do not arise. Endogeneity may nevertheless be a valid concern if important factors affecting house prices are correlated with the unobserved

errors in the hedonic equation. Thus, for example, if errors ϵ in the hedonic price function are correlated with measured values of right-hand side variables in equation 11 then estimates may be biased.

For example, we might expect increasing Airbnb activity to be correlated with the error term of the hedonic if the number of Airbnb properties within a given buffer distance were positively related to unobserved errors ϵ . Note that the problem does not involve a correlation between Airbnb activity and property values. The problem arises if we have correlation between Airbnb activity and ϵ , which is the component of property value that is **not explained** by the hedonic.

Proving there is no such relationship is extremely difficult. There are several considerations that we suggest as a basis for regarding our hedonic estimates as reasonable: 1) we include sales data prior to Airbnb's entry into the New York City market and therefore have at least five years of data (2003 through most of 2008), where sales are not subject to any Airbnb "treatment,"²⁵ 2) local neighborhood fixed effects, which in our preferred specification are at the level of Census Block-Group, and 3) use of robust standard errors, which in our preferred specification are clustered at the level of Census Tract, to help deal with correlation within clusters and heteroskedasticity. Finally, even if we expected there to be correlation between unexplained errors ϵ in the hedonic model and the number of Airbnb properties very near to the source of error, this correlation should be greatly reduced as we consider larger buffer areas. A distance exceeding 1,000 meters in the New York housing market is generally large enough to be associated with significant neighborhood change. As noted in section 4, these larger buffer areas also involve many more properties, and it strains credulity that the number of Airbnb properties within a kilometer in any direction would be significantly affected by an unusually under- or over-valued property sale.

While this approach is not immune from endogeneity concerns and makes other implicit assumptions concerning stability of trends, the central role of the treatment variable interacted with the indicator for the time period after which any treatment is delivered, coupled with the reduced likelihood that this interaction variable is correlated with the unobserved ϵ in the model make presentation of these estimates worthwhile. A final check is provided by comparing the estimates of the "preferred" models from each approach with the intuitive "back of the envelope" calculations presented in section 4 will be instructive as indicators of the reasonableness of the estimates.

²⁵Therefore, the change we are identifying, controlling for property and local neighborhood characteristics as well as the overall level of the market, should be attributable solely to Airbnb activity.

5.1 Estimating Associative Effects with Hedonic Models

Table 4 presents OLS estimates of the hedonic using several different measures of Airbnb activity, all measured within 300 meter buffers. This is followed by Table 5, which shows results for counts of Airbnb properties measured within buffers of different sizes. The results of Table 5 are then summarized graphically in Figure 9.

Note in tables 4 and 5 that the variables providing a measure of Airbnb activity are always positive and statistically significant. A doubling (100% increase) in the number of Total Airbnb accommodations is associated with a 6.46% increase in property values. Other variables always have the expected signs and are mostly statistically significant.

From table 5 we note that moving to larger buffers does reduce the magnitude of the estimate, but all are positive, significant and a doubling of Airbnb activity is associated with an increase of property values of between 6% and nearly 11%.

While this is a smaller impact than suggested by the "back-of-the-envelope" calculation presented above, it is encouraging to note that these results are almost identical to those obtained by Barron et al. (2017), who find associative impacts of between 3% and 35% on house price indices with 7% in their most completely specified models.

Using the estimated parameters associated with each year in model (1) of table 4 as the basis for constructing a house price index, we can compare the constructed index with the Case-Shiller-Weiss index for New York City over the same period. The results are illustrated in figure 10. While we would not expect the two indices to be identical, the close correspondence over the relevant time period encourages our confidence in the hedonic models.

Table 4: OLS estimates of Airbnb impacts

Variables	(1) ln(Sale Price)	(2) ln(Sale Price)	(3) ln(Sale Price)	(4) ln(Sale Price)
Total Accommodations	0.0646*** 0.00275			
Total Reviews		0.0393*** 0.00173		
Total Rooms			0.0814*** 0.00351	
Total Rents				0.0323*** 0.00133
Square Feet	0.402*** 0.0178	0.402*** 0.0178	0.402*** 0.0178	0.402*** 0.0178
Felonies	-0.0458*** 0.0161	-0.0552*** 0.0162	-0.0455*** 0.0162	-0.0517*** 0.0161
Pre-war	0.0843*** 0.0111	0.0846*** 0.0111	0.0842*** 0.0111	0.0847*** 0.0111
Distance to AOI	-0.103 0.0674	-0.101 0.0674	-0.103 0.0675	-0.102 0.0674
Distance to subway	-0.00875 0.0243	-0.00880 0.0241	-0.00897 0.0243	-0.00897 0.0242
Elevator	0.0858*** 0.0235	0.0849*** 0.0235	0.0863*** 0.0235	0.0847*** 0.0234
Y ₂₀₀₄	0.179*** 0.0121	0.180*** 0.0119	0.178*** 0.0121	0.180*** 0.0120
Y ₂₀₀₅	0.365*** 0.0127	0.367*** 0.0126	0.365*** 0.0128	0.366*** 0.0126
Y ₂₀₀₆	0.464*** 0.0164	0.467*** 0.0159	0.464*** 0.0164	0.466*** 0.0161

*** - significant at 1%, ** - significant at 5%, * - significant at 10%

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Variables	(1) ln(Sale Price)	(2) ln(Sale Price)	(3) ln(Sale Price)	(4) ln(Sale Price)
Y ₂₀₀₇	0.490*** 0.0179	0.492*** 0.0175	0.490*** 0.0179	0.491*** 0.0177
Y ₂₀₀₈	0.465*** 0.0192	0.467*** 0.0188	0.465*** 0.0192	0.466*** 0.0190
Y ₂₀₀₉	0.341*** 0.0171	0.338*** 0.0178	0.343*** 0.0170	0.339*** 0.0174
Y ₂₀₁₀	0.352*** 0.0184	0.345*** 0.0182	0.356*** 0.0185	0.344*** 0.0181
Y ₂₀₁₁	0.311*** 0.0160	0.297*** 0.0165	0.318*** 0.0161	0.296*** 0.0160
Y ₂₀₁₂	0.344*** 0.0157	0.336*** 0.0150	0.351*** 0.0160	0.333*** 0.0152
Y ₂₀₁₃	0.325*** 0.0143	0.323*** 0.0132	0.331*** 0.0146	0.318*** 0.0137
Y ₂₀₁₄	0.389*** 0.0138	0.401*** 0.0125	0.394*** 0.0140	0.391*** 0.0132
Y ₂₀₁₅	0.432*** 0.0151	0.455*** 0.0137	0.436*** 0.0152	0.437*** 0.0143
Constant	10.84*** 0.490	10.88*** 0.498	10.84*** 0.490	10.87*** 0.494
Observations	765,747	765,747	765,747	765,747
R-squared	0.524	0.524	0.524	0.524
Sale-Year FE	YES	YES	YES	YES
Local Neighborhood FE	Census Block Group	Census Block Group	Census Block Group	Census Block Group
Clustered Standard Errors	Census Tract	Census Tract	Census Tract	Census Tract

*** - significant at 1%, ** - significant at 5%, * - significant at 10%

Table 5: OLS estimates of Airbnb impacts with increasing buffer sizes

Variables	(1) ln(Sale Price)	(2) ln(Sale Price)	(3) ln(Sale Price)	(4) ln(Sale Price)	(5) ln(Sale Price)
Airbnb ₁₅₀	0.109*** 0.00555				
Airbnb ₃₀₀		0.0879*** 0.00377			
Airbnb ₅₀₀			0.0773*** 0.00309		
Airbnb ₁₀₀₀				0.0670*** 0.00261	
Airbnb ₂₀₀₀					0.0601*** 0.00249
Square Feet	0.403*** 0.0180	0.403*** 0.0179	0.403*** 0.0179	0.402*** 0.0179	0.402*** 0.0179
Felonies	-0.0574*** 0.0171	-0.0363** 0.0161	-0.0268* 0.0159	-0.0243 0.0156	-0.0307* 0.0158
Pre-war	0.0838*** 0.0112	0.0838*** 0.0112	0.0839*** 0.0112	0.0842*** 0.0112	0.0840*** 0.0112
Distance to AOI	-0.0993 0.0770	-0.100 0.0770	-0.100 0.0768	-0.0997 0.0772	-0.0991 0.0770
Distance to subway	-0.00978 0.0251	-0.00931 0.0250	-0.00984 0.0249	-0.0111 0.0249	-0.0113 0.0248
Elevator	0.0904*** 0.0239	0.0907*** 0.0239	0.0907*** 0.0239	0.0903*** 0.0238	0.0902*** 0.0238
Y ₂₀₀₄	0.180*** 0.0122	0.177*** 0.0121	0.176*** 0.0119	0.175*** 0.0118	0.176*** 0.0116
Y ₂₀₀₅	0.366*** 0.0129	0.363*** 0.0127	0.362*** 0.0125	0.362*** 0.0123	0.363*** 0.0122

*** - significant at 1%, ** - significant at 5%, * - significant at 10%

Continued on next page

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Variables	(1) ln(Sale Price)	(2) ln(Sale Price)	(3) ln(Sale Price)	(4) ln(Sale Price)	(5) ln(Sale Price)
Y ₂₀₀₆	0.465*** 0.0168	0.462*** 0.0164	0.461*** 0.0161	0.461*** 0.0159	0.462*** 0.0157
Y ₂₀₀₇	0.490*** 0.0181	0.488*** 0.0180	0.488*** 0.0177	0.488*** 0.0176	0.489*** 0.0175
Y ₂₀₀₈	0.465*** 0.0194	0.464*** 0.0193	0.463*** 0.0191	0.464*** 0.0190	0.465*** 0.0189
Y ₂₀₀₉	0.345*** 0.0168	0.341*** 0.0171	0.338*** 0.0171	0.330*** 0.0170	0.316*** 0.0168
Y ₂₀₁₀	0.360*** 0.0185	0.354*** 0.0185	0.346*** 0.0184	0.331*** 0.0180	0.313*** 0.0174
Y ₂₀₁₁	0.328*** 0.0156	0.307*** 0.0159	0.286*** 0.0160	0.255*** 0.0155	0.219*** 0.0148
Y ₂₀₁₂	0.359*** 0.0161	0.327*** 0.0159	0.303*** 0.0152	0.269*** 0.0145	0.228*** 0.0135
Y ₂₀₁₃	0.364*** 0.0150	0.328*** 0.0147	0.302*** 0.0142	0.265*** 0.0136	0.220*** 0.0129
Y ₂₀₁₄	0.421*** 0.0144	0.385*** 0.0142	0.357*** 0.0137	0.317*** 0.0132	0.269*** 0.0128
Y ₂₀₁₅	0.467*** 0.0156	0.428*** 0.0155	0.398*** 0.0149	0.355*** 0.0148	0.308*** 0.0147
Constant	10.88*** 0.545	10.75*** 0.547	10.70*** 0.548	10.69*** 0.552	10.73*** 0.553
Observations	742,328	742,328	742,328	742,328	742,328
R-squared	0.524	0.524	0.525	0.525	0.525
Local Neighborhood FE	Census Block Group				
Clustered Standard Errors	Census Tract				

*** - significant at 1%, ** - significant at 5%, * - significant at 10%

Figure 9: Airbnb impacts for different buffer sizes

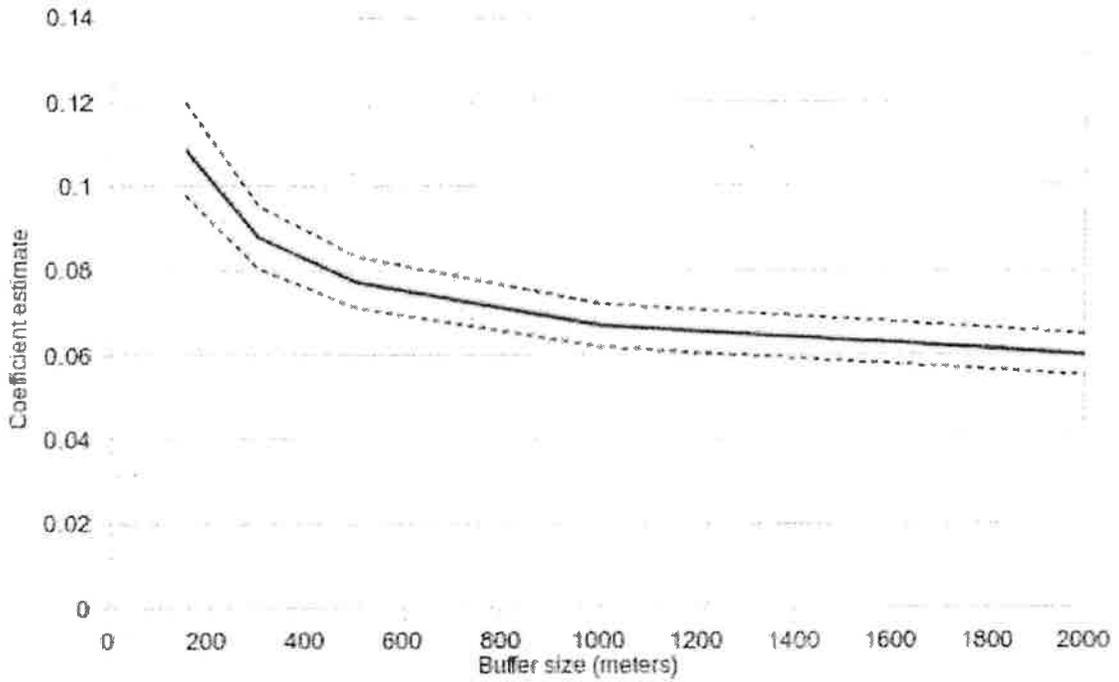
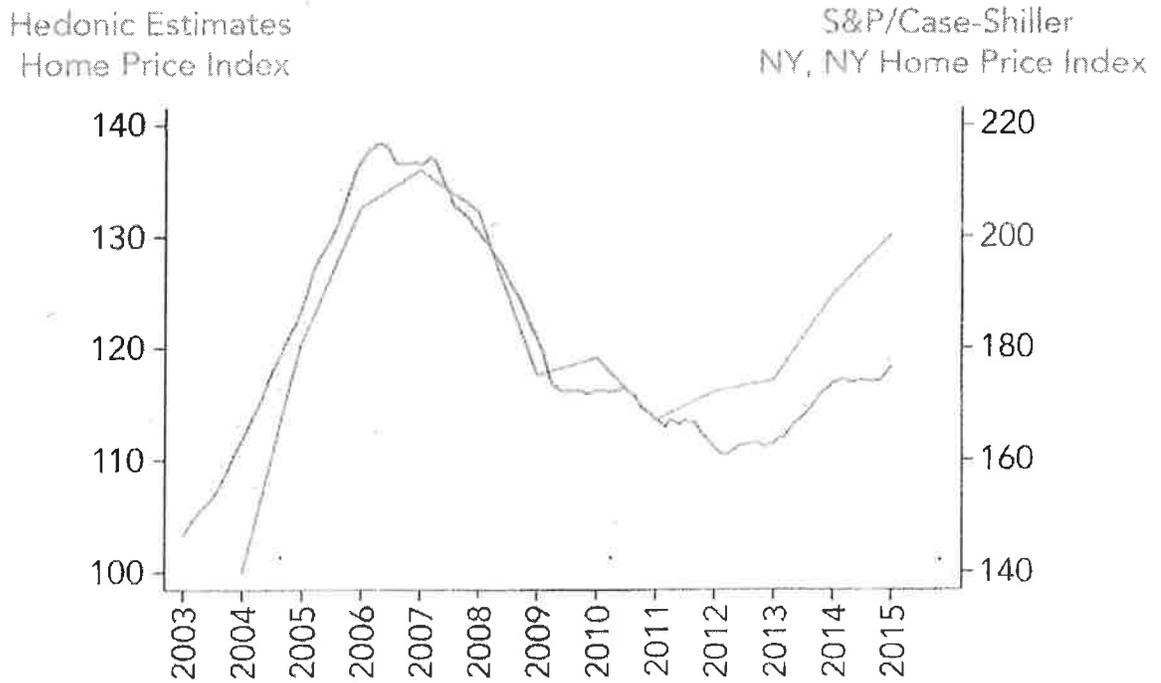


Figure 10: Comparison of house price index from Airbnb model with CSW index



5.2 Quasi-Experimental Estimation of Airbnb Treatment Effects

The results presented in the preceding subsection cannot be given a clear causal interpretation. Hedonic models present the association observed in equilibrium between structure and neighborhood characteristics (such as the presence of Airbnb properties within 300 meters of the property) and the recorded sale price. As noted in Sheppard (1999) the hedonic price function arises from the interaction of supply and consumption choices made in the housing market and describes a locus of equilibrium outcomes rather than a behavioral or causal link.

To properly evaluate the causal impact of Airbnb properties on house prices, we would ideally have a controlled experiment in which identical properties were identified, one of them exposed to the treatment of having nearby Airbnb properties and one of them insulated from this treatment, and the sales prices could then be compared over a sample of properties to estimate the impact on house prices caused by Airbnb.

The impracticality of conducting such an experiment is obvious, but our observational data permit application of widely-used²⁶ quasi-experimental approaches. These approaches permit us, given certain assumptions, to identify the experimental information that are contained within our observational data and to approximate a controlled experimental design. The large size and extensive time over which our data are observed make this a particularly appropriate methodology for application.

We employ three methods for evaluating treatment effects: construction of treatment and control groups based on nearest-neighbor matching, based on propensity-score matching, and the use of regression adjustment for determination of treatment and control groups.

Table 6 provides the estimated treatment effects, based on sales prices adjusted for prevailing property price levels using the Case-Shiller-Weiss house price index for New York City. Note that 'treatment' here means that the sale of a residential property took place at a time when there were Airbnb properties available within 300 meters of the sale property location. The first rows present estimates making use of all properties with full data in the sample, without regard to location. Subsequent rows, as noted in the first column, break the data into subsamples based on the distance between the sale property and the CBD, here taken to be Wall Street in lower Manhattan.

The first column of average treatment effect estimates is obtained using nearest-neighbor matched pairs

²⁶See discussion and references in Chapter 21 of Wooldridge (2010) or Chapters 1 and 2 of Cerulli (2015).

based on the Mahalanobis distance between observations, applying large-sample bias correction. Beneath estimate of treatment effects is the estimated standard error. The second column presents estimates of average treatment effects constructing treatment and control groups using propensity score matching. The third column presents estimated average treatment effects using regression adjustment, followed by the mean potential outcome for the data and the number of observations.

In every case, the estimated standard errors are very small so that estimated precision of the estimates is high. Estimated treatment effects on the population are generally somewhat higher than the associational estimates obtained using the hedonic models or our 'back-of-the-envelope' calculations, ranging from a nearly 21% impact estimated using nearest-neighbor comparisons to nearly 35% using regression adjustment.

Table 6: Estimated effect of treatment: presence of Airbnb property within 300 meters

	Nearest Neighbor	Propensity Score	Regression Adjustment	Mean Potential Outcome	Observations
All distances	0.2094***	0.3171***	0.3493***	13.0494***	710,422
σ	0.007	0.006	0.003	0.001	
Less than 7 km	0.3252***	0.5142***	0.5490***	13.1592***	171,815
σ	0.058	0.014	0.005	0.004	
7 km to 11.5 km	0.2405***	0.3113***	0.2854***	13.2848***	189,492
σ	0.057	0.008	0.005	0.002	
11.5 km to 17 km	0.1734***	0.2774***	0.1678***	12.8657***	166,121
σ	0.020	0.011	0.007	0.002	
More than 17 km	0.1051***	0.0490***	0.0428***	12.9035***	182,994
σ	0.024	0.014	0.010	0.002	

*** - significant at 1 percent

Our data include an extended time period during which there were no treated properties. The very first treated sales occur in 2008 but, as noted above and illustrated in Figure 6, most treated sales take place after the beginning of 2010. Even in 2012 the majority of property sales are not within 300 meters of a property ever available on Airbnb and hence 'untreated'.

For all estimation approaches, we see that the average treatment effects are higher for properties located closer to the commercial center, and lower for those properties located further away. This is not simply an artifact of more intense treatment (in the sense of proximity to more Airbnb properties) for more centrally located sales. Table 7 presents a set of estimated treatment effects for the population that distinguishes between different intensities of treatment.

As expected, we see that for all distances (the first column of estimates) the treatment effect rises with intensity of treatment. Properties sold within 300 meters of 1 to 5 Airbnb properties sell for about 16% more, while those exposed to 31 or more properties sell for a 77% premium. This general pattern holds within distance bands as well. Average treatment effects rise with treatment intensity for properties within 7 kilometers of the center as well as for those further out. In addition, restricting attention to a particular treatment intensity and moving along the row (to more distant properties) shows again that the treatment effect tends to decline. Thus, for example, a property exposed to between 6 and 10 Airbnb properties sells for a 58% premium within 7 km of the center, and the treatment effect diminishes as we consider properties further from the center (but exposed to the same intensity of treatment).

Figure 11 illustrates these results. The diagram shows a dot for each value in Table 7, and we see that within each color group (distance from the center) the estimated treatment effect rises with the intensity of treatment. We also see that, in general, the red dots (closest to CBD) are higher than the blue, which in turn are higher than the green. This indicates that the increase in house prices (and presumably the price of space) is greater at central locations and diminishes as we move towards the periphery of the city.

Table 7: Estimated effect of different treatment levels

# Airbnb	All Distances	Less than 7km	7km to 11.5km	11.5km to 17km	More than 17km
1 to 5	0.1596***	0.1413***	0.1653***	0.0855***	0.0354 ***
σ	0.004	0.010	0.006	0.007	0.011
6 to 10	0.4553***	0.5838***	0.3371***	0.2202***	-0.0522
σ	0.012	0.010	0.012	0.046	0.125
11 to 15	0.5399***	0.6486***	0.4228***	-0.1171	
σ	0.030	0.012	0.019	0.194	
16 to 20	0.6636***	0.6712***	0.4999***	0.4179*	
σ	0.035	0.014	0.023	0.241	
21 to 25	0.6403***	0.6699***	0.5361***	-0.0761	
σ	0.037	0.015	0.027	0.237	
26 to 30	0.6436***	0.6499***	0.5379***	-0.3063	
σ	0.043	0.019	0.034	0.365	
31 or more	0.7748***	0.7934***	0.5903***	-0.0325	
σ	0.018	0.007	0.016	0.173	

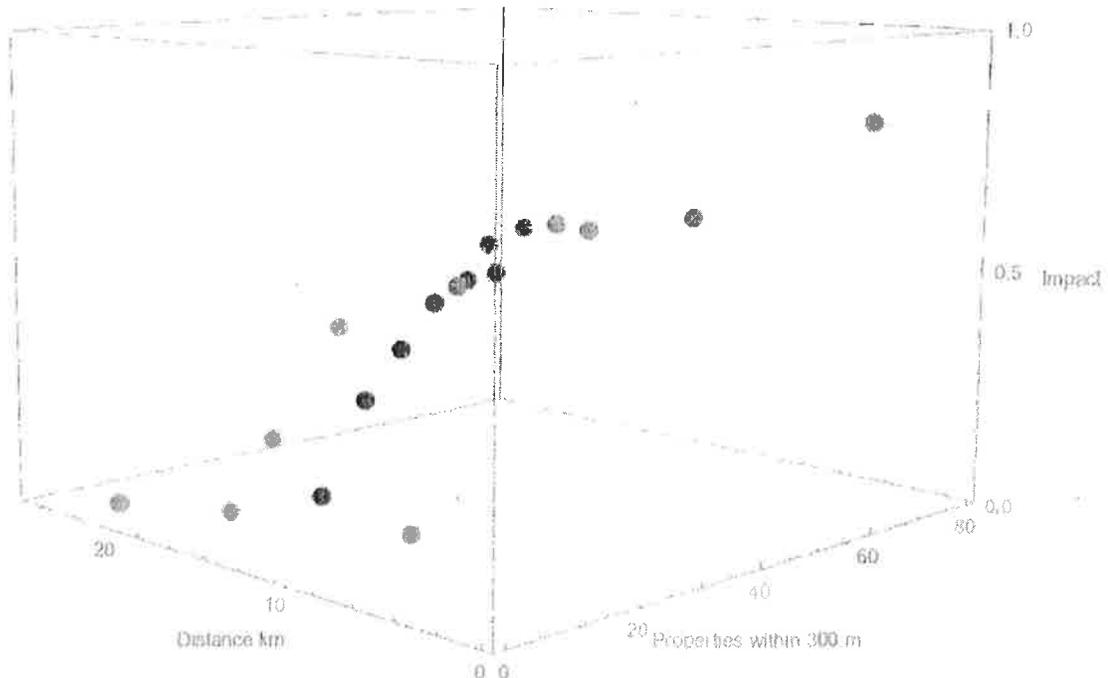
*** - significant at 1 percent, * - significant at 10 percent

Table 8: Estimation with endogenous treatment effects

Sales price (outcome)	All Distances	Less than 7 km	7 to 11.5 km	11.5 to 17 km	More than 17 km
Treatment	0.6456***	1.3613	1.0088***	0.3840***	-0.0481
σ	0.114	1.449	0.119	0.125	0.080
Square feet area	0.6556***	1.0315***	0.5689***	0.4784***	0.5623***
σ	0.126	0.297	0.078	0.053	0.029
Felonies	-0.0486	-0.0809	-0.0821	0.0249	-0.0405
σ	0.050	0.136	0.051	0.050	0.053
Median income	0.1746*	0.0633	0.3363***	-0.0298	0.0611
σ	0.101	0.161	0.065	0.053	0.052
Percent white	0.0201	0.0647	0.0295	-0.0398*	0.0290***
σ	0.013	0.112	0.023	0.021	0.010
Pre-war construction	0.2222***	0.3852**	0.1551***	0.2685***	0.1770***
σ	0.050	0.169	0.028	0.028	0.035
Wall St. Distance	-0.2505***	-0.2195	-0.3766**	-0.2661	-0.1381
σ	0.039	0.136	0.178	0.215	0.134
Elevator	0.1905**	0.6893**	0.2473***	0.1018	-0.0938*
σ	0.085	0.304	0.089	0.063	0.054
Constant	7.2420***	5.5297***	6.6094***	10.1850***	8.9606***
σ	0.897	1.561	1.396	1.153	0.861
Treatment model					
Columbus Cir Distance	-0.0674***	0.0311	-0.0631***	-0.0797***	-0.0429***
σ	0.008	0.045	0.009	0.014	0.012
Distance to AOI	0.00010**	-0.00001	0.00009	0.00016**	-0.00009
σ	0.00004	0.00005	0.00005	0.00007	0.00006
Distance to subway	-0.00024***	-0.00008	-0.00029***	-0.00016**	-0.00016***
σ	0.00004	0.00024	0.00008	0.00006	0.00004
Constant	-0.1927	-0.5146	-0.1751	-0.2977	-0.6097**
σ	0.143	0.366	0.145	0.235	0.294
ρ	-0.1572*	-0.4655	-0.4914***	-0.1188***	0.0621
σ	0.1199	0.5960	0.0684	0.0626	0.0388
λ	0.8511	1.0979	0.8621	0.7264	0.6595
	0.0700	0.3650	0.0255	0.0248	0.0235
	-0.1338**	-0.5111	-0.4237***	-0.0863***	0.0409*
	0.0930	0.8240	0.0679	0.0467	0.0258
$\chi^2(1)$	1.66	0.44	35.62***	3.53*	2.55
$P[] > \chi^2$	0.1976	0.5074	0	0.0602	0.1104
Observations	710422	171815	189492	166121	182994
Nbd clusters	494	157	186	260	222
$\chi^2(8)$	493.13***	150.27***	669.5***	222.72***	618.7***

*** : significant at 1 percent, ** - significant at 5 percent, * - significant at 10 percent.

Figure 11: Impact on house prices of different treatment levels at various distances



There is a natural concern that these results may be an artifact of some endogeneity in the treatment of properties. This is not a fully randomized assignment of treatment to similar properties, and it may be that (despite the results presented in Table 7) some element of high-demand locations might be subjecting properties closer to the CBD to more intense treatment. We consider the possibility that these impacts may be distorted by endogeneity of treatment, and present the resulting estimates in Table 8.

As expected, the more demanding estimation approach results in somewhat less precise estimates, but overall the results are quite comparable to those presented in the previous tables. The treatment model considers three measures of location advantage to identify areas where treatment is more likely. Distance from Columbus Circle, distance to other areas of interest identified by the Department of Finance, and distance to the nearest subway station. Only distance to Columbus Circle and to the nearest subway station are typically estimated with precision. The models cluster standard errors by neighborhood.

Overall, the results suggest average treatment effects that are larger in the central locations and diminish (to the point of insignificance) as we move towards the periphery of the city. For all distances combined, the average treatment effect indicates a 64% premium for treated sales taking place within 300 meters of

other properties that are available via Airbnb.

Interestingly, the estimated correlation ρ is negative, indicating that unobservable factors that increase property sales prices tend to occur with unobservables that decrease the chance of nearby Airbnb properties. This increases our confidence that the estimated average treatment effects are not merely an artifact of endogenous treatment probabilities, even in those distance bands where the chi-square test indicates that we must reject the hypothesis of no endogeneity in treatment selection.

6 Conclusions

In this paper we have presented a variety of estimates of the impacts that properties listed for rent on Airbnb appear to have on the market value of residential properties in New York City. The direction and magnitude of these impacts has prompted widespread concern and considerable debate about the impact on urban structure and housing affordability in New York City and in other cities around the world. Many jurisdictions have responded by attempting to regulate or impose restrictions on the ability of Airbnb to operate or of property owners to make use of Airbnb services.

We present intuitive and formal theoretical arguments that generally support, but do not ensure that this impact would be for house prices to increase in response to Airbnb listings as long as the Airbnb properties themselves are not the source of extensive or concentrated negative externalities. This impact is not guaranteed, however, and empirical investigation is required to determine the sign and magnitude of impact.

Our theoretical arguments suggest two possibilities: an increase in property values throughout the city that is greater in the center than at the periphery (if Airbnb properties facilitate an increase in population accommodated in the city), an increase in property values that is greater at the urban periphery and diminishes (or is negative) at the urban center (if Airbnb brings increased income to residents or increases the demand for space for each household). The first possibility is associated with a decline in equilibrium utility levels of residents. The second with an increase in utility.

We have presented several estimates of the likely range of impacts. A quick 'back-of-the-envelope' calculation based on income capitalization suggests that property values should increase about 17%. Hedonic analysis of house prices indicates that a doubling of the total number of Airbnb properties within 300 meters

of a house is associated with an increase in property value of 6% to 9% (depending on model specification).

Consideration of the introduction of Airbnb as an experimental treatment to the housing market, and estimation of average treatment effects provides the most satisfactory approach to evaluation of the impacts of Airbnb on house prices. Our analysis indicates that subjecting a property to the treatment of having Airbnb properties available nearby when it is sold increases prices by 3.5% (for properties that are far from the center and whose 'treatment' consists of only a few Airbnb properties) to more than 65% for properties that are near the center and/or are 'treated' by having a larger number of local Airbnb properties.

Somewhat more speculatively, we note that our analysis is consistent with thinking of Airbnb as increasing local urban population (by attracting tourists), since this would generate a pattern of property value changes similar to those we estimate as having taken place. This increase in population, as desirable as it might be for certain individuals and the temporary occupants of the properties, is associated overall with a decline in equilibrium utility in the urban area. This observation helps to explain the concern of policy makers and the (occasional) vehemence of local opposition to Airbnb properties.

Despite the speculative assessment of utility impacts, and the clear evidence for impact on house prices, we advise caution in crafting policies that ban Airbnb or similar short-term private rentals altogether. Public policies that reduce house prices in pursuit of housing affordability by diminishing the efficiency with which an owner can make use of his or her property may fail to be welfare-improving, in the same way as a city that creates "affordable" housing by encouraging more crime hardly seems desirable. Evaluating the welfare consequences of Airbnb, and hence the appropriateness of any regulatory action to limit use of Airbnb services, requires deeper analysis than we have provided here and much deeper analysis than appears to have been undertaken to date.

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The Impact of Airbnb on NYC Rents

New York City Comptroller Scott M. Stringer

Bureau of Budget

APRIL 2018

Introduction

New York City has been suffering through an affordable housing crisis for years. Between 2011 and 2017, New York City lost nearly 183,000 affordable units of housing renting for less than \$1,000 – larger than the entire public housing stock. Affordable housing is increasingly hard to find, with vacancy rates for apartments renting for less than \$1,000 at 1.54%.¹ Homelessness stands at a record high, with over 60,000 homeless people sleeping in shelters every night. Meanwhile, wages are stagnant and rents continue to climb in all five boroughs.

The rising popularity of homesharing websites such as Airbnb is adding to the problem.² The trendy replacement for hotels and hostels in effect removes housing units from the overall supply – units that might otherwise be available to rent to New Yorkers looking to rent an apartment. The most basic concept in the field of economics – supply and demand – says that, everything else equal, a reduction in supply will lead to higher prices. This report, by Comptroller Scott M. Stringer, evaluates the impact of homesharing on rents in New York City over the period 2009 to 2016.

Background

Between 2009 and 2016, rents rose 25% on average citywide, or \$279 per month. Rents rose most rapidly in Brooklyn, by 35% (\$340 per month) followed by Queens by 22% (\$242 per month); Bronx by 21% (\$171 per month); Manhattan by 19% (\$276 per month); and Staten Island by 14% (\$129 per month).³

During the same period, Airbnb listings skyrocketed, from 1,000 in 2010 to over 43,000 in 2015, before declining to slightly under 40,000 in 2016 according to data from AirDNA (Figure 1) – most in violation of existing State or City laws.⁴ Airbnb listings are most heavily concentrated in Manhattan (52% of all listings in 2016) and Brooklyn (35% of all listings in 2016), but are found in

¹ Source: Department of Housing Preservation and Development: *Selected Initial Findings of the 2017 New York City Housing and Vacancy Survey* (dated February 9, 2018) (<http://www1.nyc.gov/assets/hpd/downloads/pdf/about/2017-hvs-initial-findings.pdf>).

² There are other homesharing websites, including HomeAway and VRBO, which have smaller presences in the City and for which listings data was not available. They were therefore not included in this analysis. Presumably their inclusion would have amplified the results.

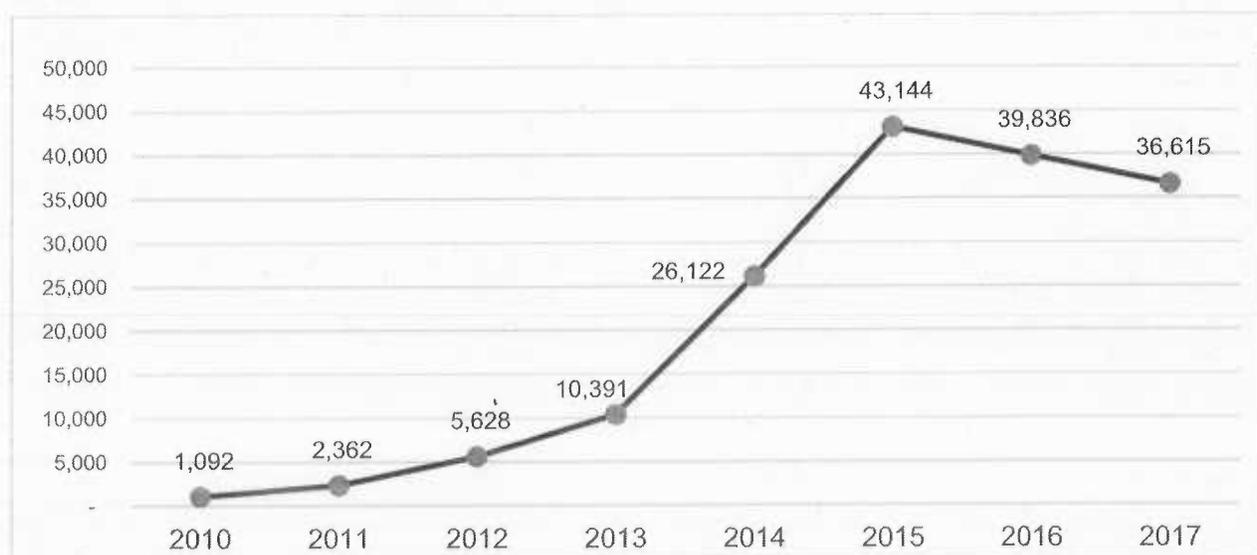
³ Source: U.S. Census Bureau, American Community Survey, 2009-2016.

⁴ A report by Attorney General Eric Schneiderman found that 72% of short-term rentals on Airbnb appeared to be illegal (<https://ag.ny.gov/pdfs/AIRBNB%20REPORT.pdf>)

every borough. Airbnb listings are particularly concentrated in Manhattan below 59th Street, including Chelsea, Clinton and Midtown Business District (11.3% of all listings in 2016), Battery Park City, Greenwich Village and Soho (7.9%), Chinatown and Lower East Side (6.9%), Murray Hill, Gramercy and Stuyvesant Town (5.9%) as well as parts of Brooklyn including Greenpoint and Williamsburg (8.3%), Bedford-Stuyvesant (5.1%), and Bushwick (5.0%).

Rents in these eight neighborhoods rose at substantially higher rates than the borough average between 2009 and 2016. Average monthly rent in Greenpoint and Williamsburg went up by 62.6% (\$659 per month), by 47.2% in Bedford-Stuyvesant (\$407 per month), by 39.5% in Bushwick (\$369 per month), by 25.9% Murray Hill, Gramercy and Stuyvesant Town (\$488 per month), by 23.4% in Chelsea, Clinton and Midtown Business District (\$398 per month), by 23% in Chinatown and Lower East Side (\$242 per month), and by 21.4% in Battery Park City, Greenwich Village and Soho (\$411 per month).

Figure 1: Airbnb Total Listings by Year, 2010 - 2017



Findings

We sought to estimate the impact that Airbnb listings have had on neighborhood rents.

Utilizing neighborhood level data for the years 2009 to 2016, we found that:

- For each one percent of all residential units in a neighborhood listed on Airbnb, rental rates in that neighborhood went up by 1.58 percent.
- Between 2009 and 2016, approximately 9.2 percent of the citywide increase in rental rates can be attributed to Airbnb.
- Airbnb listings were heavily concentrated in parts of Manhattan and Brooklyn and had a greater impact on these neighborhoods. Approximately 20% of the increase in rental rates was due to Airbnb listings in midtown and lower Manhattan including neighborhoods such

as Chelsea, Clinton, and Midtown Business District; Murray Hill, Gramercy, and Stuyvesant Town; Chinatown and Lower East Side; Battery Park City, Greenwich Village, and Soho as well as parts of Brooklyn including Greenpoint and Williamsburg.

- In aggregate, New York City renters had to pay an additional \$616 million in 2016 due to price pressures created by Airbnb, with half of the increase concentrated in the neighborhoods highlighted above.

Data and Methodology

We obtained Airbnb listings data from AirDNA (<https://www.airdna.co/>), which scrapes listings data on a daily basis from Airbnb. We gathered zip code level data going back to 2010 when Airbnb first listed dwellings in New York City, through the end of 2017. We then summed the data to the neighborhood level, defined by Census Bureau Public Use Microdata Area (PUMA).⁵ Whenever a zip code crossed PUMA boundaries, we used 2010 population ratios as weights to divide the number of listings between PUMAs. The number of unique listings in New York City peaked in 2015 at just over 43,000 and dropped to under 37,000 by 2017.

Rental rate data comes from the annual American Community Survey (2009-16). We use average monthly gross rent for all renters as our rent measure.⁶ We also control for neighborhood level economic and demographic characteristics using data from the American Community Survey.

We pooled eight years of data for 55 neighborhoods, bringing our total number of observations to 440. The dependent variable is the logarithm of average monthly gross rent by neighborhood in a given year. The independent variable with the coefficient of interest is the share of residential units listed on Airbnb which is calculated by dividing annual unique Airbnb listings in the neighborhood by total residential units in the same neighborhood.⁷ We also control for demographic and economic changes in neighborhood level by including average household income (in log form), population (in log form), and the shares of college-educated and employed residents in the neighborhood. We also included year and neighborhood-level fixed effects (dummy) variables to control for otherwise uncontrolled-for trends and neighborhood characteristics.

A summary of the regression results is presented in Table 1. We find that as the share of units listed on Airbnb goes up by one percentage point, rental rates in the neighborhood go up by 1.58 percent, after controlling for neighborhood level demographic and economic changes. The result is statistically significant at the 1-percent level. Coefficients of other control variables including household income, population and share of college graduates are positive and statistically significant at 1-percent level. Employment rate is not statistically different from zero.

⁵ PUMAs are geographic units used by the US Census for providing statistical and demographic information. Each PUMA contains at least 100,000 people. There are 55 PUMAs in New York City. See <https://www.census.gov/geo/reference/puma.html> for more details.

⁶ Gross monthly rent includes contract rent, utility costs, and fuel costs. Gross monthly rent amounts are more comparable across time and households than contract rent which may or may not include utilities and fuels.

⁷ A table with Airbnb listings, Residential Units and Airbnb Share by PUMA in 2016 can be found in the Appendix.

In order to calculate the Airbnb contribution to total change in rents, we first predict the change in PUMA level average gross rents from 2009 to 2016 using the regression model coefficients with existing conditions (i.e. with existing demographic and economic conditions as well as Airbnb listings). We then compare these predictions with an alternative prediction in which Airbnb listings are set to zero throughout the entire time period. The difference between the latter and the former gives the rent change associated with Airbnb growth in the neighborhood. Results are reported in Table 2 (column labeled “Total Annual Rental Cost of Airbnb to the Neighborhood”), which shows rental change associated with increase in Airbnb listings at PUMA level. With existing conditions, from 2009 to 2016, citywide annual gross rents were predicted to go up by 25.3% (approximately \$6.67 billion). If, however, there were no Airbnb listings, the rents would be predicted to go up by 23% (approximately \$6.06 billion). Therefore, approximately \$616 million, or 9.2 percent of the overall increase in rents for the period may be attributed to the rise in Airbnb listings.

Airbnb growth, however, was particularly high in certain neighborhoods. For instance, the share of Airbnb listings reached 4.1% of residential units in the Chelsea, Clinton & Midtown Business District neighborhood and 4.6% in Greenpoint and Williamsburg. The largest relative Airbnb effects on the rental market occurred in Chelsea, Clinton & Midtown Business District (21.6%) and Murray Hill, Gramercy & Stuyvesant Town (21.5%). Average monthly rents went up by in these neighborhoods by \$398 and \$488 respectively out of which \$86 and \$105 per month could be attributed to Airbnb growth. The largest absolute effect occurred in Greenpoint and Williamsburg where average rents increased by \$659 between 2009 and 2016, of which \$123 can be attributed to Airbnb growth.

Table 1: Regression Results

Dependent Variable: Logarithm of Average Rental Rate

Variables	Fixed Effects Model
AirBnb Share	1.584*** (0.389)
Household Income (log)	0.152*** (0.0349)
Population (log)	0.194*** (0.0421)
Share of College Graduates	0.436*** (0.109)
Employment Rate	0.154 (0.111)
Constant	2.760*** (0.554)
Observations	440
Number of PUMAs	55
R-squared	0.836
PUMA FE	YES
Year FE	YES

NOTE: Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 2: Neighborhood Results

PUMA Code	Neighborhood Name	Rental Units (2016)	Airbnb Listings (2016)	Monthly Rent (2009)	Monthly Rent (2016)	Change in Monthly Rent (2009-16)	Change due to Airbnb (in \$)	% Change associated with Airbnb	Total Annual Rental Cost of Airbnb to the Neighborhood
4001	Greenpoint & Williamsburg	45,147	3,296	\$1,054	\$1,713	\$659	\$123	18.6%	\$66,401,795
3808	Murray Hill, Gramercy & Stuyvesant Town	54,579	2,355	\$1,887	\$2,375	\$488	\$105	21.5%	\$68,820,035
3807	Chelsea, Clinton & Midtown Business District	59,679	4,486	\$1,697	\$2,095	\$398	\$86	21.6%	\$61,451,469
3810	Battery Park City, Greenwich Village & Soho	51,596	3,123	\$1,916	\$2,327	\$411	\$79	19.3%	\$49,121,185
4003	Bedford-Stuyvesant	34,555	2,047	\$863	\$1,270	\$407	\$59	14.4%	\$24,288,659
4002	Bushwick	36,052	1,990	\$935	\$1,304	\$369	\$58	15.6%	\$24,984,861
4004	Brooklyn Heights & Fort Greene	34,811	1,321	\$1,270	\$1,779	\$510	\$54	10.7%	\$22,737,172
3809	Chinatown & Lower East Side	60,180	2,746	\$1,052	\$1,294	\$242	\$47	19.6%	\$34,252,965
3805	Upper East Side	78,130	1,803	\$1,780	\$2,158	\$378	\$43	11.3%	\$40,027,985
3802	Hamilton Heights, Manhattanville & West Harlem	37,380	1,433	\$1,093	\$1,338	\$245	\$39	15.9%	\$17,452,649
4005	Park Slope, Carroll Gardens & Red Hook	30,750	787	\$1,593	\$1,906	\$312	\$39	12.4%	\$14,341,390
4006	Crown Heights North & Prospect Heights	38,532	1,238	\$931	\$1,307	\$376	\$39	10.4%	\$18,131,790
3806	Upper West Side & West Side	68,920	1,750	\$1,722	\$2,012	\$290	\$32	11.1%	\$26,613,050
4101	Astoria & Long Island City	58,653	1,239	\$1,075	\$1,386	\$311	\$29	9.2%	\$20,092,964
3803	Central Harlem	41,832	1,119	\$798	\$1,084	\$287	\$28	9.8%	\$14,118,122
4109	Sunnyside & Woodside	36,068	647	\$1,292	\$1,608	\$317	\$22	6.9%	\$9,431,814
3801	Washington Heights, Inwood & Marble Hill	60,473	995	\$935	\$1,214	\$279	\$21	7.5%	\$15,253,929
4011	Crown Heights South, Prospect Lefferts & Wingate	32,957	585	\$938	\$1,213	\$275	\$20	7.4%	\$8,067,130
4012	Sunset Park & Windsor Terrace	33,528	394	\$991	\$1,312	\$321	\$20	6.2%	\$7,991,986
4014	Borough Park, Kensington & Ocean Parkway	31,126	263	\$988	\$1,405	\$417	\$19	4.6%	\$7,113,264
4110	Ridgewood, Glendale & Middle Village	35,651	464	\$1,049	\$1,375	\$326	\$14	4.3%	\$5,989,498
3804	East Harlem	37,814	1,003	\$831	\$960	\$129	\$13	10.4%	\$6,114,647
4015	Flatbush & Midwood	41,110	396	\$935	\$1,196	\$261	\$13	5.1%	\$6,618,526
4108	Forest Hills & Rego Park	27,313	216	\$1,241	\$1,600	\$359	\$12	3.5%	\$4,088,401
4007	Brownsville & Ocean Hill	33,250	404	\$705	\$886	\$181	\$10	5.3%	\$3,817,643
4010	East Flatbush, Farragut & Rugby	29,698	256	\$929	\$1,192	\$264	\$10	3.7%	\$3,488,963
4013	Bay Ridge & Dyker Heights	27,982	195	\$1,070	\$1,354	\$284	\$9	3.2%	\$3,041,981
4103	Flushing, Murray Hill & Whitestone	48,979	292	\$1,177	\$1,368	\$191	\$7	3.7%	\$4,104,914
4107	Elmhurst & South Corona	33,304	190	\$1,115	\$1,320	\$205	\$7	3.5%	\$2,895,541
4008	East New York & Starrett City	37,776	288	\$839	\$1,021	\$182	\$6	3.4%	\$2,794,966

PUMA Code	Neighborhood Name	Rental Units (2016)	Airbnb Listings (2016)	Monthly Rent (2009)	Monthly Rent (2016)	Change in Monthly Rent (2009-16)	Change due to Airbnb (in \$)	% Change associated with Airbnb	Total Annual Rental Cost of Airbnb to the Neighborhood
4016	Sheepshead Bay, Gerritsen Beach & Homecrest	27,490	167	\$918	\$1,222	\$303	\$6	1.9%	\$1,880,709
4102	Jackson Heights & North Corona	32,819	228	\$1,131	\$1,288	\$157	\$6	3.9%	\$2,389,733
4106	Briarwood, Fresh Meadows & Hillcrest	28,452	100	\$1,064	\$1,448	\$384	\$5	1.2%	\$1,597,232
4114	Far Rockaway, Breezy Point & Broad Channel	22,373	177	\$856	\$995	\$139	\$5	3.5%	\$1,302,810
3701	Riverdale, Fieldston & Kingsbridge	27,564	95	\$1,011	\$1,225	\$214	\$4	1.7%	\$1,211,959
4009	Canarsie & Flatlands	27,002	146	\$1,000	\$1,242	\$242	\$4	1.6%	\$1,236,019
4104	Bayside, Douglaston & Little Neck	12,621	83	\$1,269	\$1,542	\$273	\$4	1.6%	\$667,138
4111	Richmond Hill & Woodhaven	23,544	126	\$1,132	\$1,354	\$222	\$4	1.9%	\$1,169,156
3704	Pelham Parkway, Morris Park & Laconia	29,595	72	\$887	\$1,126	\$239	\$3	1.3%	\$1,087,022
3903	Port Richmond, Stapleton & Mariners Harbor	26,520	125	\$855	\$1,061	\$207	\$3	1.5%	\$1,013,387
4018	Brighton Beach & Coney Island	32,416	119	\$770	\$946	\$177	\$3	1.5%	\$1,040,590
3706	Bedford Park, Fordham North & Norwood	39,929	66	\$854	\$1,032	\$178	\$2	1.1%	\$942,338
3707	Morris Heights, Fordham South & Mount Hope	41,488	54	\$777	\$970	\$193	\$2	1.1%	\$1,029,003
3708	Concourse, Highbridge & Mount Eden	40,145	86	\$750	\$934	\$184	\$2	1.2%	\$1,095,031
3709	Castle Hill, Clason Point & Parkchester	50,936	64	\$819	\$1,025	\$206	\$2	0.8%	\$1,006,744
3710	Hunts Point, Longwood & Melrose	42,778	114	\$653	\$811	\$158	\$2	1.1%	\$876,036
4017	Bensonhurst & Bath Beach	34,275	87	\$899	\$1,214	\$314	\$2	0.7%	\$941,936
4105	Queens Village, Cambria Heights & Rosedale	16,594	108	\$1,178	\$1,325	\$147	\$2	1.4%	\$410,678
4112	Jamaica, Hollis & St. Albans	32,053	142	\$990	\$1,146	\$156	\$2	1.3%	\$801,327
3702	Wakefield, Williamsbridge & Woodlawn	27,747	62	\$966	\$1,092	\$126	\$1	1.0%	\$402,301
3703	Co-op City, Pelham Bay & Schuylerville	22,244	37	\$970	\$1,095	\$125	\$1	0.8%	\$251,180
3705	Belmont, Crotona Park East & East Tremont	47,005	70	\$712	\$838	\$126	\$1	0.7%	\$506,036
4113	Howard Beach & Ozone Park	11,866	58	\$1,139	\$1,254	\$114	\$1	1.0%	\$167,533
3901	Tottenville, Great Kills & Annadale	8,205	20	\$1,094	\$1,074	(\$19)	\$0	0.3%	(\$4,864)
3902	New Springville & South Beach	12,239	53	\$1,048	\$1,109	\$61	\$0	0.8%	\$72,989

Acknowledgements

The Comptroller wishes to thank Selçuk Eren, senior economist in the Bureau of Budget, for his work on this report, as well as Lawrence Mielnicki, Chief Economist, and Preston Niblack, Deputy Comptroller for Budget.

Appendix

Table A:1: Residential Units and Airbnb Listings by Neighborhood, 2016

PUMA Code	Neighborhood Name	Airbnb listings (2016)	Residential Units (2016)	Airbnb Share (2016)
3701	Riverdale, Fieldston & Kingsbridge	95	50,560	0.2%
3702	Wakefield, Williamsbridge & Woodlawn	62	53,892	0.1%
3703	Co-op City, Pelham Bay & Schuylerville	37	49,029	0.1%
3704	Pelham Parkway, Morris Park & Laconia	72	50,610	0.1%
3705	Belmont, Crotona Park East & East Tremont	70	70,636	0.1%
3706	Bedford Park, Fordham North & Norwood	66	50,419	0.1%
3707	Morris Heights, Fordham South & Mount Hope	54	52,433	0.1%
3708	Concourse, Highbridge & Mount Eden	86	55,131	0.2%
3709	Castle Hill, Clason Point & Parkchester	64	68,096	0.1%
3710	Hunts Point, Longwood & Melrose	114	67,852	0.2%
3801	Washington Heights, Inwood & Marble Hill	995	84,947	1.2%
3802	Hamilton Heights, Manhattanville & West Harlem	1,433	61,784	2.3%
3803	Central Harlem	1,119	67,946	1.6%
3804	East Harlem	1,003	61,588	1.6%
3805	Upper East Side	1,803	137,519	1.3%
3806	Upper West Side & West Side	1,750	125,673	1.4%
3807	Chelsea, Clinton & Midtown Business District	4,486	108,218	4.1%
3808	Murray Hill, Gramercy & Stuyvesant Town	2,355	101,111	2.3%
3809	Chinatown & Lower East Side	2,746	91,149	3.0%
3810	Battery Park City, Greenwich Village & Soho	3,123	95,239	3.3%
3901	Tottenville, Great Kills & Annadale	20	62,339	0.0%
3902	New Springville & South Beach	53	54,777	0.1%
3903	Port Richmond, Stapleton & Mariners Harbor	125	68,653	0.2%
4001	Greenpoint & Williamsburg	3,296	71,055	4.6%
4002	Bushwick	1,990	54,560	3.6%
4003	Bedford-Stuyvesant	2,047	59,405	3.4%
4004	Brooklyn Heights & Fort Greene	1,321	76,011	1.7%
4005	Park Slope, Carroll Gardens & Red Hook	787	52,216	1.5%
4006	Crown Heights North & Prospect Heights	1,238	62,837	2.0%
4007	Brownsville & Ocean Hill	404	56,542	0.7%
4008	East New York & Starrett City	268	63,601	0.4%

PUMA Code	Neighborhood Name	Airbnb listings (2016)	Residential Units (2016)	Airbnb Share (2016)
4009	Canarsie & Flatlands	146	71,956	0.2%
4010	East Flatbush, Farragut & Rugby	256	56,163	0.5%
4011	Crown Heights South, Prospect Lefferts & Wingate	585	48,350	1.2%
4012	Sunset Park & Windsor Terrace	394	51,043	0.8%
4013	Bay Ridge & Dyker Heights	195	52,955	0.4%
4014	Borough Park, Kensington & Ocean Parkway	263	47,063	0.6%
4015	Flatbush & Midwood	396	62,138	0.6%
4016	Sheepshead Bay, Gerritsen Beach & Homecrest	167	63,169	0.3%
4017	Bensonhurst & Bath Beach	87	69,620	0.1%
4018	Brighton Beach & Coney Island	119	52,290	0.2%
4101	Astoria & Long Island City	1,239	84,838	1.5%
4102	Jackson Heights & North Corona	228	61,099	0.4%
4103	Flushing, Murray Hill & Whitestone	292	97,693	0.3%
4104	Bayside, Douglaston & Little Neck	83	46,865	0.2%
4105	Queens Village, Cambria Heights & Rosedale	108	67,354	0.2%
4106	Briarwood, Fresh Meadows & Hillcrest	100	65,384	0.2%
4107	Elmhurst & South Corona	190	48,613	0.4%
4108	Forest Hills & Rego Park	216	57,309	0.4%
4109	Sunnyside & Woodside	647	61,224	1.1%
4110	Ridgewood, Glendale & Middle Village	464	68,089	0.7%
4111	Richmond Hill & Woodhaven	126	49,917	0.3%
4112	Jamaica, Hollis & St. Albans	142	79,376	0.2%
4113	Howard Beach & Ozone Park	58	41,837	0.1%
4114	Far Rockaway, Breezy Point & Broad Channel	177	51,028	0.3%

The High Cost of Short-Term Rentals in New York City

David Wachsmuth
David Chaney
Danielle Kerrigan
Andrea Shillolo
Robin Basalaev-Binder

January 30, 2018



A report from the
Urban Politics and Governance research group
School of Urban Planning
McGill University

Executive Summary

This report provides a comprehensive analysis of Airbnb activity in New York City and the surrounding region in the last three years (September 2014 - August 2017). Relying on new methodologies to analyze big data, we set out to answer four questions:

1. Where is Airbnb activity located in New York, and how is it changing?
2. Who makes money from Airbnb in New York?
3. How much housing has Airbnb removed from the market in New York?
4. Is Airbnb driving gentrification in New York?

KEY FINDINGS:

- **Two Thirds of Revenue from Likely Illegal Listings:** Entire-home/apartment listings account for 75% (\$490 million) of total Airbnb revenue and represent 51% of total listings. 87% of entire-home reservations are illegal under New York State law, which means that 66% of revenue (\$435 million) and 45% of all New York Airbnb reservations last year were illegal.
- **13,500 Units of Lost Housing:** Airbnb has removed between 7,000 and 13,500 units of housing from New York City's long-term rental market, including 12,200 frequently rented entire-home listings that were available for rent 120 days or more and 5,600 entire-home listings available for rent 240 days or more.
- **\$380 More in Rent:** By reducing housing supply, Airbnb has increased the median long-term rent in New York City by 1.4% over the last three years, resulting in a \$380 rent increase for the median New York tenant looking for an apartment this year. In some Manhattan neighborhoods the increase is more than \$700.
- **4,700 Ghost Hotels:** There are 4,700 private-room listings that are in fact "ghost hotels" comprising many rooms in a single apartment. These ghost hotels have removed 1,400 units of housing from the long-term rental market, and are a new tactic for commercial Airbnb operators to avoid regulatory scrutiny.
- **28% of Revenue:** Commercial operators that control multiple entire-home/apartment listings or large portfolios of private rooms are only 12% of hosts but they earn more than 28% of revenue in New York City.
- **Top 10% of Hosts:** The top 10% of hosts earned a staggering 48% of all revenue last year, while the bottom 80% of hosts earned just 32%.
- **200% and \$100K More:** The median host of a frequently rented entire-home/apartment

Executive Summary



listing earned 55% more than the median long-term rent in its neighborhood last year. This disparity between short-term and long-term rents is driving Airbnb-induced housing loss and gentrification. **Nearly 300 unique listings earned \$100,000 or more last year.**

- **Racialized Revenue:** White neighborhoods make systematically more money on Airbnb than non-white neighborhoods. Neighborhoods with high existing Airbnb revenue (generally in Midtown and Lower Manhattan) are disproportionately white. But the fastest-growing neighborhoods for Airbnb (particularly Harlem and Bedford-Stuyvesant) are disproportionately African American.
- **72% of the Population:** Nearly three quarters of the population in neighborhoods at highest risk of Airbnb-induced gentrification across New York is non-white, as Airbnb continues to have a strongly racialized impact across the city.
- **“Airbnb as a Racial Gentrification Tool”:** In March 2017, InsideAirbnb.com released a report that categorized host photographs in all predominantly Black NYC neighborhoods. That report’s key findings have been cited in this new report:
 - Across all 72 predominantly Black New York City neighborhoods, **Airbnb hosts are 5 times more likely to be white.** In those neighborhoods, the **Airbnb host population is 74% white, while the white resident population is only 14%.**
 - **White Airbnb hosts in Black neighborhoods earned an estimated \$160 million, compared to only \$48 million for Black hosts—a 530% disparity.**
 - The loss of housing and neighborhood disruption due to Airbnb is **6 times more likely to affect Black residents,** based on their majority presence in Black neighborhoods, as residents in these neighborhoods are **14% white and 80% Black.**

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Introduction

Community groups and housing advocates in cities across the world have begun to sound the alarm about the impact Airbnb is having on affordable housing in their communities, citing concerns about housing supply lost, racialized gentrification, and impact on residents' quality of life. To understand Airbnb's impact on housing in New York, this report presents a comprehensive analysis of three years of Airbnb activity in New York City and the surrounding region. It relies on the most comprehensive third-party dataset of Airbnb activity available, and new methodologies for spatial analysis of big data.

AIRBNB AND ITS CRITICS IN NEW YORK

Community groups and housing advocates in cities across the world have begun to sound the alarm about Airbnb's impact on affordable housing in their communities, citing concerns about housing supply lost, racialized gentrification, and impact on residents' quality of life (see, e.g., BJH Advisors 2016; Lee 2016; Samaan 2015; New York Communities for Change 2015; Wachsmuth et al. 2017; Wieditz 2017). Several years ago, a study by New York Communities for Change and Real Affordability for All found that Airbnb took approximately 20% of vacancies off the market in certain Manhattan and Brooklyn zip codes, and up to 28% in the East Village neighborhood, even though it is technically illegal to rent an entire unit for fewer than 30 days in most buildings. Overall, they estimated that the 20 neighborhoods most popular on Airbnb have lost 10% of rental units (NYCC and RAFA 2015). These neighborhoods are also featured in Airbnb's neighbourhood guides. More recently, a study found that Airbnb hosts are prone to reject African-American guests even if it means a loss in possible income (Edelman et al. 2017). Another study found that short-term rentals are growing faster in Black neighborhoods in New

York, displacing and otherwise disproportionately affecting Black residents while accruing wealth for white residents (Cox 2017).

Quality of life is also a concern for residents who have seen their neighbourhoods transformed into de facto hotel districts (Cócola Gant 2016). In the fall of 2016, residents of New Orleans, still recovering from Hurricane Katrina, held a jazz funeral at city hall (with coffins reading "RIP real neighbors" and "RIP affordable housing") to mourn neighbourhoods lost to Airbnb tourism in a protest (Litten 2016). Meanwhile, hotel associations complain that short-term rentals effectively function as hotels but have an unfair advantage because they don't pay taxes and don't comply with safety and zoning regulations.

Airbnb has effectively created a new category of rental housing—short-term rentals—which occupies a gap between traditional residential rental housing and hotel accommodation. Nonetheless, Airbnb's impact on cities and housing markets is not well understood, in part because the company takes great pains to cloud its operations from scrutiny. The New York



Attorney General, for example, was forced to subpoena Airbnb's data for the city, which the company eventually provided only in anonymized form. It was unclear how many transactions were excluded, and the Attorney General's office had to accept the anonymization in good faith.

Airbnb's business model has been particularly controversial because it so clearly flouts existing housing and land-use regulations in many or even most of the cities in which it operates, and does so in a fashion which appears to undermine policies aimed at protecting the supply of affordable housing. Airbnb and its advocates insist that these regulations must be updated to accommodate the new possibilities presented by the sharing economy. Opponents argue that Airbnb aims to avoid regulation and taxation, and threatens affordable housing in cities.

REPORT OBJECTIVES

The report is motivated by the concerns increasingly raised by local communities and housing advocates that short-term rentals are having a detrimental impact on housing availability and affordability in New York. These concerns are closely connected to a widespread suspicion that a large amount of activity on short-term rental platforms is not "home sharing" as the

term is normally understood (occasional short-term rentals of a family's primary residence or a room within the primary residence), but rather a new form of de facto hotel.

Either concern, if justified, would represent a serious problem for municipal authorities. But reliable, up-to-date evidence has been hard to come by. Accordingly, we set out to answer four questions using rigorous empirical analysis:

1. **Where is Airbnb activity located in New York, and how is it changing?**
2. **Who makes money from Airbnb in New York?**
3. **How much housing has Airbnb removed from the market in New York?**
4. **Is Airbnb driving gentrification in New York?**

The findings in this report are based on a comprehensive study of three years of Airbnb activity in the New York region. Relying on estimates of Airbnb activity from the consulting firm Airdna, we measured and analyzed more than 80 million data points, relying on new spatial big data methodologies developed specifically to analyze short-term rentals. (The methodology is outlined in detail in the appendix.) We collected and analyzed data for the entire 20-million population New York metropolitan region, which includes significant seasonal tourism destinations such as Long Island and the New Jersey Shore. These latter areas receive large numbers of Airbnb tourists each summer, and so are important components of the region's short-term rental activity. But because the report's focus is the relationship of short-term rentals to urban housing availability and affordability, we tend not to emphasize these areas in our findings. Instead, we focus on New York City. In general, we present all aggregate figures for a) New York City, b) the borough of Manhattan, c) the borough of Brooklyn, and d) the areas of the metropolitan region outside of New York City.

SUMMARY OF KEY FINDINGS

The report provides detailed analysis of three years of Airbnb activity in New York, including profiles of neighborhoods with disproportionate shares of either total Airbnb activity or new growth. The key report findings are as follows:

Two Thirds of Revenue from Likely Illegal Listings: Entire-home/apartment listings account for **75% (\$490 million) of total Airbnb revenue and represent 51% of total listings**. 87% of entire-home reservations are illegal under New York State law, which means that **66% of revenue (\$435 million) and 45% of all Airbnb reservations in New York City last year were illegal**.

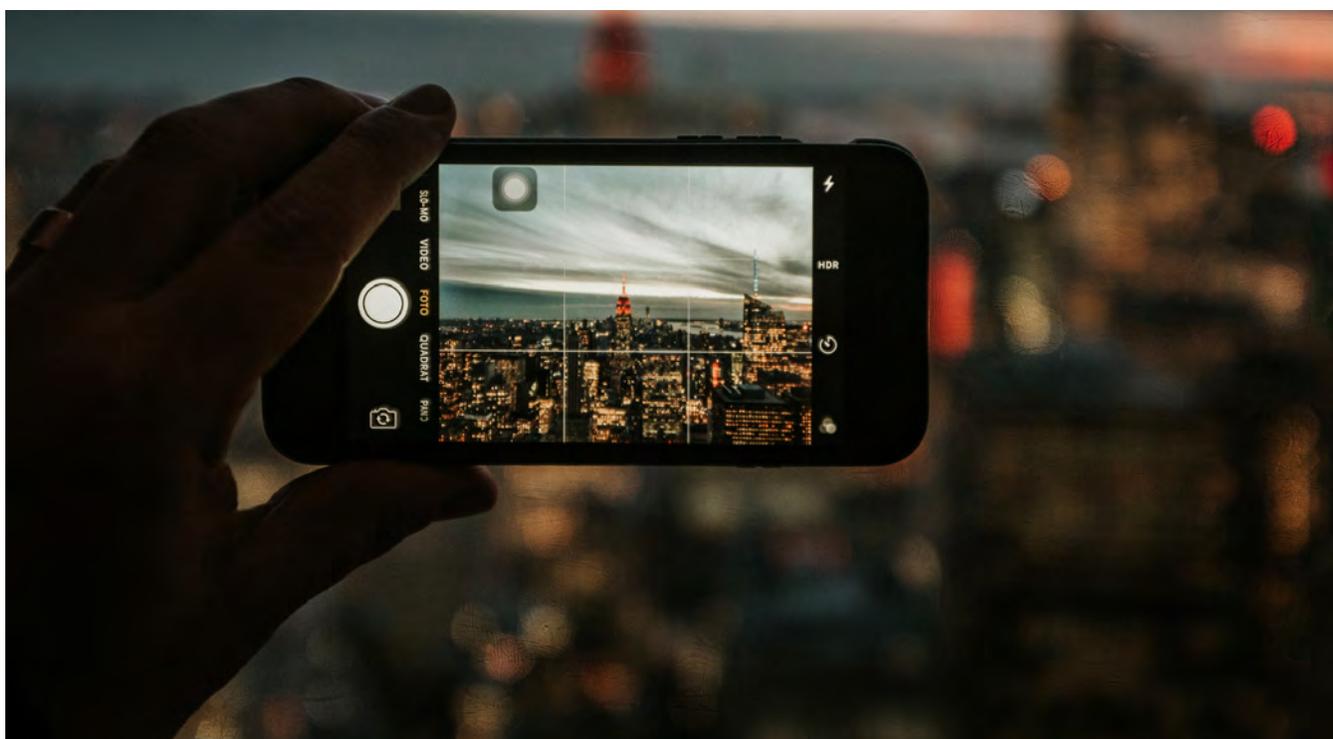
13,500 Units of Lost Housing: Airbnb has removed between 7,000 and 13,500 units of housing from New York City's long-term rental market, including 12,200 frequently rented entire-home listings that were available for rent 120 days or more and 5,600 entire-home listings available for rent 240 days or more.

\$380 More in Rent: By reducing housing supply, Airbnb has **increased the median long-term rent in New York City by 1.4%** over the last three years: a **\$380 rent increase** for the median New York tenant looking for an apartment this year. In some Manhattan areas the increase is \$700 or more.

4,700 Ghost Hotels: There are 4,700 private-room listings that are in fact "ghost hotels" comprising many rooms in a single apartment or building. **These ghost hotels have removed 1,400 units of housing from the long-term rental market**, and represent a new tactic for commercial Airbnb operators to avoid regulatory scrutiny.

28% of Revenue: Commercial operators that control multiple entire-home listings or large portfolios of private rooms are only 12% of hosts but earn **more than 28% of revenue in New York City**.

Top 10% of Hosts: The top 10% of hosts earned a staggering 48% of all revenue last year, while the bottom 80% of hosts earned just 32%.





200% and \$100K More: The median host of a frequently rented entire-home/apartment listing earned 55% more than the median long-term rent in its neighborhood last year. This disparity between short-term and long-term rents is driving Airbnb-induced housing loss and gentrification. **Nearly 300 unique listings earned \$100,000 or more last year.**

Racialized Revenue: White neighborhoods make systematically more money on Airbnb than non-white neighborhoods. Neighborhoods with high existing Airbnb revenue (generally in Midtown and Lower Manhattan) are disproportionately white. But the fastest-growing neighborhoods for Airbnb (particularly Harlem and Bedford-Stuyvesant) are disproportionately African American.

72% of the Population: Nearly three quarters of the population in neighborhoods at highest risk of Airbnb-induced gentrification across New

York is non-white, as Airbnb continues to have a strongly racialized impact across the city.

“Airbnb as a Racial Gentrification Tool”:

In March 2017, InsideAirbnb.com released a report that categorized host photographs in all predominantly Black NYC neighborhoods. That report’s key findings have been cited in this new report: Across all 72 predominantly Black New York City neighborhoods, **Airbnb hosts are 5 times more likely to be white.** In those neighborhoods, **the Airbnb host population is 74% white, while the white resident population is only 14%. White Airbnb hosts in Black neighborhoods earned an estimated \$160 million, compared to only \$48 million for Black hosts—a 530% disparity.** The loss of housing and neighborhood disruption due to Airbnb is **6 times more likely to affect Black residents**, based on their majority presence in Black neighborhoods, as residents in these neighborhoods are **14% white and 80% Black.**

1. Where is Airbnb activity located, and how is it changing?

In the last year, Airbnb growth in New York City has slowed down considerably. Revenue-earning listings grew by only 4.5% (to 67,100) citywide, and even shrunk by 3% (to 34,000) in Manhattan. Total host revenue grew by 14% (to \$657 million) between 2016 and 2017, a major slowdown from the previous year's growth rate of 35% (to \$576 million). However, growth remains strong in several North Brooklyn and North Manhattan neighborhoods, even as it has stagnated in the areas with historically the most short-term rental activity. Entire-home Airbnb listings are a slim majority of total listings (51%, 34,300 listings) but account for 75% (\$490 million) of total revenue. They predominate in Midtown and Lower Manhattan and North Brooklyn, while private-room listings are more common outside this core area. Nearly half of New York City listings in a given month are hosting illegal reservations.

AIRBNB ACTIVITY ACROSS THE NEW YORK METROPOLITAN REGION

In the past year (September 2016 - August 2017), there were 67,100 listings reserved at least once on Airbnb in New York City — a 4.5% increase from the previous year (64,200 listings), and a 37% increase from the year before that (48,800 listings). It is not the case, however, that there

are 67,100 listings receiving reservations at any given time—there is a large amount of churn in the market and, on average, half of the listings available on Airbnb in a given month receive at least one reservation. Just over 50% (34,000) of these listings are in Manhattan, while 37%

	Listings reserved at least once in the last year	% increase over previous year	Listings available at least once in the last year	Listings reserved month-to-month	Listings available month-to-month
New York City	67,100	4.5%	95,500	16,100 - 25,700	50,000 - 59,100
Manhattan	34,000	-3.0%	49,000	7,900 - 15,600	25,500 - 30,000
Brooklyn	25,000	9.3%	35,100	6,200 - 11,100	18,300 - 21,900
Rest of MSA	18,200	48%	25,000	3,700 - 10,200	12,500 - 18,200

Figure 1a. Airbnb listings in the New York region

(25,000) are in Brooklyn. Although listings in the former have decreased year-over-year, they continue to grow robustly in the latter. New York City is responsible for the overwhelming majority of Airbnb activity in the wider metropolitan region (the New York MSA), but listings in the rest of the MSA are growing at more than ten times New York City's rate (Figure 1a).

The number of revenue-earning listings is the clearest indicator of the fluctuations of the short-term rental market. Figure 1b aggregates this count and represents it spatially in three heatmaps of revenue-earning Airbnb listings, and indicates both the expansion and intensification of listing density in the New York region over the last three years. Manhattan, Midtown, the West Side, and the Lower East Side have consistently seen the greatest concentration of Airbnb activity; off the island of Manhattan, only Williamsburg in Brooklyn is comparable. In the last two years, however, new hotspots have been emerging in Brooklyn (Bushwick and Bedford-Stuyvesant), Manhattan (the Upper West Side and Harlem), and New Jersey (Jersey City).

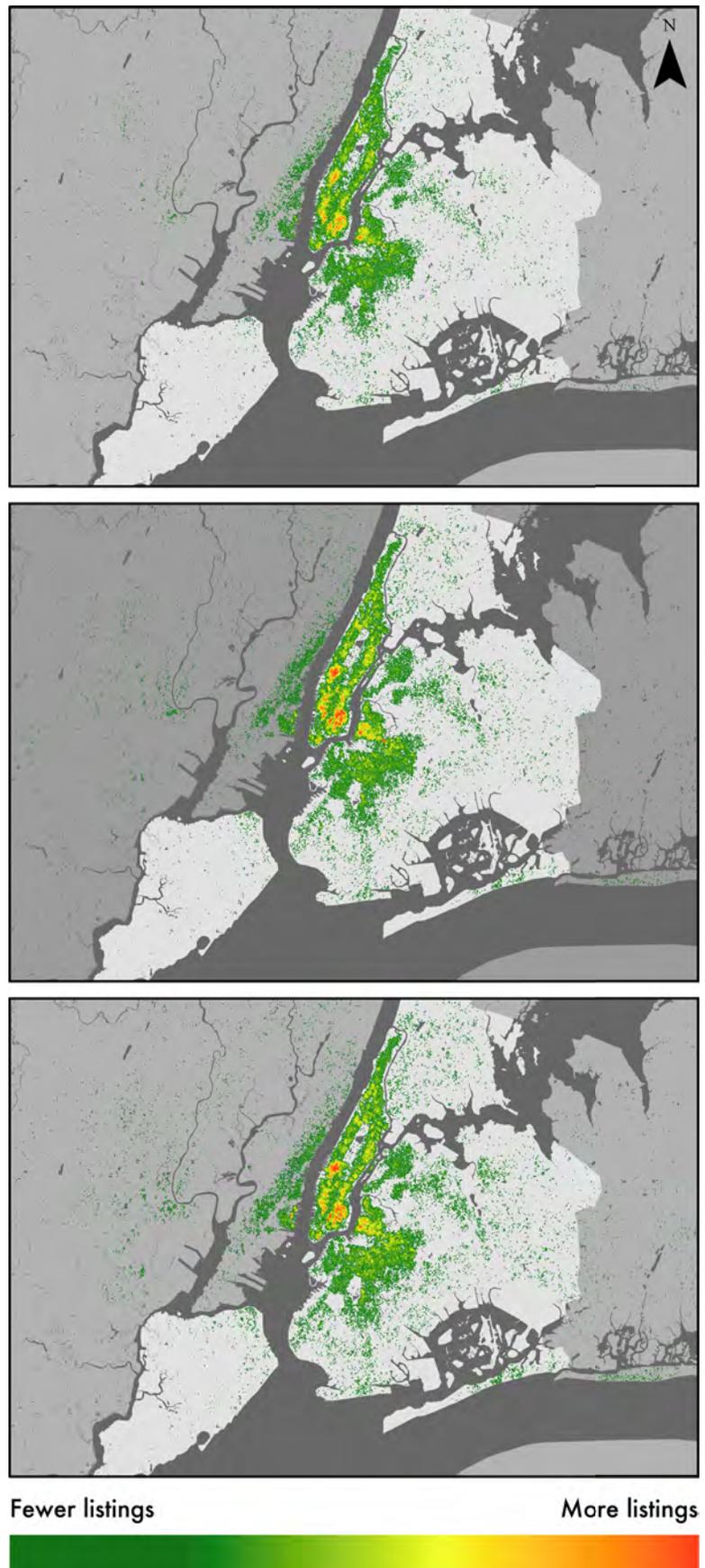


Figure 1b. The growth in revenue-earning Airbnb listings, Sep 2014 - Aug 2017

AIRBNB'S DECLINING GROWTH IN NEW YORK: MANHATTAN DOWN, BROOKLYN UP

Airbnb's growth in New York City has decisively slowed down in the last year. For the year ending August, total host revenue grew by 35% (to \$576 million) between 2015 and 2016, but only by 14% (to \$657 million) between 2016 and 2017. Figure 1c shows the month-to-month change in the number of listings which receive at least one reservation. (These figures are seasonally

adjusted, as discussed in the Appendix.) Two patterns are apparent. First, a slowdown in listing growth across New York City, even as the rest of the region continues to grow. Second, a convergence between Manhattan and Brooklyn, with the latter borough drawing within a few thousand listings of the former for the first time ever.

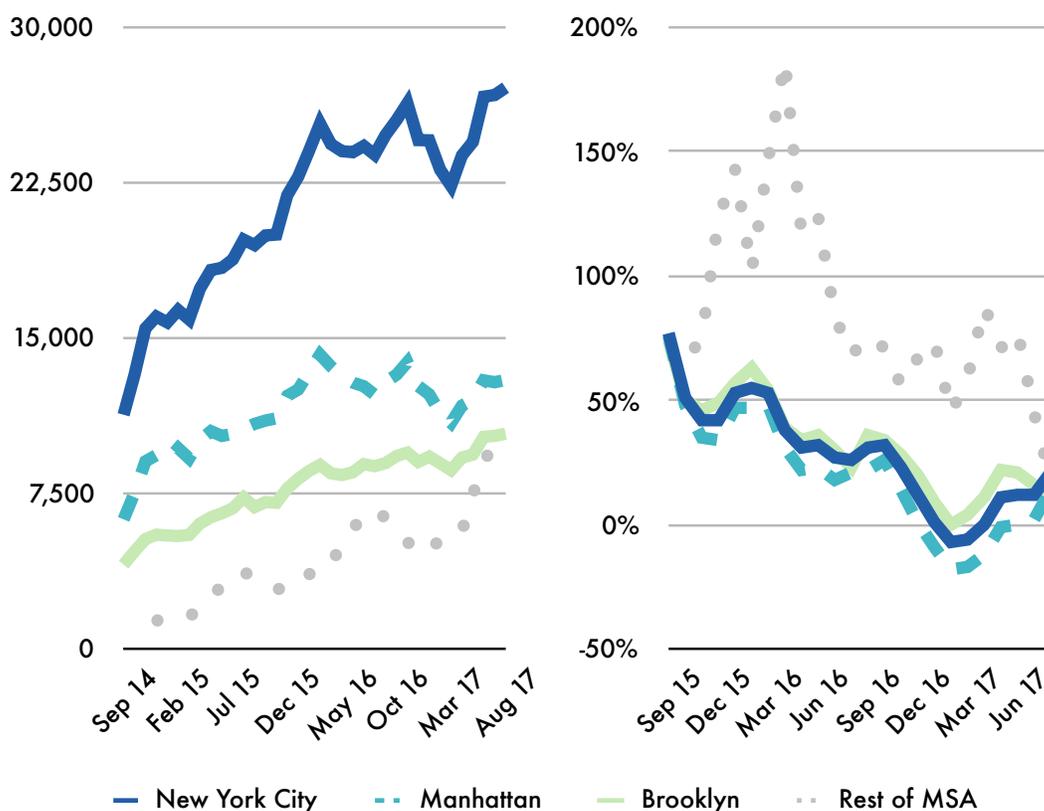


Figure 1c. Seasonally adjusted revenue-earning listings: month-to-month listings (left) and year-over-year growth rate (right)

Even as the growth of new listings has slowed down in the last year, revenue growth in New York City has stagnated completely (Figure 1d.). While the wider New York region has continued to see moderate (though slowed) revenue growth, average year-over-year growth in the city has been flat for the last six months, with significant shrinkage in Manhattan (an average of -6% over the last six months) balanced out by continuing

(although slowing) growth in Brooklyn (averaging 9% over the last six months).

As a result of Manhattan's decline in contrast to Brooklyn's growth, the latter borough now accounts for a historically large proportion of New York City's Airbnb activity—32% (\$195 million) of monthly revenue at the end of the study period, compared to 27% (\$114 million) at the beginning.

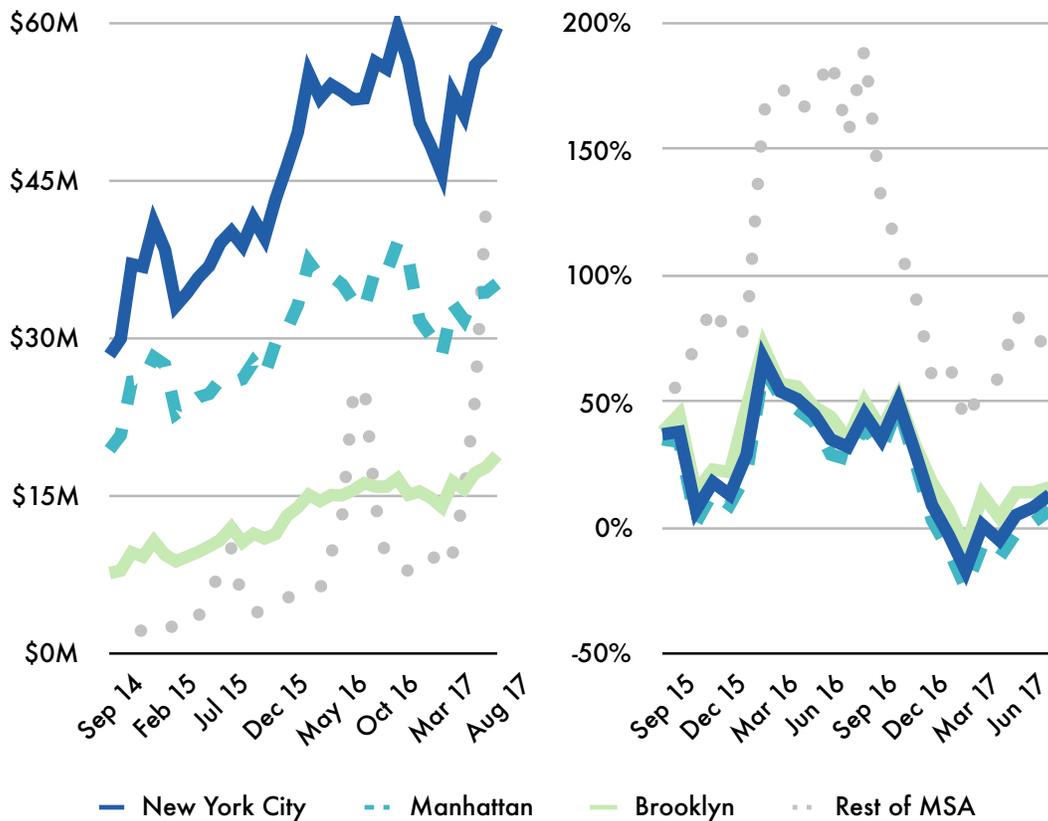


Figure 1d. Seasonally adjusted host revenue: month-to-month revenue (left), year-over-year growth rate (right)

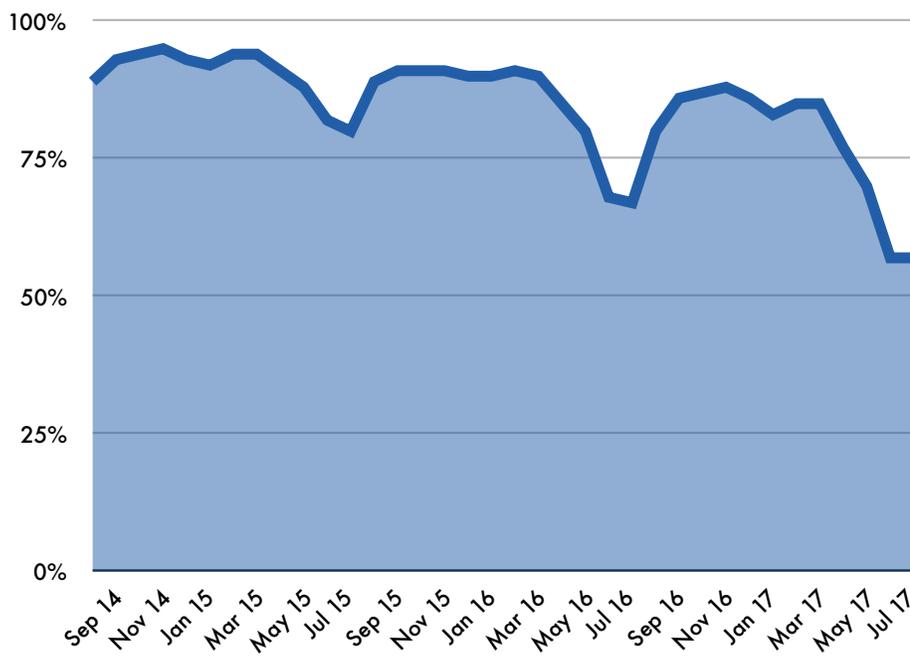


Figure 1e. New York City's declining share of the region's Airbnb host revenue

Recent months have also seen the intensification of a longer-term trend: over time, New York City has accounted for a smaller and smaller proportion of the New York region's Airbnb activity. As Figure 1e shows, each summertime New York City's share of total regional revenue plummets, since listings outside the city are more likely to be seasonally variable vacation homes. But, each year, New York City's peak share of revenue (in the winter) has been lower than the one before it, and its lowest share (in the summer) has been lower still. While in 2015 August saw 82% of regional revenue go to New York City, that proportion fell to 57% in 2017. Current trends suggest that, for the first time, New York City will account for a minority of monthly regional revenue in the summer of 2018.

THE SHIFTING DOMINANCE OF ENTIRE-HOME LISTINGS

A majority of revenue-earning Airbnb listings (51%, 34,300 listings) in New York City are entire homes. Entire-home listings account for a disproportionate share of host revenue—75% of the total (\$490 million out of \$657 million). However this proportion varies geographically; broadly speaking, Manhattan has a far higher proportion of entire-home listings than Brooklyn. Figure 1f shows the variation in entire home listing proportion across the region, and demonstrates a concentration of entire-home listings stretching continuously from Midtown Manhattan down through Park Slope in Brooklyn.

The ratio of entire-home to private-room listings has also been changing steadily over time. Entire homes are accounting for fewer and fewer of all active listings, and this pattern is consistent across New York City and each borough (although not the rest of the region, where the proportion is rising slightly). At the same time, the proportion of host revenue earned by entire-home listings has not declined at the same rate. Although they have decreased slightly in number in New York City

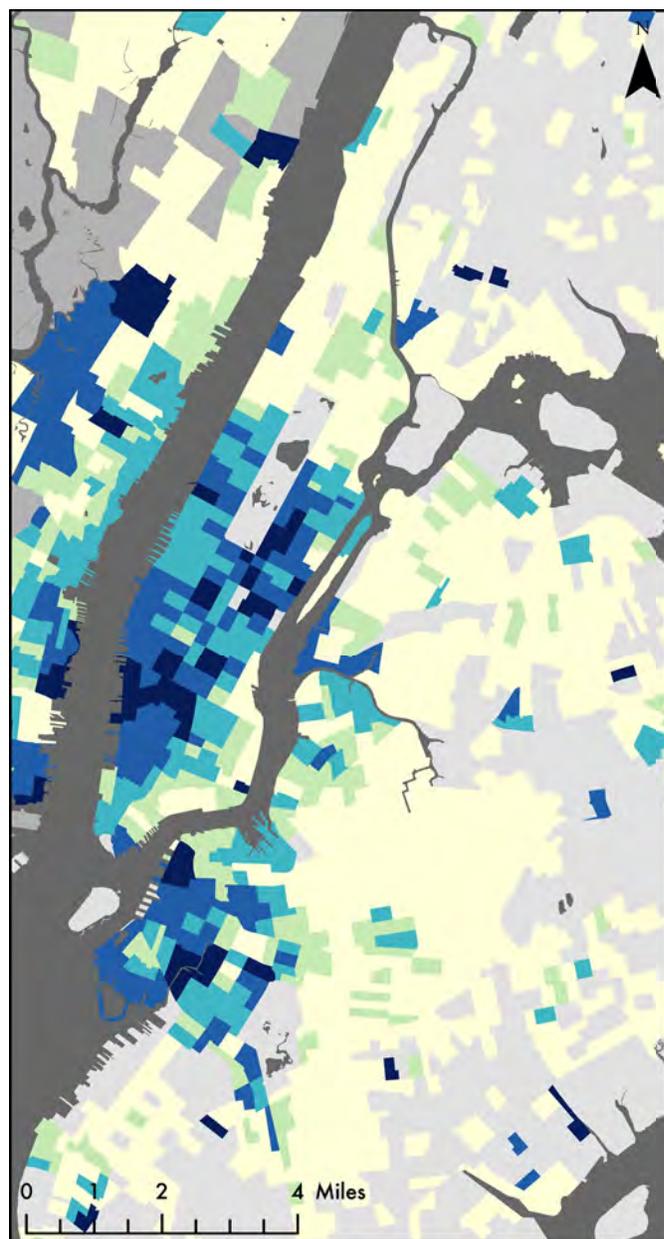


Figure 1f. Percentage of all revenue-earning listings which are entire homes in the last year, by census tract

and Manhattan, entire homes are now earning proportionally more revenue in Brooklyn and outside New York City (Figure 1g). Since entire-home and private-room Airbnb rentals have very different implications for housing availability and regulatory compliance, these patterns will be explored at length in the rest of the report.

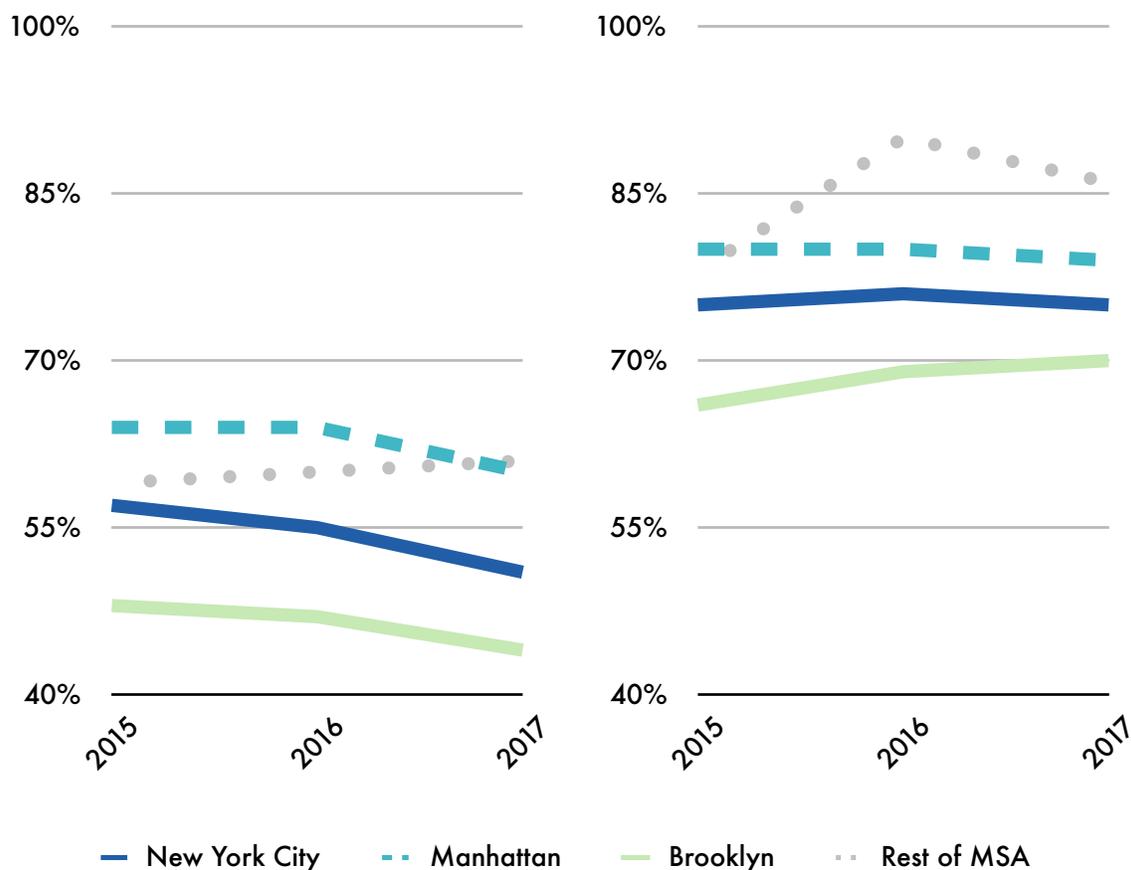


Figure 1g. Percentage of all revenue-earning listings (left) and host revenue (right) from entire homes

HOW MANY AIRBNB LISTINGS IN NEW YORK CITY ARE ILLEGAL?

Under New York State's Multiple Dwelling Law (MDL), short-term rentals of fewer than 30 days are illegal in buildings with 3 or more units unless the owner is present. Any entire-home rental of fewer than 30 days in such a building is therefore almost certainly an illegal rental. Using our dataset in combination with census-tract information from the American Community Survey about building types, we are therefore able to estimate what percentage of Airbnb reservations violate the MDL, and what percentage of listings are in violation of the MDL at any given time.

Private-room rentals will also violate the MDL if the owner is not present, as would be the case with ghost hotels, but it is difficult to make reliable

estimates of the frequency of these illegal rentals because there is no way to reliably know if the owner is present. There are other reasons why a short-term rental might violate of regulations, notably for health and safety standards mandated by the New York City building code, but these cannot be assessed using our existing dataset.

Since the current iteration of the Multiple Dwelling Law was passed in October 2016, we estimate that between 85 percent and 89 percent of entire-home rentals to have been illegal each month. This means, even assuming that all private-room listings are legal, that between 43 percent and 47 percent of reservations in New York City have been illegal. In any given month, between

7,600 and 12,700 listings have had illegal reservations—accounting for between 42 percent and 46 percent of all active listings. In total over the last year, 45% of reservations were likely illegal, and these illegal reservations generated 66% (\$435 million) of all host revenue.

Because Manhattan has a higher proportion of entire-home listings than the other boroughs, along with a much higher proportion of multi-unit apartment buildings (in which entire-home short-term rentals are generally illegal), it also has the highest proportion of illegal Airbnb listings. A majority (57%) of reservations in Manhattan last year were illegal, and these illegal reservations generated 77% of revenue. In Brooklyn, 37% of reservations and 58% of revenue were illegal.

A small decline in the non-compliance rate occurred between October 2016 (when the Multiple Dwelling Law was revised) and January

2017 (when the revised law came into effect); however, a similar decline occurred the previous year, suggesting that this was just seasonal variation. When comparing the percentage of listings with illegal reservations for the October to July period from the year before, similar patterns and results are apparent, with between 43 percent and 49 percent of all listings in violation of the MDL from month to month (Figure 1h). At the same time, last year's level of illegality was consistently higher than this year's, a fact which largely reflects the growing prominence of (presumptively legal) private-room listings on Airbnb in New York. The available evidence thus leads to the conclusion that current regulations may be having a modest impact on illegal activity on the Airbnb platform. It is possible that heightened regulatory scrutiny under the Multiple Dwelling Act is driving an observable shift in Airbnb hosts from entire-home to private-room listings.

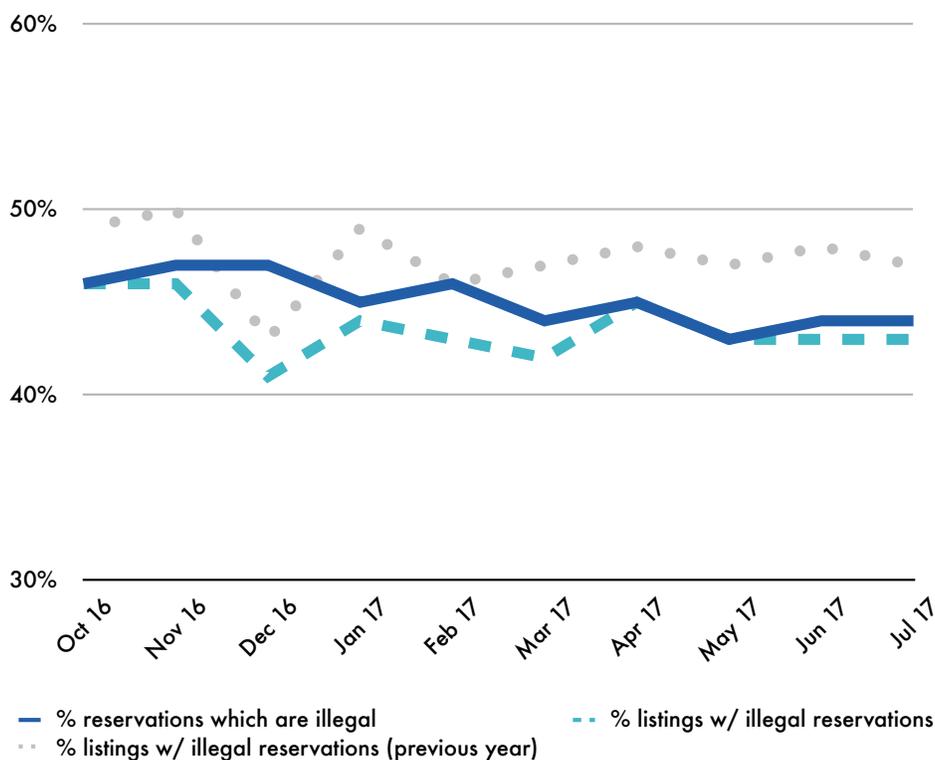
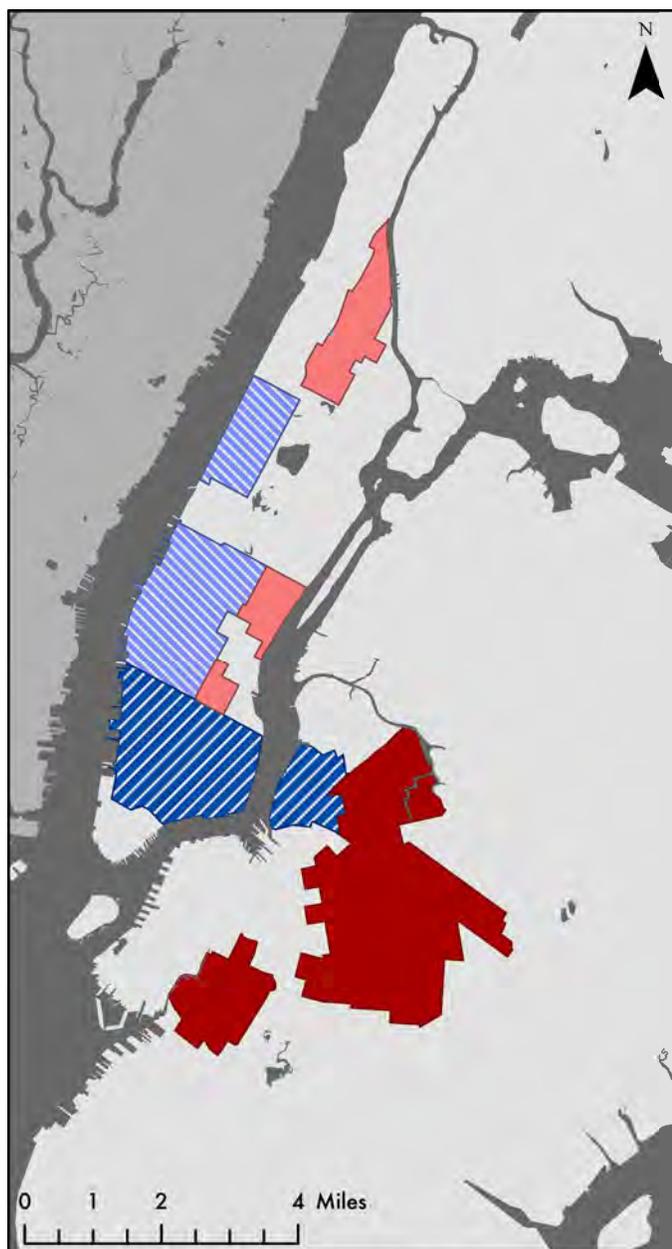


Figure 1h. New York City reservations and listings in violation of the MDL



High-revenue neighborhoods High-growth neighborhoods

Midtown Manhattan
 Eastside Manhattan
 Downtown Man. & W'burg
 North-Central Brooklyn

Figure 1i. Location of highlight neighborhoods and Airbnb performance last year

NEIGHBORHOOD PROFILES

The broad patterns above can be refined by analyzing a set of distinctive neighborhoods. Figure 1i identifies the 10 New York City neighborhoods with the highest total Airbnb host

High Revenue

Neighborhood (component areas)	Rev.-earning listings (% growth)	Total revenue (% growth)
Midtown Manhattan (Chelsea, Clinton, Midtown, Upper West Side)	8,800 (0.0%)	\$126 million (11%)
Downtown Manhattan and Williamsburg (Chinatown, East Village, SoHo-TriBeCa, West Village, Williamsburg)	12,400 (-9.2%)	\$160 million (1.1%)

High Growth

Neighborhood (component areas)	Rev.-earning listings (% growth)	Total revenue (% growth)
Eastside Manhattan (Central Harlem, Central Harlem South, Gramercy, East Midtown)	4,200 (4.7%)	\$52.1 million (26%)
North-Central Brooklyn (Bedford, Bushwick South, Crown Heights North, East Williamsburg, Park Slope, Stuyvesant Heights)	10,100 (10%)	\$75.7 million (23%)

revenue, and the 10 other neighborhoods growing the fastest, and clusters them in four groups (Midtown Manhattan; Downtown Manhattan and Williamsburg; East Manhattan; and North-

Central Brooklyn). The boundaries are taken from neighborhood tabulation areas defined by the city government, which are meant to provide a middle-ground between the very small census tracts used elsewhere in the report, and the very large community districts used for city planning purposes. The map demonstrates at a glance that Airbnb's areas of historic intensity are on the west side and downtown of Manhattan, while the newer areas of growth are in Brooklyn and outlying parts of Manhattan.

The table in Figure 1h summarizes current performance and growth characteristics of Airbnb listings in each of the highlight neighborhoods. It demonstrates a clear divergence between the historic Airbnb hotspots in Manhattan—which at this point appear to be largely saturated, with an average revenue growth rate of only 4.6% in the last year—and new emerging hotspots further from the center, which are bucking the city-wide trend of growth stagnation and grew their revenue on average 24% in the last year.



2. Who makes money from Airbnb?

Airbnb revenue is distributed highly unequally among hosts in New York City. Commercial Airbnb operators, who have multiple entire-home listings or large portfolios of private rooms, are 12% of hosts but earn more than one quarter of revenue in New York City. The top 10% (5,000) of hosts earned a staggering 48% (\$318 million) of all revenue last year, while the bottom 80% (40,400) of hosts earned just 32% (\$209 million). The median listing earned a modest \$4,100 last year, but at the high end of the market, more than 280 listings earned \$100,000 or more.

REVENUE GROWTH AND DISTRIBUTION

The previous chapter established that Airbnb host revenue growth is slowing in New York City—most notably in Manhattan, Airbnb’s traditionally most lucrative submarket. This state of affairs makes all the more urgent the question of who is earning the revenue, since there may no longer be a “rising tide to lift all boats”. The simple answer is that revenue is distributed in a highly uneven fashion among New York hosts. Figures 2a and 2b summarize key statistics related to Airbnb revenue in the last year, and show large disparities between both geographical regions and individual hosts. On the first point, the most notable disparity is between Manhattan and Brooklyn: the former has high revenue per listing but slow growth, while the latter has low revenue per listing but faster growth. Across all geographies, the large gap between average revenue per listing and median revenue per listing reveals the unequal distribution of revenue: in general, where the average of a set of cases is much higher than the median, it indicates that a relatively small number of cases has pulled the average higher than the level at which most cases are clustered. However, focusing on revenue characteristics of all active listings in the last twelve months will tend to understate

revenue performance, because, even with a relatively lower growth rate than previous years, many hosts joined in the middle of the last twelve months, and hence drag down average annual revenue. An arguably more accurate portrait of listing performance can be seen by examining only those listings which were active throughout the entire last twelve months. The same pattern is visible here, with the average revenue roughly double the median revenue. This indicates that, even among dedicated, long-term Airbnb listings, there is a large disparity in revenue earnings.

Another way of analyzing inequality in revenue earning among Airbnb hosts is to look at earning percentiles. There were 50,500 income-earning hosts in New York City last year, who earned nearly \$660 million between them. Just ten percent of these hosts earned half that revenue (48%, \$319 million), and the top twenty percent of hosts earned a staggering 68% (\$448 million) of all host revenue. The top 1% of hosts, each of whom earned substantially more than \$100,000 on Airbnb last year, managed to earn 12% of total revenue (\$76 million). As Figure 2c shows, this unequal distribution of host revenue looks

	Total revenue (year-over- year growth)	Average rev. per rev.- earning listing	Median rev. per rev.- earning listing	Average rev. per listing active year-round	Median rev. per listing active year-round
New York City	\$657 million (14%)	\$9,800	\$4,100	\$17,200	\$10,200
Manhattan	\$414 million (8.5%)	\$12,200	\$5,300	\$22,200	\$13,800
Brooklyn	\$195 million (21%)	\$7,800	\$3,300	\$13,700	\$8,400
Rest of MSA	\$211 million (82%)	\$11,600	\$5,000	\$17,000	\$9,100

Figure 2a. Revenue earned by Airbnb listings in the last year

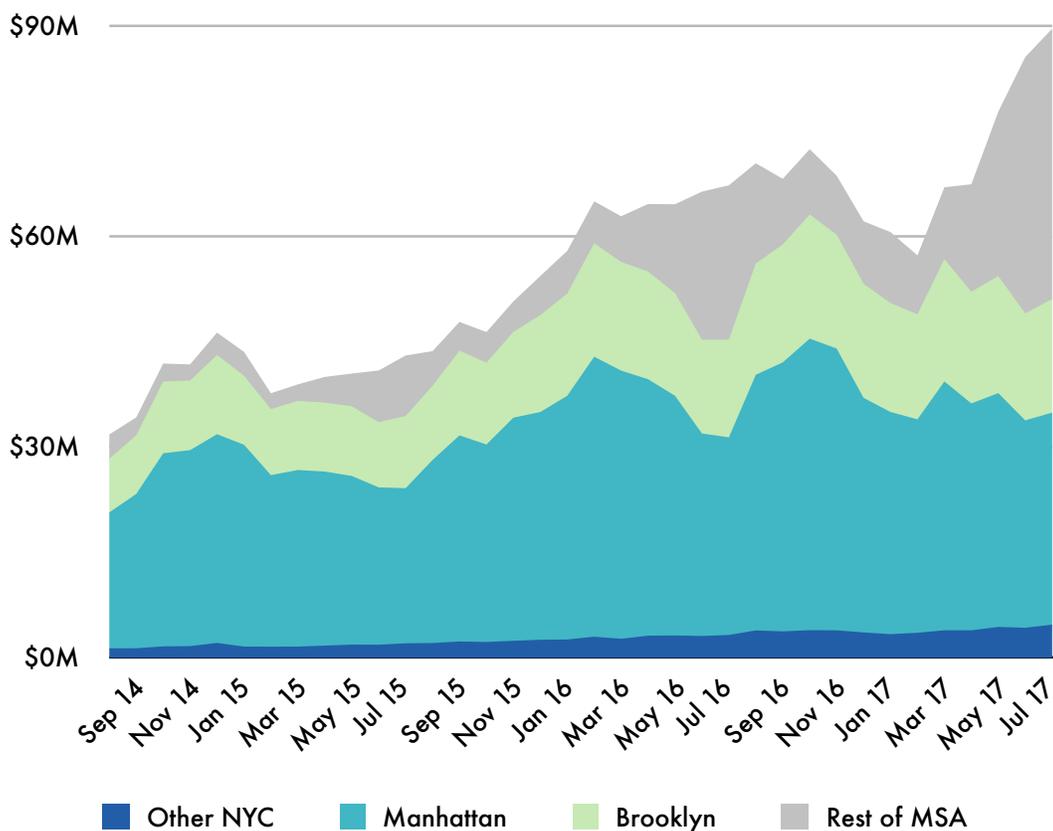


Figure 2b. Geographic components of seasonally adjusted host revenue

very similar for the different New York region geographies. The concentration of Airbnb revenue among an extremely narrow segment of hosts provides vital context for debates about the benefits of home sharing to middle-class families—for example Airbnb’s (2014) claim that “87% of Airbnb hosts in New York share only the home in which they live. And 62% of Airbnb hosts said Airbnb helped them stay in their homes.”

These statements misleadingly suggest that most Airbnb reservations are hosted by small-scale, part-time hosts. In fact, half of rentals on the Airbnb platform are being conducted by only 10% of hosts. While the median New York host earned \$5,200 last year, the top 10% earned a median of \$33,700—more than six times as much. And many of these top earners, as we will explore shortly, are unambiguously commercial operators.

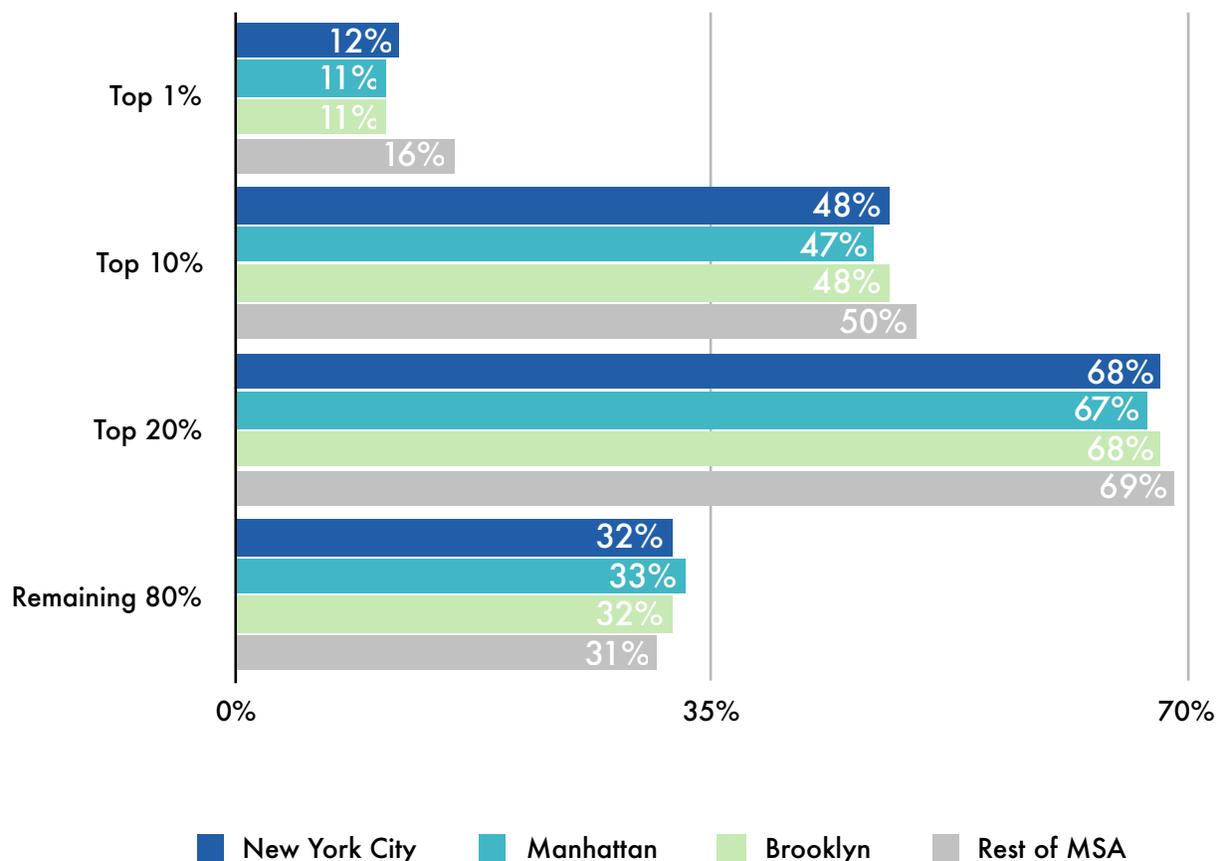


Figure 2b. Geographic components of seasonally adjusted host revenue in the last year

COMMERCIAL OPERATORS

The term “home sharing” conjures an image of a family occasionally renting a spare room in their home, or perhaps renting their entire home for a brief period of time while they are out of town. And, indeed, this occasional use characterizes the majority of Airbnb hosts in New York. For example in summer 2017, during the peak tourism season

of May to August, among the 56,300 listings in the region which were reserved at some point during these four months, the median listing was rented for 7 or 8 nights per month. And yet, as the revenue distribution figures presented above demonstrate, these occasional hosts might be the numerical majority of hosts, but they account for

a surprisingly small proportion of the actual rental activity on Airbnb and earn a surprisingly small proportion of the actual revenue.

One way to isolate commercial operators is to look at hosts who have multiple listings on Airbnb. In particular, a host with more than one entire home listing is by definition a commercial operator, since only one of their listings could be their primary residence. Estimating commercial operators this way will dramatically underestimate their numbers, since it will fail to identify hosts who have a single listing which is not their primary residence and which they run as a business, and it will fail to identify hosts who have operate their listings via multiple Airbnb accounts, but it is a useful first approximation. We define a “multi-listing” as an entire-home listing whose host has at least one other entire-home listing, or a private-room listing whose host has at least two other private-room listings. (We set a higher threshold for private-room multi-listings to avoid falsely include a pair of spare rooms in a host’s primary residence; there will be very few homes in the New York region that have both a primary resident living in them and three or more spare bedrooms.) Figure 2d summarizes basic facts

about the nearly 20,000 multi-listings in New York City. Each of these listings, and the 28% (\$184 million) of total platform revenue they represent, is by definition a commercial operation which does not represent any reasonable definition of “home sharing”. Instead, these are de facto hotel units which, as the next chapter will explore, are in direct competition with long-term housing for New Yorkers.

Multi-listing hosts consistently earn a disproportionate share of revenue. In the last year, for example, they were just 12% of all revenue-earning hosts in New York (6,200 out of 50,500), but earned 28% of revenue (\$184 million out of \$657 million). Their share of revenue, however, has been declining substantially across all geographies, despite an ongoing rise in the proportion of listings which are multi-listings (Figure 2e). Multi-listings continue to earn a disproportionately high share of revenue, but by a much narrower margin than in previous years. This appears to be a result of a shift in the composition of multi-listing units from entire homes to private rooms. Across all geographies, private room multi-listings have grown dramatically as a share of all listings, while entire-

	Entire-home multi-listings (% of all entire-home listings)	Private-room multi-listings (% of all private-room listings)	Multi-listing revenue (% of total revenue)
New York City	8,300 (24%)	7,700 (25%)	\$184 million (28%)
Manhattan	5,200 (25%)	2,700 (22%)	\$110 million (27%)
Brooklyn	2,400 (22%)	3,300 (25%)	\$56.9 million (29%)
Rest of MSA	4,300 (39%)	2,400 (37%)	\$78.0 million (37%)

Figure 2d. Multi-listing hosts in the New York region last year

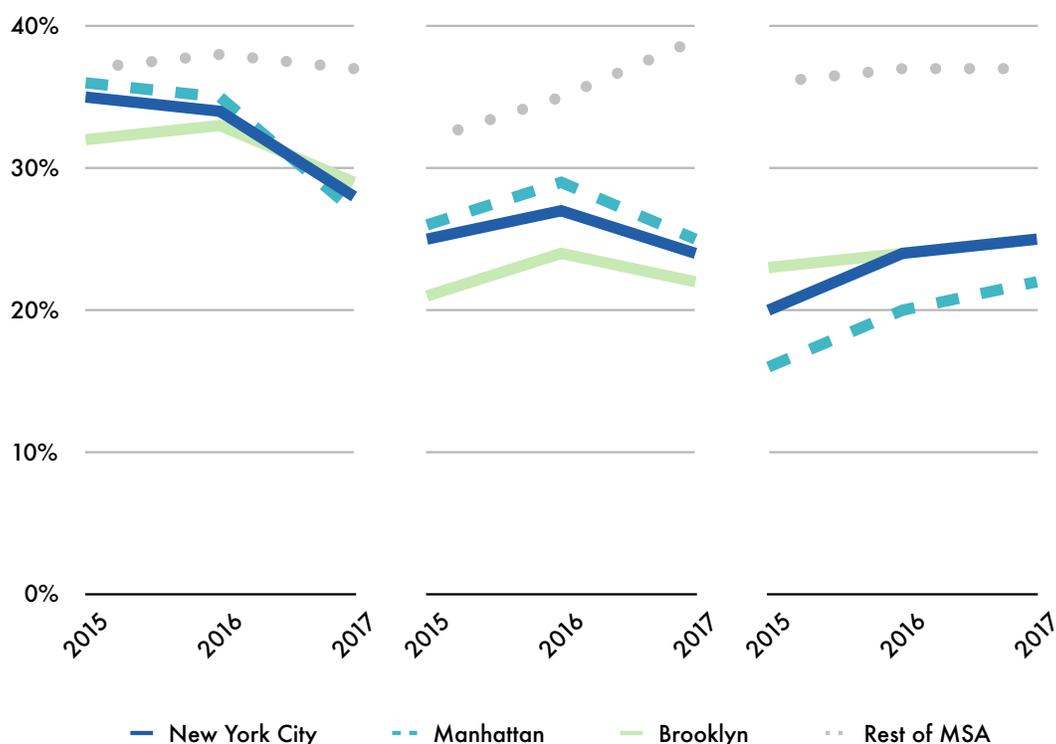


Figure 2e. Percentage of revenue earned by multi-listings (left), and proportion of revenue-earning entire-home listings (center) and private-room listings (right) which are multi-listings

home multi-listings have declined in the last year. Below we discuss the possibility that this trend represents a deliberate strategy of commercial operators to shift their listings away from (illegal) entire homes to private rooms, by relisting entire homes as multiple private rooms.

The New York region has a number of extremely large Airbnb commercial operators. In particular, there are seven currently active hosts who control more than 100 listings. Most of these, however, are vacation rental companies active in traditional vacation areas, such as Long Island and the New

Top Host	Main area of operation	# of revenue-earning listings	Approximate annual revenue
"West Village"	Manhattan	7	\$700,000
(Host closed account)	Manhattan	16	\$450,000
"Anthony and Laura"	Queens	7	\$450,000
"Lisa"	Manhattan and Long Island	5	\$400,000 in NYC, \$250,000 outside
"Tatiana"	Manhattan and Long Island	9	\$400,000

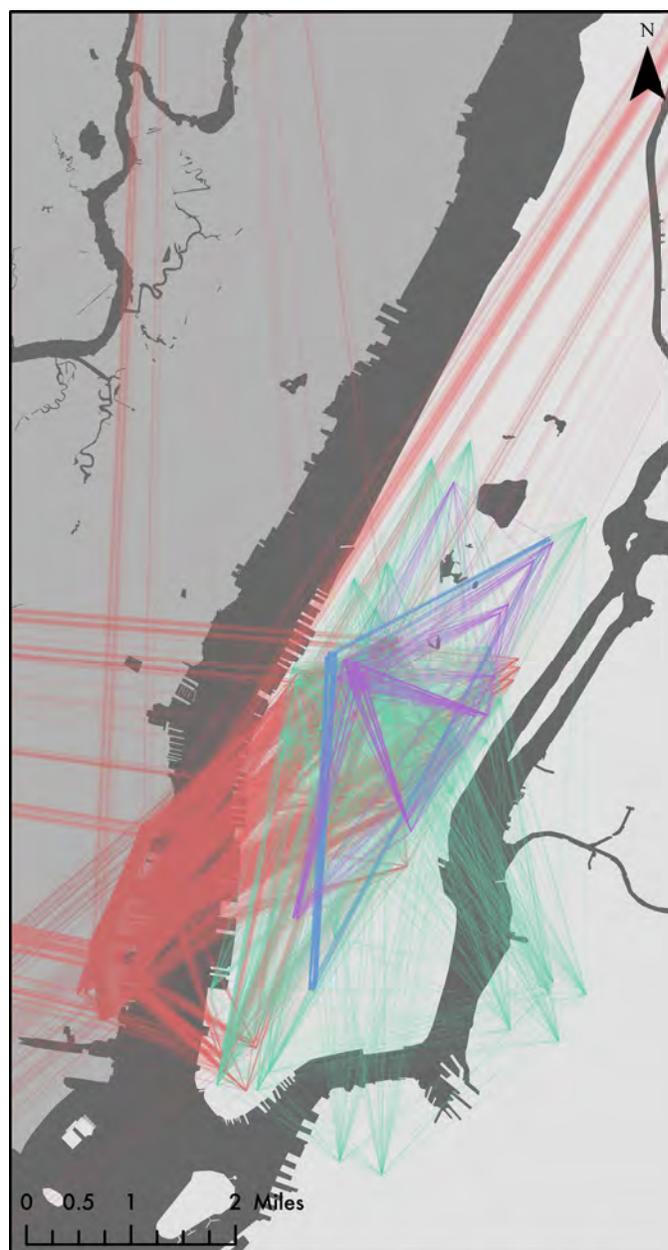
Figure 2f. The largest commercial operators by revenue in New York City last year

Jersey Shore. The largest commercial operator in the region by revenue earned, for example, is Symbol Management, a vacation rental company based in the Hamptons. It only entered the Airbnb market in February of 2017, but has nearly 300 entire homes listed on the service, and appears to have already earned nearly \$1.5 million on the platform in half a year. Unlike some other cities, New York does not appear to see a dominance of its central city Airbnb market by very large firms with dozens or hundreds of listings. The top-earning host in New York City made \$700,000 last year renting four entire homes and three private rooms. The five largest commercial operators by revenue in New York City are summarized in Figure 2f. (It is important to note that, because this population is extremely small, the uncertainty about these estimates is much higher than with the rest of the revenue estimates in the report, which are generally aggregating hundreds or thousands of listings.)

Figure 2g shows the listing distributions of the entire-home listings for the four commercial operators of entire-homes listings in New York City. Each listing controlled by a single host is connected by a thin line to emphasize the spatial extent of each host's holdings. As the map indicates, among the largest operators, entire-home multi-listings are concentrated in Manhattan. Two of the hosts (shown in blue and purple on the map) have all their listings in Midtown and Downtown Manhattan. A third host (in green) has listings concentrated in Manhattan but with several in adjacent areas in Brooklyn. Only the largest operator (shown in red) has significant non-Manhattan listings, although these are in fact west and north of New York City altogether.

THE HIGH END OF AIRBNB IN NEW YORK CITY

The preceding sections demonstrated that a disproportionate amount of Airbnb host revenue is earned by a small high-end of hosts and commercial operators. What does that



Top entire-home commercial operators in New York City

— Host 1 — Host 2 — Host 3 — Host 4

Figure 2g. The four largest commercial operators of entire-home listings in New York City last year

look like in New York City? More than 280 listings earned more than \$100,000 last year, but the very highest-earning Airbnb listings in the city (which earned \$200,000 or more)

Location	Listing title excerpts	Average annual revenue	Average annual nights booked	Average nightly rate
Manhattan	"Ultra-Modern", "West Village Townhouse", "New Modern Townhouse", "Heart of New York", "Midtown Triplex"	\$281,000	241	\$1,170
Brooklyn	"Gorgeous Townhouse in Williamsburg", "6BR Duplex", "7 Bedrooms", "Heart of Williamsburg", "Gorgeous Historic Brownstone"	\$158,000	236	\$670

Figure 2h. The five highest-earning Airbnb properties in Manhattan and Brooklyn

are concentrated exclusively in Manhattan—in Midtown and Greenwich Village. Brooklyn's top earning properties, meanwhile, are nearly all in Williamsburg. Some characteristics from these properties are summarized in Figure 2h. The top-earning listings in both Manhattan and Brooklyn were booked extremely frequently—on average

240 nights a year (close to the feasible maximum, given the need for cleaning). All of the top Manhattan listings advertise their luxuriousness, prime location, and high-end facilities (Figure 2i). In a review of a Manhattan townhouse, one guest noted "We usually stay in 5 star hotel suites in NYC and in comparison this is a great price point."

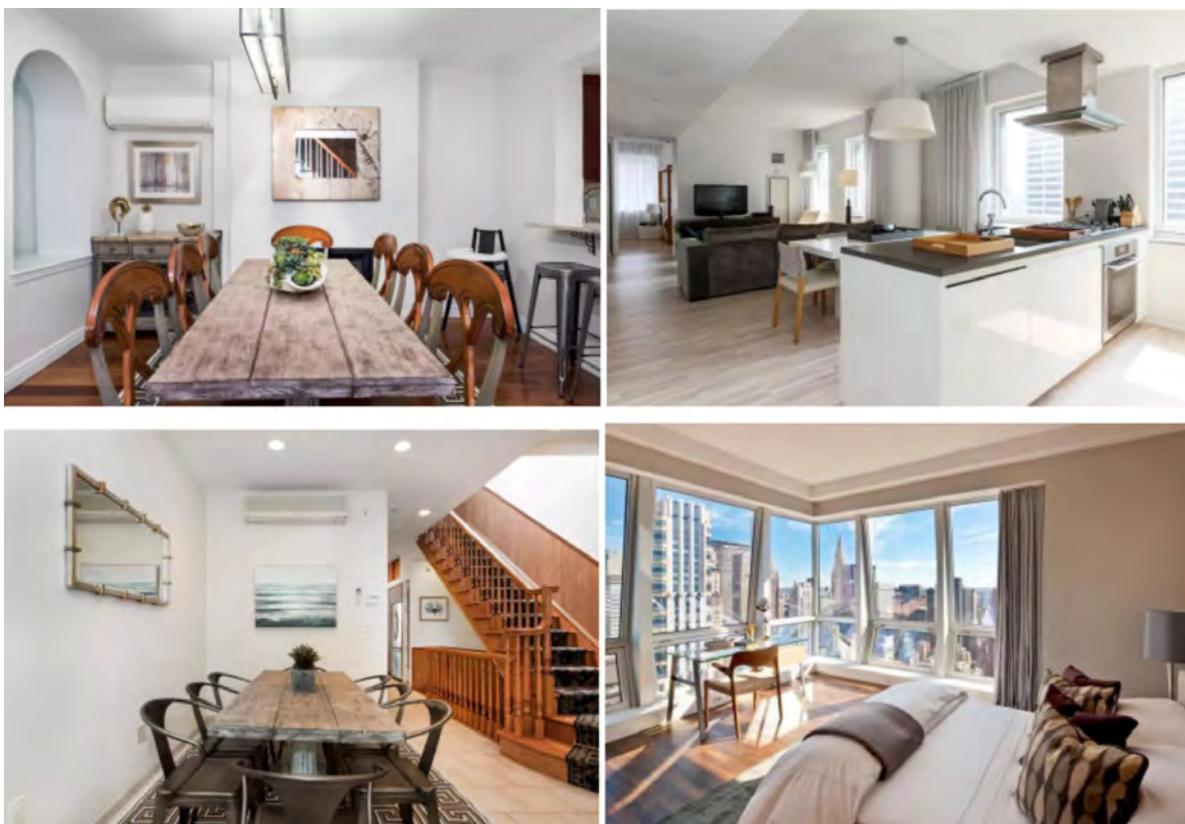


Figure 2i. Photos from top-earning Airbnb rentals in New York City

3. How much housing has Airbnb removed from the market?

Airbnb has removed between 7,000 and 13,500 units of housing from New York City's long-term rental market. In the last year, 12,200 entire-home listings were frequently rented (rented 60 days or more, and available 120 days or more), while 5,600 entire-home listings were very frequently rented (rented 120 days or more, and available 240 days or more). These listings are concentrated in Midtown and Downtown Manhattan, but are growing rapidly in Brooklyn, and taking up a larger and larger portion of the overall Airbnb market over time. Additionally, spatial cluster analysis reveals that 4,700 private-room listings are in fact "ghost hotels" comprising many rooms in a single apartment or building. This is perhaps the fastest growing category of listing in all of New York, and may represent a tactic for commercial Airbnb operators to avoid regulatory scrutiny.

ENTIRE HOMES CONVERTED TO DEDICATED AIRBNB RENTALS

Despite Airbnb's public-relations focus on small scale and occasional uses of its platform—the way, for example, that homeowners can help meet their mortgage payments by hosting occasional guests—most regulatory scrutiny of short-term rentals has been focused on entire homes which are frequently rented or available on short-term rental platforms. This is for good reason: every home converted to full-time Airbnb use is subtracted from the pool of long-term rental housing units in a city. In many cases, full-time, entire-home Airbnb listings would have housed long-term tenants, whom the landlord evicted or failed to replace after they left. In other cases, particularly in recently built apartments and condominiums, the unit has spent its entire lifetime on the short-term rental market. Such listings were not literally "removed" from the long-term market, but they represent exactly the same loss of potential rental housing as units that were directly removed. If full-time, entire-home rentals

on Airbnb were prohibited, both these types of unit would end up on the long-term rental market.

Defining the threshold at which an Airbnb listing is likely to have departed the long-term housing market is difficult. There are probably people who travelled extremely frequently during a year, and were able to keep a unit as their primary residence while still renting it on Airbnb for 200 days in the year. And there are probably people who listed their unit year-round but set too high a price or were in an area with insufficient demand, and it only rented 25 days in total despite being otherwise unoccupied by a long-term resident. Setting the threshold too low will generate many false positives—for example by counting as "full-time" an apartment which was on Airbnb for a few weeks after one long-term tenant moved out and before another moved in, or an apartment which the long-term inhabitant puts on Airbnb during periods of occasional travel. On the other hand,

setting the threshold too high will generate many false negatives, and end up underestimating the impact Airbnb is having on housing markets.

We use two metrics to estimate frequent Airbnb usage: the number of days per year that a unit is booked (“occupancy”), and the number of days that a unit is either booked or available to be booked (“availability”). We define “frequently rented” as 60 days of occupancy and 120 days of availability. Sixty days of occupancy rules out most scenarios of occasional short-term rental, such as a landlord taking advantage of a one-month gap between long-term tenants, or a family leaving on a one-month summer vacation. Setting an additional constraint of 120 days of availability prevents the inclusion of listings which are rented relatively infrequently but with extremely high efficiency; for example, a homeowner who was out of town every weekend and listed their unit on Airbnb would only have 104 days of availability, and so would not be counted as “full-time” by our criteria even if they managed to rent the unit for 60 of those days.

We also define a more stringent threshold of “very frequently rented” as 120 days of occupancy and 240 days of availability. While it is likely that very few frequently rented listings can also house long-



	Entire-home listings rented 60 days and available 120 days	Percentage of revenue-earning entire-home listings	Year-over-year growth rate	Entire-home listings rented 120 days and available 240 days
New York City	12,200	36%	14%	5,600
Manhattan	7,000	34%	20%	3,100
Brooklyn	4,200	38%	14%	2,000
Rest of MSA	3,200	29%	80%	1,100

Figure 3a. Frequently rented (60/120) entire-home listings in the New York region last year

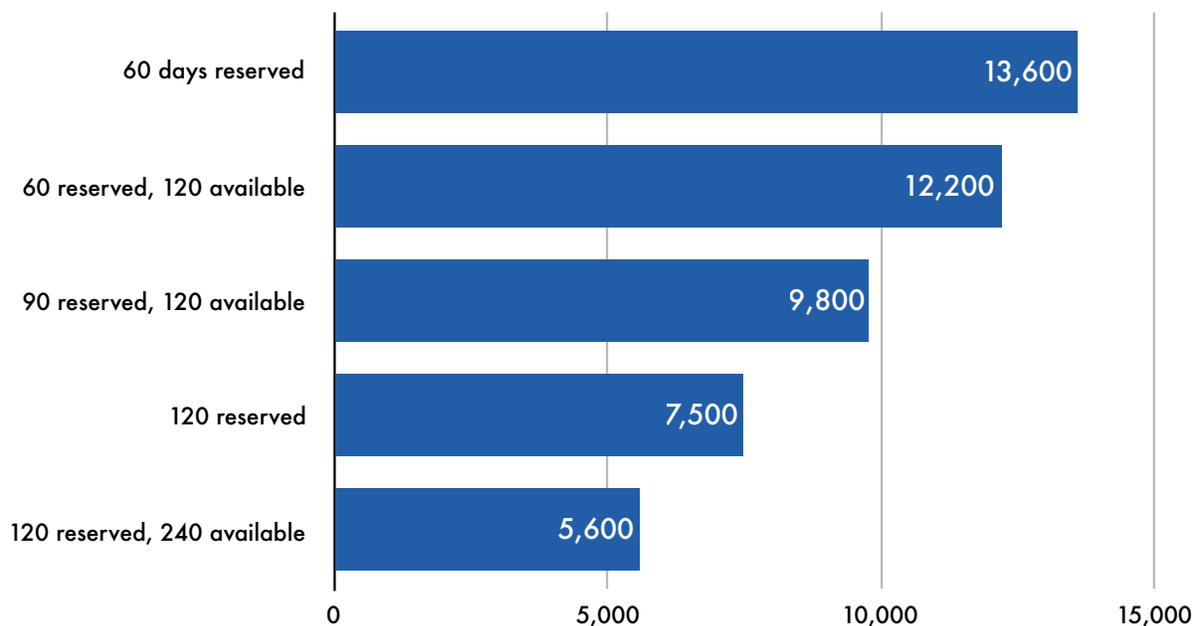


Figure 3b. Entire-home listings in New York City at different thresholds of “frequently rented”

term resident, it would be nearly impossible for a very frequently rented listing to have a long-term resident, since these listings are on Airbnb for at least 8 months of the year, and have short-term tenants for at least 4 months.

According to these thresholds, there are 12,200 entire-home Airbnb listings in New York City which were frequently rented in the last year—5,600 of which were very frequently rented. These figures set reasonable upper and lower bounds on the number of housing units which have been removed from New York’s housing market by Airbnb. The 5,600 very frequently rented entire homes have almost certainly been subtracted from the city’s rental housing supply. The 12,200 frequently rented entire homes may also all have been removed from the long-term rental market; at minimum, they are at high risk of being removed. Figure 3a summarizes key facts related to frequently rented entire-home listings, while Figure 3b contextualizes these estimates by showing the number of entire-home listings in the New York region which meet a series of different definitions of “frequently rented”.

In New York City, revenue-earning listings increased by 4.5% last year (from 64,200 to 67,100). By contrast, frequently rented entire-home listings increased by 14% in New York City (from 10,700 to 12,200). In other words, frequently rented entire-home listings are growing at approximately three times the overall listing growth rate.

The significance of the frequently rented entire-home listings becomes even clearer when they are expressed as a percentage of total housing on a neighborhood scale. Figure 3c shows the proportion of total housing in each census tract that is frequently or very frequently rented on Airbnb over the last three years. It reveals significant areas of the city where 2% or more of total housing stock has either already been lost to Airbnb or is at serious risk of being lost. Figure 3d summarizes these patterns for the highlight neighborhoods, demonstrating that there are entire neighborhoods where more than 1% of housing has been lost or is under threat of being lost to Airbnb, along with other areas where the year-over-year growth rate of these listings has exceeded 30%.

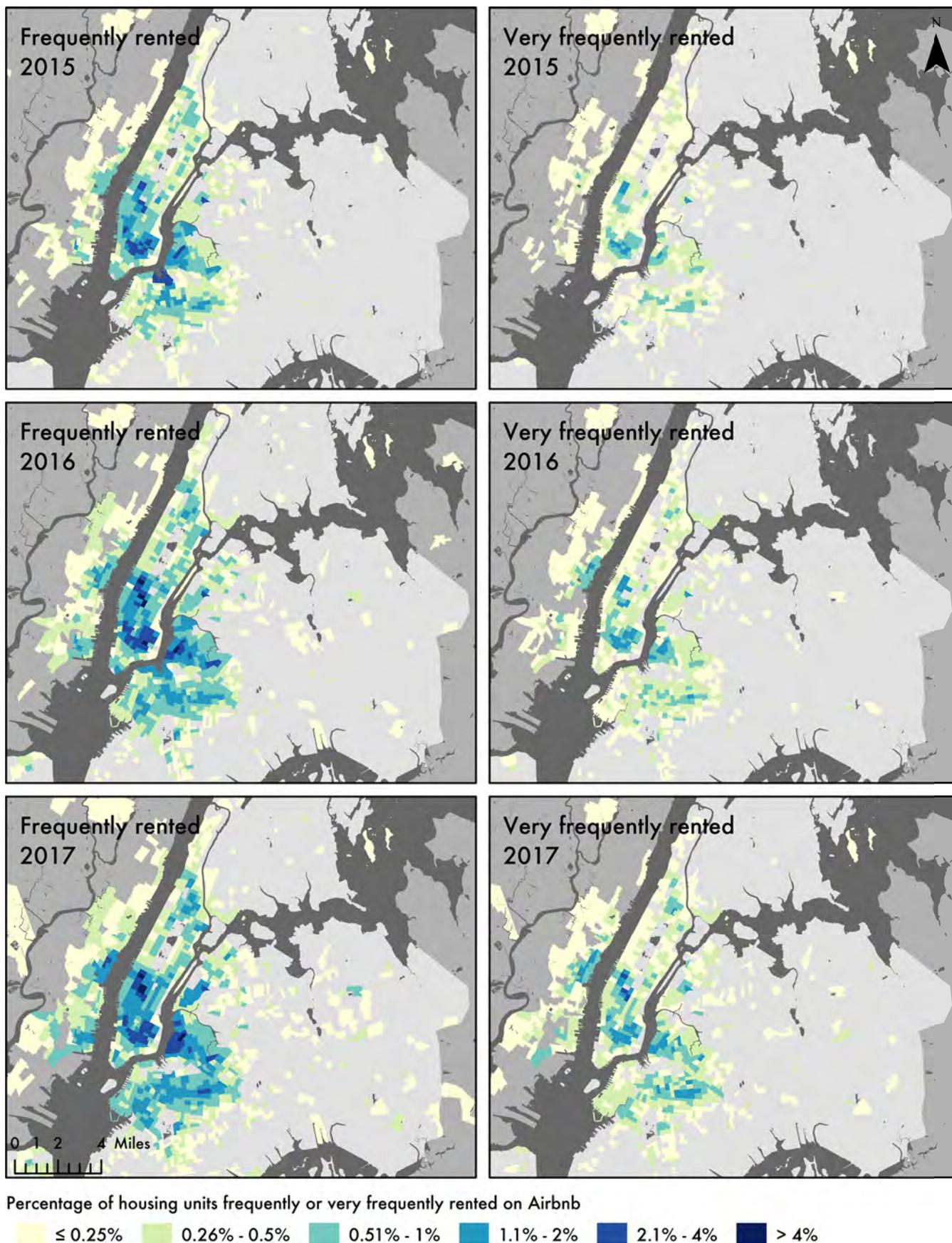


Figure 3c. The proportion of total housing units frequently (60/120) and very frequently (120/240) rented in New York

High Revenue

Neighborhood	Number of 60/120 frequently rented listings (% growth rate)	% of all housing units frequently rented on Airbnb
Midtown Manhattan	2,000 (0.8%)	1.1%
Downtown Manhattan and Williamsburg	2,700 (-2.3%)	1.6%

High Growth

Neighborhood	Number of 60/120 frequently rented listings (% growth rate)	% of all housing units frequently rented on Airbnb
Eastside Manhattan	900 (17%)	0.7%
North-Central Brooklyn	1,700 (32%)	0.9%

Figure 3d. Frequently rented (60/120) Airbnb listings in the highlight neighborhoods last year

NEW YORK'S GHOST HOTELS

It is likely that most private-room listings on Airbnb are rented by primary residents with a spare room. But using spatial analysis we have identified 4,700 listings across New York City (16% of all private-room listings in the city) which are in fact “ghost hotels”—entire units or even whole apartment buildings which have been converted into many private-room listings by the owner. These 4,700 listings form 1,200 discrete ghost hotels, a number which has increased 79% since 2015 (far faster than the overall rate of Airbnb growth in New York). All told, New York’s ghost hotel operators earned \$30.4 million on Airbnb last year.

Most discussion of Airbnb’s impact on housing availability and affordability focuses on entire-home listings, and for good reason—these are the listings which, if rented sufficiently often throughout the year, by definition can no longer be housing a

long-term tenant. Private room listings, by contrast, are generally assumed to have little if any impact on housing markets, since they generally do not displace renters. This assumption is clearly false in a city such as New York where a high percentage of renters live with roommates. A primary tenant who might have previously listed a spare bedroom on Craigslist and found a long-term tenant can now list the spare bedroom on Airbnb. But the impact of private-room Airbnb rentals on the long-term rental market for roommates is difficult to estimate without extensive surveying and interviews to determine what residents were previously doing with the rooms which they are now renting on Airbnb.

There is another possible way in which private-room Airbnb rentals may be reducing rental housing supply for long-term tenants, though. This is the question of whether entire units or

apartment buildings are being converted into what the Canadian housing advocacy group Fairbnb has called “ghost hotels” (Wieditz 2017). Ghost hotels are entire units or buildings whose individual bedrooms have been listed individually on Airbnb as private rooms. There are various reasons a host might choose to list their units this way, but given that short-term rentals of entire homes are generally illegal in New York, converting apartments into ghost hotels would be a convenient way for a host to avoid regulatory scrutiny.

Using spatial cluster analysis, we identified groupings of private rooms rented by a single host which are highly likely to be located in the same building. The results are startling: across New York City, there are 1,200 ghost hotels, comprising over 4,700 separate private-room listings. Each of these ghost hotels has removed rental housing from the long-term rental market. Most of these ghost hotels comprise three to five private-room listings, and thus appear to be single apartment units. But some have 10 or more listings, and thus are almost certainly multiple units in a building—or an entire building—listed on Airbnb by the landlord. (The top three ghost hotels are detailed in Figure 3e; a traditional hostel which has listed its rooms on Airbnb has been excluded.)

Three facts are striking about New York City’s ghost hotels. The first is the simple fact of their existence. Public discussion and debate about

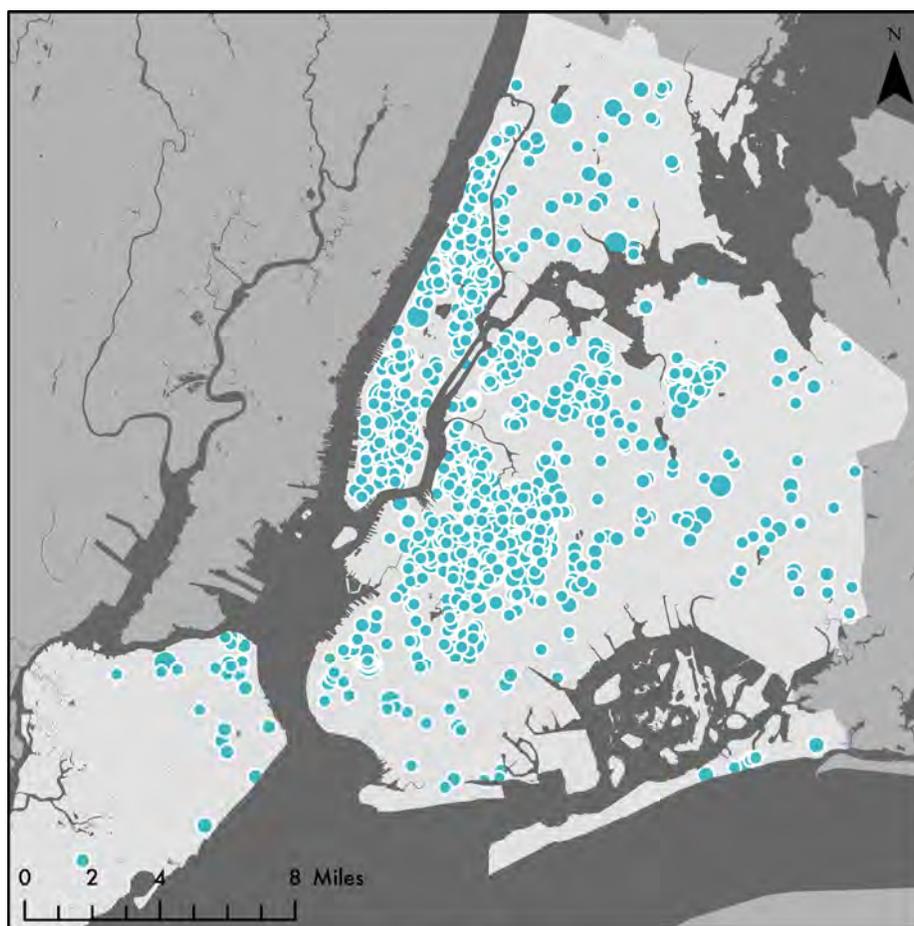
short-term rentals often assumes the benignness of private-room rentals, because these are thought to be hosted by owner- or renter-occupiers and thus not removing any rental housing options for local residents. The fact that thousands of these listings are actually a surreptitious mechanism for converting apartments (and entire apartment buildings) into hotels is an important fact to be added to the public debate. For example, here is a guest review from a private-room listing in one of the most lucrative ghost hotels in New York:

This is made to look like a couple sharing their home on AirBNB, but it’s actually more like a hostel run by multiple people. Very misleading listing. There are like 20ish tiny rooms and you can hear people snoring and cleaning and such.... Additionally, for those who believe every small room is “private”, it’s actually not. On my check in, I was given room keys for room 116, but my room was 115, but my key still worked for room 115. My first day there, I got curious and tried using the keys on room 116 as well, and they actually worked. The door key to every single “room” is the same.

The second striking fact is the scale and distribution of the ghost hotel phenomenon. Figure 3f shows the locations of all the ghost hotels operating in New York City over the last twelve months (the size of points is proportionate to the number of private rooms in the ghost hotel). There are ghost hotels across all five boroughs, although

Example listing title	# of revenue-earning rooms	Average # of annual nights booked per room	Approx. annual revenue
“[301] 5 minute WALK to Times Square”	11	180	\$350,000
“Interfaith Retreat Guest Rooms (Seva)”	11	260	\$200,000
“Large Room 15 Minutes to Manhattan”	12	220	\$200,000

Figure 3e. The largest three ghost hotels in New York City last year



Number of private rooms in each New York City ghost hotel

• 1 ■ 2.5 ● 5 ● 7.5 ● 10

Figure 3f. Locations of the 1,200 likely ghost hotels in New York City

Brooklyn has the most in both absolute and proportional terms. These hotels earn on average \$6,400 per room annually, which is 27% higher than non-ghost-hotel private-room listings (which earn \$5,100 annually). In total, New York City's ghost hotels earned \$30.4 million dollars—which is 19% of all the revenue earned by private-room Airbnb listings in the city.

The final striking fact about New York's ghost hotels is their growth rate. Over the last two years, the number of revenue-earning listings in New York City has grown 37%, from 48,800 in the September 2014 - August 2015 year to 67,100 in the September 2016 - August 2017 year. In the same time period, the number of revenue-earning private-room listings has grown 55%, from 19,600 to 30,300. Ghost hotels are growing

substantially faster than either of these categories, nearly doubling over the same time period. In the year ending August 2015, there were 670 ghost hotels, comprising 2,600 listings and earning a total of \$19.3 million for the year. Two years later, the number of ghost hotels had increased 79% to 1,202, comprising 4,700 private-rooms (an 84% increase) earning \$30.4 million (a 58% increase). These facts are summarized in Figure 3g, and clearly demonstrate that ghost hotels are a rapidly growing portion of Airbnb activity in New York City. This portion has so far flown under the radar of regulatory scrutiny despite the fact that it is taking an increasingly large number of apartments off the long-term housing market for New York residents. Given that every ghost hotel is by definition a commercial operation and not "home sharing", new regulatory scrutiny seems warranted.

	# of ghost hotels (% increase from 2015)	# of private rooms in ghost hotels (% of total revenue-earning private rooms)	Annual revenue
New York City	1,200 (79%)	4,700 (16%)	\$30.4 million
Manhattan	400 (76%)	1,500 (12%)	\$11.8 million
Brooklyn	520 (49%)	2,100 (16%)	\$13.0 million

Figure 3g. New York's ghost hotels

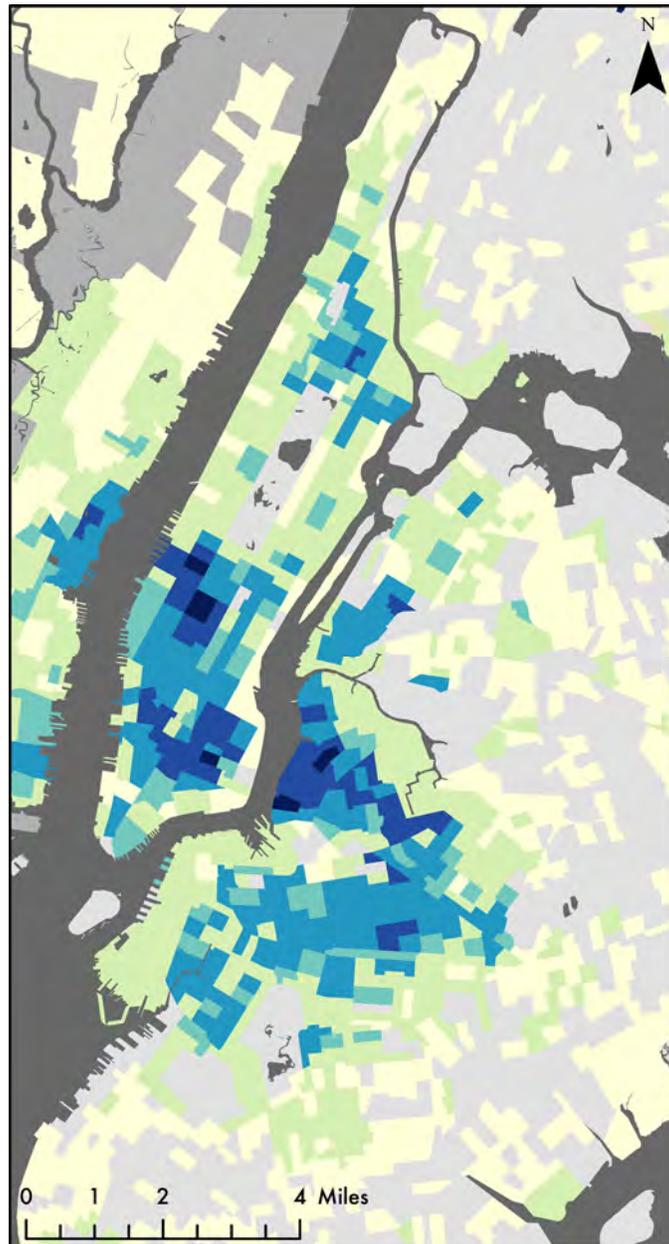
HOW MANY HOUSING UNITS HAS AIRBNB REMOVED FROM THE RENTAL MARKET?

Combining the estimates of entire-home Airbnb listings which have been removed from the rental market with the ghost hotels provides an estimate of Airbnb's overall impact on long-term rental housing availability in New York. Figure 3h provides these estimates for a range of different New York geographies, while Figure 3i shows the distribution of lost housing across the city. What these figures indicate is that no fewer than 7,000

units have been removed from the market for local residents (very frequently rented, entire-home listings plus ghost hotels), and the number of lost units could in fact be 13,500 or more (frequently rented, entire-home listings plus ghost hotels). This housing loss has been concentrated most heavily in Midtown and Lower Manhattan, but the growth rate of housing loss is highest in North and Central Brooklyn.

	Frequently rented entire-home listings	Very frequently rented entire-home listings	Rental units converted to ghost hotels	Plausible range for housing lost to Airbnb
New York City	12,200	5,600	1,400	7,000 - 13,500
Manhattan	7,000	3,100	500	3,600 - 7,500
Brooklyn	4,200	2,000	600	2,600 - 4,800
Midtown Manhattan	2,000	900	90	1,000 - 2,000
Downtown Manhattan and Williamsburg	2,700	1,200	150	1,300 - 2,900
Eastside Manhattan	900	400	60	500 - 600
North-Central Brooklyn	1,700	900	270	1,200 - 2,000

Figure 3h. Combined estimate of housing lost to Airbnb



High-end estimate of % housing lost to Airbnb

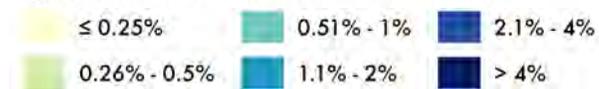


Figure 3i: Combined estimate of housing lost to Airbnb by census tract

4. Is Airbnb driving gentrification?

We estimate that, by reducing housing supply, Airbnb has increased the average long-term rent by 1.4% over the last three years, implying that the average New York tenant looking for an apartment this year will pay \$380 more annually in rent because of Airbnb. In large parts of the city, hosts of frequently rented entire-home Airbnb listings earn 200% or more the median long-term neighborhood rent, and these areas are 72% non-white. This means there is a powerful economic incentive for landlords to displace tenants and convert apartments to Airbnb de facto hotels in communities of color. High-growth neighborhoods (particularly Harlem and Bedford-Stuyvesant) are disproportionately African American, while neighborhoods with high existing Airbnb revenue (generally in Midtown and Lower Manhattan) are disproportionately white.

AIRBNB'S ECONOMIC DOMINANCE OF NEW YORK'S RENTAL MARKET

Given the fact that Airbnb has taken between 7,000 and 13,500 units of long-term rental housing off the market in New York City, an important question is the extent to which Airbnb is thereby fueling gentrification across the city. Based on an analysis of revenue flows through the housing market, our conclusion is that Airbnb has created a new “rent gap”—a systematic gap between rental revenue under a building’s current use and potential revenue under a different use—which is driving gentrification in a number of Manhattan and Brooklyn neighborhoods (Wachsmuth and Weisler forthcoming). The potential economic returns to the very same apartment may be higher now than they were a few years ago, simply because Airbnb provides a new revenue stream which requires little new investment needed on behalf of landlords. While serious Airbnb entrepreneurs may well refurbish their units to increase their success with the service, the only necessary step for converting

a long-term rental to a short-term rental is to remove the existing tenant.

The implication is that, in areas where there is strong tourist demand, owners of rental units in areas have a strong economic incentive to convert units to short-term rentals. In order to quickly and cheaply realize these higher potential rents, owners of rental units may evict existing tenants, or not replace tenants when they depart. Figures 4a and 4b analyze revenue flows through Airbnb and through the long-term rental market to identify the areas of New York where Airbnb has already had a large impact on housing market revenue flows and the areas where the likelihood of future impact is highest. Figure 4a compares total monthly Airbnb host revenue with total monthly long-term rental revenue by census tract. The hotspots are Midtown Manhattan, the Lower East Side, and Williamsburg—neighborhoods which are all “post-gentrified”, in the sense that they saw massive increases in rents and massive

displacement over the last several decades, and now have been transformed, to a greater or lesser extent, into affluent neighborhoods. In these areas, Airbnb generally now accounts for 5% or more of the entire housing rental market by revenue.

Across the entire city last year, the median host of a frequently rented entire-home listing earned 54% more than the median long-term rent in the same neighborhood. In fact, 92% of all hosts of frequently rented entire-home listings made more than the median long-term neighborhood rent. Figure 4b shows this pattern across the city; neighborhoods where the ratio of short-term rents to long-term rents is highest are where the data suggests that there is money to be made but landlords haven't yet seized on the opportunity en masse. In other words, these are the neighborhoods at greatest risk for Airbnb-induced gentrification in the near future. Whereas current Airbnb impacts were concentrated in already-gentrified areas, these at-risk neighborhoods are all still very clearly at the gentrification frontier. Just under 380,000 households in New York City live in these areas—11% of the city's population. Comparing these two patterns—the percentage of housing revenue that now flows through Airbnb, and the percentage of the median rent which an average full-time Airbnb property earns—allows us to see where Airbnb has already had a major impact on local housing and where it is likely to have an impact in the future. The first pattern indicates where Airbnb has already had a major impact on local housing. The second pattern indicates where there is still money to be made for landlords by converting long-term rental housing to short-term rentals.

IS AIRBNB INCREASING RENTS IN NEW YORK?

Applying a comparative model developed by researchers at UCLA, we estimate that Airbnb has increased long-term rents in New York City by 1.4% over the last three years. This implies that the median renter household looking for a new

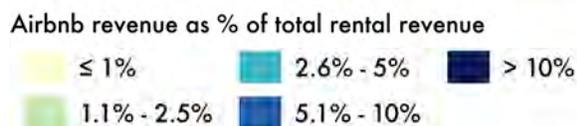
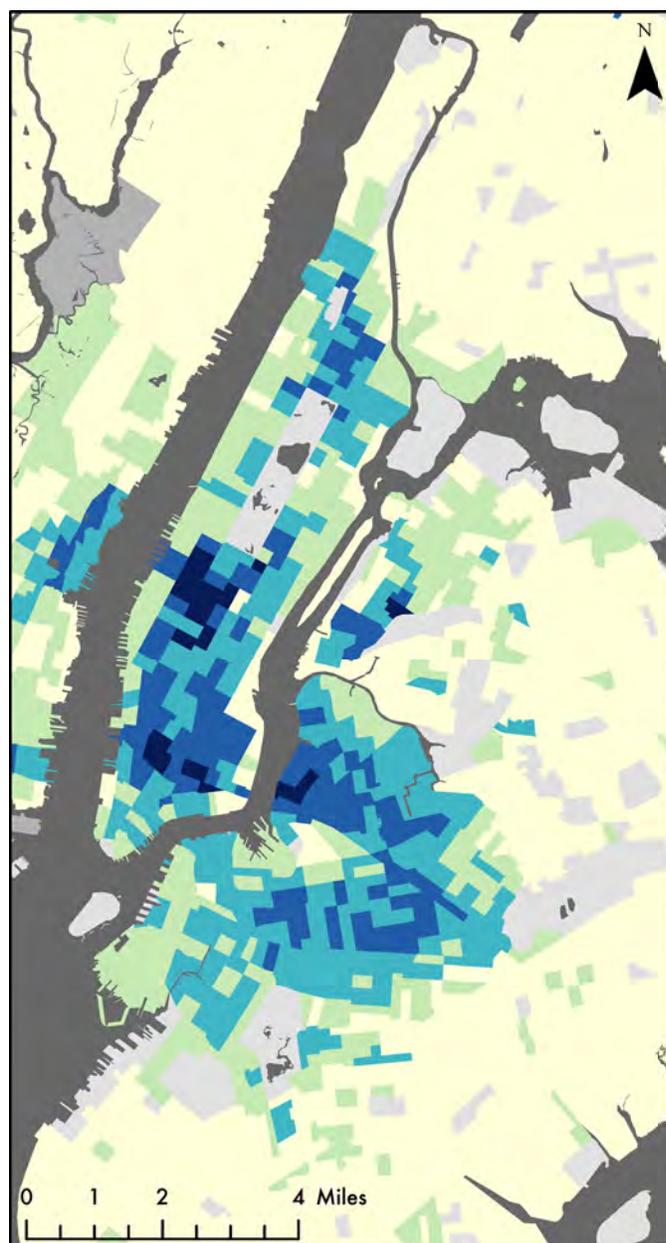
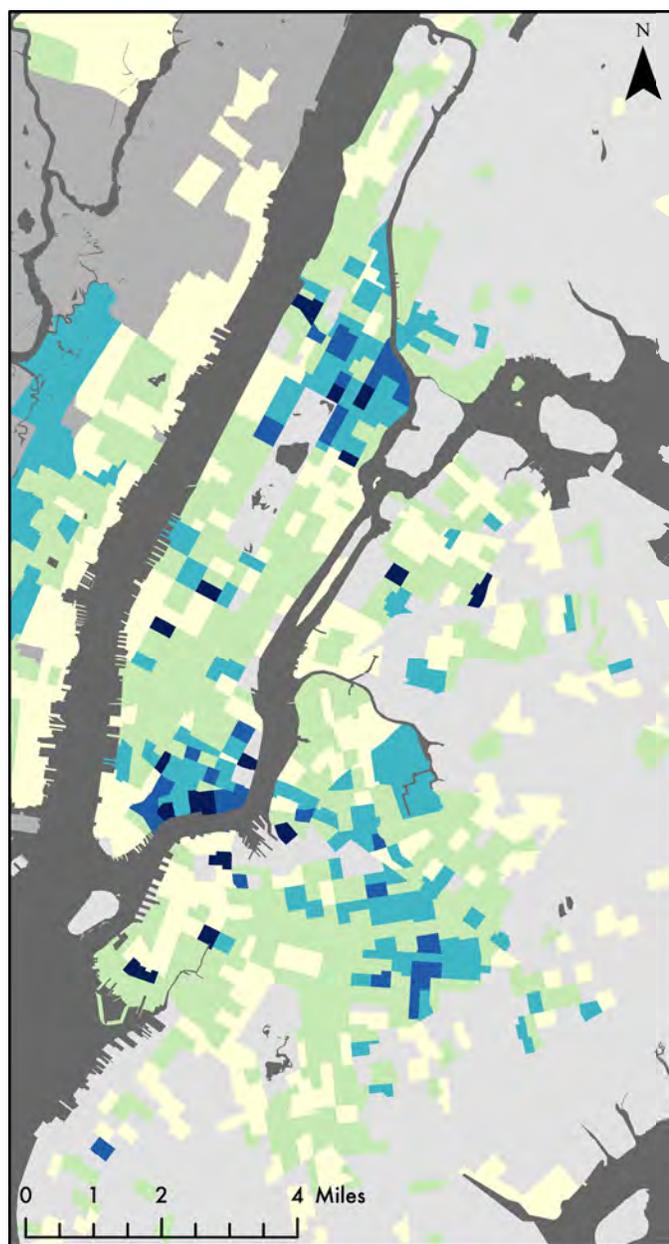


Figure 4a. The percentage of rent payments which now flow through Airbnb

apartment will pay \$384 more per year because of Airbnb's recent growth.

The previous chapter demonstrated that Airbnb is very likely removing between 7,000 and 13,500 units of rental housing from the long-term rental



% of med. rent earned by avg. freq. rented ent.-home listing



Figure 4b. The profitability of an average Airbnb listing compared to median 12-month rents in the neighborhood

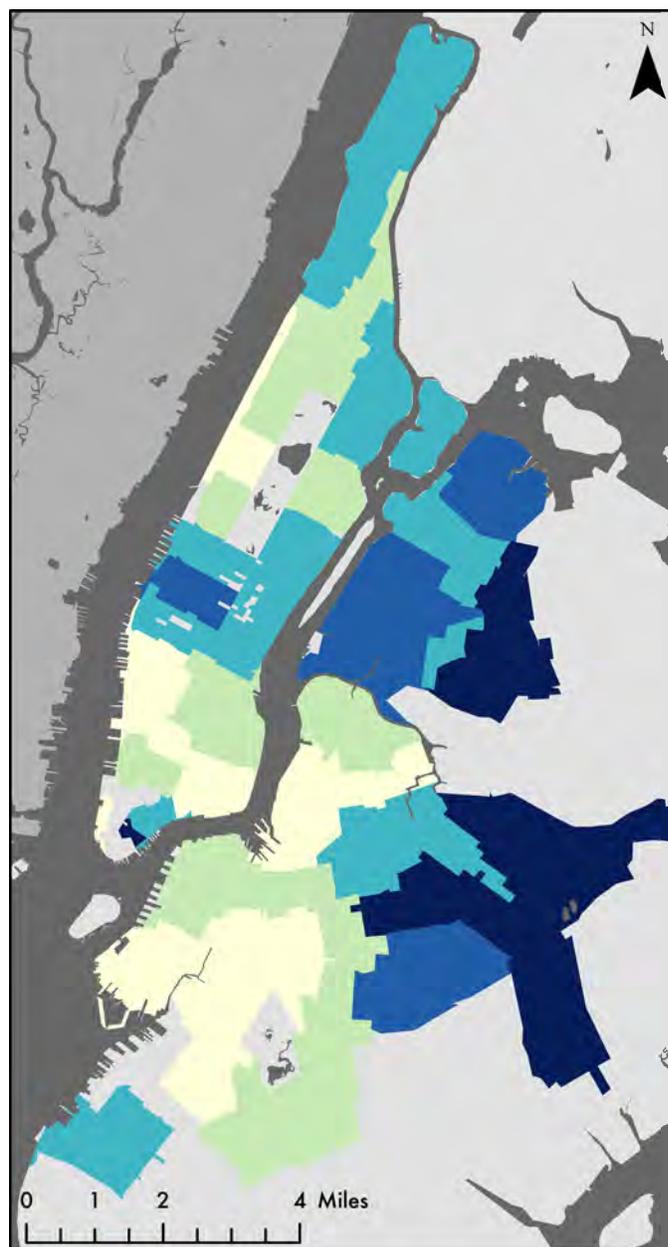
market across New York City, with the effects particularly concentrated in neighborhoods in Midtown and Lower Manhattan and North Brooklyn. Basic principles of supply and demand suggest that the removal of rental housing

stock will drive up prevailing rents, because the same amount of demand for accommodation will be chasing a smaller supply of available accommodation. But is it possible to directly estimate Airbnb's impact on rents in New York? Such an estimation can only be done by comparing New York to other city-regions. This is because we need to be able to control for "endogeneity": factors specific to New York which might suggest a spurious correlation. For example, imagine that New York's tourism office conducts an extremely successful place-marketing campaign that encourages many new tourists, but also encourages long-term residential relocations. We might observe rising Airbnb activity and rising long-term rents, and conclude that Airbnb activity causes higher rents. But in fact, the tourism campaign was the cause of both the increased Airbnb activity and the higher rents, and our conclusion would be false. If we can compare New York with many other cities, we can minimize these confounders, and find the true association between short-term rentals and long-term rentals.

Conducting such a large-scale comparison is outside the scope of the present study. However, a recent paper by Barron et al. (2017) has gathered data from 100 US cities to answer precisely this question. After controlling for a comprehensive set of factors, they find that a "exogenous" 10% increase in number of Airbnb listings in an area (which is to say, an increase that is not driven by other factors which would have increased rents anyway) predicts a 0.42% increase in long-term rents. Applying this relationship to our data, we find strong evidence that Airbnb has increased long-term rents in New York City. On a city-wide scale, using the broadest possible definition of active listings (used by Barron et al. in their model), active listings increased annually by 116%, 62%, and 33% in the three years between September 2014 and August 2017. Applying Barron et al.'s national average ratio of exogeneity to New York City, this implies that, city-wide, Airbnb drove up

rents by 0.8% in 2015, 0.4% in 2016, and 0.2% in 2017 (all for years ending in August). This is a cumulative 1.4% increase in rents over these three years attributable to Airbnb's presence in the city. The overall median rent increase in New York City in this time period was 8.7%, which means that Airbnb is responsible for something like 16% of the total increase in rents in New York City in the last three years.¹

Zillow's rent index is generally understood to offer the best estimate of current market rents, which means rents which a prospective tenant is likely to encounter if searching for an apartment. According to Zillow, the current monthly median rent city-wide is \$2,354. If Airbnb had remained at its September 2014 levels in New York City over the last three years, Barron et al.'s model implies that the median rent would instead be \$2,322. The implication is that the median renter household looking for housing in New York City will pay an average of \$384 more in rent this year because of the growth of short-term rentals in the city over the last three years. Of course, Airbnb activity is not distributed evenly across the city. Figure 4c estimates the impact of Airbnb on rents at the census tract scale using Barron et al.'s model. (In the map, zip codes with fewer than 100 listings at the beginning of the study period are suppressed because of reliability concerns, although their data contributed in aggregate to the calculation of the city-wide average.) Figure 4d summarizes the impact for the four profile neighborhoods, along with all the sub-neighborhoods for which reliable data could be collected. Many of these areas have seen estimated increases in annual median rent of \$500 or more thanks to the last three years of Airbnb activity. Notably, zip code 10036 in Clinton has seen an estimated increase of \$780.



% 2014-2017 rent increase attributable to Airbnb

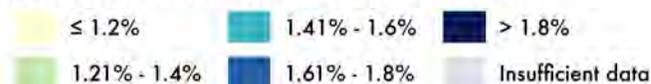


Figure 4c. Total estimated 2014-2017 annual rent increases attributable to Airbnb

¹ Because these figures are derived from a limited subset of data used for a national comparative model, they should be treated as suggestive rather than definitive. For reference, across their entire national dataset, Barron et al. find that Airbnb has driven up rents an average of 0.27% each year, compared to the average of 0.46% each year we find for New York. Given how much faster Airbnb has grown in New York than the country as a whole, our estimates are quite plausible.

High Revenue

Neighborhood	Total estimated 2014-2017 annual % rent increase attributable to Airbnb	Range of estimated annual \$ increases in median rent by sub-neighborhood
Midtown Manhattan	1.42%	Chelsea: \$610 - \$720 Clinton: \$690 - \$780 Upper West Side: \$560 - \$580
Downtown Manhattan and Williamsburg	1.17%	East Village: \$610 Lower East Side: \$510 - \$590 West Village: \$570 Williamsburg: \$330

High Growth

Neighborhood	Total estimated 2014-2017 annual % rent increase attributable to Airbnb	Range of estimated annual \$ increases in median rent by sub-neighborhood
Eastside Manhattan	1.31%	Central Harlem North: \$460 Central Harlem South: \$490 East Midtown: \$640 - \$720 Gramercy: \$570
North-Central Brooklyn	1.42%	Bedford: \$370 Crown Heights: \$450 East Williamsburg: \$470 Park Slope/Gowanus: \$310 - \$350 Stuyvesant Heights: \$530

Figure 4d. Total estimated 2014-2017 rent increases driven by Airbnb across highlight neighborhoods

RACIALIZED IMPACTS OF AIRBNB IN NEW YORK

Over the last several years, evidence has mounted that people of color face persistent discrimination on Airbnb. Edelman et al. (2017) found, for example, that prospective guests with distinctively African American names are 16% less likely to have their reservation requests accepted than nearly identical guests with distinctively white names. The Twitter hashtag *#airbnbwhileblack* amply documents these experiences. But if people of color face persistent discrimination as users of

Airbnb while traveling, how does Airbnb impact communities of color in their home cities? Is Airbnb contributing economically to these communities, or increasing their economic challenges?

Across New York City, we find no correlation between host revenue growth and the racial composition of a neighborhood. But we do find a moderately strong positive correlation ($\rho = 0.229$) between host revenue earned in the last

year and the proportion of households which are white. In other words, at the level of simple correlation, white neighborhoods make more money on Airbnb than non-white neighborhoods. This pattern is borne out for the high-revenue highlight neighborhoods, in which white households are dramatically overrepresented. Across New York City, 39.2% of households are white, while 68.4% of households in the Midtown Manhattan focus neighborhood are white, as are 56.9% of households in the Downtown Manhattan and Williamsburg focus neighborhood.

The pattern looks quite different for the high-growth neighborhoods, though; the North-Central Brooklyn highlight neighborhood in particular is 70.8% non-white by household, compared to the city-wide average of 60.8% (Figure 4e). The Eastside Manhattan neighborhood is very close to the city-wide average, although in this case this figure is somewhat misleading, since the area combines two disproportionately white Midtown locations (Gramercy and Turtle Bay) with two disproportionately Black and Latino locations (Central Harlem South and Central Harlem North). In spite of this complication,

the overall pattern is clear: the highest-earning neighborhoods for Airbnb tend to be whiter than the city as a whole, while the fastest-growing neighborhoods for Airbnb tend to be less white than the city as a whole.

Narrowing in on the parts of New York City where the average frequently rented entire-home Airbnb listing earns more than double the median long-term rent reveals an even starker picture of racialized gentrification. Because of the large disparity between current long-term rental income and potential future Airbnb income, these areas are under the highest pressure for Airbnb-induced rent increases and loss of rental housing. And these neighborhoods are 72% non-white.

Variations of this fact have been noted by a range of commentators, as well as by Airbnb itself, which has launched an aggressive public relations campaign touting the supposed economic benefits it brings to Black neighborhoods. According to recent research, however, the reality is that most Black residents of areas seeing Airbnb growth are unlikely to see much benefit from this growth. Using facial recognition technology

High Revenue

Neighborhood	% of households which are non-white
Midtown Manhattan	31.6%
Downtown Manhattan and Williamsburg	43.1%

High Growth

Neighborhood	% of households which are non-white
Eastside Manhattan	57.9%
North-Central Brooklyn	70.8%

Figure 4e. High-revenue neighborhoods are disproportionately white, while high-growth neighborhoods are disproportionately African American and Latino

to identify the race of Airbnb hosts, Murray Cox (2017) has investigated the impact of Airbnb on predominantly Black neighborhoods in New York City. The study found that short-term rentals are growing faster in Black neighborhoods, displacing and otherwise disproportionately affecting Black residents while simultaneously accruing wealth for white residents. The findings conclude that, across Black neighborhoods, Airbnb hosts are five times more likely to be white than the underlying demographics would predict. Seventy four percent of Airbnb listings are operated by white hosts, while white residents comprise only 13.9 percent of the population in those neighborhoods.

Cox (2017) uses a “white disparity index” to calculate the representation of whites people in the Airbnb community compared to their representation in a neighborhood (“An index of 100 means that white Airbnb hosts are representative in the Airbnb host community in the same proportion as their representation in the underlying neighborhood” [ibid, 9]). The highest white disparity index can be found in Erasmus, southeast of Prospect Park in Brooklyn, where white people make up 1.7 percent of

the neighborhood population but 58 percent of Airbnb hosts. Across all the 72 predominantly Black neighborhoods, where white residents make up only 13.9% of the population, white Airbnb hosts earned \$159.7 million in the study period, compared to \$48.3 million earned by Black hosts in those neighborhoods.

The patterns identified by Cox (2017) suggest that the new growth of Airbnb in Black neighborhoods will not provide the economic benefits that the company claims it will. Indeed, Cox concludes that Black residents are six times more likely than white residents to be affected by Airbnb-induced housing loss in the neighborhoods he examined, since 79.2% of residents of these neighborhoods are Black, and only 13.9% are white. (Likewise, we found that in high-risk neighborhoods across the city, 72% of residents are non-white.) As we have discussed in the current and previous chapters, the expansion of Airbnb activity in these areas is taking long-term housing off the market and increasing rents for new tenants. Meanwhile, Cox’s findings imply that white hosts are disproportionately accruing economic benefit from Airbnb in these areas.

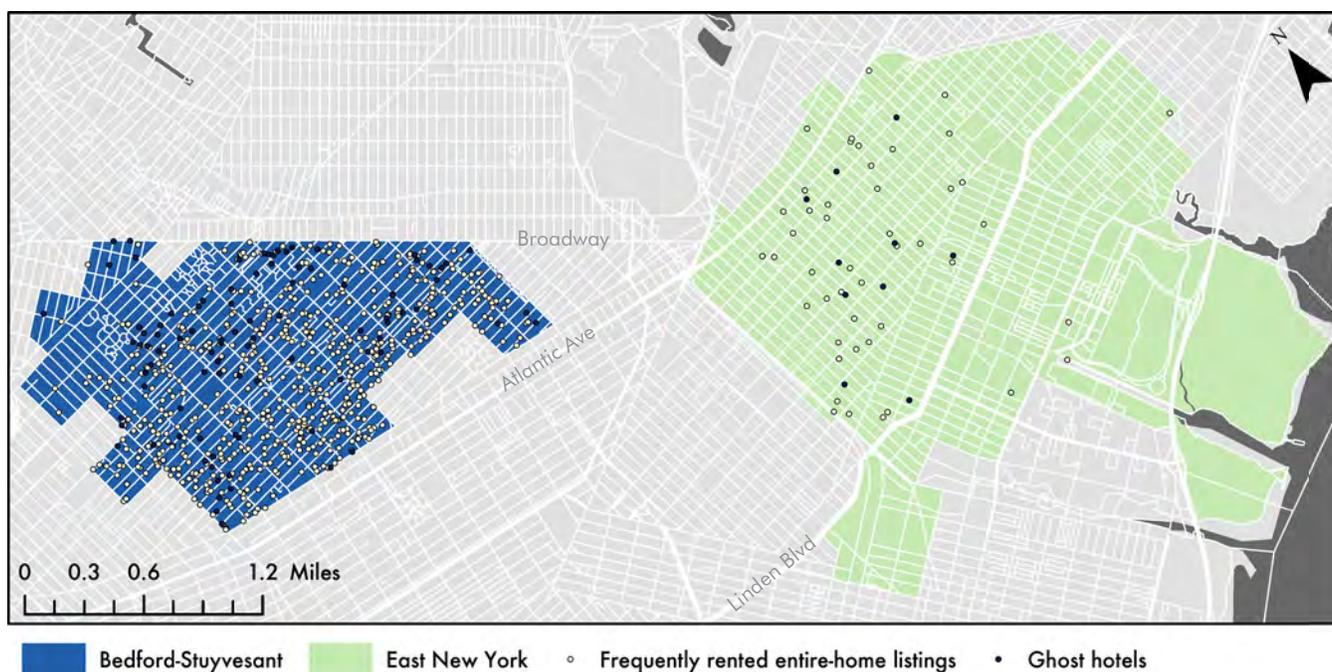


Figure 4f. Case study neighborhoods and approximate locations of Airbnb listings threatening housing supply

CASE STUDY: BEDFORD-STUYVESANT AND EAST NEW YORK

The relationship of Airbnb to gentrification can be illustrated through a more detailed examination of a pair of Brooklyn neighborhoods: Bedford-Stuyvesant and East New York. (These neighborhoods are shown, along with the Airbnb listings which are threatening to remove housing from the rental market, in Figure 4f.) Each of these areas has seen Airbnb growth far outpacing the city-wide average. For example, between 2015 and 2017, the number of frequently rented, entire-home listings in New York City increased 63%, from 7,500 to 12,200. In the same time period, the number of these listings nearly doubled in Bedford-Stuyvesant (a 94% increase from 310 to 610 listings), and nearly quadrupled in East New York, albeit from a very low base (a 275% increase from 12 to 45 listings). Bedford-Stuyvesant is quickly becoming one of the city-wide hotspots for Airbnb activity in New York, while East New York represents the far edge of Airbnb's expansion in the city.

The median asked rent in zip codes 11216 and 11221, which roughly overlap the western (Bedford) and eastern (Stuyvesant Heights) portions of Bedford-Stuyvesant were \$2,320 and \$2,316 in September 2014. Three years later, they had increased to \$2,485 and \$2,466. These are 7.1% and 6.5% increases. In the same time period, the total number of Airbnb listings (active and inactive) in the two zip codes increased from 838 and 706 to 3,499 and 4,615. Applying Barron et al.'s (2017) model, this suggests that approximately one sixth of the rent increase in Bedford's zip code 11216 could be attributed to Airbnb expansion (1.2%, or \$30 a month), while fully a quarter of the rent increase in Stuyvesant Heights's zip code 11221 could have been caused by Airbnb (1.83%, or \$44 a month).

How could Airbnb have had such a dramatic impact on rents in Stuyvesant Heights over the last three years? Last year there were 1,640 revenue-earning

listings in the area. However, many of these listings were part-time, and many more were private rooms in homes occupied by their primary resident. Limiting the tally to only those units at serious risk of being removed from the long-term rental market, 350 entire-home listings were frequently rented, and a further 50 units appear to have been converted into private-room ghost hotels. This means that approximately 400 long-term housing units in Stuyvesant Heights may have been removed from the long-term rental market and converted to full-time Airbnb usage. This is a large number, but less than 1% of the total 47,855 units of housing in the neighborhood. However, the vast majority of those housing units are occupied by long-term residents. Market rents are determined by the intersection of supply and demand for the much smaller number of units available on the rental market at any given point. According to the 2015 American Community Survey (the most recent available), there were 1,557 housing units in the neighborhood vacant and available for rent. If we charitably assume that none of these was directly converted into an Airbnb listing, it still remains the case that full-time Airbnb listings account for something like 20% of the "available" rental housing stock (i.e. all the units vacant and available for rent, plus all the units which would be available for rent if they weren't full-time Airbnb short-term rentals).

Cox's (2017) study of Airbnb hosts further demonstrates that, in Stuyvesant Heights, it is white Airbnb hosts who are disproportionately benefiting from Airbnb, while Black residents are bearing the burden of higher rents and fewer available apartments. Cox found white people make up 74.9 percent of Airbnb hosts and generate 63.4% of platform revenue in Stuyvesant Heights, but represent only 7.4 percent of the neighborhood population. This makes it the fourth most disparate in the top 20 predominantly Black neighborhoods, with a white disparity index of 1,012.

	Active listings in 2017 (% growth since 2015)	Airbnb host revenue in 2017 (% growth since 2015)	Freq. rented entire-home listings in 2017 (% growth since 2015)	Estimated annual \$ increases in median rent
Bedford-Stuyvesant	3,270 (56.9%)	\$26.0 million (87.4%)	610 (93.6%)	\$370 (Bedford) \$530 (Stuy. Heights)
East New York	190 (246%)	\$1.3 million (311%)	45 (275%)	\$550 (zip 11207)

Figure 4g. Airbnb's impact on Bedford-Stuyvesant and East New York

East New York is one of New York City's poorest neighborhoods, and has suffered waves of disinvestment since the Second World War. However, in 2016 City Council approved a comprehensive rezoning of the neighborhood, ushering in new housing development, some of it subsidized by the City. As development starts to accelerate, gentrification concerns have accelerated as well, and there is evidence to suggest that Airbnb is now growing rapidly in the area, and is beginning to reduce housing affordability and availability particularly in the west wide of East New York.

The median rent in zip codes 11207 and 11208 (which include East New York as well as adjacent areas to the north) increased from \$1,985 and \$2,108 in September 2014 to \$2,225 and \$2,191 in September 2017: respectively 12.1% and 3.9% increases in three years. Applying Barron et al.'s (2017) model to zip code 11207 (the western portion of East New York) suggests that approximately a sixth of the total rent increase—2.1%, or \$46 a month—could be attributed to Airbnb expansion in this area. The eastern area (zip code 11207) did not have enough Airbnb listings in 2014 to reliably estimate the effects of Airbnb on long-term rents, although the much lower level of Airbnb activity here would suggest a more modest impact on rents. Indeed, the following facts are suggestive: in 2014, the eastern zip code had 6% higher median rent than the western zip code, but by 2017 this situation had reversed, and the western area (where Airbnb usage had surged) had slightly higher rent. Moreover, the

increase in Airbnb usage in the western part of East New York has mapped very closely onto subway access (an important predictor of Airbnb listing success). Nearly all the frequently rented listings and ghost hotels are within 1500 feet of a subway station. The eastern part of the neighborhood does not have subway access, and has not seen the same increase in frequently rented listings.

Unlike Stuyvesant Heights, however, East New York has not seen the same enormously disproportionate share of the economic benefits of Airbnb hosting accruing to the white population. The situation is mixed; on the one hand, Cox (2017) found that white hosts administered 29% of listings in the neighborhood, despite accounting for only 2.5% of the population. On the other hand, he estimated that Black hosts earned 97.9% of the revenue from Airbnb hosting in East New York, actually slightly outpacing Black residents' 94.6% share of the neighborhood's population. An important proviso to these findings is that they are more than a year old; given the rapid Airbnb growth in East New York since then, along with the previous scarcity of listings, it is difficult to know how to extrapolate Cox's findings here to the present.

The conclusion of these case studies (summarized in Figure 4g), as well as the preceding analysis of New York City as a whole, is that Black residents are coming under increased housing availability and affordability stress thanks in part to the expanding Airbnb hosting activities of white residents. In other words, Airbnb is increasing racialized gentrification pressures in New York.

Appendix: Data and methodology

The findings in this report are based on a comprehensive analysis of three years of Airbnb activity in the New York region. The data covers the “New York-Newark-Jersey City, NY-NJ-PA Metro Area”, the US Census Bureau-defined “metropolitan statistical area” (MSA) which contains 24 million residents across the tri-state areas. The study period is September 2014 - August 2017, and every Airbnb listing which existed at any point in this period in the New York MSA has been included in the analysis. Excluding listings which were created but never made available on the Airbnb website (for example because they were created shortly below the end of the study period), the database contains 184,462 listings. For each of these listings, we have information about its reservation status for each day it was active over the three-year period. In total, we analyzed just over 80 million datapoints.

The analysis relies on two data sources. The first is a proprietary dataset of Airbnb activity obtained from the consulting firm Airdna, which has been performing daily “scrapes” of Airbnb’s public website since mid-2014, and aggregating the information. The Airdna data has two parts: a “property file” which provides specific static characteristics of each property listing (such as number of bedrooms, cancellation policies, the listing title, etc.), and a “transaction file” which provides a complete list of daily activities for each property (the listed nightly price and whether the property was available, reserved, or blocked for each day). For 2014 and 2015, this transaction data was taken directly from Airbnb and is thus highly accurate. At the end of 2015 Airbnb stopped disclosing when a non-available property was reserved or was simply blocked from new reservations, which made it impossible to precisely measure occupancy and revenue earned. In response, Airdna developed a machine learning

model to estimate this information based on a combination of its existing historical dataset of activity and other information which remained publicly available (e.g. reviews and ratings). While the activity dataset for 2016 and 2017 therefore cannot be fully accurate, we believe it is the most accurate third-party estimate available, and it enables us to estimate occupancy rates as well as revenues for each property over time.

The second data source is the American Community Survey (ACS), an annual survey performed by the US Census Bureau to serve as a complement to the decennial census. We used the 2015 ACS five-year estimates, which provide reliable data about demographics and housing market performance for the 2011-2015 period, and are the most current government data available. The ACS data was analyzed at the scale of the census tract (a small, stable geographic area of approximately 1,200-8,000 people defined by the Census Bureau).

The methodology for the report was developed specifically to analyze Airbnb activity’s relationship to urban housing markets, and has been used in two previous studies (Wachsmuth et al. 2017; Wachsmuth and Weisler forthcoming), one of which is currently undergoing peer review in a leading scholarly journal. It is a spatial big data methodology designed to extract meaningful patterns out of tens of millions of datapoints, and it is based on two principles:

Be conservative about spatial uncertainty:

Although each Airbnb listing is specified on the public Airbnb website with exact latitude and longitude coordinates, these coordinates have been shifted from the real location by up to 150m in a random direction (in order to protect hosts’ privacy). This randomness means that maps which show the

exact locations of listings (or rely on these locations for their analyses) are misleading inasmuch as they exaggerate the precision of the underlying spatial data. It also can lead to nonsensical situations, such as listings apparently located in the middle of a park or a body of water. For spatial analysis of the listings, we have developed a novel Bayesian spatial inference technique to address this problem. This technique relies on the distribution of housing units across the city to “weight” the probabilities of a listing being located in any position within the 150-m radius in which Airbnb randomized it. In practical terms, this means that a listing which has X-Y coordinates which place it in an area with relatively little housing but very close to an area with a lot of housing will be assigned a higher probability of being located in the highly populated area than the lightly populated one. This inference was carried out at the scale of census tracts, and the results aggregated to either census tracts or to the Neighborhood Tabulation Areas defined by New York City. This method of probabilistic spatial analysis allows our estimates to be more reliable at smaller scales than other approaches, while simultaneously avoiding the false appearance of precision of using exact latitude and longitude coordinates which is common in short-term rental mapping.

Aggregate information at meaningful geographies and timescales: We have two strategies for dealing with other, non-spatial sources of uncertainty and error. First, the analysis presented in this report is almost exclusively conducted with large aggregates of listings, at which scales random error should be relatively minimal. Furthermore, results are presented with conservative precision (i.e. where there is higher uncertainty, numbers are rounded to fewer significant digits), in order to not over-imply precision. Second, there is the possibility of non-random (i.e. systematic) error in the underlying dataset, since it is based on a third-party estimate of Airbnb activity. To mitigate this possibility, we have chosen to present as many of the findings as possible in the form of comparisons over

time. Even where there is some uncertainty about the precise levels of the various estimates, the trends presented are much less subject to this uncertainty, because they have been derived using a consistent methodology over time. For example, an estimate of 8,000 homes taken off the long-term rental market may slightly overstate or understate the real figure, but if we find, using the same methodology, that the estimate was 7,000 for the previous year, then there is good reason to think that the underlying growth pattern is accurate.

SEASONALITY: NEW YORK’S SIX-MONTH SUMMER

Any attempt to measure growth trends of short-term rental activity must contend with the fact that this activity is highly seasonal. New York, like other internationally popular tourist destinations, receives substantially more visitors during the summertime than at other points in the year. Given the increasing popularity of Airbnb as accommodation for tourists, it therefore seems likely that Airbnb activity will also be seasonal. Measuring—and ultimately “controlling for”—this seasonality is necessary to accurately interpret month-to-month changes in Airbnb activity. For example, total monthly Airbnb host revenue in the New York region increased by just over 30% between April and May of 2017. This sounds like a large increase, but is it more, less, or equal to the change we should expect based on past years? We are able to answer this question, as well as any other questions related to growth trends, by constructing seasonal indices. A seasonal index allows a time series to be decomposed into two parts: the routine variation that occurs over a year, and the underlying pattern of growth or decline. Using the “ratio-to-moving-average” method, we calculated seasonal indices for the 35-month period October 2014 to August 2017.

Figure Aa shows three seasonality curves for New York Airbnb activity over the three-year

study period. For the number of listings available in a given month, the number of listings with reservations in a given month, and the total host revenue earned in a given month, these seasonality curves show the proportion of a year's activity which occurs in each calendar month, independent of the underlying trends of growth or decline. As the figure indicates, the number of listings active in a given month shows relatively little seasonal variation; in other words, hosts do not appear to add or remove listings from Airbnb in response to changes in demand throughout the year. However, the number of monthly reserved listings (i.e. listings which receive at least one reservation in a given month) does show substantial seasonal variation, and the total amount of revenue hosts earn in a month shows even more variation. In both these cases, the New York region has what can be characterized as a six-month summer. Airbnb activity is at its lowest in January and February, and rises consistently until May, when it plateaus through October. (These six months account for 60% of revenue

earned through the year.) Activity falls steeply in November, and then rises again in December thanks to the holiday season.

Given the highly seasonal nature of Airbnb activity in New York, it is also noteworthy that this seasonality is intensifying. Figure Ab compares revenue seasonality curves for the earliest and latest periods for which it can be calculated (October 2014 - August 2016, and October 2015 - August 2017). It shows that the June-September period is starting to account for more and more of the year's revenue, while revenue from the December-April period is declining. This pattern suggests that Airbnb is hosting increasing proportions of seasonal tourists, and decreasing proportions of off-season visitors (such as business travelers). In the New York regional context, this appears to have been caused by a leveling off of Airbnb revenue growth in New York City (where demand has less seasonal variation) and strong growth in outlying seasonal tourism destinations on Long Island, in Upstate New York, and along the New Jersey Shore.

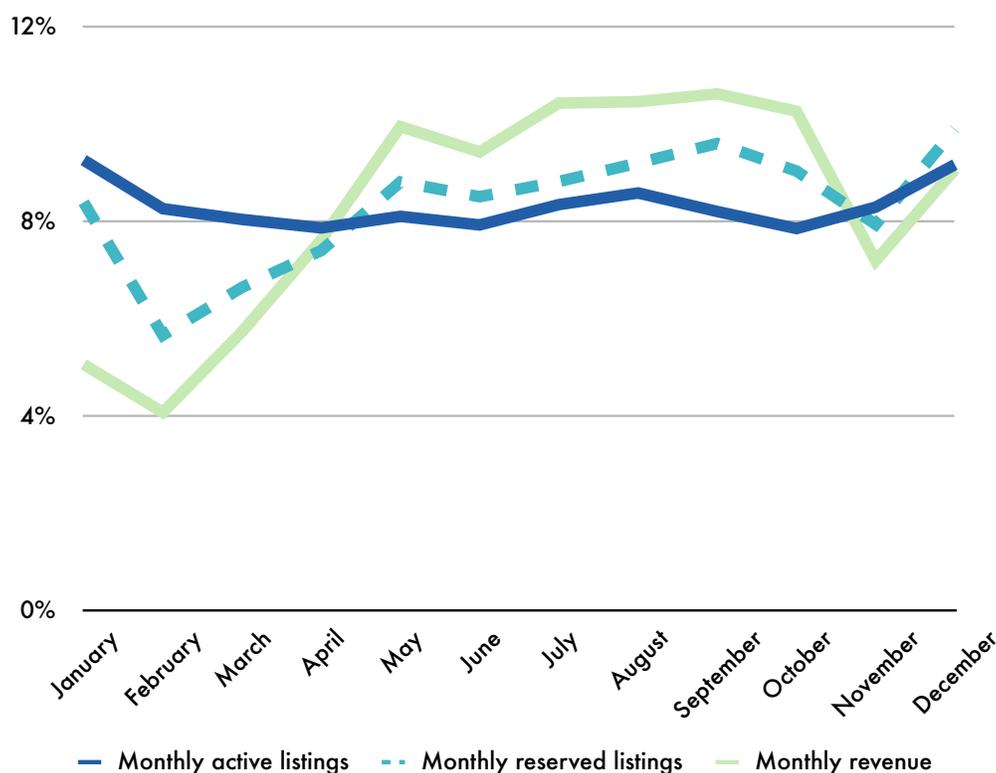


Figure Aa. Seasonality curves for Airbnb activity in the New York MSA

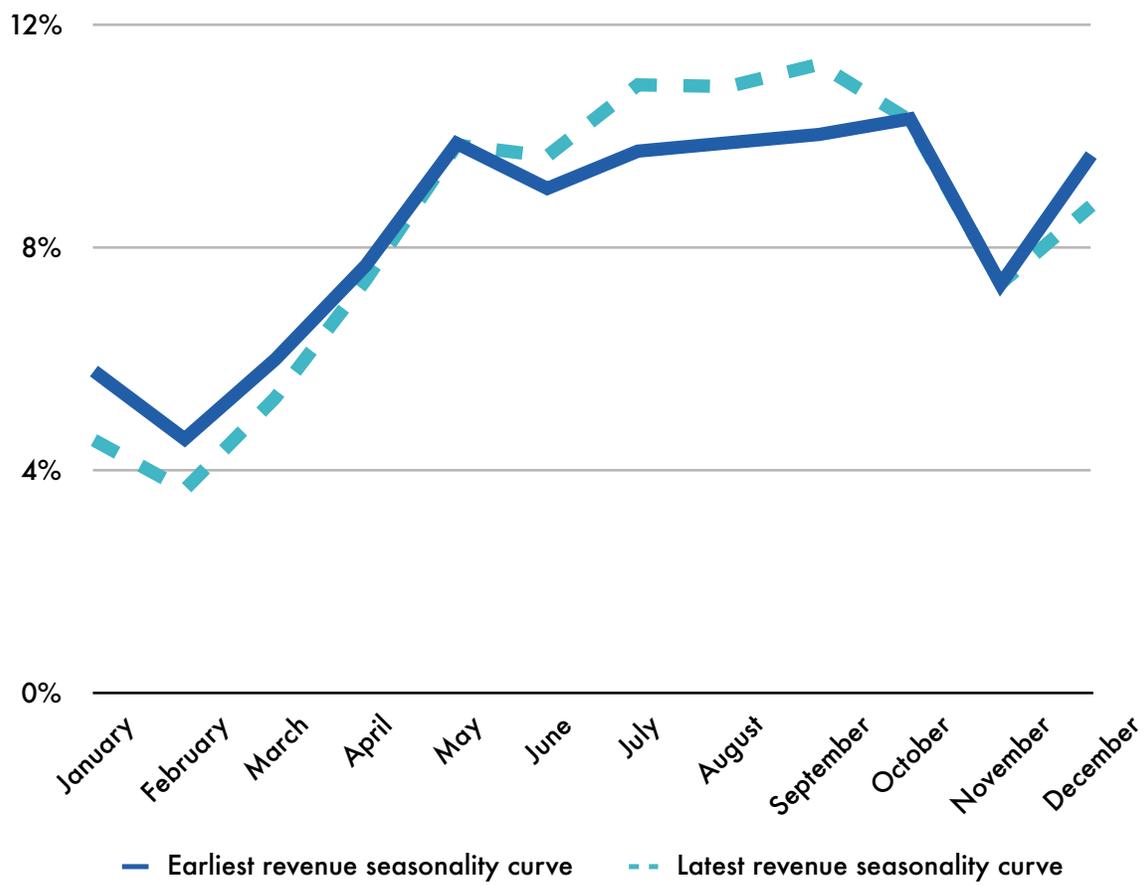


Figure Ab. Increasing revenue seasonality in the New York MSA

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ABOUT UPGO

UPGo, the Urban Politics and Governance research group at McGill University, conducts rigorous, public-interest research into pressing urban governance problems—particularly those that exceed or challenge city boundaries. Our three research themes are 1) local and regional economic development; 2) urban sustainability policy; 3) the impact of globalization on local housing markets. UPGo is led by Prof. David Wachsmuth of McGill's School of Urban Planning.



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The Sharing Economy and Housing Affordability: Evidence from Airbnb*

Kyle Barron[†] Edward Kung[‡] Davide Proserpio[§]

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Abstract

We assess the impact of home-sharing on residential house prices and rents. Using a dataset of Airbnb listings from the entire United States and an instrumental variables estimation strategy, we find that a 1% increase in Airbnb listings leads to a 0.018% increase in rents and a 0.026% increase in house prices at the median owner-occupancy rate zipcode. The effect is moderated by the share of owner-occupiers, a result consistent with absentee landlords reallocating their homes from the long-term rental market to the short-term rental market. A simple model rationalizes these findings.

Keywords: Sharing economy, peer-to-peer markets, housing markets, Airbnb

JEL Codes: R31, L86

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[†]NBER; barronk@nber.org.

[‡]Department of Economics, UCLA; ekung@econ.ucla.edu.

[§]Marshall School of Business, USC; proserpi@marshall.usc.edu.

1 Introduction

The sharing economy represents a set of peer-to-peer online marketplaces that facilitate matching between demanders and suppliers of various goods and services. The suppliers in these markets are often small (mostly individuals), and they often share excess capacity that might otherwise go unutilized—hence the term “sharing economy.” Economic theory would suggest that the sharing economy improves economic efficiency by reducing frictions that cause capacity to go underutilized, and the explosive growth of sharing platforms (such as Uber for ride-sharing and Airbnb for home-sharing) testifies to the underlying demand for such markets.¹ The growth of the sharing economy has also come at the cost of great disruption to traditional markets (Zervas et al., 2017), as well as new regulatory challenges, leading to contentious policy debates about how best to balance individual participants’ rights to freely transact, the efficiency gains from sharing economies, the disruption caused to traditional markets, and the role of the platforms themselves in the regulatory process.

Home-sharing, in particular, has been the subject of intense criticism. Namely, critics argue that home-sharing platforms like Airbnb raise the cost of living for local renters, while mainly benefitting local landlords and non-resident tourists.² It is easy to see the economic argument. By reducing frictions in the peer-to-peer market for short-term rentals, home-sharing platforms cause some landlords to switch from supplying the market for long-term rentals—in which residents are more likely to participate—to supplying the short-term market—in which non-residents are more likely to participate. Because the total supply of housing is fixed or inelastic in the short run, this drives up the rental rate in the long-term market. Concern over home-sharing’s

¹These frictions could include search frictions in matching demanders with suppliers, and information frictions associated with the quality of the good being transacted, or with the trustworthiness of the buyer or seller. See Einav et al. (2016) for an overview of the economics of peer-to-peer markets, including the specific technological innovations that have facilitated their growth.

²Another criticism of Airbnb is that the company does not do enough to combat racial discrimination on its platform (see Edelman and Luca (2014); Edelman et al. (2017)), though we will not address this issue in this paper.

impact on housing affordability has garnered significant attention from policymakers, and has motivated many cities to impose stricter regulations on home-sharing.³

Whether or not home-sharing increases housing costs for local residents is an empirical question. There are a few reasons why it might not. The market for short-term rentals may be very small compared to the market for long-term rentals. In this case, even large changes to the short-term market might not have a measurable effect on the long-term market. The short-term market could be small—even if the short-term rental rate is high relative to the long-term rate—if landlords prefer more reliable long-term tenants and a more stable income stream. Alternatively, the market for short-term rentals could be dominated by housing units that would have remained vacant in the absence of home-sharing. Owner-occupiers, those who own the home in which they live, may supply the short-term rental market with spare rooms and cohabit with guests, or they may supply their entire home during temporary absences.⁴ These otherwise vacant rentals could also be vacation homes that would not be rented to long-term tenants because of the restrictiveness of long-term leases. In either case, such owners would not make their homes available to long-term tenants, independently of the existence of a convenient home-sharing platform. Instead, home-sharing provides them with an income stream for times when their housing capacity would otherwise be underutilized.

In this paper, we study the effect of home-sharing on the long-term rental market using a comprehensive dataset of all US properties listed on Airbnb, the world's largest home-sharing platform. We first develop a simple model of house prices and rental rates when landlords can choose to allocate housing between long-term residents and short-term visitors. The effect of a home-

³For example, Santa Monica outlaws short-term, non-owner-occupied rentals of less than 30 days, as does New York State for apartments in buildings with three or more residences. San Francisco passed a 60-day annual hard cap on short-term rentals (which was subsequently vetoed by the mayor). It is unclear, however, the degree to which these regulations are enforced. We are aware of only one successful prosecution of an Airbnb host, occurring in Santa Monica in July 2016.

⁴A frequently cited example is that of the flight attendant who rents out his or her home on Airbnb while traveling for work.

sharing platform such as Airbnb is to reduce the frictions associated with renting on the short-term market. From the model we derive three testable predictions: 1) Airbnb increases both rental rates and house prices in the long-term market; 2) the increase in house prices is greater than the increase in rental rates, thus leading to an increase in the price-to-rent ratio; and 3) the effect on rental rates is smaller when a greater share of the landlords are owner-occupiers. Intuitively, the owner-occupancy rate matters because only non-owner-occupiers are on the margin of substituting their housing units between the long and short-term rental markets. Owner-occupiers interact with the short-term market only to rent out unused rooms or to rent while away on vacation, but they do not allocate their housing to long-term tenants.

To test the model, we collect primary data sources from Airbnb, Zillow, and the Census Bureau. We construct a panel dataset of Airbnb listings at the zipcode-year-month level from data collected from public-facing pages on the Airbnb website between the beginning of 2011 and the end of 2016, covering the entire United States. From Zillow, a website specializing in residential real estate transactions, we obtain a panel of house price and rental rate indices, also at the zipcode-year-month level. Zillow provides a platform for matching landlords with long-term tenants, and thus their price measures reflect sale prices and rental rates in the market for long-term housing. Finally, we supplement this data with a rich set of time-varying zipcode characteristics collected from the Census Bureau's American Community Survey (ACS), such as the median household income, population count, share of college graduates, and employment rate.

In the raw correlations, we find that the number of Airbnb listings in zipcode i in year-month t is positively associated with both house prices and rental rates. In a baseline OLS regression with no controls, we find that a 1% increase in Airbnb listings is associated with a 0.1% increase in rental rates and a 0.18% increase in house prices. Of course, these estimates should not be interpreted as causal, and may instead be picking up spurious correlations. For example, cities that are growing in population likely have rising rents, house prices, and numbers of Airbnb listings at the same time. We therefore

exploit the panel nature of our dataset to control for unobserved zipcode level effects and arbitrary city level time trends. We include zipcode fixed effects to absorb any permanent differences between zipcodes, while fixed effects at the Core Based Statistical Area (CBSA)-year-month level control for any shocks to housing market conditions that are common across zipcodes within a CBSA.⁵

We further control for unobserved *zipcode-specific, time-varying* factors using an instrumental variable that is plausibly exogenous to local zipcode level shocks to the housing market. To construct the instrument, we exploit the fact that Airbnb is a young company that has experienced explosive growth over the past five years. Figure 1 shows worldwide Google search interest in Airbnb from 2008 to 2016. Demand fundamentals for short-term housing are unlikely to have changed so drastically from 2008 to 2016 as to fully explain the spike in interest, so most of the growth in Airbnb search interest is likely driven by information diffusion and technological improvements to Airbnb's platform as it matures as a company. Neither of these should be correlated with local zipcode level unobserved shocks to the housing market. By itself, global search interest is not enough for an instrument because we already control for arbitrary CBSA level time trends. We therefore interact the Google search index for Airbnb with a measure of how "touristy" a zipcode is in a base year, 2010. We define "touristy" to be a measure of a zipcode's attractiveness for tourists and proxy for it using the number of establishments in the food service and accommodations industry.⁶ These include eating and drinking places, as well as hotels, bed and breakfasts, and other forms of short-term lodging. The identifying assumptions of our specification are that: 1) landlords in more touristy zipcodes are more likely to switch into the short-term rental market in response to learning about Airbnb than landlords in less touristy zipcodes; and 2) ex-ante levels of touristiness are not systematically correlated with ex-post unobserved shocks to the housing market at the zipcode level *that are*

⁵The CBSA is a geographic unit defined by the U.S. Office of Management and Budget that roughly corresponds to an urban center and the counties that commute to it.

⁶We focus on tourism because Airbnb has historically been frequented more by tourists than business travelers. Airbnb has said that 90% of its customers are vacationers, but is attempting to gain market share in the business travel sector.

also correlated in time with Google search interest for Airbnb. We discuss the instrument, its construction, and exercises supporting the exclusion restriction in more detail in Sections 4 and 4.1.

Using this instrumental variable, we estimate that for zipcodes with the median owner-occupancy rate (72%), a 1% increase in Airbnb listings leads to a 0.018% increase in the rental rate and a 0.026% increase in house prices. We also find that, as predicted by our theoretical model, the effect of Airbnb listings on rental rates and house prices is decreasing in the owner-occupancy rate. For zipcodes with a 56% owner-occupancy rate (the 25th percentile), the effect of a 1% increase in Airbnb listings is 0.024% for rents and 0.037% for house prices. For zipcodes with a 82% owner-occupancy rate (the 75th percentile), the effect of a 1% increase in Airbnb listings is only 0.014% for rents and 0.019% for house prices. These results are consistent with the model's predictions that the effect on both rental rate and house prices will be positive, that the effect on house prices will be larger than the effect on rents, and that the effect will be decreasing in owner-occupancy rate.

Next, we test the hypothesis that the effects we observe are partially due to absentee landlords substituting away from the rental and for-sale markets for long-term residents, and towards the short-term market. To do so, we consider the effect of Airbnb on housing vacancy rates. Because zipcode level data on vacancies are not available at a monthly—or even yearly—frequency, we focus on annual vacancy rates at the CBSA level. We find that annual CBSA vacancy rates have no association with the number of Airbnb listings. However, looking at the different types of vacancy we find that the number of Airbnb listings is positively associated with the share of homes that are vacant for seasonal or recreational use (likely to be part of the short-term rental market inventory) and negatively associated with the share of homes that are vacant-for-rent and vacant-for-sale (part of the long-term market inventory). These findings are consistent with absentee landlord switching from the long- to the short-term rental market.⁷

⁷Census Bureau methodology classifies a housing unit as vacant even if it is temporarily occupied by persons who usually live elsewhere.

Related literature

We are aware of only two other academic papers to directly study the effect of home-sharing on housing costs, and both of them focus on a specific US market. Lee (2016) provides a descriptive analysis of Airbnb in the Los Angeles housing market, while Horn and Merante (2017) use Airbnb listings data from Boston in 2015 and 2016 to study the effect of Airbnb on rental rates. They find that a one standard deviation increase in Airbnb listings at the census tract level leads to a 0.4% increase in asking rents. In our data, we find that a one standard deviation increase in listings at the within-CBSA zipcode level in 2015-2016 implies a 0.54% increase in rents.

We contribute to the literature concerning the effect of home-sharing on housing costs in three ways. First, we present a model that organizes our thinking about how home-sharing is expected to affect housing costs in the long-term market. Second, we provide direct evidence for the model's predictions, highlighting especially the role of the owner-occupancy rate and of the marginal landowner. Third, we present the first estimates of the effect of home-sharing on housing costs that uses comprehensive data from across the U.S.

Our paper also contributes to the growing literature on peer-to-peer markets. Such literature covers a wide array of topics, from the effect of the sharing economy on labor market outcomes (Chen et al., 2017; Hall and Krueger, 2017; Angrist et al., 2017) to entry and competition (Gong et al., 2017; Horton and Zeckhauser, 2016) to trust and reputation (Fradkin et al., 2017; Proserpio et al., 2017; Zervas et al., 2015). Because the literature on the topic is quite vast, we refer the reader to Einav et al. (2016) for an overview of the economics of peer-to-peer markets and to Proserpio and Tellis (2017) for a complete review of the literature on the sharing economy.

In terms of studies on Airbnb, both Zervas et al. (2017) and Farronato and Fradkin (2018) study the impact of Airbnb on the hotel industry. Zervas et al. (2017) focus on the effects on incumbents, while Farronato and Fradkin (2018) focus on the consumers gain in welfare. Our paper looks at a somewhat unique context in this literature because we focus on the effect of the sharing economy

on the reallocation of goods from one purpose to another, which may cause local externalities. Local externalities are present here because the suppliers are local and the demanders are non-local; transactions in the home-sharing market, therefore, involve a reallocation of resources from locals to non-locals. Our contribution is therefore to study this unique type of sharing economy in which public policy may be especially salient.

The rest of the paper is organized as follows. In Section 2, we present a simple model of house prices and rental rates where landlords can substitute between supplying the long-term and the short-term market. In Section 3, we describe the data we collected from Airbnb and present some basic statistics. In Section 4, we describe our methodology and present exercises in support of the exclusion restriction of our instrument, and in Section 5 we discuss the results and present several robustness checks to reinforce the validity of our results. Section 6 discusses our findings, the limitations of our work, and provide concluding remarks.

2 Model

2.1 Basic setup

We consider a housing market with a fixed stock of housing H , which can be allocated to short-term housing S , or long-term housing L . $S + L = H$. The rental rate of short-term housing is Q and the rental rate of long-term housing is R . The two housing markets are segmented—tenants who need long-term housing cannot rent in the short-term market and tenants who need short-term housing cannot rent in the long-term market.⁸

For now, we assume that all housing is owned by absentee landlords and will return to the possibility of owner-occupiers later. Each landlord owns

⁸In our view, the primary driver of this market segmentation is the length of lease and tenant rights. Local residents participating in the long-term rental market will typically sign leases of 6 months to a year, and are also granted certain rights and protections by the city. On the other hand, non-resident visitors participating in the short-term market will usually only rent for a few days and are not granted the same rights as resident tenants.

one unit of housing and decides to rent it on the short-term market or the long-term market, taking rental rates as given. A landlord will rent on the short-term market if $Q - c - \epsilon > R$, where $c + \epsilon$ is an additional cost of renting on the short-term market, with c being a common component and ϵ being an idiosyncratic component across landlords.⁹ The share of landlords renting in the short-term market is therefore:

$$f(Q - R - c) = P(\epsilon < Q - R - c) \quad (1)$$

f is the cumulative distribution function of ϵ , and $f' > 0$. The total number of housing units in the short-term market are:

$$S = f(Q - R - c)H \quad (2)$$

Long-term rental rates are determined in equilibrium by the inverse demand function of long-term tenants:

$$R = r(L) \quad (3)$$

with $r' < 0$. Short-term rental rates are determined exogenously by outside markets.¹⁰ The market is in steady state, so the house price P is equal to the present value of discounted cash flows to the landlord:

$$\begin{aligned} P &= \sum_{t=0}^{\infty} \delta^t E[R + \max\{0, Q - R - c - \epsilon\}] \\ &= \frac{1}{1 - \delta} [R + g(Q - R - c)] \end{aligned} \quad (4)$$

where $g(x) = E[x - \epsilon | \epsilon < x]f(x)$ gives the expected net surplus of being able

⁹Renting in the short-term market could be costlier than in the long-term market because the technology for matching landlords with tenants may be historically more developed in the long-term market. Landlords may have idiosyncratic preferences over renting in the long-term market vs. the short-term market if they have different preferences for the stability provided by long-term tenants.

¹⁰For example, they could be determined by elastic tourism demand. Relaxing this assumption and allowing for price elasticity in the short-term market would not change the qualitative results.

to rent in the short-term market relative to the long-term market, and $g' > 0$.

2.2 The effect of home-sharing

The introduction of a home-sharing platform reduces the cost for landlords to advertise on the short-term market, implying a decline in c . This could happen for a variety of reasons. By improving the search and matching technology in the short-term market, the sharing platform may reduce the time it takes to find short-term tenants. By providing identity verification and a reputation system for user feedback, the platform may also help reduce information costs.

We consider how an exogenous change to the cost of listing in the short-term market, c , affects long-term rental rates and house prices. Equilibrium conditions (1)-(3) imply that:

$$\frac{dR}{dc} = \frac{r' f' H}{1 - r' f' H} < 0 \quad (5)$$

So, by decreasing the cost of listing in the short-term market, the home-sharing platform has the effect of raising rental rates. The intuition is fairly straightforward: the home-sharing platform induces some landlords to switch from the long-term market to the short-term market, reducing supply in the long-term market and raising rental rates.

For house prices, we can use Equation (4) to write:

$$\frac{dP}{dc} = \frac{1}{1 - \delta} \left[\frac{dR}{dc} - \left(1 + \frac{dR}{dc} \right) g' \right] \quad (6)$$

We note from Equation (5) that $-1 < \frac{dR}{dc} < 0$, and so $\frac{dP}{dc} < \frac{1}{1 - \delta} \frac{dR}{dc} < \frac{dR}{dc} < 0$. The latter inequality concludes that home-sharing increases house prices and that the house price response will be greater than the rental rate response. This is because home-sharing increases the value of homeownership through two channels. First, it raises the rental rate which is then capitalized into house prices. Yet, if this were home-sharing's only effect, then the price response and the rental rate response would be proportional by the discount factor.

Instead, the additional increase in the value of homeownership comes from the enhanced option value of renting in the short-term market. Because of this second channel, prices will respond even more than rental rates to the introduction of a home-sharing platform.

2.3 Owner-occupiers

We now relax the assumption that all homeowners are absentee landlords by also allowing for owner-occupiers. Let H_a be the number of housing units owned by absentee landlords and let H_o be the number of housing units owned by owner-occupiers. We still define L as the number of housing units allocated to long-term residents—including owner-occupiers—and therefore the number of renters is $L - H_o$. We assume that H_a is fixed, and that H_o will be determined by equilibrium house prices and rental rates.¹¹

We allow owner-occupiers to interact with the short-term housing market by assuming that a fraction γ of their housing unit is excess capacity. This excess capacity can be thought of as the unit's spare rooms or the time that the owner spends away from his or her home. Owner-occupiers have the choice to either hold their excess capacity vacant, or to rent it out on the short-term market. They cannot rent **excess capacity** on the long-term market, due to the nature of leases and renter protections. The benefit to renting excess capacity on the short-term market is $Q - c - \epsilon$, where c and ϵ are again the cost and the idiosyncratic preference for listing on the short-term market, respectively. If excess capacity remains unused, the owner neither pays a cost nor derives any benefit from the excess capacity. Owner-occupiers will rent on the short-term market if $Q - c - \epsilon > 0$, and thus $f(Q - c)$ is the share of owner-occupiers who rent their excess capacity on the short-term market.

Note that the choice of the owner-occupier is to either rent on the short-term market, or to hold excess capacity vacant. Thus, participation in the

¹¹If H_a is not fixed, then all of the housing stock will be owned by either absentee landlords or owner-occupiers, depending on which has the higher net present value of owning. In the Appendix, we numerically solve a model with heterogeneous agents which allows for an endogenous share of absentee landlords, and show that the qualitative results of this section still hold.

short-term market by owner-occupiers does not change the overall supply of housing allocated to the long-term market, L . It also does not change S , which is by definition equal to $H - L$ (we think of S as the number of units that are *permanently* allocated towards short-term housing, as determined by absentee landlords.) The equilibrium supply of short and long-term housing are therefore:

$$S = f(Q - R - c)H_a \quad (7)$$

$$L = H - f(Q - R - c)H_a \quad (8)$$

Rental rates in the long-term market continue to be determined by the inverse demand curve of residents, $r(L)$. The equilibrium response of rental rates to a change in c becomes:

$$\frac{dR}{dc} = \frac{r' f' H_a}{1 - r' f' H_a} \leq 0 \quad (9)$$

Equation (9) is similar to Equation (5) except that H is replaced with H_a . Equation (9) therefore makes clear that it is the absentee landlords who affect the rental rate response to Airbnb because it is they who are on the margin between substituting their units between the short and long-term markets. When the share of owner-occupiers is high, the rental rate response to Airbnb will be low. In fact, the response of rental rates to Airbnb could be zero if all landlords are owner-occupiers.

Since long-term residents are ex-ante homogeneous, an equilibrium with a positive share of both renters and owner-occupiers requires that house prices make residents indifferent between renting and owning:

$$P = \frac{1}{1 - \delta} [R + \gamma g(Q - c)] \quad (10)$$

Equation (10) says that the price that residents are willing to pay for a home is equal to the present value of long-term rents plus the present value of renting excess capacity to the short-term market. The response of prices to a change

in c is:

$$\frac{dP}{dc} = \frac{1}{1-\delta} \left[\frac{dR}{dc} - \gamma g' \right] \quad (11)$$

So, again, we see that prices are more responsive to a decrease in c than rental rates.

To summarize the results of this section, we derived three testable implications. First, rental rates should increase in response to the introduction of a home-sharing platform. This is because home-sharing causes some landowners to substitute away from supplying the long-term rental market and into the short-term rental market. Second, house prices should increase as well, but by an even greater amount than rents. This is because home-sharing affects house prices through two channels: first by increasing the rental rate, which then gets capitalized into house prices, and second by directly increasing the ability for landlords to utilize the home fully. Finally, the rental rate response will be smaller when there is a greater share of owner-occupiers. This is because owner-occupiers are not on the margin of substituting between the long-term and short-term markets, whereas absentee landlords are.¹² We now turn to testing these predictions in the data.

3 Data and Background on Airbnb

3.1 Background on Airbnb

Recognized by most as the pioneer of the sharing economy, Airbnb is a peer-to-peer marketplace for short-term rentals, where the suppliers (hosts) offer different kinds of accommodations (i.e. shared rooms, entire homes, or even yurts and treehouses) to prospective renters (guests). Airbnb was founded in 2008 and has experienced dramatic growth, going from just a few hundred hosts in 2008 to over three million properties supplied by over one million

¹²Another class of homeowners we have yet to discuss is vacation-home owners. Owners of vacation homes can be treated either as owner-occupiers with high γ (here γ is the amount of time spent living in their primary residence), or as absentee landlords, depending on how elastic they are with respect to keeping the home as a vacation property vs. renting it to a long-term tenant. In either case, the key implications of the model will not change.

hosts in 150,000 cities and 52 countries in 2017. Over 130 million guests have used Airbnb, and with a market valuation of over \$31B, Airbnb is one of the world's largest accommodation brands.

3.2 Airbnb listings data

Our main source of data comes directly from the Airbnb website. We collected consumer-facing information about the complete set of Airbnb properties located in the United States and about the hosts who offer them. The data collection process spanned a period of approximately five years, from mid-2012 to the end of 2016. Scrapes were performed at irregular intervals between 2012 to 2014, and at a weekly interval starting January 2015.

Our scraping algorithm collected all listing information available to users of the website, including the property location, the daily price, the average star rating, a list of photos, the guest capacity, the number of bedrooms and bathrooms, a list of amenities such as WiFi and air conditioning, etc., and the list of all reviews from guests who have stayed at the property.¹³ Airbnb host information includes the host name and photograph, a brief profile description, and the year-month in which the user registered as a host on Airbnb.

Our final dataset contains detailed information about 1,097,697 listings and 682,803 hosts spanning a period of nine years, from 2008 to 2016. Because of Airbnb's dominance in the home-sharing market, we believe that this data represents the most comprehensive picture of home-sharing in the U.S. ever constructed for independent research.

3.3 Calculating the number of Airbnb listings, 2008-2016

Once we have collected the data, the next step is to define a measure of Airbnb supply. This task requires two choices: first, we need to choose the geographic

¹³ Airbnb does not reveal the exact street address or coordinates of the property for privacy reasons; however, the listing's city, street, and zipcode correspond to the property's real location.

granularity of our measure; second, we need to define the entry and exit dates of each listing to the Airbnb platform. Regarding the geographic aggregation, we conduct our main analysis at the zipcode level for a few reasons. First, it is the lowest level of geography for which we can reliably assign listings without error (other than user input error).¹⁴ Second, neighborhoods are a natural unit of analysis for housing markets because there is significant heterogeneity in housing markets across neighborhoods within cities, but comparatively less heterogeneity within neighborhoods. Zipcodes will be our proxy for neighborhoods. Third, conducting the analysis at the zipcode level as opposed to the city level helps with identification. This is due to our ability to compare zipcodes within cities, thus controlling for any unobserved city level factors that may be unrelated to Airbnb but all affect neighborhoods within a city, such as a city-wide shock to labor productivity.

The second choice, how to determine the entry and exit date of each listing, comes less naturally. First, our scraping algorithm did not constantly monitor a listing's status to determine whether it was active or not, but rather obtained snapshots of the property available for rent in the US at different points in time until the end of 2014, and at the weekly level starting in 2015. Second, even if it did so, measuring active supply would still be challenging.¹⁵ Thus, to construct the number of listings going back in time, we employ a variety of methods following Zervas et al. (2017), which we summarize in Table 1.

¹⁴Airbnb does report the latitude and longitude of each property, but only up to a perturbation of a few hundred meters. So it would be possible, but complicated, to aggregate the listings to finer geographies with some error.

¹⁵Estimating the number of active listings is a challenge even for Airbnb. Despite the fact that Airbnb offers an easy way to unlist properties, many times hosts neglect to do so, creating "stale vacancies" that seem available for rent but in actuality are not. Pradkin (2015), using proprietary data from Airbnb, estimates that between 21% to 32% of guest requests are rejected due to this effect.

Table 1: Methods for Computing the Number of Listings

	Listing is considered active ...
Method 1	starting from host join date
Method 2	for 3 months after host join date, and after every guest review
Method 3	for 6 months after host join date, and after every guest review

Method 1 is our preferred choice to measure Airbnb supply and will be our main independent variable in all the analyses presented in this paper. This measure computes a listing's entry date as the date its host registered on Airbnb and assumes that listings never exit. The advantage of using the host join date as the entry date is that for a majority of listings, this is the most accurate measure of when the listing was first posted. The disadvantage of this measure is that it is likely to overestimate the listings that are available on Airbnb (and accepting reservations) at any point in time. However, as discussed in Zervas et al. (2017), such overestimation would cause biases only if, after controlling for several zipcode characteristics, it is correlated with the error term.¹⁶

Aware of the fact that method 1 is an imperfect measure of Airbnb supply, we also experiment with alternative definitions of Airbnb listings' entry and exit. Methods 2 and 3 exploit our knowledge of each listing's review dates to determine whether a listing is active. The heuristic we use is as follows: a listing enters the market when the host registers with Airbnb and stays active for m months. We refer to m as the listing's Time To Live (TTL). Each time a listing is reviewed the TTL is extended by m months from the review date. If a listing exceeds the TTL without any reviews, it is considered inactive. A listing becomes active again if it receives a new review. In our analysis, we test two different TTLs, 3 months and 6 months.

¹⁶The absence of bias in this measure is also confirmed by Farronato and Fradkin (2018) where using Airbnb proprietary data resulted in the same estimates obtained by Zervas et al. (2017) (where the data collection and measures of Airbnb supply are similar to those used in this paper).

Despite the fact that our different measures of Airbnb supply rely on different heuristics and data, because of Airbnb's tremendous growth, all our measures of Airbnb supply are extremely correlated. The correlation between method 1 and each other measure is above 0.95 in all cases. In the Appendix, we present robustness checks of our main results to the different measures of Airbnb supply discussed above, and show that results are qualitatively and quantitatively unchanged.

3.4 Zillow: rental rates and house prices

Zillow.com is an online real estate company that provides estimates of house and rental prices for over 110 million homes across the U.S. In addition to giving value estimates of homes, Zillow provides a set of indexes that track and predict home values and rental prices at a monthly level and at different geographical granularities.

For house prices, we use the Zillow Home Value Index (ZHVI) which estimates the median transaction price for the actual stock of homes in a given geographic unit and point in time. The advantage of using the ZHVI is that it is available at the zipcode-month level for over 13,000 zipcodes.

For rental rates, we use the Zillow Rent Index (ZRI). Like the ZHVI, Zillow's rent index is meant to reflect the median monthly rental rate for the actual stock of homes in a geographic unit and point in time. Crucially, Zillow's rent index is based on rental *list prices* and is therefore a measure of prevailing rents for new tenants. This is the relevant comparison for a homeowner deciding whether to place her unit on the short-term or long-term market. Moreover, because Zillow is not considered a platform for finding short-term housing, the ZRI should be reflective of rental prices in the long-term market.

3.5 Other data sources

We supplement the above data with several additional sources. We use monthly Google Trends data for the search term "airbnb", which we downloaded directly from Google. This index measures how often people worldwide search

for the term “airbnb” on Google, and is normalized to have a value of 100 at the peak month. We use County Business Patterns data to measure the number of establishments in the food services and accommodations industry (NAICS code 72) for each zipcode in 2010. We collect from the American Community Survey (ACS) zipcode level 5-year estimates of median household income, population, share of 25-60 years old with bachelors’ degrees or higher, employment rate, and owner-occupancy rate. Finally, we obtain annual 1-year estimates of housing vacancy rates at the Core Based Statistical Area (CBSA) level from the same source.

3.6 Summary statistics

Figure 2 shows the geographic distribution of Airbnb listings in June 2011 and June 2016. The map shows significant geographic heterogeneity in Airbnb listings, with most Airbnb listings occurring in large cities and along the coasts. Moreover, there exists significant geographic heterogeneity in the growth of Airbnb over time. From 2011 to 2016, the number of Airbnb listings in some zipcodes grew by a factor of 30 or more; in others there was no growth at all. Figure 3 shows the total number of Airbnb listings over time in our dataset using methods 1-3. Using method 1 as our preferred method, we observe that from 2011 to 2016, the total number of Airbnb listings grew by a factor of 30, reaching over 1 million listings in 2016.

Table 2 gives a sense of the size of Airbnb relative to the housing stock at the zipcode level, for the 100 largest CBSAs by population in our data. Even in 2016, Airbnb remains a small percentage of the total housing stock for most zipcodes. The median ratio of Airbnb listings to housing stock is 0.21%, and the 90th percentile is 1.88%. When comparing to the stock of vacant homes, Airbnb begins to appear more significant. The median ratio of Airbnb listings to vacant homes is 2.63%, and the 90th percentile is 20%. Perhaps the most salient comparison—at least from the perspective of a potential renter—is the number of Airbnb listings relative to the stock of homes listed as vacant and for rent. This statistic reaches 13.7% in the median zipcode in 2016 and 129%

in the 90th percentile zipcode. This implies that in the median zipcode, a local resident looking for a long-term rental unit will find that about 1 in 8 of the potentially available homes are being placed on Airbnb instead of being made available to long-term residents. Framed in this way, concerns about the effect of Airbnb on the housing market do not appear unfounded.

4 Methodology

Let Y_{ict} be either the price index or the rent index for zipcode i in CBSA c in year-month t , let $Airbnb_{ict}$ be a measure of Airbnb supply, and let $oorate_{ic,2010}$ be the owner-occupancy rate in 2010.¹⁷ We assume the following causal relationship between Y_{ict} and $Airbnb_{ict}$:

$$\ln Y_{ict} = \alpha + \beta Airbnb_{ict} + \gamma Airbnb_{ict} \times oorate_{ic,2010} + X_{ict}\eta + \epsilon_{ict} \quad (12)$$

where X_{ict} is a vector of observed time-varying zipcode characteristics, and ϵ_{ict} contains unobserved factors which may additionally influence Y_{ict} . If the unobserved factors are uncorrelated with $Airbnb_{ict}$, conditional on X_{ict} , then we can consistently estimate β and γ by OLS. However, ϵ_{ict} and $Airbnb_{ict}$ may be correlated through unobserved factors at the zipcode, city, and time levels. We allow ϵ_{ict} to contain unobserved zipcode level factors δ_i , and unobserved time-varying factors that affect all zipcodes within a CBSA equally, θ_{ct} . Writing: $\epsilon_{ict} = \delta_i + \theta_{ct} + \xi_{ict}$, Equation (12) becomes:

$$\ln Y_{ict} = \alpha + \beta Airbnb_{ict} + \gamma Airbnb_{ict} \times oorate_{ic,2010} + X_{ict}\eta + \delta_i + \theta_{ct} + \xi_{ict} \quad (13)$$

Even after controlling for unobserved factors at the zipcode and CBSA-year-month level, there may still be some unobserved *zipcode-specific, time-varying* factors contained in ξ_{ict} that are correlated with $Airbnb_{ict}$. To address

¹⁷We use the owner-occupancy rate in 2010 to minimize concerns about endogeneity of the owner-occupancy rate. In the Appendix, we show that the results are robust to using the contemporaneous owner-occupancy rate calculated from ACS 5-year estimates from 2011 to 2016.

this issue, we construct an instrumental variable which is plausibly uncorrelated with local shocks to the housing market at the zipcode level, ξ_{ict} , but likely to affect the number of Airbnb listings.

Our instrument begins with the worldwide Google Trends search index for the term “airbnb”, g_t , which measures the quantity of Google searches for “airbnb” in year-month t . Such trends represent a measure of the extent to which awareness of Airbnb has diffused to the public, including both demanders and suppliers of short-term rental housing. Figure 1 plots g_t from 2008 to 2016, and it is representative of the explosive growth of Airbnb over the past ten years. Crucially, the search index is *not* likely to be reflective of growth in overall tourism demand, because it is unlikely to have changed so much over this relatively short time period. Moreover, it should not be reflective of overall growth in the supply of short-term housing, *except* to the extent that it is driven by Airbnb.

The CBSA-year-month fixed effects θ_{ct} already absorb any unobserved variation at the year-month level. Therefore, to complete our instrument we interact g_t with a measure of how attractive a zipcode is for tourists in base year 2010, $h_{i,2010}$. We measure “touristiness” using the number of establishments in the food services and accommodations industry (NAICS code 72) in a specific zipcode. Zipcodes with more restaurants and hotels may be more attractive to tourists because these are services that tourists need to consume locally—thus, it matters how many of these services are near the tourist’s place of stay. Alternatively, the larger number of restaurants and hotels may reflect an underlying local amenity that tourists value.

Our operating assumption is that landlords in more touristy zipcodes are more likely to switch from the long-term market to the short-term market in response to learning about Airbnb. Landlords in more touristy zipcodes may be more likely to switch because they can book their rooms more frequently, and at higher prices, than in non-touristy zipcodes. We can verify this assumption by examining the relationship between Google trends and the difference in Airbnb listings for more touristy and less touristy zipcodes. Figure 4 shows that such difference increases as Airbnb awareness increases confirming our

hypothesis.

In order for the instrument to be valid, $z_{ict} = g_t \times h_{i,2010}$ must be uncorrelated with the zipcode-specific, time-varying shocks to the housing market, ξ_{ict} . This would be true if either ex-ante touristiness in 2010 ($h_{i,2010}$) is independent of zipcode level shocks (ξ_{ict}), or growth in worldwide Airbnb searches (g_t) is independent of zipcode level shocks. To see how our instrument addresses potential confounding factors, consider changes in zipcode level crime rate as an omitted variable. It is unlikely that changes to crime rates across all zipcodes are systematically correlated in time with worldwide Airbnb searches. Even if they were, they would have to correlate in such a way that the correlation is systematically stronger or weaker in more touristy zipcodes. Moreover, these biases would have to be systematically present within all cities in our sample. Of course, we cannot rule this possibility out completely. We therefore now turn to a detailed discussion of the instrument and its validity, and present some exercises that suggest that the exogeneity assumption is likely satisfied.

4.1 Discussion: Validity of the instrumental variable

The construction of an instrumental variable using the interaction of a plausibly exogenous time-series (Google trends) with a potentially endogenous cross-sectional exposure variable (the touristiness measure) is an approach that was popularized by Bartik (1991) and that has been used in many prominent recent papers (Peri (2012); Dube and Vargas (2013); Nunn and Qian (2014); Hanna and Oliva (2015); Diamond (2016)).

The approach is popular because one can often argue that some aggregate time trend, which is exogenous to local conditions, will affect different spatial units systematically along some cross-sectional exposure variable. In the classic Bartik (1991) example, national trends in industry-specific productivity are interacted with the historical local industry composition to create an instrument for local labor demand. Such instrument will be valid if the interaction of the aggregate time trend with the exposure variable is independent of the error term. This could happen if either the time trend is independent of the error

term ($E[g_t, \xi_{ict}] = 0$) or if the exposure variable is independent of the error term ($E[h_{i,2010}, \xi_{ict}] = 0$). While this may seem plausible at first glance, Christian and Barrett (2017) point out that if there are long-run time trends in the error term, and if these long-run trends are systematically different along the exposure variable, then the exogeneity assumption may fail. In our context, a story that may be told is the following. Suppose there is a long-run trend towards gentrification, which leads to higher house prices over time. Suppose also that the trend of gentrification is higher in more touristy zipcodes. Since there is also a systematic long-run trend in the time-series variable, g_t , the instrument $g_t h_{i,2010}$ is no longer independent of the error term, and 2SLS estimates may reflect the effects of gentrification rather than home-sharing.

We now proceed to make four arguments for why the exogeneity condition is likely to hold in our setting.

Parallel pre-trends

As Christian and Barrett (2017) noted, the first stage of this instrumental variable approach is analogous to a difference-in-differences (DD) coefficient estimates. In our case, since the specification includes year-month and zipcode fixed effects, the variation in the instrument comes from comparing Airbnb listings between high- and low-Airbnb awareness year-months, and between high- and low-touristiness zipcodes. Because of this, Christian and Barrett (2017) suggest testing whether spatial units with different levels of the exposure variable have parallel trends in periods before g_t takes effect. This is similar to testing whether control and treatment groups have parallel pre-trends in DD analysis. To do this, we plot the Zillow house price index for zipcodes in different quartiles of 2010 touristiness ($h_{i,2010}$), from 2009 to the end of 2016.¹⁸ The results are shown in Figure 5. The figure shows that there are no differential pre-trends in the Zillow Home-Value Index (ZHVI) for zipcodes in different quartiles of touristiness until after 2012, which also happens to be when interest in Airbnb began to grow according to Figure 1. This is true

¹⁸We cannot repeat this exercise with rental rates because Zillow rental price data did not begin until 2011 or 2012 for most zipcodes.

both when computing the raw averages of ZHVI within quartile (top panel) and when computing the average of the residuals after controlling for zipcode and CBSA-year-month fixed effects (bottom panel). The lack of differential pre-trends suggests that zipcodes with different levels of touristiness do *not* generally have different long-run house price trends, but they only began to diverge after 2012 when Airbnb started to become well known.

Placebo test

The above test is not perfect, especially because 2012 happens to be the year in which house prices began to recover from the Great Recession. Because of this, it is possible that touristy zipcodes have a different recovery pattern than non-touristy zipcodes. We therefore consider a second test to support the validity of the instrument. Recall that our instrumental variable relies on the assumption that increases in Airbnb awareness (measured using Google trends) will differentially affect the number of Airbnb listings in high-touristiness zipcodes and in low-touristiness zipcodes. Following Christian and Barrett (2017) we implement a form of randomization inference to test whether this type of instrument is really exogenous. The idea behind this test is that by randomizing the endogenous variable of interest (the number of Airbnb listings in a specific zipcode) while holding constant everything else should eliminate (or at least attenuate) the causal effect of Airbnb.

To do so we keep constant touristiness, Google trends, the zipcodes experiencing any Airbnb entry, observable time-varying zipcode characteristics, housing market variables, and the aggregate number of Airbnb listings in any year-month period. However, among the zipcodes with positive Airbnb entry, we randomly assign the specific number of Airbnb listings among these zipcodes; for example, we randomly assign to zipcode i the variable $Airbnb_{jct}$ (i.e., the Airbnb counts of zipcode j of CBSA c for every t spanning the period from 2011 to 2016).

Note that this new dataset still preserves possible sources of endogeneity such as zipcode touristiness and spurious time trends; however, the randomization eliminates a major source of variation needed for our instrument to work

because now it is not necessarily the case that, for the same level of Airbnb awareness, high-touristiness zipcodes experience stronger Airbnb growth than low-touristiness zipcodes. This means that a 2SLS estimate of the effect of Airbnb using this dataset should produce results that are indistinguishable from zero (or much smaller than the estimates on the real dataset), unless there is some spurious correlation between the instrument and our dependent variable (i.e., the exclusion restriction does not hold).

We estimate the 2SLS specification on this dataset for 100 draws of randomized allocations of Airbnb listings among zipcodes, and find that the measured effect of Airbnb completely disappears for all of our dependent variables, i.e., rent index, price index, and price-to-rent ratio.¹⁹ Thus, this test strongly supports the validity of our instrument.

IV has no effect in non-Airbnb zipcodes

To further provide support to the validity of our instrument we perform another test which consists of checking whether the instrumental variable predicts house prices and rental rates in zipcodes that were never observed to have any Airbnb listings. If the instrument is valid, then it should only be correlated to house prices and rental rates through its effect on Airbnb listings, so in areas with no Airbnb we should not see a positive relationship between the instrument and house prices and rental rates.²⁰ To test this, we regress the Zillow rent index, house price index, and price-to-rent ratio (our three outcomes of interest) on the instrumental variable directly, using only data from zipcodes in which we never observed any Airbnb listings. Table 3 reports the results of

¹⁹The median estimate (standard error) of β and γ are 0.17 (1.25) and 8.77e-07 (8.44e-07) for the rent index, -.23 (1.08) and 1.53e-06 (1.04e-06) for the price index, and -.27 (1.45) and 1.56e-06 (1.27e-06) for the price-to-rent ratio.

²⁰This exercise is similar in spirit to an exercise performed in Martin and Yurukoglu (2017) to support the validity of an instrument. In Martin and Yurukoglu (2017), the channel position of Fox News in the cable line up is used as an instrument for the effect of Fox viewership on Republican voting. They show that the future channel position of Fox News is not correlated with Republican voting in the time periods before Fox News. This is analogous to us showing that our instrument is not correlated with house prices and rents in zipcodes without Airbnb.

these regressions and shows that, conditional on the fixed effects and zipcode demographics, we do not find any statistically significant relationship between the instrument and house prices/rental rates in zipcodes without Airbnb. If anything, we find that there is a *negative* relationship between the instrument and house prices/rental rates in zipcodes without Airbnb, though the estimates are imprecise and the sample size is considerably reduced when considering only such zipcodes.²¹ Thus, there does not seem to be any evidence that the instrument would be positively correlated with house prices/rental rates, except through its effect on short-term rentals.

Robustness to the inclusion of demographic controls

Of course, the above test to support the validity of the instrument is not perfect either. The sample of zipcodes that never had any Airbnb listings could be fundamentally different from the sample of zipcodes that did.²² We therefore make one final argument to support the validity of our instrument, which is that the regression results we will present in Section 5 are robust to the inclusion of zipcode demographic characteristics. Because the included demographic controls (population, household income, share of college-educated, and employment rate) are fairly basic measurements of zipcode level economic outcomes, they are likely to be highly correlated with other unobserved factors that affect zipcode level housing markets. Therefore, the fact that our results are not affected by these controls suggests that it is unlikely that the instrument is correlated with other unobserved zipcode level factors that affect housing markets. To see this, consider the story about gentrification posited above. If the relationship between Airbnb listings and house prices/rental rates is spuriously driven by gentrification, then one would expect the estimated effect to be reduced once controlling for neighborhood level income and education; however, since this does not happen, gentrification seems unlikely to be an omitted driver of the results.

²¹If we regress house prices and rental rates on the instrument for zipcodes *with* Airbnb, we find a positive and statistically significant relationship.

²²Indeed, Table 4 shows that there is a significant difference when comparing zipcodes that observed and never observed any Airbnb listings.

5 Results and Extensions

5.1 The effect of Airbnb on house prices and rents

We begin by reporting results in which $Airbnb_{ict}$ is measured as the log of one plus the number of listings as measured by method 1 in Table 1.²³ Doing so, we estimate a specification similar to that used in Zervas et al. (2017) and Farronato and Fradkin (2018), where the authors estimate the impact of Airbnb on the hotel industry.

We consider three dependent variables: the log of the Zillow Rent Index, the log of the Zillow Home-Value Index, and the log of the price-to-rent ratio. In order to maintain our measure of touristiness, $h_{i,2010}$, as a pre-period variable, only data from 2011 to 2016 are used. This time frame covers all of the period of significant growth in Airbnb (see Figure 3). We also include only data from the 100 largest CBSAs, as measured by 2010 population.²⁴ Since the regression in Equation 13 has two endogenous regressors ($Airbnb_{ict}$ and $Airbnb_{ict} \times oorate_{ic,2010}$), two instruments are used for the two-stage least squares estimation ($g_t \times h_{i,2010}$ and $g_t \times h_{i,2010} \times oorate_{ic,2010}$).

Table 5 reports the regression results when the dependent variable is the log Zillow rent index. Column 1 reports the results from a simple OLS regression of log ZRI on log listings and no controls. Without controls, a 1% increase in Airbnb listings is associated with a 0.098% increase in rental rates. Column 2 includes zipcode and CBSA-year-month fixed effects. With the fixed effects, the estimated coefficient on Airbnb declines by an order of magnitude. Column 3 includes the interaction of Airbnb listings with the zipcode's owner-occupancy rate. Column 3 shows the importance of controlling for owner-occupancy rate, as it significantly mediates the effect of Airbnb listings. Column 4 includes time-varying zipcode level characteristics, including the log total population, the log median household income, the share of 25-60

²³We add one to the number of listings to avoid taking logs of zero. In the Online Appendix, we show that our results are robust to dropping observations with 0 listings and using $\ln(\text{listings} + 1)$ instead.

²⁴The 100 largest CBSAs constitute the majority of Airbnb listings (over 80%). In the Online Appendix we show that our results are robust to the inclusion of more CBSAs.

years old with Bachelors' degrees or higher, and the employment rate. Because these measures are not available at a monthly frequency, we linearly interpolate them to the monthly level using ACS 5-year estimates from 2011 to 2016.²⁵ Column 4 shows that the results are robust to the inclusion of these zipcode demographics. Finally, columns 5 and 6 report the 2SLS results using the instrumental variable without and with time-varying zipcode characteristics as controls. Using the results from column 6 – our preferred specification – we estimate that a 1% increase in Airbnb listings in zipcodes with the median owner-occupancy rate (72%) leads to a 0.018% increase in rents. As predicted by our model, the effect of Airbnb is significantly declining in the owner-occupancy rate. At 56% owner-occupancy rate (the 25th percentile), the effect of a 1% increase in Airbnb listings is to increase rents by 0.024%, and at 82% owner-occupancy rate (the 75th percentile), the effect of a 1% increase in Airbnb listings is to increase rents by 0.014%.

Table 6 repeats the regressions with the log Zillow house price index as the dependent variable. As with the rental rates, we find that controlling for owner-occupancy rate is very important, as the estimated direct effect of Airbnb listings increases by an order of magnitude when controlling for the interaction vs. not. Further, including demographic controls still does not affect the results. Using the coefficients reported in column 6 of Table 6, we estimate that a 1% increase in Airbnb listings leads to a 0.026% increase in house prices for a zipcode with a median owner-occupancy rate. The effect increases to 0.037% in zipcodes with an owner-occupancy rate equal to the 25th percentile, and decreases to 0.019% in zipcodes with an owner-occupancy rate equal to the 75th percentile.

It is worth noting that in both the rental rate and house price regressions, the 2SLS estimates (columns 5 and 6 of Tables 5 and 6) are about twice as large as the OLS estimates (columns 3 and 4 of Tables 5 and 6). This goes against our initial intuition that omitted factors (such as gentrification) are most likely to be positively correlated with both Airbnb listings and house prices/rents, thus creating a positive bias. However, we note that the OLS estimate may

²⁵Results are not sensitive to different types of interpolations.

also be negatively biased or biased towards zero for two reasons. First, there may be measurement error in the true amount of home-sharing, leading to attenuation bias. Measurement error may arise from the fact that we only estimate the number of Airbnb listings, and we do not know their exact entry and exit. Measurement error may also arise from the fact that there are other home-sharing platforms besides Airbnb, that we do not measure. Our estimate for the number of listings is therefore a noisy measure of the true number of short-term rentals. Second, simultaneity bias may be negative if higher rental rates in the long-term rental market would cause a decrease in the number of Airbnb listings, *ceteris paribus*. This is true in our model because an increase in the long-term rental rate (holding Q fixed), would decrease the number of landlords choosing to supply the short-term market, and it is likely to be true in reality as well.

Finally, Table 7 reports the regression results when log price-to-rent ratio is used as the dependent variable. Column 6 shows that the effect of Airbnb listings on the price-to-rent ratio is positive, and that, similarly to rents and prices, the effect is declining in owner-occupancy rate. At the median owner-occupancy rate, a 1% increase in Airbnb listings leads to a statistically significant 0.01% increase in the price-to-rent ratio.

To summarize the results in Tables 5-7, we showed that 1) an increase in Airbnb listings leads to both higher house prices and rental rates; 2) the effect is higher for house prices than it is for rental rates; and 3) the effect is decreasing in the zipcode's owner-occupancy rate. These results are all consistent with the model presented in Section 2, thus providing evidence that home-sharing indeed increases housing costs by reallocating long-term rentals to the short-term market, but also that home-sharing increases homeowners' option value for utilizing excess capacity.

5.2 Robustness checks

We now report a number of robustness checks to reinforce the validity of our estimates. First, we re-estimate our specification using different subsamples of

the data. The main purpose of these checks is to confirm that the results are not being driven by only a select number of cities, zipcodes, or time periods. In doing so, our goal is to further reduce concerns about possible omitted variables correlated with location and time that may drive the results presented in Section 5.1. For example, consider the zipcode location and specifically whether it is located close to the city center. One may argue that zipcodes close to the city center would have experienced a positive increase in rents and house prices independently of the presence of Airbnb (and of course such zipcodes are also more likely to have a higher number of Airbnb listings). Second, we perform a specification test that uses an alternative functional form of Airbnb supply. This test guards against concerns related to our choice of using a log-log specification to estimate the impact of Airbnb on the housing market.

Zipcodes near and far from the city-center

First, we repeat the 2SLS regressions with full controls separately for zipcodes that are “near” to their CBSA’s city center and for zipcodes that are “far” from the city center. The city center is obtained using Microsoft’s Bing Maps API, and zipcode centroids are obtained from the Census Bureau. A zipcode is counted as “near” to the CBD if it is closer than the CBSA median, and “far” otherwise. The first two rows of Table 8 report the results. The qualitative results hold in both the near and far samples, though it seems that the effects are larger in the far group. This confirms that the results are not being solely driven by a few zipcodes close to downtown areas, and that home-sharing is having an impact even on zipcodes that are further from the city center.

Early and late time periods

Second, we repeat the regressions separately for two time periods: 2011-2013 and 2014-2016. Rows 3-4 of Table 8 report these results. Again, the main qualitative results can be seen in both time periods, though the effect of owner-occupancy rate seems to be a lot weaker in the earlier period than in the later

period. We speculate that this could be due to the possibility that Airbnb first attracted those users with spare rooms or houses not on the long-term market (e.g., vacation rentals), and that only recently Airbnb became an attractive option for landlords that previously rented in the long-term market.

Large and small CBSAs

Finally, we repeat the regressions separately for the 30 largest CBSAs, and for the CBSAs ranked 31-100 in 2010 population. Rows 5-6 of Table 8 report the results. The qualitative results hold for both samples, though the results are not statistically significant in the rank 31-100 sample when the outcome is price-to-rent ratio. The effects of Airbnb appear to be stronger in the larger cities, which could be driven by a number of factors, including differences in housing demand and housing supply elasticities.

Log-density specification

In our main results, we have used a log-log specification to measure the effect of Airbnb listings on house prices and rental rates. This is because such specification provides us with easily, interpretable coefficients in the form of elasticity that is often used in competitive settings, and it has been used in the past in the context of Airbnb (Farronato and Fradkin, 2018; Zervas et al., 2017). However, as Zervas et al. (2017) observed, the log-log specification implies constant elasticity, an assumption that might not hold in our settings.

To make sure that our results are not driven by the log-log choice we use an alternative specification in which $Airbnb_{ict}$ in Equation (13) is measured as the number of Airbnb listings divided by the total occupied housing stock.²⁶ We call this measure “Airbnb density.”

We report the results using the log-density specification in Table 9. We report OLS results in column 1 and 2SLS results in column 2. The main results continue to hold qualitatively: 1) higher Airbnb density leads to higher house prices and rental rates; 2) the effect is higher for house prices than rental rates;

²⁶Data on total occupied housing stock is from ACS 5-year estimates from 2011 to 2016.

and 3) the effect is decreasing in owner-occupancy rate.

One of the downsides of the log-density specification is that Airbnb density is extremely skewed²⁷ and using $g_t \times h_{i,2010}$ as the instrument, the first stage becomes very weak and we fail to reject underidentification.²⁸ We therefore report results using an augmented set of instruments formed by interacting second order polynomials of g_t , $h_{i,2010}$, and $oorate_{i,2010}$. In the Appendix, we show that the qualitative results are robust to a number of different sets of instruments, but that the coefficients are somewhat sensitive to the choice of instruments. This is why the log-log specification, which has proven to be very robust, remains our preferred specification.

Additional checks

In the Online Appendix, we report a number of additional robustness checks, such as using alternative measures of Airbnb listings, the effect of including even smaller CBSAs, and the effect of dropping zipcodes with zero or a small number of listings. The main results are robust to all these alternative specifications.

5.3 Effect magnitudes

In this section we consider the economic significance of our estimated effects. Our baseline result is that a 1% increase in Airbnb listings leads to a 0.018% increase in rents and a 0.026% increase in house prices, at a median owner-occupancy rate zipcode. The median year-on-year growth rate in Airbnb listings was 28% across zipcodes in the top 100 CBSAs. Taken at the sample median, then, Airbnb growth explains 0.5% in annual rent growth and 0.7% of annual price growth.

Another way to calculate effect size is to calculate the Airbnb contribution to year-over-year rent and house price growth for each zipcode by multiplying median year-over-year changes in log listings by the estimated coefficients $\hat{\beta} +$

²⁷The skewness is 129.58 compared to a mean of 0.007 and variance of 0.06.

²⁸In the rent regression, an underidentification test using the Kleibergen and Paap (2006) rk LM statistic fails to reject underidentification with a p-value of 0.6650.

$\hat{\gamma} \times oorate_{i,2010}$. We report these effects in Table 10 for the median zipcodes in the 10 largest CBSAs, as well as for the median zipcode in our sample of 100 largest CBSAs. We also include the average year-on-year rent and price growth for comparison. While the size of the Airbnb contribution may seem large, we caution that estimating the effect at the sample median masks substantial heterogeneity in the actual experiences of different zipcodes, and ignores the very likely possibility of heterogeneous treatment effects. We also note that our estimated effects are consistent with those found in Horn and Merante (2017), who study the effect of Airbnb on rents in Boston from 2015-2016. They found that a one standard deviation increase in Airbnb listings led to a 0.4% increase in rents. In our data, the within-CBSA standard deviation in log listings is 0.27 for 2015-2016, which at the median owner-occupancy rate implies a 0.54% increase in rents using our estimates.

5.4 The effect of home-sharing on housing reallocation

We close the paper by presenting some suggestive evidence that home-sharing affects rental rates and house prices through the reallocation of housing stock. To do this, we investigate the effect of Airbnb on housing vacancies. Because vacancy data is not available at the zipcode level at a monthly or annual frequency, we focus on annual CBSA level vacancies. We regress vacancy rates at the CBSA-year level on the number of Airbnb listings, year fixed effects, and CBSA fixed effects. Data on vacancies come from annual ACS 1-year estimates at the CBSA level.²⁹ Table 11 reports the results.

The first thing to note in Table 11 is that the number of Airbnb listings at the CBSA level appears uncorrelated with the total number of vacancies, once controlling for CBSA and year fixed effects (column 1). However, when we break the vacancy rate down by the type of vacancy, we find a positive and statistically significant relation with the share of homes classified as vacant for seasonal or recreational use and a negative and statistically significant

²⁹We compute the total number of vacancies as sum of the number of vacant seasonal units, vacant-for-rent units, and vacant-for-sale units. We ignore vacant units that are for migrant workers, and we ignore vacant units for which the reason for vacancy is unknown.

association with the share of homes that are vacant-for-rent and vacant-for-sale.

It is important to note that the Census Bureau classifies homes as vacant even if they are temporarily occupied by persons who usually live elsewhere. Thus, homes allocated permanently to the short-term market are supposed to be classified as vacant, and will likely also be classified as seasonal or recreational homes by their owners and/or neighbors.³⁰ The positive association of Airbnb with vacant-seasonal homes, and the negative association with vacant-for-rent and vacant-for-sale homes is therefore consistent with absentee landlords substituting away from the rental and for-sale markets for long-term residents and allocating instead to the short-term market.

6 Discussion & Conclusion

The results presented in this paper suggest that the increased ability to home-share has led to increases in both rental rates and house prices. The increases in rental rates and house prices occur through two channels. In the first channel, home-sharing increases rental rates by inducing some landlords to switch from supplying the market for long-term rentals to supplying the market for short-term rentals. The increase in rental rates through this channel is then capitalized into house prices. In the second channel, home-sharing increases house prices directly by enabling homeowners to generate income from excess housing capacity. This raises the value of owning relative to renting, and therefore increases the price-to-rent ratio directly.

The results in this paper contribute to the debate surrounding home-sharing and its impact on the housing market. While Airbnb and proponents of the sharing economy argue that the platform is not responsible for higher house prices and rental rates,³¹ critics of home-sharing argue that Airbnb does

³⁰When a home is vacant, Census workers will interview neighbors about the occupancy characteristics of the home.

³¹For example, Airbnb disputed the findings of a recent report on the effects of the platform on the housing market in New York City. See: <https://www.citylab.com/equity/2018/03/what-airbnb-did-to-new-york-city/552749/>.

raise housing costs for local residents. This paper provides evidence confirming this latter hypothesis, and it does so using the most comprehensive dataset about home-sharing in the US available to date. Moreover, this paper also provides evidence that home-sharing increases the value of homes by allowing owners to better utilize excess capacity, for example by allowing owners to rent spare bedrooms, or the entire home when on vacation.

Turning to how cities and municipalities should deal with the steady increase in home-sharing, our view is that regulations on home-sharing should (at most) seek to limit the reallocation of housing stock from long-term rentals to short-term rentals, without discouraging the use of home-sharing by owner-occupiers. One regulatory approach could be to only levy occupancy tax on home sharers who rent the entire home for an extended period of time, or to require a proof of owner-occupancy in order to avoid paying occupancy tax.

Of course, this research does not come without limitations. First, we must recognize that our Airbnb data is imperfect: while we observe properties listed on Airbnb, we do not observe exact entry and exit of these properties. However, using Airbnb proprietary data Farronato and Fradkin (2018) obtain very similar elasticity estimates to Zervas et al. (2017) who use a similar approach to ours to obtain Airbnb data and measure Airbnb supply. This, along with our extensive set of robustness checks, reassures us about the validity of our results.

Second, we need to keep in mind that in settings where the effects are likely to be heterogeneous, a 2SLS estimate does not represent the Average Treatment Effect (ATE) but instead a Local Average Treatment Effect (LATE), or the effect of Airbnb on the subset of “complier” zipcodes – those zipcodes that are induced by the instrument to change the value of the endogenous regressor. Thus, our estimate do not necessarily reflect the average effect of Airbnb on any zipcodes. Despite this limitation, however, we estimate magnitudes that are similar to those obtained by Horn and Merante (2017) for the city of Boston. Finally, our model does not take into account possible spillover effects the neighboring zipcodes can have on each other.

To summarize the state of the literature on home-sharing, research (in-

cluding this paper) has found that home-sharing 1) raises local rental rates by causing a reallocation of the housing stock; 2) raises house prices through both the capitalization of rents and the increased ability to use excess capacity; and 3) induces market entry by small suppliers of short-term housing who compete with traditional suppliers (Zervas et al. (2017); Farronato and Fradkin (2018)). More research is needed, however, in order to achieve a complete welfare analysis of home-sharing. For example, home-sharing may have positive spillover effects on local businesses if it drives a net increase in tourism demand. On the other hand, home-sharing may have negative spillover effects if tourists create negative externalities, such as noise or congestion, for local residents. Moreover, home-sharing introduces an interesting new mechanism for scaling down the local housing supply in response to negative demand shocks—a mechanism that was not possible when all of the residential housing stock was allocated to the long-term market. Understanding the impact of such mechanism on the housing market is an open question to date. We leave these research questions for future work.

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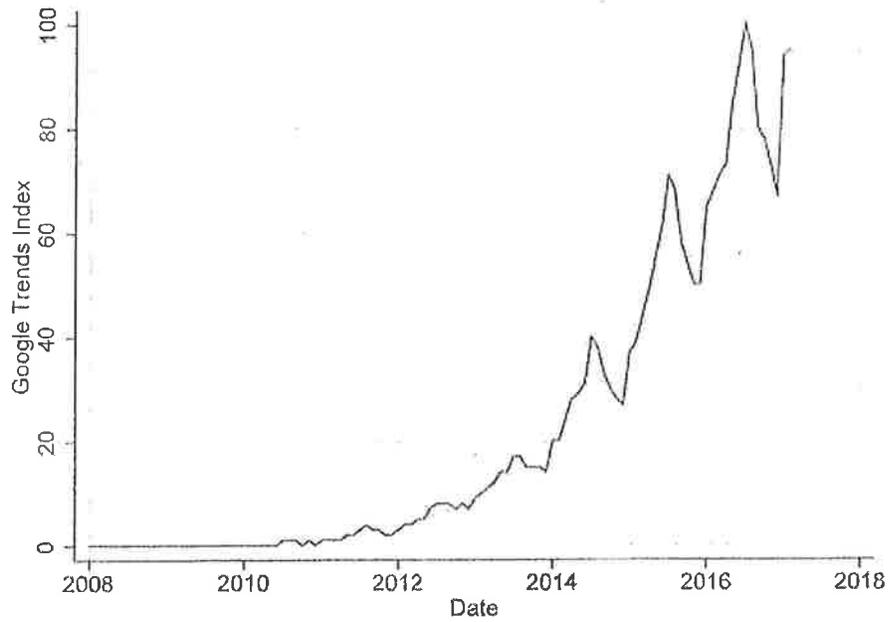
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Figure 1: Google Trends Search Index for Airbnb (Worldwide, 2008-2017)



Note: Weekly Google Trends index for the single English search term "Airbnb", from any searches worldwide. Google Trends data are normalized so that the date with the highest search volume is given the value of 100.

Figure 2: Map of Airbnb Listings by Zipcode, 2011-2016

June 2011

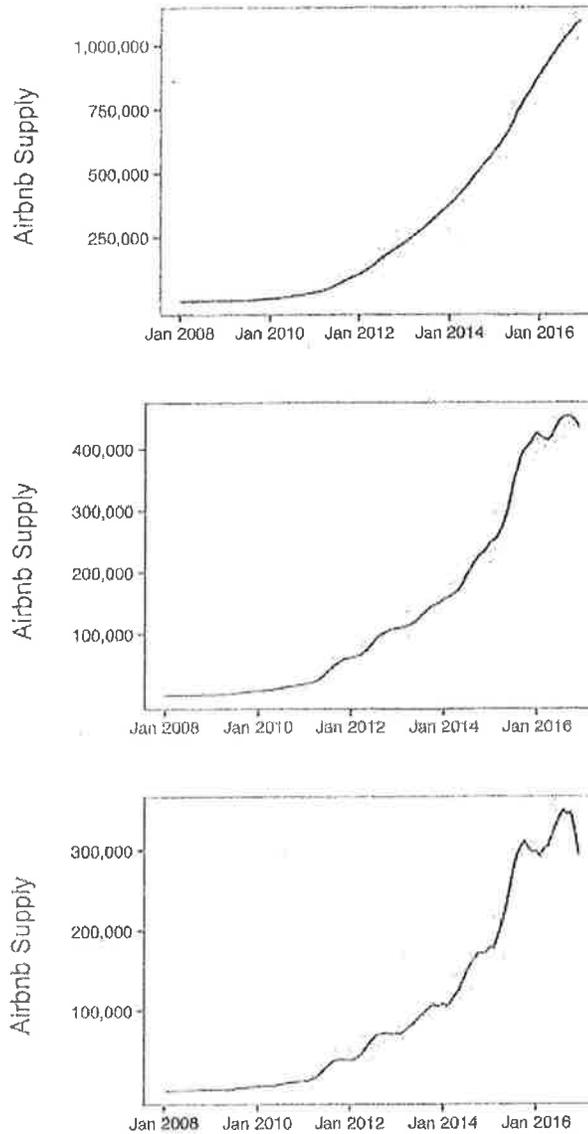


June 2016



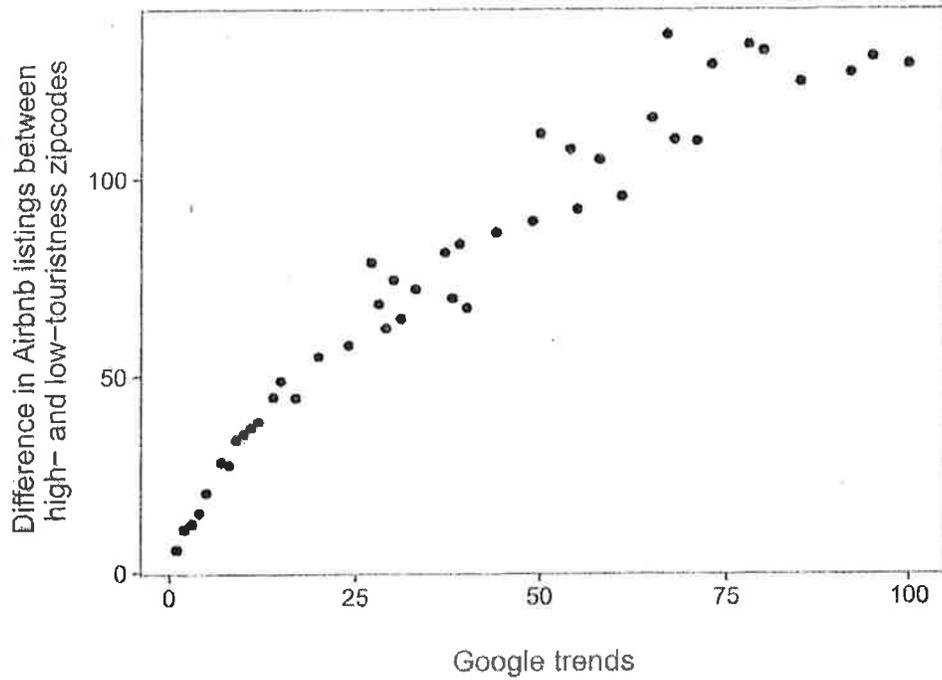
Note: The figure shows the spatial distribution of Airbnb listings in June 2011 and June 2016, where the number of listings is calculated using method 1 in Table 1. Listings are reported in logs, and log listings is set to zero if there are zero listings. Geographic areas without zipcode boundary information are colored white.

Figure 3: Total Number of Airbnb Listings (US, 2008-2016)



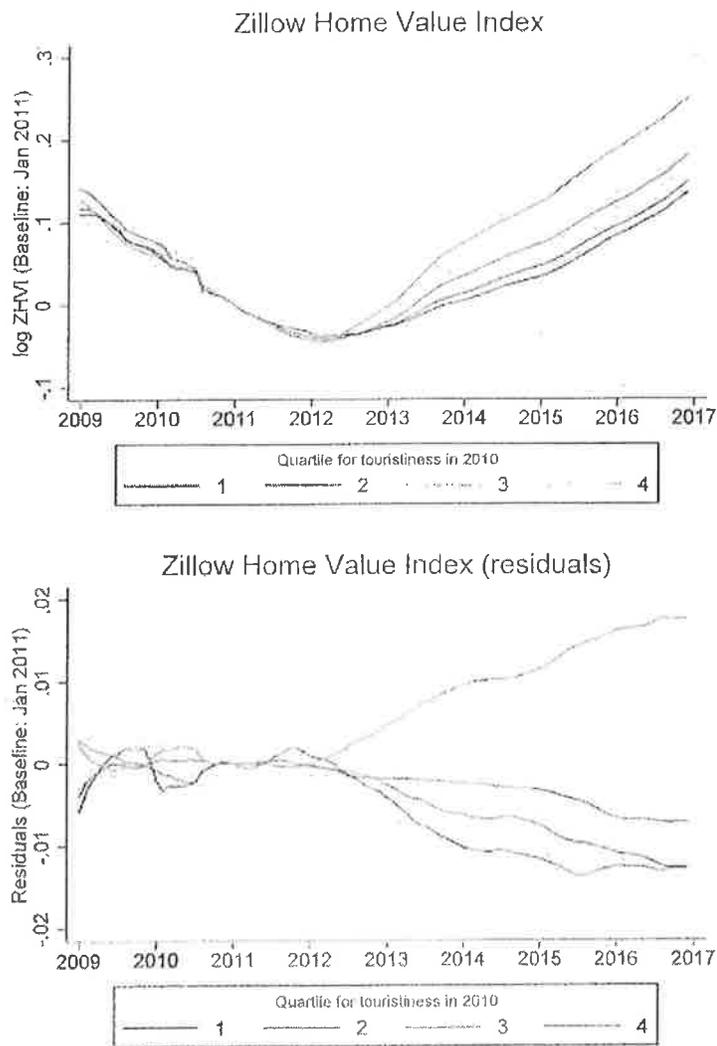
Note: This figure plots the number of Airbnb listings over time, using each of the 3 methods described in Table 1.

Figure 4: Testing the IV operating assumption



Note: This figure plots the difference in the number of Airbnb listings for high- and low-touristness zipcode over the Google trend values. We use the sample median value of touristness to create two equally sized groups of high- and low-touristness zipcodes.

Figure 5: Trends in Zillow Home Value Index by “Tourstiness” of Zipcode



Note: The top panel plots the ZHVI index, normalized to January 2011=0, averaged within different groups of zipcodes based on their level of “touristiness” in 2010. Touristiness is measured as the number of establishments in the food services and accommodations sector (NAICS code 72) in 2010, and the zipcodes are separated into four equally sized groups. The bottom panel plots the residuals from a regression of the ZHVI on zipcode fixed effects and CBSA-month fixed effects.

Table 2: Size of Airbnb Relative to the Housing Stock (zipcodes, 100 largest CBSAs)

	p10	p25	p50	p75	p90
<i>June 2011</i>					
Airbnb Listings	0	0	0	2	7
Housing Units	1,058	2,813	7,437	12,829	18,037
Airbnb Listings as a Percentage of					
Total Housing Units	.00	.00	.00	.02	.09
Renter-occupied Units	.00	.00	.00	.06	.33
Vacant Units	.00	.00	.00	.20	.92
Vacant-for-rent Units	.00	.00	.00	1.01	5.06
<i>June 2016</i>					
Airbnb Listings	1	4	13	44	144
Housing Units	1,097	2,926	7,610	13,219	18,443
Airbnb Listings as a Percentage of					
Total Housing Units	.03	.08	.21	.60	1.88
Renter-occupied Units	.13	.33	.87	2.50	7.31
Vacant Units	.37	.99	2.63	7.19	20.00
Vacant-for-rent Units	1.72	4.65	13.70	42.80	129.00

Note: This table reports the size of Airbnb relative to the housing stock, by zipcodes for the 100 largest CBSAs as measured by 2010 population. The number of Airbnb listings is calculated using method 1 in Table 1. Data on housing stocks, occupancy characteristics, and vacancies come from ACS zipcode level 5-year estimates.

Table 3: IV Validity Check: Correlation Between Instrument and Rents/Prices in Zipcodes Without Airbnb

	(1) Dep var: ln ZRI	(2) Dep var: ln ZHVI	(3) Dep var: ln ZHVI/ZRI
$g_t \times h_{t,2010}$	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
ln Population	0.011 (0.013)	0.045*** (0.016)	0.032 (0.020)
ln Median HH Income	-0.002 (0.011)	-0.001 (0.016)	0.004 (0.020)
College Share	0.054* (0.032)	0.120*** (0.038)	0.076 (0.052)
Employment Rate	0.045 (0.031)	-0.017 (0.033)	-0.063 (0.047)
Zipcode FE	Yes	Yes	Yes
CBSA-year-month FE	Yes	Yes	Yes
Observations	61854	50875	43164
R ²	0.979	0.994	0.964

Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Note: This table reports regression results when outcomes of interest are regressed on the instrumental variable directly, for zipcodes that were never observed to have any Airbnb listings. Because zipcode demographic characteristics are not available at a monthly frequency, zipcode-month measures for household income, population, college share, and employment rate are interpolated from the 2011 thru 2016 ACS 5-year estimates. Clustered standard errors at the zipcode level are reported in parenthesis.

Table 4: Comparing Airbnb and non-Airbnb zipcodes

	Airbnb Zipcodes	Non-Airbnb Zipcodes	Difference
Touristiness	43.73	7.40	36.33***
ln Median Income	11.02	10.87	0.14***
ln Population	9.47	8.25	1.21***
Share with bachelors' degree	0.35	0.20	0.15***
Employment rate	0.73	0.71	0.02***

Note: This table reports differences in demographic variables between zipcodes that were never observed to have any Airbnb listings and zipcodes that were.

Table 5: The Effect of Airbnb on Rental Rates

	(1)	(2)	(3)	(4)	(5)	(6)
ln Airbnb Listings	0.098*** (0.002)	0.003*** (0.001)	0.022*** (0.001)	0.021*** (0.001)	0.046*** (0.003)	0.043*** (0.003)
... × Owner-occupancy Rate (2010)			-0.023*** (0.002)	-0.022*** (0.002)	-0.038*** (0.003)	-0.035*** (0.003)
ln Population				0.050*** (0.007)		0.042*** (0.007)
ln Median HH Income				0.021*** (0.005)		0.017*** (0.006)
College Share				0.063*** (0.013)		0.057*** (0.013)
Employment Rate				0.048*** (0.014)		0.036*** (0.014)
Zipcode FE	No	Yes	Yes	Yes	Yes	Yes
CBSA-year-month FE	No	Yes	Yes	Yes	Yes	Yes
Instrumental Variable	No	No	No	No	Yes	Yes
Observations	649841	649841	649841	649697	649841	649697
R ²	0.170	0.991	0.991	0.991	0.991	0.991
Kleibergen-Paap F Statistic					817.3	804.2

Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Note: The number of Airbnb listings is calculated using method 1 in Table 1. To avoid taking the log of a zero, one is added to the number of Airbnb listings before taking logs. The instrumental variables are $g_t \times h_{i,2010}$ and $g_t \times h_{i,2010} \times oorate_{ict}$. Because zipcode demographic characteristics are not available at a monthly frequency, zipcode-month measures for household income, population, college share, and employment rate are interpolated from the 2011 thru 2016 ACS 5-year estimates. Clustered standard errors at the zipcode level are reported in parenthesis.

Table 6: The Effect of Airbnb on House Prices

	(1)	(2)	(3)	(4)	(5)	(6)
ln Airbnb Listings	0.175*** (0.004)	0.009*** (0.001)	0.040*** (0.002)	0.036*** (0.002)	0.079*** (0.005)	0.076*** (0.005)
... × Owner-occupancy Rate (2010)			-0.048*** (0.003)	-0.046*** (0.003)	-0.073*** (0.006)	-0.070*** (0.006)
ln Population				0.078*** (0.010)		0.064*** (0.010)
ln Median HH Income				0.012 (0.008)		0.005 (0.008)
College Share				0.073*** (0.018)		0.061*** (0.018)
Employment Rate				0.098*** (0.020)		0.070*** (0.020)
Zipcode FE	No	Yes	Yes	Yes	Yes	Yes
CBSA-year-month FE	No	Yes	Yes	Yes	Yes	Yes
Instrumental Variable	No	No	No	No	Yes	Yes
Observations	572858	572858	572858	572806	572858	572805
R ²	0.188	0.996	0.996	0.996	0.996	0.996
Kleibergen-Paap F Statistic					660.7	645.4

Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Note: The number of Airbnb listings is calculated using method 1 in Table 1. To avoid taking the log of a zero, one is added to the number of Airbnb listings before taking logs. The instrumental variables are $g_t \times h_{i,2010}$ and $g_t \times h_{i,2010} \times oorate_{ict}$. Because zipcode demographic characteristics are not available at a monthly frequency, zipcode-month measures for household income, population, college share, and employment rate are interpolated from the 2011 thru 2016 ACS 5-year estimates. Clustered standard errors at the zipcode level are reported in parenthesis.

Table 7: The Effect of Airbnb on Price-to-Rent Ratio

	(1)	(2)	(3)	(4)	(5)	(6)
ln Airbnb Listings	0.077*** (0.002)	0.002** (0.001)	0.016*** (0.002)	0.015*** (0.002)	0.032*** (0.004)	0.031*** (0.004)
... × Owner-occupancy Rate (2010)			-0.022*** (0.003)	-0.022*** (0.003)	-0.031*** (0.005)	-0.031*** (0.005)
ln Population				0.030*** (0.010)		0.025** (0.010)
ln Median HH Income				-0.013 (0.009)		-0.016* (0.009)
College Share				0.011 (0.019)		0.006 (0.019)
Employment Rate				0.046** (0.022)		0.034 (0.022)
Zipcode FE	No	Yes	Yes	Yes	Yes	Yes
CBSA-year-month FE	No	Yes	Yes	Yes	Yes	Yes
Instrumental Variable	No	No	No	No	Yes	Yes
Observations	537157	537142	537142	537080	537143	537080
R ²	0.154	0.979	0.979	0.979	0.979	0.979
Kleibergen-Paap F Statistic					627.7	614.7

Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Note: The number of Airbnb listings is calculated using method 1 in Table 1. To avoid taking the log of a zero, one is added to the number of Airbnb listings before taking logs. The instrumental variables are $g_t \times h_{i,2010}$ and $g_t \times h_{i,2010} \times oovrate_{ict}$. Because zipcode demographic characteristics are not available at a monthly frequency, zipcode-month measures for household income, population, college share, and employment rate are interpolated from the 2011 thru 2016 ACS 5-year estimates. Clustered standard errors at the zipcode level are reported in parenthesis.

Table 8: Robustness Checks (Alternative Samples)

Sample:	Panel A Dep var: ln ZRI		Panel B Dep var: ln ZHVI		Panel C Dep var: ln ZHVI/ZRI	
	Coefficient:		Coefficient:		Coefficient:	
	<i>airbnb</i> (1)	<i>... × oorate</i> (2)	<i>airbnb</i> (1)	<i>... × oorate</i> (2)	<i>airbnb</i> (1)	<i>... × oorate</i> (2)
Zipcodes: Near city center	0.030*** (0.003)	-0.022*** (0.004)	0.058*** (0.006)	-0.047*** (0.007)	0.028*** (0.006)	-0.024*** (0.007)
Zipcodes: Far from city center	0.058*** (0.005)	-0.051*** (0.005)	0.097*** (0.008)	-0.095*** (0.009)	0.035*** (0.006)	-0.039*** (0.007)
Years: 2011-2013	0.034*** (0.003)	-0.003 (0.005)	0.046*** (0.004)	-0.003 (0.006)	0.005 (0.004)	0.011* (0.006)
Years: 2014-2016	0.032*** (0.006)	-0.033*** (0.006)	0.088*** (0.009)	-0.126*** (0.010)	0.061*** (0.009)	-0.094*** (0.010)
CBSAs: pop. rank 1-30	0.054*** (0.004)	-0.041*** (0.004)	0.096*** (0.007)	-0.083*** (0.007)	0.040*** (0.005)	-0.039*** (0.005)
CBSAs: pop. rank 31-100	0.022*** (0.003)	-0.016*** (0.004)	0.031*** (0.006)	-0.025*** (0.008)	0.009 (0.006)	-0.004 (0.008)

Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Notes: This table repeats the regressions reported in column 6 of Tables 5-7, performed separately on different subsamples. "Near to city center" is the sample of zipcodes that are below the median distance to CBD, where the median is taken within CBSAs. "Far from city center" is the sample zipcodes that are above the median distance to CBD. City center coordinates are recovered using the Microsoft Bing API, and zipcode centroid coordinates are from the U.S. Census Bureau.

Table 9: Robustness Check (log-density specification)

	Panel A		Panel B		Panel C	
	Dep var: ln ZRI		Dep var: ln ZHVI		Dep var: ln ZHVI/ZRI	
	(1)	(2)	(1)	(2)	(1)	(2)
Airbnb Density	0.913*** (0.135)	1.571*** (0.182)	1.843*** (0.225)	2.679*** (0.318)	0.976*** (0.189)	1.075*** (0.267)
... × Owner-occupancy Rate (2010)	-1.223*** (0.209)	-2.609*** (0.555)	-3.063*** (0.340)	-3.608*** (0.893)	-1.942*** (0.308)	-1.754*** (0.675)
ln Population	0.052*** (0.007)	0.044*** (0.009)	0.066*** (0.010)	0.069*** (0.013)	0.018* (0.010)	0.022* (0.012)
ln Median HH Income	0.015*** (0.006)	0.010* (0.006)	0.004 (0.008)	-0.005 (0.009)	-0.013 (0.009)	-0.016* (0.009)
College Share	0.058*** (0.013)	0.058*** (0.015)	0.053*** (0.018)	0.042** (0.019)	0.004 (0.018)	-0.000 (0.019)
Employment Rate	0.046*** (0.014)	0.047*** (0.015)	0.103*** (0.019)	0.089*** (0.021)	0.051** (0.021)	0.045** (0.022)
Zipcode FE	Yes	Yes	Yes	Yes	Yes	Yes
CBSA-year-month FE	Yes	Yes	Yes	Yes	Yes	Yes
Instrumental Variable	No	Yes	No	Yes	No	Yes
Observations	613245	613245	538990	538990	504260	504260
R ²	0.991	0.991	0.996	0.996	0.979	0.979
Kleibergen-Paap F Statistic		9.954		10.92		10.54

Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Note: The number of Airbnb listings is calculated using method 1 in Table 1. Instruments in column 2 are interacted second order polynomials of g_t , $h_{t,2010}$, and $ovrate_{t,2010}$. Because zipcode demographic characteristics are not available at a monthly frequency, zipcode-month measures for household income, population, college share, and employment rate are interpolated from the 2011 thru 2016 ACS 5-year estimates. Clustered standard errors at the zipcode level are reported in parenthesis.

Table 10: Effect Magnitudes for 10 Largest CBSAs

CBSA	Year-over-Year Airbnb Contribution		Year-over-Year Growth	
	Rent	Price	Rent	Price
Top 100 CBSAs	0.59%	0.82%	3.18%	5.70%
New York-Newark-Jersey City, NY-NJ-PA	0.60%	0.83%	3.64%	3.55%
Los Angeles-Long Beach-Anaheim, CA	1.14%	1.79%	4.92%	9.66%
Chicago-Naperville-Elgin, IL-IN-WI	0.34%	0.44%	2.25%	3.98%
Dallas-Fort Worth-Arlington, TX	0.70%	1.01%	4.18%	8.21%
Miami-Fort Lauderdale-West Palm Beach, FL	1.02%	1.51%	4.51%	11.72%
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	0.54%	0.73%	1.94%	2.05%
Houston The Woodlands-Sugar Land, TX	0.95%	1.37%	4.67%	8.34%
Washington-Arlington-Alexandria, DC-VA-MD-WV	0.70%	0.96%	1.28%	4.41%
Atlanta-Sandy Springs-Roswell, GA	0.75%	1.07%	3.11%	8.42%
Detroit-Warren-Dearborn, MI	0.16%	0.21%	2.41%	8.54%

Note: Airbnb contribution is calculated as $\hat{\beta} + \hat{\gamma} \text{oorate}_{i,c,2010}$ multiplied by the median year-over-year growth in log Airbnb listings for each zipcode, and then taken at the median zipcode. Estimates from columns 6 of Tables 5 and 6 are used.

Table 11: The Effect of Airbnb on Vacancy Rates

	(1) All Vacant Units	(2) Seasonal Homes	(3) Vacant-for-Rent	(4) Vacant-for-Sale
In Airbnb Listings	0.001 (0.004)	0.008** (0.003)	-0.005*** (0.001)	-0.002*** (0.001)
Zipcode FE	Yes	Yes	Yes	Yes
CBSA-year-month FE	Yes	Yes	Yes	Yes
Observations	600	600	600	600
R ²	0.929	0.923	0.841	0.722

Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Note: Vacancy rate is regressed on the log number of Airbnb listings at the CBSA-year level. The number of Airbnb listings is calculated using method 1 in Table 1. To avoid taking the log of a zero, one is added to the number of Airbnb listings before taking logs. The dependent variable is the number of vacant units divided by the total number of housing units. Data on vacancies comes from annual ACS 1-year estimates. Seasonal homes are housing units described as being for seasonal, recreational, or occasional use. Note that according to Census methodology, housing units occupied temporarily by persons who usually live elsewhere are classified as vacant units.

For Online Publication: Appendix

A Model with Endogenous Owner-Occupiers

The model in Section 2 can be extended to allow the share of owner-occupiers to be endogenous. However, ex-ante heterogeneity in potential buyers needs to be introduced or else an equilibrium with all three of renters, owner-occupiers, and absentee landlords would require that Equations (4) and (10) both be equal. If they were not, then either long-term residents will outbid absentee landlords to own all the housing, or the opposite will happen.

We introduce heterogeneity in the most parsimonious way possible. Consider a set of N individuals who potentially interact with a local housing market. Each individual can choose to be a renter, an owner-occupier, an absentee landlord, or none of the above. Let us normalize the utility for “none of the above” to zero. The present value of utility that person i gets from being a renter is:

$$\begin{aligned} u_{i,r} &= U - \frac{1}{1-\delta}R + \epsilon_{i,r} \\ &= u_r + \epsilon_{i,r} \end{aligned}$$

Here, U is the present value of amenities that the individual gets from being a resident in this market. $\frac{1}{1-\delta}R$ is the present value of rents. $\epsilon_{i,r}$ is an idiosyncratic utility shock which is known ex-ante. The present value that person i gets from being an owner is:

$$\begin{aligned} u_{i,o} &= U - P + \frac{1}{1-\delta}\gamma g(Q - c) + \epsilon_{i,o} \\ &= u_o + \epsilon_{i,o} \end{aligned}$$

Here, U is again the present value of amenities, P is the purchase price of housing, and $\frac{1}{1-\delta}\gamma g(Q - c)$ is the present value of rents received from selling excess capacity on the peer-to-peer market. Finally, the present value that

person i gets from being an absentee landlord is:

$$\begin{aligned} u_{i,a} &= -P + \frac{1}{1-\delta} [R + g(Q - R - c)] + \epsilon_{i,a} \\ &= u_a + \epsilon_{i,a} \end{aligned}$$

For analytical tractability, let the utility shocks ϵ_i be distributed i.i.d. type 1 extreme value. The share of individuals that choose option j out of $j = \{r, o, a\}$ is:

$$s_j = \frac{\exp u_j}{1 + \sum_{k \in \{r, o, a\}} \exp u_k}$$

The equilibrium conditions determining R and P are:

$$(s_a + s_o)N = H$$

and:

$$[1 - f(Q - R - c)] s_a N = s_r N$$

The first condition is the market clearing condition for the housing market as a whole; i.e. the number of absentee landlords plus owner-occupiers is equal to the housing stock. The second condition is the market clearing condition for the long-term rental market; i.e. the number of renters is equal to the number of absentee landlords allocating housing to the long-term market.

We leave the derivation of analytical results for this model to future work or enterprising students. For this Appendix, we will simply present some numerical results which are consistent with all the key predictions in Section 2. Choosing $N = 10$, $H = 2$, $U = \$500,000$, $\delta = 0.95$, $\gamma = 0.1$, $Q = \$25,000$, and letting the distribution of idiosyncratic costs to listing in the short-term market be uniform from \$0 to \$100,000, we consider a change of c from ∞ (no home-sharing) to $c = 0$ (costless home-sharing). Table 12 below shows the results. Consistent with the model, the introduction of home-sharing under these model parameters results in a modest increase in both rental rates and house prices, and the increase in house prices is larger than the increase in rental rate. The qualitative results are robust to different parameter choices.

Table 12: Simulation Results

	$c = \infty$	$c = \$50k$	Δ
Rent	\$25,069	\$25,193	0.49%
Price	\$502,773	\$507,702	0.98%

B Additional Robustness Checks

Alternative measures of Airbnb supply

In this section, we perform a number of additional robustness checks. First, we show that our main results are robust to the alternative methods of calculating Airbnb supply, as discussed in Section 3. Rows 1 and 2 of Table 13 report the regression results when methods 2 and 3 are used to measure Airbnb supply instead of method 1. The results are barely changed, which is not surprising given the high correlation between the three measures, despite level differences.

Alternative CBSA sample

Second, we show that our main results are robust to the inclusion of smaller cities, beyond the 100 largest CBSAs. In rows 3 and 4 of Table 13, we report regression results when the sample includes the top 150 CBSAs and the top 200 CBSAs. Again, the results are not much changed, suggesting that the inclusion of smaller cities will not drive the results downwards significantly.

Excluding observations with zero or a small number of listings

Finally, one issue with the log-log specification is that we take the log of one plus the number of listings to avoid taking logs of zero. We now show that the results are robust to this choice. Row 5 of Table 13 reports regression results when instead of adding 1 to the number of listings, we instead simply drop all zipcode-month observations in which the number of listings is zero. The RHS variable is therefore $\log(\#\text{listings})$ instead of $\log(1+\#\text{listings})$. Row

6 additionally drops all zipcode-month observations in which the number of listings is less than 5. The results remain qualitatively and quantitatively similar under this alternative choice.

Using contemporaneous owner-occupancy rate

As described in Section 4, we interact $Airbnb_{ict}$ with $oorate_{ic,2010}$, the owner-occupancy rate in 2010, to reduce endogeneity concerns. However, the results are robust to using the contemporaneous owner-occupancy rate, $oorate_{ict}$.³² Row 7 of Table 13 reports the results when we use contemporaneous owner-occupancy rate.

C 2SLS Results using Airbnb Density

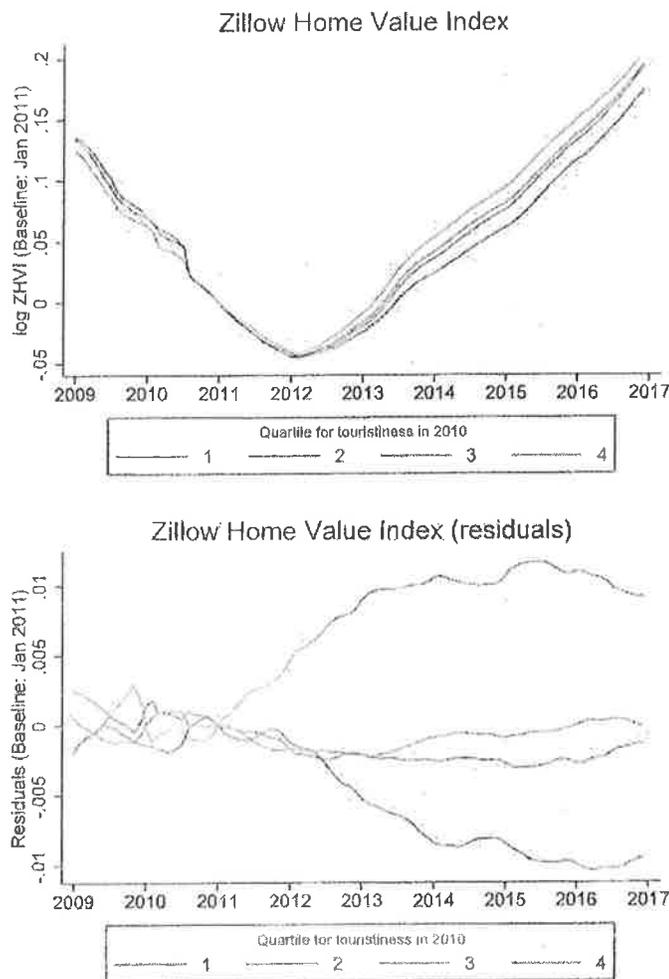
In this section, we report some 2SLS results using various choices of instruments for the log-density specification to show that the qualitative results are robust this choice. However, as we shall show, the magnitudes are somewhat sensitive. As noted in the main text, using $g_t \times h_{i,2010}$ as the instrument results in underidentification. In practice, we find that using $g_t \times h_{i,2010}/stock_{i,2010}$ as the instrument, where $stock_{i,2010}$ is the total housing stock in 2010, gives reasonable results. Figure 6 and Table 14 repeat the IV validity support exercises discussed in Section 4.1 for this instrument. Alternatively, higher order polynomials of the instrument (without dividing by $stock_{i,2010}$) appear to work as well, though the estimates are quite sensitive to the specific choice of instruments.

We report results for three 2SLS regression using different sets of instruments in Table 15. In columns (1) of each panel, the instruments are $g_t \times h_{i,2010}/stock_{i,2010}$ interacted with $oorate_{i,2010}$. In columns (2), the instruments are a third order polynomial of $g_t \times h_{i,2010}$ interacted with $oorate_{i,2010}$. In columns (3), the instruments are the full interactions between second order polynomials of g_t , $h_{i,2010}$, and $oorate_{i,2010}$. The general qualitative result is

³²Contemporaneous owner-occupancy rate is interpolated to the monthly level using ACS 5-year estimates from 2011 to 2016.

that the direct effect of Airbnb density is positive, while the interaction with owner-occupancy rate is negative, consistent with the results using the log-log specification.

Figure 6: Trends in Zillow Home Value Index by $h_{i,2010}/stock_{i,2010}$



Note: The top panel plots the ZHVI index, normalized to January 2011=0, averaged within different groups of zipcodes based on $h_{i,2010}/stock_{i,2010}$, i.e. the number of establishments in food services and accommodations sector in 2010 divided by the housing stock in 2010. The zipcodes are then separated into four equally sized groups. The bottom panel plots the residuals from a regression of the ZHVI on zipcode fixed effects and CBSA-month fixed effects.

Table 13: Additional Robustness Checks

Robustness Check:	Panel A		Panel B		Panel C	
	Dep var: ln ZRI		Dep var: ln ZHVI		Dep var: ln ZHVI/ZRI	
	Coefficient:		Coefficient:		Coefficient:	
	<i>airbnb</i>	<i>... × oorate</i>	<i>airbnb</i>	<i>... × oorate</i>	<i>airbnb</i>	<i>... × oorate</i>
	(1)	(2)	(1)	(2)	(1)	(2)
Method 2 for calculating # listings	0.048*** (0.003)	-0.040*** (0.004)	0.087*** (0.006)	-0.082*** (0.008)	0.036*** (0.005)	-0.037*** (0.006)
Method 3 for calculating # listings	0.048*** (0.003)	-0.041*** (0.004)	0.087*** (0.006)	-0.083*** (0.008)	0.036*** (0.005)	-0.037*** (0.006)
CBSAs pop. rank 1-150	0.040*** (0.003)	-0.033*** (0.003)	0.071*** (0.005)	-0.067*** (0.006)	0.030*** (0.004)	-0.031*** (0.005)
CBSAs pop. rank 1-200	0.038*** (0.002)	-0.031*** (0.003)	0.067*** (0.004)	-0.065*** (0.006)	0.027*** (0.003)	-0.030*** (0.004)
Drop obs. with zero listings	0.048*** (0.006)	-0.041*** (0.004)	0.092*** (0.010)	-0.084*** (0.007)	0.042*** (0.009)	-0.039*** (0.005)
Drop obs. with <5 listings	0.034** (0.014)	-0.043*** (0.005)	0.081*** (0.022)	-0.096*** (0.009)	0.046** (0.020)	-0.049*** (0.008)
Contemporaneous owner-occ rate	0.042*** (0.003)	-0.035*** (0.003)	0.074*** (0.005)	-0.070*** (0.006)	0.030*** (0.004)	-0.031*** (0.005)

Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Notes: This table reports results from robustness checks described in Appendix section B. In each case, 2SLS results are reported where the instrument is $g_t \times h_{i,2010}$. 1 is added before taking the log of the number of listings, except in rows 5 and 6 where the log(#listings) is taken directly.

Table 14: IV Validity Check for $g_t \times h_{i,2010}/stock_{i,2010}$

	(1) Dep var: ln ZRI	(2) Dep var: ln ZHVI	(3) Dep var: ln ZHVI/ZRI
$g_t \times h_{i,2010}/stock_{i,2010}$	0.007 (0.012)	0.013 (0.011)	-0.004 (0.014)
ln Population	0.011 (0.013)	0.045*** (0.016)	0.032 (0.020)
ln Median HH Income	-0.002 (0.011)	-0.001 (0.016)	0.004 (0.020)
College Share	0.054* (0.032)	0.120*** (0.038)	0.077 (0.051)
Employment Rate	0.046 (0.031)	-0.016 (0.033)	-0.063 (0.047)
Zipcode FE	Yes	Yes	Yes
CBSA-year-month FE	Yes	Yes	Yes
Observations	61854	50875	43164
R ²	0.979	0.994	0.964

Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Note: This table reports regression results when outcomes of interest are regressed on the instrumental variable directly, for zipcodes that were never observed to have any Airbnb listings. Because zipcode demographic characteristics are not available at a monthly frequency, zipcode-month measures for household income, population, college share, and employment rate are interpolated from the 2011 thru 2016 ACS 5-year estimates. Clustered standard errors at the zipcode level are reported in parenthesis.

Table 15: 2SLS Results for Log-Density Specification

	Panel A Dep var: ln ZRI			Panel B Dep var: ln ZHVI			Panel C Dep var: ln ZHVI/ZRI		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Airbnb Density	1.092*** (0.215)	1.889*** (0.215)	1.571*** (0.182)	2.484*** (0.304)	3.601*** (0.367)	2.079*** (0.318)	1.476*** (0.293)	1.677*** (0.279)	1.075*** (0.267)
... × Owner-occupancy Rate (2010)	-1.102* (0.594)	-3.976*** (0.709)	-2.609*** (0.555)	-3.781*** (0.874)	-6.529*** (1.138)	-3.603*** (0.893)	-2.969*** (0.960)	-3.173*** (0.731)	-1.754*** (0.675)
ln Population	0.054*** (0.008)	0.033*** (0.012)	0.044*** (0.009)	0.004*** (0.013)	0.040** (0.017)	0.060*** (0.013)	0.011 (0.015)	0.011 (0.013)	0.022* (0.012)
ln Median HH Income	0.014** (0.006)	0.008 (0.008)	0.010* (0.008)	-0.002 (0.008)	-0.005 (0.010)	-0.005 (0.008)	-0.010* (0.010)	-0.018** (0.009)	-0.016* (0.008)
College Share	0.053*** (0.015)	0.070*** (0.019)	0.055*** (0.015)	0.046** (0.018)	0.040* (0.021)	0.042** (0.019)	0.002 (0.019)	-0.001 (0.019)	-0.000 (0.019)
Employment Rate	0.041*** (0.015)	0.053*** (0.016)	0.047*** (0.015)	0.057*** (0.021)	0.113*** (0.023)	0.089*** (0.021)	0.052** (0.023)	0.050** (0.022)	0.045** (0.022)
Zipcode FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CHSA-year-month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instrumental Variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	613245	613245	613245	538950	538990	538990	504209	504200	504200
R ²	0.991	0.990	0.991	0.995	0.996	0.996	0.979	0.979	0.979
Kleibergen-Liap F Statistic	15.32	5.880	9.954	10.87	5.877	10.02	9.418	5.661	10.54

Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Note: This table reports 2SLS results using the log-density specification, for various choices of instrumental variables. In columns (1), the instruments are $g_t \times h_{t,2010}/stock_{t,2010}$ and the interaction with $oorate_{t,2010}$. In columns (2), the instruments are a third order polynomial of $g_t \times h_{t,2010}$ interacted with $oorate_{t,2010}$. In columns (3), the instruments are fully interacted second order polynomials of g_t , $h_{t,2010}$, and $oorate_{t,2010}$.

The economic costs and benefits of Airbnb

No reason for local policymakers to let Airbnb bypass
tax or regulatory obligations

Report • By [Josh Bivens](#) • January 30, 2019

Summary

“The sharing economy” refers to a constellation of (mostly) Silicon Valley–based companies that use the internet as their primary interface with consumers as they sell or rent services. Because this term is “vague and may be a marketing strategy” (AP 2019), we refer to these firms less poetically but more precisely as “internet-based service firms” (IBSFs).

Economic policy discussions about IBSFs have become quite heated and are too often engaged at high levels of abstraction. To their proponents, IBSFs are using technological advances to bring needed innovation to stagnant sectors of the economy, increasing the quality of goods and services, and providing typical American families with more options for earning income; these features are often cited as reasons why IBSFs should be excused from the rules and regulations applying to their more traditional competitors. To skeptics, IBSFs mostly represent attempts by rich capital owners and venture capitalists to profit by flouting regulations and disguising their actions as innovation.

The debates about whether and how to regulate IBSFs often involve theories about their economic costs and benefits. This report aims to inform the debate by testing those theories. Specifically, it assesses the potential economic costs and benefits of the expansion of one of the most well-known of the IBSFs: the rental business Airbnb.

Airbnb, founded in 2008, makes money by charging guests and hosts for short-term rental stays in private homes or apartments booked through the Airbnb website. It started in prototype in San Francisco and expanded rapidly, and is now operating in hundreds of cities around the world. Airbnb is frequently depicted as a boon for travelers looking for lower-cost or nontraditional accommodations, and for homeowners looking to expand their income stream. But in many local markets, the arrival and expansion of Airbnb is raising questions about its potential negative impacts on local housing costs, quality of life in residential neighborhoods, employment quality in the hospitality industry, and local governments’ ability to

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enforce municipal codes and collect appropriate taxes.

In our cost-benefit analysis, we find:

- **The economic costs Airbnb imposes likely outweigh the benefits.** While the introduction and expansion of Airbnb into U.S. cities and cities around the world carries large potential economic benefits and costs, the costs to renters and local jurisdictions likely exceed the benefits to travelers and property owners.
- **Airbnb might, as claimed, suppress the growth of travel accommodation costs, but these costs are not a first-order problem for American families.** The largest and best-documented potential benefit of Airbnb expansion is the increased supply of travel accommodations, which could benefit travelers by making travel more affordable. There is evidence that Airbnb increases the supply of short-term travel accommodations and slightly lowers prices. But there is little evidence that the high price of travel accommodations is a pressing economic problem in the United States: The price of travel accommodations in the U.S. has not risen particularly fast in recent years, nor are travel costs a significant share of American family budgets.
- **Rising housing costs are a key problem for American families, and evidence suggests that the presence of Airbnb raises local housing costs.** The largest and best-documented potential cost of Airbnb expansion is the reduced supply of housing as properties shift from serving local residents to serving Airbnb travelers, which hurts local residents by raising housing costs. There is evidence this cost is real:
 - Because housing demand is relatively inelastic (people's demand for somewhere to live doesn't decline when prices increase), even small changes in housing supply (like those caused by converting long-term rental properties to Airbnb units) can cause significant price increases. High-quality studies indicate that Airbnb introduction and expansion in New York City, for example, may have raised average rents by nearly \$400 annually for city residents.
 - The rising cost of housing is a key problem for American families. Housing costs have risen significantly faster than overall prices (and the price of short-term travel accommodations) since 2000, and housing accounts for a significant share (more than 15 percent) of overall household consumption expenditures.
- **The potential benefit of increased tourism supporting city economies is much smaller than commonly advertised.** There is little evidence that cities with an increasing supply of short-term Airbnb rental accommodations are seeing a large increase in travelers. Instead, accommodations supplied via Airbnb seem to be a nearly pure substitution for other forms of accommodation. Two surveys indicate that only 2 to 4 percent of those using Airbnb say that they would not have taken the trip were Airbnb rentals unavailable.
 - Studies claiming that Airbnb is supporting a lot of economic activity often vastly overstate the effect because they fail to account for the fact that much of this spending would have been done anyway by travelers staying in hotels or other alternative accommodations absent the Airbnb option.
- **Property owners do benefit from Airbnb's capacity to lower the transaction costs of**

operating short-term rentals, but the beneficiaries are disproportionately white and high-wealth households. Wealth from property ownership is skewed, with higher-wealth and white households holding a disproportionate share of housing wealth overall—and an even more disproportionate share of housing wealth from nonprimary residences because they are much more likely to own nonprimary residential property (such as multi-unit Airbnb rentals).

- **The shift from traditional hotels to Airbnb lodging leads to less-reliable tax payments to cities.** Several large American cities with a large Airbnb presence rely heavily on lodging taxes. Airbnb has largely blocked the ability of these cities to transparently collect lodging taxes on Airbnb rentals that are equivalent to lodging taxes on hotel rooms. One study found that the voluntary agreements Airbnb has struck with state and local governments “[undermine] tax fairness, transparency, and the rule of law.”
- **City residents likely suffer when Airbnb circumvents zoning laws that ban lodging businesses from residential neighborhoods.** The status quo of zoning regulations in cities reflects a broad presumption that short-term travelers likely impose greater externalities on long-term residents than do other long-term residents. Externalities are economic costs that are borne by people not directly engaged in a transaction. In the case of neighbors on a street with short-term renters, externalities include noise and stress on neighborhood infrastructure like trash pickup. These externalities are why hotels are clustered away from residential areas. Many Airbnb rental units are in violation of local zoning regulations, and there is the strong possibility that these units are indeed imposing large costs on neighbors.
- **Because Airbnb is clearly a business competing with hotel lodging, it should be subject to the same taxation regime as hotels.** In regard to zoning regulations, there is no empirical evidence that the net benefits of Airbnb introduction and expansion are so large that policymakers should reverse long-standing regulatory decisions simply to accommodate the rise of a single company.

Overview of the economics of Airbnb

Airbnb runs an online marketplace for short-term lodging rentals. It largely does not own dwellings or real estate of its own; instead, it collects fees by acting as a broker between those with dwellings to rent and those looking to book lodging.

The perception that Airbnb tries to foster is that its “hosts” are relatively typical households looking to earn supplementary income by renting out rooms in their homes or by renting out their entire residence when they’re away. Critics argue that Airbnb bookings have become increasingly concentrated among a relatively small number of “hosts” that are essentially miniature hotel companies.¹

Potential economic benefits

At a broad level, the potential economic benefits and costs of Airbnb are relatively straightforward.²

The key potential benefit is that property owners can **diversify the potential streams of revenue** they generate from owning homes. Say, for example, that before Airbnb arrived in a city, property owners setting up residential rental properties faced transaction costs so high that it only made economic sense to secure relatively long-term leases. These transaction costs incurred by property owners could include advertising for and screening of tenants and finding alternative accommodations for themselves if they were renting their own dwellings. But if the rise of internet-based service firms reduced these transaction costs and made short-term rentals logistically feasible and affordable for the first time, it could allow these property owners to diversify into short-term rentals as well as long-term rentals.

Another potential benefit is the **increased supply (and variety) of short-term rentals** available to travelers. This increased supply can restrain price growth for short-term rentals and make traveling more affordable.

Finally, one well-advertised potential benefit of Airbnb is the **extra economic activity that might result** if the rise of Airbnb spurs an increase in visitors to a city or town. Besides the income generated by Airbnb property owners, income might be generated by these visitors as they spend money at restaurants or in grocery stores or on other activities.

Potential costs

The single biggest potential cost imposed by Airbnb comes in the form of **higher housing costs for city residents** if enough properties are converted from long-term housing to short-term accommodations. If property owners take dwellings that *were* available for long-term leases and convert them to short-term Airbnb listings, this increases the supply of short-term rentals (hence driving down their price) but decreases the supply of long-term housing, increasing housing costs for city residents. (We refer to all long-term costs of shelter as “housing,” including rentals and owners’ equivalent rental costs.)

Another large potential city-specific cost of Airbnb expansion is the **loss of tax revenue**. Many cities impose relatively steep taxes on short-term lodging, hoping to obtain revenue from out-of-town travelers to spend on local residents. The most common and straightforward of these revenue raisers is a tax on traditional hotel rooms. If Airbnb expansion comes at the expense of traditional hotels, and if the apparatus for collecting taxes from Airbnb or its hosts is less well-developed than the apparatus for collecting taxes from traditional hotels, this could harm city revenues.

A further potential cost is the **externalities that property rentals (of all kinds) impose** on neighbors, for example, noise and/or use of building facilities. Since hosts are often not on-site with their renters, they do not bear the costs of these externalities and hence may not factor them into rental decisions. Of course, one could argue that such externalities

are also incurred with long-term rentals not arranged through Airbnb. But if the expansion of Airbnb increases total short- and long-term rental activity, or if short-term rentals impose larger externalities than long-term rentals, then Airbnb expansion can increase these externalities.

Finally, if Airbnb expansion comes at the expense of traditional hotels, it could have a **negative impact on employment**. First, since some of the labor of maintaining Airbnb lodgings is performed by the property owners themselves, the shift to Airbnb from traditional hotels would actually reduce employment overall. Second, since the task of cleaning and maintaining rooms and even greeting Airbnb renters is often done by third-party management firms, the shift from the traditional hotel sector to Airbnb rentals could degrade job quality.

The rest of this report evaluates the potential scope of each of these benefits and costs, and ends with an overall assessment of the effect of Airbnb expansion.

Potential benefits of Airbnb introduction and expansion in U.S. cities

This section elaborates on the potential benefits identified in the previous section. For each benefit, it assesses how likely the benefit is to emerge, provides empirical estimates of the magnitude of the benefit, and discusses the likely distribution of the benefit.

Potential benefit one: Property owners can diversify into short-term rentals

The most obvious benefit stemming from the creation and expansion of Airbnb accrues to property owners who have units to rent. Owners of residential property have essentially three options for earning a return on the property: They can live in the residence and hence not have to pay rent elsewhere, they can rent it out to long-term residents, or they can rent it out to short-term visitors.

If the only barrier to renting out residential property to short-term visitors were the associated transaction costs, then in theory the creation and expansion of Airbnb could be reducing these transaction costs and making short-term rental options more viable. It does seem intuitive that transaction costs of screening and booking short-term renters would be higher over the course of a year than such costs for renting to long-term residents (or the costs of maintaining owner-occupied property). However, the potential benefits are only the *difference* between what the property owner earned before the introduction of Airbnb and what the property owners earned from short-term rentals booked through the Airbnb platform.

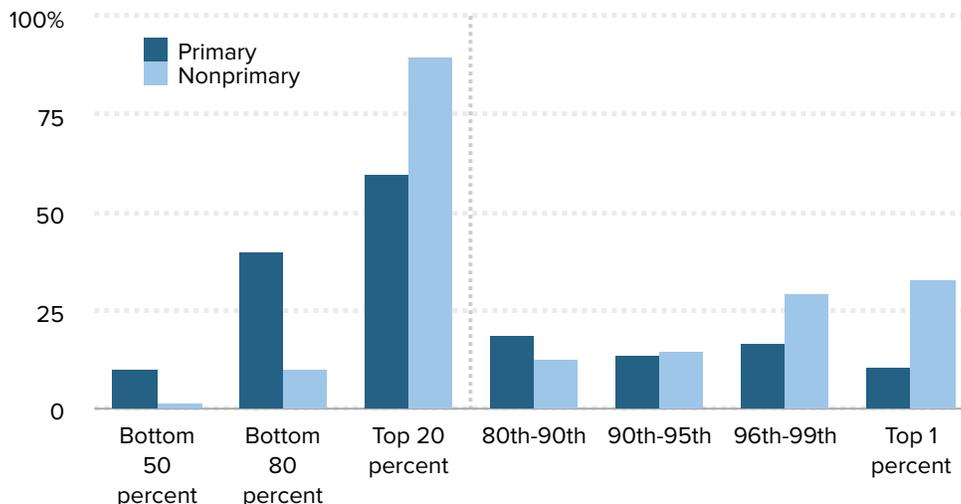
These potential benefits are likely quite skewed to those with more wealth. While housing is more widely held than most other assets, the total value of housing wealth is (like all wealth) quite concentrated among white and high-income households. Further, because of the myriad benefits of owning one's own residence, it is likely that much of the benefit of Airbnb's introduction and expansion accrues to those with more than one property (one for occupying and one or more for renting).³ The distribution of property wealth generated by nonprimary residential real estate is even more concentrated than housing wealth overall. **Figure A** shows, by wealth class, the distribution of housing wealth overall and of housing wealth excluding owner-occupied housing.

This figure shows that the potential benefits of Airbnb introduction and expansion to property owners are highly concentrated. To put it simply, any economic occurrence that provides benefits proportional to owning property is one that will grant these benefits disproportionately to the wealthy. In 2016, for example, 60.0 percent of primary housing wealth (housing wealth in households' primary residences) was held by the top 20 percent

Figure A

Housing wealth—particularly wealth from owning a nonprimary residence—is skewed

Share of total primary and nonprimary household housing wealth in the U.S. economy held by each wealth class, 2016



Note: Primary housing wealth is wealth from owner-occupied housing. Nonprimary housing wealth is wealth from nonowner-occupied housing. The wealth classes depicted overlap, with the top 20 percent broken down into households falling within the 80th to 90th, 90th to 95th, and 96th to 99th percentiles.

Source: Author's analysis of microdata from the Federal Reserve Board Survey of Consumer Finances (2016)

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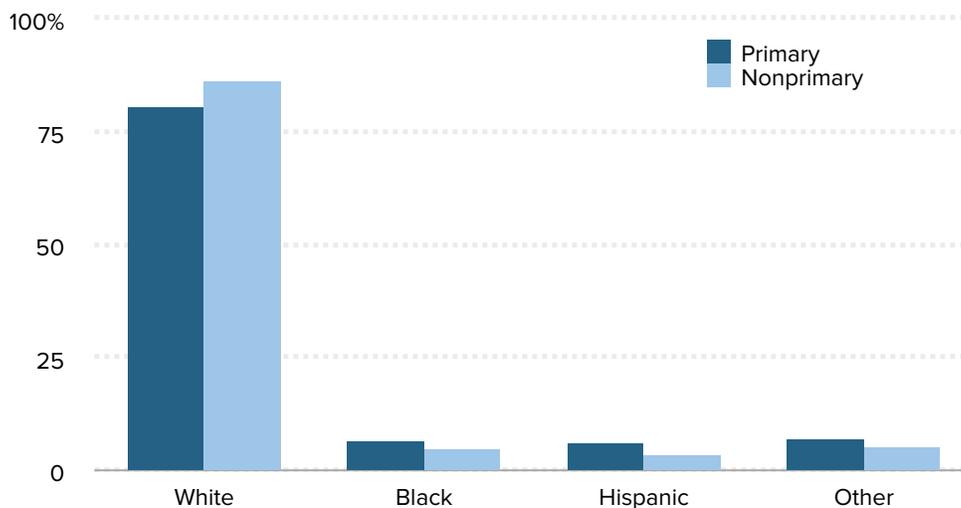
of households. (Not shown in the figure is that this share has increased by 5.4 percentage points since 1989.) As we noted earlier, however, many Airbnb listings are actually owned by households with multiple units to rent. Given this, Figure A also shows the share of housing wealth from nonprimary residences held by various groups. This “nonprimary housing wealth” is far more skewed. For example, the top 20 percent hold 90.1 percent of this type of wealth.

Figure B shows the distribution of housing wealth by race and ethnicity. Across racial groups, more than 80 percent of wealth in one’s primary residence was held by white households. African American households held just 6.5 percent of wealth in primary residences, Hispanic households held 6.0 percent of this type of wealth, while households of other races and ethnicities held 6.9 percent. Not shown is the change in the share of wealth in primary residences held by racial and ethnic groups: Primary housing wealth held by nonwhite households has risen a bit (by roughly 6 percentage points) since 1989. As with the distribution by wealth class, the holdings of nonprimary housing wealth by race and ethnicity are again even more skewed, with white households holding more than 86 percent of this type of wealth. African American households hold just 5.0 percent of nonprimary housing wealth, Hispanic households hold 3.6 percent, and households of other races and ethnicities hold 5.2 percent.

Figure B

White households disproportionately benefit from housing wealth

Share of total primary and nonprimary household housing wealth held, by race and ethnicity



Note: Primary housing wealth is wealth from owner-occupied housing. Nonprimary housing wealth is wealth from nonowner-occupied housing. Hispanic means “Hispanic any race” and the race/ethnicity categories are mutually exclusive.

Source: Author’s analysis of microdata from the Federal Reserve Board Survey of Consumer Finances (2016)

Economic Policy Institute

In short, what Figures A and B show is that because wealth from residential properties that can produce rental income is concentrated among the wealthy and white households, giving property owners the unfettered option to choose Airbnb over long-term rental uses of their property means conferring an enhanced option to predominantly wealthy and white owners of housing wealth. (**Appendix Table 1** provides the same analyses shown in Figures A and B for the years 1989, 1998, and 2007, and for the most recent data year, 2016, as well as the change from 1989 to 2016.)

Finally, while Airbnb might make short-term rentals feasible for property owners by reducing transaction costs through the technological efficiencies provided by Airbnb’s internet-based platform, the company might also just make short-term rentals feasible by creating a norm of ignoring regulations that bar short-term rentals. Short-term rentals are effectively banned in many residential neighborhoods in the cities where Airbnb operates, yet they have proliferated after the introduction of Airbnb.⁴ The regulations barring or limiting short-term rentals were established to reduce the externalities associated with commercial operations of certain kinds—including hotel operations—in residential neighborhoods. Airbnb’s business model appears to depend significantly on skirting these regulations and dodging competition from traditional hotel owners who are prohibited from operating in these same neighborhoods. If the regulations banning short-term rentals are baseless and serve no useful purpose, then subverting them could be seen as a

benefit of Airbnb. But allowing large corporations such as Airbnb to simply ignore regulations—rather than trying to change them through democratic processes—is hardly the basis of sound public policy.

Potential benefit two: Increased options and price competition for travelers' accommodations

Airbnb is essentially a positive supply shock to short-term accommodations. Like all positive supply shocks, it should be expected to lower prices. There is some accumulating evidence that Airbnb does exactly this. Zervas, Proserpio, and Byers (2017) examine the effect of Airbnb expansion across cities in Texas. They find that each 10 percent increase in the size of the Airbnb market results in a 0.4 percent decrease in hotel room revenue. They find that most of this revenue decline is driven by price declines. Evidence of the positive supply shock is particularly evident in the 10 American cities where Airbnb's presence is largest. Dogru, Mody, and Suess (2019) find a negative correlation between Airbnb expansion and hotels' average daily rates in the 10 U.S. cities with the largest Airbnb presence.

Besides cost, the introduction and expansion of Airbnb could improve the perceived quality of accommodations available. There is some limited evidence that this is the case: a survey by doctoral candidate Daniel Adams Guttentag (2016) finds that "convenient location" is one of the top reasons given by Airbnb guests when asked why they chose the service. But the Guttentag 2016 survey also identifies "low cost" as the *single most-identified* reason people give when asked why they chose Airbnb.

However, it should be stressed that this potential benefit of Airbnb introduction and expansion is overwhelmingly a *redistribution* of welfare, not an *increase* in economywide welfare. Very few people have claimed that Airbnb's spread within a given city has led developers to build *more accommodations* in the city overall. Instead, owners or third parties have often turned long-term rental units into short-term lodging via Airbnb.

The question then becomes, "Has this redistribution of potential accommodations from the long-term to the short-term market increased economic welfare overall?" One way that Airbnb could be increasing economic welfare overall is if it were helping travelers deal with rising travel accommodation costs.

By looking at trends in prices and spending in the short-term lodging sector, we can get a commonsense check on whether high prices for short-term travel accommodations are a pressing economic problem for ordinary American households. If the price of short-term travel accommodations were rising rapidly, then presumably an increase in supply that restrained price increases would be valuable (or at least more valuable than if these prices were not showing any particularly trend). The two lines in **Figure C** show changes in the consumer price index for travel accommodations compared with changes in the overall price index for personal consumption expenditures (PCE). According to Figure C, in the 2010s, the price of short-term travel accommodations has grown faster than prices overall only since 2014—this is the same year that ushered in the large-scale expansion of Airbnb.

Figure C

The price of short-term travel accommodations has increased slightly faster than prices overall, but only in recent years

Price indices for short-term travel accommodations and overall personal consumption expenditures (PCE), 2000–2016



Source: Author's analysis of Bureau of Economic Analysis National Income and Product Accounts (NIPA) Table 2.4.4.

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So it certainly seems that the launch and growth of Airbnb was not solving any preexisting price pressure—because it was operating and expanding well before recent years' price growth. (Further, it is possible that by substituting more strongly for a less-expensive slice of the traditional hotel market—leisure travel as opposed to business travel, for example—that Airbnb introduction might actually be associated with raising measured short-term travel accommodation prices, through a composition effect.)

Potential benefit three: Travelers' spending boosts the economic prospects of cities

The lower prices and greater range of options made available by the introduction and expansion of Airbnb could, in theory, induce a large increase in travel and spark economic growth in destination cities. This is precisely the claim made in a report by NERA Economic Consulting (NERA 2017), which says that Airbnb “supported” 730,000 jobs and \$61 billion in output globally, with roughly a quarter of this economic gain occurring in the United States.

To be blunt about these claims, they are flatly implausible. They rest on the assumption that all money spent by those renting Airbnb units is money that would not have been spent in some alternative accommodations had Airbnb not existed.

Say, for example, that guests at Airbnb properties spent \$10 million in New York City in 2016, including the money spent at restaurants and theaters and other attractions while visiting the city. The rental payment these guests make is included in the NERA numbers, but is expressed as extra income for Airbnb hosts. NERA then takes this entire \$10 million in spending (both nonaccommodation spending by visitors and the extra income going to Airbnb hosts) and runs it through input–output models to generate multiplier effects that yield their final numbers for output and employment supported in each city.

There are a number of problems with the NERA study. First, it is surprisingly opaque. It does not provide overall global and U.S. spending numbers or break these numbers into their components: nonaccommodation spending by Airbnb guests and income generated for Airbnb hosts. It also does not report the assumed size of the multiplier. Rather, it provides final numbers for global and U.S. output and employment that are functions of primary spending flows multiplied by the effects of their input–output model. The study states that it uses the well-known IMPLAN model, but IMPLAN can generate multipliers of varying size: It would be valuable to know just how large NERA is assuming the multiplier effects of this Airbnb-related spending is, just as a plausibility check.

Second, the study seems clearly written to maximize the perceived support Airbnb might provide local economies—both now and into the future. For example, toward the end of the report NERA provides several tables showing projected support for output and employment for years after the study (from 2017 to 2025). These projected *future* contributions to output and employment dwarf the contribution that is apparent in the actual data analyzed by NERA. But these projections rely on overoptimistic assumptions about Airbnb’s future growth. For example, NERA forecasts growth of 75 percent for Airbnb arrivals in 2017,⁵ but another study (Molla 2017) suggests that these arrivals in fact grew by closer to 25–50 percent, with growth rates particularly slowing in the U.S. and the European Union.⁶

What is by far the most important weakness of the NERA analysis is its reliance on the assumption that *all* spending done by travelers staying at Airbnb properties is spending that would not have been done had Airbnb not existed. The possibility that Airbnb visitors would still have visited a city even if Airbnb units were unavailable—by securing alternative accommodations—is completely ruled out by the NERA analysis. This is obviously an incorrect assumption. For example, it assumes that Airbnb and traditional hotels are not seen as potential substitutes for each other in the minds of travelers. But research has shown that they *are* quite close substitutes. Zervas, Proserpio, and Byers (2017) empirically assess the effect of Airbnb’s expansion on the hotel industry in the state of Texas. In their introduction, they write, “Our hypothesis is that some stays with Airbnb serve as a substitute for certain hotel stays, thereby impacting hotel revenue...” In their discussions and conclusions section, they summarize what their empirical investigation has found: “Focusing on the case of Airbnb, a pioneer in shared accommodations, we estimate that its entry into the Texas market has had a quantifiable negative impact on local hotel room revenue.” Put simply, this result is completely inconsistent with the assumption that Airbnb has no potential substitutes for those using its services. This in turn means that at least some of the economic activity “supported” in local economies by spending done by Airbnb guests is activity that would have been supported absent Airbnb, likely by these

same guests staying in traditional hotels or other accommodations.

As discussed in a previous section, Guttentag (2016) reports the findings of a survey of Airbnb users. Among other questions, the survey explicitly asks how substitutable travelers find Airbnb lodgings. The precise question is, “Thinking about your most recent Airbnb stay—If Airbnb and other similar person-to-person paid accommodations services (e.g., VRBO) did not exist, what type of accommodation would you have most likely used?” Only 2 percent of Airbnb users responded to this question with the assertion that they would not have taken the trip. The remaining 98 percent identified other lodging possibilities that they would have used. In a similar survey that included some business travelers, Morgan Stanley Research 2017 reports near-identical findings, with between 2 and 4 percent of respondents saying that they would not have undertaken a trip but for the presence of Airbnb.⁷ In both the Morgan Stanley Research survey and the Guttentag survey, roughly three-fourths of the respondents indicated that Airbnb was substituting for a traditional hotel.

If the Guttentag 2016 and Morgan Stanley Research 2017 findings are correct, this implies that NERA overstates the support Airbnb provides to local economies by somewhere between 96 and 98 percent. It is possible that some flows of spending might support more local spending when associated with Airbnb instead of traditional hotels—for example, one could argue that income accruing to Airbnb hosts is more likely to be spent locally than money paid to large hotel chains. However, the reverse is also true—for example, Airbnb rentals are far more likely to come equipped with a kitchen, and so Airbnb lodgers might be more likely to eat in rather than patronize restaurants.

Additionally, the local spillover spending associated with Airbnb expansion might not be uniform across neighborhoods. Alyakoob and Rahman (2018) document a modest increase in local restaurant spending associated with expanding Airbnb presence. Essentially, restaurants located away from central hotel cores in cities are unlikely to attract many out-of-town tourists. But if Airbnb penetration in outlying neighborhoods increases, restaurants there might now be able to tap some of this tourist market. Alyakoob and Rahman find that every 2 percent rise in Airbnb activity in a given neighborhood increases restaurant employment in that neighborhood by 3 percent. Crucially, Alyakoob and Rahman make no such calculation for potential employment-depressing effects of restaurants closer to traditional hotels. Further, they find that the boost to restaurant employment given by greater Airbnb activity does not occur in areas with a relatively high share of African American residents.

Finally, given that the overwhelming share of jobs “supported” by Airbnb are jobs that would have been supported by guests in some alternative accommodation, it seems likely that even if there is a slight increase in *spending* associated with a slight (about 2 percent) increase in visitors to a city due to Airbnb, there may well be a decline in *jobs*. We have noted previously that it is quite possible that traditional hotels are a more labor-intensive source of accommodation than are Airbnb listings. If, for example, Airbnb operators employ fewer people to provide cleaning and concierge and security services, then each dollar spent on Airbnb accommodations is likely to support less employment than each dollar spent on traditional hotel accommodations.

We can gauge the employment effect with a hypothetical scenario that assumes that the Guttentag 2016 and Morgan Stanley Research 2017 analyses are correct and that only 2 to 4 percent of the spending supported by Airbnb represents net new spending to a locality. In this case, if even half of the overall spending “supported” by Airbnb is a pure expenditure shift away from traditional hotels, and if traditional hotels are even 5 to 10 percent more labor-intensive than Airbnb units, then introducing Airbnb would actually have a *negative* effect on employment.⁸

Even if one grants that 2 to 4 percent of the output supported by Airbnb in host cities is net new spending, this spending is just a redistribution away from other, presumably less-Airbnb-intensive, localities. Given that Airbnb has tended to grow in already rich and desirable cities, it is unclear why inducing the transfer of even more economic activity away from other cities toward thriving cities would ever be viewed as a positive policy outcome.

In short, the results of the NERA study should be ignored by policymakers seeking an accurate sense of the scale of Airbnb expansion costs and benefits.⁹

Potential costs of Airbnb introduction and expansion

This section elaborates on the potential costs highlighted in the overview section. It assesses the likely outcome of these costs, estimates their empirical heft, and assesses the likely distribution of these costs.

Potential cost one: Long-term renters face rising housing costs

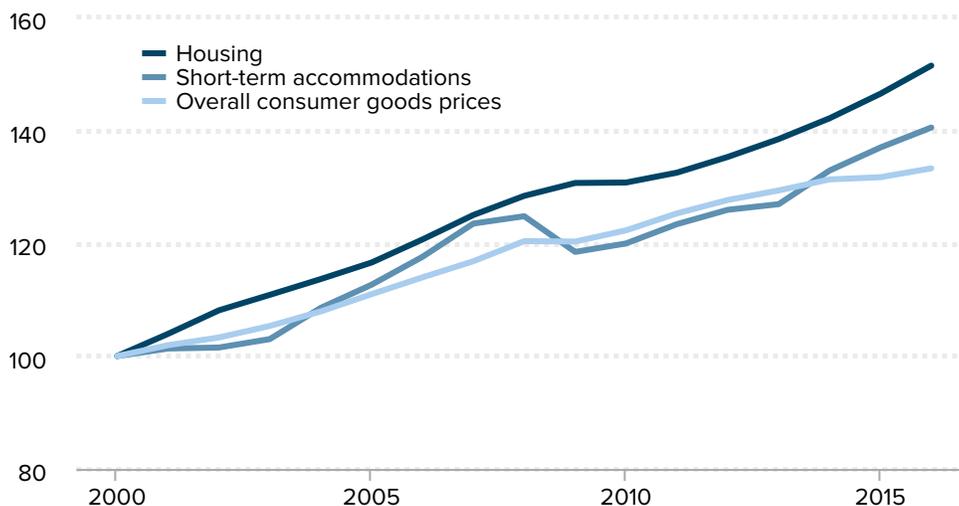
The mirror image of Airbnb’s positive supply shock to short-term travel accommodations is its negative supply shock to long-term housing options. Again, none of the literature reviewed in this paper suggests that the introduction and expansion of Airbnb has spurred more residential construction overall, so as more units become available to Airbnb customers, this means that fewer potential housing units are available to long-term renters or owner-occupiers in a city.

Earlier, we saw that price increases in short-term travel accommodations have been in line with overall consumer price increases in recent years, suggesting that there is no obvious shortage in short-term accommodations. (It is important to note that the tracking of short-term travel accommodation prices and overall prices was tight well before Airbnb was exerting any serious effect one way or the other on prices.) However, national prices of long-term housing are rising faster than overall prices, suggesting a shortage of long-term housing. Because of this above-inflation growth in long-term housing costs, any trend that exacerbates this increase is more damaging than if these prices had been relatively flat in recent years. **Figure D** shows inflation in the price indices for housing (long-term rentals as

Figure D

Housing costs are rising faster than costs of short-term accommodations or overall consumer goods

Price indices for housing, short-term travel accommodations, and overall personal consumption expenditures (PCE), 2000–2016



Note: The housing price index includes both long-term rentals as well as imputed rents for owner-occupied housing.

Source: Author's analysis of Bureau of Economic Analysis National Income and Product Accounts (NIPA) Table 2.4.4

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well as imputed rents for owner-occupied housing) and for short-term travel accommodations, and in the overall personal consumption expenditures index. In recent years, long-term housing price growth has clearly outpaced both overall price growth and increases in the price of short-term travel accommodations. This recent rise in the inflation rate of long-term housing, in fact, has become a much-discussed policy challenge that has spurred much commentary and analysis over the past decade.

The fact that the cost of long-term housing has become a prime source of economic stress for typical Americans should be considered when weighing the costs and benefits of Airbnb's introduction and expansion. Crucially, demand for housing is quite inelastic, meaning that households have little ability to forgo housing when it becomes more expensive. When demand is inelastic, even relatively small changes in housing supply can cause significant changes in the cost of housing.¹⁰ This intuition is clearly validated in a number of careful empirical studies looking precisely at the effect of Airbnb introduction and expansion on housing costs.

According to these studies, Airbnb—though relatively new—is already having a measurable effect on long-term housing supply and prices in some of the major cities where it operates. For example, Merante and Horn (2016) examine the impact of Airbnb on rental prices in Boston. The authors construct a rich data set by combining data on weekly

rental listings from online sources and data from Airbnb listings scraped from web pages. They find that each 12 Airbnb listings per census tract leads to an increase in asking rents of 0.4 percent. It is important to note that this is a finding of causation, not just correlation. They put this finding in perspective as follows:

If Airbnb's growth rate in 2015, 24%, continues for the next three years, assuming constant mean rents and total number of housing units, Boston's mean asking rents in January 2019 would be as much as \$178 per month higher than in the absence of Airbnb activity. We further find evidence that Airbnb is increasing asking rents through its suppression of the supply of rental units offered for rent. Specifically, a one standard deviation increase in Airbnb listings [an average of 12 units per census tract] relative to total housing units is correlated with a 5.9% decrease in the number of rental units offered for rent. (Merante and Horn 2016)

Barron, Kung, and Proserpio (2018) undertake a similar exercise with different data. They create a data set that combines Airbnb listings, home prices and rents from the online real estate firm Zillow, and time-varying ZIP code characteristics (like median household income and population) from the American Community Survey (ACS). To account for the fact that rents and Airbnb listings might move together even if there is no causal relationship (for example, if both are driven by the rising popularity of a given city), they construct an instrumental variable to identify the causal effect of rising Airbnb listings on rents. Using this instrument, they find that a 10 percent increase in Airbnb listings in a ZIP code leads to a 0.42 percent increase in ZIP code rental prices and a 0.76 percent increase in house prices. They also find that the increase in rents is larger in ZIP codes with a larger share of nonowner-occupied housing. Finally, like Merante and Horn, they find evidence that Airbnb listings are correlated with a rise in landlords shifting away from long-term and toward short-term rental operations.

Sheppard and Udell (2018) also undertake a similar exercise, looking within neighborhoods of New York City. Their key finding is that a doubling of Airbnb activity within a tight geographic zone surrounding a home sale is associated with a 6 to 11 percent increase in sales prices. Their coefficient values are quite close to those from Barron, Kung, and Proserpio (2018).¹¹

Wachsmuth et al. (2018) apply the regression results identified by Barron, Kung, and Proserpio (2018) to the large increase in Airbnb rentals in New York City. They find a 1.4 percent increase in NYC rents from 2015 to 2017 due to Airbnb's expansion in that city. For the median NYC renter, this implies a \$384 annual increase in rent from 2015 to 2017 due to Airbnb's expansion over that time.

Potential cost two: Local government tax collections fall

For the localities making policy decisions regarding the expansion of Airbnb, perhaps the single biggest consideration is fiscal. Across the United States, total lodging taxes are significant: For the 150 largest cities, the all-in lodging tax rate (including state, county, and

city taxes) averaged more than 13 percent (Hazinski, Davis, and Kremer 2018). The temptation for any given locality to set relatively high lodging tax rates (particularly when compared with overall sales tax rates) seems clear—city residents pay little of the lodging tax but still enjoy the benefits funded by the tax. For a number of cities, the total revenue collected is substantial. In 2016, for example, New York City and Las Vegas each collected well over \$500 million in lodging taxes, and San Francisco collected just under \$400 million.

It seems odd to exclude Airbnb stays from the lodging tax, yet the tax treatment of Airbnb rentals is inconsistent and incomplete. The company has entered into a number of tax agreements with state and local governments and is clearly trying to build the impression that it wants to help these governments collect taxes. Yet a number of tax experts argue that Airbnb’s efforts to collect and remit lodging taxes (as well as other taxes) have been wholly insufficient.

A description in Schiller and Davis 2017 of the state of Airbnb’s tax agreements as of early 2017 highlights the patchy, voluntary nature of the tax regime that Airbnb faces:

Airbnb, whose operations in some instances may violate traditional local zoning and rental ordinances, has sought to legitimize its business by negotiating agreements with cities under which it will collect local sales and lodging taxes. “Working together, platforms like Airbnb can help governments collect millions of dollars in hotel and tourist tax revenue at little cost to them,” the company stated in a “policy tool chest” it offered in late 2016.

Overall, by Airbnb’s count, the company is collecting sales, hotel, or other taxes in 26 states and the District of Columbia (DC) as of March 1, 2017. State-level taxes are collected in 18 of those states. Among this group, some or all local-level taxes are also being collected in every state except Connecticut, which lacks local lodging taxes. In the remaining eight states, Airbnb collects a patchwork of local taxes but no state taxes. In three states—Alaska, Maryland, and New Jersey—Airbnb’s tax collection is limited to a single locality (Anchorage, Montgomery County, and Jersey City, respectively). The company has dramatically expanded its tax collection practices in recent years and appears poised to continue its expansion in the months and years ahead. Airbnb recently announced that it will soon begin collecting state lodging taxes in Maine, for instance.

Dan Bucks, a former director of the Montana Department of Revenue and former executive director of the Multistate Tax Commission, wrote a report assessing the tax agreements that Airbnb has struck with state and local governments in different parts of the country. His central finding is that these agreements “[undermine] tax fairness, transparency, and the rule of law” (Bucks 2017).

Bucks examines 12 of the Airbnb tax agreements from across the country that had been made public by mid-2017. He describes them as follows:

Airbnb devises and presents to tax agencies what are typically ten to twelve-page documents covering back-tax forgiveness, prospective payments, information

access and multiple other terms that produce, as this report documents, serious negative consequences for society. Airbnb labels these documents as “voluntary collection agreements,” which they most assuredly are not. These Airbnb-drafted documents do not guarantee the proper collection of taxes due. They block tax agencies from verifying the accuracy of Airbnb payments. Airbnb may be seeking to superficially to liken these documents to the high quality “voluntary disclosure agreements” that states use to bring non-compliant taxpayers into full conformity with the law. However, these documents profoundly undermine sound tax administration and the rule of law. For these and other reasons detailed below, we will not use Airbnb’s misleading label for these documents but will refer to them objectively as “Airbnb agreements.” (Bucks 2017)

The most specific criticism Bucks makes is that these agreements have largely been kept secret from the public, in clear contrast to other “voluntary disclosure agreements.” This secrecy, combined with agreements to “cede substantial control of the payment and audit processes to Airbnb,” make it impossible for tax authorities to ensure proper payment of lodging taxes. Bucks also argues that these agreements between Airbnb and state and local governments provide large benefits to third parties (Airbnb hosts) who are not signatories and are not obligated to provide anything in exchange for these benefits.

In 2016, an analysis from AlltheRooms.com forecast that Airbnb’s failure to ensure the full payment of lodging taxes was on track to cost subnational governments a combined \$440 million in revenue unless policymakers moved to guarantee proper payment. Of the total, \$110 million in lost revenue was for New York City alone. In October 2016, shortly after the AlltheRooms.com analysis was released, New York City passed restrictions on Airbnb advertisements for rentals of less than 30 days when an owner is not present. While these restrictions may have stemmed the loss of revenue relative to the AlltheRooms.com projection, the analysis that predated the restrictions highlight how the unregulated expansion of Airbnb, and its cannibalization of traditional hotel business market share, could still have large fiscal implications for New York and other cities.

Finally, even if Airbnb were to fully comply with the local jurisdiction’s tax system on lodgings and pay the same tax rate per dollar earned as traditional hotels, there likely would still be some small fiscal losses stemming from Airbnb’s expansion. The primary appeal of Airbnb to most travelers is lower-price accommodations, so even if the same tax rate were paid on Airbnb rentals as is paid on hotel rooms, the lower Airbnb prices would lead to less tax revenue accruing to local governments.

Potential cost three: Externalities inflicted on neighbors

When owners do not reside in their residential property, this can lead to externalities imposed on the property’s neighbors. If absentee owners, for example, do not face the cost of noise or stress on the neighborhood’s infrastructure (capacity for garbage pickup, for example), then they will have less incentive to make sure that their renters are respectful of neighbors or to prevent an excessive number of people from occupying their

property.

These externalities could be worse when the renters in question are short term. Long-term renters really do have some incentive to care about the neighborhood's long-run comity and infrastructure, whereas short-term renters may have little to no such incentive. Further, some Airbnb hosts are renters themselves who are subletting a long-term rental property to short-term travelers, which may further shield the ultimate property owners from bearing the costs faced by immediate neighbors. In cities where the spread of Airbnb has become a political issue, hundreds (if not thousands) of complaints have been made in this regard.¹²

The potential for such externalities has been broadly recognized for a long time and was a consideration leading to the prevalence of zoning laws that ban short-term travel accommodations in residential neighborhoods. There is a reason, for example, why Times Square in New York City is a cluster of hotels while the Upper East Side is largely a less noisy cluster of residential dwellings. There is of course no reason why such past zoning decisions need to be completely sacrosanct and never changed, but these decisions were made for a reason, and changes to them should be subject to democratic debate.

While researchers have often noted the possibility that Airbnb may impose externalities on the communities surrounding Airbnb units, we know of no empirical estimates of these externalities. If these externalities were powerful enough in degrading the desirability of neighborhoods, they could in theory lead to reduced rents and home prices. From the evidence of the previous section, we know that Airbnb adoption in neighborhoods has actually boosted rental and home prices. But this price boost doesn't mean these externalities don't exist—it simply means that price-depressing externalities are offset by the supply effect of moving properties out of the long-term rental market.

Miller (2016) makes an interesting (if likely too abstract) policy proposal for dealing with the externalities associated with home rental via Airbnb. He proposes creating a market in “transferable sharing rights,” in which, for example, each resident of a neighborhood would be given the right to rent out one housing unit for one night. Most residents in a neighborhood won't want to rent out their home. But those who do want to rent out units using Airbnb would want far more than the right to rent out these properties for just one night. To obtain the right to rent out their properties for more nights, they would need to purchase permits from their neighbors. The price it takes to obtain these permits would provide a good indicator of the true costs of the externalities imposed by Airbnb. A city that experimented with these tradeable sharing rights could provide very useful information.

Potential cost four: Job quantity and quality could suffer

We have noted already that when Airbnb enters and expands in a city, it shifts traveler business from hotels to Airbnb, leading to downward price pressure for hotels. This shift from traditional hotels to Airbnb properties also implies either a shift in jobs or a reduction

in jobs. As an example, take hotel cleaning workers. As more visitors to a city pick Airbnb units over traditional hotel accommodations, the need for cleaning doesn't go away. Instead, it is either foisted on Airbnb proprietors, done by third-party cleaning services, or left unmet and thus implicitly imposing costs on both travelers and the surrounding neighborhood (think of improperly disposed-of trash).

Given that much of the growth of Airbnb in recent years has been driven by hosts with multiple properties (which, when in a single location, are in effect mini hotels), it is not surprising to see an emergence of cleaning services specifically serving Airbnb hosts.¹³ These new cleaning services may be less likely to offer decent wages relative to traditional travel lodging; it may also be more difficult for workers to unionize in this context. For example, in the 10 U.S. cities with a particularly large Airbnb presence (including New York City, Los Angeles, and Chicago), combined unionization rates for maids and cleaners in the hotel industry are nearly double the unionization rates of maids and cleaners in other industries in the economy.¹⁴

In some sense, the shift in cleaning jobs from traditional hotels to cleaning services for Airbnb hosts is likely analogous in its economic effects to what happens when traditional hotels outsource their own cleaning staffs. Dube and Kaplan (2010) demonstrate large negative wage effects stemming from this type of domestic outsourcing for janitors and security guards. Their findings are reinforced by recent analysis of the German labor market by Goldschmidt and Schmieder (2017), who find similar large negative effects of domestic outsourcing on a range of occupations, including cleaners. While these studies do not directly examine the effect of substituting in-house hotel cleaning jobs for Airbnb cleaning jobs, they both track the effect of "fissuring" between the entity that uses and pays for the service and the entity that manages the service providers. This fissuring has been a key and troubling feature of the American labor market in recent decades, and it is hard to see how the substitution of Airbnb for traditional hotels does not potentially constitute another layer of this fissuring.¹⁵

This potential for Airbnb to degrade the quality of cleaning jobs is recognized even by the company itself: Airbnb offers hosts the opportunity to advertise that they have taken the "living wage pledge" by committing to pay a living wage to the cleaners and servicers of their properties. It is not clear how commitment to this pledge is (or can be) enforced, however.

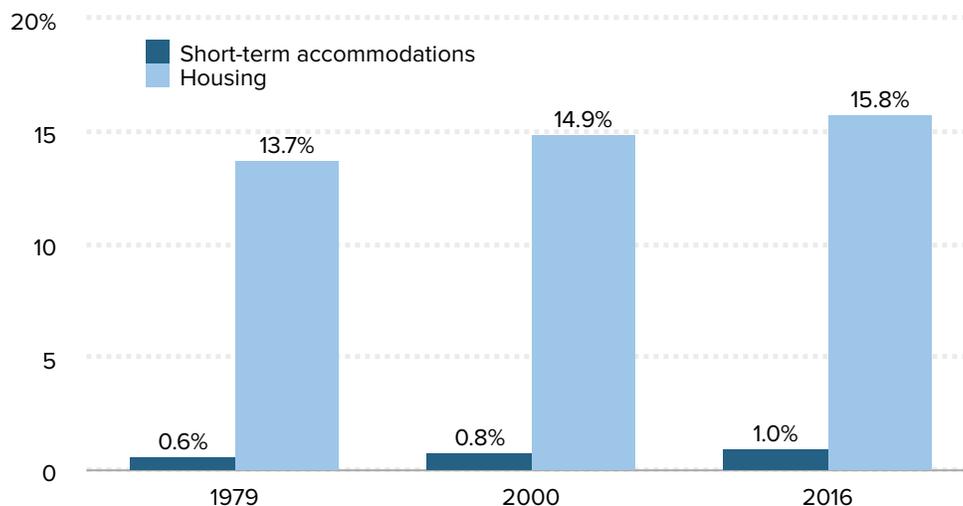
Conclusion: Airbnb should have to play by the same rules as other lodging providers

The current policy debates sparked by the rise of Airbnb have largely concerned tax collections and the emergence of "mini hotels" in residential neighborhoods. At its inception, Airbnb advertised itself as a way for homeowners (or long-term renters) to rent out a room in their primary residence, or as a way for people to rent out their dwellings for

Figure E

Housing costs matter much more to household budgets than short-term lodging costs

Shares of average household personal consumption expenditures devoted to housing vs. short-term travel accommodations, 1979, 2000, and 2016



Note: The housing price index includes both long-term rentals as well as imputed rents for owner-occupied housing.

Source: Author's analysis of Bureau of Economic Analysis National Income and Product Accounts (NIPA) Table 2.5.5

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short periods while they themselves are traveling. However, in recent years Airbnb listings and revenues have become dominated by “multi-unit” renters—absentee property owners with multiple dwellings who are essentially running small-scale lodging companies on an ongoing basis.

This evolution of Airbnb into a parallel hotel industry raises questions about the preferential treatment afforded to this rental company. These questions include, “Why isn’t Airbnb required to ensure that lodging taxes are collected, as traditional hotels are?” And, “Why is Airbnb allowed to offer short-term rentals in residential neighborhoods that are not zoned for these uses, while traditional hotels are not allowed in these same neighborhoods?”

While there are plenty of other considerations, the spread of Airbnb seems at its core to be a shift of potential housing supply from the long-term residential housing market to the market for short-term accommodations. This shift of supply can lower prices for travelers but raise housing prices for long-term residents. This seems like a bad trade-off, simply based on the share of long-term housing expenses versus short-term travel expenses in average family budgets. **Figure E** presents the share of total personal consumption expenditures accounted for by housing and by short-term travel accommodations. As the figure shows, housing costs eat up far more of the average household’s budget, and rising housing prices mean that long-term housing has grown more as a share of family budgets

than short-term travel accommodations.

This rising cost of housing has become a major economic stress for many American households. Anything that threatens to exacerbate this stress should face close scrutiny. A reasonable reading of the available evidence suggests that the costs imposed on renters' budgets by Airbnb expansion substantially exceed the benefits to travelers. It is far from clear that any other benefits stemming from the expansion of Airbnb could swamp the costs it imposes on renters' budgets.

There may be plenty wrong with the status quo in cities' zoning decisions. But the proper way to improve local zoning laws is not to simply let well-funded corporations ignore the status quo and do what they want. As this report shows, there is little evidence that the net benefit of accelerated Airbnb expansion is large enough to justify overturning previous considerations that led to the regulatory status quo—in fact, the costs of further Airbnb expansion seem likely to be at least as large, if not larger, than the benefits.

About the author

Josh Bivens joined the Economic Policy Institute in 2002 and is currently EPI's director of research. His primary areas of research include macroeconomics, social insurance, and globalization. He has authored or co-authored three books (including *The State of Working America, 12th Edition*) while working at EPI, has edited another, and has written numerous research papers, including for academic journals. He appears often in media outlets to offer economic commentary and has testified several times before the U.S. Congress. He earned his Ph.D. from The New School for Social Research.

Distribution of housing wealth (primary and nonprimary), by household characteristics

	1989	1998	2007	2016	1989–2016 change
Primary residence					
Bottom 50 percent	90.2%	85.7%	87.3%	89.6%	-0.7%
Bottom 80 percent	45.4%	47.5%	44.0%	40.0%	-5.4%
Top 20 percent	54.6%	52.5%	56.0%	60.0%	5.4%
80th–90th percentile	19.9%	17.9%	17.5%	18.6%	-1.3%
90th–95th percentile	12.6%	11.6%	11.0%	13.9%	1.3%
96th–99th percentile	15.6%	15.0%	18.2%	16.8%	1.2%
Top 1 percent	6.5%	8.0%	9.3%	10.7%	4.3%
Nonprimary residential property					
Bottom 50 percent	97.4%	95.7%	97.8%	98.4%	1.0%
Bottom 80 percent	16.8%	18.1%	13.9%	9.9%	-6.9%
Top 20 percent	83.2%	81.9%	86.1%	90.1%	6.9%
80th–90th percentile	15.2%	16.8%	10.7%	12.6%	-2.7%
90th–95th percentile	20.6%	15.5%	13.9%	14.9%	-5.7%
96th–99th percentile	28.7%	28.7%	34.0%	29.6%	0.9%
Top 1 percent	18.6%	21.0%	27.5%	32.9%	14.3%
Primary residence					
White, non-Hispanic	86.4%	87.5%	82.6%	80.6%	-5.9%
Black, non-Hispanic	4.9%	5.0%	6.2%	6.5%	1.6%
Hispanic, any race	4.1%	3.7%	6.1%	6.0%	2.0%
Other	4.6%	3.7%	5.1%	6.9%	2.3%
Nonprimary residential property					
White, non-Hispanic	87.3%	89.5%	84.2%	86.2%	-1.1%
Black, non-Hispanic	4.3%	4.1%	4.1%	5.0%	0.7%
Hispanic, any race	3.1%	3.4%	6.7%	3.6%	0.5%
Other	5.3%	3.0%	5.0%	5.2%	-0.1%

Note: Per the Survey of Consumer Finances definitions, primary housing wealth is the total value of the primary residence of a household. Nonprimary housing wealth includes the value of all of other residential real estate owned by the household, including one-to-four family structures, timeshares, and vacation homes.

Source: Author's analysis of microdata from the Federal Reserve Board Survey of Consumer Finances (2016)

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Endnotes

1. According to a recent report, “a significant—and rapidly growing—portion of Airbnb’s revenue in major U.S. cities is driven by commercial operators who rent out more than one residential property to short-term visitors” (CBRE 2017).
2. Horton and Zeckhauser (2016) provide a deep dive into the economics of internet-based service firms. Slee (2017) provides an excellent popularization of some of the economic issues surrounding IBSFs from a deeply critical perspective.
3. The most obvious benefit to living in housing that one owns is the tax treatment of mortgage interest payments on owner-occupied property, which can be deducted from federal taxes. Another benefit is that the implicit rental income earned by owner-occupiers is not taxed (the money that owner-occupiers are saving by not having to pay rent elsewhere could be viewed as implicit rental income).
4. Wachsmuth et al. (2018), for example, find that just under half of Airbnb listings in New York City had likely taken illegal reservations.
5. “Arrivals” is a term referring to each stay in a unit, regardless of length of stay.
6. For example, Molla (2017) highlights more recent forecasts for 2017 indicating a large slowdown in U.S. Airbnb expansion.
7. The range of 2 to 4 percent represents the range of findings across 2015, 2016, and 2017. The value was 4 percent in 2015, 2 percent in 2016, and 3 percent in 2017.
8. The arithmetic on this is relatively straightforward. The NERA 2017 study asserts that Airbnb supports \$14 billion in spending and 130,000 jobs in the United States. This implies each \$107,690 supports a job. Say that half of this spending is the direct cost of accommodations and that it represents a pure expenditure shift away from traditional hotels. Assume further that traditional hotels are 5 percent more labor-intensive—so each traditional hotel job is supported by \$102,300 in spending (5 percent less than the ratio identified by Airbnb). This shift from traditional hotels to Airbnb hence reduces employment by 3,400 jobs for each \$7 billion in spending. Even if overall spending were to rise by 2 percent due to Airbnb’s expansion, this would increase employment by only roughly 2,600 jobs. The key insight here is that once one allows Airbnb to substitute for other forms of accommodation, the link between output and employment might change significantly.
9. Airbnb itself has commissioned and reported on a number of studies claiming that the share of guests who would not have taken the trip absent Airbnb is as high as 30 percent. Even this number is far larger than the independent assessments of Guttentag (2016) and Morgan Stanley Research (2017), but it does highlight just how outlandish the NERA assumption on this is.
10. In a review of housing markets, Albouy, Ehrlich, and Liu (2016) note that “Housing demand is income and price inelastic.”
11. The geographic unit implicitly being examined by Sheppard and Udell (2018) is not intuitive. Their observation is an individual home sale. They then track Airbnb listings within five different radii of the sale: 150, 300, 500, 1,000, and 2,000 meters. They interact the number of Airbnb listings with categorical variables for each of the five “buffer zones” defined by the radii and use this as an explanatory variable predicting sales prices.

12. See Office of New York State Attorney General 2014.
13. Lawler (2014) notes that Airbnb was testing out dedicated cleaning services for its hosts as early as 2014.
14. Unionization rates derive from the author's analysis of data pooled from 2008–2017 from the Outgoing Rotation Groups (ORG) of the Current Population Survey (CPS). Code and results are available upon request. The 10 cities are Boston, Chicago, Los Angeles, Las Vegas, Miami, New York City, San Diego, San Francisco, Seattle, and Washington, D.C. In these 10 cities, the unionization rate for maids and cleaners was 23.2 percent in the traveler accommodation industry, but 12.1 percent in all other industries.
15. See Weil 2017 for an overview of labor market fissuring.

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Exhibit I

Airbnb's Impact in Washington D.C.

Selling the District Short

Short-term rentals: a new challenge to housing affordability in the District of Columbia



March 2017
D.C. Working Families





Legend

Listing by Type

- Entire home/apt
- Private room
- Shared room

Ward

- Ward 1
- Ward 2
- Ward 3
- Ward 4
- Ward 5
- Ward 6
- Ward 7
- Ward 8



Map of Airbnb Listings

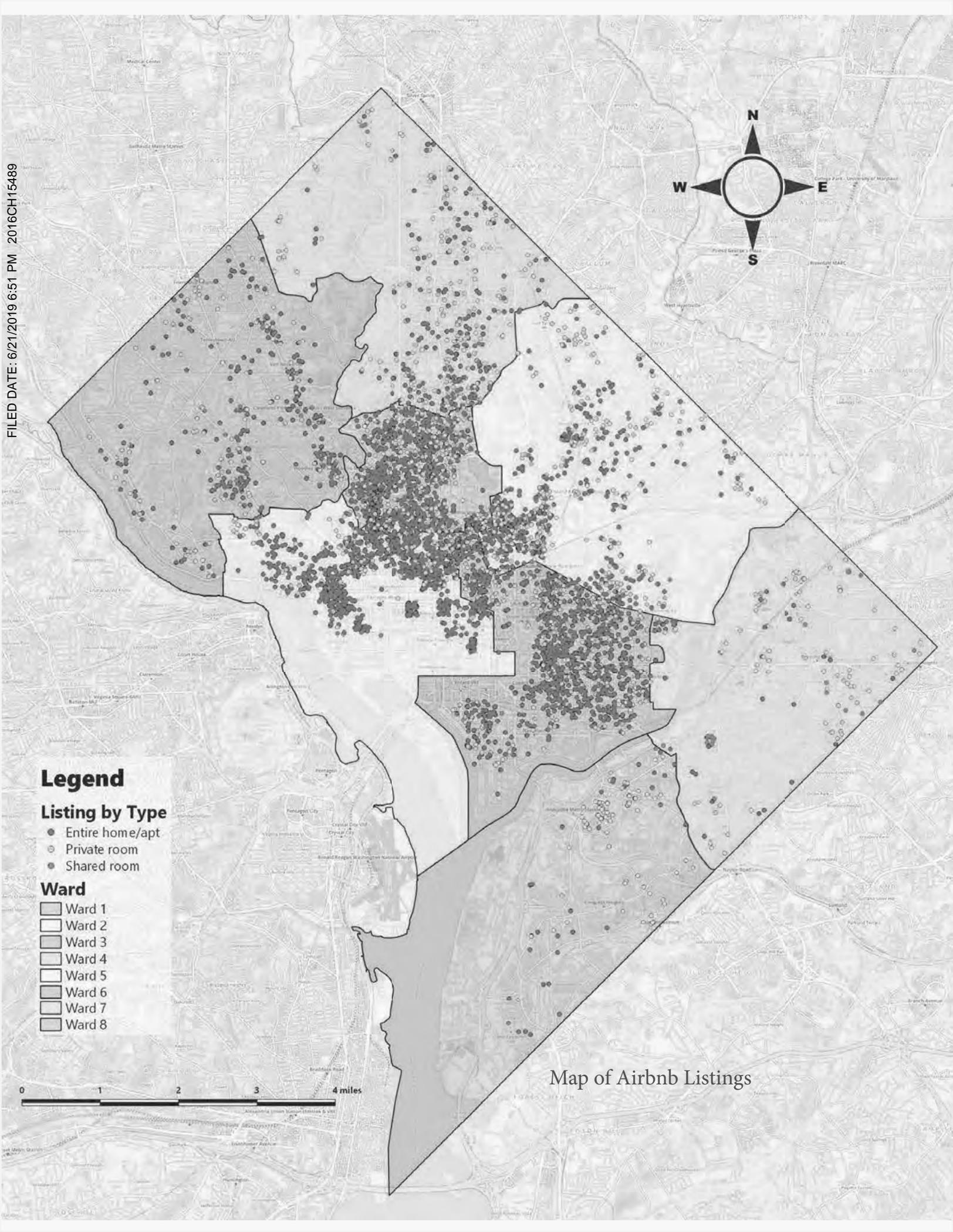


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Executive Summary

This report examines the proliferation of short-term rentals (STRs) in the District of Columbia, with a focus on their impact on the residential housing market. In light of its findings, the report recommends additional measures that should be taken to better protect D.C. neighborhoods against the rapid growth of online platforms that facilitate investment in commercial short-term rentals.

The growth of the commercial STR market has serious negative implications for housing affordability and quality of life for D.C. residents. While the District grapples with a serious housing affordability crisis, the widespread conversion of residential units into short-term rentals makes it even harder for families to find affordable places to live. Commercial short-term rental operations may be pushing steeper rent increases across the District. Moreover, regulators have not exercised enforcement of health, safety, zoning, and rental housing laws on short-term rentals.

D.C. law already prohibits the conversion of rental housing for hotel use. Unfortunately, STR platforms have solicited thousands of illegal listings in a matter of a few years. The District government currently lacks the necessary enforcement tools to adequately address this new widespread systematic violation of its laws. Furthermore, the incentive to convert housing into illegal hotel rooms is extremely strong

because of the high listing prices commanded by entire-home/apartment rentals on the STR market. Based on these findings, this report urges officials to adopt thorough and effective enforcement measures to ensure compliance with D.C. law.

The recent expansion of short-term rentals in Washington, D.C. is largely a product of online listing platforms such as Airbnb. While there are a number of short-term rental platforms operating in D.C. facilitating short-term rental transactions, including HomeAway, FlipKey, and VRBO, this report focuses its analysis on the largest and fastest-growing platform, Airbnb. As of October 2016, Airbnb had 5,295 listings in the District of Columbia, and grew by 37.8 percent in the previous year.



Topline Findings

This report defines **commercial listings** as listings by hosts with multiple listings in the District of Columbia, since it is impossible to live in more than one unit at a time. Such units are likely to represent housing that is removed from the market.

Airbnb has approximately 5,295 listings in the District; approximately 37 percent (1,980 listings) are commercial listings. This suggests that Airbnb removes a significant number of units from the housing market.

Commercial listings represent an estimated 52% of total Airbnb revenue in the District. The fact that commercial listings appear to constitute a majority of Airbnb's D.C. revenue demonstrates that commercial use is a major function of the platform and a core component of its business. Airbnb includes some exceptionally expansive operations in the District, **including one operator who has 65 listings in D.C. alone.**

Of the total number of Airbnb listings in the District, 3,567 or 67 percent of them are entire-home/apartment listings. These listings represent situations where the operator is not present to host or supervise guests, and are illegal.¹ Such listings command higher prices and create a strong incentive to remove housing from the market in order to profit from commercial STR operations.

Eighty-two percent of total revenue from Airbnb in the District was derived from illegal entire-home listings.

In nineteen different neighborhoods within the District, commercial listings are equivalent to at least 10 percent of vacant housing stock. This suggests that if commercial STR units were restored to the market, housing would become significantly more available in those neighborhoods. **In eight of these neighborhoods, commercial Airbnb units are equivalent to 15 percent of vacant rental housing units.**

STR platforms create a strong financial incentive for investors to convert residential housing to STR use. In the District's top 20 neighborhoods for Airbnb use, the average monthly rent was \$2,752, but the average illegal listing had the capacity to generate up to \$5,711, for an estimated potential profit margin of 152 percent. Because STR platforms allow owners to quickly turn a profit through rental arbitrage, **STRs may play a significant role in expediting gentrification in such neighborhoods.**

Airbnb is growing rapidly in the District. From October 2015 to October 2016, Airbnb grew by 37.8 percent, and commercial listings grew by 34 percent.



Introduction

Background on the District of Columbia Rental Market

The District of Columbia faces an increasingly critical shortage of affordable housing that threatens residents' ability to live, work, and raise families in the District. According to a March 2015 report by the D.C. Fiscal Policy Institute, rents have soared over the past decade, while incomes have remained the same. The District lost nearly half its supply of low-cost units between 2002 and 2013, with the number of low-cost apartments (those renting for less than \$800 a month) dropping from almost 60 thousand in 2002 to 33 thousand in 2013. The supply of moderately-priced apartments (\$800 to \$1,000 per month) has also dwindled by nearly 30 percent since 2002.²

Very low-income households have been the most severely affected by this trend; 64 percent of them spend half or more of their incomes on housing. For households with incomes around \$22,000 per year, monthly rents increased by \$250 in the past ten years (adjusting for inflation), while incomes remained flat, forcing them to spend an average of 50 percent of their income on rent. Even moderate-income families have felt the pinch, with incomes up to \$54,000 experiencing similarly severe cost burdens.³

As the cost of housing eats up an increasing proportion of household budgets, a growing number of residents are at risk of being unable to afford necessities like food, clothing,

healthcare, and transportation without leaving the District.⁴

The housing crisis in the District of Columbia can be attributed to numerous causes: a booming population, rising construction costs, increasing income inequality, the proliferation of low-wage work, limited land availability, and a waning public commitment to subsidizing affordable housing, especially at the federal level.⁵

In response to these trends, elected officials and community allies have fought to secure considerable public investment in increasing the availability of affordable housing and providing relief for working families. In both fiscal years 2016 and 2017 Mayor Muriel Bowser and the D.C. Council took a major step forward by committing \$100 million annually to the Housing Production Trust fund.⁶

At the same time, worker justice advocates and allied elected officials have won major victories in improving the pay of D.C.'s working class residents, which will bring some of the District's housing choices closer, and within reach for thousands of families.⁷

Short-term Rental Market & The Rise of Airbnb

While these hard-won victories represent important steps toward addressing the District's affordable housing crisis, new multinational corporations have developed business models that undermine this progress. **Airbnb and similar online short-term rental platforms are facilitating the widespread conversion of housing units into illegal hotel rooms, in a bid to profit from the District's already-scarce housing stock.**

Airbnb commenced its D.C. operations in 2009.⁸ In the past year (October 2015 through October 2016) the number of total District listings on the platform has grown from 3,843 listings to 5,295—an increase of 37.8 percent. By comparison, over the latest one-year period for which data is available (2014-2015), housing inventory in the District grew at approximately 1.1 percent (± 0.02 percent), while the District's population nearly twice as quickly at 2.0 percent.⁹

This massive growth is occurring despite the fact that under current law, the conversion of rental housing into traveler accommodations is prohibited in the District of Columbia.¹⁰

Furthermore, zoning regulations require that an individual can short-term rent only his or her permanent residence.¹¹ Anyone seeking to start a business as a short-term rental host is required to obtain a Basic Business License,¹² comply with the zoning code, and comply with the Rental Housing Act, which includes the District's rent control policy. If these laws were adequately enforced, they would virtually eliminate illegal commercial listings

Under current law, the conversion of rental housing into traveler accommodations is prohibited in the District of Columbia.

on Airbnb and significantly curb the negative impacts of short-term rental activity in the District.

Lawmakers have long recognized the need to protect affordable housing and neighborhood quality through rental housing laws and the zoning code. These laws pre-date the rise of Airbnb and other platforms and were developed without internet hosting platforms in mind. For example, the zoning code prohibits bed and breakfasts as a home occupation

in apartment buildings, likely because policymakers determined that residential apartment living is not compatible with high-traffic businesses with large numbers of guests entering the building with no security or safety precautions.¹³ The fact that such businesses are now facilitated by online hosting platforms does not change the real-world impacts that caused leaders to outlaw them in the first place.

What is new, however, is the mass solicitation and development of illegal listings by online hosting platforms. Platforms like Airbnb have made it easy and convenient for hosts to ignore and frustrate the purposes of the laws and regulations designed to preserve neighborhood quality of life and protect housing affordability.

This report sheds light on the proliferation of these illegal short-term rentals in the District and the extent to which their impact on the supply of long-term residential housing may drive up rents and exacerbate gentrification in many D.C. neighborhoods. These troubling findings make clear that while the District already has laws in place to prevent this form of rental arbitrage, significant improvements in enforcement must be made to stop illegal operators and ensure affordable housing units remain available for District residents.

Airbnb Impact on Affordable Housing & Gentrification

STRs may pose a substantial threat to the availability and affordability of housing in the District by displacing long-term owners and renters and depleting D.C.'s limited housing resources – in turn driving up rents.

Airbnb has worked hard to create an image of itself as primarily a platform to facilitate “home-sharing,”¹⁴ which means that hosts dwell in the same unit with guests. The idea is for travelers to build personal relationships with local residents for a more “authentic,” intimate experience visiting a city. However, that is not how most people use Airbnb; only about a third of Airbnb listings are actually used for home-sharing by local residents. Instead, studies have shown that Airbnb generates the majority of its revenue from real-estate investors and commercial operators who do not live on the property and instead rent out their units full time as a business venture.^{15,16}

Whenever a housing unit is used for a short-term rental instead of a home for a resident, it reduces the supply of housing. Reduced housing supply puts upward pressure on rental prices—potentially forcing some residents to leave

their neighborhoods or even move out of the District entirely. STRs may contribute to higher rental prices across the District, because when housing becomes unavailable in one neighborhood, residents are pushed to seek housing in other neighborhoods, driving up rents across the board.

Previous studies

Several studies have demonstrated links between a high concentration of Airbnb listings—particularly the commercial entire-home/apartment variety—and a decline in the supply and increase in the price of residential rental housing.

A June 2016 report by Housing Conservation Coordinators Inc. and MFY Legal Services Inc. used 2015 AirDNA data¹⁷ to assess the interaction between the short-term and traditional rental market in New York City. The report found that having a high concentration of Airbnb “Impact Listings”—those most likely to result in the reduction in

the supply of residential rental units—was strongly correlated with rapidly rising rental prices.¹⁸ According to their analysis, the average rent in the top twenty Airbnb neighborhoods in New York increased nearly twice as quickly as in the city as a whole. The report did not explore whether Airbnb was a cause of gentrification in those neighborhoods, but the strong correlation suggests that the problem of Impact Listings is particularly severe in gentrifying neighborhoods, and potentially exacerbates gentrification. Furthermore, the report determined that if the 8,058 units defined as Impact Listings were made available on the rental market, the number of available rental units citywide would increase by 10 percent.¹⁹

Another study was conducted by The Real Deal, a monthly New York real estate news magazine, using Airbnb scrape data and empirical studies of the housing market in New York, which provided

estimates of how much rent would increase or decrease based on changes in the size of citywide housing inventory. Their analysis found that Airbnb is likely responsible for increasing rents as much as \$69 per month in certain neighborhoods.²⁰ This analysis may be partially flawed in that it did not account for the fact that the empirical models they used are citywide. If a family is pushed out of a neighborhood, or prevented from living in a neighborhood, they will very likely move to another neighborhood in the city. When that happens, the impact on their original neighborhood is reduced, but rents may increase in whichever neighborhood they live in next. In that way, the gentrifying effects of short-term rentals may spread across the city even to neighborhoods where STRs are not

endemic.

Yet another report, published by Dayne Lee as a note in the Harvard Law and Policy Review using a roughly similar methodology to this report, found that STRs have contributed to gentrification and housing unaffordability in Los Angeles.²¹

Even a study commissioned by Airbnb itself found that their listings resulted in increased rental prices. Performed by Thomas Davidoff of the Sauder School of Business, University of British Columbia, the study found that Airbnb increased the price of all one-bedroom units in New York by an average of \$6 a month, and increased rents in San Francisco by an average of \$19 a month. However, the data provided by Airbnb on which Mr. Davidoff's findings were based claimed that 80 percent to 90 percent of list-

ings were by residents sharing the home in which they live.²² This appears to contradict observations of Airbnb behavior in Washington, D.C. and thus is likely to significantly underestimate the impact of Airbnb on average rent increases. Airbnb has not released the full research or the data, or explained the methodology of the report.

All four of the above studies excluded the effect of other STR platforms including VRBO and Flipkey, which have a major presence in the District, and consequently are likely to understate the actual impact of STRs on the D.C. housing market.²³ Even with this limitation, the studies outlined above suggest that STRs can exert significant upward pressure on rents which contributes to housing unaffordability and gentrification.



Airbnb Impact on Quality of Life

In addition to STR's potential impact on rental prices and housing availability, STRs have drawn complaints that they detract from long-term residents' quality of life and sense of security in their neighborhoods.

Residential tenants and homeowners traditionally expect their neighbors to be other long-term residents, approved by a landlord or seller, and accountable to a lease or otherwise invested in the neighborhood, with a stake in maintaining decent relations with their neighbors and landlords. Short-term renters, on the other hand, are not accountable to anyone but

the STR host, who in many cases is not present in the building to be responsible for their guests. This can often mean there is no recourse for neighboring tenants when things go wrong.

There have been complaints in the District about housing being used as party venues in residential neighborhoods.²⁴ In one prominent example, the Attorney General shut

down an Airbnb party house operating in Dupont Circle, which was operating illegally. Police had been dispatched to the house more than one hundred times in the previous year because of complaints from neighbors.²⁵

Despite the lawsuit, the house was still operating through Airbnb without an appropriate license, as of the writing of this report.²⁶

D.C.'s Zoning Code is designed to provide places for tourist accommodations while also protecting residential neighborhoods. Unfortunately, online hosting platforms have enabled thousands of users to simultaneously and anonymously violate these laws.



Purpose and Scope of Work

The goal of this report is to ascertain the extent to which the negative impacts of STRs studied in cities like New York and San Francisco are affect-

ing the D.C. housing market. By examining the number and type of Airbnb listings in the District, along with rental price and occupancy trends,

this report seeks to identify the neighborhoods that are most impacted by STRs and highlight the consequences of these illegal listings.

Airbnb prevents thousands of housing units from being used by D.C. residents

More than one-third (37 percent) of all Airbnb listings in the District are controlled by operators with multiple D.C. listings.

Commercially-operated listings are likely to represent residential housing units that are no longer available to D.C. families because they have been converted into illegal hotel rooms. In total, there are an estimated 1,980 commercial listings in the District.

This finding suggests that STR platforms

significantly reduce the availability of housing in the District. Unfortunately, this number is only a snapshot from October 2016; as shown in Part III of this report, the number of commercial listings on Airbnb has been growing quickly and this growth shows no sign of abating any time soon. Without proper regulation, it is impossible to predict how many housing units could ultimately be removed from the rental market.

In October 2016, there were an estimated 1,980 commercial listings in the District of Columbia, or 37% of total listings

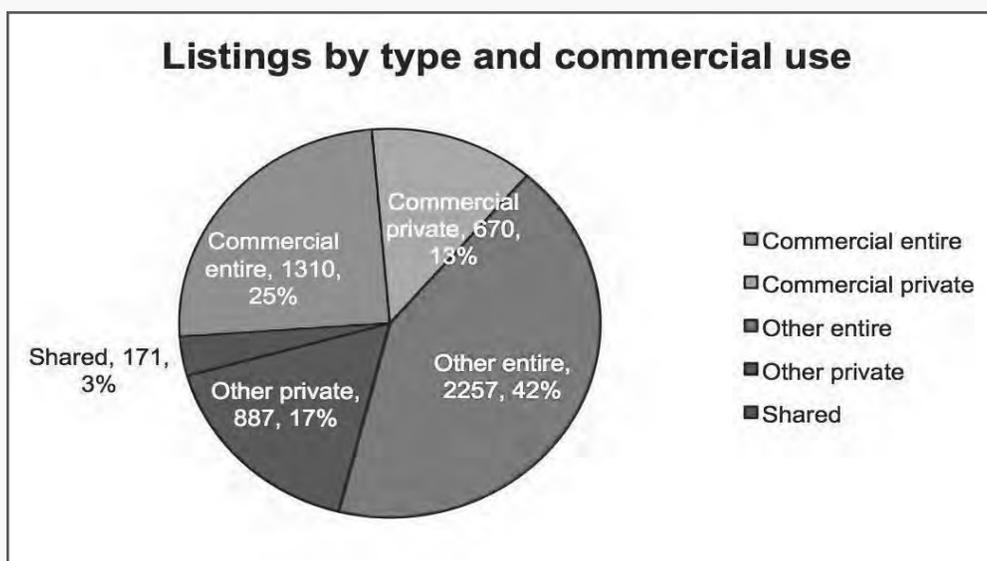


Figure 1: Listings by type and commercial estimate. Source: Share Better Scrape, October 2016

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Illegal entire-home/apartment listings dominate Airbnb

While Airbnb portrays itself as mainly facilitating home-sharing, in which hosts share a spare couch or bedroom with a guest in the spirit of hospitality and meeting new people, home-sharing is a relatively minor function of the platform.

Sixty-seven percent of its listings (3,567) are entire apartment listings, and only 33 percent (1,728) are private or shared rooms. “Shared rooms” account for only

3 percent of listings in the District. This means the majority of Airbnb’s listings are illegal listings in which the operator is not present to host guests.

67% of all Airbnb listings in the District are entire-home/apartment rentals in which the operator is not present to host guests.

Listings by type

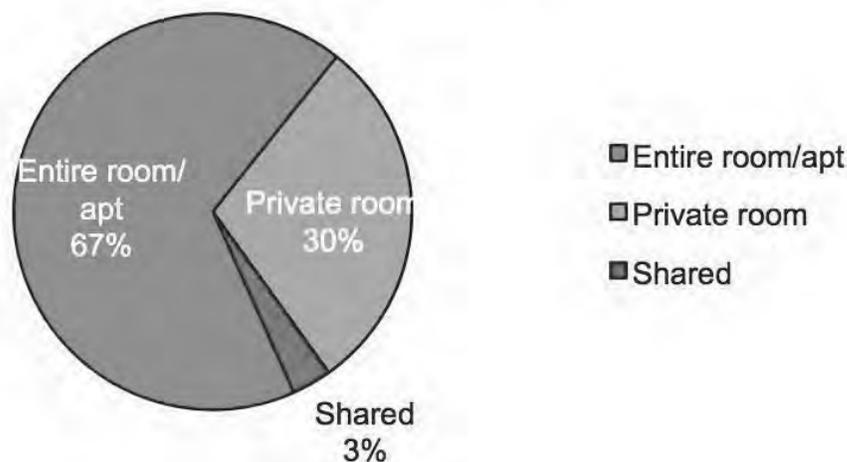


Figure 2: Number of listings per type. Source: Share Better Scrape, October 2016

Entire-home listings pose a variety of problems. Such listings by definition typically lack a responsible individual managing the listing in person, which gives rise to heightened concerns about quality of life impacts.²⁷ There have been several reports of entire-home listings being used as party houses in the District. In apartment buildings, they can present serious quality of life and security

concerns, as they allow unsupervised visitors access to apartment buildings, where they have no accountability to the unit's neighbors.

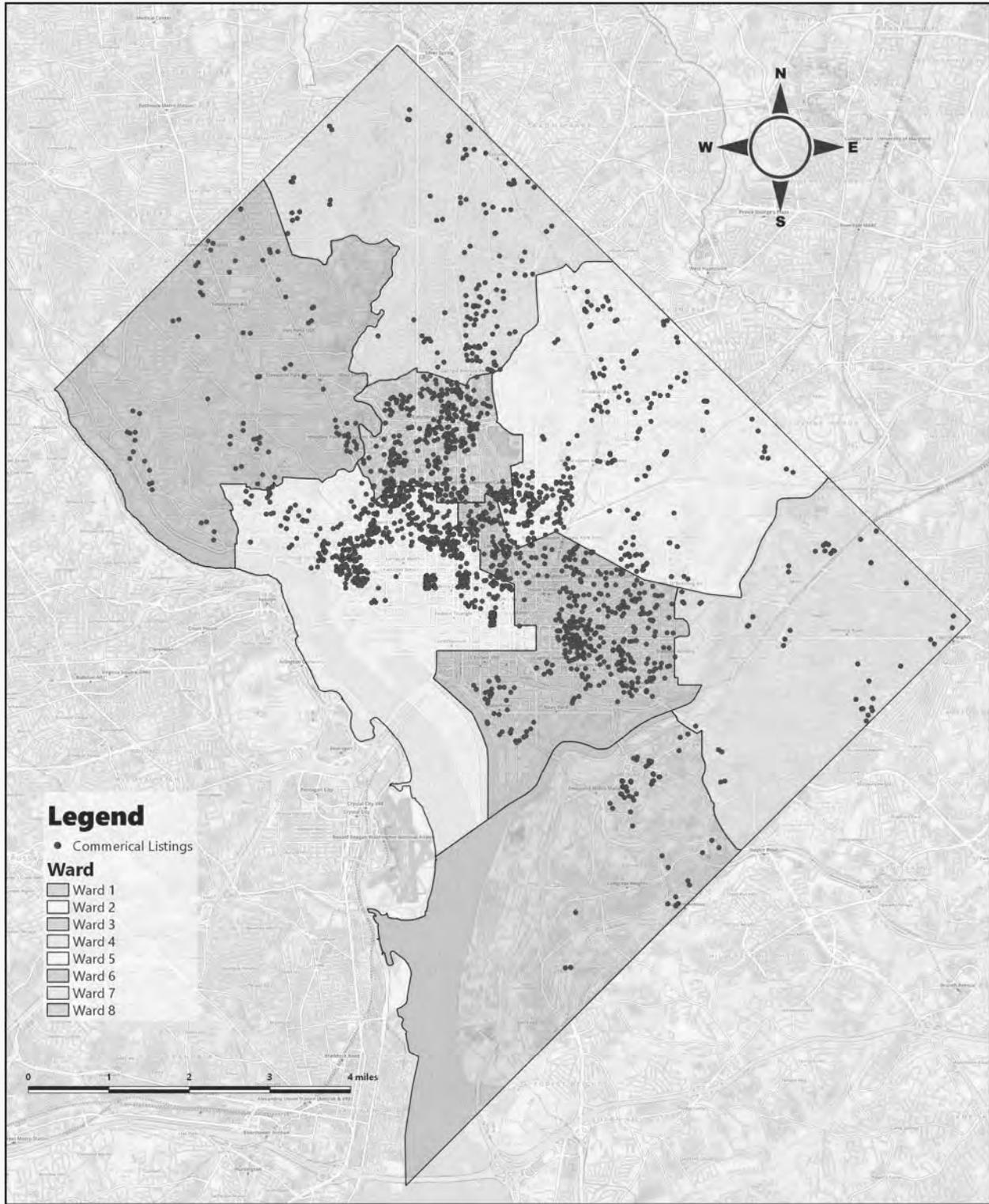
More importantly, the prevalence of entire-home/apartment listings is a particular threat to the availability of housing in the District. Of course, commercial private room listings are also likely to deprive D.C. residents of an affordable room. But commer-

cial entire-home/apartment listings completely remove lodgings designed for a household and convert them to short-term, commercial use.

As discussed below, the ability to post entire-room listings creates a strong temptation for investors to remove housing from the market in order to take advantage of the high prices short-term rentals can command.



Figure 3: Map of Commercial Airbnb Listings, October 2016. Sources: Airbnb Website- Share Better Scrape, October 2016; Ward boundaries - DC Office of the Chief Technology Officer; OSM TF Landscape – NextGIS December 2016.



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STR platforms create a powerful incentive to remove housing from the market

Historical rent data from Zillow shows that Airbnb listings, on average, generate much higher rates than long-term rentals—creating a substantial incentive to convert housing units into illegal hotel rooms.

By comparing average rent data produced by Zillow, an online real estate database, from October 2015 through October 2016, with average Airbnb listing prices for entire-home rentals, we can determine the likely profit margins for entire-home commercial hosts in Airbnb's top neighborhoods. We consider entire-home rentals only here because they most directly relate to the incentive to remove entire units from the housing market, and because it is difficult to estimate the rental price for individual rooms.

Overhead for Airbnb units can be extremely low. Airbnb allows operators to charge an additional cleaning fee (not included in this analysis) for rentals which can cover more than just the cost of cleaning. The two cost factors we consider are the cost of renting the unit and the 3 percent host service fee Airbnb takes off the listing price.

As a baseline for revenue estimates, this analysis assumes 100 percent occupancy of Airbnb units for thirty nights a month. Although most units are unlikely to achieve this

level of occupancy, we use this estimate in order to determine a point of reference for the potential profit for a unit.

Within the twenty neighborhoods with the highest ratios of commercial Airbnb listings to vacant housing units, the average neighborhood rent was \$2,752²⁸, but the average Airbnb listing would yield \$6,927 if rented full-time over thirty days—a \$4,175 difference, or approximately a 152 percent return.

Even scaled down to match the occupancy rate at D.C. hotels, the profit potential is



considerable. At a 79.8 percent occupancy rate, operators could expect a 101 percent profit margin on average in the top 20 Airbnb neighborhoods.²⁹ These estimates also make it clear that Airbnb units

can be highly profitable even with much lower occupancy levels than hotel rooms.

In sixteen neighborhoods, hosts could potentially earn more than double the aver-

age monthly rent and achieve more than a 100 percent profit margin. **In Downtown D.C., operators could achieve a 207.7% profit margin.**

Table 1 The incentive to rent short-term. The below chart lists top Airbnb neighborhoods by the number of units as a percent of the vacant housing units in the neighborhood (red), and shows the percent difference between residential rents and short-term rental rates, for a full-time STR (blue). Sources: ShareBetter Scrape, October 2016; Zillow Rental Index, ZRI Time Series, City and Neighborhood, 2011-2016.

Neighborhood	Commercial listings / vacant units	Avg. Rent 2015-2016	Airbnb Average Potential Revenue ³⁰	Potential profit margin at 100% occupancy
U Street Corridor	68.5% ± 27.9%	\$2,937	\$7,519	156.1%
Judiciary Square	30.8% ± 6.8%	\$2,831	\$7,426	162.3%
Shaw	23.2% ± 6.2%	\$2,993	\$6,661	122.6%
Logan Circle	18.6% ± 6.8%	\$2,825	\$6,666	135.9%
Eckington	18.3% ± 3.6%	\$2,628	\$4,625	76.0%
Capitol Hill	18.1% ± 2.2%	\$2,928	\$8,109	177.0%
Mount Vernon Square	17.8% ± 4.6%	\$2,555	\$6,658	160.6%
Brookland	15.1% ± 5.5%	\$2,713	\$6,153	126.8%
Michigan Park	14.8% ± 5.5%	\$2,437	\$8,107	232.7%
Columbia Heights	14.8% ± 1.9%	\$2,748	\$6,115	122.6%
NoMa	14.1% ± 3.8%	\$2,250	\$6,468	187.5%
Near Northeast	13.9% ± 3.4%	\$2,842	\$7,848	176.1%
Barney Circle	12.6% ± 3.5%	\$2,699	\$5,534	105.1%
Downtown	12.1% ± 1.8%	\$2,661	\$8,187	207.7%
Ledroit Park	11.7% ± 2.6%	\$2,933	\$5,247	78.9%
Truxton Circle	11.6% ± 3.6%	\$2,738	\$6,701	144.8%
Petworth	11.0% ± 2.3%	\$2,597	\$6,188	138.2%
Bloomingdale	10.9% ± 1.9%	\$2,940	\$4,140	40.8%
West End	10.6% ± 3.1%	\$3,097	\$5,925	91.3%
Dupont Circle	9.9% ± 2.4%	\$2,417	\$5,032	108.2%
Top 20 Airbnb Neighborhoods	15.5% ± 2.4%	\$2,752	\$6,927	151.7%

Above, the table demonstrates the powerful incentive to convert long-term residential units into highly profitable illegal hotel rooms in the top twenty District neighborhoods for Airbnb.

Commercial and entire-home/ apartment listings dominate Airbnb revenue

In order to get a clearer picture of the role commercial and entire-home listings play on Airbnb, we examine the importance of such listings in contributing to the total revenue generated by the platform in the District. This question is important to understanding whether commercial and investment use of STR hosting platforms are a major component of these platforms' business. If heavy commercial and investment use of STR hosting platforms were the exception rather than the norm, it might suggest that enforcement policy should be more targeted to finding and stopping bad operators. In that case, platforms would have an incentive to work with cities to promote lawful use of their platform, in order to maintain a good public image. On the other hand, if commercial and entire-home

use are a major component of STR platforms' business, platforms may find it imperative to prevent general compliance with the law. In that case, it would be necessary to regulate the platforms themselves.

As outlined above, commercial units account for a major component of Airbnb usage—an estimated 37 percent of listings are controlled by commercial operators. When considering revenue, commercial listings are even more prominent.

Commercial listings represent an estimated 52 percent of revenue for Airbnb rentals in the District of Columbia.³¹

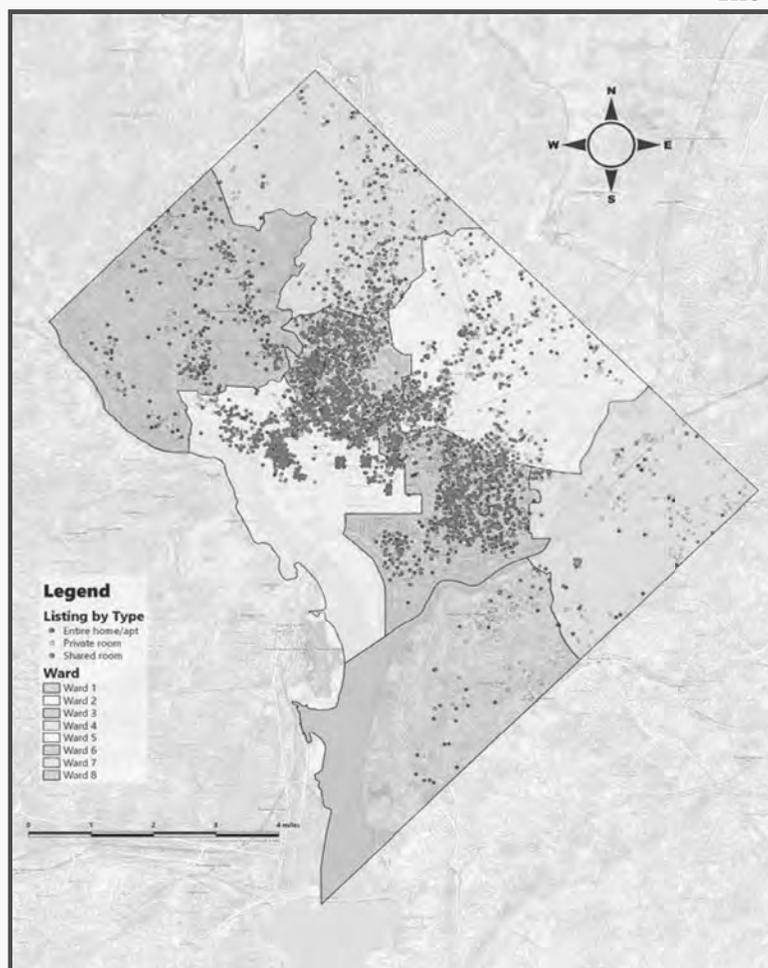
The reason for this is that, as expected, commercial listings are much more heavily used than other listings. Airbnb's dependence on illegal entire-home listings is especially striking. The data shows that entire-home listings account for more than three-quarters of total D.C. revenue for Airbnb.

Entire-home listings account for 82 percent of revenue for Airbnb rentals.

These revenue figures demonstrate that commercial and entire-home listings—not home sharing—represent the core of Airbnb's business.

Unfortunately, they also may explain why Airbnb has been reluctant to share data that would help officials enforce existing short-term rental laws or to remove illegal listings from their website. A major portion of Airbnb's profits depend on illegal rentals.

Figure 4: Map of Airbnb listings by type, October 2016. Sources: Airbnb Website- Share Better Scrape, October 2016; Ward boundaries - DC Office of the Chief Technology Officer; OSM TF Landscape - NextGis December 2016.





Airbnb Listing Concentration by Neighborhood

Likely due to their high profitability, commercial STRs may remove a significant portion of housing inventory that should be available for District residents. In nineteen different neighborhoods, commercial Airbnb listings are equivalent to more than 10 percent of vacant housing stock.

In eight different neighborhoods, this figure exceeds 15 percent. These neighborhoods are particularly impacted by the growth of Airbnb, and may suffer the greatest increases in rental prices because of reduced housing sup-

ply. (See Table 2, below.)

Airbnb units are most highly concentrated in Wards 1, 2, and 6—areas which are the most convenient to Downtown and the monuments, museums, and landmarks of the federal district. These wards contain a mix of high-priced and rapidly gentrifying neighborhoods. Wards 1 and 2 also have high concentrations of affordable units, and in particular have more rent-controlled units than any other wards.³²

The proliferation of short-term rentals may threaten that

housing. A flagrant example of short-term rentals removing rent-controlled housing from the market is discussed in the case study below, in which an entire rent-controlled building is converted to short-term rental use.

Although these wards are the mostly highly affected, the map below reveals that Airbnb is gaining a significant presence in all eight wards of the District.



Rent Increases in Top Airbnb Neighborhoods

- The median rent increase across Airbnb's top 20 neighborhoods was 14.9%, compared to the District-wide average rent increase of 11.0%.
- In those neighborhoods, rent is rising 35 percent faster than in the District as a whole.
- Sixty-five percent of the 20 top-Airbnb neighborhoods saw larger average rent increases than the District-wide average.
- In neighborhoods like Eckington, Capitol Hill, and LeDroit Park, the average rent increase was nearly double the District-wide average increase.

Rental pricing data from Zillow shows that rents haven't risen more quickly in the top twenty Airbnb neighborhoods from 2011-2016, with a median increase of 14.9 percent compared to the citywide average of 11.0 percent.³³

While the table below demonstrates that many of the top neighborhoods for Airbnb were also some of the most rapidly gentrifying neighborhoods in the District, it does not prove Airbnb caused the increase. For example, it is possible that commercial STR operations are most viable in gentrifying neighborhoods, and that they locate in such neighborhoods for that reason.

Regardless of the cause, commercial STR operations are most prominent in gentrifying neighborhoods, and therefore take away housing where it is needed most.

Neighborhood	# Of Illegal Commercial Listings	# Of Vacant Rentals	Illegal Commercial Listings as % of vacant rental housing	% Rent Increase 2011-2016
U Street Corridor	102	149 ± 60.8	68.5% ± 27.9%	11.87%
Judiciary Square	76	247 ± 54.4	30.8% ± 6.8%	5.45%
Shaw	54	233 ± 62.4	23.2% ± 6.2%	15.72%
Logan Circle	48	258 ± 93.8	18.6% ± 6.8%	9.23%
Eckington	48	263 ± 52.6	18.3% ± 3.6%	23.21%
Capitol Hill	207	1143 ± 136.5	18.1% ± 2.2%	21.59%
Mount Vernon Square	62	349 ± 90.0	17.8% ± 4.6%	10.25%
Brookland	18	119 ± 43.5	15.1% ± 5.5%	14.88%
Michigan Park	17	115 ± 43.0	14.8% ± 5.5%	16.27%
Columbia Heights	166	1123 ± 148.0	14.8% ± 1.9%	10.35%
NoMa	37	262 ± 70.5	14.1% ± 3.8%	6.78%
Near Northeast	37	266 ± 64.5	13.9% ± 3.4%	20.32%
Barney Circle	19	151 ± 42.3	12.6% ± 3.5%	17.27%
Downtown	145	1201 ± 179.4	12.1% ± 1.8%	12.95%
Ledroit Park	31	266 ± 59.0	11.7% ± 2.6%	19.55%
Truxton Circle	22	190 ± 58.4	11.6% ± 3.6%	15.29%
Petworth	56	507 ± 103.7	11.0% ± 2.3%	18.45%
Bloomingdale	52	475 ± 82.0	10.9% ± 1.9%	19.86%
West End	75	709 ± 206.7	10.6% ± 3.1%	8.84%
Dupont Circle	45	454 ± 110.6	9.9% ± 2.4%	6.19%
Median of Top 20 Airbnb D.C. Neighborhoods				14.9%
D.C. City-Wide Average				11.0%

Table 2: Top Twenty D.C. Airbnb neighborhoods marked by higher median rent increases over the last five years, higher than the city-wide average. Sources: Airbnb website - Share Better Scrape, October 2016; Housing vacancy data, neighborhood - American Community Survey 5-year Estimates, 2015 - neighborhoods defined as sets of Census tracts assigned based on to DC Office of Planning, Google, and other data sources; Housing data, citywide - American Community Survey 5-year Estimates, 2015. Rent data: Zillow Rental Index, 2016. Five neighborhoods with unreliable housing estimates or low numbers of Airbnb listings were excluded from the list.

The Cascade Effect and Gentrification

Short-term rentals have the potential to hasten the gentrification process in several ways.

First, short-term rentals increase the potential for residential buildings to be used as vehicles for speculative investment without providing housing for residents. For example, in the case study below, an investor purchased a rent-controlled apartment building in Columbia Heights, kept the building free of tenants, and instead rented out rooms to tourists using STR platforms.³⁴ This allowed the owner to earn income from the building without operating it as a residential apartment building.

The owner was able to operate this way for a long time in part because there were no long-term tenants to complain about rent control violations. If the laws restricting commercial STRs had been enforced, the most practical means of gener-

ating income through the building would have been to renovate the building and offer it for permanent residents to rent in compliance with housing laws. Instead, up to twenty families were deprived of housing in Columbia Heights.

Second, at the neighborhood level, any single unit taken off the market likely means that one less family will be able to reside in that neighborhood—thanks to extremely low vacancy rates. This family will then need to move to a different neighborhood, increasing demand-side pressure on that area's housing market. In the aggregate, this may cause a cascade effect, in which rent rises not just in the top Airbnb neighborhoods where people are unable to find a place to live, but also in the overflow neighborhoods where

families are moving.

Finally, short-term rentals may induce landlords to increase rents, by increasing the amount of rent a subset of tenants is willing and able to pay. At the same time, short-term rentals may create the opportunity for landlords to push steeper rent increases. Contrary to Airbnb's message that STRs help "middle-class families" stay in their homes in the face of increasing rents, Airbnb may instead be contributing to increasing rents by reducing housing supply. In fact, some property management companies have been holding discussions with Airbnb on allowing STRs in their building in exchange for a cut of the revenue.³⁵



Table 3 Percent of potential units removed because of commercial Airbnb activity. Sources: Airbnb website - Share Better Scrape, October 2016; Housing data, neighborhood – American Community Survey 5-year Estimates, 2015 – neighborhoods defined as sets of Census tracts assigned based on to DC Office of Planning, Google, and other data sources; Housing data, citywide – American Community Survey 5-year Estimates, 2015. Five neighborhoods with unreliable housing estimates or low numbers of Airbnb listings were excluded from the list.

Neighborhood	Total housing inventory	Vacant units	Commercial listings	Commercial listings / vacant units (%)
U Street Corridor	6977	149 ± 60.8	102	68.5% ± 27.9%
Judiciary Square	3081	247 ± 54.4	76	30.8% ± 6.8%
Shaw	2402	233 ± 62.4	54	23.2% ± 6.2%
Logan Circle	4791	258 ± 93.8	48	18.6% ± 6.8%
Eckington	1932	263 ± 52.6	48	18.3% ± 3.6%
Capitol Hill	14119	1143 ± 136.5	207	18.1% ± 2.2%
Mount Vernon Square	5822	349 ± 90.0	62	17.8% ± 4.6%
Brookland	1779	119 ± 43.5	18	15.1% ± 5.5%
Michigan Park	2674	115 ± 43.0	17	14.8% ± 5.5%
Columbia Heights	14801	1123 ± 148.0	166	14.8% ± 1.9%
NoMa	2890	262 ± 70.5	37	14.1% ± 3.8%
Near Northeast	2906	266 ± 64.5	37	13.9% ± 3.4%
Barney Circle	2025	151 ± 42.3	19	12.6% ± 3.5%
Downtown	10065	1201 ± 179.4	145	12.1% ± 1.8%
Ledroit Park	1444	266 ± 59.0	31	11.7% ± 2.6%
Truxton Circle	1407	190 ± 58.4	22	11.6% ± 3.6%
Petworth	7486	507 ± 103.7	56	11.0% ± 2.3%
Bloomingdale	3927	475 ± 82.0	52	10.9% ± 1.9%
West End	4885	709 ± 206.7	75	10.6% ± 3.1%
Dupont Circle	5559	454 ± 110.6	45	9.9% ± 2.4%
DISTRICT OF COLUMBIA	303,312	29,922 ± 905	1,980	6.6% ± 0.2%

Case study: Rent-Controlled Building in Columbia Heights

Columbia Heights is one of the most rapidly gentrifying neighborhoods in the District of Columbia. In November 2015, the Latino Economic Development Center (LEDC) discovered a 21 unit rent-controlled apartment building in Columbia Heights that they believed was being used for illegal short-term rental use instead of permanent housing.

The LEDC became aware of the property when they were alerted that an ownership stake in the building was being sold. The owners were required to notify the Department of Housing and Community Development (DHCD) of the sale because under the Tenant Opportunity to Purchase Act (TOPA), the building's tenants had the right to purchase the building themselves.

An LEDC community organizer who went to visit the property to alert the tenants of their TOPA rights was barred from entering by a woman who identified herself as a friend of the owner.

Closer inspection of the offer of sale revealed that the owners testified to the District government that the building had exactly one tenant—the “friend” the organizer had previously encountered—and all twenty other units were vacant.

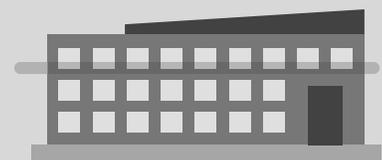
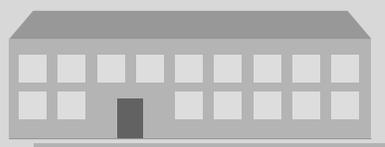
Additional research showed that several units in the apartment were listed on Flipkey, Homeaway, and seemingly on Airbnb.³⁶ The building owner and sole tenant were mentioned frequently as managers or owners of the building in the listings and reviews.

It appeared that the building had been partially or entirely converted into a hotel instead of being used to provide affordable housing for District residents.

Further inspection of several short-term rental hosting platforms revealed that **the owner also owned at least three other residential buildings which were being used as short-term rentals instead of permanent housing.**

LEDC sent correspondence to both DCRA, which regulates business licensing and enforces zoning, and DHCD, which administers the rent control law, all of which were apparently being violated. DCRA insisted they could not inspect the property unless the LEDC organizer was able to get an invitation from the owner. DHCD did not follow up at all. An LEDC organizer then testified at a Budget Oversight Hearing under the D.C. Council Committee on Business Consumer and Regulatory Affairs on February 29, 2016.

In December 2016, Ward 1 Councilmember Brianne Nadeau and the D.C. Working Families Party conducted an exposé on the property in order to highlight the risk commercial short-term rental operations pose to housing affordability in the District.³⁷



Airbnb is Growing Rapidly

The negative impacts of STRs on the District are likely to get worse as Airbnb continues to grow.

In the past year alone, the number of total listings in the District has grown by 38 percent—from 3,843 listings to 5,297. Commercial listings have grown from 1,480 to 1,980, a 34 percent increase.³⁸

By comparison, from 2014 to 2015, housing inventory grew at approximately 1.1 percent (± 0.02 percent)³⁹, while the District's population increased by 2.0 percent.⁴⁰

In the past year, commercial listings have grown by 34%.

These statistics reveal what is one of the fundamental problems underlying the District's housing crisis: population growth is outstripping housing supply.

Unfortunately, while District leaders scramble to provide more affordable housing to narrow this gap, commercial STR investors are converting the District's existing housing stock into illegal hotel rooms.

In the past year, commercial listings have grown by

34%



Figure 5 Growth in number of listings, October 2015 to October 2016. Airbnb Website- Share Better Monthly Scrapes, October 2015 to October 2016

Methodology

Data

The data used in this report was provided by ShareBetter, a national coalition of neighbors, community activists and elected officials who advocate for effective regulation of short-term rentals to protect neighborhoods and affordable housing. Because Airbnb has a history of declining to provide reliable data on its service, the most effective way to obtain this information is through automated observation of activity visible on the Airbnb website.⁴¹

This process is known as “scraping.” ShareBetter has obtained data from web scrapes performed on a monthly basis dating back to September 2015. A majority of the figures in this report are based on an October 2016 web scrape.⁴² It bears noting that although Airbnb is the most well-known STR hosting platform, it is only one of several that operate in the District. This report does not include data from these, although HomeAway,

Flipkey, and VRBO also have a significant presence in D.C. The principal reason for this omission is that it is impossible to know which listings are cross-listed on multiple platforms. To include data from all STR hosting platforms would likely cause the analysis to over-estimate the number of STRs in the District. Instead, by excluding listings from other sites, it is likely that this report understates the prevalence and growth of STRs in the District.

Calculating Commercial Listings

In order to identify and calculate the number of commercial listings, **this report estimates commercial listings as all entire-home/apartment and private room listings by hosts with multiple**

listings.⁴³ Shared rooms are excluded from this calculation. Given the available data, this metric is the best way to estimate the likelihood that an STR will be used as a commercial enterprise, and deprive a D.C. resident of potential housing.

For the rest of this report, this metric is called “Commercial Listings.” The appendix provides a more detailed discussion on how the metric of commercial listings was selected.



Calculating Revenue Estimates

This report analyzes estimates of the revenue generated by each category of listing, defined by type (“entire-home” vs. “private room” vs. “shared room”) and commercial use (“commercial” vs. “other”).⁴⁴ Revenue estimates by type and commercial use were derived using the following methodology using scrape data:

First, we estimate revenues by summing the prices of all listings for each category. Then, finding that

commercial listings are much more heavily used than other listings, we multiply the un-weighted revenue estimate by the average number of reviews for each category to obtain the estimated proportions of revenue from each category.

Based on a November 2015 report by Airbnb, entire-home listings appear to have a substantially similar distribution of activity level as other listings.⁴⁶

Therefore, if we were to assume that commercial and other listings did not have significantly different levels of transient usage, it would be reasonable to estimate the proportion of revenue obtained from each category by summing the prices for all listings in each category, as shown in Figure 1.

Under this estimate, commercial listings would represent 43 percent of total revenue.

Sum of prices by category

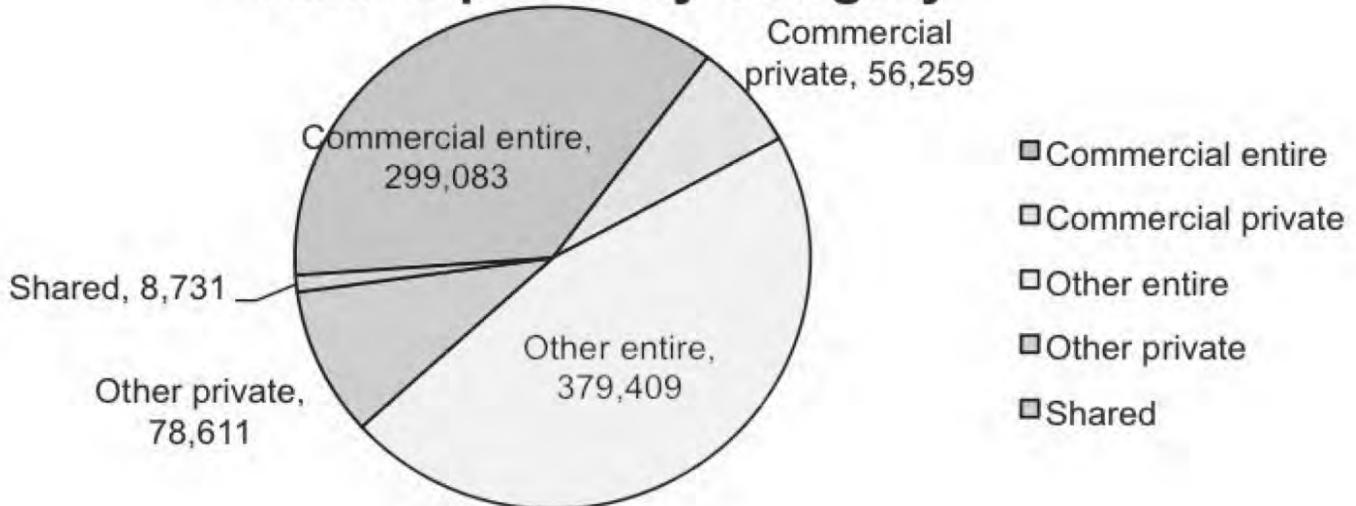


Figure 6: Sum of listed prices by category. Source: Share Better Scrape, October 2016⁴⁵

However, it would be incorrect to assume that commercial listings have the same level of activity as other listings. As expected, commercial listings are much more heavily used than other listings. The best proxy we have for activity level is the total number of guest reviews for each listing. We assume in the below discussion that number of guest reviews is, on average, linearly related to the number of

total nights the listing has been The average number of guest reviews for commercial entire-house listings is 24 percent higher than for other entire-house listings, and the average number of reviews for commercial private room listings is 92 percent higher than for other private room listings.

Therefore it is possible to obtain an estimate of the proportion of revenue from each category by

multiplying the revenue estimates in Figure 1 by the average reviews for each category booked.

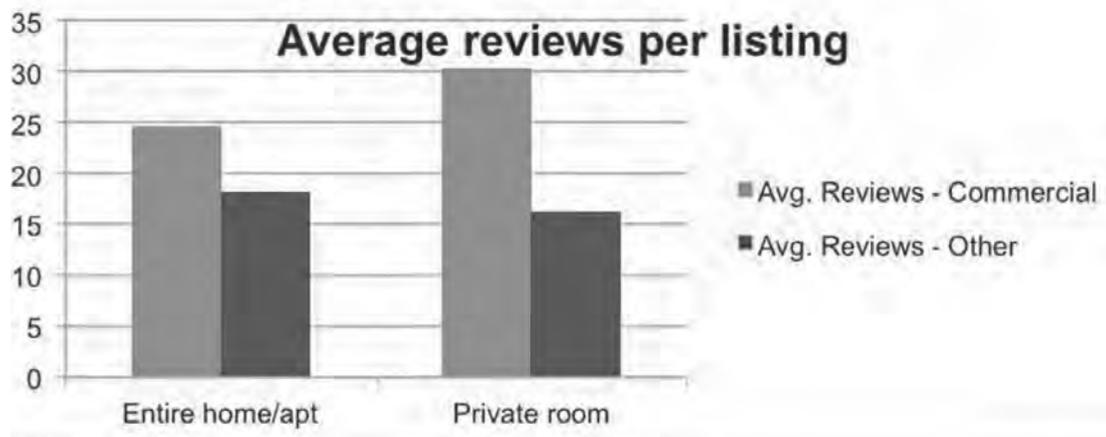


Figure 7: Average reviews by category. Source: Share Better Scrape, October 2016

The average number of guest reviews for commercial entire-home listings is 24 percent higher than for other entire-home listings, and the average number of reviews for commercial private room listings is 92 percent higher than for other private room listings.⁴⁷

Therefore, it is possible to obtain an estimate of the proportion of revenue from each category by multiplying the revenue estimates in Figure 1 by the average reviews for each category.⁴⁸

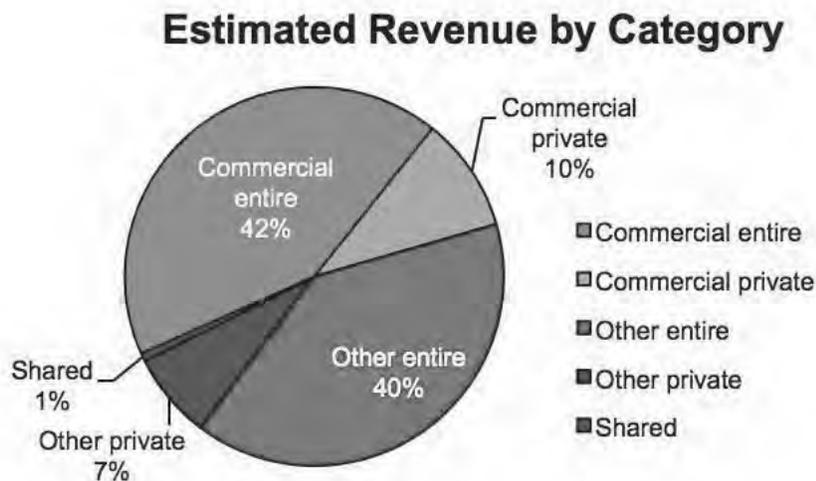


Figure 8 Estimated revenue by commercial/other listings and type. Source: Share Better Scrape, October 2016.

Appendix - Definitions

This report makes several distinctions between rentals in order to differentiate which listings are depleting the housing inventory and better estimate the size of their impact.

Shared Rooms

“Shared Rooms” are rentals in which the guest sleeps in a room that will simultaneously be used by the host (ie. on a couch in the living room). These listings are unlikely to represent situations where a permanent tenant would be displaced, except in a few cases where they appear to be a part of Airbnb hostels..

Private Rooms

“Private Rooms” are those in which guests have the privacy of their own room but the host is expected to be present during the guest’s stay. These listings may or may not displace long-term tenants because they have the potential to be used to fill vacant rooms in multi-bedroom apartments, which could otherwise be filled by long-term roommates. They can also deprive families of larger units by incentivizing hosts to rent or purchase larger units than they need.

Entire-Home/Apartment

“Entire-home/apartment” rentals grant guests private access to the entire dwelling unit. These listings are the most likely to displace permanent residents and are also the most viable as commercial units, commanding roughly double the average price of a “Private Room” listing.

Operator

Sixty-six percent of listings in the District are “entire home/apartment” listings. That means that, in a majority of cases, the person who listed the property is not actually hosting the guest. For that reason, we use the term “operator” as a generic term for a person who controls an STR listing. We will use the term “host” specifically to refer to situations in which a permanent resident of a dwelling unit actually hosts guests in their home.

Commercial Listings

“Commercial Listings” are those that are most likely to be principally used as a revenue source rather than as a permanent dwelling, thus displacing local residents. Commercial listings are primarily responsible for STRs’ negative impact on the D.C. housing market.

Because Airbnb has refused to publish accurate, anonymized data that would enable researchers and policy-makers to understand and address the impact of STRs, this report estimates the number of commercial listings based on the number of entire-home and private room listings by hosts who have posted multiple listings.

This metric is not perfect but is likely a fair approximation of the number of units being used for commercial purposes. Hosts who post multiple listings cannot live in all of their listings, and may not live in any of their listings. The metric may over-count commercial listings because in some cases hosts may live in one of their listings permanently and rent out another unit as an investment (which would represent one commercial unit, not two), or post multiple listings for the place where they live, which Airbnb may allow in some cases.

On the other hand, the metric may under-count commercial listings because some hosts post under several host names. Moreover, many hosts may operate exactly one commercial listing (not where they live), and not post any other units on Airbnb. Such commercial units would not be included under this metric. Finally, commercial operators may operate multiple units, but only one inside the District. This would not be included in our count of commercial listings either.

In any case, the number almost certainly understates the total number of commercial STRs in the District because of Airbnb being the only platform that is included. On balance, the “multiple listing” metric is probably the best approximation possible for commercial listings, given the available data, so it is the one used in this report.

Neighborhoods

This report examines neighborhood-level effects from short-term rentals. Such an effort necessarily leads to the difficulty of comparing hyper-local data drawn using different boundary lines.

This difficulty is addressed by using a variety of data sources, mainly Google and Office of Planning designations, to map Census tracts to neighborhood names. Each Airbnb listing was mapped into a Census tract using the listing’s approximate coordinates scraped from the Airbnb website and the official tract boundaries (provided by the D.C. Office of the Chief Technology Officer).

Zillow’s Rental Index provides neighborhood-level data based on their own neighborhood designations; these designations are highly comparable with this report’s set of neighborhoods. ZRI’s neighborhood designations were then mapped to the same set of neighborhood designations.

Thus, the Airbnb listings, the Census figures, and the Zillow rental estimates have been mapped to the same set of neighborhoods with the same boundaries. This method is not exact but should result in reasonable comparisons for the purposes of the methodology used by this report.

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24. For example, see Robert Devaney, "ANC Report: Airbnb; Yarrow Marmout," Georgetown, July 1, 2015, accessed January 26, 2016, <http://www.georgetown.com/articles/2015/jul/01/anc-report-airbnb-yarrow-marmout/>.
25. Benjamin Freed, "DC Sues Owner of Airbnb House Often Used for Parties," Washingtonian, May 8, 2016, <https://www.washingtonian.com/2015/05/08/dc-sues-owner-of-airbnb-rental-house-used-for-parties/>.

26. “Doug,” <https://www.airbnb.com/rooms/789295>, accessed January 26, 2016. According to the D.C. Property Information Verification System, the house has a license for single family rentals. The address of the house is 2220 Q Street NW. See <https://pivsservices.dcrs.dc.gov/PIVS/Search.aspx>, accessed January 26, 2016. Single family housing rental licenses are prohibited to be used for transient occupancy (14 DCMR 201.3) and are intended for families to rent as housing on a long-term basis.
27. Use of Airbnb rentals as party houses in the District has not yet been extensively covered by the press, but there have been frequent conversations at the neighborhood level. For example, see Robert Devaney, “ANC Report: Airbnb; Yarrow Marmout,” *The Georgetown*, July 1, 2015, accessed December 7, 2016, <http://www.georgetowner.com/articles/2015/jul/01/anc-report-airbnb-yarrow-marmout/>; and Benjamin Freed, “DC Sues Owner of Airbnb House Often Used for Parties,” *Washingtonian*, May 8, 2015, accessed December 7, 2016, <https://www.washingtonian.com/2015/05/08/dc-sues-owner-of-airbnb-rental-house-used-for-parties/>. There has been extensive national coverage of this issue; for example, see Ron Lieber, “New Worry for Home Buyers: A Party House Next Door,” *New York Times*, October 9, 2015, accessed December 7, 2016, <http://www.nytimes.com/2015/10/10/your-money/new-worry-for-home-buyers-a-party-house-next-door.html>.
28. Zillow Rental Index, ZRI Time Series, City and Neighborhood. Average weighted by number of residential units per neighborhood; neighborhood averages are the mean of monthly estimates from October 2015 through October 2016.
29. D.C. hotels had an estimated 79.8 percent occupancy rate in 2016. Jon Banister, “DC’s Hotel Influx Expected To Hurt Occupancy, RevPAR in 2017,” *Bisnow*, October 3, 2016, accessed January 26, 2016, <https://www.bisnow.com/washington-dc/news/hotel/dc-hotel-occupancy-expected-to-decline-as-supply-boom-continues-65939>.
30. Monthly figure obtained by deducting 3 percent host service fee from neighborhood average for commercial entire-unit listings, then multiplying by thirty
31. See Figure 3 Estimated revenue by commercial/other listings and type..
32. Peter A. Tatian and Ashley Williams. A Rent Control Report for the District of Columbia. (Washington, DC: Urban Institute, November 2011), 7, accessed August 3, 2016, <http://www.urban.org/sites/default/files/alfresco/publication-pdfs/412347-A-Rent-Control-Report-for-the-District-of-Columbia.pdf>
33. For neighborhood data the report uses neighborhood level time-series data. For the citywide average, the report uses the citywide time-series data. Zillow Rental Index. For methodology, see Bun, Yeng, “Zillow Rent Index: Methodology,” *Zillow.com*, March 12, 2012, accessed August 5, 2016, <http://www.zillow.com/research/zillow-rent-index-methodology-2393/>.
34. Sufficient neighborhood-level data do not exist to provide reliable averages across the top 20 neighborhoods; the median provides a useful measure of central tendency across these neighborhoods.
35. Laura Kusisto. “Rent Your Place on Airbnb? The Landlord Wants a Cut.” *Wall Street Journal*, December 16, 2015, accessed August 3, 2016. <http://www.wsj.com/articles/big-landlords-airbnb-discuss-partnerships-1450200473>. It is a little surprising that more companies have not sought such arrangements. This likely reflects the serious legal, health, safety, and quality of life complications inherent in allowing short-term rental use in residential apartment buildings.
36. Airbnb makes it difficult to pinpoint addresses, but the owner of the building had a profile with apartments listed in extremely close proximity to the site.
37. Andrew Giambrone, “‘Sting Operation’ Reveals Questionable Airbnb Use at Building in Columbia Heights,” *Washington City Paper*, December 15, 2016, accessed January 31, 2016, <http://www.washingtoncitypaper.com/news/housing-complex/blog/20846838/sting-operation-reveals-questionable-airbnb-use-at-building-in-columbia-heights>.
38. Analysis of Share Better scrape data, October 2015 to October 2016.
39. U.S. Census Bureau, “Housing units,” 2014 and 2015 American Community Survey 1-Year Estimates, Table B25001, accessed January 26, 2016.
40. U.S. Census Bureau, “Total Population,” 2014 and 2015 American Community Survey 1-Year Estimates, Table B01003, accessed January 26, 2016. The Census also estimates the number of households, though less reliably. From 2014 to 2015 the ACS shows a 1.59 percent increase (± 0.98 percent) in the number of households which is not reliable enough an estimate for meaningful comparison with the growth in housing units. See ACS 1-Year Estimates “Households and Families” Table S1101.
41. Airbnb has consistently refused to provide data on its activities, and has sued cities that have attempted to obtain data from the company. See for example Lien, Tracey and Emily Alpert Reyes, “Airbnb sues San Francisco – its hometown – to block new rental law,” *Los Angeles Times*, June 28, 2016, accessed August 3, 2016, <http://www.latimes.com/business/technology/la-fi-tn-airbnb-sues-sf-20160627-snap-story.html>. In 2015, Airbnb voluntarily released data on its operations in New York City, however, it was discovered that the company had scrubbed 1,500 listings. See Bromwich, Jonah, “Airbnb Purged New York Listings to Create a Rosier Portrait, Report Says,” *New York Times*, February 11, 2016, accessed August 3, 2016, <http://www.nytimes.com/2016/02/12/business/airbnb-purged-new-york-listings-to-create-a-rosier-portrait-report-says.html>.
42. At the time of writing, data from November 2016 were available; however, November saw a steep spike in listings likely resulting from anticipated bookings from the inauguration and related events. October 2016 was chosen instead because it is more likely to be characteristic of the District’s STR market long-term.
43. See the Appendix for definitions of listing types.
44. “Shared rooms” are not broken up by commercial use, since we do not count any shared rooms as commercial—even though some of them are. It is reasonable to assume that, in most cases, shared rooms do not displace a resident; or, if they do, it takes several shared rooms to displace one resident, as might be the case for a hostel posting rooms on Airbnb.

45. The dollar figures shown do not have any real life meaning; however, figures are shown in dollars rather than percent because the summed prices are used to calculate the actual estimated proportions of revenue by category shown in Figure 3. Lighter colors are used in this chart because these figures represent an intermediate step in the calculation of estimated revenue.

46. Airbnb, "Overview of the Airbnb Community in Washington, D.C.," November 16, 2015.

47. It should be noted that these are averages of total number of reviews, not average reviews for each listing, because the scraped data does not indicate the age of a listing. Therefore, a new listing with a smaller number of reviews may in fact be more active than an older listing with more reviews. Thanks to the large number of listings, however, assuming listing age is independent from use intensity and whether a listing is commercial or not—and there is no obvious reason to doubt it—the above percent differences should accurately estimate the actual differences in use intensity between the two types of listings.

48. That is, a category c 's share of revenue = $R_c = \frac{\text{Sum of prices for listings in category} \times \text{avg. reviews for listings in category}}{\text{Total sum of (sum of prices} \times \text{avg. reviews) for all categories}}$ or $R_c = \frac{\sum_{l=1} p_{c_l} \bar{r}_c}{\sum_{c=1} \sum_{l=1} p_{c_l} \bar{r}_c}$, where R_c is the estimated proportion of revenue from category c , p_{c_l} is the price of a given listing in a category c , and \bar{r}_c is the mean number of reviews in the category.

REPORT OF BRYAN ESENBERG

March 28, 2019

A. Introduction

I am a Deputy Commissioner in the City of Chicago's Department of Housing, and I have been asked to determine whether there is support for the proposition that house sharing has a tendency to reduce the availability of affordable housing, thereby contributing to the problem of homelessness. I have also been asked to review and respond to the report of Dr. Adrian Moore, submitted by the plaintiffs in the case of Mendez, et. al. v. City of Chicago, et. al., 16 CH 15489.

B. Qualifications

1. My educational background is as follows:

- 1998 BA Economics, Indiana University
- 2006 MA Real Estate, University of Illinois – Chicago

2. My employment background is as follows:

City of Chicago, Dept. of Housing [formerly Planning & Development], Chicago, IL
05/17 to present

Deputy Commissioner, Multifamily Finance and Housing Preservation

- Oversee the City's investment in multifamily affordable housing and housing preservation programs
- Direct the planning and coordination of multifamily financing tools to include tax credits, bond cap, TIF and HUD funding totaling over \$100M annual
- Provide day to day management for the underwriting team and act as the division liaison for interdepartmental coordination
- Represent the division in strategic planning sessions for new funding sources, bonus programs and pilot programs to increase affordable housing opportunities and improve neighborhoods

City of Chicago, Dept. of Planning and Development, Chicago, IL
11/13 to 05/17

Assistant Commissioner, Housing Preservation

- Oversaw the management and implementation of the Troubled Buildings Initiative [TBI], the MicroMarket Recovery Program [MMRP] and the Neighborhood Stabilization Program [NSP]

- Provided guidance and direction to MMRP community partners, technical liaisons and delegate agencies under a revised community forward strategy to address vacant buildings and neighborhood change
- Leveraging MMRP and TBI, worked with the Dept. of Law, Dept. of Buildings and colleagues at DPD to develop and monitor the integration and collaboration of disparate division programs to achieve joint and related programmatic goals resulting in an expedited process to reclaim abandoned buildings
- Managed division day-to-day operations in absence of Deputy Commissioner from December of 2014 to February 2016

NHS Redevelopment Corporation, Chicago, IL
10/06 to 11/13

Real Estate Manager

- Manage day to day operations, budgeting and strategic planning for the real estate and development operations of NHS Chicago.
- Grew the Troubled Buildings single receivership program from 12 units to over 150 units annually. Affected over 1000 units of housing through the program.
- Assisted with City's MicroMarket Recovery Program strategy including vacant building acquisition, leveraging receivership and defining end use for vacant buildings. Raised \$300,000 in private contributions to rehabilitate 3 homes in the West Humboldt MMRP for long term, affordable Veteran housing on 500 Central Park.
- Improved property management operations for a scattered site portfolio of low income rentals across 289 MF units and 22 SF properties. Introduced energy efficiency measures to reduce expenses, implemented an asset management plan and transitioned management operations to third party vendors.

3. As a result of my educational and employment background, I have knowledge and experience that assist me with addressing the issues I have been asked to address in this report. Specifically, my BA in Economics and MA in Real Estate have been the foundation for my career in understanding Chicago's real estate markets, developing affordable housing and administering government housing programs.

C. Materials Reviewed

In connection with this matter, I have reviewed the following materials:

1. The City's answers to plaintiffs' first and second sets of interrogatories.
2. The documents produced by the City, marked D1 – 618.

3. The report of Dr. Moore (Moore deposition exhibit 3).
4. The transcript of the deposition of Dr. Moore, including the deposition exhibits.

I have also performed some research of my own, as discussed below.

D. Affirmative Opinions

In my opinion, there is substantial support for the proposition that house sharing has a tendency to reduce the availability of affordable housing, thereby contributing to the problem of homelessness. Reports discussed at Dr. Moore's deposition include:

- "How Airbnb Short-Term Rentals Exacerbates Los Angeles's Affordable Housing Crisis," Dayne Lee, Harvard Law & Policy Review, vol. 10 pages 229 – 253 (2016), Bates numbers D304 – 328, Moore deposition exhibit 4. This report concluded, among other things, that Airbnb increases rents and reduces the affordable housing stock. *Id.* at 234, D309. The author noted that "[e]ach apartment or home listed year-round on Airbnb is a home that has been removed from the residential housing market ..." *Id.* In addition, "the pressure that STRs [short-term rentals] place on rent prices pushes units out of the margins of affordability for low- and middle-income residents, an effect that cascades throughout the city." *Id.* at 240, D315.
- "From Air Mattresses to Unregulated Business: An Analysis of the Other Side of Airbnb," John W. O'Neill, professor of hospitality management and director of the Center for Hospitality Management at Penn State (2016), D15 – 55, Moore deposition exhibit 7. This report found, among other things, that 58% of Airbnb's Chicago-area revenue came from operators who listed properties for rent more than 180 days per year, 96% came from operators who listed units for rent more than 30 days per year, and 38% came from operators listing multiples units for rent. *Id.* at D33. The neighborhoods with the most properties listed on Airbnb were Lake View, Boystown, the Magnificent Mile, Streeterville, Lincoln Park, Sheffield Neighbors, the Old Town Triangle, Old Town, the Gold Coast, Wicker Park and West Town. *Id.*
- "Is Home Sharing Driving up Rents? Evidence from Airbnb in Boston," Mark Merante and Keren Mertens Horn, University of Massachusetts Boston, Department of Economics (2016), D391 – 426, Moore deposition exhibit 9. This report concluded that in Boston, "a city where the demand for rental housing is outpacing supply and pushing up rents quickly, home sharing is contributing to this dynamic ..." *Id.* at 21 – 22, D412 – 413.
- "Hosts with Multiple Units – A Key Driver of Airbnb Growth: A Comprehensive National Review Including a Spotlight on 13 U.S. Markets," CBRE Hotels, Jamie Lane, Senior Economist and R. Mark Woodworth, Senior Managing Director and Head of Lodging Research (March 2017), D56 – 79, Moore deposition exhibit 8. This report found, among other things, that revenue generated by multi-unit entire-home hosts in Chicago increased by 100% between October 2014 and September 2016, that 77% of

Chicago revenue came from entire-home rentals, and that 24% of the total revenue generated by multi-unit hosts came from hosts with ten or more units. *Id.* at 3, D58, 13, D68.

- “Do Airbnb properties affect house prices?” Stephen Sheppard and Andrew Udell, Williams College Department of Economics (January 1, 2018), D80 – 125, Moore deposition exhibit 5. This report “presented a variety of estimates of the impacts that properties listed for rent on Airbnb appear to have on the market value of residential properties in New York City” and noted that “[t]he direction and magnitude of these impacts has prompted widespread concern and considerable debates about the impact on urban structure and housing affordability in New York City and in other cities around the world.” *Id.* at 41, D122.
- “The Impact of Airbnb on NYC Rents,” Office of the New York City Comptroller Scott M. Stringer (April 2018), copy attached as Exhibit A. This report found that between 2009 and 2016, rental rates rose dramatically in most neighborhoods of New York City, and its empirical analysis attributed 9.2% of the rental rate increase to Airbnb.
- “The Sharing Economy and Housing Affordability: Evidence from Airbnb,” Kyle Barron, Edward Kung and Davide Proserpio (April 1, 2018), D329 – 390, Moore Deposition exhibit 6. Using a dataset of Airbnb listings from the entire United States, this report found that a 1% increase in Airbnb listings leads to a 0.018% increase in rents. *Id.* at 1, D329. The authors concluded that “home-sharing increases rental rates by inducing some landlords to switch from supplying the market for long-term rentals to supplying the market for short-term rentals.” *Id.* at 33, D361. They also stated that their study provided evidence confirming their conclusion that Airbnb raises housing costs for local residents. *Id.* at 33 – 34, D361 – 362. The data reviewed included “effect magnitudes” for the nations’ ten largest metropolitan areas, including the Chicago area. *Id.* at 52, D380.

All of these reports support the proposition that house sharing has a tendency to reduce the availability of affordable housing, and there is no reason to believe that they would not apply to Chicago. In my opinion, these reports are of a type that would be reasonably relied upon by policy makers and advisers in positions such as mine in forming opinions and inferences upon the subjects that the reports address.

In addition, my research has disclosed the following studies that further support the proposition:

- “The High Cost of Short-Term Rentals in New York City,” David Wachsmuth, David Chaney, Danielle Kerrigan, Andrea Shillolo, Robin Basalaev-Binder, Urban Politics and Governance research group, School of Urban Planning, McGill University (January 30, 2018), copy attached as Exhibit B. This report provided a comprehensive analysis of Airbnb activity in New York City and the surrounding region, from September 2014 through August 2017. *Id.* at 2. Key findings were, among other things, that Airbnb had

removed between 7,000 and 13,500 units of housing from New York City's long-term rental market, and that by reducing housing supply, Airbnb had increased the median long-term rent in New York City by 1.4% over the last three years. *Id.*

- “The economic costs and benefits of Airbnb,” Josh Bivens, Economic Policy Institute (January 30, 2019), copy attached as Exhibit C. This report stated, among other things: “The largest and best-documented potential cost of Airbnb expansion is the reduced supply of housing as properties shift from serving local residents to serving Airbnb travelers, which hurts local residents by raising housing costs. ... High-quality studies indicate that Airbnb introduction and expansion in New York City, for example, may have raised average rents by nearly \$400 annually for city residents.” *Id.* at 2.
- “Selling the District Short,” D.C. Working Families (March 2017), copy attached as Exhibit D. The report stated, among other things: “The growth of the commercial STR market has serious negative implications for housing affordability and quality of life for D.C. residents.” Exhibit D at 4.

In my opinion, these reports too are of a type that would be reasonably relied upon by policy makers and advisers in positions such as mine in forming opinions and inferences upon the subjects that the reports address.

E. Responses to Dr. Moore

In his report, Dr. Moore makes a number of arguments with which I disagree. These are listed and discussed below:

- Dr. Moore states that studies which rely on New York City data “may not be representative.” Report at 7. He also claims “[t]here is a rule of thumb in economics ‘New York City is always an outlier’ – meaning that what is true in New York City is not typical of the rest of the United States.” *Id.* at 10. He further states that “[t]here is no clear reason to think the effects of home sharing on rents would [be] as strong as in in [sic.] New York City ...” *Id.* At his deposition, Dr. Moore could cite no academic literature supporting these opinions. Moore deposition transcript at 22. His main explanation was that New York City is more dense than other cities, and its real estate market is less “flexible.” *Id.* at 22-24. It is true that New York City is more dense than Chicago, but I see no reason to believe that the effects of Airbnb found in New York City would not be expected to occur in Chicago as well. Even if, as Dr. Moore suggests, they would not be as strong, that does not mean that they would not be significant. In fact, as I discuss below, in my position with the City of Chicago’s Department of Housing, I have observed such effects in Chicago first hand. In addition, as discussed above, similar reports have been issued using data from Los Angeles, Boston, Washington D.C. and cities nationwide, and those reports have all reached similar conclusions.
- Dr. Moore states that “the type of business and vacation travelers who use Airbnb are not looking for apartments at the bottom of the market.” Report at 9. At his deposition, Dr.

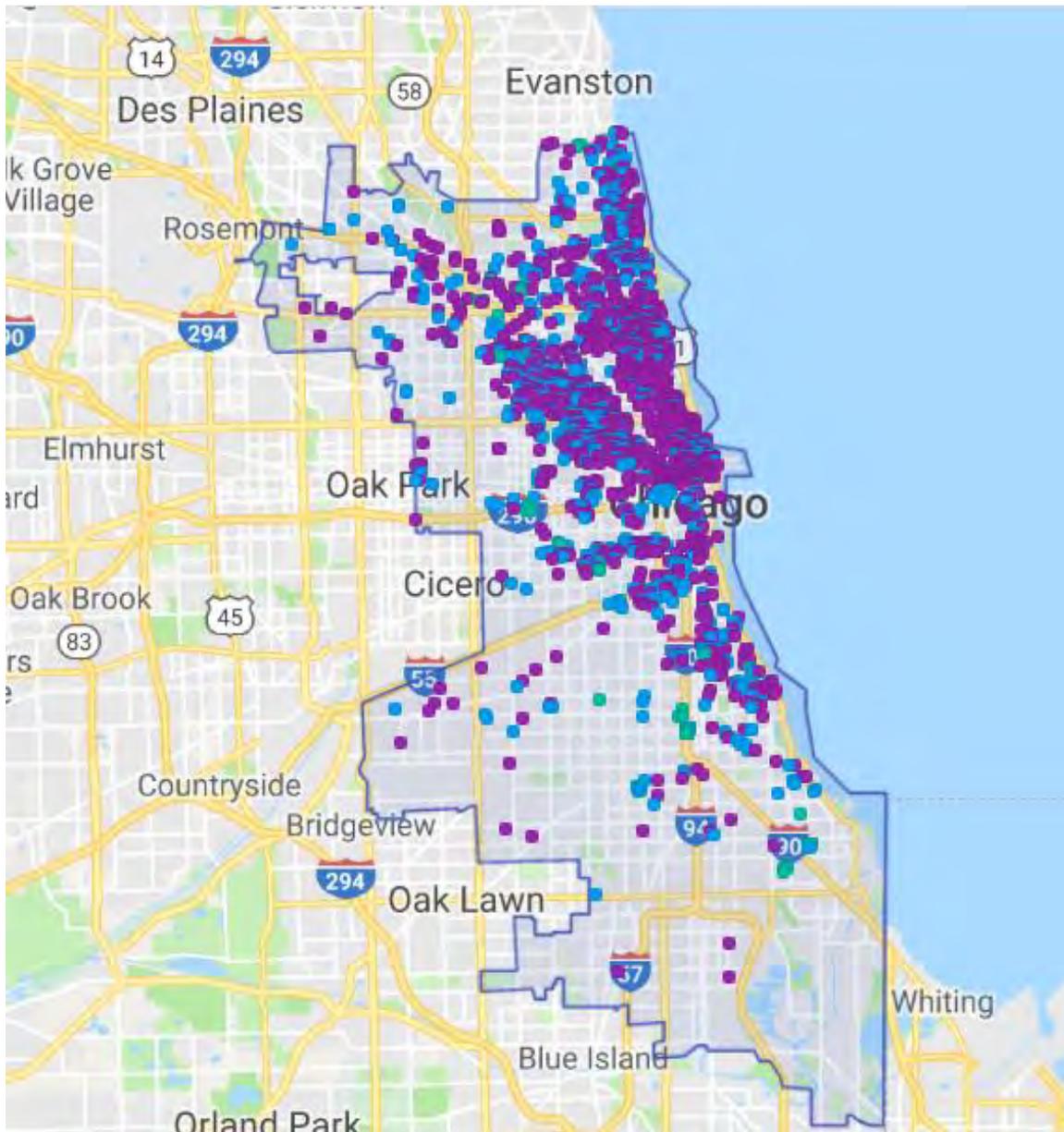
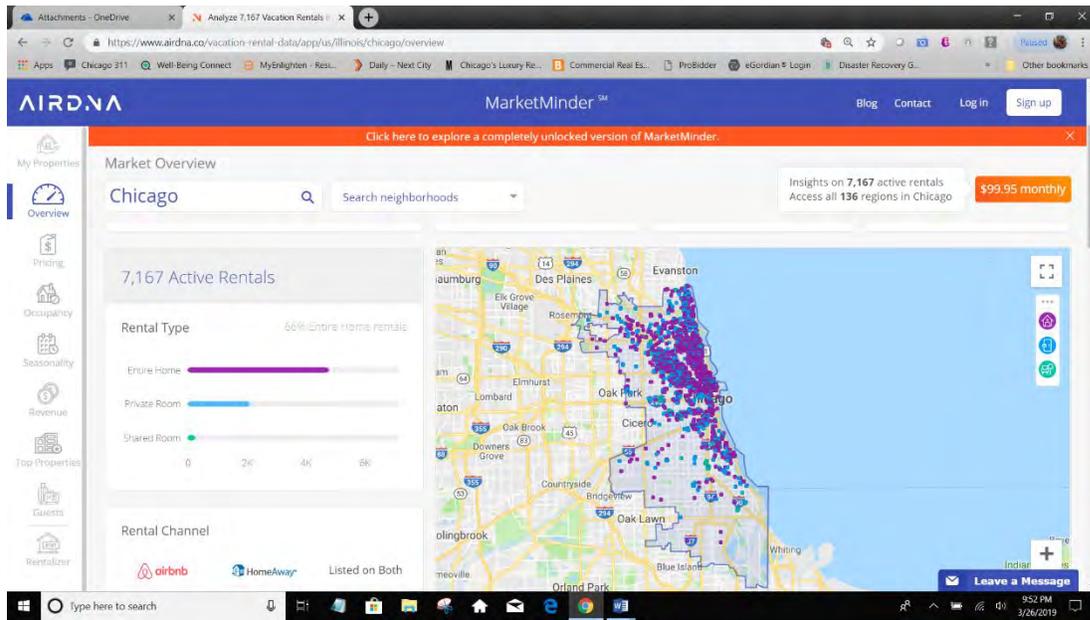
Moore admitted that he did not do any study of Chicago Airbnb listings, to see if this was accurate for Chicago. Moore deposition transcript at 30, 39. Working with my staff, I did do such a study. We found that the most Airbnb listings are indeed in better off neighborhoods. However, we also found that there are many Airbnb listings in almost every neighborhood of Chicago. A map of these results shows 7,167 listings attached as Exhibit E. The report authored by the Office of the New York City Comptroller found a similar pattern in New York City. Exhibit E, Table 2 and Appendix.

- Dr. Moore states that “while conversion to home sharing might affect the total rental housing market, it’s unlikely that those effects are sufficiently strong among the population of renters most vulnerable to disruption to push them into homelessness.” Report at 10. This ignores the spillover effect of house sharing. As noted in “How Airbnb Short-Term Rentals Exacerbates Los Angeles’s Affordable Housing Crisis,” discussed above, the pressure that short-term rentals place on rent prices “pushes units out of the margins of affordability for low- and middle-income residents, an effect that cascades throughout the city.” Id. at 240, D315. In other words, if rent prices increase in the neighborhoods where house sharing is most common, some people who cannot afford those rents move into less expensive neighborhoods, which raises the rents there. This in turn spills over to less well-off neighborhoods, where at some point people who could barely afford the rent before have to move out or get evicted. These people become homeless or at least require governmental assistance to secure housing.
- Dr. Moore draws a distinction between “the effect of home sharing on homelessness” and its effect “on rental prices.” Report at 10. I agree that there are many causes to homelessness. However, an individual’s inability to pay the rent can be one of them. If someone is just barely able to pay the rent, and if the rent goes up, then that person has to move out or be evicted. If that person is already at the bottom of the economic ladder, then there may be no new place to move into, and that person will become homeless or at least need governmental assistance to secure housing.
- Dr. Moore did not include in his report any reference to his deposition Exhibits 7 and 8, discussed above. Those reports included Chicago data showing that a large percentage of house share listings are by investors and developers, as opposed to individuals who truly want to share the unit in which they live. At his deposition, Dr. Moore said he did not include those reports because he did not consider them relevant to the issue of whether house sharing has an impact on the availability of affordable housing. Moore deposition transcript at 34-36. As he put it, given a certain number of units listed on Airbnb, it doesn’t matter who owns the unit. Id. at 44-45. However, Dr. Moore’s conclusion ignores the disparate impact upon the rental market between a host who rents out an extra room versus an absentee host who rents out an entire home or building. Specifically, in the case of the live-in host, renting out a room does not remove housing from the long-term rental market. By contrast, when an investor or developer reserves multiple units for short-term rentals, this does remove those units from the long-term rental market. Therefore, in my opinion, Dr. Moore’s conclusion that the impact on the available stock of housing is the same, regardless of who is listing the unit, is incorrect.

In my position with the City of Chicago Department of Housing, I have seen the effects of house sharing first-hand. In particular, the following single room occupancy hotel (“SRO”) was recently converted into a building that will be reserved for short term rentals: 2001 North California. This is in the Logan Square neighborhood of Chicago. Typically, SROs house people of limited means who are not in a position to sign long-term lease agreements. When this SRO was converted, the City had to help provide resources and assist with finding replacement housing for many people who had previously lived in those buildings. The City required the developer to provide relocation assistance to the residents who will be displaced by this property being removed from the market and no longer being operated affordably. The relocation assistance included a cash settlement for losing their home and help in identifying a new place to live.

F. Conclusion

For the reasons summarized above, I believe there is substantial support for the proposition that house sharing has a tendency to reduce the availability of affordable housing, thereby contributing to the problem of homelessness.



**IN THE CIRCUIT COURT OF COOK COUNTY, ILLINOIS
COUNTY DEPARTMENT, CHANCERY DIVISION**

LEILA MENDEZ and ALONSO ZARAGOZA,)

Plaintiffs,)

v.)

CITY OF CHICAGO, a municipal corporation;
And ROSA ESCARENO, in her official
capacity as Commissioner of the City of
Chicago Department of Business Affairs and
Consumer Protection,)

Defendants.)

Case No. 16 CH 15489

Hon. Sanjay T. Tailor

**CITY OF CHICAGO'S RESPONSE TO PLAINTIFFS' SECOND
SET OF INTERROGATORIES**

Defendant City of Chicago ("City") responds to Plaintiffs' Second Set of Interrogatories as follows:

INTERROGATORY NO. 26

Identify each and every fact the City will rely on to show that the stated purpose of the Amendment's 2% surcharge — "to fund housing and related supportive services for victims of domestic violence," Chi. Muni. Code 3-24-030(C) — bears a reasonable relationship to the object of the Ordinance.

Response: The City objects to this Interrogatory on the grounds that it is vague and lacks foundation. Subject to and without waiving these objections, the City states that the surcharge's stated purpose is the same as the object of the Ordinance and therefore, by definition, bears a reasonable relationship to it.

INTERROGATORY NO. 27

Identify each and every object of the Amendment's 2% surcharge.

Response: The purpose of the surcharge is to fund housing and related supportive services for victims of domestic violence.

INTERROGATORY NO. 28

Identify any and all public policies that the City alleges support the Amendment's 2% surcharge.

Response: One public policy consideration supporting the surcharge is caring for victims of domestic violence. Survivors and victims of domestic violence often report that lack of safe and affordable housing is one of the primary barriers they face in choosing to leave an abusive partner. Studies indicate that house sharing has a tendency to reduce the availability of affordable housing, thereby contributing to the problem of domestic abuse victims lacking affordable housing. Each housing unit that is used for short-term house sharing rentals is a unit that it not available for use as permanent or transitional housing for victims of domestic violence. This also negatively impacts the housing available to the City and non-profit organizations seeking to shelter victims of domestic violence.

Another related policy consideration is to reduce the number of homeless people in Chicago. Domestic violence is seen as a predictive factor of homelessness. Studies indicate that domestic violence significantly contributes to homelessness due to lack of available and affordable housing for those seeking to escape a domestic abuse situation. A related policy consideration is to comply with HUD's federal mandate to prioritize domestic violence victims when addressing issues of homelessness. Compliance with that mandate is necessary in order to secure access

to the limited federal resources provided to combat homelessness. Investigation continues. The City will supplement this Response as appropriate.

INTERROGATORY NO. 29

Identify the "related supportive services for victims of domestic violence" the City funds, has funded, plans to fund, or may fund with revenue from the Amendment's 2% surcharge.

Response: The surcharge will enable the City to maintain existing shelter beds, fund additional shelter beds, and build a new shelter for victims of domestic violence. Additionally, the City currently supports approximately 30 different programs through various partner organizations who offer services to survivors of domestic violence. Some of these services include a 24/7 domestic violence hotline, immediate crisis counseling, safety planning, explanation of victim rights under the Illinois Domestic Violence Act, emotional support and guidance, crisis intervention, shelter placement, legal advocacy, linking survivors to medical and health services, child care, job training and housing options. Investigation continues. The City will supplement this Response as appropriate.

INTERROGATORY NO. 30

Identify each person who provided information needed to respond to any interrogatory or request herein, including which interrogatory (by number) was addressed by each such person respectively.

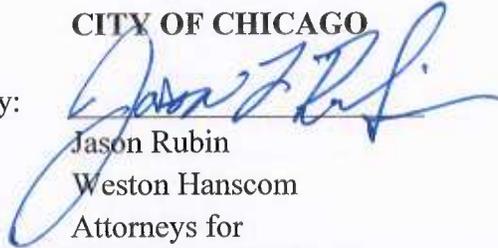
Response: Stefan Schaffer-City of Chicago Chief Resilience Officer, Christopher Wheat-Asst. to the Mayor, Anne Sheahan-Assistant to the Mayor, Robin Ficke-Research Director for World Business Chicago and Maura McCauley-Director of Homeless Prevention, Policy and Planning for the Chicago Department of Family

and Support Services all either provided or confirmed the accuracy of information used in answering Interrogatories Number 28 and 29.

Respectfully submitted,

CITY OF CHICAGO

By:



Jason Rubin
Weston Hanscom
Attorneys for
Defendants

Weston Hanscom
Deputy Corporation Counsel
City of Chicago Law Department
Revenue Litigation Division
30 N. LaSalle, Suite 1020
Chicago, IL 60602
(312) 744-9077

Jason Rubin
Senior Counsel
City of Chicago Law Department
Revenue Litigation Division
30 N. LaSalle, Suite 1020
Chicago, IL 60602
(312) 744-4174

CERTIFICATION

On this day, November 7, 2018, under penalties as provided by law pursuant to Section 1-109 of the Code of Civil Procedure, the undersigned certifies that the answers to Interrogatories as set forth in this document are true and correct to the best of his knowledge, information and belief.


Stefan Schaffer
Chief Resilience Officer for City of Chicago

CERTIFICATE OF SERVICE

I, Jason Rubin, an attorney, hereby certify that on November 7, 2018, I caused the foregoing City of Chicago's Response to Plaintiffs' Second Set of Interrogatories to be served on:

Jeffrey Schwab
Liberty Justice Center
Cook County No. 49098
190 S. LaSalle Street, Suite 1500
Chicago, Illinois 60603
jschwab@libertyjusticecenter.org

via messenger delivery and electronic mail; and on

Jacob Huebert
Christina Sandefur
Timothy Sandefur
Goldwater Institute
jhuebert@goldwaterinstitute.org
csandefur@goldwaterinstitute.org
tsandefur@goldwaterinstitute.org

via electronic mail.

A handwritten signature in blue ink, appearing to read "Jason Rubin", is written over a horizontal line.

IN THE CIRCUIT COURT OF COOK COUNTY, ILLINOIS
COUNTY DEPARTMENT, CHANCERY DIVISION

LEILA MENDEZ and ALONSO ZARAGOZA,)

Plaintiffs,)

v.)

CITY OF CHICAGO, et al.,)

Defendants.)

Case No. 16 CH 15489

Judge Sanjay T. Tailor

DECLARATION OF ADRIAN T. MOORE

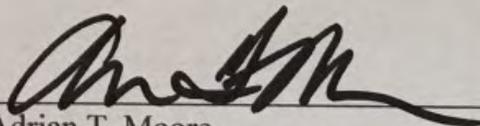
I, Adrian T. Moore, declare as follows:

1. I was retained by Plaintiffs to provide an expert opinion in this case evaluating the City of Chicago's argument that home-sharing tends to reduce affordable housing and contribute to homelessness.

2. A true and accurate copy of the expert report I prepared for this case is attached to this Declaration as Exhibit 1.

3. The contents of my report are true and correct, and I would testify to the same under oath if called upon to do so.

Under penalties as provided by law pursuant to Section 1-109 of the Illinois Code of Civil Procedure, I certify that the statements set forth in this instrument are true and correct.


Adrian T. Moore

6-20-19
Date

Expert Report of Adrian T. Moore, Ph.D.

1. Opinions to be expressed.

- a. The studies shared by defendant are few, mostly rely on New York City data—which may not be representative, and find very small to modest effects of home sharing on rents, and no direct connection to homelessness.
- b. Chicago has long suffered a shortage of affordable housing with no evidence the problem is worse since the advent of home sharing.
- c. An extensive literature finds that housing price increases beyond construction costs (which are stable) are driven predominantly--90% by best estimate--by local land use and housing regulations.
- d. Studies directly link land use and housing regulations to increased homelessness, with effects that considerably exceed those of home sharing cited by defendant.
- e. Income problems explain most of homelessness.
- f. City of Chicago has many policy options to address land use and housing regulations that could reduce housing costs and rents and help homelessness. Housing markets are dynamic if not fast moving and will adapt to the technology change of home sharing if allowed to.

2. Basis for opinions to be expressed

The economic theories and literature on housing supply and regulation have been part of my career's work with state and local jurisdictions on affordable housing issues. I have 22 years of experience analyzing housing markets and regulations, including testifying before local and state government bodies on their effects.

In preparing these opinions I reviewed the most important and the most recent academic literature on licensing of firms and regulations concerning licensing and market entry, including (in order cited):

Dayne Lee, "How Airbnb Short-Term Rentals Exacerbate Los Angeles's Affordable Housing Crisis: Analysis and Policy Recommendations," *Harvard Law & Policy Review*, Vol. 10, 2016, pp.229-253.

Office of the New York City Comptroller Scott M. Stringer, *The Impact of Airbnb on NYC Rents*, April 2018.

Stephen Sheppard and Andrew Udell, "Do Airbnb properties affect house prices?" Williams College Department of Economics Working Papers, January 1, 2018.

Kyle Barront, Edward Kung, and Davide Proserpio, "The Sharing Economy and Housing Affordability: Evidence from Airbnb," Available at Social Science Research Network, April 1, 2018.

Phil Nyden, James Lewis, Kale Williams and Nathan Benefield, *Affordable Housing in the Chicago Region: Perspectives and Strategies*, Institute for Metropolitan Affairs, Roosevelt University & Center for Urban Research and Learning, Loyola University Chicago, & Community Partners, 2003.

Morgan Stanley, *Global Insight: Who Will Airbnb Hurt More - Hotels or OTAs?*, November 15, 2015.

Daniel Guttentag, Steven Smith, Luke Potwarka, and Mark Havitz, "Why Tourists Choose Airbnb: A Motivation-Based Segmentation Study," *Journal of Travel Research*, 2018, 57(3), pp.342–359.

Up for Growth National Coalition, Holland Government Affairs, ECONorthwest, *Housing Underproduction in the U.S.: Economic, Fiscal and Environmental Impacts of Enabling Transit-Oriented Smart Growth to Address America's Housing Affordability Challenge*, 2018.

William A. Fischel, *Do Growth Controls Matter? A Review of the Empirical Evidence on the Effectiveness and Efficiency of Local Government Land Use Regulation*, Lincoln Institute of Land Policy, 1990.

Harvard Joint Center for Housing Studies, *America's Rental Housing: Expanding Options for Diverse and Growing Demand*, 2015.

Jason Furman, "Barriers to Shared Growth: The Case of Land Use Regulation and Economic Rents," The Urban Institute, November 20, 2015.

Christopher J. Mayer and C. Tsuriel Somerville, "Land Use Regulation and New Construction," *Regional Science and Urban Economics*, 2000 30, (6), pp.639-662.

John M. Quigley and Steven Raphael, "Regulation and the High Cost of Housing in California," *The American Economic Review*, 2005, 95 (2), pp.323–328.

Edward L. Glaeser and Bryce A. Ward, "The Causes and Consequences of Land Use Regulation: Evidence from Greater Boston," *Journal of Urban Economics*, 2009, 65, pp.265-278.

Housing Markets and the Economy: Risk Regulation, and Policy, Cambridge, MA: Lincoln Land Institute (2009)

Rethinking Federal Housing Policy: How to Make Housing Plentiful and Affordable, Washington, D.C.: The AEI Press (2008).

Edward L. Glaeser and Joseph Gyourko, “The Impact of Building Restrictions on Housing Affordability,” *FRBNY Economic Policy Review*, June 2003.

Edward L. Glaeser, “Reforming Land Use Regulations,” Brookings Institution, April 2017.

Edward L. Glaeser, Joseph Gyourko, and Raven Saks, “Why is Manhattan so expensive? Regulation and the rise in housing prices,” *The Journal of Law and Economics*, 2005, 48, no. 2, pp. 331-369

Keith R. Ihlanfeldt, “The Effect of Land Use Regulation on Housing and Land Prices,” *Journal of Urban Economics*, 2007, 61.3, pp.420-435.

Adam Millsap, Samuel Staley, and Vittorio Nastasi, *Assessing the Effects of Local Impact Fees and Land-use Regulations on Workforce Housing in Florida*, James Madison Institute, 2018.

William Tucker, How Housing Regulations Cause Homelessness, *National Affairs The Public Interest*, 1991, pp.78-88.

Todd Swanstrom, “No Room at the Inn: Housing Policy and the Homeless,” *Journal of Urban and Contemporary Law*, 1989, Vol. 35:81, pp.81-105.

Steven Raphael, “Homelessness and Housing Market Regulation” in Ingrid Gould-Ellen and Brendan O’Flaherty (eds.), *How to House the Homeless*, Russell Sage Foundation, 2010, pp 110-135.

Brendan O’Flaherty, “Wrong Person and Wrong Place: For Homelessness, the Conjunction Is What Matters,” *Journal of Housing Economics*, 2004, 13(1), pp.1–15

Stephen Malpezzi and Richard K. Green, “What Has Happened to the Bottom of the U.S. Housing Market?” *Urban Studies*, 1996, 33(1), pp.1807–20.

National Coalition for the Homeless, <https://nationalhomeless.org/about-homelessness>

John M. Quigley, Steven Raphael, and Eugene Smolensky, “Homeless in America, Homeless in California,” *The Review of Economics and Statistics*, February 2001, 83(1), pp.37–51.

Ron J. Feldman, “The Affordable Housing Shortage: Considering the Problem, Causes and Solutions,” *The Region*, Federal Reserve Bank of Minneapolis, September 2002.

Christina Sandefur, “Life, Liberty, and the Pursuit of Home-Sharing,” *Regulation*, Fall 2016, 39(3), pp.12-15.

3. Qualifications

I hold a master's and Ph.D. in economics from the University of California at Irvine. I have performed economic analysis of land use and housing policies at Reason Foundation, a non-profit research organization based in Los Angeles, for the last 22 years, the last 17 of which as vice-president in charge of the research division.

I have served on local, state, and federal advisory commissions on regulatory and economic policy issues, and published many reports and articles in professional, trade, academic and popular magazines on regulatory and economic issues.

In particular, I have supervised and conducted research and published articles on the effects of policies governing housing markets.

4. Publications Authored Within the Preceding 15 Years

Contracting For Road and Highway Maintenance, with Geoffrey F. Segal and Samuel McCarthy, Reason Public Policy Institute, March 2003.

California Citizen's Budget, with Carl DeMaio, Adam Summers, Geoffrey F. Segal, Lisa Snell, Vincent Badolato, and George Passantino, Reason Public Policy Institute and Performance Institute, April 2003.

Decentralizing Federal Employment, with John P. Blair and Geoffrey F. Segal, The Buckeye Institute for Public Policy Solutions, June 2003.

Getting the Right People for the Right Job: Solving Human Capital Challenges with Competitive Sourcing, with Geoffrey F. Segal and John P. Blair, Reason Foundation, September 2003.

Movin' Juice: Making Electricity Transmission More Competitive, with Lynne Kiesling, Reason Foundation, September, 2003.

Private Competition for Public Services: Unfinished Agenda in New York State, with . J. McMahon and Geoffrey F. Segal, Manhattan Institute, December 2003.

Frequently Asked Questions about Water / Wastewater Privatization, with Geoffrey F. Segal, Reason Foundation, September 2003.

A Legislative Guide to Competitive Sourcing in the States (and Elsewhere), with Geoffrey F. Segal and Rebecca Bricken, National Federation of Independent Businesses, July 2005.

Offshoring and Public Fear: Assessing the Real Threat to Jobs, with Ted Balaker, Reason Foundation, May 2005.

Rebuilding After Katrina: Policy Strategies for Recovery, with Lisa Snell, and Geoffrey Segal, Reason Foundation, October 2005.

Addressing California's Transportation Needs, with Ted Balaker, George Passantino, Robert W. Poole, Jr., Adam Summers, and Lanlan Wang, Reason Foundation, September 2006.

Undermining the Future: Problems with November's Bond Initiatives, and Alternatives, with George Passantino and Adam B. Summers, September 2006, Reason Foundation, September 2006.

The Bond Propositions on California's November Ballot: Where Would the Money Be Spent?, Reason Foundation, September 2006.

The Emerging Paradigm: Financing and Managing Pennsylvania's Transportation Infrastructure and Mass Transit, with Geoffrey Segal and Matthew Brouillette, Commonwealth Foundation, March 2007.

The California High-Speed Rail Proposal: A Due Diligence Report, with Wendell Cox and Joeseeph Vranich, Reason Foundation, September 2008

Ten Principles of Privatization, with Len Gilroy, Reason Foundation, July, 2010

Restoring Trust In the Highway Trust Fund, with Robert W. Poole, Reason Foundation, August, 2010

19th Annual Highway Report: The Performance of State Highway Systems (1984-2008), with David T. Hartgen, Ravi K. Karanam and M. Gregory Fields, Reason Foundation, September, 2010

Corrections 2.0: A Proposal to Create a Continuum of Care in Corrections through Public-Private Partnerships, with Leonard Gilroy, Reason Foundation, January, 2011

Reducing Greenhouse Gas Emissions from Automobiles, with Wendell Cox, Reason Foundation, November, 2011

Impacts of Transportation Policies on Greenhouse Gas Emissions in U.S. Regions, with David T. Hartgen & M. Gregory Fields, Reason Found. (Nov. 2011)

Reducing Traffic Congestion & Increasing Mobility in Chicago, with Samuel Staley, Reason Foundation, July 2012.

The XpressWest High-Speed Rail Line from Victorville to Las Vegas: A Taxpayer Risk Analysis, with Wendell Cox, Reason Foundation, August 2012

California Voters' Guide: November 2012 Ballot Propositions, Reason Foundation, October 2012

California High-Speed Rail: An Updated Due Diligence Report, with Joseph Vranich and Wendell Cox, Reason Foundation, April 2013

Savings for Fresno: The Role of Privatization, with Leonard Gilroy, Reason Foundation, May 2013

20th Annual Highway Report on the Performance of State Highway Systems, with David Hartgen, Gregory Fields, and Elizabeth San José, Reason Foundation, July 2013

Still A Loser: The Tampa to Orlando High-Speed Rail Proposal, with Wendell Cox, Reason Foundation, December 2013

Pension Reform Handbook: A Starter Guide for Reformers, with Lance Christensen, Reason Foundation, July 2014.

Occupational Licensing Kills Jobs, with Matthew Laird and Samuel Staley, February 2016

Urban Containment: The Social and Economic Consequences of Limiting Housing and Travel Options, with Wendell Cox, March, 2016

The Changing Workplace And The New Self-Employed Economy, May, 2018

Cannabis Legalization and Juvenile Access, May, 2018

A Common Sense Approach to Marijuana-Impaired Driving, with Teri Moore, January, 2019

The Link between Home Sharing and Homelessness Is Weak and Small, Overwhelmed by Policy Decisions

1. SUMMARY

Defendant argue that studies indicate that house sharing reduces affordable housing and contributes to homelessness.

I argue that:

- a. The studies shared by defendant are few, mostly rely on New York City data—which may not be representative, and find very small to modest effects of home sharing on rents, and no direct connection to homelessness.
- b. Chicago has long suffered a shortage of affordable housing with no evidence the problem is worse since the advent of home sharing.
- c. An extensive literature finds that housing price increases beyond construction costs (which are stable) are driven predominantly--90% by best estimate--by local land use and housing regulations.
- d. Studies directly link land use and housing regulations to increased homelessness, with effects that considerably exceed those of home sharing cited by defendant.
- e. Income problems explain most of homelessness.
- f. City of Chicago has many policy options to address land use and housing regulations that could reduce housing costs and rents and help homelessness. Housing markets are dynamic if not fast moving and will adapt to the technology change of home sharing if allowed to.

2. City of Chicago's Argument

City of Chicago, in response to plaintiff's interrogatory no. 13 states, "Studies indicate that house sharing has a tendency to reduce the availability of affordable housing, thereby contributing to the problem of homelessness. Each housing unit that is used for short term house sharing rentals is a unit that is not available for use as permanent housing for residents."¹

In addition, defendants have provided plaintiffs with several reports to support this statement:

- A 2016 study that points to correlation between increasing listings of Airbnb and lower vacancy rate of apartments in Los Angeles. It argues that, unlike many other commodities a shortage of housing supply cannot be quickly resolved with new construction, so rapid

¹ *Mendez v City of Chicago*, Defendants' Responses to Plaintiffs' First Set of Interrogatories, p.7.

growth of short-term rentals like Airbnb constitutes a supply shock to the rental housing market.²

- A 2018 report by the New York City comptroller that says of Airbnb, “the trendy replacement for hotels and hostels in effect removes housing units from the overall supply.” It finds that between 2009 and 2016 rental rates rose dramatically in most neighborhoods of New York City and its empirical analysis attributes 9.2% of the rental rate increase to Airbnb.³
- An unpublished but useful 2018 Williams College working paper also looks at data from New York City and finds that “doubling the total number of Airbnb properties within 300 meters of a house is associated with an increase in property value of 6 to 9%.” It does not go on to calculate how much of the rising property values translates into a rise in rent.⁴
- A 2018 Social Science Research Network working paper using national data finds that “a 1% increase in Airbnb listings leads to a 0.018% increase in rent and a 0.26% increase in house prices at the median owner occupancy rate zipcode.”⁵

These reports constitute the body of evidence linking home sharing to homelessness, and indeed are cited by others than City of Chicago. Given the very short time in which data on Airbnb has been available, there is not much published research on this association. The statement from City of Chicago I opened with provides a fair summary of this research.

3. Reasons to Doubt the Linkage of Home Sharing and Homelessness and the Appropriate Degree of Policy Response

Housing supply cannot change much in the short run—construction takes time, as does permitting, environmental review, inspections, etc. Though there is almost always a certain amount of real estate that owners don’t have available in the market for economic or financial reasons that can be brought to market more quickly than new construction if conditions change. The argument that property owners shifting housing units from long-term rentals to home sharing replaces the supply of long-term rental housing with the short- to medium-term seems to make sense, but the key questions are:

² Dayne Lee, “How Airbnb Short-Term Rentals Exacerbate Los Angeles's Affordable Housing Crisis: Analysis and Policy Recommendations,” *Harvard Law & Policy Review*, Vol. 10, 2016, pp.229-253.

³ Office of the New York City Comptroller Scott M. Stringer, *The Impact of Airbnb on NYC Rents*, April 2018.

⁴ Stephen Sheppard and Andrew Udell, “Do Airbnb properties affect house prices?” Williams College Department of Economics Working Papers, January 1, 2018.

⁵ Kyle Barront, Edward Kung, and Davide Proserpio, “The Sharing Economy and Housing Affordability: Evidence from Airbnb,” Available at Social Science Research Network, April 1, 2018.

- Are affordable housing shortages new in Chicago or appreciably worse since the advent of Airbnb?
- Are the effects of home sharing on home prices and homelessness substantial and are supply restrictions the best response?
- What policy choices determine home prices and rents, and how large are those effects relative to home sharing?
- Do analyses of rental housing markets consider home sharing a significant factor?

3.1. Affordable housing problems in Chicago predate homes sharing.

Chicago's affordable housing problems long pre-date the advent of Airbnb. A 2003 study examined Chicago's housing problem in detail and makes several relevant points.⁶ First it cites an analysis of rental housing markets in Chicago conducted by the Metropolitan Planning Council in 2000, which concluded that "the Chicago area rental market fell far short of being able to meet the current and anticipated demand for rental housing." If the amount of housing being built and added to the supply is not keeping up with the amount demanded you have a classic economic shortage which tends to drive up prices. Second, the housing report goes on to provide over 100 pages of analysis of the many social, economic and policy forces that are restricting and distorting Chicago's rental housing market, ranging from the distribution of building sites relative to jobs to racial barriers to distortions in federal funding. In other words, the study finds various forces are restricting housing supply. Third, it emphasizes that the location of the most affordable rental housing tends to be far from areas of economic growth.

Consider defendants' argument that when an apartment converts to Airbnb it displaces people who wind up being homeless and needing city services. But people who are financially and unable to afford moving to another apartment if their lease is canceled tend to live in apartments near the bottom of the market.⁷ In contrast, the type of business and vacation travelers who use Airbnb are not looking for apartments at the bottom of the market.⁸ They are looking for higher quality apartments. Indeed, the apartments at the bottom of the market where the most vulnerable

⁶ Phil Nyden, James Lewis, Kale Williams and Nathan Benefield, *Affordable Housing in the Chicago Region: Perspectives and Strategies*, Institute for Metropolitan Affairs, Roosevelt University & Center for Urban Research and Learning, Loyola University Chicago, & Community Partners, 2003.

⁷ See discussion in section 4.3 below about income and homelessness.

⁸ Middle class tourists visiting a city like Chicago, likely from a suburban community or small city, are almost certainly not looking for apartments in the poorest neighborhoods of Chicago. A Morgan Stanley analysis in 2015 found "~66% of U.S. Airbnb users earning over \$75k/year," Morgan Stanley, *Global Insight: Who Will Airbnb Hurt More - Hotels or OTAs?*, November 15, 2015. Daniel Guttentag, Steven Smith, Luke Potwarka, and Mark Havitz, "Why Tourists Choose Airbnb: A Motivation-Based Segmentation Study," *Journal of Travel Research*, 2018, 57(3), pp.342–359 found that over 80% of Airbnb users are on leisure travel.

people live are typically not in the places close to key business centers and tourist sites that Airbnb users seek. So, while conversion to home sharing might affect the total rental housing market, it's unlikely that those effects are sufficiently strong among the population of renters most vulnerable to disruption to push them into homelessness.

3.2 The effects of home sharing on homelessness are indirect and small.

The empirical evidence for defendants' core argument, as listed in section 2 above, does not measure the effects of home sharing on homelessness, but rather on rental prices. It is assumed that higher rents and fewer vacancies create an impact on homelessness. Those studies find home sharing raising rents up to 9%, but that is based only on two studies of data in New York City and one national dataset that found the lowest average impact on rents—less than 1%. There is a rule of thumb in economics “New York City is always an outlier”—meaning that what is true in New York City is not typical of the rest of the United States. There is no clear reason to think the effects of home sharing on rents would as strong as in New York City—indeed that city may be the upper bound. Ultimately they are not large effects, especially based on such limited data and mostly unpublished work.

Clearly other, much larger forces are at work, as discussed in the next section. Policy responses based on such a small share of the cause of a problem are not serious attempts to address the problem. Policy interventions that skew the market may have much larger effects than the problem they attempt to address when aimed at such a small target.

4. The Major Movers of Rental Prices and Homelessness: Land Use Regulations and Income

4.1. Land Use and Housing Regulations and Housing Prices

Harvard's Joint Center for Housing Studies' definitive survey of America's rental housing market in 2017 finds rental vacancies are increasing nationwide and thoroughly discusses the challenges that the rental housing market faces with no mention of Airbnb or the rise of home sharing. Home sharing is simply not a problem that even shows up on the radar screen relative to long running major factors that shape the rental market.

An extensive literature finds that the cost of constructing housing is relatively stable compared to the economy as a whole, and that housing is very affordable in much of the United States but that some cities experience considerably higher prices and affordable housing shortages. As explained further on, land-use and growth restrictions, zoning, and housing regulations explain roughly 90% of the home price differentials between markets with similar amenities. In other

words, most of the problem with lack of affordable housing in Chicago and high rents is attributable to decisions by the city that raise the cost of housing.

Housing Underproduction in the U.S., a very thorough 2018 study, finds that “from 2000 to 2015, 23 states underproduced housing to the tune of 7.3 million units, or roughly 5.4% of the total housing stock of the U.S., which has created the supply and demand imbalance that is reflected in today’s home prices.”⁹

An important 1990 review of research on prices in housing and land markets first drew attention to how land use regulations, zoning, and growth controls have significant and substantial effects on home prices—and those effects increase with the degree of restriction of the market.¹⁰ More recently, the Harvard Joint Center for Housing Studies 2015 report on America’s rental market pointed out that:

*Local land use restrictions often restrict the area available for multifamily development, particularly in the suburbs, which can increase the competition for available sites and raise land costs. Parcel assemblage and acquisition are also costly in locales where demand for market-rate rentals is strong. In addition, development economics rest heavily on allowable densities, but local zoning restrictions often limit the number of units in multifamily development. This raises per unit construction costs and ultimately the rents the developers must charge to be profitable.*¹¹

The California Legislative Analyst’s Office examined the causes of high housing prices in California, concluding that “[C]ommunity resistance to housing, environmental policies, lack of fiscal incentives for local government to approve housing, and limited land constrains new housing construction. A shortage of housing along California’s coast means households wishing to live there compete for limited housing. This competition builds up home prices and rents.” Of course, this is precisely true of large downtowns like Chicago as well.

⁹ Up for Growth National Coalition, Holland Government Affairs, ECONorthwest, *Housing Underproduction in the U.S.: Economic, Fiscal and Environmental Impacts of Enabling Transit-Oriented Smart Growth to Address America’s Housing Affordability Challenge*, 2018.

¹⁰ William A. Fischel, *Do Growth Controls Matter? A Review of the Empirical Evidence on the Effectiveness and Efficiency of Local Government Land Use Regulation*, Lincoln Institute of Land Policy, 1990.

¹¹ Harvard Joint Center for Housing Studies, *America’s Rental Housing: Expanding Options for Diverse and Growing Demand*, 2015.

Jason Furman, while chairman of the President's Council of Economic Advisers in 2015, spoke about the causes of high housing and rental costs to the Urban Institute and provided a great review of the literature.¹² Among the findings he discussed are that:

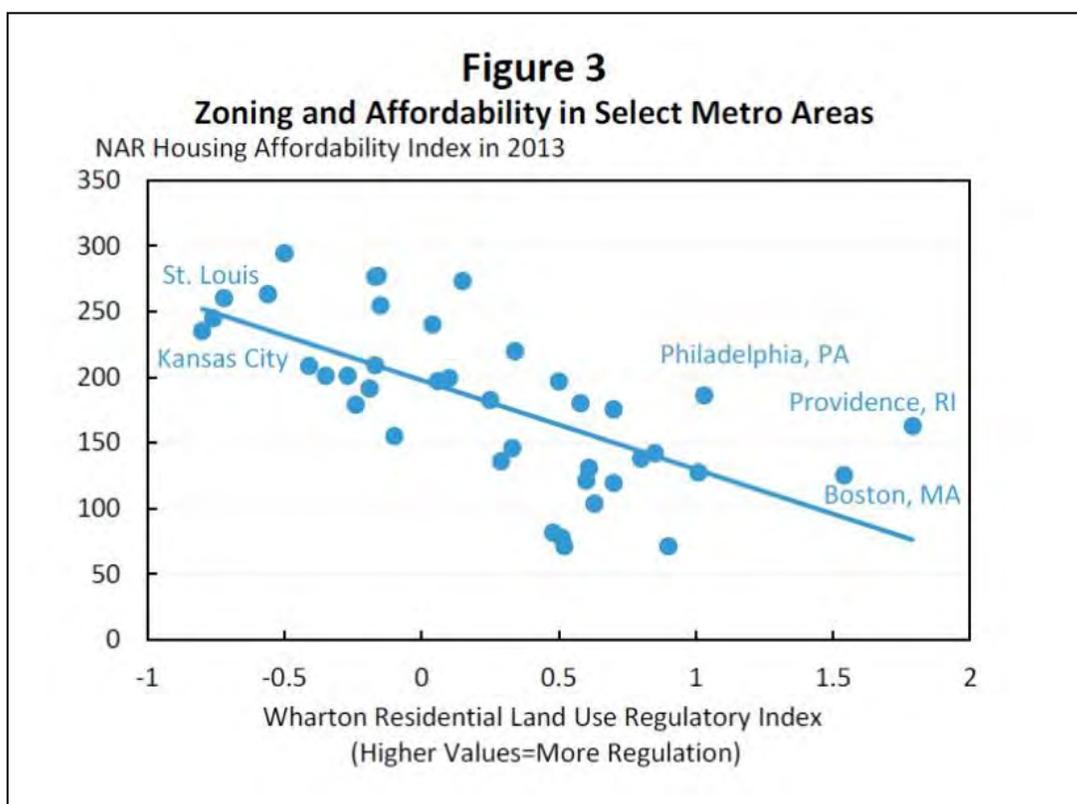
When construction markets are relatively competitive, the gap between house prices and construction costs should largely reflect the cost of buying land – a cost that increases with tighter land-use restrictions... [T]he gap between real house prices and construction cost has grown over time, even if we exclude the period of rapid house price increases in the mid-2000s... Real house prices in 2010 to 2013 are 56% above real construction costs... [A]fter around 1970, more stringent regulations played a much bigger role proportionately, implying that relaxing zoning constraints could bring house price is more in line with construction costs and reduce the economic rents accruing to landowners.

Cross-sectional evidence also provides a similar picture... We can observe that some of the largest US cities with both restrictive zoning rules and desirable public goods tend to have persistently high housing prices relative to the cost of construction. Moreover, more cities saw an increase in these price markups than saw a decrease during the 1990s.

Zoning restrictions...are supply constraints. Basic economic theory predicts – and many empirical studies confirm – that housing markets in which supply cannot keep up with demand will see housing prices rise. Mayer and Somerville (2000) conclude that land-use regulation and levels of new housing construction are inversely correlated, with the ability of housing supply to expand to meet greater demand being much lower in the most heavily regulated metro areas. Quigley and Rafael (2005) show that new construction is not as prevalent in areas characterized by growth restrictions. Glaeser and Ward (2009) found that an increase in one acre in a Greater Boston town's average minimum lot size is associated with about 40% fewer new permits.¹³

¹² Jason Furman, "Barriers to Shared Growth: The Case of Land Use Regulation and Economic Rents," The Urban Institute, November 20, 2015.

¹³ Furman elegantly summarizes these important works so I need not. See Christopher J. Mayer and C. Turiel Somerville, "Land Use Regulation and New Construction," *Regional Science and Urban Economics*, 2000 30, (6), pp.639-662; John M. Quigley and Steven Raphael, "Regulation and the High Cost of Housing in California," *The American Economic Review*, 2005, 95 (2), pp.323–328; and Edward L. Glaeser and Bryce A. Ward, "The Causes and Consequences of Land Use Regulation: Evidence from Greater Boston," *Journal of Urban Economics*, 2009, 65, pp.265-278.



From Furman, “Barriers to Shared Growth.”

Furman goes on to compare the National Association of Realtors Housing Affordability Index to the Wharton Residential Land Use Regulatory Index, and concludes that “restricted supply leads to higher prices and less affordability... this house price appreciation experienced especially in those cities towards the right of the figure presents affordability challenges for nearly all but they can hit the poorest Americans the hardest.” His analysis is shown in his Figure 3 above.

Chicago is in the middle of the figure—the Wharton Residential Land Use Regulatory Index puts Chicago in the middle of the pack with respect to land use regulations. This means that while the housing market in Chicago is not as restricted as in, say, Boston, there are nearly 100 points in the Housing Affordability Index between Chicago and the least restrictive cities like St. Louis, Indianapolis, and Kansas City. This shows that Chicago has many policy options available to loosen up the housing market and lower home prices and rents.

Harvard economist Edward Glaeser has published dozens of papers on land-use regulations and policies and costs.¹⁴ In a joint paper with Joseph Gyourko for the Federal Reserve Bank of New

¹⁴ Too many to list, including two books: *Housing Markets and the Economy: Risk Regulation, and Policy*, Cambridge, MA: Lincoln Land Institute (2009) and *Rethinking Federal Housing*

York in 2003 examining the evidence of the impact of building restrictions on housing affordability they find that:

- Zoning and other restrictions on building account for 90% of the value of a home above construction costs.
- High levels of land use regulation are highly correlated with high housing costs.
- The market would lead to higher density in high cost areas, but cost and density are poorly correlated, indicating that policies prevent the market outcome.¹⁵

In a 2017 report for the Brookings Institution Glaeser summarizes his years of research and states:¹⁶

If demand alone drove prices, then we should expect to see places that have high costs also have high levels of construction. The reverse is true. Places that are expensive don't build a lot and places that build a lot aren't expensive.

Naturally, there are also a host of papers showing the correlation between different types of rules and either reductions in new construction or increase in prices or both. The problem with empirical work on any particular land-use control is that there are so many ways to say no to new construction. Since the rules usually go together, it is almost impossible to identify the impact of any particular land use control. Moreover, eliminating one rule is unlikely to make much difference since anti-growth communities will easily find ways to block construction in other ways.

Empirically, there is also a little evidence that these land use controls correct for real externalities. For example if people really value the lower density levels that land use controls create, then we should expect to see much higher prices in communities with lower density levels, holding distance to city center fixed. We do not. (Glaser and Ward, 2010) Our attempt to assess the total externalities generated by building in Manhattan found that they were tiny relative to the

Policy: How to Make Housing Plentiful and Affordable, Washington, D.C.: The AEI Press (2008). For more, see his CV at

https://scholar.harvard.edu/files/glaeser/files/ed_glaeser_cv_2.10.15.pdf

¹⁵ Edward L. Glaeser and Joseph Gyourko, "The Impact of Building Restrictions on Housing Affordability," *FRBNY Economic Policy Review*, June 2003.

¹⁶ Edward L. Glaeser, "Reforming Land Use Regulations," Brookings Institution, April 2017.

*implicit tax on building created by land use controls (Glaeser, Gyourko and Saks 2005).*¹⁷

Reforming local land use controls is one of those rare areas in which the libertarian and the progressive agree. The current system restricts the freedom of the property owner, and also makes life harder for poor Americans. The politics of zoning reform may be hard, but our land-use regulations are badly in need of re-thinking.

Just to show these results are not confined to studies in the Midwest and Northeast, a pair of studies of Florida cities are informative. A 2007 study examined data from 112 Florida jurisdictions in 25 counties and found that land use regulations have substantial effects on the price of housing and vacant residential land.¹⁸ Building on that work, another study used data from Florida cities to examine the home price effects of regulation and construction delay due to permitting and licensing processes, finding a range of 4% to 11% increase from regulatory costs and another almost 2% increase from delay.¹⁹

The bottom line is, there is a rich literature digging into what drives high housing costs in some cities that finds the vast majority of the blame rests on land use restrictions and housing regulations. Recall the Glaeser and Gyourko conclusion that zoning and other restrictions on building account for 90% of the value of a home above construction costs.

4.2. Land Use and Housing Regulation and Homelessness

There has been some direct examination of the relationship between housing regulation and homelessness. A very early simple examination of homelessness relative to median home prices in 40 large U.S. cities found about 42% of the variation in homelessness is explained by median home prices.²⁰ So even if a rise in home sharing does affect home prices by a few percent, less than half of that affect passes on to an effect on homelessness, attenuating the impact of home

¹⁷ See Edward L. Glaeser, Joseph Gyourko, and Raven Saks, “Why is Manhattan so expensive? Regulation and the rise in housing prices,” *The Journal of Law and Economics*, 2005, 48, no. 2, pp. 331-369 and Glaeser and Ward, “The Causes and Consequences of Land Use Regulation.”

¹⁸ Keith R. Ihlanfeldt, “The Effect of Land Use Regulation on Housing and Land Prices,” *Journal of Urban Economics*, 2007, 61.3, pp.420-435.

¹⁹ Adam Millsap, Samuel Staley, and Vittorio Nastasi, *Assessing the Effects of Local Impact Fees and Land-use Regulations on Workforce Housing in Florida*, James Madison Institute, 2018.

²⁰ William Tucker, How Housing Regulations Cause Homelessness, *National Affairs The Public Interest*, 1991, pp.78-88.

sharing on homelessness. The majority of the effect on home prices is from land-use restrictions and regulations on housing.

A 1989 law review article argued persuasively that:²¹

1. *Homelessness is primarily caused not by personal deficiencies, but by structural problems in metropolitan housing markets.*
2. *As a housing market problem, it is primarily a matter of inadequate supply, not inadequate economic demand.*
3. *A major cause of the inadequate supply of low income rental housing in large metropolitan areas with expanding service economies is the unintended effects of government policies.*
4. *Q.E.D.: to solve the problem of homelessness, it is not enough simply to spend more money on shelters; instead, housing policies, at all levels of government, must be redirected.*

Building codes increased the cost of new construction, often beyond what was necessary for health and safety, thus helping to move the bottom of the rental market out of the reach of the very poor. Recent research indicates that strict enforcement of housing codes can lead to displacement of the poor, who cannot afford the increased rents necessary to cover the repairs, thus reducing the supply of low income housing.

The homeless problem is caused primarily by inadequate supply, not inadequate demand (or simple poverty). The supply problem is rooted in the transformation of cities from centers of industry to centers of high-level service employment. Subsidizing demand, in the form of housing vouchers, does not address the underlying shortage of low-rent housing.

Instead of helping those who need it the most, many policies protect the privileged position of entrenched housing interests, thereby hindering the ability of regional housing markets to adapt to changing needs—especially the needs of low income renters. Progress on the homeless problem, then, requires that we dismantle those policies that have helped cause the problem: tax incentives targeted to the wealthy homeowners, suburban zoning regulations designed to keep out low income rental housing, central city economic development policies that boost gentrification without regard to displacement—to name only a few.

²¹ Todd Swanstrom, “No Room at the Inn: Housing Policy and the Homeless,” *Journal of Urban and Contemporary Law*, 1989, Vol. 35:81, pp.81-105.

An exceptionally thorough analysis of the connection between housing market regulations and homelessness is the chapter by UC Berkeley economist Steven Raphael, “Homelessness and Housing Market Regulation,” in the 2010 book *How to House the Homeless*.²² It provides a detailed and data-driven analysis of how a wide range of regulations increases the cost of housing and shift the distribution of housing toward the higher end of the market, discouraging construction of low-cost housing. For the lowest income population seeking housing, even the minimum-quality units are often out of reach in heavily regulated cities.

*Empirically, point-in-time counts of the incidence of homelessness as well as period-prevalence counts are generally higher in regions of the country where housing is more expensive (see, for example, the number of studies cited in O’Flaherty 2004). John Quigley, Steven Raphael, and Eugene Smolensky (2001) demonstrate this positive association using several data sets that count the homeless during the mid-1990s and earlier.*²³

Raphael goes on to argue that there are several parts to the explanation for homelessness, including poverty and physical and mental illnesses, but “that the housing market itself may be a particularly important determinant of homelessness.”²⁴ He goes on to examine specific regulations and housing standards that prevent housing from being built without such things as private kitchens or private bathrooms, and how people at high risk of homelessness are most in need of this type of minimalist or SRO housing (single room occupancy, low income single room apartments with shared kitchens and bathrooms). Note that this margin of housing is for people at high risk for homelessness, not the higher end apartments typically demanded by middle class vacation travelers and sometimes converted to home sharing.²⁵

Expanding on this, Raphael argues:

Zoning regulation often restricts the amount of land within a municipality available for residential development and then dictates the density and quality of the housing that can be built. Growth controls, growth moratoria, exaction fees leveled on new development, and lengthy and complex project approval processes

²² Steven Raphael, “Homelessness and Housing Market Regulation” in Ingrid Gould-Ellen and Brendan O’Flaherty (eds.), *How to House the Homeless*, Russell Sage Foundation, 2010, pp 110-135.

²³ Ibid, p. 112. See Brendan O’Flaherty, “Wrong Person and Wrong Place: For Homelessness, the Conjunction Is What Matters,” *Journal of Housing Economics*, 2004, 13(1), pp.1–15 and Quigley, Raphael, and Smolensky, “Homeless in America.”

²⁴ Raphael, “Homelessness and Housing Market Regulation,” p.114

²⁵ Op.cit note 8 above.

tend to discourage new housing construction and the nature of new housing that is ultimately supplied to the local market. Although such regulations may not prohibit construction of minimum-quality housing, they do constrain production processes and likely restrict supply.

These alternative forms of housing-market regulation impact housing costs by increasing production costs, restricting housing supply, and increasing housing demand. All three factors will ultimately be reflected in an area's housing prices.²⁶

He points out that empirical research finds the impact of these kinds of regulations particularly affect housing for lower income people.

Steven Malpezzi and Richard Green (1996) study how the degree of regulatory stringency affects the price of rental housing at various points in the rental-housing quality distribution—low, medium, and high. To the extent that regulations have an impact on the supply of relatively low-quality housing, one might expect larger impacts on low- and moderate-income households. Their results indicate that moving from a relatively unregulated to a heavily regulated metropolitan area increases rents among the lowest-income renters by one-fifth and increases home values for the lowest-quality single-family homes by more than three-fifths. The largest price effects of such regulations occur at the bottom of the distribution in units that are disproportionately occupied by low- and moderate-income households.²⁷

Raphael summarizes the research:

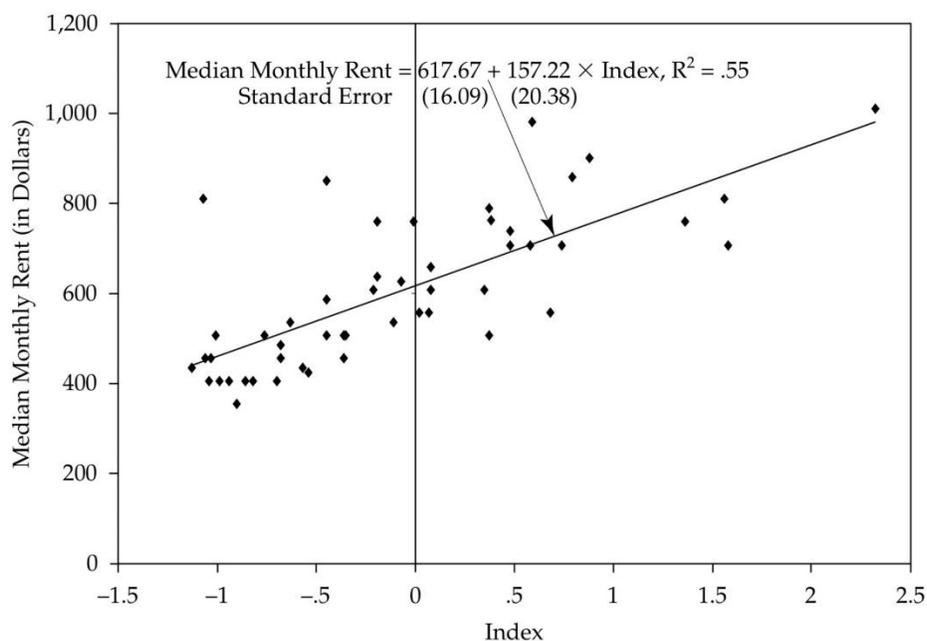
Thus, the existing research on the effects of land-use regulatory stringency on housing prices and supply consistently documents several findings. First, housing is more expensive in regulated markets, which cannot be explained by higher land values. Second, the supply of housing is less responsive to changes in demand in more regulated markets, suggesting that demand pressures result in greater price increases the more stringent the regulatory environment is. Finally, the effect of land-use regulation on prices is greatest on the housing units that are most likely to be occupied by low- and moderate-income households.²⁸

²⁶ Ibid, p.115.

²⁷ See Stephen Malpezzi and Richard K. Green, "What Has Happened to the Bottom of the U.S. Housing Market?" *Urban Studies*, 1996, 33(1), pp.1807–20.

²⁸ Raphael, "Homelessness and Housing Market Regulation," p.118.

Figure 6.3 Median Monthly Rent at State Level Against Local Land-Use Regulation Index (2007)



Source: Author's calculation.

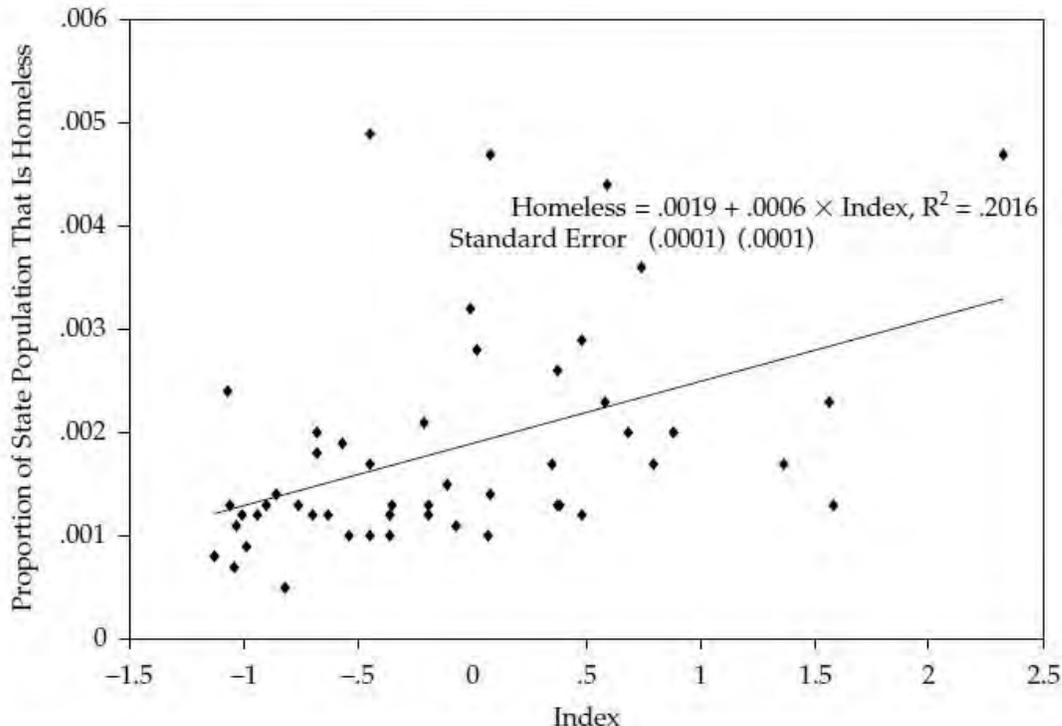
From Raphael, "Homelessness and Housing Market Regulation," p.126.

He then performs his own empirical analyses. His Figure 6.3 shows the positive relationship of median monthly rent with the Wharton regulatory index, with higher rents in more regulated cities. Chicago, with an index of 0.6, is roughly at the \$700 median rent level at the time of this dataset, 40%-50% more than the least regulated and lowest median rent cities. His Figure 6.6 compares the extent of homelessness to the Wharton regulatory index. Most cities with less housing regulation have an extent of homelessness between 50%-100% *lower* than median regulation cities like Chicago.

Performing a number of regression analyses on this data, Raphael finds that reduction in housing regulations to the median can reduce homelessness by approximately 7%, while reducing it to the lowest level among the cities in the Wharton index can reduce homelessness by 22%.²⁹ These effects of housing regulations on homelessness are considerably higher than any estimated effects from home sharing, and advocates for the homeless argue that the effects of income are even more important.

²⁹ Ibid, pp.136-37.

Figure 6.6 State Population Homeless on a Single Night Against Local Regulation Index (2007)



Source: Author's calculation.

From Raphael, "Homelessness and Housing Market Regulation," p.133.

4.3. Income and Homelessness

Indeed, homelessness also has many causes but the chief one is poverty. As the National Coalition for the Homeless puts it:

Homelessness and poverty are inextricably linked. Poor people are frequently unable to pay for housing, food, childcare, health care, and education. Difficult choices must be made when limited resources cover only some of these necessities. Often it is housing, which absorbs a high proportion of income that must be dropped. If you are poor, you are essentially an illness, an accident, or a paycheck away from living on the streets.³⁰

³⁰ National Coalition for the Homeless, <https://nationalhomeless.org/about-homelessness>

A seminal work on the relationship between rents and homelessness found appreciable effects in California if rent to income ratios rise. It is not obvious how true this is in less volatile housing markets than California's and it is clear in their results that level of income is much more important to their finding than level of rents.³¹

An article published by the Federal Reserve Bank of Minneapolis in 2002 argues extensively that problems of income are much more important in creating homelessness than are problems in housing supply.

*After examining the data for the United States and for the Twin Cities, a metropolitan area reputed to have a severe affordable housing shortage, we find that low incomes are the primary reason why the poor live in unaffordable rental units. Even if costs fell significantly—by an amount roughly equal to estimates of the increase in cost due to regulation—the vast majority of the poor living in the United States and the Twin Cities would still live in rental units considered unaffordable.*³²

In other words, problems with income are much more important for explaining homelessness than are housing supply and costs, while land use and housing regulations lead to nearly all housing supply and cost issues, leaving home sharing with very little impact on homelessness. Defendants have a vast menu of policy options to help people with low incomes to improve their lot and to deal with shocks such as sickness, temporary job loss, etc. that can cause them to become homeless.

5. Conclusion

Analyses of the housing market, and particularly of rental housing markets, do not consider home sharing to be even worth mentioning as a factor influencing the market. Research on the causes of housing shortages and high housing costs attribute 90% to overly restrictive land use and housing regulations. Analyses of the causes of homelessness say that problems of income are much more important than problems of housing supply, and that land use and housing regulations directly increase homelessness to an appreciable degree. Meanwhile, the measured effects of home sharing on housing are real, but small.

³¹ John M. Quigley, Steven Raphael, and Eugene Smolensky, "Homeless in America, Homeless in California," *The Review of Economics and Statistics*, February 2001, 83(1), pp.37–51.

³² Ron J. Feldman, "The Affordable Housing Shortage: Considering the Problem, Causes and Solutions," *The Region*, Federal Reserve Bank of Minneapolis, September 2002.

Housing markets are dynamic, if not as fast moving as other goods markets. Technology, supply, and demand all change over time. Property owners are responding to profit opportunities to get more return on their investment in apartments and other homes by taking advantage of the technology of home sharing. Their property right enables them to take advantage of this opportunity, and such shifts are part of what drives changes in the market. For example, it creates incentives for property owners to improve their properties in order to increase revenue.³³ It also creates more incentive to expand housing supply, which is precisely the thing that helps address rising housing costs and homelessness.

A short-term effect such as a shift from long-term rentals to home sharing will create a response in the market. If supply and demand are allowed to move, and are not restricted by over regulation of land-use and housing, supply and price differentials will close. It won't be long before the immediate profit opportunity that home sharing represents relative to long-term rentals is offset by the higher operational costs such as frequent cleanings, etc. compared to the convenience and income stability of long-term renters. Large and long running interventions in the market during a time of transition driven by technological innovation such as home sharing will prevent market dynamics from moving toward beneficial outcomes for all.

³³ Christina Sandefur, "Life, Liberty, and the Pursuit of Home-Sharing," *Regulation*, Fall 2016, 39(3), pp.12-15.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and that this disclosure was executed on February 7, 2019.

A handwritten signature in black ink, appearing to read "Adrian T. Moore", with a long horizontal flourish extending to the right.

Adrian T. Moore, Ph.D.

Exhibit M

FILED DATE: 6/21/2019 6:51 PM 2016CH15489

2

1 APPEARANCES:
2
3 GOLDWATER INSTITUTE
4 BY: MR. JACOB HUEBERT
5 500 East Coronado Road
6 Phoenix, Arizona 85004
7 (602)462-5000
8 jhuebert@goldwaterinstitute.org
9
10 -AND-
11
12 LIBERTY JUSTICE CENTER
13 BY: MR. JEFFREY SCHWAB
14 190 South LaSalle Street
15 Suite 1500
16 Chicago, Illinois 60603
17 (312) 263-7668
18 jschwab@libertyjusticecenter.org
19
20 appeared on behalf of the Plaintiffs.
21
22
23 CITY OF CHICAGO
24 BY: MR. WESTON W. HANSCOM
MR. RICHARD DANAHER
30 North LaSalle Street
Suite 1020
Chicago, Illinois 60602
(312) 744-9077
whanscom@cityofchicago.org
richard.danaher@cityofchicago.org
appeared on behalf of the Defendant.

4

1 DR. ADRIAN T. MOORE,
2 having been first duly sworn, was examined and
3 testified as follows:
4 EXAMINATION
5 BY MR. HANSCOM:
6 BY MR. HANSCOM:
7 Q. Could you state your full name for the
8 record, please.
9 A. **Adrian Moore.**
10 Q. We were introduced, but I'm Wes Hanscom, one
11 of the attorneys for the City of Chicago. And if any
12 of the questions I ask you are unclear to you, please
13 let me know. Okay?
14 A. **Okay.**
15 Q. So let's just start by marking this as
16 Exhibit No. 1.
17 (Deposition Exhibit No. 1
18 was so marked, and the
19 proceedings continued as
20 follows.)
21 BY MR. HANSCOM:
22 Q. (Document tendered.)
23 Okay, Dr. Moore, I've handed you what
24 we've marked as Exhibit 1, and my first question

3

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5

1 is whether that is a copy of your bio as printed from
2 the Reason Foundation's website?
3 A. **That's what it looks like without pulling up
4 the website and confirming, but it looks right.**
5 Q. Okay, on the second page at the end, there's
6 a summary of your educational background?
7 A. **Yes.**
8 Q. It mentions you earned a Ph.D. in economics
9 from the University of California, Irvine, is that
10 correct?
11 A. **Yes.**
12 Q. When did you earn that?
13 A. **2000.**
14 Q. And then it says you hold a masters in
15 economics from the University of California, Irvine,
16 is that correct?
17 A. **Yes.**
18 Q. And when did you earn that?
19 A. **'98.**
20 Q. And then you have a masters in history from
21 California State University, Chico, correct?
22 A. **Yes.**
23 Q. And when did you earn that?
24 A. **'87.**

6

1 Q. And where did you get your undergraduate
2 degree?
3 **A. University of California, Riverside.**
4 Q. And when was that?
5 **A. '84.**
6 Q. What was your major there?
7 **A. History.**
8 MR. HANSCOM: Okay, let's mark this as Exhibit 2,
9 please.
10 (Deposition Exhibit No. 2
11 was so marked, and the
12 proceedings continued as
13 follows.)
14 BY MR. HANSCOM:
15 Q. (Document tendered.)
16 I'm handing you what's been marked as
17 Exhibit No. 2. It's titled About Reason Foundation,
18 and I'll ask if that is a summary concerning About
19 Reason Foundation from the Foundation's website.
20 **A. Yes.**
21 Q. Where is the Reason Foundation located?
22 **A. The headquarters is in Los Angeles,**
23 **California.**
24 Q. And where are you located?

7

1 **A. Sarasota, Florida.**
2 Q. How many locations does the Foundation have?
3 **A. Do you mean offices?**
4 Q. Yes.
5 **A. Most Reason employees tele-communicate.**
6 Q. And how many employees are there?
7 **A. I don't know the exact number.**
8 Q. Just roughly?
9 **A. The vicinity, 90.**
10 MR. HANSCOM: Let's mark this as Exhibit 3,
11 please.
12 (Deposition Exhibit No. 3
13 was so marked, and the
14 proceedings continued as
15 follows.)
16 BY MR. HANSCOM:
17 Q. (Document tendered.)
18 I'm handing you what's been marked as
19 Exhibit No. 3. I'll ask if that is the copy of the
20 report you had prepared in this case that we're here
21 for today.
22 **A. Yes.**
23 Q. Okay. You can keep that there. I will be
24 asking you questions about it.

8

1 How did you come to be involved in this
2 case?
3 **A. I was approached by Christina Sanford**
4 **(phonetic) with the Goldwater Institute who asked**
5 **me if I had worked on this issue, and then we spoke**
6 **about the case, and then she introduced me to Jacob.**
7 Q. And this issue being what?
8 **A. Housing policy and home sharing.**
9 Q. When did this conversation happen?
10 **A. I don't remember. Last year.**
11 Q. Do you remember where it happened?
12 **A. Email.**
13 Q. Have you worked with the Goldwater --
14 **A. Institute?**
15 Q. -- Institute before?
16 **A. As an expert witness?**
17 Q. In any way.
18 **A. Yes.**
19 Q. And could you describe generally what that
20 is?
21 **A. We've collaborated on a lot of public policy,**
22 **work policy research, events around a wide range of**
23 **issues over a lot of years, maybe 15 years.**
24 Q. Have you worked with the Liberty Justice

9

1 Center before?
2 **A. Yes.**
3 Q. And could you describe what the nature of
4 that has been?
5 **A. To save my life, I can't remember what year**
6 **it was, but some years ago I was a -- I worked with**
7 **them on a case having to do with licensing of shuttle**
8 **services in Bloomington, Illinois.**
9 Q. Have you served as an expert witness for the
10 Goldwater Institute or Liberty Justice Center
11 before?
12 **A. Not with Goldwater before but that one time**
13 **with Liberty Justice Center.**
14 Q. That was the one with the bus service?
15 **A. Yes.**
16 Q. Do you remember what the basic issue was that
17 you testified about?
18 **A. The city refused to issue a license to**
19 **an applicant and there were -- there was some**
20 **economic justifications offered for that refusal, and**
21 **I was asked to analyze those justifications.**
22 Q. Was that a court case?
23 **A. Yes, though it wound up -- as I recall, we**
24 **never went to -- I didn't get deposed in that one.**

10

1 **So it didn't go that far.**
2 Q. It somehow got settled?
3 **A. Yes.**
4 Q. Was that in court in Bloomington, Illinois?
5 **A. I don't remember.**
6 Q. What was the name, again, of the woman that
7 you said you spoke with from Goldwater about this
8 case?
9 **A. Christina Sanford.**
10 Q. Do you remember what Ms. Sanford told you
11 about the case at that time?
12 **A. Not in any detail. I think -- it was in very**
13 **general terms, and we didn't really talk about any**
14 **details until I was speaking with Jacob.**
15 Q. What is your understanding of what your
16 assignment was in this matter?
17 **A. The City has offered some economic arguments**
18 **in favor of its policies and provided some literature**
19 **in support of that, and I was asked to assess the**
20 **merits of those arguments and that research.**
21 Q. What materials have you been provided with?
22 **A. I was provided a -- the Complaints, some**
23 **Interrogatories, if that's the right name for them,**
24 **the documents provided by the City. I don't know if**

11

1 **that was discovery or what that was but many hundreds**
2 **of pages of documents. That's all I've been**
3 **provided.**
4 Q. Were you told whether the documents that you
5 were provided that the City had produced was a full
6 set of the documents the City had produced?
7 **A. That was my understanding, yes.**
8 Q. And when were you provided with those?
9 **A. I can't remember exactly when the first set**
10 **came. It was in the fall. And then I believe I got**
11 **a final set in January, if I remember right.**
12 Q. Do you remember was that a second production
13 of --
14 **A. No. I think it was a little -- some**
15 **additional documents.**
16 Q. Some additional documents the City had
17 produced?
18 **A. You know, I'm not sure. I can't quite**
19 **remember the sequence. I would have to go through**
20 **my files.**
21 Q. Is there anything else, other than what
22 you've mentioned, that you were provided with in
23 terms of documents?
24 **A. No.**

12

1 Q. What basic activities did you conduct in
2 preparing your report?
3 **A. So in economics, there's a pretty standard**
4 **procedure for tackling an issue, essentially, and**
5 **we casually call it doing a lit review which is if**
6 **you're going to write an economic paper on any topic,**
7 **the first thing you do is you have to understand what**
8 **everybody has written on it so that you're not just**
9 **doing something that's already been done.**
10 **And so that you have a command of what's**
11 **already known and what isn't known. That usually**
12 **informs your work to either confirm a known result or**
13 **development a new result. So I applied that pretty**
14 **standard approach to conducting the research to**
15 **insure that I understood what the literature -- the**
16 **existing literature was on the questions that I**
17 **essentially set up which are based on the arguments**
18 **that the City has made.**
19 Q. What research did you do?
20 **A. As is usual with this approach, if you're**
21 **working in an area that you've done work, you already**
22 **have files. So I had a lot of research already**
23 **available. I reviewed that. I reviewed the**
24 **citations to identify related work, acquired that,**

13

1 **reviewed its citations. So you do this iterative**
2 **process citation driven.**
3 **That gets you most of the way there, and**
4 **then you search, you look at who are the prominent**
5 **people that have worked in this field and who have**
6 **they worked with and what work have they done, fill**
7 **some gaps that way.**
8 **But it's a largely a citation-driven**
9 **process that gets you -- if you keep cascading**
10 **through, you eventually find all of the work that's**
11 **been done that's germane to a particular topic.**
12 Q. And how did you do the follow-up searches?
13 Do you use Google? Do you use some other
14 technique?
15 **A. So some Google, though, Google is not as**
16 **great for scholarly work these days as it used to be.**
17 **So there are a lot of scholarly journal index systems**
18 **that academic university libraries use, and so it's a**
19 **pretty straightforward economic literature indexing**
20 **system that you can go into.**
21 **And there's also what's called the Social**
22 **Science Research Network which is a pretty thorough**
23 **index of economic research.**
24 Q. And which of those tools did you use in this

14

1 case?
2 **A. All of them.**
3 Q. You mentioned having had a file already.
4 What types of subjects were being treated
5 in the materials in those files?
6 **A. I had a pretty extensive collection of**
7 **literature on what influences housing market**
8 **outcomes, so what are the forces that drive supply**
9 **and demand prices in housing markets. That's an area**
10 **I've worked on for about 25 years, so I had a lot.**
11 **Ultimately, out of all of this stuff I**
12 **cited, I had about half of it already on hand.**
13 Q. Did you have materials on house sharing in
14 your files?
15 **A. Yes.**
16 Q. Do you recall what those were?
17 **A. No.**
18 Q. Are they referenced in your report?
19 **A. Yes.**
20 Q. Are you being compensated for your work in
21 this matter?
22 **A. No.**
23 Q. Is the Reason Foundation being compensated
24 for it?

15

1 **A. No.**
2 Q. What is your basic reason for putting in the
3 time for no compensation?
4 **A. A combination of a long running interest in**
5 **the topic and practice of partnering -- I've been an**
6 **expert witness on quite a few cases over the years,**
7 **and it's usually been on areas that I work on. So it**
8 **seems like a natural extension of my research work in**
9 **this area to apply it.**
10 **So I see it as part of being an expert in**
11 **the subject, but it's also the case that it -- this**
12 **work fits within the mission of my organization, and**
13 **so I have a lot of discretion over how I can fill**
14 **that mission and so...**
15 Q. And your organization being the Reason
16 Foundation?
17 **A. The Reason Foundation, yes.**
18 Q. About how many hours have you put into this
19 project?
20 **A. I pay attention to that when I'm being**
21 **compensated. When I'm not, I don't.**
22 **In preparing this document, I would say I**
23 **put in about 50, 60 hours.**
24 Q. And does that include the time spent doing

16

1 the research?
2 **A. Yes.**
3 Q. Can you give an approximate breakout of the
4 percentage of that time that was spent doing research
5 as opposed to writing the report?
6 **A. 70 percent research, 30 percent writing.**
7 Q. Okay.
8 Let's take a look at the report, and
9 I have a few questions in there. So this is
10 Exhibit 3.
11 On the first page, there is a heading
12 number two titled Basis for Opinions to be Expressed;
13 do you see that?
14 **A. Yes.**
15 Q. And at the bottom, it starts a list of
16 some academic literature that you reviewed,
17 correct?
18 **A. Yes.**
19 Q. The first one listed says Dayne, D-A-Y-N-E,
20 Lee, How Airbnb Short-Term Rentals Exacerbate
21 Los Angeles' Affordable Housing Crisis, Analysis and
22 Policy Recommendations, close quote, and it's Harvard
23 Law and Policy Review; do you see that?
24 **A. Yes.**

17

1 MR. HANSCOM: Let's mark this as Exhibit 4,
2 please.
3 (Deposition Exhibit No. 4
4 was so marked, and the
5 proceedings continued as
6 follows.)
7 BY MR. HANSCOM:
8 Q. (Document tendered.)
9 My question is whether that is the item
10 that I just mentioned?
11 **A. Yes.**
12 Q. Over at the top of the second page, the first
13 item listed is Stephen Sheppard and Andrew Udell,
14 U-D-E-L-L, Do Airbnb Properties Affect Housing --
15 excuse me -- House Prices, Williams College; do you
16 see that?
17 **A. Yes.**
18 MR. HANSCOM: Let's mark that as 5, please.
19 (Deposition Exhibit No. 5
20 was so marked, and the
21 proceedings continued as
22 follows.)
23 BY MR. HANSCOM:
24 Q. (Document tendered.)

18

1 I hand you what's been marked as
2 Exhibit 5. Does that appear to be a copy of that
3 study?
4 **A. Yes.**
5 Q. And then the next one listed is Kyle Barront,
6 B-A-R-R-O-N-T, and other people, The Sharing Economy
7 and Housing Affordability Available at Social Science
8 Research Network; do you see that?
9 **A. Yes.**
10 **(Deposition Exhibit No. 6**
11 **was so marked, and the**
12 **proceedings continued as**
13 **follows.)**
14 BY MR. HANSCOM:
15 Q. (Document tendered.)
16 Handing you what's been marked as
17 Exhibit 6, I'll ask you if that is a copy of that
18 item?
19 **A. Yes.**
20 Q. Back in your report, which is Exhibit 3, if
21 we could flip to page seven, please?
22 **A. Yes.**
23 Q. In your summary, the paragraph with the
24 smaller letter a, you mention that studies relying on

19

1 New York City data may not be representative; do you
2 see that?
3 **A. Yes.**
4 Q. What is your basis for saying that?
5 **A. There's a common saying among economists that**
6 **New York City is always an outlier, and what that**
7 **means is that when you plot data on virtually**
8 **anything, of cities in the United States, New York**
9 **is almost never on the fitted line of the rest of**
10 **the cities.**
11 **So it has unique -- it consistently has**
12 **unique empirical results from the rest of the country**
13 **so much so that you're expected as an economist to**
14 **look for that, you're expected to account for that,**
15 **and you expect to see that when you review someone's**
16 **work.**
17 **We don't exclude it. We just recognize**
18 **that it tends to be outside of the norm of results**
19 **for other cities in America.**
20 Q. Have you had personal experience with that in
21 your own studies?
22 **A. Yes.**
23 Q. Can you give details?
24 **A. Whoop, boy, the most recent thing I would**

20

1 say was some work I did eight or nine years on
2 electricity prices and factors that affect them,
3 and we looked at a number of cities in the northeast
4 compared to a number of cities in the southwest,
5 and New York was not like the other cities in the
6 northeast. It was -- it didn't substantially affect
7 our results, but it was my most recent example of
8 seeing New York as an outlier.
9 Q. And how was it different?
10 **A. When you look at -- if you make graphs of**
11 **say, in this case, electricity prices per capita over**
12 **time or wholesale versus retail electricity cost**
13 **changes year-by-year or month-by-month -- and I think**
14 **we were looking at month-by-month back then -- you**
15 **know, imagine that you create a graph that shows that**
16 **for all of the cities, and the standard economic**
17 **procedure is you then do a statistical measurement**
18 **that attempts to find the trend.**
19 **So the trend line is a pretty common**
20 **representation of what a lot of our statistical**
21 **models do. That rule of thumb for New York is it**
22 **will almost never be close to that line. It will**
23 **usually stand out from the scatter of dots that**
24 **you're connecting with that line.**

21

1 **And so in this case, you would see -- we**
2 **would see New York out of the pack of results, and**
3 **that's sort of a layman's representation of what**
4 **outlier means.**
5 **An outlier means that the results from**
6 **this particular observation are further from**
7 **the norm than most -- than the common variance. So**
8 **you have a lot of -- some are a little above. Some**
9 **are a little below the line. And then you've got one**
10 **or two that are just way out. And New York is almost**
11 **always one of the ones that's way out.**
12 Q. Was that particular case the subject of
13 one of your publications that's listed in your
14 report?
15 **A. I believe so.**
16 Q. Could you see if you could identify which one
17 that was?
18 **A. Oh, boy, oh, boy, oh, boy.**
19 **If I remember right -- it is not in this**
20 **list. It was a journal article, and I don't think**
21 **I included all of my journal articles in this**
22 **list.**
23 Q. Do you remember in that matter having an
24 opinion as to what it was about New York that made it

22

1 unrepresentative?

2 **A. No, I don't think we did. Understanding that**

3 **was not germane to our research question.**

4 Q. Do you know of any academic literature that

5 states the point that you're making about New York

6 being an outlier?

7 **A. I have not delved into that so, no, I don't**

8 **know of -- so let me clarify.**

9 **Are you asking are there papers that**

10 **specifically attempt to explain why New York is**

11 **always an outlier?**

12 Q. Or that even just says --

13 **A. Points that out.**

14 Q. -- something -- correct.

15 **A. I can't name one right now.**

16 Q. In this case, can you explain what about

17 New York would be different from Chicago to make

18 you think that data from New York would not be

19 representative here?

20 **A. The -- New York's density alone, Manhattan**

21 **in particular, is -- orders of magnitude higher than**

22 **any other City in America, including Chicago.**

23 **There's -- Chicago is far more comparable to Phoenix**

24 **than New York is to Chicago on just that scale. So**

23

1 **that's a big part of it.**

2 **The amount of available developable space**

3 **is extremely limited New York in a way that it isn't**

4 **in other major US cities. So those are probably the**

5 **two most important kind of physical factors. I**

6 **definitely heard among economists that there's a**

7 **demographic driver, too. New York has its -- kind**

8 **of its own demographic in some ways that I would**

9 **think in this particular case would probably be a**

10 **factor.**

11 **But in the existing literature, there's no**

12 **-- there's nothing that attempts to address this.**

13 **I'm talking about the literature discussed in my**

14 **report. So, you know, we don't really know.**

15 Q. How would the factor you mentioned

16 such as density affect the issue of the impact

17 of house sharing on availability of affordable

18 housing?

19 **A. The ability of -- for adjustments to happen**

20 **in the market, and I'm using that in the broadest**

21 **sense, supply, demand, adjustments, adding to supply**

22 **changes and takes all of those things -- are**

23 **influenced by the flexibility of the market.**

24 **The slower it moves, that gets**

24

1 **incorporated into behavioral responses, and so a**

2 **denser less flexible market like New York is going**

3 **to have a different shape to the elasticity curves**

4 **and reactions that you see in the market compared**

5 **to cities that are not so constrained.**

6 Q. Is Chicago a more flexible market for

7 housing?

8 **A. Than New York?**

9 Q. Than New York.

10 **A. I think so.**

11 Q. And do you why do you think so?

12 **A. Two main reasons.**

13 **One is there is -- I do cite in my**

14 **statement the Wharton Index which scores Chicago**

15 **as more flexible than New York City, but also just**

16 **having worked on housing markets, the -- one of the**

17 **things that makes New York unique is that the suburbs**

18 **are so dense. You know, think of Brooklyn and Queens**

19 **compared to -- if you go 10 miles from Manhattan,**

20 **you're going to see a very different environment than**

21 **if you go 10 miles from where we're sitting in a**

22 **direction other than the lake.**

23 **So that profile, that density profile, has**

24 **a big influence on where development can occur, where**

25

1 **people move in anticipation of changes in the market,**

2 **where jobs locate in anticipation of access to**

3 **workers, all of these things.**

4 **Chicago has a lot more opportunity for**

5 **things to shift in appreciable ways than the much**

6 **denser and almost over-developed New York profile**

7 **does.**

8 Q. And when you talk about flexibility, are you

9 talking about ability to build more housing units

10 over time?

11 **A. That's a subset. I'm talking about**

12 **flexibility as a word to capture -- you can have**

13 **significant changes in supply and demand for**

14 **housing in a given zone either because of a lot of**

15 **construction, a lot of re-development shifting from**

16 **residential to commercial or vice versa or people**

17 **moving in and out.**

18 **All of those things can happen more**

19 **readily if you pick a random Chicago suburban**

20 **neighborhood than if you pick a random New York**

21 **suburban neighborhood.**

22 Q. So if a study says that in New York house

23 sharing is having an effect of raising rental prices,

24 your view would be that might support the idea that

26

1 that could happen in Chicago as well but not as much?
2 Would that be a fair way to put it?
3 **A. No. I would say so in economics, basically**
4 **when you have a hypothesis, you know, that's a**
5 **lunch-time discussion; you know, I can make a logical**
6 **argument this might be so, and you can kick that**
7 **around.**
8 **When you find a data set and you test that**
9 **hypothesis, so say you go into New York, and you use**
10 **New York data and you find, ah, I have found evidence**
11 **in support of this hypothesis, then it becomes a**
12 **research question.**
13 **So on this question, we are at that stage**
14 **where the finding of a result by a paper or two using**
15 **New York data only indicates that there's something**
16 **to be researched here. But, no, I should say if you**
17 **had done this in San Francisco or Atlanta, it would**
18 **be treated the same. Results from a city mean that**
19 **there's something worth investigating.**
20 **It is not remotely a conclusion. So**
21 **I don't think any economist would say based on a**
22 **result from New York, we can draw policy conclusions.**
23 Q. And you'd say the same thing about a study of
24 any other city?

27

1 **A. Yes. It really -- yes.**
2 Q. Okay. Let's go back to your work and
3 still on page seven. Number two is titled City
4 of Chicago's Argument; do you see that?
5 **A. Yes.**
6 Q. And the second paragraph of that says
7 Defendants have provided Plaintiffs with several
8 reports; do you see that?
9 **A. Yes.**
10 Q. And then you have a list of some bullet
11 points. The first bullet point at the bottom of page
12 seven is a 2016 study concerning Los Angeles.
13 Now is that the Exhibit 4 that we already
14 marked?
15 **A. Yes.**
16 Q. And then if we can flip over to the top of
17 page eight, the next bullet point mentioned a 2018
18 report by the New York City Comptroller; do you see
19 that?
20 **A. Yes.**
21 Q. Are you sure that that is a report that the
22 Defendants provided to the Plaintiffs?
23 **A. Yes.**
24 Q. And do you recall whether that had these

28

1 numbers on them, and they are called Bate numbers,
2 like Exhibit 4 has?
3 **A. It does have those on it.**
4 Q. Do you recall what they are, or do you have
5 them?
6 **A. I could pull it up. It might take me a**
7 **while to find it because the large PDF files I**
8 **received were unindexed.**
9 MR. HANSCOM: Let's go off the record for a
10 second, please.
11 (WHEREUPON a discussion was
12 held off the record, and
13 the proceedings continued
14 as follows.)
15 MR. HANSCOM: While we were off the record, I
16 mentioned that we did not see that in our copy of
17 what we produced, but I think counsel and the witness
18 are going to check, and we'll see if we can pin that
19 down later.
20 BY MR. HANSCOM:
21 Q. The next bullet point mentions a Williams
22 College working paper, and that is what we marked as
23 Exhibit 5, correct?
24 **A. Yes.**

29

1 Q. And then the one after that is a 2018 Social
2 Science Research Network Working Paper, and I believe
3 that's the one we marked as Exhibit 6?
4 **A. Yes.**
5 Q. Did you find any other studies than the ones
6 you have listed in your report that deal with the
7 subject of what impact house sharing has on the
8 availability of affordable housing?
9 **A. Do you mean that address that as their**
10 **central question?**
11 Q. Well, let's just even say that -- got into
12 that issue at all.
13 **A. No. One of the arguments that I make in my**
14 **statement is that when I looked at research that**
15 **tried to explain the problem of lack of housing in**
16 **urban areas, other than these ones we just discussed,**
17 **none of them mentioned home sharing, and I find that**
18 **to be an indication that it is not considered an**
19 **important contributor.**
20 Q. Did you find any studies not mentioned in
21 your report that purported to look at the question
22 of whether house sharing affects availability of
23 affordable housing?
24 **A. No. I think I stated -- I state in my**

30

1 report that these reports constitute the body of
2 evidence linking home sharing and homelessness and,
3 indeed, cited by others in the City of Chicago.
4 As far as I can find, no one has done any
5 other empirical work on this cite. I find no
6 citations anywhere in any other work.
7 Q. It's not like you found a study and decided
8 not to include it in your report?
9 A. No.
10 Q. Flipping to page nine of your report, at the
11 bottom just above the footnotes, you mention that
12 the type of business and vacation travelers who use
13 Airbnb are not looking for apartments at the bottom
14 of the market, correct?
15 A. Yes.
16 Q. Did you do any studies of where Airbnb
17 listings are in Chicago?
18 A. No.
19 Q. Do you know if there would be a way to do
20 that?
21 A. If Airbnb would give you the data, you could.
22 Q. Well, a person could go to the Airbnb website
23 and plug in zip codes, for example, correct?
24 A. Right.

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1 If you wanted to see the listings?
2 Q. Right.
3 A. Yes, you could do that. That would give you
4 the listings at that point in time that were
5 available.
6 Q. Have you ever lived in Chicago?
7 A. No.
8 Q. Have you visited here before?
9 A. A lot.
10 Q. Have you had any long stays in Chicago?
11 A. No.
12 Q. Are you familiar with which neighborhoods
13 in Chicago you would expect to have the most Airbnb
14 listings?
15 A. Yes.
16 Q. Which ones?
17 A. Well, I'm just a -- the most meaning where
18 you would have a denser accumulation of listings
19 would be, you know, downtown. I would expect the --
20 you know, north side and out near O'Hare, Rosemont --
21 yeah, Rosemont area would probably be my just
22 impressionistic choices.
23 But when I was looking for my statement, I
24 did not find -- I didn't find anybody who had put

32

1 that together because that was a question I had as
2 well as has someone basically explained the
3 distribution of home sharing in Chicago. I couldn't
4 find any of that analysis, so it would have to be
5 done.
6 Q. Have you ever acted as a house-sharing host?
7 A. No.
8 Q. Have you been a house-sharing quest?
9 A. Yes.
10 Q. How often have you done that?
11 A. On average, at least once a month. I travel
12 for business a lot.
13 Q. Do you sometimes stay at hotels rather than a
14 house sharing?
15 A. Yes.
16 Q. How do you decide which one to pick?
17 MR. HUEBERT: Objection. This pertains to his
18 personal experience and not his expert testimony.
19 You can answer.
20 THE WITNESS: My first rule is if it's only one
21 night, I stay in a hotel because I don't get any
22 benefit from the kitchen primarily. If it's more
23 than one night, I consider Airbnb. Location -- I
24 should say not just Airbnb but other home-sharing

33

1 services. Then I look at location, and then I look
2 at price, and then I look at amenities. I like
3 certain things.
4 MR. HANSCOM: Let's mark this as Exhibit 7,
5 please.
6 (Deposition Exhibit No. 7
7 was so marked, and the
8 proceedings continued as
9 follows.)
10 BY MR. HANSCOM:
11 Q. (Document tendered.)
12 Handing you what's been marked as
13 Exhibit No. 7, it has the title From Air Mattresses
14 to Unregulated Business, an Analysis of the Other
15 Side of Airbnb. At the top, it's got the date
16 of 2016, and this has Bate numbers D15 through D55.
17 Do you recall seeing this before?
18 A. Yes.
19 Q. And in what -- how was it that you came to
20 see this?
21 A. It was included in the -- as I recall, it was
22 included in the documents the City provided.
23 Q. This is not cited in your report, correct?
24 A. Right.

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1 Q. Why did you not cite this in your report?
2 **A. Because it -- I did not think it had**
3 **information germane to the questions I was**
4 **addressing. It's got useful information in it but**
5 **nothing on supply and demand effects. Just on growth**
6 **of home sharing.**
7 Q. Well, this does have some data in it from
8 Chicago that relates to the issue we were talking
9 about, correct?
10 **A. Which issue?**
11 Q. Neighborhoods where the house sharing is most
12 common.
13 **A. Oh, it does, yes, yes.**
14 Q. If you go to the page with D33 as the number,
15 that has some statistics for Chicago, correct?
16 **A. Yes. So some -- right. So these are the**
17 **neighborhoods with the most properties listed, but it**
18 **doesn't give me the other neighborhoods. So I don't**
19 **know quite what -- you know, is it most as in just**
20 **one more, or is it most as in three times as many. I**
21 **don't know.**
22 **Is the sixth at 290, or is the sixth at**
23 **100? It doesn't tell me that. So I don't know that.**
24 **Yeah, I didn't find anything in there that I thought**

35

1 **was useful for my statement.**
2 MR. HANSCOM: Let's mark this as Exhibit 8.
3 (Deposition Exhibit No. 8
4 was so marked, and the
5 proceedings continued as
6 follows.)
7 BY MR. HANSCOM:
8 Q. (Document tendered.)
9 Handing you what's been marked as
10 Exhibit 8, this has the title Hosts with Multiple
11 Units, a Key Driver of Airbnb Growth. It's dated
12 March 2017, and it has Bate numbers D56 through D79;
13 do you see that?
14 **A. Yes.**
15 Q. Do you recall seeing that as well in the
16 documents that were produced?
17 **A. Yes.**
18 Q. It says it's from CBRE; do you see that?
19 **A. Yes.**
20 Q. Do you know who that is?
21 **A. That is a very large real estate corporation.**
22 **Something, something, something Richard Ellis. I**
23 **can't remember what the CB stands for.**
24 Q. This was not cited in your report either,

36

1 correct?
2 **A. That's correct.**
3 Q. Why did you not cite this?
4 **A. It addresses the trend in how many -- the**
5 **trend in home-sharing owners who have multiple units**
6 **versus only have one unit, and that did not seem**
7 **germane to the topic I was addressing.**
8 Q. If you turn to the page marked D68, they have
9 Chicago data listed there, too, correct --
10 **A. Yes.**
11 Q. -- on the topic you mentioned?
12 **A. Which topic?**
13 Q. The topic about basically the portion of the
14 house sharing that's multi-unit versus --
15 **A. Right. Yes.**
16 Q. -- single?
17 MR. HANSCOM: This is 9.
18 (Deposition Exhibit No. 9
19 was so marked, and the
20 proceedings continued as
21 follows.)
22 BY MR. HANSCOM:
23 Q. (Document tendered.)
24 Handing you what's been marked as Exhibit

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1 9, it's titled Is Home Sharing Driving Up Rents?
2 Evidence from Airbnb in Boston. It says Working
3 Paper. It's Department of Economics, University
4 of Massachusetts and Bate numbers D391 through 426;
5 do you see that?
6 **A. Yes.**
7 Q. And did you review this as well with the
8 papers produced by the City?
9 **A. I don't remember this one.**
10 Q. It is not cited in your report, is that
11 correct?
12 **A. It isn't, yes.**
13 Q. Do you know why you did not cite this in your
14 report?
15 **A. I don't remember seeing it so...**
16 Q. Back to your report, at the bottom of
17 page 10, in the last lines, you state that in your
18 opinion, land use and growth restrictions, zoning and
19 housing regulations explain roughly 90 percent of the
20 home price differentials between markets with similar
21 amenities, correct?
22 **A. Yes.**
23 Q. What would you put in the other 10 percent?
24 **A. The biggest part of other 10 percent would**

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1 **be construction cost changes. It's pretty standard**
2 **in the literature to differentiate between**
3 **construction cost changes and other factors.**
4 **So this -- the 90 percent is net**
5 **of construction cost changes. So that would**
6 **be most of it. Probably most of the rest would**
7 **be economic growth. Growing areas have very**
8 **different housing markets from shrinking areas or**
9 **steady state.**
10 Q. And when you use the phrase markets there,
11 I take it you're referring to different geographical
12 areas, different cities and so on?
13 **A. Yes.**
14 MR. HANSCOM: I would like to take about a
15 five-minute break.
16 (WHEREUPON a short recess
17 was taken, and the
18 proceedings continued as
19 follows.)
20 MR. HANSCOM: We only have a few more minutes
21 here.
22 THE WITNESS: Okay.
23 BY MR. HANSCOM:
24 Q. So if you could look back at what was

39

1 Exhibit 4.
2 **A. Okay.**
3 Q. So that study had to do with Los Angeles,
4 correct?
5 **A. Yes.**
6 Q. And then Exhibit 5, that was a New York City
7 study, correct?
8 **A. Yes.**
9 Q. And Exhibit 6 I think did not focus on any
10 one city, am I correct?
11 **A. No, it did not. It's a national data set.**
12 Q. And Exhibit 9 I know you said you didn't
13 recall, but it is titled Evidence From Airbnb in
14 Boston, correct?
15 **A. Yes.**
16 Q. And you're not aware of any studies that have
17 focused on Chicago, correct?
18 **A. Correct.**
19 Q. And, obviously, you did not do your own
20 full-blown study for Chicago?
21 **A. Correct.**
22 MR. HANSCOM: We could mark this as Exhibit 10,
23 please.
24

40

1 (Deposition Exhibit No. 10
2 was so marked, and the
3 proceedings continued as
4 follows.)
5 BY MR. HANSCOM:
6 Q. (Document tendered.)
7 This is a printout from a website. It was
8 produced as D1 through 5, and the title at the top is
9 Host Compliance.
10 Do you remember seeing this in the papers
11 you reviewed?
12 **A. Yes.**
13 Q. Are you familiar with this Host Compliance?
14 **A. Yes.**
15 Q. Who are they?
16 **A. I don't really know who they are. I just**
17 **have encountered their website and documents**
18 **before.**
19 Q. This particular article is titled Are
20 Short-Term Vacation Rentals Contributing to the
21 Housing Crisis; do you see that?
22 **A. Yes.**
23 Q. At the top of the second page, it says, "The
24 rise and growth of short-term rental platforms such

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1 as Airbnb, Home Away and Flip Key has created plenty
2 of debate amongst local governments, the hotel
3 industry, the real estate lobby, housing activists
4 and local residents about the impact of such rentals
5 on the availability of affordability of long-term
6 rental housing." Do you see that?
7 **A. Yes.**
8 Q. Would you agree with that statement?
9 **A. I don't know. I don't feel like I have a**
10 **good sense of how many places are having this debate.**
11 **I'm aware of it in three cities, and I live in a**
12 **vacation -- a short-term rental dense state where it**
13 **is not part of the discussion.**
14 Q. It is not part of the discussion in Florida?
15 **A. In Florida, it's -- there is lots of issues**
16 **about home sharing, but it's not the long-term rental**
17 **question.**
18 Q. And what are the three cities you're
19 mentioning?
20 **A. Miami, Washington and New York -- Chicago,**
21 **Washington and New York.**
22 Q. What about Boston? One of these studies was
23 in Boston.
24 **A. Yeah, I haven't heard anything about how much**

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1 **of an issue this is in Boston.**
2 Q. And another study was in Los Angeles?
3 **A. That wasn't a study.**
4 **That was a law review article that made**
5 **arguments about Los Angeles but didn't actually do**
6 **empirical work.**
7 Q. And other than those cities, you're not aware
8 of this being an issue elsewhere?
9 **A. No, not that I can think of.**
10 MR. HANSCOM: Okay.
11 I think that's all we've got. Thank you.
12 THE WITNESS: Thank you.
13 MR. HUEBERT: I'll have a few questions.
14 MR. HANSCOM: Okay.
15 EXAMINATION
16 BY MR. HUEBERT:
17 BY MR. HUEBERT:
18 Q. We discussed -- on your page eight of
19 your report, which was Exhibit 3, we discussed
20 a 2018 report by the New York City Comptroller or
21 rather you testified regarding that.
22 Do you recall now how that came to your
23 attention?
24 **A. Yes.**

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1 **The City -- the documents provided by**
2 **the City may not have included the actual report.**
3 **Without going through them, I can't be sure. But**
4 **they -- it did include articles that referenced**
5 **the report, and that's how it came to my attention.**
6 Q. You discussed earlier how -- first of all,
7 you discussed people not looking for short-term
8 rentals at the bottom of the housing market.
9 Can you explain your basis for that
10 conclusion?
11 **A. I looked at some reports that are -- my**
12 **footnote number eight discusses this, looking at the**
13 **income level and types of travel that home-sharing**
14 **users -- so the demographics of home-share users and**
15 **the types of travel that dominate home sharing. And**
16 **it's relatively high income, on average over 75,000**
17 **a year and, overwhelmingly, leisure travel.**
18 **And so I reason from that that vacationers**
19 **who make upper-middle-class incomes are not looking**
20 **to stay in remote shabby, you know, poor apartments.**
21 **They are looking to stay close to tourist locations**
22 **and vacation homes.**
23 Q. It was suggested earlier that you might
24 be able to go onto the Airbnb website to see

44

1 where properties are listed in the City of
2 Chicago.
3 **A. Right.**
4 Q. Would seeing where properties are listed
5 on Airbnb necessarily tell you where and how
6 frequently properties are actually rented
7 short-term?
8 **A. No.**
9 **You lack data on frequency, you know,**
10 **percent occupancy. You know, more popular places**
11 **would be occupied much of the year. Other places**
12 **would be -- could be occupied very occasionally.**
13 **And in order to answer that question**
14 **about distribution of use, you would have to know**
15 **all of that. You would have to know also about**
16 **properties going in and off because there's a lot of**
17 **turnover in home-sharing properties so where they're**
18 **springing up and where they're retracting because**
19 **they're not worth the cost.**
20 Q. In Exhibit 8, which was the CBRE report,
21 you stated that you didn't think the details on
22 rentals of multi-unit -- short-term rentals in
23 multi-unit buildings versus single-family homes were
24 germane to your analysis.

45

1 Can you explain why you don't consider
2 that to be germane to the question you're analyzing?
3 **A. If there's -- so who owns the properties has**
4 **not been posited to influence the effects on the**
5 **supply of, you know, long-term rental properties**
6 **nor can I think of any logical connection between the**
7 **two.**
8 **So if all of the Airbnb -- all of the**
9 **vacation rentals in Chicago were owned by one person,**
10 **that does not tell you anything about how many there**
11 **are or how they affect the housing market. It only**
12 **tells you who owns them.**
13 Q. Turning to Exhibit 9, do you recall seeing
14 this document before this deposition?
15 **A. No.**
16 Q. Have you had an opportunity to briefly look
17 at what this document is --
18 **A. Yes.**
19 Q. -- since we began this deposition?
20 **A. Yes.**
21 Q. And did you see any conclusions that this
22 study reaches?
23 **A. Yes.**
24 Q. And what did you see?

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1 **A. They conclude that for census tracks in**
2 **the highest decile of Airbnb listings relative to**
3 **total housing units, this increase in asking rents**
4 **ranges from 1.3 to 3.1 percent.**
5 Q. Do you think that that -- understanding
6 that you have not reviewed this study in detail,
7 do you think that there is any reason why that
8 conclusion could lead one to conclude that
9 short-term rentals generally or in Chicago in
10 particular would tend to increase rents or
11 increase homelessness?
12 **A. No.**
13 **Assuming their methodology is sound and**
14 **there are no confounding factors that were**
15 **unaccounted for which I haven't had a chance to**
16 **review for that, what the results indicate is that**
17 **a -- relatively more Airbnb is associated with a very**
18 **small increase in rents on average as a statistical**
19 **average using their methodology.**
20 **What that means, if say average rents are**
21 **\$750, which would be really low for a major urban**
22 **area, a 1 to 3 percent rent increase would be \$15**
23 **a month or something like that on 750 per percent.**
24 **So between 15 and \$20 a month.**

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1 **Nobody raises their rent by 15 or \$20**
2 **a month. What that means is it's a statistical**
3 **average, so what they're saying is that one out of**
4 **every hundred or one out of fifty landlords is**
5 **raising their rents by a hundred dollars.**
6 **So this isn't a widespread shock. This is**
7 **a tiny effect of the margin affecting, in reality, in**
8 **the housing market only a small percentage of units.**
9 **So to draw conclusions from that on overall**
10 **availability and the effect on people's housing**
11 **situations would be a stretch way beyond what the**
12 **data actually shows.**
13 Q. And you said the conclusion -- in describing
14 the conclusion, I think the word decile was in there.
15 Can you --
16 **A. Yes.**
17 Q. -- explain what that means?
18 **A. So let me find that page that we were on.**
19 **There we are.**
20 **For the census tracks in the highest**
21 **decile of Airbnb listings. So what they did is they**
22 **divided census tracks in the Boston area by how dense**
23 **the Airbnb listings were, and they then looked at the**
24 **top 10 percent.**

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1 **So the 10 percent of census tracks in**
2 **Boston that has the most Airbnb listings is what**
3 **they base that result on, not average across the city**
4 **or typical but the most extreme -- the most extreme**
5 **effect they could find was 1 to 3 percent using the**
6 **most extreme situation.**
7 Q. In all of the -- in the items you reviewed
8 that are listed on the bottom of page seven and the
9 top of page eight of your report, across those
10 reports, did you see any consistent deficiencies
11 in their analysis, anything that these studies
12 were consistently ignoring that you would think
13 would be important to make a determination about the
14 issues they seek to analyze or the issue in this
15 case?
16 **A. Yeah.**
17 **So the first thing that struck me is that**
18 **you have a small sample. So we have hard empirical**
19 **results primarily from New York, so only one city**
20 **which may be an outlier. When we have one paper that**
21 **uses a national data set and is not subject to that**
22 **problem and they find a magnitude of result, that's**
23 **one-tenth of the magnitude of the small sample**
24 **studies that only look at New York. And I would say**

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1 **that if I added the Boston analysis in, it would be**
2 **one-twentieth of the effect -- I'm sorry, one-fifth**
3 **of the effect.**
4 **So the more comprehensive the data in**
5 **this -- the space is, at least from the information**
6 **we had so far, the smaller the effect is. The other**
7 **thing is that all of this literature is looking at**
8 **second- or third-order influencers on the fundamental**
9 **question. None of this is data on homelessness.**
10 **This is comparing the effects of home**
11 **sharing on rents and then concluding that if -- then**
12 **reasoning from that that an effect on rents must**
13 **affect total supply, and effect on total supply must**
14 **affect the number of people who have housing versus**
15 **don't, the don'ts being the homeless and, therefore,**
16 **we have a problem.**
17 **So in each of the steps of that causal**
18 **chain, there are many other influences, orders of**
19 **magnitude stronger.**
20 **The reason I spend a lot of time arguing**
21 **about -- in my statement about the effects**
22 **of land use and housing regulations is because,**
23 **overwhelmingly, the literature says that 90 -- that**
24 **explains 90 percent of the differences. Construction**

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1 costs explains a big chunk of the rest, economic
2 fortunes, a bunch of the rest.
3 So you're really addressing a very, very
4 tiny set of the influences on this question. That is
5 a -- and it's tiny and it's third order attenuated by
6 many other factors.
7 So if I -- if you wanted to solve the
8 problem of homelessness, you could gamble that this
9 small initial literature indicates a policy change
10 that might have a very, very small third-order effect
11 on the problem you're trying to address, or you could
12 make policy changes that we have a robust literature,
13 says has a 90 percent probability of substantially
14 effecting the problem you're trying to address in the
15 form of homelessness.
16 Q. And the first bullet point on the bottom
17 of page seven, this is the report concerning
18 Los Angeles.
19 A. Yes.
20 Q. Did this report engage in what you would call
21 a thorough economic analysis?
22 A. No.
23 It opens by looking at some comparative
24 statics in the growth and home sharing and the change

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1 in rent levels in Los Angeles and then reasons from
2 that argument about the relative effects. It does
3 not perform any statistical analysis to link the two
4 differently.
5 And, in fact, specifically states in the
6 paper that it's an argument from correlation that
7 he's making.
8 Q. So the analysis it does is not up to your
9 professional standards as an economist?
10 A. It's not an economic analysis. It's a legal
11 analysis.
12 MR. HUEBERT: That's all.
13 MR. HANSCOM: I've got a little follow up.
14 FURTHER EXAMINATION
15 BY MR. HANSCOM:
16 BY MR. HANSCOM:
17 Q. If you were a landlord and you had a tenant
18 who was living in your unit, I assume you would not
19 list it for rental as a house share while the tenant
20 was there, correct?
21 MR. HUEBERT: Objection. Irrelevant. Calls for
22 speculation.
23 You can answer.
24 THE WITNESS: I don't think it would be legal to

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1 do so.
2 BY MR. HANSCOM:
3 Q. Well --
4 A. Like if I had a tenant, I can't give
5 somebody else the keys for that apartment and
6 let him go in there. They have -- the tenant has
7 rights to privacy in the space they're renting and
8 not have strangers come wondering in to sleep on
9 their bed.
10 Q. Exactly.
11 So you can't really have one unit
12 available for both, advertising for house share and
13 at the same time have a tenant in there?
14 MR. HUEBERT: Objection. Calls for a legal
15 conclusion.
16 You can answer.
17 THE WITNESS: I would say you can't advertise on
18 home sharing and have a long -- a tenant with a
19 long-term lease.
20 BY MR. HANSCOM:
21 Q. The Boston study that's Exhibit 9 that you --
22 A. Yes.
23 Q. -- were looking at again, if you can turn to
24 the end of it, page 21 under the Conclusions, this is

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1 D412.
2 At the bottom, it said, "In a city where
3 the demand for rental housing is outpacing supply and
4 pushing up rents quickly, home sharing is
5 contributing to this dynamic," correct?
6 A. That's what it says, yes.
7 Q. Do you know the phrase single-room occupancy
8 hotel?
9 A. Yes.
10 Q. And those are sometimes called SROs?
11 A. Yes.
12 Q. Do you know if there are SROs in Chicago?
13 A. I do not. I looked at that issue a little
14 bit in my work. I found some general work. Nothing
15 Chicago-specific.
16 Q. If a developer bought one of those and turned
17 it to house share, that would be an example of the
18 multi-unit house sharing that is referenced in one of
19 the reports, correct?
20 A. In other words, if someone owned a building
21 that had multiple units all offered on house sharing,
22 yes, I think that would.
23 Q. And do you know whether under the Chicago
24 hotel tax ordinance there is the tax applying to

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1 people who live in SROs?
 2 MR. HUEBERT: Objection. Calls for a legal
 3 conclusion.
 4 You can answer.
 5 THE WITNESS: I don't know.
 6 So you mean pre-existing SROs that are not
 7 offered for -- on home sharing?
 8 BY MR. HANSCOM:
 9 Q. Correct, where people are living there
 10 basically for longer periods than 30 days.
 11 A. I don't.
 12 Q. You don't know?
 13 A. Yeah, I don't know.
 14 MR. HANSCOM: Off the record a second.
 15 (WHEREUPON a discussion was
 16 held off the record, and
 17 the proceedings continued
 18 as follows.)
 19 MR. HANSCOM: Just one last quick topic.
 20 BY MR. HANSCOM:
 21 Q. That New York City's Comptroller's report,
 22 do you know which of the reports that the City
 23 did produce it's referenced in?
 24 A. I had that on here.

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1 MR. HANSCOM: Or, Counsel, if you know.
 2 MR. HUEBERT: We don't know offhand, but we can
 3 certainly tell you when we're done here.
 4 If you just want the information, that
 5 will be easy enough.
 6 MR. HANSCOM: Yeah, okay. That would be good.
 7 Bate number whatever.
 8 MR. DANAHER: Yeah, the Bates number.
 9 MR. HUEBERT: There was a news article about it
 10 that was included in the materials but not the report
 11 itself.
 12 MR. HANSCOM: Okay. That's all we've got.
 13 MR. HUEBERT: Okay.
 14 MR. HANSCOM: Thank you.
 15 (Whereupon said
 16 deposition adjourned.)
 17
 18
 19
 20
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 22
 23
 24

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1 STATE OF ILLINOIS)
) SS:
 2 COUNTY OF COOK)
 3
 4 IN THE CIRCUIT COURT OF COOK COUNTY, ILLINOIS
 4 CHANCERY DEPARTMENT
 5 LEILA MENDEZ and ALONSO)
 ZARAGOZA,)
 6)
) Plaintiffs,)
) No. 16 CH 15489
 7 vs.)
 8)
 9 City OF CHICAGO, a Municipal)
 Corporation and ROSA ESCARENO,)
 in here official capacity as)
 10 Commissioner of the City of)
 Chicago Department of Business)
 11 Affairs and Consumer)
 Protection.)
 12)
) Defendants.)
 13
 14 I, DR. ADRIAN T. MOORE, state that I have
 15 read the foregoing transcript of the testimony given
 16 by me at my deposition on the 28th day of February
 17 2019, and that said transcript is a true and accurate
 18 record of the testimony so given by me at said
 19 deposition except as I have so indicated on the
 20 errata sheet(s) provided herein.
 21 _____
 DR. ADRIAN T. MOORE
 22
 23 SUBSCRIBED AND SWORN TO
 before me this _____ day
 of _____, A.D., 2019.
 24 _____

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1 ERRATA SHEET
 2 Examination of: Dr. Adrian T. Moore
 3 Date taken: 2-28-19
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 5 _____ Change: _____
 6 Reason: _____
 7 _____ Change: _____
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 18 Reason: _____
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 22 Reason: _____
 23 Deponent's
 24 Signature _____ Date _____

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1 ERRATA SHEET

2 Examination of: Dr. Adrian T. Moore

3 Date taken: 2-28-19

4 Page Line

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14 Reason: _____

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16 Reason: _____

17 _____ Change: _____

18 Reason: _____

19 _____ Change: _____

20 Reason: _____

21 _____ Change: _____

22 Deponent's

23 Signature _____ Date _____

24

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1 typewritten copies only, signed and certified

2 transcripts only. I assume no responsibility for the

3 accuracy of any reproduced copies not made under my

4 control or direction.

5 In testimony whereof, I have hereunto set

6 my hand and affixed my notarial seal this 5th day of

7 March 2019.

8

9

10 

11 *Jeannine Miyuskovich*

12 Jeannine Scheff Miyuskovich

13 CSR No. 084-003551

14

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59

1 STATE OF ILLINOIS)

2) SS:

3 COUNTY OF McHENRY)

4

5

6 I, Jeannine Scheff Miyuskovich, CSR and

7 Notary Public in and for the County of McHenry and

8 the State of Illinois, do hereby certify that on the

9 28th day of February 2019, I reported in shorthand

10 the testimony of DR. ADRIAN T. MOORE, to the best of

11 my ability.

12 I further certify that said witness,

13 DR. ADRIAN T. MOORE, was by me first duly sworn to

14 testify to the truth, the whole truth and nothing but

15 the truth in the cause aforesaid before the taking of

16 the deposition; that the testimony was reduced to

17 writing in the presence of said witness by means of

18 machine shorthand, and afterwards said stenographic

19 notes were reduced to typewriting.

20 I further certify that I am in no way

21 related to any of the parties to this suit, nor am I

22 in any way interested in the outcome thereof.

23 I further certify that this certificate

24 annexed hereto applies to the original and

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<p style="text-align: center;">A</p> <p>A.D 56:23 a.m 1:23 ability 23:19 25:9 59:11 able 43:24 academic 13:18 16:16 22:4 access 25:2 account 19:14 accumulation 31:18 accuracy 60:3 accurate 56:17 acquired 12:24 acted 32:6 activists 41:3 activities 12:1 actual 43:2 added 49:1 adding 23:21 additional 11:15 11:16 address 23:12 29:9 50:11,14 addresses 36:4 addressing 34:4 36:7 50:3 adjourned 55:16 adjustments 23:19,21 Adrian 1:15 3:5 4:1,9 56:14,21 57:2 58:2 59:10,13 advertise 52:17 advertising 52:12 Affairs 1:11 56:11 affect 17:14 20:2 20:6 23:16 45:11 49:13,14 affixed 60:6</p>	<p>affordability 18:7 41:5 affordable 16:21 23:17 29:8,23 aforesaid 59:15 ago 9:6 agree 41:8 ah 26:10 Air 33:13 Airb 45:8 Airbnb 16:20 17:14 30:13,16 30:21,22 31:13 32:23,24 33:15 35:11 37:2 39:13 41:1 43:24 44:5 46:2,17 47:21 47:23 48:2 ALONSO 1:5 56:5 amenities 33:2 37:21 America 19:19 22:22 amount 23:2 analysis 16:21 32:4 33:14 44:24 48:11 49:1 50:21 51:3,8,10,11 analyze 9:21 48:14 analyzing 45:2 AND- 2:6 Andrew 17:13 Angeles 6:22 27:12 39:3 42:2,5 50:18 51:1 Angeles' 16:21 annexed 59:24 answer 32:19</p>	<p>44:13 51:23 52:16 54:4 anticipation 25:1,2 anybody 31:24 apartment 52:5 apartments 30:13 43:20 appear 18:2 appeared 2:11 2:18 applicant 9:19 applied 12:13 applies 59:24 apply 15:9 applying 53:24 appreciable 25:5 approach 12:14 12:20 approached 8:3 approximate 16:3 area 12:21 14:9 15:9 31:21 46:22 47:22 areas 15:7 29:16 38:7,8,12 arguing 49:20 argument 26:6 27:4 51:2,6 arguments 10:17,20 12:17 29:13 42:5 Arizona 2:4 article 21:20 40:19 42:4 55:9 articles 21:21 43:4 asked 8:4 9:21 10:19 asking 7:24 22:9 46:3</p>	<p>assess 10:19 assignment 10:16 associated 46:17 assume 51:18 60:2 Assuming 46:13 Atlanta 26:17 attempt 22:10 attempts 20:18 23:12 attention 15:20 42:23 43:5 attenuated 50:5 attorneys 4:11 availability 23:17 29:8,22 41:5 47:10 available 12:23 18:7 23:2 31:5 52:12 average 32:11 43:16 46:18,19 46:20 47:3 48:3 aware 39:16 41:11 42:7</p> <hr/> <p style="text-align: center;">B</p> <p>B-A-R-R-O-N... 18:6 back 18:20 20:14 27:2 37:16 38:24 background 5:6 Barront 18:5 base 48:3 based 12:17 26:21 basic 9:16 12:1 15:2 basically 26:3 32:2 36:13 54:10</p>	<p>basis 16:12 19:4 43:9 Bate 28:1 33:16 35:12 37:4 55:7 Bates 55:8 bed 52:9 began 45:19 behalf 2:11,18 behavioral 24:1 believe 11:10 21:15 29:2 benefit 32:22 best 59:10 beyond 47:11 big 23:1 24:24 50:1 biggest 37:24 bio 5:1 bit 53:14 Bloomington 9:8 10:4 body 30:1 Boston 37:2 39:14 41:22,23 42:1 47:22 48:2 49:1 52:21 bottom 16:15 27:11 30:11,13 37:16 43:8 48:8 50:16 53:2 bought 53:16 boy 19:24 21:18 21:18,18 break 38:15 breakout 16:3 briefly 45:16 broadest 23:20 Brooklyn 24:18 build 25:9 building 53:20 buildings 44:23</p>
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Mendez vs City of Chicago

16 CH 15489

Deposition of: Bryan Esenberg

Taken on: April 30, 2019



LEXITAS™
180 North LaSalle Street, Suite 2800
Chicago, IL 60601
312.236.6936
877.653.6736
www.lexitaslegal.com

1 STATE OF ILLINOIS)
2) SS.
3 COUNTY OF COOK)

4 IN THE CIRCUIT COURT OF COOK COUNTY, ILLINOIS
5 COUNTY DEPARTMENT, CHANCERY DIVISION

6 LEILA MENDEZ and ALONSO ZARAGOZA,)
7)
8 Plaintiffs,)

9 vs.)

No. 16 CH 15489

10 CITY OF CHICAGO, et al.,)
11)
12 Defendants.)

13 The deposition of BRYAN ESENBERG taken
14 before Jennifer Vravis, Registered Professional
15 Reporter and Notary Public, taken pursuant to the
16 provisions of the Illinois Code of Civil Procedure and
17 the Rules of the Supreme Court thereof pertaining to
18 the taking of depositions for the purpose of discovery
19 at 30 North LaSalle Street, Suite 1020, Chicago,
20 Illinois, commencing at 1:18 p.m. on the 30th day of
21 April, A.D., 2019.
22
23
24

FILED DATE: 6/21/2019 6:51 PM 2016CH15489

Page 2

1 APPEARANCES:

2 GOLDWATER INSTITUTE
 MR. JACOB HUEBERT
 3 500 East Coronado Road
 Phoenix, Arizona 85004
 4 Phone: (602) 462-5000
 E-mail: jhuebert@goldwaterinstitute.org

5 and

6 LIBERTY JUSTICE CENTER
 MR. JEFFREY SCHWAB
 7 190 South LaSalle Street
 Suite 1500
 8 Chicago, Illinois 60603
 Phone: (312) 263-7668
 9 E-mail: jschwab@libertyjusticecenter.org

10 On behalf of the Plaintiffs;

11 CITY OF CHICAGO - DEPARTMENT OF LAW
 REVENUE LITIGATION DIVISION
 MR. WESTON W. HANSCOM
 12 30 North LaSalle Street
 Suite 1020
 13 Chicago, Illinois 60602
 Phone: (312) 744-9077
 14 E-mail: whanscom@cityofchicago.org

15 On behalf of the Defendants.

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22
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24

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2 BYRAN ESENBERG		
3 Examination by Mr. Huebert		5
4		
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6 DEPOSITION EXHIBIT		PAGE
7 No. 1 (March 28, 2019 Report of		9
8 Bryan Esenberg)		
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10 No. 2 (July 25, 1994 Chicago Tribune		13
11 article entitled SRO Hotels		
12 Continue To Dwindle)		
13 No. 3 (Chicago Magazine article		16
14 entitled The Long, Slow		
15 Decline of Chicago's SROs)		
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3 E X H I B I T S

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6 deposition excerpts)		
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8 NOTE: All exhibits retained by Counsel		
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1 (Witness sworn.)

2 WHEREUPON:

3 BYRAN ESENBERG,

4 called as a witness herein, having been first duly

5 sworn, was examined and testified as follows:

6 EXAMINATION

7 BY MR. HEUBERT:

8 Q. All right. Good afternoon.

9 Could you please state your name for the

10 record?

11 A. Sure.

12 My name is Bryan Esenberg.

13 Q. Thank you.

14 My name is Jacob Heubert, and I'll be taking

15 your deposition today.

16 Have you ever been deposed before?

17 A. I have been deposed before.

18 Q. About how many times -- Or how many times?

19 A. I was deposed one time.

20 Q. And what kind of case was it?

21 A. It was a few years ago, and the case was

22 specific to a housing case. It had to do with a

23 troubled building, a vacant and abandoned building.

24 Q. And you were a witness for the City of



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1 Chicago in that case?
2 A. Correct.
3 Q. Were you an expert witness in that case?
4 A. I was not.
5 Q. So you were -- you were a fact witness who
6 testified as to things that you happened to know
7 because of your job?
8 A. Correct.
9 Q. Okay. I'm going to ask you a series of
10 questions as you know since you've done this. You're
11 required to answer them fully, accurately, and to the
12 best of your ability. Okay?
13 A. Correct.
14 Q. A deposition, as you know, is not like a
15 normal conversation. The court reporter is going to be
16 taking down everything we say so we have to be careful
17 not to talk over each other. Okay?
18 A. Okay.
19 Q. When you answer my questions you have to
20 answer audibly and clearly so the court reporter can
21 take down what you say.
22 So, for example, if your answer to a
23 question is a yes or no you can't just nod or shake
24 your head or such, but you have to actually say yes or

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1 no. Okay?
2 A. Understood.
3 Q. If at any time you don't understand my
4 question or need me to repeat it for any reason you'll
5 let me know. Okay?
6 A. Okay.
7 Q. And otherwise when I ask you a question I'll
8 assume that you understood it and that you answered it
9 fully, accurately, and to the best of your ability.
10 Okay?
11 A. Okay.
12 Q. If you need to take a break at any time we
13 can do that. If there's a question that's pending I'll
14 ask you to answer the question that's out there, but
15 once that's done you can ask for a break and we can do
16 that. Okay?
17 A. Okay.
18 Q. Have you talked to or otherwise communicated
19 with anyone about your deposition?
20 A. I have communicated with the Department of
21 Law.
22 Q. And who did you communicate with?
23 A. So specifically Wes Hanscom and
24 Rueben (phonetic).

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1 Q. And when did you communicate with them about
2 that?
3 A. So we discussed today briefly in terms of
4 the rules for discussion -- or deposition. We met I
5 believe yesterday or two days ago as well just to kind
6 of go through -- actually it was last week, I
7 apologize -- similar exercise, and then otherwise we
8 had talked about some of the exhibits in the past.
9 Q. Did you review any documents to prepare for
10 this deposition?
11 A. I did. I did read the exhibits.
12 Q. And so which exhibits?
13 A. I believe there was a number of exhibits.
14 Q. Do you mean the exhibits to your expert
15 report or the exhibits to the other expert report in
16 this case?
17 A. So I -- I'm not sure what the answer would
18 be. I've definitely read a number of reports that
19 were -- I read all the reports that were cited in my
20 expert report, and I believe a number of those had been
21 provided or cited by the other expert.
22 MR. HEUBERT: Okay. I'm going to ask the court
23 reporter to mark this document here as Exhibit 1.
24

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1 (Deposition Exhibit No. 1
2 marked as requested.)
3 (Discussion off the record.)
4 BY MR. HEUBERT:
5 Q. Okay. So you've been handed Exhibit 1.
6 Is this the expert report you prepared in
7 connection with this case minus the exhibits that were
8 attached to it?
9 A. It appears to be that. Yes.
10 Q. Could you, please, turn to page 7 of the
11 report?
12 A. Sure.
13 Q. Wait. I may have said the wrong number so
14 just a second here.
15 I meant page 4 -- I didn't mean page 4. I
16 meant page 7. I apologize for my confusion.
17 A. Okay.
18 Q. Okay. So in the first paragraph on this
19 page you reference a building in the Logan Square
20 neighborhood of Chicago, correct?
21 A. Correct.
22 Q. Rents have risen a lot in Logan Square in
23 recent years, haven't they?
24 A. Yes.

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1 Q. Do you have a sense of how much they've
2 risen?
3 A. I do not.
4 Q. Do you have a sense of when they started to
5 rise dramatically?
6 A. I do not.
7 Q. Do you have -- Why do you think rents have
8 risen so much in Logan Square?
9 A. I don't know why rents have risen
10 specifically in Logan Square, but there are a number of
11 factors of rents increasing throughout the city.
12 Q. And what would some of those factors be?
13 A. I mean definitely demand issues,
14 homeownership issues, issues around location
15 preferencing, and issues around supply and the
16 production of supply.
17 Q. And when you say demand issues what do you
18 mean?
19 A. So I think in some estimate we're getting
20 increasing numbers of people hoping to move into the
21 city in specific neighborhoods that are becoming
22 popular like Logan Square.
23 Q. And when you say supply issues what do you
24 mean?

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1 A. So supply issues in that the supply issues
2 are basically real estate supply and demand concerns in
3 that there are a number of available units for rental,
4 how many of those are being converted over to
5 homeownership, how many of those are being taken
6 offline and out of the market.
7 Q. There's at least one other factor that you
8 mentioned besides demand issues and supply issues.
9 Do you recall what that was?
10 A. Other than location preferences?
11 Q. Oh, okay.
12 And do location preferences tie into what I
13 already said about demand issues with just people
14 prefer to live there --
15 A. Yeah. I think location is a function of
16 demand.
17 Q. So because of the rising rents in Logan
18 Square people are concerned about a lack of affordable
19 housing there, aren't they?
20 A. It seems to be a problem for a lot of people
21 right now.
22 Q. So is there a lack of affordable housing
23 there in Logan Square?
24 A. I do not know.

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1 Q. Looking again at this paragraph on page 7 of
2 your report you reference single-room occupancy hotel
3 or SRO.
4 Can you explain what that is?
5 A. Sure.
6 Single-room occupancy is a zoning
7 classification for a type of hotel or living situation
8 that is predominately for low-income or formerly
9 homeless or currently homeless individuals. The
10 difference between that and a traditional rental
11 situation is that you rent a room that may be not a
12 complete unit. So it may actually just be a room with
13 a shared bathroom facility and that the leasing terms
14 are much more flexible all the way to the night or the
15 week.
16 Q. Do you know how many SRO buildings are
17 operating in Chicago now?
18 A. I do not know how many are operating
19 currently, but it is definitely a concern to the City
20 so the City has an SRO preservation ordinance to
21 maintain as many of them as possible.
22 Q. Do you have a ballpark figure of how many
23 there are?
24 A. I do not.

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1 Q. Do you know how many SRO units are being
2 rented or are available for rent in Chicago now?
3 A. I do not know.
4 Q. Do you have any sense of the ballpark of
5 that?
6 A. I do not.
7 Q. Okay. But one thing you could say for sure
8 is Chicago used to have a lot more SROs than it has
9 now; is that fair to say?
10 A. So one thing I can say for sure is that over
11 the last five to ten years there's been an increasing
12 effort with the City to preserve what is left of the
13 SROs and we have an ordinance to help us do that.
14 Q. But before five or ten years ago, decades
15 ago, there were a lot more SROs than there are now?
16 A. I do not know.
17 Q. Okay. I'm going to hand you Exhibit -- Or
18 I'm going to ask the court reporter to mark another
19 exhibit here. This will be Exhibit 2.
20 (Deposition Exhibit No. 2
21 marked as requested.)
22 BY MR. HEUBERT:
23 Q. Okay. Do you see that this appears to be a
24 Chicago Tribune article called SRO Hotels Continue To

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1 Dwindle from 1994?
2 A. It appears to be that. That's true.
3 Q. If you turn to the second page, please, and
4 look at the -- Just a second --
5 (Brief pause.)
6 BY MR. HEUBERT:
7 Q. -- second page there's a paragraph that
8 begins from 1973 to 1994.
9 Do you see that paragraph?
10 A. I do.
11 Q. And you say it says during that time period
12 SRO housing fell from 52,130 units to 13,554 units.
13 Do you know whether those figures are
14 correct?
15 A. I do not.
16 Q. Do they seem about right to you?
17 A. I have no context to make that answer.
18 Q. Okay. Do you know whether that would at
19 least reflect the general trend of the decline during
20 that time period?
21 A. I really do not know.
22 Q. Do you see there's a paragraph that begins
23 the report by the non-for-profit Lakefront SRO Corp.?
24 A. Uh-huh.

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1 Q. Have you heard of that organization?
2 A. I did. They're -- They're now called Mercy
3 of Lakefront.
4 Q. Okay. Would you consider it to be reputable
5 and reliable when it comes to this sort of information?
6 A. You'd have to define this sort of
7 information.
8 Q. Well, would it -- information about the
9 number of SRO units available in the city.
10 A. I think they're a great, qualified,
11 affordable housing developer. I do not know if they're
12 qualified to report on SROs for the city of Chicago.
13 Q. Okay. And then there's a paragraph that
14 begins with the words the loss of this affordable
15 housing.
16 Do you see that paragraph?
17 A. I do.
18 Q. And then later in that paragraph it says
19 nearly 70 percent of the SROs in the West Loop have
20 been demolished since 1985.
21 Do you know whether that was correct as of
22 that time?
23 A. I do not know.
24 Q. I'm going to ask the court reporter to mark

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1 another exhibit here, and then I'm going to hand it to
2 you.
3 (Deposition Exhibit No. 3
4 marked as requested.)
5 BY MR. HEUBERT:
6 Q. Do you see that this is an article --
7 appears to be an article from Chicago Magazine called
8 The Long, Slow Decline of Chicago's SROs?
9 A. It does appear to be that.
10 Q. Oh, I'm sorry (tendering).
11 Okay. And you see there's sort of a block
12 quote there that starts on the first page, and at the
13 bottom of the page it says -- continuing on to the
14 second page it says "But on the whole, the number of
15 SROs in Chicago has declined noticeably in the last
16 five years. In 2008 there were 106 licensed SROs.
17 Today, there are 81."
18 It starts in 2008. Today means five years
19 later in 2013.
20 Do you know if that information is correct?
21 A. I do not know if it's correct.
22 Q. Is it consistent with what you understand to
23 be the general trend during that time period for SROs
24 in Chicago?

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1 A. I don't know about that time period, but
2 there's a general trend in Uptown that SROs are being
3 privatized which is why the City has an ordinance to
4 preserve SROs.
5 Q. On page 4 of the next to last paragraph do
6 you see that it says in 1986 the Tribune reported that
7 the city had lost 17,000 SROs units since 1976,
8 including 3,000 alone in the West Loop space that now
9 houses the Presidential Towers?
10 Do you know whether any of those numbers are
11 correct?
12 A. I do not.
13 Q. Do you know if they're consistent with the
14 general trend in Chicago between 1976 and 1986?
15 A. I do not.
16 Q. Do you know those numbers to be incorrect?
17 A. I do not know them to be incorrect.
18 Q. And is that also true of the other numbers
19 regarding the number of SRO units I've given you don't
20 know them to be either correct or incorrect?
21 A. That would be true.
22 Q. We may have already covered this, but is it
23 fair to say that in recent decades there has been an
24 overall decline in the number of SRO buildings in the

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1 city of Chicago?
2 A. I don't know about recent decades.
3 Q. Is there a time period up to the present
4 when you know there has been a decline in the number of
5 SROs in Chicago?
6 A. So SROs in general are grandfathered in
7 their zoning so they're existing buildings and as they
8 age often there's -- there is a lot of private
9 development interest in purchasing those buildings
10 often because of the location and so what we've done in
11 the city is create a preservation ordinance to begin to
12 preserve affordability with those SROs as long as
13 possible.
14 Q. Okay. And the ordinance was considered
15 necessary because without it more of these buildings
16 would be put toward uses other than SROs as they age
17 and developers want to put them toward some other
18 purpose that they would consider to be more profitable?
19 A. That would be fair.
20 Q. Okay. The SRO ordinance you've referenced
21 that was enacted in 2014; is that right?
22 A. I believe that's correct.
23 Q. Do you know how many SRO buildings the city
24 had at that time?

Page 19

1 A. The City owned those buildings or existed?
2 Q. That were in the city at that time.
3 A. I do not know.
4 Q. Do you know how many SRO units were in the
5 city at that time?
6 A. I do not.
7 Q. So I'm going to tell you my understanding of
8 certain provisions of this SRO ordinance, and you can
9 then -- and I'll stop and ask you at different points
10 if my understanding is correct and if that's not how it
11 works you can correct me.
12 Now, my understanding of the SRO ordinance
13 is that if somebody owns an SRO building and wants to
14 sell it they have two choices. One choice would be to
15 pay the City a preservation fee of \$20,000 per unit in
16 that building and if they do that they can sell the
17 building right away basically to anybody with no
18 special restrictions on the future use of the building.
19 Is that one of the options?
20 A. I believe that's correct.
21 Q. Okay. And then my understanding of the
22 other choice is that if you want to sell your building
23 you give the City notice and then you have to wait
24 180 days to see if any offers to buy the property come

Page 20

1 in from anybody who wants to maintain the property as
2 affordable housing; is that right so far?
3 A. I believe that's correct.
4 Q. And if someone who wants to keep the
5 property as affordable housing makes an offer within
6 that 180-day period the owner then has to negotiate in
7 good faith with that would-be buyer for the rest of the
8 180-day period; is that right?
9 A. They don't have to negotiate for the rest of
10 the 180-day period. No, that's not correct. But they
11 can use that 180 days to negotiate.
12 Q. I see.
13 But -- Okay. Are you saying they don't have
14 to negotiate at all?
15 A. It depends on the buyer and the seller.
16 Q. Okay. And then if that -- that buyer who
17 wants to use the building for affordable housing and
18 the seller reach an agreement they have to enter a
19 contract where the buyer has to maintain the property
20 as affordable housing for 15 years; is that right?
21 A. I don't know if the ordinance specifies it
22 exactly but that would be the intention.
23 Q. Now, if an owner and a would-be buyer engage
24 in negotiations during that 180-day period and don't

Page 21

1 reach a deal then my understanding is the owner has
2 120 days in which he or she can sell the building to
3 anyone; is that correct?
4 A. I believe that's correct.
5 Q. And then if the owner doesn't sell it within
6 that 120-day period the owner has to go back basically
7 to square one and start the whole process over with
8 another 180-day period; is that correct?
9 A. I believe that's correct.
10 Q. Okay. Now, in addition to all that there
11 are anti-displacement and relocation requirements that
12 somebody who sells an SRO has to comply with; is that
13 right?
14 A. That is correct.
15 Q. Okay. And one of those requirements is if
16 an SRO is going to displace residents but there will be
17 some new affordable housing units in the new building,
18 whether that's an actual new building or renovated
19 building, they have to be invited back except if there
20 isn't room for all of them then there's a lottery to
21 decide who gets to be invited back; is that correct?
22 A. I believe that's correct.
23 Q. And if a conversion or construction makes an
24 SRO building temporarily uninhabitable then the owner

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1 has to arrange for comparable temporary accommodations,
2 including moving expenses, for those temporarily
3 displaced tenants; is that your understanding?
4 A. I don't know if that's 100 percent correct.
5 Q. Is there something in particular you think
6 might have been incorrect?
7 A. I'm not sure about the responsibility of
8 the -- of the developer to house all the individuals
9 temporarily, but there is a need to provide relocation
10 assistance.
11 Q. If an SRO resident is displaced because a
12 building is sold, converted, or demolished then the
13 owner or purchaser has to pay that person the greater
14 of \$2,000 or three months' rent -- and that 2,000 might
15 be adjustable for inflation. I'm not sure about
16 that -- does that sound right?
17 A. It sounds -- It sounds correct, but I'd have
18 to verify it.
19 Q. And if an SRO owner takes the option to pay
20 the preservation fee, paying that \$20,000 a unit to the
21 City, instead of going through the 180-day period then
22 the owner also has to pay an additional relocation fee
23 to the tenant of \$8600; is that consistent with your
24 understanding?

Page 23

1 A. I'm not sure about the numbers, but the idea
2 seems to be somewhat consistent.
3 Q. Okay. Going back to your report, Exhibit 1,
4 on page 7 you refer to an SRO building -- or a former
5 SRO building at 2001 North California in Chicago.
6 Do you know what I'm talking about?
7 A. I do.
8 Q. It says in your report that this building
9 was recently converted into a building that will be
10 reserved for short-term rentals.
11 Do you recall that?
12 A. That's correct.
13 Q. Do you know whether this building was sold
14 to a new owner who intends to -- or intended to convert
15 it for short-term rental use or is it just being
16 converted by the same owner who owned it before?
17 A. It's being sold to a new owner.
18 Q. Do you know if the original owner, you know,
19 the first owner went through the 180-day process or
20 paid the \$20,000 a unit fee to the City?
21 A. So the owner went through the -- the latter
22 process. He did not pay the fee. They went through
23 the time line.
24 Q. And did they sell to somebody who would use

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1 part of it for affordable housing or did they sell it
2 during that 120-day period where they're not restricted
3 in the new use of the building?
4 A. They were sold to the 120-day period where
5 they're not restricted.
6 Q. So nobody wanted to buy this building
7 apparently to use it for affordable housing?
8 A. No. I don't know that anybody came to a
9 consensus with the -- with the seller during the
10 negotiation period so I couldn't say that honestly.
11 Q. How do you know the building -- Well, has
12 the building been converted to use for short-term
13 rentals yet, do you know?
14 A. So the current operator is in the process of
15 pulling permits. The new owner is in the process of
16 permits.
17 Q. Okay. So the sale is complete?
18 A. The sale is complete.
19 Q. Okay. And how do you know it is being
20 converted for use as short-term rentals?
21 A. So the new owner told us it's being
22 converted for short-term rentals.
23 This particular owner operates similar
24 buildings and their leasing strategy is short-term

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1 rentals.
2 Q. And that's for the entire building?
3 A. That is their strategy. Yes.
4 Q. Doesn't Chicago's home sharing ordinance
5 restrict the number of units in a building that can be
6 used for short-term rentals?
7 A. I'm not an expert on that.
8 Q. So you don't know -- Do you know whether
9 they're going to use all of the units for short-term
10 rentals?
11 A. I do not know.
12 Q. Do you know how many units they're going to
13 use for short-term rentals?
14 A. I do not know.
15 Q. Do you know whether it's more than one unit?
16 A. I believe it's more than one unit.
17 Q. Do you know whether it's more than two?
18 A. I do not know specifically.
19 Q. So is that no?
20 A. So I do not know if they're going to do more
21 than one unit or more than two units.
22 What I do know is they told me that their
23 leasing strategy is to do short-term rentals.
24 Q. How many -- Do you know how many units will

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1 be in the converted building?
2 A. I believe there is 24 units total.
3 Q. And were residents of the building as an SRO
4 displaced as a result of this sale?
5 A. Yes.
6 Q. Do you know how many there were?
7 A. I do not know. We have that list, but I do
8 not know off the top of my head.
9 Q. And those residents should have received
10 whatever assistance the short-term rental ordinance
11 calls for for the -- either the previous owner or the
12 new owner to provide to them?
13 A. Correct.
14 Q. Did those residents also receive additional
15 assistance from the City?
16 A. No -- Well, actually let me -- how would you
17 define additional assistance?
18 They did not receive any additional cash
19 from us.
20 Q. Is there something else they received?
21 A. So I don't know, but I believe they may have
22 been connected with like DFSS or support services to
23 help in the relocation.
24 Q. What kind of services might DFSS have

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1 provided to --
2 A. DFSS focuses more on tenants specific or
3 human engagement services so they may have provided
4 options for housing or they may have provided options
5 for resources; but I'm not from the department, nor am
6 I very familiar with that.
7 Q. If those people did go to DFSS do you know
8 whether that would impose additional costs on DFSS to
9 deal with those people?
10 A. Oh, I don't know.
11 Q. Do you know whether the displaced SRO
12 residents found new lodging?
13 A. I do not.
14 Q. Do you know whether any of those displaced
15 residents are now homeless?
16 A. I do not know.
17 Q. Do you know whether the building at
18 2001 North California would still be operating as an
19 SRO if the current owner weren't using it for
20 short-term rentals?
21 A. Are you asking me if the current owner
22 bought it would they maintain as an SRO?
23 Q. I'll try to rephrase the question.
24 Is it your position that if the current

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1 owner weren't using this building at least in part for
2 short-term rentals the building would still be in use
3 as an SRO?
4 A. I do not know the intentions of the current
5 owner after they purchased the building, but I do know
6 that the short-term rental situation creates an issue
7 around long-term leasing that makes it difficult for us
8 to negotiate for any on-site affordability in addition
9 to what they're already doing because they are not
10 maintaining leases.
11 Q. Who's not maintaining the leases?
12 A. The -- The current owner. The new owner.
13 Q. Well, they might be having some long-term
14 leases, right?
15 A. They may, but the description they provided
16 to us is that they're going to lease using short-term
17 rental strategies.
18 Q. Okay. But again you don't know what
19 percentage of the leases would be used for short-term
20 versus long-term rentals?
21 A. I do not.
22 Q. If you're a landlord in Logan Square right
23 now and you only care about making money then it would
24 make sense to rent out your place at market rates for

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1 long-term rentals rather than SRO rates if you had a
2 choice, right?
3 MR. HANSCOM: Object to the form but go ahead if
4 you can.
5 BY THE WITNESS:
6 A. I mean I think that's part of the challenge,
7 correct, that we have an opportunity created through
8 short-term rentals that provides immediate cash to
9 investors and owners that may be greater than market
10 rents and so there becomes an incentive to do those
11 things unless you have to otherwise.
12 So unless you were forced to maintain
13 affordability that's probably unlikely they would
14 maintain affordability.
15 Q. And that would be true whether we're talking
16 about short-term rents or long-term rents, right, in a
17 market like Logan Square where rents for everybody are
18 increasing?
19 A. It depends on the ability of the property.
20 If we have existing relationships with the building
21 through zoning requirements or investments then it
22 makes it less true.
23 Q. Can you explain what you mean a little bit
24 more?

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1 A. So if we were invested into a property then
2 they have an obligation to rent it affordably
3 regardless of the location. So while they may have a
4 desire it doesn't mean they have an option.
5 So similar to an SRO they're granted a
6 certain zoning status based on their willingness to
7 rent affordably so maintaining that zoning status
8 moving forward is also a condition of renting it
9 affordably.
10 So regardless of location it becomes kind of
11 an ability to preserve affordability or protect
12 affordability.
13 Q. You referenced the City being invested in a
14 property.
15 What do you mean by that?
16 A. So part of my role is to invest funds into
17 buildings to create affordable options.
18 Q. So literally the City invests money in
19 buildings?
20 A. Correct.
21 Q. And does it become a part owner or does that
22 just place certain restrictions on the person who is
23 the owner?
24 A. So we become a lienholder and it does put

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1 restrictions on the owner and what they can do with
2 their tenancy.
3 Q. Was that the case with this building in
4 Logan Square we were talking about?
5 A. So in this building they had received --
6 they were conditioned on their zoning approval. Their
7 zoning was grandfathered in as an SRO and so to
8 maintain that zoning you have to -- under the
9 definition of an SRO you have to maintain at least
10 90 percent of the building as affordable.
11 Q. When they sold the building for a new use
12 did they have to get a zoning change?
13 A. I think they intend to get a zoning change.
14 Q. Does their current zoning not allow them to
15 do non-SRO rentals?
16 A. I do not believe their current zoning allows
17 them to do non-SRO rentals because they're zoned as an
18 SRO.
19 Q. And that's a unique, specific zoning
20 designation for SROs?
21 A. Yes.
22 SROs in general are units that are less than
23 a certain square footage that we would consider to be
24 not necessarily a habitable or unit size and SROs may

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1 not have an individual bathroom or a kitchen which we
2 require for a particular unit, so SROs are frankly
3 grandfathered in.
4 Q. So I think you said this but I want to make
5 sure I understand, your understanding is that this
6 building on North California cannot engage in any
7 short-term or long-term rentals until it gets a zoning
8 change?
9 A. Unless it's going to continue to operate as
10 an SRO.
11 Q. And does your office have to approve that
12 zoning change?
13 A. My office does not. The zoning office does.
14 Q. Does it have to go through the city council
15 to get that change?
16 A. Yes -- Or I believe it goes through the
17 zoning board of appeals. I'm not sure if that
18 qualifies as city council.
19 Q. Your job title is deputy commissioner in the
20 City of Chicago's Department of Housing; is that
21 correct?
22 A. That is correct.
23 Q. How long have you had that job?
24 A. So I've been with the deputy commissioner

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1 now since I believe 2017. July of 2017, I believe.
2 Q. Okay. And I see on page 1 of your report
3 here underneath where it says deputy commissioner
4 there's a number of bullet points. The first one says
5 oversee the City's investment in multifamily,
6 affordable housing and housing preservation programs.
7 Could you elaborate on what that means?
8 A. Sure.
9 So what I do is I oversee a number of
10 resources and programs that allow us to invest funds in
11 new construction and rehab and ultimate preservation of
12 affordability throughout the city.
13 Q. And could you explain what the next bullet
14 point means?
15 A. So the next bullet point says direct the
16 planning and coordination of multifamily financing
17 tools to include tax credits, bond cap, TIF and HUD
18 funding totaling over \$100 million annual and what that
19 means is I have a 100-million-dollar annual budget that
20 includes loan composing; tax credits; bond cap; TIF,
21 which is a funding source; and other HUD funds which
22 often are CDBG and home.
23 Q. And these are funds you can deploy to invest
24 in properties in the way you were telling me about

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1 earlier?
2 A. Yes.
3 Q. Okay. The next bullet says provide
4 day-to-day management for the underwriting team and act
5 as the division liaison for interdepartmental
6 coordination.
7 Could you elaborate on what that means?
8 A. Sure.
9 So I have a team of underwriters who look at
10 every deal and work with the developers for -- to
11 ensure our investment is meeting the qualification of
12 underwriting criteria that we've established and then
13 my role is also to be the liaison with all the other
14 departments that are involved in these activities. So
15 in the event if there's a zoning action I would meet
16 with a zoning officer.
17 Q. And then finally the next bullet point
18 begins represent the division in strategic planning
19 sessions.
20 Can you elaborate on that one?
21 A. Sure.
22 So the bullet says represent the division in
23 strategic planning sessions for new funding sources,
24 bonus programs, and pilot programs to increase

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1 affordable housing opportunities and improve
2 neighborhoods. So the role of the department is to
3 increase affordable housing throughout the city and to
4 improve neighborhoods of disinvestment.
5 What I often do is provide kind of that
6 affordable housing standpoint in those scenarios in
7 conversations and I use my expertise of having managed
8 these programs for a number of years to talk about what
9 works, what doesn't work, and what are some new ways we
10 can generate affordable housing.
11 Q. Underneath that the report indicates that
12 you were an assistant commissioner for housing
13 preservation in the City of Chicago Department of
14 Planning and Development.
15 Could you describe your duties in that job?
16 A. Sure.
17 So -- So at that point I was managing many
18 more of the programs and so technically I oversee that
19 division at this point. I'm supervising the now
20 A.C. of that position, but the role was much more
21 engaged on neighborhood development activities, vacant
22 and abandoned buildings, and working with community
23 groups to help redevelop the neighborhood and create
24 affordable housing opportunities.

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1 Q. The next item listed there on page 2 of
2 Exhibit 1 it says you were a real estate manager for
3 NHS Redevelopment Corporation.
4 Could you describe your duties in that job?
5 A. Sure.
6 So NHS Redevelopment Corporation is a
7 nonprofit affordable housing developer and my role was
8 to oversee their real estate activities, which was
9 anything from managing their bank and availability
10 programs to helping develop affordable housing, and a
11 lot of the programs that I worked on actually became
12 programs that I managed when I became assistant
13 commissioner.
14 Q. I see in your report that you received a
15 bachelor's degree in economics from Indiana University
16 in 1998; is that correct?
17 A. That's correct.
18 Q. Did you have to write an undergraduate
19 thesis?
20 A. I did not.
21 Q. As an undergraduate did you do any research
22 regarding the housing market?
23 A. I did not.
24 Q. Did you graduate with honors?

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1 A. I did not.
2 Q. I see also that you received a master's
3 degree in real estate from the University of Illinois
4 Chicago in 2006; is that correct?
5 A. That's correct.
6 Q. What is a master's degree in real estate?
7 A. A master's in real estate particularly at
8 UIC is the combination of what is their urban planning
9 program and their MBA program, and so while if you had
10 a master's in economics you would take 16 courses
11 dedicated to economics.
12 My classwork is specific to real estate, but
13 it was all engaged in -- it was specific to real estate
14 finance, real estate economics, and real estate theory.
15 Q. Do you have a sense of what people who get
16 that degree use it for?
17 A. I do not.
18 Q. Did you write a master's thesis?
19 A. I did not.
20 MR. HEUBERT: I'm going to hand the court reporter
21 another exhibit.
22 (Deposition Exhibit No. 4
23 marked as requested.)
24

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1 BY MR. HEUBERT:
2 Q. Do you recognize this?
3 A. I do not.
4 Q. Okay. Do you see that it's a list of course
5 requirements for people who receive an M.A. in real
6 estate at University of Illinois Chicago?
7 Is that what it appears to be?
8 A. If that's what you're telling me it appears
9 to be sure.
10 Q. Well, you see there's the URL there with
11 uic.edu and it kind of spells that out.
12 Were these the requirements for that degree
13 at the time that you received it?
14 MR. HANSCOM: The first part says admission
15 requirements, but then you're referencing the degree
16 requirements?
17 MR. HEUBERT: Yeah. In fact, yeah, I -- we can
18 focus on the degree requirements.
19 BY THE WITNESS:
20 A. So on page 1 the degree requirements I
21 believe that's accurate.
22 On page 2 I definitely recall a number of
23 these classes. I don't know if all of the classes were
24 required at the time. I'm not sure if this is saying

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1 all of the classes are required now.
2 Q. Do you recall which of these classes you
3 took?
4 A. I do recall a number of the classes. Yes.
5 Q. Can you tell me which ones of these you
6 recall taking?
7 A. So I recall Real Estate Finance,
8 Econ/Finance 472; Finance 500, Introduction to
9 Corporate Finance; Urban Space, Place and Institutions,
10 UPP 501; Land Use Law, UPP 553. Professional Topics
11 was a topic class so I do remember taking it, but the
12 topics changed.
13 Areas of concentration minor in
14 concentration was urban planning. I remember taking
15 UPP 533, Development Finance Analysis.
16 I do not recall the other classes.
17 Q. Anything you learned in the real estate
18 finance class inform the opinions you offered in your
19 report in this case?
20 A. Yeah. I think the opinions I offer in my
21 report were pretty simple in terms of the supply of
22 law. I mean, you know, it's supply and demand, and so
23 I'm sure corporate finance had some assistance but
24 that's generally around net present values and the cost

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1 of dollars. I think more specifically it starts with
2 an understanding of economics as an undergraduate
3 working throughout my career.
4 Q. Were you talking about real estate finance
5 or introduction to corporate finance?
6 A. I think you asked me about introduction to
7 corporate finance.
8 Q. Okay. How about real estate finance?
9 A. Real estate finance still is also it's --
10 The difference between finance and economics is finance
11 is really focused on the dollars and what's the cost of
12 a dollar and how does that value over time and so it's
13 really an understanding of that functionality.
14 So supply and demand issues, which is our
15 concern, is really more of an economics concern.
16 Q. Okay. So the finance courses you're saying
17 are not especially relevant to the opinions you've
18 offered in this case?
19 A. I would say that. Yes.
20 Q. What about the urban space, place, and
21 institutions course?
22 A. I would say yes.
23 Q. Yes what?
24 A. Yes, it is relevant.

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1 Q. Okay. Can you explain how?
2 A. So drawing back on my memory of urban space,
3 place, and institutions really talks about location and
4 spaces of location and how neighborhoods blend together
5 or work together and what those neighborhoods do to
6 build up into a community or a city and so it begins to
7 the lay the groundwork for planning as a -- as a
8 theory.
9 Q. And how does that relate to the opinions you
10 offered in this case?
11 A. So understanding particularly how the city
12 works across each of the neighborhoods realistically
13 and there was a number of references to the cascading
14 effects of rent changes and I think that plays directly
15 to that.
16 Q. Did anything in the course address the
17 effects the short-term rentals in the housing market?
18 A. I do not believe short-term rentals existed
19 when I went to graduate school.
20 Q. Did anything in the course address the
21 effects of increased long-term rents on homelessness?
22 A. I don't believe it went into homelessness at
23 all.
24 Q. On the -- Excuse me.

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1 How about the land use law course did that
2 cover things that you applied in forming your opinions
3 in this case?
4 A. It may have. Land use law is a foundational
5 theory of real estate law so it may have had some
6 implications, but I can't remember directly what those
7 would have been.
8 Q. And you mentioned the professional topics
9 course could be various topics.
10 Do you recall what the topic of your
11 professional topics course was?
12 A. Not specifically, but it had to do with the
13 development analysis.
14 Q. Is there anything in that that you think
15 is -- that you applied in forming your opinions in this
16 case?
17 A. I do not recall.
18 Q. Going down to the development finance
19 analysis course is there anything covered in that
20 course that you applied in forming your opinions in
21 this case?
22 A. I do not recall. I believe this case --
23 this class was much more specific to finance.
24 Q. Do you have any academic degrees that aren't

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1 listed on your report?
2 A. I do not.
3 Q. Have you ever published anything in any
4 academic journals?
5 A. I have not.
6 Q. Have you ever published articles anywhere
7 else?
8 A. Academic articles, no. But I have been
9 featured in articles, but I've not written any
10 articles. No.
11 Q. Okay. When you say featured in articles you
12 mean quoted or --
13 A. Quoted or asked for, yes.
14 Q. Do you have any experience performing an
15 econometric analysis?
16 A. I do not.
17 Q. Do you have any experience in performing
18 statistical analysis?
19 A. I do not.
20 Q. Did you play any role in drafting Chicago's
21 ordinance regulating home sharing?
22 A. I did not.
23 Q. You advise anyone to your knowledge who
24 played any role in the drafting the home sharing

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1 ordinance?
2 A. I did not.
3 Q. Before Chicago enacted its surcharge on home
4 sharing did you advise anyone that the City should do
5 that?
6 A. I did not.
7 Q. Do you know where the idea of the home
8 sharing surcharge came from?
9 A. I do not.
10 Q. How did you become involved in this lawsuit?
11 A. So I -- I believe I was referred by someone
12 in another department and -- and Wes was I believe the
13 first person to reach out to me and asked my
14 familiarity with short-term rentals and understanding
15 really kind of what I did for the City.
16 I believe that's how I got involved.
17 Q. Do you remember who the person in the other
18 department who contacted you about that was?
19 A. No. I was contacted directly by the
20 Department of Law. I'm not sure who referred me.
21 Q. Oh, I see.
22 If you look at your report, Exhibit 1, on
23 page 4 there's a paragraph in the middle of the page
24 between the bullet points.

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1 Do you see there it says in my opinion these
2 reports are of a type that would be reasonably relied
3 upon by policymakers and advisors in positions such as
4 mine in forming opinions and inferences upon the
5 subjects that the reports address?
6 Do you see what I'm talking about?
7 A. I do see it. Yes.
8 Q. What do you mean by policymakers and
9 advisors in positions such as mine?
10 A. So when I was describing my role I think
11 that last bullet point we talked about kind of
12 strategic planning and so often what I do is I make
13 policy or I advise others who are making policy around
14 the creation or preservation of affordable housing.
15 Q. Do you ever give advice regarding tax
16 policy?
17 A. I do not deal with taxes -- No. I take that
18 back.
19 Yes. We have made recommendations to the
20 State for tax policy which is related to affordable
21 housing.
22 Q. Can you explain that a little bit?
23 A. Other than the State and the County the
24 County in particular has had a -- what they call a

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1 Class 9 designation for affordable housing that they
2 got rid of last year so some of the advocate community
3 has been pushing for changes to the tax code to help
4 homeowners -- help landowners or developers that own
5 and rent affordably that their taxes should also
6 reflect that designation.
7 Q. When you say policymakers and advisors in
8 positions such as mine who are you including in that
9 category?
10 A. So I would -- I would say the deputy
11 commissioner level as well as managing deputy at the
12 commissioner level who often work with the legislative
13 staff within the City to create laws and policy.
14 Q. Are you talking about specific officials in
15 the city of Chicago or are you talking about a broader
16 group of some kind of professionals?
17 A. So in this context I'm talking about the
18 city of Chicago, but I think equally it could be a
19 broader group of professionals or lawmakers.
20 Q. And -- And how would you describe that
21 category of people?
22 A. So initially I described it as the deputy
23 commissioners, managing deputy commissioners, and then
24 commissioners of the various departments working with

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1 the Mayor's Office, but there is also instances
2 particularly as I relate to the Class 9 where we worked
3 with the advocate community who was working with the
4 State and the state representatives.
5 Q. So you mean state legislators?
6 A. Yeah.
7 Q. And so you're including state legislators in
8 the group of policymakers here?
9 A. So I think in this case I was specifically
10 talking about the deputy commissioners, managing deputy
11 commissioners, and the commissioners in the city as
12 well as the Mayor's Office who make policies and laws,
13 but as I reflect on it there's no reason why these
14 types of reports wouldn't help any policymaker. I mean
15 these are exactly the type of reports that we would
16 look at.
17 Q. Well, how do you decide what report to rely
18 on when you're considering what policies are
19 appropriate for the City to adopt?
20 A. So I think we rely on a number of reports as
21 opposed to one specific report.
22 Q. Okay. Well, how do you decide which ones?
23 A. I think it's through consensus more than
24 anything else. As everybody reads the reports and

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1 begins to believe in digesting what they're saying if
2 there's consensus amongst those who are engaged in the
3 reports as well as the various reports and what they
4 say I think that's how you end up choosing them.
5 Q. And who would this consensus be among?
6 A. It depends on what we're talking about or
7 law or policy.
8 So it could be as small as -- if I was doing
9 a policy within my division it could be as small as me
10 and my underwriting team and maybe the commissioner.
11 If I working across the city I may engage the
12 Mayor's Office and potentially some of the aldermanic
13 and elected officials.
14 Q. When you're deciding what reports to rely
15 on, understanding that you're going to have to reach a
16 consensus with others, but when you're deciding which
17 ones you think should be relied on do you consider who
18 authored the report?
19 A. I think there's definitely a consideration
20 for who authored the report, but I don't know what
21 value I'd weight that with compared to other
22 considerations.
23 Q. Okay. And what kinds of authors would you
24 be more likely to rely on?

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1 A. I believe we'd be more likely to rely on
2 university authors or larger, familiar research
3 institutions. And generally I think we try to -- to
4 rely on particularly -- I particularly try to rely on
5 agencies that don't have any sort of intentional or
6 bias perspective on -- on any agenda.
7 Q. Do you consider whether a report was peer
8 reviewed?
9 A. So I do not consider whether a report is
10 peer reviewed. No.
11 Q. Do you consider where it was published?
12 A. I'm concerned with who published it.
13 In terms of where I mean for our purposes we
14 generally stick to the U.S.
15 Q. I suppose I meant where it was in the sense
16 of whether it was in an academic journal, whether it
17 was on a website; whether it was a, you know, policy
18 study put out by some kind of foundation that that sort
19 of thing do you consider the source in that sense.
20 One sort of source would be the author. The
21 other sort of source would be like the publisher.
22 A. So we would consider the author and the
23 publisher, but I wouldn't necessarily consider the
24 medium.

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1 Q. And what publishers would you be more likely
2 to rely on?
3 A. So similarly, so nonprofits or research
4 institutions or universities.
5 Q. Do you consider whether the author of a
6 report applied a reliable methodology?
7 A. So there are others that may consider that
8 more than I would. Yes.
9 Q. I'm asking about you.
10 A. So I can -- I'm more concerned about the
11 size of the -- of those engaged.
12 So methodology, yes; but whether it's the
13 econometrics or a statistical analysis, no, I do not.
14 But if it's a large enough sample size then, yes, I do.
15 Q. How do you know whether a sample size is
16 large enough?
17 A. So usually the report will describe it.
18 Q. Well, how do you make a judgment if it's
19 large enough if you're not familiar with the
20 econometric or statistical methods?
21 A. I think my judgment is much more simple than
22 that. If it's a few tens or a few hundreds then I'm
23 not that interested, but if it's, you know, a much more
24 measurable effect that can be replicated or understood

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1 on a larger level than I am interested.
2 Q. Well, how do you know whether tens or
3 hundreds are an appropriate sample size in a given
4 field?
5 A. So I think every field is different. So it
6 would have to be -- it would have to be something that
7 we'd be looking at, but I don't know that tens or
8 hundreds would affect policy decisions.
9 Q. Okay. But you did say you judge the
10 reliability of a report by its sample size so I'm still
11 trying to figure out how you determine what's an
12 appropriate sample size.
13 A. Yeah. No. I think a sample size is going
14 to be respective to the topic and report at hand so I
15 don't know that there's a binary answer to that.
16 Q. Do you consider an author or publisher's
17 political or ideological background in deciding whether
18 to rely on its report?
19 A. That has not been a factor that I've had to
20 consider or been known or aware of to have to consider.
21 Q. Going back to your statement that the
22 reports you list are of a type that would be reasonably
23 relied upon by policymakers and advisors in positions
24 such as mine, how do you know what other policymakers

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1 and advisors would rely on outside of the city of
2 Chicago?
3 A. So I don't know for sure what other
4 policymakers outside the city of Chicago would rely on,
5 but I do engage a number of other cities both
6 domestically and internationally and we do discuss
7 topics and we do share policy papers and so my
8 assumption is that they rely on similar types of
9 analysis as these.
10 Q. Let's turn to page 3 of Exhibit 1, which is
11 your report.
12 The bullet points that start there are
13 reports that the plaintiffs' expert reviewed; is that
14 right?
15 A. Are you asking me or are you asking your
16 colleague?
17 Q. I'm asking you.
18 A. If you're telling me that, yes, I believe
19 so.
20 Q. Okay. Well, I mean I -- right, that's how
21 it's set up here reports discussed at Dr. Moore's
22 deposition included and then there's bullet points and
23 so that's what we're talking about.
24 And the first thing on here is an item

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1 called How Airbnb Short-Term Rentals Exacerbates Los
2 Angeles's Affordable Housing Crisis by Dayne Lee.
3 Do you see what I mean there?
4 A. I do.
5 Q. That article is actually a student note from
6 a law journal, isn't it?
7 A. I do not know.
8 Q. Do you know whether law students' notes are
9 peer reviewed?
10 A. I do not.
11 Q. Do you know whether this student was peer
12 reviewed?
13 A. I do not know.
14 Q. Are law review student notes something you
15 normally rely on in formulating policy advice or making
16 policy decisions?
17 A. I do not know.
18 Q. Do you know whether the author here Dayne
19 Lee has any training in economics?
20 A. I do not know.
21 Q. Have you read the entire note by Dayne Lee?
22 A. I've read this -- the excerpt that was
23 provided to me -- the study that was provided to me.
24 Q. Were you provided with the complete article?

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1 A. I believe so or at least the 229 to 253.
2 It's been some time. I'd have to go back and confirm.
3 Q. What methodology did this article apply?
4 A. Other than laws of supply and demand I do
5 not know -- I do not recall.
6 MR. HEUBERT: All right. I'm going to hand the
7 court reporter this as our next exhibit, and can you
8 please mark this as the next exhibit.
9 (Deposition Exhibit No. 5
10 marked as requested.)
11 MR. HEUBERT: I'll give you this copy (tendering).
12 I apologize that these are printed on both
13 sides. We realized kind of too late that we did that.
14 Hopefully that won't make it too hard to find what
15 we're talking about.
16 MR. HANSCOM: Do you want a break?
17 THE WITNESS: No. I'm fine.
18 MR. HANSCOM: Okay.
19 BY MR. HEUBERT:
20 Q. Okay. If you could turn to the page marked
21 down in the lower right-hand corner D00309.
22 A. Mine's cut off.
23 MR. SCHWAB: He might not be able to see that.
24

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1 BY MR. HEUBERT:
2 Q. Oh, I'm sorry. Okay. Well, how about do
3 you have the page numbers at the top?
4 A. I do.
5 Q. Okay. Could you go to page 234?
6 A. (Complying.)
7 Q. And then you'll see there's a section
8 heading here Airbnb Increases Rents. It starts that
9 way.
10 A. Uh-huh.
11 Q. This is the section of this article that
12 discusses how the author believes Airbnb increases
13 rents particularly in Los Angeles, correct?
14 A. Correct.
15 Q. At the beginning of the last paragraph on
16 this page, which is not a complete paragraph on this
17 page, it says each apartment or home listed year-round
18 on Airbnb is a home that has been removed from the
19 residential housing market and added to the city's
20 aggregate stock of hotel rooms.
21 That's not necessarily true, right?
22 A. I do not know.
23 Q. I mean a person could list their place on
24 Airbnb all the time and then when it's rented out go

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1 stay with a friend or family member or something like
2 that so that it wouldn't actually be removed from the
3 residential housing market.
4 A. Well, if it's listed year-round it is not
5 available for rent.
6 Q. But it could be the person's residence that
7 they stay in and then they just -- you know, if they
8 rent it out a few times a month during those days they
9 go stay with a friend or family member, they just go
10 stay somewhere else for a while but otherwise they live
11 there it's serving as a residence for them; it's not
12 being taken out of the stock of residential housing;
13 that can happen, right?
14 A. It is taken out of the stock and when they
15 go rent somewhere else they're also taking that out of
16 the stock.
17 Q. Right. But the scenario I'm describing is
18 this person doesn't go rent another place. They live
19 in this place, their stuff is there, they rent it out
20 sometimes and when they do rent it out they go stay
21 with their parents say so it's not being removed from
22 the stock of residential housing, right; it's still
23 that person's residence?
24 A. It's still their residence but not made

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1 available to anybody other than short-term rentals so
2 it's not available for lease by an actual tenant.
3 Q. That person is the tenant. In fact, that
4 person could be a long-term tenant, right?
5 They could be leasing it from somebody else
6 long term.
7 A. How would you make the distinction between
8 that person and just an investor/owner who doesn't live
9 there at all?
10 Q. I mean that is the distinction. That's the
11 distinction I'm drawing, this is somebody who --
12 A. So is the building available for rent or
13 not?
14 Q. It's used as long-term -- In my hypothetical
15 that I'm presenting to you it is used as this person's
16 long-term residence, they have no other long-term
17 residence, but sometimes they let somebody stay there
18 and they go hang out someplace else so in that
19 situation nothing is changing in the housing market,
20 right, nothing is any different than if they didn't
21 list it as a short-term rental at all.
22 A. I think there's a lot of difference.
23 Q. How is the housing market different if a
24 person does that versus if they don't?

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1 A. Well, that person is not living there.
2 Q. Well, they are living there just not for the
3 occasional periods of time when someone is staying
4 there short-term.
5 A. If they're listed year-round I don't see how
6 that's occasional.
7 Q. Well, that's the hypothetical I just
8 presented to you.
9 A. I don't work in hypotheticals.
10 The hypothetical that I presented is it's
11 taken out of the market.
12 Q. You have to answer the questions that I ask.
13 You can't give me a different hypothetical.
14 A. I believe there's an effect. It's taken off
15 the market. The person isn't living there.
16 Q. Do you understand that it's not on the --
17 it's not on the market anyway the way I'm setting this
18 out for you.
19 A person -- If I -- Okay. I have my house
20 that I live in. If I occasionally do short-term
21 rentals on it and go stay with my mom during that time
22 nothing in the housing market has changed, right,
23 because my house is still my house just like it always
24 was?

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1 I'm not renting a different place. Nobody
2 else is renting my place.
3 It's the same except that there's a
4 short-term renter who pops in, but for purposes of the
5 housing market nothing is different, right?
6 A. I mean you're not living in your house and
7 you're staying elsewhere.
8 Q. But I'm not driving up rents, right, through
9 my activity?
10 A. Well, we don't know that.
11 Q. How would that activity I just described
12 potentially drive up rents?
13 A. Well, if someone would actually like to live
14 in that unit and you're not living there and you've
15 removed that unit from the marketplace and so you
16 reduce supply.
17 So your hypothetical becomes worse if you
18 have two houses or three houses.
19 Q. Right. I'm not talking about that.
20 I'm talking about I only have one house --
21 A. Right.
22 Q. -- it's got all my stuff in it, and I go
23 stay with my parents, which I could do even if I didn't
24 have a short-term rental --

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1 A. Right.
2 Q. -- right?
3 If I didn't have a short-term rental and I
4 go stay with my mom for a few days I'm not affecting
5 the housing market surely, right?
6 A. Any time you live, own, or operate a
7 building you're affecting the housing market.
8 Q. But the fact that I go visit somebody
9 doesn't change anything with respect to the housing
10 market, right?
11 A. No. You're living there has already
12 affected the housing market.
13 Q. Right.
14 A. You owning that place is affecting --
15 Q. Right.
16 A. -- the housing market.
17 Q. Yes. Yes.
18 Owning it affects it, but the fact that I go
19 visit somebody for a few days and leave it vacant say
20 that doesn't change anything in the housing market,
21 right?
22 A. If you leave your house for a few days it
23 does not change anything in the housing market.
24 Q. And that's true whether or not a short-term

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1 guest from out of town is occupying it while I'm out
2 for a few days, right?
3 A. If you're out for a few days and a guest is
4 there for a few days it doesn't change anything so long
5 as you're not occupying another unit in the city.
6 Q. Okay. And if a home previously wasn't
7 rented out long term and then starts being rented out
8 on a short-term basis could we really say it was
9 removed from the housing market?
10 A. Yes.
11 Q. Why can we say that?
12 A. Because it's no longer available for other
13 people to live in it.
14 Your house is a function of the housing
15 market.
16 Q. Turning to the next page 235 at the top of
17 the next page the author makes the claim in the last
18 sentence on this page in 2014 rents in these
19 neighborhoods, which he's just listed, were 20 percent
20 higher and increased 30 percent -- 33 percent faster
21 than rents citywide.
22 Oh, and those are the neighborhoods that
23 he's identified are the ones where Airbnb listings are
24 most concentrated.

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1 And so in this paragraph the author is
2 alleging correlation, not causation, right?
3 A. I'm not sure what you mean by that.
4 Q. So the author is saying these are the
5 listing -- these are the neighborhoods where Airbnb
6 listings are concentrated --
7 A. Okay.
8 Q. -- and in those neighborhoods rents went up
9 faster than in other neighborhoods, but he is not
10 saying here that necessarily the fact that these have
11 the most Airbnb listings is responsible for the
12 increase in rents. It could be.
13 He's not saying it's not, but he's only
14 saying the fact that these have the most Airbnbs and
15 rents did go up there, correct?
16 A. I don't know that you're asking me a
17 question.
18 Q. Okay. Do you understand the difference
19 between correlation and causation?
20 A. It would be helpful if you explain it. Yes.
21 Q. If -- Okay. If -- It's one thing to say --
22 Let me think of a good example.
23 (Brief pause.)
24

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1 BY MR. HEUBERT:
2 Q. So we can observe these neighborhoods have
3 the most Airbnb listings and these neighborhoods also
4 saw a bigger increase in rents than other
5 neighborhoods. That's a correlation more Airbnbs and
6 higher rents are together in the same place but that
7 information by itself doesn't tell us that having more
8 Airbnb listings makes rents go up.
9 It could be a coincidence just based on that
10 information, right?
11 A. If you were to limit the information just to
12 those two factors then, yes, that would be correct.
13 Q. Right.
14 And my point is you need something else to
15 prove causation to prove that the fact that there were
16 Airbnb listings made the rents go up.
17 A. I'm not sure how to answer because I still
18 question the validity of the correlation based on those
19 two facts, and the reason I'm stuck, frankly, is just
20 when you start talking about -- one because we're only
21 narrowing it down to a limited instance, but, two, any
22 time you start talking about rents and increases of
23 rents it implies a lot of other factors and so I don't
24 know if I can actually say there's only the two

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1 instances in your corollary example because rents is
2 kind of a loaded term.
3 You know, if you were to say people that eat
4 carrots and smoke cigarettes get lung cancer I
5 understand that, but neither one of those are very
6 loaded.
7 Q. Right.
8 Well, that's the -- Right, that's whole
9 point of correlation and causation but --
10 A. So I struggle because reality is I
11 understand and that's why these are great -- these
12 reports as a whole are just great points of reference
13 to us so we can come up with opinions because in our --
14 in our denser areas where rents have increased it's
15 often as a result of a number of factors of which
16 supply may be one of them and so as you move toward
17 short-term rentals we know supply is being affected and
18 so you have less units available and price goes up.
19 Q. Does this author purport to have done the
20 kind of economic study necessary to show causation that
21 is that more Airbnb listings makes rents go up?
22 A. I believe this author did say that, but I
23 would have to review it more recently to make that
24 declarative statement.

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1 Q. So right now your answer is you don't know;
2 is that right?
3 A. So I think this author makes a strong case
4 that the effect of Airbnb in any neighborhood affects
5 the city as a whole.
6 Q. Okay. What methodology does he use to do
7 that?
8 A. I don't know.
9 Q. Does he perform the kind of econometric
10 analysis that an economist would perform to show that
11 one factor causes another, the change in one thing
12 causes a change in another?
13 A. I do not know.
14 Thumbing through it it does not appear
15 there's an econometric analysis, nor do I know that I
16 would rely on it so -- because there was an econometric
17 analysis.
18 Q. You wouldn't rely on it more if it was an
19 econometric analysis showing causation?
20 A. No.
21 I would let other people on our consensus
22 team worry about that.
23 Q. Do you have economists on your team?
24 A. We have people that are policymakers that

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1 have econometric and statistical backgrounds. Yes.
2 Q. Who are they?
3 A. So individuals out of the Mayor's Office.
4 Particularly there was one person named Cara Bader and
5 I don't recall the others, but we're at a point of
6 transition now so it's -- I don't know who's left.
7 Q. Looking at the last full paragraph on
8 page 237 if you could just read that paragraph to
9 yourself and let me know when you're done?
10 A. Starting with the price effect?
11 Q. Yep, just that paragraph.
12 (Brief pause.)
13 BY THE WITNESS:
14 A. Okay.
15 Q. So the author here is making a -- sort of a
16 claim about the price effect on a supply shock in
17 Los Angeles and it says in the last sentence the
18 rent -- under the model he has here the rent on
19 2,680-dollar, one-bedroom apartment in Venice would
20 increase by \$67 per month as a result of a 1 percent
21 decrease in supply; is that right?
22 A. That is what he wrote. Correct.
23 Q. Do you know if that's -- the way this is
24 discussed here in this paragraph is how an economist

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1 would analyze this issue?
2 A. I think what he's using is very basic supply
3 and demand comparison, but I don't know how much deeper
4 that goes.
5 Q. Okay. But my question was do you know if
6 that's how an economist would analyze this issue.
7 A. I believe an economist would come up with a
8 very similar response.
9 Q. Okay. And what do you base that on?
10 A. My experience in reading these reports and
11 having gone through an undergraduate degree and a
12 master's that involved a lot of economy research and
13 understanding.
14 (Brief pause.)
15 BY MR. HEUBERT:
16 Q. Do you know how strong the statistical
17 correlation the author is discussing here on page 237
18 is?
19 A. I'm not sure what you're referring to.
20 Q. Okay. The author talks about -- In the last
21 full paragraph on page 237 --
22 A. Uh-huh.
23 Q. -- the author talks about a supposed effect
24 that changes in supply has on rents.

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1 Do you know how strong the statistical
2 correlation in that model is?
3 A. Statistical correlation to what?
4 What the author has done is said here's a
5 relatively simple model and so if you hold your supply
6 relatively flat that each decrease would change the
7 rents.
8 I don't know that you need statistics to
9 figure that out.
10 Q. If you look at Footnote 43 on page 237 the
11 next to last sentence in that footnote says "However,
12 it is likely that the whole unit STR figure cited from
13 the Samaan report include some housing units that are
14 in fact occupied by the owner or leaseholder for most
15 of the year, and not listed year-round on that service.
16 Such units are not removed from the residential housing
17 market."
18 Do you disagree with that statement?
19 A. This goes back to your question earlier of
20 how you would define remove the residential housing
21 market.
22 So, yes, the owner if they're living there
23 they're part of the housing market and unless it's --
24 as long as it's serving that main purpose of housing

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1 somebody for long term then that's fine.
2 I think it's fair to make some distinctions
3 between in which the time somebody lives in their unit
4 and the time at which that unit is available for
5 short-term rental, and I think part of that distinction
6 involves whether or not you can rent it to somebody
7 else on a full-time lease.
8 Q. All right. Going back to your report,
9 Exhibit 1, the third bullet point on page 3 references
10 an article called Is Home Sharing Driving Up Rents?
11 Evidenced from Airbnb in Boston.
12 Do you see what I'm talking about?
13 A. I do.
14 Q. Do you know whether this report was peer
15 reviewed before it was published?
16 A. I do not.
17 Q. Have you read the entire report?
18 A. I have.
19 Q. What methodology do the authors of that
20 article apply?
21 A. I do not recall.
22 MR. HEUBERT: Okay. I'm going to ask the court
23 reporter to mark this as Exhibit 6.
24

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1 (Deposition Exhibit No. 6
2 marked as requested.)
3 BY MR. HEUBERT:
4 Q. If you turn to page 19 of the report and
5 look under "Results" I'll have a question about that.
6 Okay. So in the -- under results the third
7 sentence says for those census tracts in the highest
8 decile of Airbnb listings relative to total housing
9 units this -- this increase in asking rents ranges from
10 1.3 percent to 3.1 percent. That's the first part of
11 the sentence. I'll cut it off there.
12 Now, is it your understanding when they're
13 talking about the highest decile of Airbnb listings
14 they mean the 10 percent of census tracts in Boston
15 that have the most Airbnb listings; is that -- relative
16 to total housing --
17 A. True.
18 Q. -- is that right?
19 A. True.
20 Q. And they're saying that Airbnbs have caused
21 rents to rise in that highest decile from 1.3 percent
22 to 3.1 percent; is that your understanding what they're
23 saying?
24 A. That is what they're saying.

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1 Q. Okay. Do you know how strong the
2 statistical correlation between increased Airbnb
3 density and increased rent is?
4 A. I do not.
5 Q. Does this article say whether this
6 1.3 to 3.1 percent increase in rents would lead to an
7 increase in homelessness?
8 A. This report I do not believe says it will
9 specifically increase homelessness, but it does say
10 that it will increase rents which makes affordability
11 more difficult.
12 Q. Do you believe that a 1.3 to 3.1 percent
13 increase in rent will increase homelessness?
14 A. So ultimately, yes, I do believe any
15 increase in rents through reduction of supply may have
16 an effect that increases homelessness.
17 Q. Okay. Can you explain the process by which
18 a 1.3 to 3.1 increase in rent would lead to an increase
19 in homelessness?
20 A. Sure.
21 So I think it's very easy for a lot of
22 people to think that neighborhoods work in a silo and
23 the reality is it doesn't. The city is a whole and
24 where people move is often a function of that whole,

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1 and so any time you have supply issues and you have
2 difficulty in finding affordable rental, affordable
3 rental availability you're forcing people to be moving
4 around and displaced and so it could be as simple you
5 could have a situation like we do in Logan Square where
6 because of the high cost of rents if somebody chose to
7 buy an SRO and displace families and make them homeless
8 or you could only have an effect like this where
9 they're increasing rents you can just kind of have a
10 spiraling effect and it pushes a lot of downward
11 pressure as people are forced to move from where they
12 could afford to where they can't afford and ultimately
13 that works its way down the struggle.
14 It is fairly common to understand that a
15 number of families are on the edge of homelessness and
16 it could be as simple as one paycheck. It could be as
17 simple as a couple hundreds of dollars so any minor
18 increase in rent could tip them over the edge of their
19 housing and security.
20 Q. Do you think -- So this is talking about a
21 1.3 to 3.1 increase in rents in these areas with a high
22 concentration of Airbnb listings.
23 Do you think that this increase in those
24 areas could lead to an increase in rents of more than

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1 3.1 percent in other neighborhoods?
2 A. I think, you know, without knowing all the
3 different variables that go into it, sure, why not. I
4 mean it's really an issue of supply and demand and so
5 depending on how many people are being displaced or
6 removed from their particular area and their movement
7 into other areas it could be exacerbated.
8 So in Boston in particular they have a
9 tremendous issue with housing affordability and so I
10 think the number of available and affordable units is
11 already readily slip and slow and so as you begin to
12 exacerbate that problem, yeah, you could easily go
13 above that number.
14 Q. But this study doesn't purport to show that,
15 right?
16 A. No.
17 Q. And are you aware of any study that purports
18 to show that?
19 A. That it's over 3.1 percent, no.
20 MR. HANSCOM: I wouldn't mind a five-minute break
21 in a minute.
22 MR. HEUBERT: I'm between questions so it's as
23 good as time as any.
24 MR. HANSCOM: Okay. Great. Thank you.

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1 (A recess is taken.)
2 BY MR. HEUBERT:
3 Q. So in this Boston study that we've been
4 talking about this 1.3 to 3.1 percent increase in rents
5 was an average, right, not necessarily an increase in
6 everyone's rent in the areas they studied?
7 A. I think they were talking specifically about
8 that highest decile.
9 Q. Right.
10 But within that highest decile it's not like
11 everybody saw that increase; it could be some people
12 saw more than a 3.1 percent increase and some people
13 didn't see any increase?
14 A. I would have to review it in more detail to
15 find out.
16 Q. Okay. I mean does the study tell you how
17 many renters actually saw an increase in their rents?
18 A. I would have to look to see if it said that
19 specifically.
20 Q. You can refresh your memory.
21 (Brief pause.)
22 BY THE WITNESS:
23 A. So in an attempt to refresh my memory I'm
24 not seeing any specific cited number to say how many

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1 people were affected by rent changes.
2 Q. Do you think the author's conclusion about
3 Boston tell us anything about the effects of short-term
4 rentals and affordable housing in Chicago?
5 A. So I think studies like this definitely
6 allow us to form some opinions about Chicago.
7 Q. Why?
8 A. So I think studies like this like we've seen
9 across a lot of these studies any time you reduce
10 supply of available rental housing you have an issue or
11 you start to see an uptick in rent prices which has an
12 effect on affordable housing.
13 Q. Going back to Exhibit 1, turning to page 4
14 of your report, do you see the first bullet point on
15 that page which refers an article called Do Airbnb
16 properties affect house prices?
17 A. I do.
18 Q. Have you read that entire article?
19 A. I have.
20 Q. Did this article find a statistical
21 correlation between increasing rents and short-term
22 rentals?
23 A. I do not recall if they had a statistical
24 correlation.

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1 Q. Do you recall what methodology the authors
2 of that article applied?
3 A. I do not.
4 Q. Did the article say anything about
5 short-term rentals effect on homelessness?
6 A. I do not believe it specifically cited
7 homelessness.
8 Q. And do you think the author's conclusions in
9 that article about New York City tell us anything about
10 the effects of short-term rentals on affordable housing
11 in Chicago?
12 A. I believe like all these reports it provides
13 enough understanding about supply and demand that we
14 should provide our own opinions for Chicago.
15 Yes, it's been very helpful.
16 Q. Do you think the author's conclusions about
17 New York City tell us anything about the effects of
18 short-term rentals on homelessness in Chicago?
19 A. I think ultimately the concern about
20 homelessness and affordability are the same.
21 So when you lose affordability you
22 exacerbate homelessness.
23 Q. Okay. Now looking at the second bullet
24 point on page 4 do you see there it says there's a

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1 report called The Impact of Airbnb on NYC Rents?
2 Do you see what I'm talking about?
3 A. Yes.
4 Q. Okay. Have you read that entire article?
5 A. I have.
6 Q. Did this article find a statistical
7 correlation between increasing rents and short-term
8 rentals?
9 A. I mean the bullet point here says an
10 empirical analysis so if you consider that to be
11 statistical analysis I would say yes, but otherwise I
12 am not sure.
13 Q. Do you know how strong -- Do you know how
14 strong the statistical correlation was?
15 A. I do not.
16 Q. Do you know what methodology the authors of
17 the article applied?
18 A. I do not.
19 Q. Did this article say anything about
20 short-term rentals' effect on homelessness?
21 A. It did not directly cite homelessness.
22 Q. The third bullet point on page 4 of your
23 report refers to an article The Sharing Economy and
24 Housing Affordability: Evidence from Airbnb.

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1 Do you see that one?
2 A. I do.
3 Q. Have you read that entire article?
4 A. I have.
5 Q. What methodology did the authors of that
6 article apply?
7 A. I do not recall.
8 Q. Did that article find a statistical
9 correlation between increasing rents and short-term
10 rentals?
11 A. I do not recall if it had a statistical
12 correlation.
13 Q. In your description of this article you say
14 this report found a 1 percent increase in Airbnb
15 listings leads to a 0.018 percent increase in rents.
16 That's a really tiny increase, isn't it?
17 A. I think everything is relative.
18 Q. Well, if you're paying \$1,000 in a month in
19 rent and your rent went up by .018 percent that would
20 be an increase of 18 cents, right?
21 A. Possibly.
22 Q. And so that would mean that if there were a
23 100 percent increase in Airbnb listings someone paying
24 \$1,000 in rent would see an increase of \$18 in their

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1 rent, right?
2 A. Correct.
3 Q. Do you think that kind of increase in rent
4 could make people homeless?
5 A. I think that type of increase in rent over
6 the long term could exacerbate issues of affordability
7 of homelessness. Yes.
8 So everything is relative. Eighteen dollars
9 to you is a lot of money to somebody else.
10 Q. But of course we're talking about to have --
11 you know, to have even a strong effect under --
12 assuming this relationship as described is correct to
13 have much of an increase in rents at all there would
14 have to be a lot of Airbnbs in a place, right?
15 A. I don't know if you have to have a lot of
16 Airbnbs, but this is definitely suggesting the more
17 Airbnbs you have the more increase in rents you'll get.
18 Q. And so even when there's a big increase in
19 Airbnbs we're seeing a pretty small amount of money
20 here and so we're talking about second and third order
21 effects if we're talking about people being homeless,
22 right, because you have to say that that small increase
23 in this part of the market will it lead to some other
24 increase in another part of the market that will be so

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1 significant that it will render people homeless, right?
2 MR. HANSCOM: Object to the form but go ahead.
3 BY THE WITNESS:
4 A. So I think what you're -- I think what
5 you're looking at is this a study on the entire
6 United States and when you look at individual
7 neighborhoods in individual cities this 1 percent
8 increase towards this .018 percent increase in rents is
9 something to watch for, and as we saw in prior studies
10 that .018 percent might be 9.2 percents, it might be
11 other percents, so we don't know specifically what's
12 going to happen in Chicago but we do have plenty of
13 studies to demonstrate there is an effect on the cost
14 of rent and as you increase rent there is an effect on
15 the individuals who are least likely to be able to
16 afford the rents they currently pay.
17 Q. Is it your position that any increase in
18 rents at the top of the market will tend to work its
19 way down such that some people on the margin will be
20 rendered homeless?
21 A. Yes.
22 Q. Whether it's caused by short-term rentals or
23 not?
24 A. So I think short-term rentals have come in

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1 and caused what we call a supply shock and so the speed
2 in which they're moving in, the size in which they're
3 moving in, and as articles to this allude to the
4 frequency in which existing rental investors are taking
5 their units offline to rent through short-term rentals
6 as opposed to long-term rental has exacerbated that
7 issue even further.
8 Q. Okay. But to be clear is it your position
9 that if rent at the top of the market increases for any
10 reason, even if it's not short-term rentals, that is
11 going to work its way down into the market and render
12 some people on the margins homeless?
13 Is that your position?
14 A. No.
15 My position is that if rents are increased
16 as a result of decreased supply then that will work its
17 way down to the market.
18 Q. And result in increased homelessness?
19 A. Correct.
20 Q. Every time?
21 A. Every time.
22 Q. So if one unit in the Trump Tower in Chicago
23 is taken off the market that's going to increase
24 homelessness because it's a decrease in supply?

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1 A. Did that increase rents throughout the
2 market?
3 Q. I don't know. I'm asking you if you said
4 any change in supply at the top of the market will
5 increase homelessness on the other side of the market.
6 A. No. What I said was any change in supply
7 that affects rents across the market will increase
8 homelessness at the bottom of the market.
9 So if your one unit didn't increase rents
10 across the market then your one unit didn't have an
11 effect.
12 Q. So the removal of units from the market
13 doesn't always increase rents?
14 A. So the removal of units from the market
15 changes the supply and demand scenario that may have an
16 effect on rents.
17 Q. But not necessarily?
18 A. Well, it depends on demand.
19 So what we're dealing with is relatively
20 strong demand, basically an elastic, and so in our
21 situation, yes, the reduction of supply has an effect
22 on the market.
23 Supply and demand work independently. So if
24 you had too much supply and you remove a unit then not

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1 a problem, you don't have too much supply.
2 Q. At the bottom of page 4 of your report
3 there's a bullet point referencing an article called
4 The High Cost of Short-Term Rentals in New York City.
5 Do you see what I mean?
6 A. I do.
7 Q. Have you read that entire article?
8 A. I have.
9 Q. What methodology did the authors of that
10 article apply?
11 A. I do not recall.
12 Q. Did that article say anything about
13 short-term rentals' effect on homelessness?
14 A. I do not believe it specifically cited
15 homelessness.
16 Q. Your description here says that this study
17 found that, quote, Airbnb had increased the median
18 long-term rent in New York City by 1.4 percent over the
19 last three years, unquote.
20 So that means if you were paying \$1,000 a
21 month in rent and it went up by 1.4 percent you'd have
22 an increase in your rent of \$14, right?
23 A. That would be correct.
24 Q. And you think that kind of increase in rent

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1 will displace some people from their homes rendering
2 them homeless?
3 A. I believe that's no different than the prior
4 example, but more specifically in this report they also
5 identify that overall the average increase in rents is
6 about \$380 and to refer back to what I said earlier on
7 in that families that are in housing insecurity are a
8 paycheck away or as little as \$400 away from
9 homelessness that number is pretty much right on mark.
10 Q. Okay. But that \$380 that's not everybody,
11 right, that's just --
12 A. It's an average.
13 Q. -- an average?
14 So some people might have zero increase?
15 A. No.
16 Q. And some people might have a greater
17 increase?
18 A. Maybe.
19 Q. And you don't know how the increases are
20 distributed at all, right?
21 A. I mean the only way to know is to assume
22 that rents were a fixed rent in the first place. So
23 since everybody's rent is below or above market or at
24 market there's no way to answer that question.

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1 Q. Could you explain that a little further?
2 A. So if everybody's rents went up by
3 1.3 percent but if my individual rent was already
4 higher then I may not be able to get that 1.3 percent.
5 If I was already lower then I'm able to get more than
6 1.3 percent.
7 Q. Higher or lower than what?
8 A. The rent the area established at the time.
9 So not everybody's rents are pegged at
10 \$1,000.
11 Q. Oh, right. Well, no.
12 It doesn't matter whether it's \$1,000 but --
13 A. Right.
14 So which means -- So there's an established
15 idea of market rent. So let's pretend it's \$1,000.
16 Somebody could be renting currently at 950. Somebody
17 could be renting at 1050. If market rents go up to
18 1,014 that person at 1050 may stay at 1050; that person
19 at 950 may go to 1014.
20 Q. But there's no one market price for housing.
21 I mean there's no reason to focus on the
22 1,000, right?
23 A. Which is why everything is done on averages.
24 Q. The amount of increase we're talking about

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1 is increased over what they would otherwise pay, right?
2 A. No. I believe the median long-term rent so
3 it's an average rent --
4 Q. Uh-huh.
5 A. -- for multiple people.
6 So it's not an individual person, it's not
7 an individual rent, and so when you ask me if
8 everybody's rent is going to go up I don't know because
9 I just gave an example of how everyone's rent is
10 already different.
11 Q. Right. Right.
12 You don't know whether everybody's rent is
13 going to go up or whether that 380-dollar average comes
14 from a certain subset of people within the group of
15 New York City who are seeing much bigger increases than
16 380 that are being -- and then they're being offset by
17 other people who see no increase that could be, we just
18 don't know based on what we have here, right?
19 A. We don't know.
20 Q. Did this study say whether the increase in
21 rent supposedly caused by Airbnb had forced anyone to
22 leave their homes because they couldn't afford it?
23 A. I do not recall.
24 Q. Your summary of the study says Airbnb

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1 removed between 7,000 and 13,500 units of housing from
2 New York City's long-term rental market.
3 Do you know how the study's authors arrived
4 at that range?
5 A. I do not.
6 Q. Do you know how the study's authors
7 determined whether a unit used for Airbnb would
8 otherwise be used for long-term rentals?
9 A. I do not know how the authors determined
10 that.
11 Q. Did this study say anything about short-term
12 rentals' effect homelessness?
13 A. I do not believe this study cited anything
14 specific to homelessness.
15 Q. Turning to page 5 of your report do you see
16 the first bullet point there refers to an item called
17 the economic costs and benefits of Airbnb --
18 A. I do.
19 Q. -- which was attached to your report as
20 Exhibit C?
21 I'm going to hand this to the court reporter
22 to be marked as an exhibit.
23 (Deposition Exhibit No. 7
24 marked as requested.)

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1 BY MR. HEUBERT:
2 Q. Okay. Is this the article that was attached
3 to your report as Exhibit C?
4 A. I have read this report.
5 Yes.
6 Q. Could you please turn to page 13, and then
7 do you see the heading there Potential costs one:
8 Long-Term renters face rising housing costs?
9 A. Yes.
10 Q. Do you see what I'm talking about?
11 A. I do see that.
12 Q. This is the part of this report where the
13 author discusses how in his view short-term rentals
14 lead to higher housing costs for long-term renters; is
15 that right?
16 A. Yes.
17 Q. Now if you turn to page 14 and look at the
18 next to last paragraph on that page, which is the only
19 full paragraph on that page, do you see there it says
20 at the end of that paragraph a number of careful
21 empirical studies looking precisely at the effect of
22 Airbnb introduction and expansion on housing costs?
23 It refers to a number of what it calls
24 careful empirical studies.

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1 Do you see what I'm talking about?
2 A. No. I'm missing that -- the last sentence.
3 Q. So on the only full paragraph on page 14 the
4 last sentence talks about studies that look at the
5 effect on Airbnb introduction and expansion in housing
6 costs.
7 A. Sure.
8 Q. Okay. Then in the next paragraph do you see
9 that it refers to a 2016 study by Merante and Horn?
10 A. I do.
11 Q. That's the same study by Merante and Horn
12 you refer to on page 3 of your report, isn't it?
13 A. Okay. Sure.
14 Q. And now if you turn to page 15 and look at
15 the first full paragraph on that page after the block
16 quote it refers there to a 2018 study by Barron, Kung,
17 and Proserpio.
18 That's the same study by Barron, Proserpio
19 that you refer to on page 4 of your report, isn't it?
20 A. True.
21 Q. And then if you look at the next paragraph
22 on page 15 do you see it refers to a 2018 study by
23 Sheppard and Udell?
24 A. Okay.

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1 Q. That's the same study by Sheppard and Udell
2 you refer to on page 4 of your report, isn't it?
3 A. I believe so.
4 (Brief pause.)
5 BY THE WITNESS:
6 A. Sure.
7 Q. And now if you look at the next paragraph on
8 page 15, this is the last full paragraph on page 15, do
9 you see it refers to a 2018 study by Wachsmuth et al.?
10 A. Uh-huh.
11 Q. That's the same study by Wachsmuth et al.
12 that you referred to on page 4 of your report, isn't
13 it?
14 A. Yes.
15 Q. And that's the end of the Economic Policy
16 Institute report here is discussion of short-term
17 housing effects on rents, right?
18 A. Yes.
19 Q. So that section just summarized the same
20 report you discussed in your report?
21 It doesn't appear that this author did any
22 additional research on the effects of short-term
23 housing on rents, does it?
24 A. It does not.

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1 Q. Looking back at page 5 of your report -- and
2 we can put this exhibit aside -- do you see the second
3 bullet point that refers to something called selling
4 the district short which you attached as Exhibit D to
5 your report?
6 A. Where am I looking?
7 Q. On page 5 of your report is there an item
8 listed there called selling the district short?
9 A. Oh. Yes.
10 Q. Okay. And that was attached as Exhibit D to
11 your report, correct?
12 A. Yep.
13 MR. HEUBERT: Okay. I'll hand an exhibit here to
14 the court reporter.
15 (Deposition Exhibit No. 8
16 marked as requested.)
17 MR. HEUBERT: Oh, sorry. This one is for you and
18 this one over here (tendering).
19 BY MR. HEUBERT:
20 Q. Do you know who authored this item?
21 A. Not off the top my head.
22 It says D.C. Working Families.
23 Q. What is D.C. Working Families?
24 A. Off the top of my head I am not sure.

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1 Q. Okay. If you could turn to Exhibit --
2 excuse me -- page 8 of this exhibit do you see on
3 page 8 it has the heading Airbnb Impact On Affordable
4 Housing & Gentrification?
5 A. I do.
6 Q. This is the part of this report where the
7 author discusses the relationship between short-term
8 rentals and affordable housing, correct?
9 A. Correct.
10 Q. Do you see there's a subheading there that
11 says previous studies in the middle of the page?
12 A. Oh. Yes.
13 Q. And then under that it discusses a June 2016
14 report by Housing Conservation Coordinators Inc. and
15 MFY Legal Services Inc.
16 Do you see that?
17 A. I do.
18 Q. And then there's the last sentence in that
19 column of text that says the report found that having a
20 high concentration of Airbnb impact listings those most
21 likely to result in the reduction of the supply of
22 residential rental units was strongly correlated with
23 rapidly rising rental prices.
24 Do you see that?

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1 A. I do.
2 Q. And then there's a Footnote 18.
3 Can you please look at Footnote 18, which is
4 on page 30?
5 A. Yeah.
6 Q. And then we see -- can you read Footnote 18
7 to yourself?
8 A. Sure.
9 (Brief pause.)
10 BY MR. HEUBERT:
11 Q. Have you done that?
12 A. Yes.
13 Q. Okay. So the last sentence of this
14 Footnote 18 says strong correlation suggests two
15 variables likely related but does not prove one causes
16 the other.
17 So this says there's a correlation between
18 Airbnb listings and rising long-term rental rates in a
19 neighborhood, but it doesn't prove that the Airbnb
20 listings or short-term rentals caused the increase in
21 rents, correct?
22 A. That's what it says. Correct.
23 Q. So at least based on this it's possible that
24 rents would have gone up anyway, right?

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1 A. I believe it says there's a strong
2 correlation of .93 out of a 1.
3 Q. Right.
4 But based on this -- I mean this is telling
5 us, right, that based on this alone we can't say that
6 one causes the other?
7 A. Yeah. This is telling us there is a strong
8 correlation but does not prove one causes the other.
9 Q. Turning back to page 8 in the last paragraph
10 on the page do you see it references a study by
11 something called The Real Deal?
12 A. Yes.
13 Q. Do you know what The Real Deal is?
14 A. It's just an online like real estate website
15 journal.
16 Q. Is it an academic journal?
17 A. I do not believe so.
18 Q. Do you know who authored that item that was
19 published in The Real Deal?
20 A. I do not.
21 Q. Have you reviewed that study by The Real
22 Deal?
23 A. I do not recall.
24 Q. Do you know whether that study by The Real

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1 Deal applied reliable econometric or statistical
2 methods?
3 A. I do not.
4 Q. Do you have any basis for determining
5 whether the findings of The Real Deal article are
6 correct?
7 A. I do not.
8 Q. Now turning to page 9 of Exhibit 8 at the
9 top of the second column do you see a reference to an
10 item by Dayne Lee?
11 A. Yes.
12 Q. That's the same article you referenced on
13 page 3 of your report, correct?
14 A. Correct.
15 Q. Looking further down the middle of the
16 column 9 of Exhibit 8 do you see a reference to a study
17 performed by Thomas Davidoff for Airbnb?
18 A. I do.
19 Q. Have you reviewed Davidoff's study?
20 A. I have not.
21 Q. Do you know whether it applied reliable
22 econometric or statistical methods?
23 A. I do not.
24 Q. Do you see at the top of the third column

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1 there's a Footnote 22?
2 A. Uh-huh.
3 Q. All right. Let's look at Footnote 22 on
4 page 30.
5 Do you see that's a citation to a Wall
6 Street Journal blog post?
7 A. I do.
8 Q. So that's the only citation this publication
9 here provides for Davidoff's study, isn't it?
10 A. It appears so.
11 Q. Do you know whether the blog post and
12 Footnote 22 reported Davidoff's findings accurately?
13 A. I do not.
14 Q. Do you rely on secondhand information in
15 blog posts when you give policy advice?
16 A. So we use a lot of different mediums to
17 provide us information, but I don't know that we rely
18 on blog posts.
19 Q. Turning back to page 9 in the middle column
20 do you see that it says that the study found that
21 Airbnb increased the price of all one-bedroom units in
22 New York by an average of \$6 a month?
23 A. I do.
24 Q. Assuming that's true do you think that

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1 six-dollar per month increase in rent would increase
2 homelessness in New York City?
3 A. Can you say that one more time?
4 Q. Assuming that that finding is correct do you
5 think that six-dollar per month increase in rent would
6 increase homelessness in New York City?
7 A. I think it has to do with supply, but in
8 this context I think also the issue is this is not
9 based on long-term or impact rentals. It is all based
10 on shared rentals.
11 But here nor there, yeah, I think when you
12 reduce supply and it has an effect of increasing prices
13 it could be an indication of the increase in
14 homelessness.
15 Q. Okay. But to be clear do you think that a
16 six-dollar per month increase in rent would increase
17 homelessness in New York City?
18 A. I believe anything that reduces supply that
19 has an impact on rent eventually is going to have an
20 impact on the overall affordability of units and that
21 overall affordability then exacerbates the issue of
22 homelessness.
23 Q. Okay. Well, when we're talking about
24 overall affordability we're talking about a six-dollar

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1 per month increase in rent.
2 Is that something you believe will render
3 people homeless?
4 A. It's \$6 is more than a dollar -- what did
5 you say before, 14 or 1.4 percent -- yes. I think any
6 time you reduce the supply it has an effect on pricing,
7 it increases rents, you're ultimately going to have an
8 issue where there's going to be concerns around housing
9 affordability and that housing affordability results in
10 homelessness.
11 Q. So is your answer to my question which is
12 whether you think a six-dollar per month increase in
13 rent would increase homelessness in New York City your
14 answer is yes?
15 A. If that increase in rent was driven by a
16 reduction in supply then my answer is yes.
17 Q. But not if it's not driven by a reduction in
18 supply?
19 A. Then we're talking a ton of different
20 variables that I don't understand how to answer your
21 question appropriately.
22 Q. And as with other examples that six-dollar
23 increase is an average so that could mean that some
24 people's rent might go up by more than \$6 and some

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1 might go up by less or not go up at all, correct?
2 A. Correct.
3 Q. Let's turn to page 19 of this exhibit.
4 As you can see this says that the median
5 rent increase across Airbnbs topped 20 neighborhoods in
6 Washington D.C. was 14.9 percent compared to an average
7 rate increase of 11 percent across the District of
8 Columbia as a whole, correct?
9 A. Correct.
10 Q. Now, if you could please read aloud the
11 second paragraph -- full paragraph under the box on
12 this page.
13 A. While the table below demonstrates that many
14 of the top neighborhoods for Airbnb were also some of
15 most rapidly gentrified neighborhoods in the district
16 it does not prove Airbnb caused the increase. For
17 example, it is possible that commercial short-term
18 rental operations are most viable in gentrifying
19 neighborhoods and that they locate in such
20 neighborhoods for that reason.
21 Q. Do you disagree with that paragraph?
22 A. I think anything is possible. It's
23 definitely possible that they may locate in gentrifying
24 neighborhoods.

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1 Q. Okay. We can put this aside and turn back
2 to your report.
3 On page 5 under the heading Responses to
4 Dr. Moore in the first bullet point there you address
5 Dr. Moore's statement that New York City is always an
6 outlier. And you say there at his deposition Dr. Moore
7 could cite no academic literature supporting these
8 opinions.
9 Can you cite any academic literature
10 refuting the idea that there is a rule of thumb in
11 economics that New York City is always an outlier?
12 A. Yes. Anything that talks about the laws of
13 supply and demand does not -- puts asterisk that says
14 New York is an outlier.
15 Q. Okay. But for empirical analyses are you
16 aware of any -- anything that says that the empirical
17 data from New York City may be an outlier?
18 A. I have never heard that.
19 Q. Okay. You've never heard it.
20 Have you ever seen anything saying that it's
21 not true?
22 A. I've never heard any or read anything that
23 has ever said New York is an outlier for any sort of
24 analysis.

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1 Q. Okay. Have you surveyed the academic
2 literature looking for anything on that point?
3 A. I have not looked for anything on that
4 point, but I have definitely come across many instances
5 of articles written about New York or indications of
6 housing concerns in New York and none of them had said
7 this is an outlier.
8 Q. You also say on page 5 it is true that
9 New York City is more dense than Chicago, but I see no
10 reason to believe that the effects of Airbnb found in
11 New York City would not be expected to occur in Chicago
12 as well.
13 When you say New York City is more dense do
14 you mean there's more population density?
15 A. I believe I'm responding to Dr. Moore saying
16 that New York is more dense, but when I think about
17 density I think about the density of living in a
18 particular area and so how many units are clustered on
19 one piece of land.
20 Q. And could it be that New York City given its
21 existing density has less room to increase its housing
22 stock than a less dense city such as Chicago?
23 A. Can you repeat that?
24 Q. Could it be that New York City has less room

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1 to increase its housing stock than a less dense city
2 such as Chicago?
3 A. So New York is very good about building up
4 so I don't know that I would answer that question as
5 true or false. I think both cities respond to their
6 density needs and availability but Chicago does have
7 more available land and so we are not forced to build
8 as tall as maybe New York would be.
9 Q. Is it easy to build up if you own a property
10 in New York that isn't already built up?
11 A. I don't have the expertise of New York to be
12 able to answer that question, but they do build a lot.
13 Q. How do you know?
14 A. Because I've work with New York City in the
15 high cost housing forum and they're often -- they're
16 always spending more resources and building more units
17 than we are.
18 Q. More units of affordable housing?
19 A. Housing in general but also affordable.
20 Yes.
21 Q. Do you have any sense of the magnitude of
22 that?
23 A. I have a sense of the magnitude but nothing
24 that I could quote specifically.

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1 Q. Do you have anything more specific you can
2 say about it?
3 A. So my budget is \$100 million and I know that
4 New York's budget is at least a billion dollars.
5 Q. But that doesn't necessarily reflect how
6 much more building they do, right?
7 There could be other things affecting --
8 A. It does. They have tremendously more
9 production than we do.
10 Q. But it's not necessarily whatever a ten to
11 one or whatever that was, right, because --
12 A. Oh, I don't know.
13 Yeah. I don't know.
14 Q. It could be more -- a lot more expensive to
15 build something in New York than in Chicago, right?
16 A. They could also leverage their money
17 differently.
18 Q. Okay. But the answer to my question is yes
19 or no?
20 A. I don't know.
21 Q. Okay. Looking at the top of page 6 of your
22 report you say that you and your staff, quote, found
23 that there are many Airbnb listings in almost every
24 neighborhood of Chicago, unquote.

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1 Did your review consider how often the
2 places listed on Airbnb are rented out?
3 A. So my review is from AirDNA and I believe
4 the review specifically was cited around the total
5 amount of active listings, those that were full home
6 listings and those that were shared rooms and I believe
7 there was another category amongst that. I do not
8 believe if the time was a factor.
9 Q. Okay. So is the answer to my question no?
10 A. The answer is I do not recall if time is a
11 factor.
12 Q. Did your study take into account whether a
13 property listed on Airb [sic] is ever actually rented
14 out?
15 A. So my study is a reflection of the active
16 listings.
17 Q. So the fact that something is listed?
18 A. Correct.
19 Q. You don't know whether a given property was
20 ever actually rented out; you just know it was listed?
21 A. Correct.
22 Q. And it's possible a place could be listed on
23 Airbnb but never rented out at all, right?
24 A. It could be, which is also the same effect

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1 of removing it from the market.
2 Q. Only if a person is choosing not to live
3 there also?
4 A. Right.
5 Q. If it's vacant essentially?
6 A. Right.
7 Q. But a person could list a place, not rent it
8 out, and the place wouldn't be vacant, right?
9 A. If a person was living in a place and they
10 listed it and they -- then, yes, it would not be vacant
11 because they live there.
12 MR. HEUBERT: Next exhibit here.
13 (Deposition Exhibit No. 9
14 marked as requested.)
15 BY MR. HEUBERT:
16 Q. Is this Exhibit E that you attached to your
17 report?
18 A. It is but mine was much more legible.
19 Q. Okay. Can I see yours to make sure that
20 there is not some special legibility problem?
21 A. No. I'm having a hard time reading that
22 gray box under rental type. I think it was just a
23 matter of clarity on the printout.
24 Q. Can you explain what this shows?

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1 A. So this shows a point in time all the active
2 rentals that are listed on a multiple number of
3 short-term rental networks of which the concentration
4 is on the north and northwest sides there is more or
5 less citywide and then predominately they're entire
6 home rentals.
7 Q. It appears to me there are vast areas of the
8 south side with no Airbnb listings at all, right?
9 A. It does appear that way.
10 Q. In fact, once you get south of I-55 and west
11 of I-90 they're really sparse, aren't they?
12 A. I would not say they're really sparse.
13 They're still heavily concentrated east of the Dan Ryan
14 along the lake shore.
15 Q. Okay. But I said west of I-90.
16 A. Okay.
17 Q. They're sparse west of I-90 --
18 A. Sure.
19 Q. -- right?
20 A. So is our population. Yes.
21 The density of housing in Chicago is
22 predominately where the graph reflects.
23 Q. Okay. But there are people living in all
24 this gray area on this map, right?

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1 A. There are people living in those areas but
2 not at all to the same density or level of the rest of
3 the city.
4 Q. Sure.
5 But this isn't all just industrial area or
6 something?
7 A. No. Some of it. Some of it but not all of
8 it.
9 Q. And some of this gray area would include
10 some of Chicago's poorest neighborhoods, wouldn't it?
11 A. It would.
12 Q. It also looks relatively sparse on the west
13 side north of I-290, doesn't it?
14 A. I mean it's all relative, but there are
15 units along Austin along the northwest side, sure, but
16 I think the graph accurately reflects kind of the
17 density of housing in the city.
18 Q. Would you also say it tends to correlate
19 with higher incomes in the city?
20 A. No. I don't know that you can make that
21 assessment.
22 I mean our neighborhoods in general are --
23 are often economically diverse more so than people
24 would like to believe.

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1 Q. You mean within neighborhoods --
2 A. Within neighborhoods.
3 Q. -- there's more economic diversity?
4 A. Absolutely.
5 Q. But yet some neighborhoods in Chicago that
6 are simply poor and don't have economic diversity; is
7 that fair to say?
8 A. No. You definitely have some neighborhoods
9 with very low income residents but it doesn't mean
10 everybody is poor.
11 Q. And wouldn't those neighborhoods with the
12 higher concentrations of people with lower incomes many
13 of them be located in this gray area where we don't see
14 much home sharing activity?
15 A. Oh, I don't know about that. We have
16 affordable residences throughout the city.
17 Q. I'm not sure I understand your answer to my
18 question.
19 A. What was your question again?
20 Q. So there are some neighborhoods in this city
21 with much higher percentages of low incomes than some
22 other neighborhoods?
23 There are some neighborhoods we would
24 describe as predominately low income, is that fair?

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1 A. So there are. Yes, you could say that.
2 Q. And many of those neighborhoods would be
3 included within the gray areas as we see on this map
4 where there is little or no home sharing activity; is
5 that fair to say?
6 A. I think it is fair to say that some areas of
7 the southwest sides represent lower income
8 neighborhoods but not all areas of the gray are
9 residential. Some of them are industrial.
10 Q. Are you familiar with the Wharton Index?
11 A. Not off the top of my head, no.
12 MR. HEUBERT: I have one last exhibit.
13 (Deposition Exhibit No. 10
14 marked as requested.)
15 BY MR. HEUBERT:
16 Q. Okay. Would you agree with me this appears
17 to be excerpts from the deposition of Dr. Adrian Moore
18 in this case?
19 A. It appears to be. Yes.
20 Q. If you look at page 23 the first full
21 paragraph it says the amount of available developable
22 space is extremely limited in New York in a way that it
23 isn't in other major U.S. cities.
24 Do you agree with that statement?

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1 A. No.
2 Q. Why do you disagree?
3 A. I think there are a lot of landlocked cities
4 in the country. So I think San Francisco is a great
5 corollary.
6 Q. Okay. Are there others you can think of
7 that are comparable in that respect?
8 A. I think Boston is very similar.
9 Q. Is Chicago similar?
10 A. So parts of Chicago are similar but not all
11 of Chicago is similar.
12 I mean I would argue Seattle is also up
13 there in that same sense. Portland.
14 Q. If you could look at Dr. Moore's answer that
15 begins on the page at the bottom of page 23 and
16 continues on to the top of page 24.
17 (Brief pause.)
18 BY MR. HEUBERT:
19 Q. Do you agree with what Dr. Moore says there?
20 (Brief pause.)
21 BY THE WITNESS:
22 A. So I believe Dr. Moore is correct when he
23 says that less flexible markets are going to have
24 different shapes to their elasticity curves than other

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1 markets that are less constrained. Yes.
2 Q. Okay. Then further down the page can you
3 see where it says in Dr. Moore's answer two main
4 reasons and he says under the Wharton Index Chicago
5 scores as more flexible than New York City?
6 Do you know whether that's correct?
7 A. I am not familiar with the Wharton Index.
8 Q. And then if you could read the rest of that
9 paragraph and tell me when you're done I'll ask you a
10 question about that.
11 (Brief pause.)
12 BY THE WITNESS:
13 A. Sure.
14 Q. Do you know whether Dr. Moore's correct in
15 his discussion of differences between New York and
16 Chicago suburbs?
17 A. So I believe he's making the distinction
18 that the suburbs in New York are also very dense
19 compared to the suburbs here, and I would agree that
20 that is true.
21 But I would also agree with his statement
22 earlier that the elasticity is dependent on a number of
23 factors including supply and demand and adjustments and
24 essentially laws and policies.

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1 So density is not the only factor and
2 buildable land is not the only factor.
3 Q. First full paragraph on page 25 says Chicago
4 has a lot more opportunity for things to shift in
5 appreciable ways than the much denser and
6 over-developed New York profile does.
7 Do you know whether that's correct?
8 A. I don't think that's correct.
9 Q. Why not?
10 A. Because elasticity both on supply and demand
11 have to do with a lot of a number of things beyond just
12 density.
13 I mean if -- if, for example, New York has
14 liberal zoning laws that allow you to develop really
15 tall then their density is easily achieved so it's a
16 lot more elastic; whereas, compare it to a north shore
17 suburb where they're restricted to single-family zoning
18 they're not going to allow you to have any density so
19 it is extremely inelastic.
20 Q. Do you know whether New York has liberal
21 zoning laws as you described?
22 A. I do not. I am not an expert on New York.
23 Q. If you could read Dr. Moore's answer on
24 page 26 and let me know when you're done I'll ask you

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1 about that.
2 (Brief pause.)
3 BY THE WITNESS:
4 A. Okay.
5 Q. Do you think Dr. Moore's statement about
6 data from a single city is correct?
7 A. So I think what he's saying is that there is
8 no definitive indication that New York will affect
9 Chicago, but I think he is also -- so I think he is
10 somewhat correct that you do have an inference that may
11 affect policymaking so I somewhat do disagree that
12 his -- that it's -- that it's just a remote conclusion,
13 and I do disagree that any economist would have any
14 engagement in the policy conclusions.
15 Q. You disagree with his statement at the end I
16 don't think any economist would say based on a result
17 from New York we can draw policy conclusions?
18 A. So I think -- Well, actually I take that
19 back. You're absolutely correct.
20 We can begin to create policy conclusions.
21 So I think he and I are both dancing around two heads
22 of the same coin.
23 Q. I'm not sure I understand.
24 Do -- The last sentence of his answer there

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1 do you agree with it or disagree with it?
2 A. So I'm not sure what an economist would say
3 about their policy conclusions, but I think instances
4 from New York provide indications that we should be
5 concerned with in Chicago and that we would need to
6 consider what happens in New York and other cities
7 before we make policy conclusions.
8 Q. All right. Before our last thing to look at
9 in this deposition do you see the question and answer
10 it begins on page 48 and continues on to page 49 and 50
11 and could you read that to yourself, please, and then
12 let me know when you're done?
13 (Brief pause.)
14 BY THE WITNESS:
15 A. Okay.
16 Q. Do you see on the -- now on page 49 the last
17 full paragraph Dr. Moore says so in each of the steps
18 of that causal chain, there are many other influences,
19 orders of magnitude stronger.
20 Do you disagree with that statement?
21 MR. HANSCOM: Just object to the form but go
22 ahead.
23 BY THE WITNESS:
24 A. So I'm not sure if I agree or disagree.

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1 There are a number of -- There are a number
2 of instances that are not specific to just the
3 availability of a unit or the cost of a unit and so
4 yes.
5 How I weight those I'm not necessarily sure.
6 Q. Do you recall in Dr. Moore's report he noted
7 that the city government may have policies that
8 restrict the supply of housing in the city?
9 A. I don't know -- I don't recall him saying
10 the city may, but I do recall him saying the City has
11 the tools to change the supply of housing. Yes.
12 Q. Do you agree with that?
13 A. Yeah, absolutely.
14 Q. And do you think the City of Chicago has
15 certain policies in place now that restrict the supply
16 of housing compared to what it could be?
17 A. I think every city has instances where they
18 can improve their supply through policy change,
19 absolutely.
20 Q. And are some of those restrictions on what
21 residential buildings can be placed on certain
22 properties?
23 A. What residential buildings can be placed on
24 certain properties that's not what I was specifically

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1 thinking of now. No. But that is generally something
2 that at least in Chicago you can get a zoning change.
3 So if you were looking to change it from
4 commercial to residential you could likely do that.
5 So it depends on -- That's really less of a
6 policy issue but that can occur.
7 Q. Anybody can get a zoning change?
8 A. It's fairly easy. We are fairly liberal in
9 our willingness to provide zoning changes to homeowners
10 and residents.
11 We are residentially friendly.
12 Q. Don't you need your alderman's blessing for
13 that?
14 A. No.
15 Q. No?
16 A. No.
17 Q. Doesn't it help?
18 A. I don't know.
19 Q. Aren't there some properties in Chicago say
20 where there might currently be a three-flat but if you
21 were to tear it down you could only build a
22 single-family residence based on the current zoning?
23 A. I don't -- If there was it would be
24 grandfathered in. It would be kind of an outside --

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1 That would be an outlier.
2 If you have the existing density then you're
3 generally granted the existing density. It is rare to
4 see an area in which multifamily buildings exist and it
5 is downsized to single family, but I am by no means a
6 zoning expert.
7 MR. HEUBERT: Okay. Well, why don't we take
8 another short break and we'll just see if we have
9 anything else we need to cover, and we're probably
10 getting close to the end.
11 MR. HANSCOM: Sounds good.
12 (A recess is taken.)
13 MR. HEUBERT: I think we're done.
14 MR. HANSCOM: Oh, great. Okay.
15 MR. HEUBERT: Sorry to make you sit down.
16 Do you have anything?
17 MR. HANSCOM: No.
18 THE COURT REPORTER: Signature?
19 MR. HANSCOM: We'll reserve signature.
20 THE COURT REPORTER: Did you need this
21 transcribed?
22 MR. HEUBERT: Yes, please.
23 THE COURT REPORTER: Did you want a copy?
24

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1 MR. HANSCOM: Yeah, please.
 2 (Witness excused.)
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1 STATE OF ILLINOIS)
 2) SS.
 3 COUNTY OF COOK)
 4
 5 IN THE CIRCUIT COURT OF COOK COUNTY, ILLINOIS
 6 COUNTY DEPARTMENT, CHANCERY DIVISION
 7 LEILA MENDEZ and ALONSO ZARAGOZA,)
 8)
 9 Plaintiffs,)
 10)
 11 vs.) No. 16 CH 15489
 12)
 13 CITY OF CHICAGO, et al.,)
 14)
 15 Defendants.)
 16
 17 I, BRYAN ESENBERG, state that I have read
 18 the foregoing transcript of the testimony given by me
 19 at my deposition on the 30th day of April, A.D., 2019,
 20 and that said transcript constitutes a true and correct
 21 record of the testimony given by me at the said
 22 deposition except as I have so indicated on the errata
 23 sheets provided herein.
 24

 BRYAN ESENBERG

 No corrections (Please initial) _____
 Number of errata sheets submitted _____ (pgs.)

 SUBSCRIBED AND SWORN to
 before me this ____ day
 of _____, 2019.

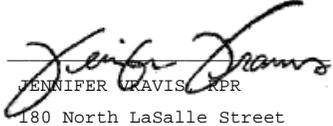
 NOTARY PUBLIC

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1 STATE OF ILLINOIS)
 2) SS.
 3 COUNTY OF COOK)
 4
 5 I, Jennifer Vravis, Registered Professional
 6 Reporter and Notary Public, do hereby certify that on
 7 the 30th day of April, A.D., 2019, the deposition of
 8 the witness, BRYAN ESENBERG, called by the Plaintiffs,
 9 was taken before me, reported stenographically, and was
 10 thereafter reduced to typewriting under my direction.
 11 The said deposition was taken at the offices
 12 of City of Chicago - Department of Law Revenue
 13 Litigation Division, 30 North LaSalle Street,
 14 Suite 1020, Chicago, Illinois, and there were present
 15 counsel as previously set forth.
 16 The said witness, BRYAN ESENBERG, was first
 17 duly sworn to tell the truth, the whole truth, and
 18 nothing but the truth, and was then examined upon oral
 19 interrogatories.
 20 I further certify that the foregoing is a
 21 true, accurate, and complete record of the questions
 22 asked of and answers made by the said witness, BRYAN
 23 ESENBERG, at the time and place hereinabove referred
 24 to.

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1 The signature of the witness, BRYAN
 2 ESENBERG, was reserved by agreement of counsel.
 3 The undersigned is not interested in the
 4 within case, nor of kin or counsel to any of the
 5 parties.
 6 Witness my official signature and seal as
 7 Notary Public in and for Cook County, Illinois, on this
 8 8th day of May, A.D., 2019.
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 JENNIFER VRAVIS, RPR
 180 North LaSalle Street
 Suite 2800
 Chicago, Illinois 60601
 Phone: (312) 236-6936

CSR No. 084-004556

1 Errata Sheet
2
3 NAME OF CASE: Mendez vs City of Chicago
4 DATE OF DEPOSITION: 04/30/2019
5 NAME OF WITNESS: Bryan Esenberg
6
7 Page ____ Line ____ Reason _____
8 From _____ to _____
9 Page ____ Line ____ Reason _____
10 From _____ to _____
11 Page ____ Line ____ Reason _____
12 From _____ to _____
13 Page ____ Line ____ Reason _____
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20 From _____ to _____
21 Page ____ Line ____ Reason _____
22 From _____ to _____
23
24 _____
SIGNATURE OF DEPONENT

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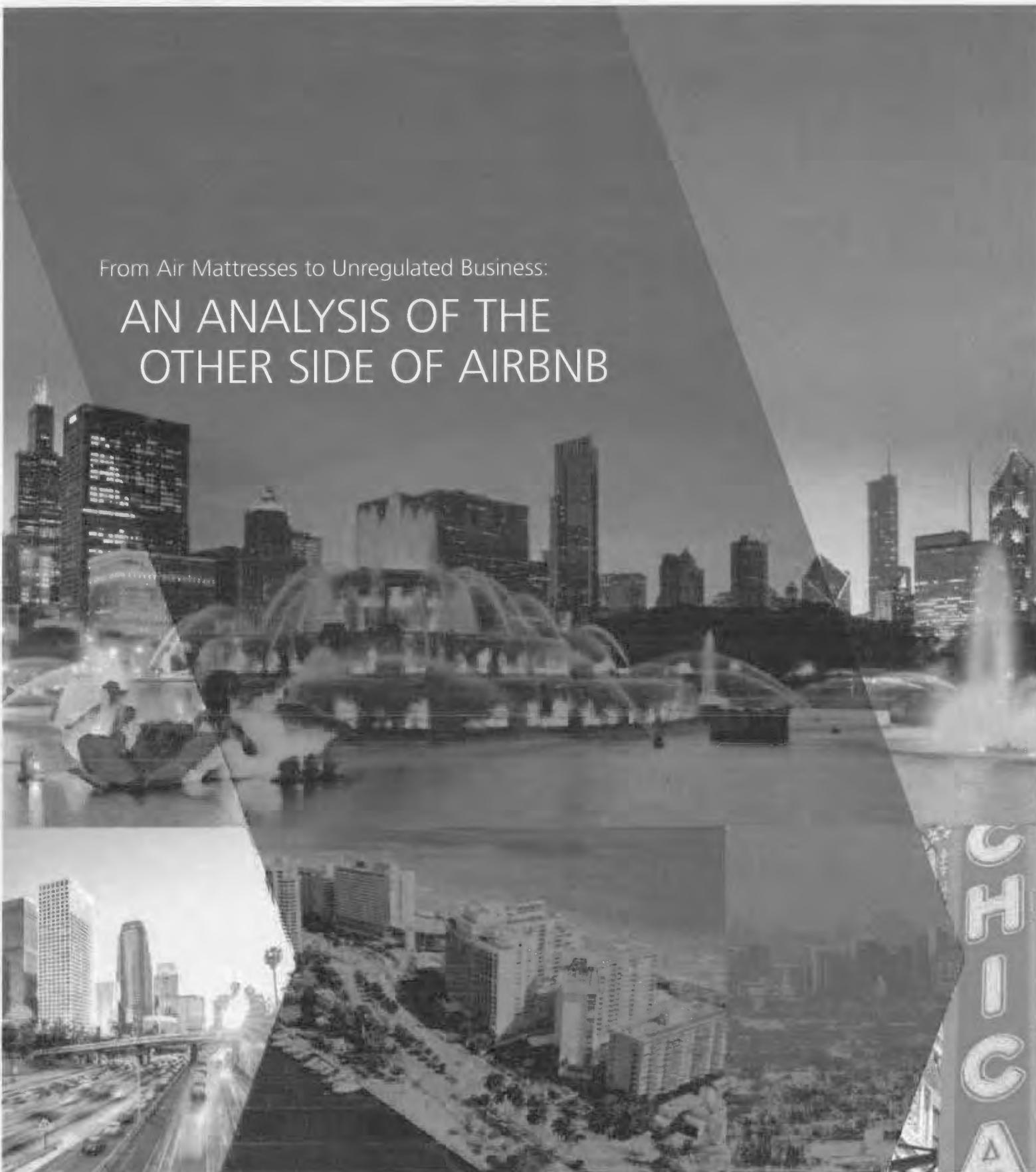
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From Air Mattresses to Unregulated Business:

AN ANALYSIS OF THE OTHER SIDE OF AIRBNB





CONTENTS

**From Air Mattresses to Unregulated Business:
An Analysis of the Other Side of Airbnb**

City Spotlight: Phoenix, Arizona

City Spotlight: Los Angeles, California

City Spotlight: Chicago, Illinois

City Spotlight: Miami, Florida

City Spotlight: Boston, Massachusetts

City Spotlight: New York, New York

City Spotlight: Philadelphia, Pennsylvania

City Spotlight: San Francisco, California

A NATIONAL VIEW: EXECUTIVE SUMMARY

As the popularity of short-term rental platforms grows in the public arena, this analysis takes a closer look at the hosts dominating one of the most trafficked platforms, Airbnb. The company, valued at some \$25 billion, has a reported 2 million listings worldwide. In media interviews and public materials, Airbnb suggests that its hosts largely use the platform to supplement their income. It states that “a typical listing earns \$5,110 a year, and is typically shared less than 4 nights per month.”¹

But that does not represent the full picture.

This analysis represents the first comprehensive look at the commercial activity being conducted on Airbnb. The analysis of hundreds of thousands of data points reveals a notable trend with respect to two overlapping groups of hosts, multiple-unit operators who rent out two or more units, and full-time operators who rent their unit(s) 360 or more days per year. These two subsets of operators generate a substantial amount of Airbnb’s revenue. Hosts who rent fewer than 360 days, but still far more than occasionally (for instance, more than 180 days), also contribute greatly to Airbnb’s bottom line.

This analysis also includes additional, city-level analyses that provide greater detail about the commercial activity being conducted on Airbnb in the 14 major metropolitan areas studied.

1. <https://www.airbnbaction.com/data-on-the-airbnb-community-in-nyc/>

Data Source

The data used in this analysis were sourced from Airdna, which tracks Airbnb revenues and operations and provides pricing and revenue data to Airbnb operators. Airdna conducts a continuous search of the Airbnb web site, resulting in each Airbnb listing being analyzed once every seven days.

The data cover 14 of the nation’s largest metropolitan statistical areas (MSAs): New York, Chicago, Los Angeles, Philadelphia, Miami, Houston, Dallas, Phoenix, San Antonio, San Diego, San Francisco, Boston, Austin and Washington, D.C. The research focuses on hosts who rent multiple units and the length of time they are renting their units.

Kwinn Labs, a hospitality research firm, sorted the data, which included Airbnb operators from October 2014 through September 2015.

Exclusions: All data exclude all shared rooms and units and unique units, such as boats, tree houses, and tents.

Additional Information:

John W. O’Neill, MAI, ISHC, Ph.D., professor of hospitality management and director of the Center for Hospitality Real Estate Strategy in the School of Hospitality Management at Penn State University and Yuxia Ouyang, doctoral student, conducted the analysis and developed the key findings. They examined over 448,000 lines of data and over 10.2 million variables.

This study was primarily funded by the American Hotel & Lodging Educational Foundation. Additional funds provided by the American Hotel & Lodging Association. Penn State University received no funding for the study.

Glossary of Terms

Host: Person or entity renting out at least one residential unit on the Airbnb platform.

Full-time operator: Any host renting out unit(s) 360 or more days per year.

Multi-unit operator: Any host renting out two or more units.

Variable operator: Host renting a variable number of units (1, 2, or more) 360 days or more days per year

Mega-operator: Any host renting out three or more units.

KEY FINDINGS

Two overlapping groups of operators, multiple-unit operators and full-time operators, are a growing percentage of total Airbnb hosts and generate a very significant share of the company's revenue in major U.S. cities. The analysis revealed the following key findings in the 14 cities studied from October 2014 through September 2015.

Multi-Unit Hosts

There is a rapid expansion of multi-unit operators, defined as hosts renting out two or more units, on Airbnb. We found this to be the case in all 14 of the cities we analyzed, which also represent some of the largest cities in the country.



Multiple-unit operators (2+ units) account for nearly 40% of the revenue on Airbnb in the 14 cities studied;

\$500 Million



\$1.3 billion Revenue

That translates to **over \$500 million of the \$1.3 billion in revenues Airbnb generated** from whole units in those cities.

Full-Time Hosts

A growing number of hosts are using the Airbnb platform to operate full-time businesses. 26% of Airbnb's revenue is derived from this group of full-time hosts. They are becoming bigger and more prominent.



2,772 full-time operators (renting **360+ days per year** just like a hotel) recorded **\$347,479,616 in revenue** or a very high average of \$125,353 per host during the time period studied.



The **growth in Airbnb hosts accelerated over the summer** months and then remained steady.



The cities with the largest number of full-time operators include:
East Coast: New York and Miami
West Coast: Los Angeles and San Francisco

By The Numbers

24.0%

New York

Nearly a **quarter (24%) of Airbnb's revenue (\$107,471,333)** came from full-time hosts who made up 3% of operators.

62.1%

Miami

Almost **two-thirds (62%) of Airbnb's revenue (\$76,159,487)** came from multi-unit hosts who made up 30% of operators.

30.4%

Los Angeles

Almost a **third (30%) of Airbnb's revenue (\$79,619,092)** came from full-time hosts who made up 4% of operators.

32.1%

San Francisco

Almost a **third (32%) of Airbnb's revenue (\$58,803,933)** came from multi-unit hosts who made up 14.9% of operators.

NATIONAL TRENDS

Airbnb host revenue has increased significantly. The total 14-city sample shows that monthly operator revenue increased from \$93.2 million in October of 2014 to \$139.0 million in September of 2015, representing a 49% increase. Monthly revenue peaked during the summer of 2015 when there was \$150,228,110 revenue in July and \$145,544,831 in August, though revenue remained near those levels in September 2015, as well, at \$139,007,806.

The highest revenue growth rate was from multi-unit operators who rent out 2 units on Airbnb. In the 12 months studied, the revenue derived from these operators rose 102%, from \$13.2 million in October 2014 to \$26.7 million in September 2015. At the same time, the number of these operators increased 62%, from 2,215 in October 2014 to 3,590 in September 2015.

The rate of growth of mega-operators (those renting out three or more units) was the largest, increasing from 1,397 in October 2014 to 2,319 in September 2015, a 66% increase. These operators generated \$21.1 million in revenue in October 2014 and \$31.4 million in September 2015, a 49% increase over 12 months.

These mega-operators generated a very substantial share of revenue. They represented 6.5% of all operators, but generated nearly a quarter (24.6%) of revenue (\$328,299,944) during the period studied.

The broader subgroup of multi-unit operators who rented two or more units represented 16.1% of total hosts, generating 39.3% of revenue.

Full-time operators offering units at least 360 days over the 12 months from October 2014 through September 2015 generated an even more disproportionate share of revenue. They represented only 3.5% of operators, but generated 26.0% of revenue.

Appendix 1: Full-Time and Multi-Unit Operators Data Tables

In order to produce this analysis, John W. O'Neill, MAI, ISHC, Ph.D., professor of hospitality management and director of the Center for Hospitality Real Estate Strategy in the School of Hospitality Management at Penn State University and Yuxia Ouyang, doctoral student, reviewed Airbnb listing data in 14 major cities from October 2014 through September 2015. The tables below provide a detailed snapshot of the data and calculations reflected in the analysis.

APPENDIX: DATA TABLES

January 2016 Report

In order to produce the January 2016 report entitled, "From Air Mattresses to Unregulated Business: An Analysis of the Other Side of Airbnb," researchers from Penn State's School of Hospitality Management reviewed Airbnb listing data in 14 major U.S. Cities from October 2014 through September 2015. The tables below provide a detailed snapshot of the data and calculations reflected in the report.

Glossary Of Terms:

Host: Person or entity renting out at least one residential unit on the Airbnb platform.

Full-time operator: Any host renting out unit(s) 360 or more days per year.

Multi-unit operator: Any host renting out two or more units.

Variable operator: Host renting a variable number of units (1, 2, or more) 360 or more days per year.

	TOTALS	FULL-TIME OPERATORS				ALL OPERATORS				MULTI-UNIT OPERATORS		
		Count No.	Revenue	Full-Time %	Revenue %	Count No.	Revenue	Host %	Revenue %	Host %	Revenue %	
Totals	1 unit Full-Time Operators	416	\$22,891,122	0.6%	2.8%	1 unit Hosts	66,755	\$809,982,372	83.9%	60.7%	16.1%	39.3%
	2 unit Full-Time Operators	152	\$15,922,024	2.0%	8.1%	2 unit Hosts	7,780	\$196,852,874	9.8%	14.7%		
	3+ unit Full-Time Operators	44	\$7,639,523	0.9%	2.3%	3+ unit Hosts	5,071	\$328,299,944	6.4%	24.6%		
	Variable Full-Time Operators	2,160	\$301,026,947									
	Total Full-Time Operators	2,772	\$347,479,616	3.5%	26.0%	Total Hosts	79,606	\$1,335,135,189				
Averages	1 unit Revenue per Host		\$55,027				\$12,134					
	2 unit Revenue per Host		\$104,750				\$25,303					
	3+ unit Revenue per Host		\$173,626				\$64,740					
	Variable Operator Revenue per Host		\$139,364									
	Total Operators		\$125,353				\$16,772					
	CITY-BY-CITY MARKET BREAKDOWN	FULL-TIME OPERATORS				ALL OPERATORS				MULTI-UNIT OPERATORS		
		Count No.	Revenue	Full-Time %	Revenue %	Count No.	Revenue	Host %	Revenue %	Host %	Revenue %	
Austin	1 unit Full-Time Operators	19	\$711,913	0.6%	2.7%	1 unit Hosts	2,985	\$26,423,587	89.9%	67.4%	10.1%	32.6%
	2 unit Full-Time Operators	13	\$1,042,731	5.8%	20.8%	2 unit Hosts	224	\$5,022,280	6.7%	12.8%		
	3+ unit Full-Time Operators	1	\$56,437	0.9%	0.7%	3+ unit Hosts	111	\$7,778,646	3.4%	19.8%		
	Variable Full-Time Operators	90	\$10,115,235									
	Total Full-Time Operators	123	\$11,926,316	3.7%	30.4%	Total Hosts	3,320	\$39,224,513				
Boston	1 unit Full-Time Operators	16	\$773,853	0.6%	2.9%	1 unit Hosts	2,487	\$26,235,888	89.8%	55.4%	10.2%	44.6%
	2 unit Full-Time Operators	3	\$288,580	2.0%	2.7%	2 unit Hosts	148	\$10,527,526	5.3%	22.2%		
	3+ unit Full-Time Operators	0	\$0	0.0%	0.0%	3+ unit Hosts	134	\$10,625,288	4.8%	22.4%		
	Variable Full-Time Operators	60	\$9,783,562									
	Total Full-Time Operators	79	\$10,845,995	2.9%	22.9%	Total Hosts	2,769	\$47,388,702				
Chicago	1 unit Full-Time Operators	16	\$683,103	0.4%	2.2%	1 unit Hosts	3,651	\$30,447,930	84.5%	61.6%	15.5%	38.4%
	2 unit Full-Time Operators	6	\$557,918	1.3%	8.0%	2 unit Hosts	445	\$6,981,545	10.3%	14.1%		
	3+ unit Full-Time Operators	2	\$201,775	0.9%	1.7%	3+ unit Hosts	226	\$12,018,824	5.2%	24.3%		
	Variable Full-Time Operators	87	\$10,314,479									
	Total Full-Time Operators	111	\$11,757,275	2.6%	23.8%	Total Hosts	4,321	\$49,448,299				
Dallas	1 unit Full-Time Operators	3	\$65,000	0.4%	0.2%	1 unit Hosts	696	\$5,534,623	85.7%	71.3%	14.3%	28.7%
	2 unit Full-Time Operators	0	\$0	0.0%	0.0%	2 unit Hosts	85	\$1,137,909	10.5%	14.7%		
	3+ unit Full-Time Operators	0	\$0	0.0%	0.0%	3+ unit Hosts	31	\$1,092,282	3.8%	14.1%		
	Variable Full-Time Operators	19	\$1,353,418									
	Total Full-Time Operators	22	\$1,418,418	2.7%	18.3%	Total Hosts	812	\$7,764,814				

	CITY-BY-CITY MARKET BREAKDOWN	FULL-TIME OPERATORS				ALL OPERATORS				MULTI-UNIT OPERATORS		
		Count No.	Revenue	Full-Time %	Revenue %	Count No.	Revenue	Host %	Revenue %	Host %	Revenue %	
Houston	1 unit Full-Time Operators	4	\$168,366	0.5%	2.6%	1 unit Hosts	730	\$6,360,134	82.8%	59.4%	17.2%	40.6%
	2 unit Full-Time Operators	1	\$62,632	1.3%	5.2%	2 unit Hosts	76	\$1,197,976	8.6%	11.2%		
	3+ unit Full-Time Operators	0	\$0	0.0%	0.0%	3+ unit Hosts	76	\$3,148,533	8.6%	29.4%		
	Variable Full-Time Operators	25	\$2,595,440									
	Total Full-Time Operators	30	\$2,826,438	3.4%	26.4%	Total Hosts	882	\$10,706,643				
Los Angeles	1 unit Full-Time Operators	58	\$2,847,357	0.5%	9.4%	1 unit Hosts	10,671	\$138,965,233	80.6%	53.1%	19.4%	46.9%
	2 unit Full-Time Operators	28	\$2,417,853	1.9%	6.5%	2 unit Hosts	1,450	\$36,929,224	10.9%	14.1%		
	3+ unit Full-Time Operators	14	\$2,286,359	1.2%	2.7%	3+ unit Hosts	1,126	\$85,857,238	8.5%	32.8%		
	Variable Full-Time Operators	477	\$72,067,522									
	Total Full-Time Operators	577	\$79,619,092	4.4%	30.4%	Total Hosts	13,246	\$261,751,695				
Miami	1 unit Full-Time Operators	15	\$677,886	0.4%	1.5%	1 unit Hosts	3,518	\$46,515,767	69.8%	37.9%	30.2%	62.1%
	2 unit Full-Time Operators	13	\$1,049,999	1.7%	5.8%	2 unit Hosts	744	\$18,220,593	14.8%	14.9%		
	3+ unit Full-Time Operators	6	\$1,047,895	0.8%	1.8%	3+ unit Hosts	781	\$57,938,894	15.5%	47.2%		
	Variable Full-Time Operators	277	\$44,566,095									
	Total Full-Time Operators	311	\$47,341,874	6.2%	38.6%	Total Hosts	5,044	\$122,675,254				
New York	1 unit Full-Time Operators	176	\$10,505,238	0.7%	3.5%	1 unit Hosts	24,062	\$303,868,908	85.7%	67.7%	14.3%	32.3%
	2 unit Full-Time Operators	54	\$6,351,213	2.1%	9.0%	2 unit Hosts	2,582	\$70,318,507	9.2%	15.7%		
	3+ unit Full-Time Operators	11	\$2,457,792	0.8%	3.3%	3+ unit Hosts	1,426	\$74,519,356	5.1%	16.6%		
	Variable Full-Time Operators	668	\$88,157,090									
	Total Full-Time Operators	909	\$107,471,333	3.2%	24.0%	Total Hosts	28,070	\$448,706,772				
Philadelphia	1 unit Full-Time Operators	3	\$85,580	0.2%	0.9%	1 unit Hosts	1,558	\$9,030,180	85.3%	63.6%	14.7%	36.4%
	2 unit Full-Time Operators	2	\$155,410	1.2%	9.6%	2 unit Hosts	161	\$1,624,239	8.8%	11.4%		
	3+ unit Full-Time Operators	2	\$148,439	1.9%	4.2%	3+ unit Hosts	108	\$3,538,479	5.9%	24.9%		
	Variable Full-Time Operators	34	\$3,479,128									
	Total Full-Time Operators	41	\$3,868,558	2.2%	27.3%	Total Hosts	1,827	\$14,192,898				
Phoenix	1 unit Full-Time Operators	2	\$76,663	0.1%	0.3%	1 unit Hosts	1,491	\$24,996,727	86.1%	59.2%	13.9%	40.8%
	2 unit Full-Time Operators	0	\$0	0.0%	0.0%	2 unit Hosts	157	\$3,547,484	9.1%	8.4%		
	3+ unit Full-Time Operators	0	\$0	0.0%	0.0%	3+ unit Hosts	85	\$13,669,909	4.9%	32.4%		
	Variable Full-Time Operators	22	\$2,096,961									
	Total Full-Time Operators	24	\$2,173,624	1.4%	5.1%	Total Hosts	1,732	\$42,214,120				
San Antonio	1 unit Full-Time Operators	4	\$103,973	1.8%	4.7%	1 unit Hosts	223	\$2,224,479	75.8%	60.7%	24.2%	39.3%
	2 unit Full-Time Operators	1	\$39,876	2.3%	6.6%	2 unit Hosts	43	\$600,637	14.7%	16.4%		
	3+ unit Full-Time Operators	1	\$68,245	3.6%	8.1%	3+ unit Hosts	28	\$839,008	9.5%	22.9%		
	Variable Full-Time Operators	8	\$490,404									
	Total Full-Time Operators	14	\$702,498	4.8%	19.2%	Total Hosts	294	\$3,664,124				
San Diego	1 unit Full-Time Operators	11	\$523,971	0.4%	1.6%	1 unit Hosts	2,910	\$32,604,964	83.1%	60.6%	16.9%	39.4%
	2 unit Full-Time Operators	3	\$281,949	0.8%	3.5%	2 unit Hosts	361	\$8,043,009	10.3%	14.9%		
	3+ unit Full-Time Operators	3	\$537,446	1.3%	4.1%	3+ unit Hosts	229	\$13,160,360	6.5%	24.5%		
	Variable Full-Time Operators	89	\$11,585,325									
	Total Full-Time Operators	106	\$12,928,691	3.0%	24.0%	Total Hosts	3,500	\$53,808,333				
San Francisco	1 unit Full-Time Operators	65	\$4,391,125	0.8%	3.5%	1 unit Hosts	8,362	\$124,409,528	85.1%	67.9%	14.9%	32.1%
	2 unit Full-Time Operators	24	\$3,253,153	2.5%	12.3%	2 unit Hosts	959	\$26,410,758	9.8%	14.4%		
	3+ unit Full-Time Operators	3	\$561,336	0.6%	1.7%	3+ unit Hosts	510	\$32,393,175	5.2%	17.7%		
	Variable Full-Time Operators	216	\$32,003,207									
	Total Full-Time Operators	308	\$40,208,822	3.1%	21.9%	Total Hosts	9,832	\$183,213,462				
Washington	1 unit Full-Time Operators	24	\$1,277,093	0.7%	3.9%	1 unit Hosts	3,412	\$32,364,423	86.2%	64.2%	13.8%	35.8%
	2 unit Full-Time Operators	4	\$420,709	1.2%	6.7%	2 unit Hosts	344	\$6,291,187	8.7%	12.5%		
	3+ unit Full-Time Operators	1	\$273,800	0.5%	2.3%	3+ unit Hosts	201	\$11,719,951	5.1%	23.3%		
	Variable Full-Time Operators	88	\$12,419,081									
	Total Full-Time Operators	117	\$14,390,683	3.0%	28.6%	Total Hosts	3,957	\$50,375,561				

All data exclude all shared rooms and units and unique units, such as boats, tree houses, and tents.

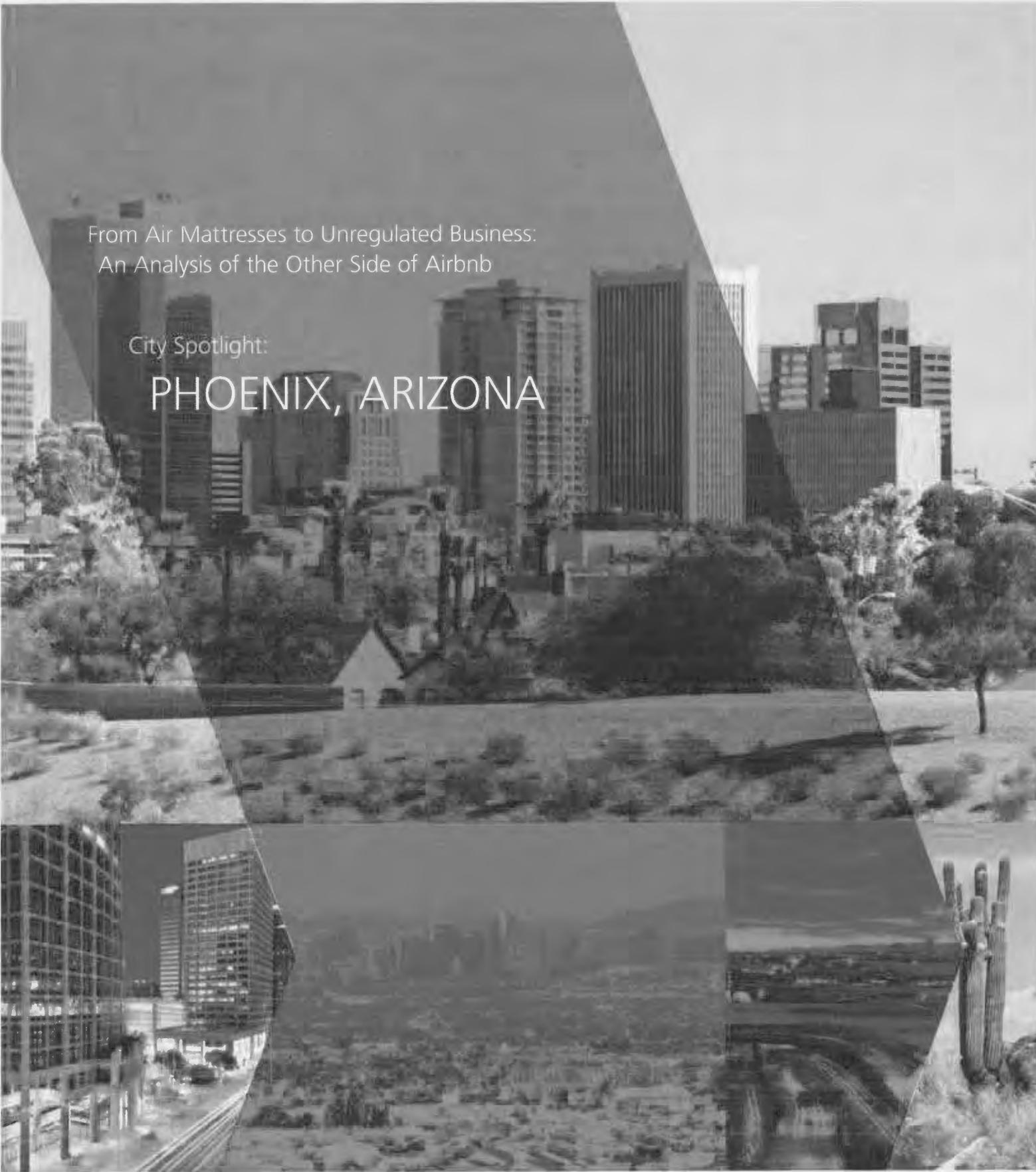
MARCH, 2016

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From Air Mattresses to Unregulated Business:
An Analysis of the Other Side of Airbnb

City Spotlight:

PHOENIX, ARIZONA



D000023

BACKGROUND

In January, 2016, the American Hotel & Lodging Association (AH&LA) released an analysis providing a view of the commercial activity being conducted on Airbnb in the nation's largest metropolitan statistical areas (MSAs). John W. O'Neill, MAI, ISHC, Ph.D., professor of hospitality management and director of the Center for Hospitality Real Estate Strategy in the School of Hospitality Management at Penn State University, conducted the analysis of over 448,000 lines of data and over 10.2 million variables and developed the key findings, which include:

- ▶ More than a quarter (26%) of Airbnb's revenue in 14 of the nation's largest markets – \$347 million – came from operators who list properties for rent full-time, or for 360 days or more during 12 months from October 2014 through September 2015.
- ▶ Based on a rigorous analysis of Airbnb listing data in 14 major U.S. metropolitan areas over the course of a full year, commercial operators in the nation's largest cities generate a substantial share of the company's revenue by renting out multiple residential properties year-round.
- ▶ The number of people renting out two or more residential properties on Airbnb appears to be growing, and nearly 40% of the company's revenue in 14 of the nation's largest cities is generated by these "multi-unit operators," totaling more than half a billion dollars a year.

The following analysis provides greater detail about the commercial activity being conducted on Airbnb the Phoenix MSA.

Data Source

The data used in this report were sourced from Airdna, which tracks Airbnb revenues and operations and provides pricing and revenue data to Airbnb operators. Airdna conducts a continuous search of the Airbnb web site, resulting in each Airbnb listing being analyzed once every seven days.

The data cover 14 of the nation's largest metropolitan statistical areas (MSAs): New York, Chicago, Los Angeles, Philadelphia, Miami, Houston, Dallas, Phoenix, San Antonio, San Diego, San Francisco, Boston, Austin and Washington, D.C. The research focuses on hosts who rent multiple units and the length of time they are renting their units.

Kalib Labs, a hospitality research firm, sorted the data, which included Airbnb operators from October 2014 through September 2015.

Exclusions: All data exclude all shared rooms and units and unique units, such as boats, tree houses, and tents.

Additional Information:

John W. O'Neill, MAI, ISHC, Ph.D., professor of hospitality management and director of the Center for Hospitality Real Estate Strategy in the School of Hospitality Management at Penn State University and Yuxia Ouyang, doctoral student, conducted the analysis and developed the key findings. They examined over 448,000 lines of data and over 10.2 million variables.

This study was primarily funded by the American Hotel & Lodging Educational Foundation. Additional funds provided by the American Hotel & Lodging Association. Penn State University received no funding for the study.

Glossary of Terms

Host: Person or entity renting out at least one residential unit on the Airbnb platform.

Full-time operator: Any host renting out unit(s) 360 or more days per year.

Multi-unit operator: Any host renting out two or more units.

KEY FINDINGS: PHOENIX REGION

The data show that Airbnb operators listing residential properties for rent for the bulk of the year drive a disproportionate share of the company's revenue in the Phoenix MSA.

Number of Days Operator Lists Unit for Rent	Number of Operators 10/2014 – 9/2015	Revenue Generated 10/2014 – 9/2015	% of Airbnb Operator Population 10/2014 – 9/2015	% of Airbnb's Revenue 10/2014 – 9/2015
30+ Days / Year	1,478	\$41,246,320	85.33%	97.71%
180+ Days / Year	245	\$9,112,300	14.15%	21.59%
360+ Days / Year	24	\$2,173,623	1.39%	5.15%



Almost a quarter (21%) of Airbnb's Phoenix-area revenue – more than \$9 million – comes from operators who list properties for rent more than 180 days a year.



Almost all of Airbnb's revenue in the Phoenix area – 97% or more than \$41 million – comes from operators who list units for rent for more than 30 days per year.



More than a third (41%) of Airbnb's revenue in the Phoenix region – \$17 million – comes from operators who list multiple units for rent.

The five Phoenix area ZIP codes with the most properties listed on Airbnb account for nearly \$8 million, or 19% of Airbnb's revenue in the Phoenix MSA.

ZIP Code	Neighborhoods	Host Count 10/2014 – 9/2015	Property Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015
85251	Scottsdale, Las Viviendas, Desert Cove, Waterfront	191	235	\$3,100,631
85254	Greenway Park, Cactus Glen, Desert Trails	76	142	\$1,657,416
85260	Northsight, Encata, Sundown Vista	75	91	\$1,268,313
85281	Tempe, University Heights, Lindon Park	82	85	\$1,072,307
85006	Coronado, Avalon, Kenwood	54	70	\$794,527
Total		478	623	\$7,893,194

If Airbnb operators in the Phoenix area followed the same tax rubric as other local lodging businesses in the City of Phoenix, in the 12 months between October 2014 and September 2015 they would have owed municipal governments in the region more than \$5 million in local taxes.

City of Phoenix Lodging Taxes				
State Sales Tax	City Sales Tax	Total Phoenix Tax Rate	Airbnb's Phoenix Regional Revenue	Airbnb's Estimated Tax Obligation
7.27%	5.3%	12.57%	\$42,214,119	\$5,306,314

APPENDIX: PHOENIX METROPOLITAN STATISTICAL AREA DATA TABLES

Revenue Analysis by ZIP Code

ZIP Code	Property Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015	ZIP Code	Host Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015
85251	235	\$3,100,631	85251	191	\$3,100,631
85254	142	\$1,657,416	85281	82	\$1,072,307
85260	91	\$1,268,313	85254	76	\$1,657,416
85281	85	\$1,072,307	85260	75	\$1,268,313
85006	70	\$794,527	85018	62	\$1,683,640
85018	69	\$1,683,640	85250	55	\$673,071
85014	63	\$916,822	85006	54	\$794,527
85250	61	\$673,071	85016	52	\$912,988
85016	54	\$912,988	85258	49	\$940,262
85258	54	\$940,262	85014	48	\$916,822

Frequent Hosts

Number of Days Operator Lists Unit(s) for Rent	Operator Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015	Percent of Operators Who List Unit(s) for Multiple Days 10/2014 – 9/2015	Percent of Revenue From Operators Who List Unit(s) for Multiple Days 10/2014 – 9/2015
Total	1,732	\$42,214,120	—	—
30+ days	1,478	\$41,246,321	85.33%	97.71%
60+ days	921	\$31,215,121	53.18%	73.94%
90+ days	665	\$27,106,524	38.39%	64.21%
120+ days	456	\$12,216,520	26.33%	28.94%
180+ days	245	\$9,112,301	14.15%	21.59%
360+ days	24	\$2,173,624	1.39%	5.15%

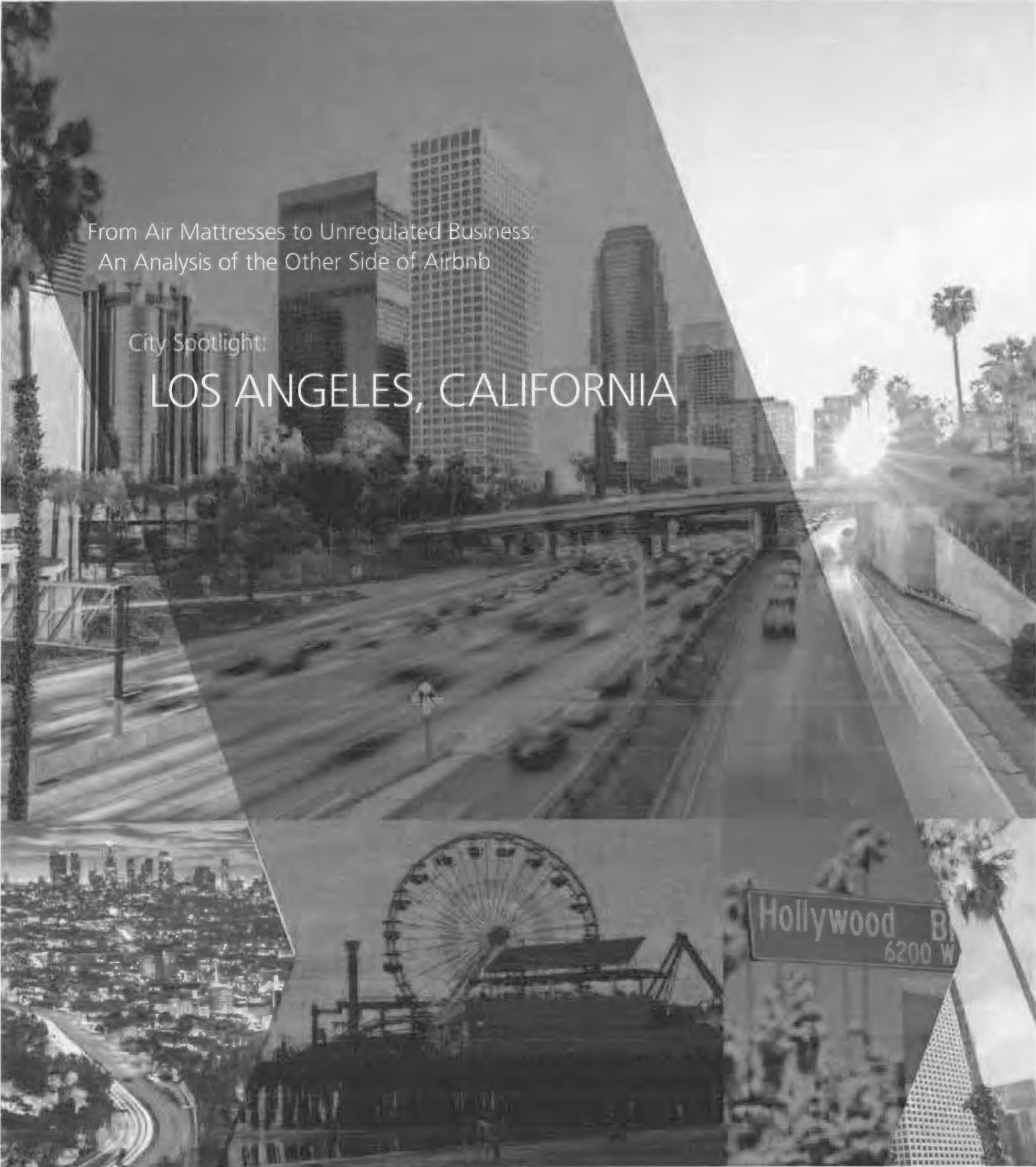
MARCH, 2016

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From Air Mattresses to Unregulated Business:
An Analysis of the Other Side of Airbnb

City Spotlight:

LOS ANGELES, CALIFORNIA



D000027

BACKGROUND

In 2016, the American Hotel & Lodging Association (AH&LA) released an analysis providing a view of the commercial activity being conducted on Airbnb in the nation's largest metropolitan statistical areas (MSAs). John W. O'Neill, MAI, ISHC, Ph.D., professor of hospitality management and director of the Center for Hospitality Real Estate Strategy in the School of Hospitality Management at Penn State University, conducted the analysis of over 448,000 lines of data and over 10.2 million variables and developed the key findings, which include:

- ▶ More than a quarter (26%) of Airbnb's revenue in 14 of the nation's largest markets – \$347 million – came from operators who listed properties for rent full-time, or for 360 days or more, during 12 months from October 2014 through September 2015.
- ▶ Based on a rigorous analysis of Airbnb listing data in 14 major U.S. metropolitan areas over the course of a full year, commercial operators in the nation's largest cities generate a substantial share of the company's revenue by renting out multiple residential properties year-round.
- ▶ The number of people renting out two or more residential properties on Airbnb appears to be growing, and nearly 40% of the company's revenue in 14 of the nation's largest cities is generated by these "multi-unit operators," totaling more than half a billion dollars a year.

The following analysis provides greater detail about the commercial activity being conducted on Airbnb in the Los Angeles MSA.

Data Source

The data used in this report were sourced from Airdna, which tracks Airbnb revenues and operations and provides pricing and revenue data to Airbnb operators. Airdna conducts a continuous search of the Airbnb web site, resulting in each Airbnb listing being analyzed once every seven days.

The data cover 14 of the nation's largest metropolitan statistical areas (MSAs): New York, Chicago, Los Angeles, Philadelphia, Miami, Houston, Dallas, Phoenix, San Antonio, San Diego, San Francisco, Boston, Austin and Washington, D.C. The research focuses on hosts who rent multiple units and the length of time they are renting their units.

Kulibers Labs, a hospitality research firm, sorted the data, which included Airbnb operators from October 2014 through September 2015.

Exclusions: All data exclude all shared rooms and units and unique units, such as boats, tree houses, and tents.

Additional Information:

John W. O'Neill, MAI, ISHC, Ph.D., professor of hospitality management and director of the Center for Hospitality Real Estate Strategy in the School of Hospitality Management at Penn State University and Yuxia Ouyang, doctoral student, conducted the analysis and developed the key findings. They examined over 448,000 lines of data and over 10.2 million variables.

This study was primarily funded by the American Hotel & Lodging Educational Foundation. Additional funds provided by the American Hotel & Lodging Association. Penn State University received no funding for the study.

Glossary of Terms

Host: Person or entity renting out at least one residential unit on the Airbnb platform.

Full-time operator: Any host renting out unit(s) 360 or more days per year.

Multi-unit operator: Any host renting out two or more units.

KEY FINDINGS: LOS ANGELES REGION

The data show that Airbnb operators listing residential properties for rent for the bulk of the year drive a disproportionate share of the company's revenue in the LA region.

Number of Days Operator Lists Unit for Rent	Number of Operators 10/2014 – 9/2015	Revenue Generated 10/2014 – 9/2015	% of Airbnb Operator Population 10/2014 – 9/2015	% of Airbnb's Revenue 10/2014 – 9/2015
30+ Days / Year	11,096	\$257,583,147	83.77%	98.41%
180+ Days / Year	2,941	\$181,547,646	22.20%	69.36%
360+ Days / Year	577	\$79,619,092	4.36%	30.42%



98%

Almost all of Airbnb's revenue in the LA-area – 98% or more than \$250 million – comes from operators who list units for rent more than 30 days per year.



\$180M

Almost three-fourths (69%) of Airbnb's LA-area revenue – more than \$180 million – comes from operators who list properties for rent more than 180 days per year.



30%

More than 30% of Airbnb's revenue in the LA area came from the 4.4% of operators who listed properties for rent for more than 360 days per year.

The five LA area ZIP codes with the most properties listed on Airbnb account for nearly \$81 million, or 31% of Airbnb's revenue in the LA metropolitan area.

ZIP Code	Neighborhoods	Host Count 10/2014 – 9/2015	Property Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015
90291	Venice, Venice Beach, Oakwood	1,082	1,582	\$32,857,565
90046	West Hollywood, Hollywood Hills, Laurel Canyon	883	1,125	\$18,028,931
90028	Hollywood	595	964	\$14,806,487
90026	Angelino Heights, Silver Lake, Echo Park	606	702	\$10,065,162
90036	Fairfax, La Brea, Miracle Mile	402	544	\$7,972,326
Total		3,568	4,917	\$83,730,471

If Airbnb in the LA region followed the same tax rubric as other local lodging businesses in the City of Los Angeles, in the 12 months between October 2014 and September 2015 they would have owed municipal governments in the region more than \$41 million in local taxes.

City of Los Angeles Lodging Taxes					
Room Tax	Assessment Tax	Tourism Fee	Total City of LA Lodging Tax Rate	Airbnb's LA Regional Revenue	Airbnb's Estimated Tax Obligation
14%	.2%	1.5%	15.7%	\$261,751,695	\$41,095,016

APPENDIX: LOS ANGELES METROPOLITAN STATISTICAL AREA DATA TABLES

Revenue Analysis by ZIP Code

ZIP Code	Property Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015	ZIP Code	Host Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015
90291	1,582	\$32,857,565	90291	1,082	\$32,857,565
90046	1,125	\$18,028,931	90046	883	\$18,028,931
90028	964	\$14,806,487	90026	606	\$10,065,162
90026	702	\$10,065,162	90028	595	\$14,806,487
90036	544	\$7,972,326	90027	414	\$5,058,872
90068	485	\$8,263,758	90069	408	\$7,737,891
90027	476	\$5,058,872	90036	402	\$7,972,326
90069	473	\$7,737,891	90068	402	\$8,263,758
90405	438	\$6,782,431	90405	397	\$6,782,431
90292	402	\$7,001,520	90292	313	\$7,001,520

Frequent Hosts

Number of Days Operator Lists Unit(s) for Rent	Operator Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015	Percent of Operators Who List Unit(s) for Multiple Days 10/2014 – 9/2015	Percent of Revenue From Operators Who List Unit(s) for Multiple Days 10/2014 – 9/2015
Total	13,246	\$261,751,695	-	-
30+ days	11,096	\$257,583,147	83.77%	98.41%
60+ days	8,089	\$245,573,376	61.07%	93.82%
90+ days	6,004	\$229,957,872	45.33%	87.85%
120+ days	4,659	\$213,790,685	35.17%	81.68%
180+ days	2,941	\$181,547,646	22.20%	69.36%
360+ days	577	\$79,619,092	4.36%	30.42%

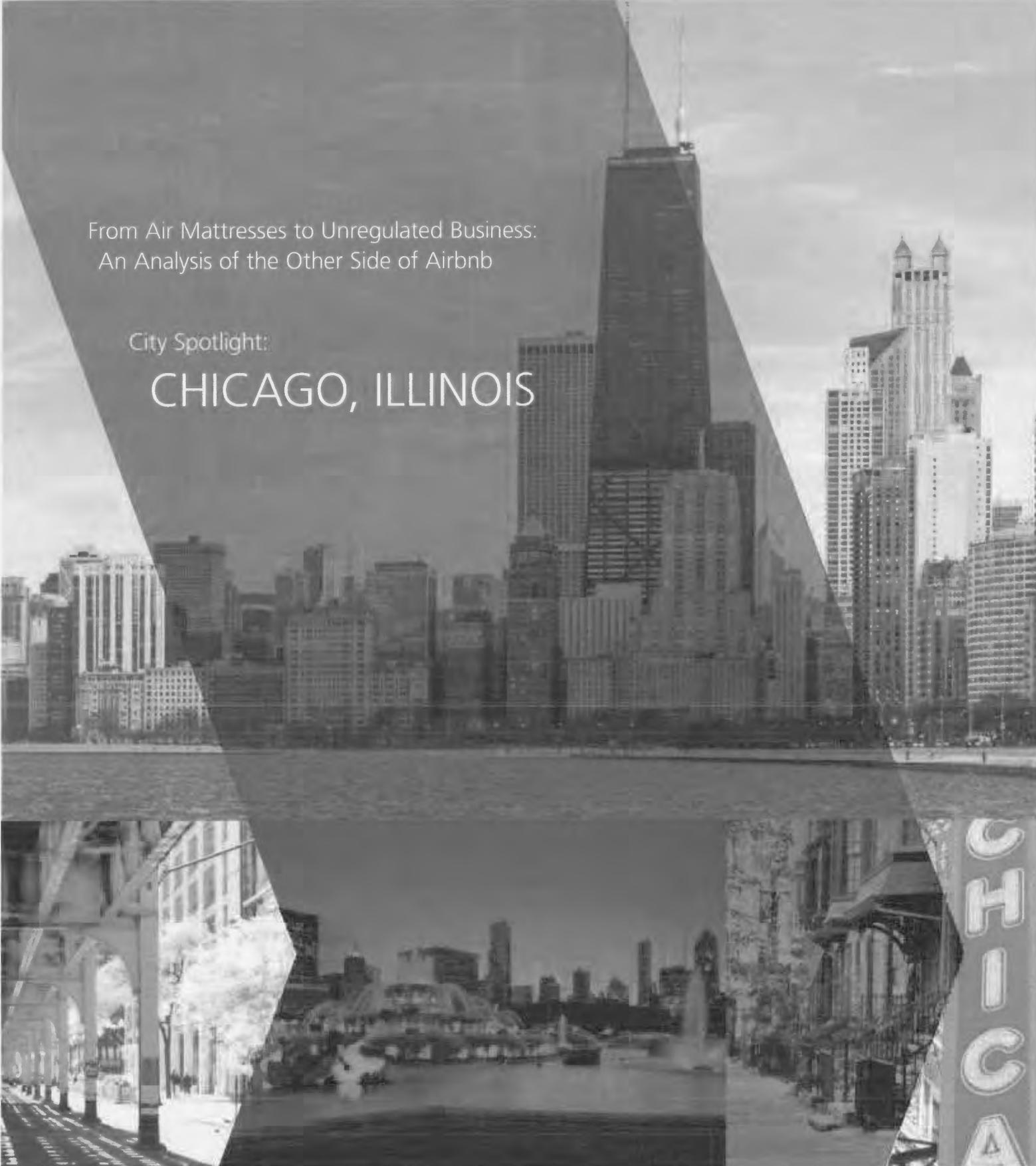
MAY, 2016

From Air Mattresses to Unregulated Business:
An Analysis of the Other Side of Airbnb

City Spotlight:

CHICAGO, ILLINOIS

FILED DATE: 6/21/2019 6:51 PM 2016CH15489



D000031

BACKGROUND

In 2016, the American Hotel & Lodging Association (AH&LA) released an analysis providing a view of the commercial activity being conducted on Airbnb in the nation's largest metropolitan statistical areas (MSAs). John W. O'Neill, MAI, ISHC, Ph.D., professor of hospitality management and director of the Center for Hospitality Real Estate Strategy in the School of Hospitality Management at Penn State University, conducted the analysis of over 448,000 lines of data and over 10.2 million variables and developed the key findings, which include:

- ▶ More than a quarter (26%) of Airbnb's revenue in 14 of the nation's largest markets – \$347 million – came from operators who listed properties for rent full-time, or for 360 days or more during 12 months from October 2014 through September 2015.
- ▶ Based on a rigorous analysis of Airbnb listing data in 14 major U.S. metropolitan areas over the course of a full year, commercial operators in the nation's largest cities generate a substantial share of the company's revenue by renting out multiple residential properties year-round.
- ▶ The number of people renting out two or more residential properties on Airbnb appears to be growing, and nearly 40% of the company's revenue in 14 of the nation's largest cities is generated by these "multi-unit operators," totaling more than half a billion dollars a year.

The following analysis provides greater detail about the commercial activity being conducted on Airbnb in the Chicago MSA.

Data Source

The data used in this report were sourced from Airdna, which tracks Airbnb revenues and operations and provides pricing and revenue data to Airbnb operators. Airdna conducts a continuous search of the Airbnb web site, resulting in each Airbnb listing being analyzed once every seven days.

The data cover 14 of the nation's largest metropolitan statistical areas (MSAs): New York, Chicago, Los Angeles, Philadelphia, Miami, Houston, Dallas, Phoenix, San Antonio, San Diego, San Francisco, Boston, Austin and Washington, D.C. The research focuses on hosts who rent multiple units and the length of time they are renting their units.

Kalith Labs, a hospitality research firm, sorted the data, which included Airbnb operators from October 2014 through September 2015.

Exclusions: All data exclude all shared rooms and units and unique units, such as boats, tree houses, and tents.

Additional Information:

John W. O'Neill, MAI, ISHC, Ph.D., professor of hospitality management and director of the Center for Hospitality Real Estate Strategy in the School of Hospitality Management at Penn State University and Yuxia Ouyang, doctoral student, conducted the analysis and developed the key findings. They examined over 448,000 lines of data and over 10.2 million variables.

This study was primarily funded by the American Hotel & Lodging Educational Foundation. Additional funds provided by the American Hotel & Lodging Association. Penn State University received no funding for the analysis.

Glossary of Terms

Host: Person or entity renting out at least one residential unit on the Airbnb platform.

Full-time operator: Any host renting out unit(s) 360 or more days per year.

Multi-unit operator: Any host renting out two or more units.

KEY FINDINGS: CHICAGO REGION

The data show that Airbnb operators listing residential properties for rent for the bulk of the year drive a disproportionate share of the company's revenue in the Chicago region.

Number of Days Operator Lists Unit(s) for Rent	Number of Operators 10/2014 – 9/2015	Revenue Generated 10/2014 – 9/2015	% of Airbnb Operator Population 10/2014 – 9/2015	% of Airbnb's Revenue 10/2014 – 9/2015
30+ Days / Year	3,210	\$47,602,833	74.29%	96.27%
180+ Days / Year	635	\$28,828,196	14.7%	58.3%
360+ Days / Year	111	\$11,757,274	2.57%	23.78%



\$29M

More than half (58%) of Airbnb's Chicago-area revenue – almost **\$29 million** – comes from operators who list properties for rent **more than 180 days per year.**



96%

Almost all of Airbnb's revenue in the Chicago region – **96% or more than \$47 million** – comes from operators who list units for **rent more than 30 days per year.**

38%



Operators listing **multiple units for rent** drove more than **one-third (38%)** of Airbnb's revenue in the Chicago region – **\$19 million.**

The five Chicago area ZIP codes with the most properties listed on Airbnb account for more than \$20 million, or 41% of Airbnb's revenue in the Chicago metropolitan area.

ZIP Code	Neighborhoods	Host Count 10/2014 – 9/2015	Property Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015
60657	Lake View, Boystown	391	434	\$3,291,856
60611	Magnificent Mile, Streeterville	314	419	\$4,622,857
60614	Lincoln Park, Sheffield Neighbors, Old Town Triangle	364	411	\$4,179,342
60610	Old Town, Gold Coast	324	393	\$4,415,188
60622	Wicker Park, West Town	291	333	\$3,671,681
Total		1,684	1,990	\$20,180,924

APPENDIX: CHICAGO METROPOLITAN STATISTICAL AREA DATA TABLES

Revenue Analysis by ZIP Code

Zip Code	Property Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015	Zip Code	Host Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015
60657	434	\$3,291,856	60657	391	\$3,291,856
60611	419	\$4,622,857	60614	364	\$4,179,342
60614	411	\$4,179,342	60610	324	\$4,415,188
60610	393	\$4,415,188	60611	314	\$4,622,857
60622	333	\$3,671,681	60647	297	\$2,906,511
60647	324	\$2,906,511	60622	291	\$3,671,681
60654	271	\$2,296,983	60654	247	\$2,296,983
60613	265	\$2,233,421	60613	245	\$2,233,421
60601	258	\$2,913,019	60601	211	\$2,913,019
60640	211	\$1,538,997	60640	184	\$1,538,997

Frequent Hosts

Number of Days Operator Lists Unit(s) for Rent	Operator Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015	Percent of Operators Who List Unit(s) for Multiple Days 10/2014 – 9/2015	Percent of Revenue From Operators Who List Unit(s) for Multiple Days 10/2014 – 9/2015
Total	4,321	\$49,448,299.10	–	–
30+ days	3,210	\$47,602,834	74.29%	96.27%
60+ days	2,173	\$43,882,554	50.29%	88.74%
90+ days	1,505	\$39,414,950	34.83%	79.71%
120+ days	1,092	\$35,595,780	25.27%	71.99%
180+ days	635	\$28,828,197	14.70%	58.30%
360+ days	111	\$11,757,275	2.57%	23.78%

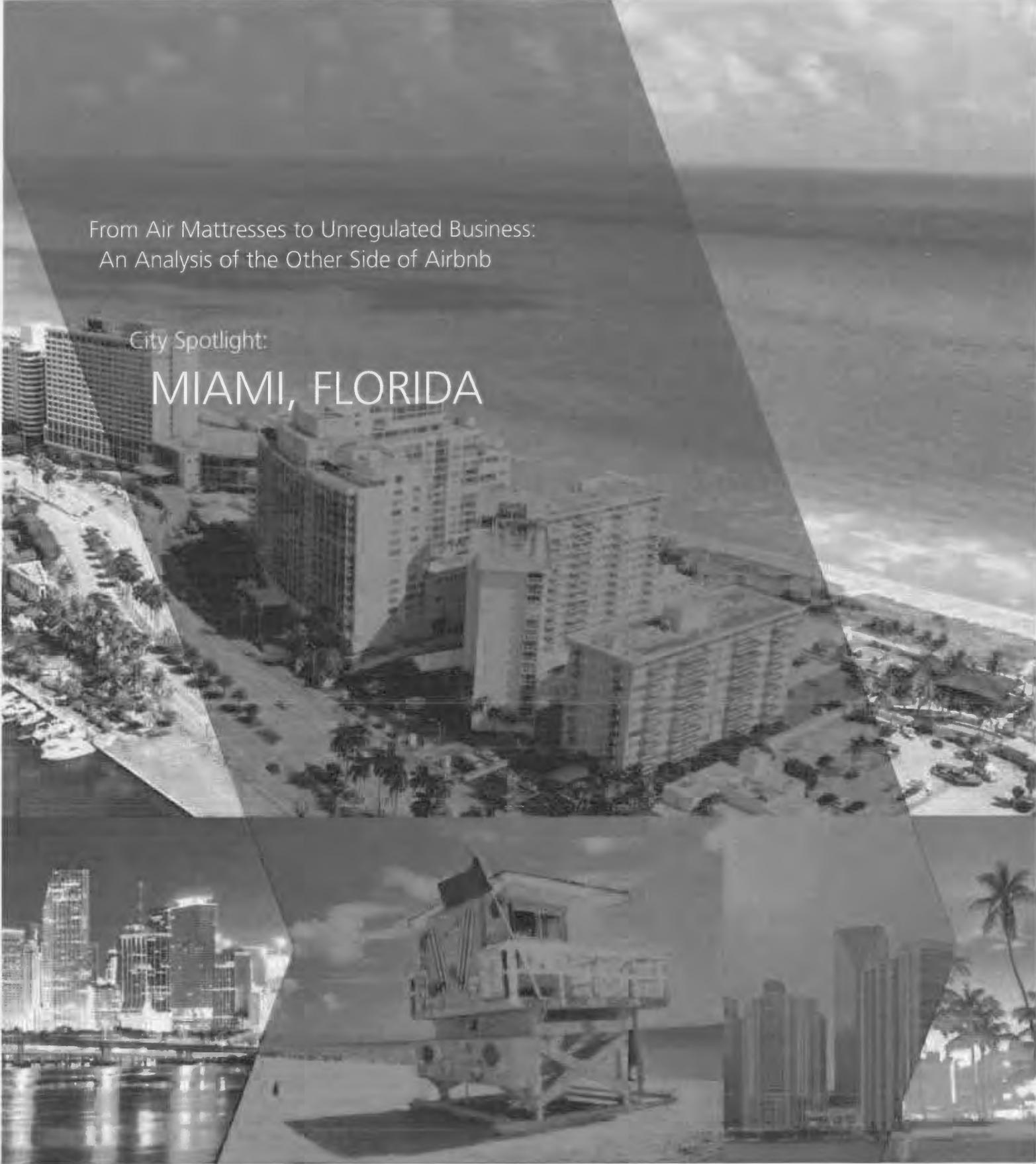
JUNE, 2016

FILED DATE: 6/21/2019 6:51 PM 2016CH15489

From Air Mattresses to Unregulated Business:
An Analysis of the Other Side of Airbnb

City Spotlight:

MIAMI, FLORIDA



D000035

BACKGROUND

In 2016, the American Hotel & Lodging Association (AH&LA) released an analysis providing a view of the commercial activity being conducted on Airbnb in the nation's largest metropolitan statistical areas (MSAs). John W. O'Neill, MAI, ISHC, Ph.D., professor of hospitality management and director of the Center for Hospitality Real Estate Strategy in the School of Hospitality Management at Penn State University, conducted the analysis of over 448,000 lines of data and over 10.2 million variables and developed the key findings, which include:

- ▶ More than a quarter (26%) of Airbnb's revenue in 14 of the nation's largest markets – \$347 million – came from operators who listed properties for rent full-time, or for 360 days or more, during 12 months from October 2014 through September 2015.
- ▶ Based on a rigorous analysis of Airbnb listing data in 14 major U.S. metropolitan areas over the course of a full year, commercial operators in the nation's largest cities generate a substantial share of the company's revenue by renting out multiple residential properties and/or renting properties year-round.
- ▶ The number of people renting out two or more residential properties on Airbnb appears to be growing, and nearly 40% of the company's revenue in 14 of the nation's largest cities is generated by these "multi-unit operators," totaling more than half a billion dollars a year.

The following analysis provides greater detail about the commercial activity being conducted on Airbnb in the Miami MSA.

Data Source

The data used in this report were sourced from Airdna, which tracks Airbnb revenues and operations and provides pricing and revenue data to Airbnb operators. Airdna conducts a continuous search of the Airbnb web site, resulting in each Airbnb listing being analyzed once every seven days.

The data cover 14 of the nation's largest metropolitan statistical areas (MSAs): New York, Chicago, Los Angeles, Philadelphia, Miami, Houston, Dallas, Phoenix, San Antonio, San Diego, San Francisco, Boston, Austin and Washington, D.C. The research focuses on hosts who rent multiple units and length of time that hosts rent out their unit(s).

Kalbar Labs, a hospitality research firm, sorted the data, which included Airbnb operators from October 2014 through September 2015.

Exclusions: All data exclude all shared rooms and units and unique units, such as boats, tree houses, and tents.

Additional Information:

John W. O'Neill, MAI, ISHC, Ph.D., professor of hospitality management and director of the Center for Hospitality Real Estate Strategy in the School of Hospitality Management at Penn State University and Yuxia Ouyang, doctoral student, conducted the analysis and developed the key findings. They examined over 448,000 lines of data and over 10.2 million variables.

This study was primarily funded by the American Hotel & Lodging Educational Foundation. Additional funds provided by the American Hotel & Lodging Association. Penn State University received no funding for the study.

Glossary of Terms

Host: Person or entity renting out at least one residential unit on the Airbnb platform.

Full-time operator: Any host renting out unit(s) 360 or more days per year.

Multi-unit operator: Any host renting out two or more units.

KEY FINDINGS: MIAMI REGION

The data show that Airbnb operators listing residential properties for rent for the bulk of the year drive a large percentage of the company's revenue in the Miami region.

Number of Days Operator Lists Unit(s) for Rent	Number of Operators 10/2014 – 9/2015	Revenue Generated 10/2014 – 9/2015	% of Airbnb Operator Population 10/2014 – 9/2015	% of Airbnb's Revenue 10/2014 – 9/2015
30+ Days / Year	4,533	\$121,727,626	89.87 %	99.23%
180+ Days / Year	1,412	\$93,584,435	27.99%	76.29%
360+ Days / Year	311	\$47,341,874	6.17%	38.59%



Three-quarters (76%) of Airbnb's Miami-area revenue, over \$93 million, came from operators who listed properties for rent more than 180 days per year.



Operators listing **multiple residential units for rent** drove nearly two-thirds (**62%, the highest percentage of any city studied**) of Airbnb's revenue in the Miami region, or **more than \$76 million.**



Full-time operators listing residential properties for rent 360 days or more per year generated more than \$47 million – **39% of Airbnb's revenue, the highest percentage of any city studied** – in the Miami area.

The five Miami-area ZIP codes with the most properties listed on Airbnb from October 2014 through September 2015, accounted for more than \$79 million, or 65% of Airbnb's revenue in the Miami metropolitan area.

ZIP Code	Neighborhoods	Airbnb Operator Count 10/2014 – 9/2015	Property Count 10/2014 – 9/2015	Airbnb Revenue 10/14 – 9/15
33139	South Beach, South Pointe, City Center	1,427	2,930	\$45,687,010
33140	Bayshore, Mid-Beach	365	833	\$11,534,012
33160	Golden Beach, Eastern Shores, Sunny Isles Beach	319	704	\$8,742,640
33141	North Beach, North Bay Village	368	617	\$7,520,232
33131	Downtown Miami, Brickell Key	287	424	\$5,859,474
Total		2,766	5,508	\$79,343,367

If Airbnb in the Miami region followed the same tax rubric as other local lodging businesses in the City of Miami, in the 12 months between October 2014 and September 2015 Airbnb operators in the metropolitan area would have owed almost \$16 million in taxes.

City of Miami Lodging Taxes					
Florida State Sales Tax	City of Miami Tax	City of Miami Hotel Room Occupancy Tax	Total City of Miami Lodging Tax Rate	Airbnb's Miami Regional Revenue (10/14 – 9/15)	Airbnb's Estimated Tax Obligation
7%	3%	3%	13%	\$122,675,254	\$15,947,783

APPENDIX: MIAMI METROPOLITAN STATISTICAL AREA DATA TABLES

Revenue Analysis by ZIP Code

Zip Code	Property Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015	Zip Code	Host Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015
33139	2,930	\$45,687,010	33139	1,427	\$45,687,010
33140	833	\$11,534,012	33141	368	\$7,520,232
33160	704	\$8,742,640	33140	365	\$11,534,012
33141	617	\$7,520,232	33160	319	\$8,742,640
33131	424	\$5,859,474	33131	287	\$5,859,474
33019	376	\$3,633,028	33132	235	\$4,555,822
33132	356	\$4,555,822	33019	182	\$3,633,028
33130	225	\$2,100,584	33137	168	\$1,738,627
33137	191	\$1,738,627	33130	160	\$2,100,584
33304	148	\$1,459,188	33133	93	\$1,659,930

Frequent Hosts

Number of Days Operator Lists Unit(s) for Rent	Operator Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015	Percent of Operators Who List Unit(s) for Multiple Days 10/2014 – 9/2015	Percent of Revenue From Operators Who List Unit(s) for Multiple Days 10/2014 – 9/2015
Total	5,044	\$122,675,254	-	-
30+ days	4,533	\$121,727,627	89.87%	99.23%
60+ days	3,505	\$118,179,990	69.49%	96.34%
90+ days	2,745	\$112,926,256	54.42%	92.05%
120+ days	2,154	\$106,338,476	42.70%	86.68%
180+ days	1,412	\$93,584,435	27.99%	76.29%
360+ days	311	\$47,341,874	6.17%	38.59%

JUNE, 2016

From Air Mattresses to Unregulated Business:
An Analysis of the Other Side of Airbnb

City Spotlight:

BOSTON, MASSACHUSETTS

FILED DATE: 6/21/2019 6:51 PM 2016CH15489



D000039

BACKGROUND

In 2016, the American Hotel & Lodging Association (AH&LA) released an analysis providing a view of the commercial activity being conducted on Airbnb in the nation's largest metropolitan statistical areas (MSAs). John W. O'Neill, MAI, ISHC, Ph.D., professor of hospitality management and director of the Center for Hospitality Real Estate Strategy in the School of Hospitality Management at Penn State University, conducted the analysis of over 448,000 lines of data and over 10.2 million variables and developed the key findings, which include:

- ▶ More than a quarter (26%) of Airbnb's revenue in 14 of the nation's largest markets – \$347 million – came from operators who listed properties for rent full-time, or for 360 days or more, during 12 months from October 2014 through September 2015.
- ▶ Based on a rigorous analysis of Airbnb listing data in 14 major U.S. metropolitan areas over the course of a full year, commercial operators in the nation's largest cities generate a substantial share of the company's revenue by renting out multiple residential properties and/or renting properties year-round.
- ▶ The number of people renting out two or more residential properties on Airbnb appears to be growing, and nearly 40% of the company's revenue in 14 of the nation's largest cities is generated by these "multi-unit operators," totaling more than half a billion dollars a year.

The following analysis provides greater detail about the commercial activity being conducted on Airbnb in the Boston MSA.

Data Source

The data used in this report were sourced from Airdna, which tracks Airbnb revenues and operations and provides pricing and revenue data to Airbnb operators. Airdna conducts a continuous search of the Airbnb web site, resulting in each Airbnb listing being analyzed once every seven days.

The data cover 14 of the nation's largest metropolitan statistical areas (MSAs): New York, Chicago, Los Angeles, Philadelphia, Miami, Houston, Dallas, Phoenix, San Antonio, San Diego, San Francisco, Boston, Austin and Washington, D.C. The research focuses on hosts who rent multiple units and length of time that hosts rent out their unit(s).

Kidder Labs, a hospitality research firm, sorted the data, which included Airbnb operators from October 2014 through September 2015.

Exclusions: All data exclude all shared rooms and units and unique units, such as boats, tree houses, and tents.

Additional Information:

John W. O'Neill, MAI, ISHC, Ph.D., professor of hospitality management and director of the Center for Hospitality Real Estate Strategy in the School of Hospitality Management at Penn State University and Yuxia Ouyang, doctoral student, conducted the analysis and developed the key findings. They examined over 448,000 lines of data and over 10.2 million variables.

This study was primarily funded by the American Hotel & Lodging Educational Foundation. Additional funds provided by the American Hotel & Lodging Association. Penn State University received no funding for the study.

Glossary of Terms

Host: Person or entity renting out at least one residential unit on the Airbnb platform.

Full-time operator: Any host renting out unit(s) 360 or more days per year.

Multi-unit operator: Any host renting out two or more units.

KEY FINDINGS: BOSTON REGION

The data show that Airbnb operators listing residential properties for rent for the bulk of the year drive a large percentage of the company's revenue in the Boston region.

Number of Days Operator Lists Unit(s) for Rent	Number of Operators 10/2014 – 9/2015	Revenue Generated 10/2014 – 9/2015	% of Airbnb Operator Population 10/2014 – 9/2015	% of Airbnb's Revenue 10/2014 – 9/2015
30+ Days / Year	1,882	\$39,218,458	67.97%	82.76%
180+ Days / Year	431	\$24,846,265	15.57%	52.43%
360+ Days / Year	79	\$10,845,995	2.85%	22.89%



Almost all of Airbnb's revenue in the Boston region – **83%** or almost **\$40 million** – comes from operators who list units for rent **more than 30 days per year**.



More than half (52%) of Airbnb's Boston-area revenue – almost **\$25 million** – comes from operators who listed properties for rent **more than 180 days per year**.



Operators listing **multiple units for rent** drove almost half (**45%**) of Airbnb's revenue in the Boston region – **\$21 million**.

The five Boston-area ZIP codes with the most properties listed on Airbnb from October 2014 through September 2015 accounted for more than \$13 million, or 28% of Airbnb's revenue in the Boston metropolitan area.

ZIP Code	Neighborhoods	Airbnb Operator Count 10/2014 – 9/2015	Property Count 10/2014 – 9/2015	Airbnb Revenue 10/14 – 9/15
02139	Mid-Cambridge, East Cambridge, Riverside, Cambridgeport	205	254	\$3,427,482
02116	Back Bay, Bay Village, Columbus	179	250	\$2,629,783
02138	North Cambridge, Cambridge Highlands, West Cambridge	204	239	\$2,974,939
02118	Central, Fenway, South End, North Dorchester	142	183	\$ 2,486,161
02114	West End, Beacon Hill	134	158	\$1,926,928
Total		864	1,084	\$13,445,293

APPENDIX: BOSTON METROPOLITAN STATISTICAL AREA DATA TABLES

Revenue Analysis by ZIP Code

Zip Code	Property Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015	Zip Code	Operator Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015
02139	254	\$3,427,482	02139	205	\$3,427,482
02116	250	\$2,629,783	02138	204	\$2,974,939
02138	239	\$2,974,939	02116	179	\$2,629,783
02118	183	\$2,486,161	02118	142	\$2,486,161
02114	158	\$1,926,928	02114	134	\$1,926,928
02215	140	\$1,398,817	02130	120	\$1,711,627
02115	131	\$1,286,826	02115	117	\$1,286,826
02130	128	\$1,711,627	02215	103	\$1,398,817
02143	110	\$1,146,935	02143	97	\$1,146,935
02127	92	\$1,184,940	02127	86	\$1,184,940

Frequent Hosts

Number of Days Operator Lists Unit(s) for Rent	Operator Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015	Percent of Operators Who List Unit(s) for Multiple Days 10/2014 – 9/2015	Percent of Revenue From Operators Who List Unit(s) for Multiple Days 10/2014 – 9/2015
Total				
30+ days	1,882	\$39,218,459	67.97%	82.76%
60+ days	1,260	\$35,998,268	45.50%	75.96%
90+ days	896	\$32,824,978	32.36%	69.27%
120+ days	675	\$29,909,247	24.38%	63.11%
180+ days	431	\$24,846,265	15.57%	52.43%
360+ days	79	\$10,845,995	2.85%	22.89%

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JUNE, 2016

From Air Mattresses to Unregulated Business:
An Analysis of the Other Side of Airbnb

City Spotlight:

NEW YORK, NEW YORK

FILED DATE: 6/21/2019 6:51 PM 2016CH15489



D000043

BACKGROUND

In 2016, the American Hotel & Lodging Association (AH&LA) released an analysis providing a view of the commercial activity being conducted on Airbnb in the nation's largest metropolitan statistical areas (MSAs). John W. O'Neill, MAI, ISHC, Ph.D., professor of hospitality management and director of the Center for Hospitality Real Estate Strategy in the School of Hospitality Management at Penn State University, conducted the analysis of over 448,000 lines of data and over 10.2 million variables and developed the key findings, which include:

- ▶ More than a quarter (26%) of Airbnb's revenue in 14 of the nation's largest markets – \$347 million – came from operators who listed properties for rent full-time, or for 360 days or more, during 12 months from October 2014 through September 2015.
- ▶ Based on a rigorous analysis of Airbnb listing data in 14 major U.S. metropolitan areas over the course of a full year, commercial operators in the nation's largest cities generate a substantial share of the company's revenue by renting out multiple residential properties and/or renting properties year-round.
- ▶ The number of people renting out two or more residential properties on Airbnb appears to be growing, and nearly 40% of the company's revenue in 14 of the nation's largest cities is generated by these "multi-unit operators," totaling more than half a billion dollars a year.

The following analysis provides greater detail about the commercial activity being conducted on Airbnb in the New York City MSA.

Data Source

The data used in this report were sourced from Airdna, which tracks Airbnb revenues and operations and provides pricing and revenue data to Airbnb operators. Airdna conducts a continuous search of the Airbnb web site, resulting in each Airbnb listing being analyzed once every seven days.

The data cover 14 of the nation's largest metropolitan statistical areas (MSAs): New York, Chicago, Los Angeles, Philadelphia, Miami, Houston, Dallas, Phoenix, San Antonio, San Diego, San Francisco, Boston, Austin and Washington, D.C. The research focuses on hosts who rent multiple units and length of time that hosts rent out their unit(s).

Valize Labs, a hospitality research firm, sorted the data, which included Airbnb operators from October 2014 through September 2015.

Exclusions: All data exclude all shared rooms and units and unique units, such as boats, tree houses, and tents.

Additional Information:

John W. O'Neill, MAI, ISHC, Ph.D., professor of hospitality management and director of the Center for Hospitality Real Estate Strategy in the School of Hospitality Management at Penn State University and Yuxia Ouyang, doctoral student, conducted the analysis and developed the key findings. They examined over 448,000 lines of data and over 10.2 million variables.

This study was primarily funded by the American Hotel & Lodging Educational Foundation. Additional funds provided by the American Hotel & Lodging Association. Penn State University received no funding for the study.

Glossary of Terms

Host: Person or entity renting out at least one residential unit on the Airbnb platform.

Full-time operator: Any host renting out unit(s) 360 or more days per year.

Multi-unit operator: Any host renting out two or more units.

KEY FINDINGS: NEW YORK CITY REGION

The data show that Airbnb operators listing residential properties for rent for the bulk of the year drive a large percentage of the company's revenue in the New York City region.

Number of Days Operator Lists Unit(s) for Rent	Number of Operators 10/2014 – 9/2015	Revenue Generated 10/2014 – 9/2015	% of Airbnb Operator Population 10/2014 – 9/2015	% of Airbnb's Revenue 10/2014 – 9/2015
30+ Days / Year	21,623	\$432,861,637	77.03%	96.47%
180+ Days / Year	4,712	\$265,478,756	16.79%	59.17%
360+ Days / Year	909	\$107,471,333	3.24%	23.95%



\$265M

More than half (59%) of Airbnb's New York City revenue – over \$265 million – comes from operators who listed units for rent **more than 180 days per year.**



24%

Nearly one-quarter of Airbnb's revenue in the New York City area – **24% or more than \$107 million** – comes from operators who list units for rent **full-time.**

32%



Operators listing **multiple units for rent** drove almost one-third (32%) of Airbnb's revenue in the New York City region – **\$145 million.**

The five New York City-area ZIP codes with the most properties listed on Airbnb from October 2014 through September 2015 accounted for more than \$95 million, or 21% of Airbnb's revenue in the New York MSA.

ZIP Code	Neighborhoods	Airbnb Operator Count 10/2014 – 9/2015	Property Count 10/2014 – 9/2015	Airbnb Revenue 10/14 – 9/15
11211	Williamsburg	1,349	1,443	\$18,905,453
10011	Chelsea	1,120	1,181	\$18,095,204
10003	Union Square, Gramercy Park	1,090	1,165	\$20,175,660
10002	Lower East Side	1,036	1,115	\$19,363,658
10009	East Village	1,013	1,100	\$18,598,365
Total		5,608	6,004	\$95,138,340

If Airbnb operators in the New York City area followed the same tax rubric as other lodging businesses in New York City, in the 12 months between October 2014 and September 2015 they would have owed municipal governments in the region more than \$75 million.

City of New York Lodging Taxes										
State Tax	City Sales Tax	Transportation District Surcharge	Hotel Room Occupancy Tax	Total Tax Rate	NY Unit Fee	Occupancy Tax	Total Fee/ Night	Sold Room Nights	Airbnb's NYC Regional Revenue	Airbnb's Estimated Tax Obligation
4%	4.5%	.375%	5.88%	14.75%	\$1.50	\$2.00	\$3.50	2,582,659	\$448,706,771	\$75,223,555

APPENDIX: NEW YORK CITY METROPOLITAN STATISTICAL AREA DATA TABLES

Revenue Analysis by ZIP Code

Zip Code	Property Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015	Zip Code	Host Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015
11211	1,443	\$18,905,453	11211	1,349	\$18,905,453
10011	1,181	\$18,095,204	10011	1,120	\$18,095,204
10003	1,165	\$20,175,660	10003	1,090	\$20,175,660
10002	1,115	\$19,363,658	10002	1,036	\$19,363,658
10009	1,100	\$18,598,365	10014	1,018	\$19,070,874
10014	1,085	\$19,070,874	10009	1,013	\$18,598,365
10019	1,027	\$20,378,469	10019	897	\$20,378,469
10012	926	\$18,464,117	10012	870	\$18,464,117
10016	765	\$10,386,529	11238	711	\$7,532,799
11238	764	\$7,532,799	10016	708	\$10,386,529

Frequent Hosts

Number of Days Operator Lists Unit(s) for Rent	Operator Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015	Percent of Operators Who List Unit(s) for Multiple Days 10/2014 – 9/2015	Percent of Revenue From Operators Who List Unit(s) for Multiple Days 10/2014 – 9/2015
Total	28,070	\$448,706,772	-	-
30+ days	21,623	\$432,861,638	77.03%	96.47%
60+ days	14,789	\$398,392,112	52.69%	88.79%
90+ days	10,403	\$358,837,333	37.06%	79.97%
120+ days	7,681	\$323,158,044	27.36%	72.02%
180+ days	4,712	\$265,478,757	16.79%	59.17%
360+ days	909	\$107,471,333	3.24%	23.95%

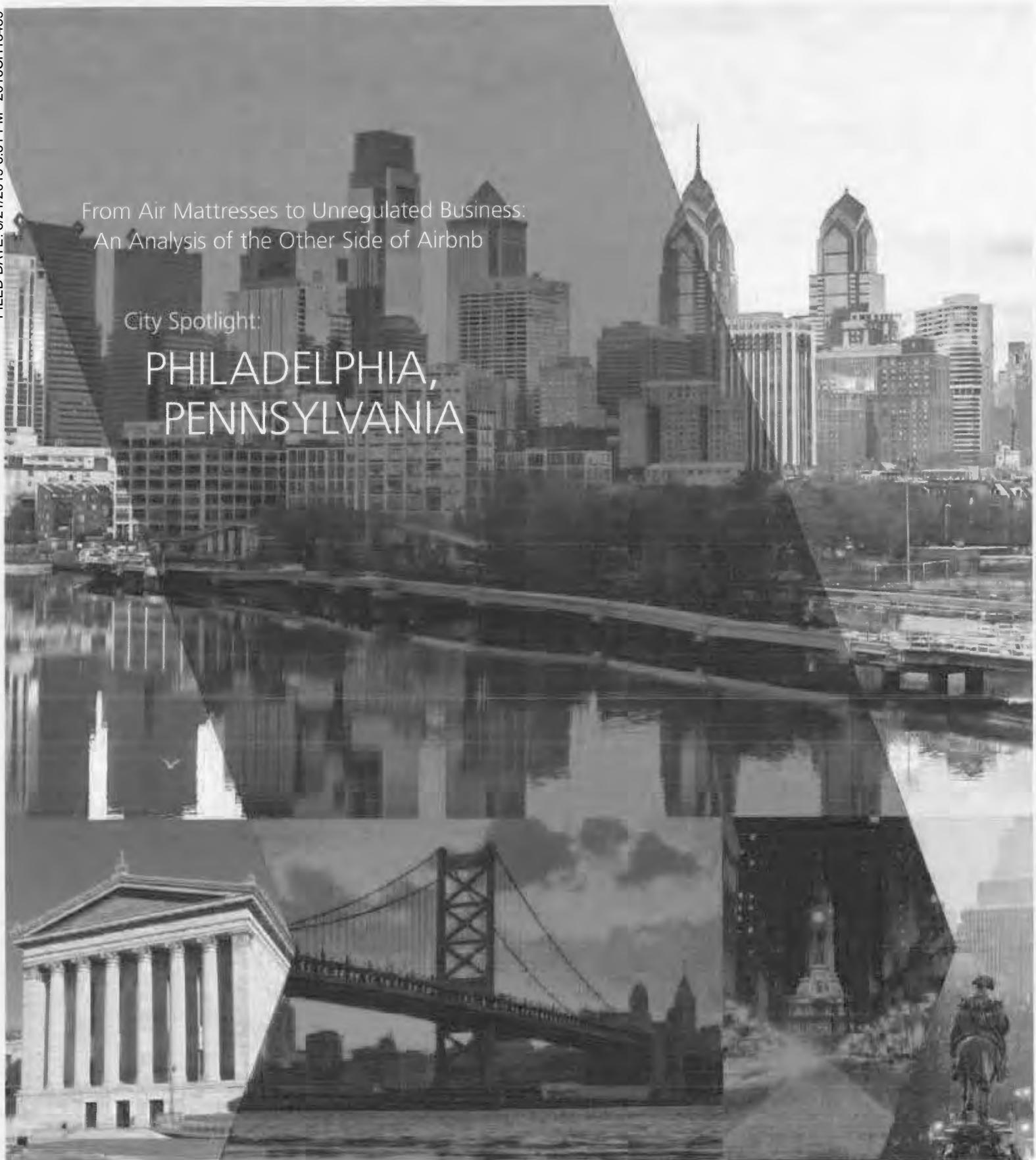
SEPTEMBER, 2016

From Air Mattresses to Unregulated Business:
An Analysis of the Other Side of Airbnb

City Spotlight:

PHILADELPHIA, PENNSYLVANIA

FILED DATE: 6/21/2019 6:51 PM 2016CH15489



D000047

BACKGROUND

In 2016, the American Hotel & Lodging Association (AH&LA) released an analysis providing a view of the commercial activity being conducted on Airbnb in the nation's largest metropolitan statistical areas (MSAs). John W. O'Neill, MAI, ISHC, Ph.D., professor of hospitality management and director of the Center for Hospitality Real Estate Strategy in the School of Hospitality Management at Penn State University, conducted the analysis of over 448,000 lines of data and over 10.2 million variables and developed the key findings, which include:

- ▶ More than a quarter (26%) of Airbnb's revenue in 14 of the nation's largest markets – \$347 million – came from operators who listed properties for rent full-time, or for 360 days or more, during 12 months from October 2014 through September 2015.
- ▶ Based on a rigorous analysis of Airbnb listing data in 14 major U.S. metropolitan areas over the course of a full year, commercial operators in the nation's largest cities generate a substantial share of the company's revenue by renting out multiple residential properties and/or renting properties year-round.
- ▶ The number of people renting out two or more residential properties on Airbnb appears to be growing, and nearly 40% of the company's revenue in 14 of the nation's largest cities is generated by these "multi-unit operators," totaling more than half a billion dollars a year.

The following analysis provides greater detail about the commercial activity being conducted on Airbnb in the Philadelphia MSA.

Data Source

The data used in this report were sourced from Airdna, which tracks Airbnb revenues and operations and provides pricing and revenue data to Airbnb operators. Airdna conducts a continuous search of the Airbnb web site, resulting in each Airbnb listing being analyzed once every seven days.

The data cover 14 of the nation's largest metropolitan statistical areas (MSAs): New York, Chicago, Los Angeles, Philadelphia, Miami, Houston, Dallas, Phoenix, San Antonio, San Diego, San Francisco, Boston, Austin and Washington, D.C. The research focuses on hosts who rent multiple units and length of time that hosts rent out their unit(s).

Kalibri Labs, a hospitality research firm, sorted the data, which included Airbnb operators from October 2014 through September 2015.

Exclusions: All data exclude all shared rooms and units and unique units, such as boats, tree houses, and tents.

Additional Information:

John W. O'Neill, MAI, ISHC, Ph.D., professor of hospitality management and director of the Center for Hospitality Real Estate Strategy in the School of Hospitality Management at Penn State University and Yuxia Ouyang, doctoral student, conducted the analysis and developed the key findings. They examined over 448,000 lines of data and over 10.2 million variables.

This study was primarily funded by the American Hotel & Lodging Educational Foundation. Additional funds provided by the American Hotel & Lodging Association. Penn State University received no funding for the study.

Glossary of Terms

Host: Person or entity renting out at least one residential unit on the Airbnb platform.

Full-time operator: Any host renting out unit(s) 360 or more days per year.

Multi-unit operator: Any host renting out two or more units.

KEY FINDINGS: PHILADELPHIA REGION

The data show that Airbnb operators listing residential properties for rent for the bulk of the year drive a large percentage of the company's revenue in the Philadelphia region.

Number of Days Operator Lists Unit(s) for Rent	Number of Operators 10/2014 – 9/2015	Revenue Generated 10/2014 – 9/2015	% of Airbnb Operator Population 10/2014 – 9/2015	% of Airbnb's Revenue 10/2014 – 9/2015
30+ Days / Year	1,167	\$13,383,017	63.98%	94.29%
180+ Days / Year	232	\$8,152,419	12.72%	57.44%
360+ Days / Year	41	\$3,868,558	2.25%	27.26%



\$8M

More than half (57%) of Airbnb's Philadelphia revenue – over \$8 million – comes from operators who listed properties for rent **more than 180 days per year.**



27%

Over one-quarter of Airbnb's revenue in the Philadelphia area – **27% or almost \$4 million** – comes from operators who listed units for rent **full time.**

36%



Operators listing **multiple units for rent** drove over one-third (36%) of Airbnb's revenue in the Philadelphia region – **over \$5 million.**

The 5 Philadelphia-area ZIP codes with the most properties listed on Airbnb from October 2014 through September 2015 accounted for more than \$7 million, or nearly half of Airbnb's revenue in the Philadelphia metropolitan area.

ZIP Code	Neighborhoods	Airbnb Operator Count 10/2014 – 9/2015	Property Count 10/2014 – 9/2015	Airbnb Revenue 10/14 – 9/15
19103	Rittenhouse Square	286	426	\$3,486,012
19130	Fairmount District	167	176	\$835,173
19146	Devils Pocket	160	169	\$1,094,784
19147	Queen Village	152	168	\$1,229,632
19107	Center City	147	156	\$970,012
Total		912	1,095	\$7,615,613

APPENDIX: PHILADELPHIA METROPOLITAN STATISTICAL AREA DATA TABLES

Revenue Analysis by ZIP Code

Zip Code	Property Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015	Zip Code	Host Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015
19103	426	\$3,486,012	19103	286	\$3,486,012
19130	176	\$835,173	19130	167	\$835,173
19146	169	\$1,094,784	19146	160	\$1,094,784
19147	168	\$1,229,632	19147	152	\$1,229,632
19107	156	\$970,012	19107	147	\$970,012
19106	102	\$845,872	19106	92	\$845,872
19104	85	\$372,382	19123	77	\$331,873
19123	80	\$331,873	19104	73	\$372,382
19125	67	\$365,342	19125	62	\$365,342
19143	66	\$459,728	19143	60	\$459,728

Frequent Hosts

Number of Days Operator Lists Unit(s) for Rent	Operator Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015	Percent of Operators Who List Unit(s) for Multiple Days 10/2014 – 9/2015	Percent of Revenue From Operators Who List Unit(s) for Multiple Days 10/2014 – 9/2015
Total	1824	\$14,192,897.67	-	-
30+ days	1167	\$13,383,017.20	63.98%	94.29%
60+ days	765	\$12,137,080.23	41.94%	85.52%
90+ days	565	\$11,123,496.71	30.98%	78.37%
120+ days	409	\$10,081,476.51	22.42%	71.03%
180+ days	232	\$8,152,418.70	12.72%	57.44%
360+ days	41	\$3,868,557.65	2.25%	27.26%

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From Air Mattresses to Unregulated Business:
An Analysis of the Other Side of Airbnb

City Spotlight:

SAN FRANCISCO, CALIFORNIA



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BACKGROUND

In 2016, the American Hotel & Lodging Association (AH&LA) released an analysis providing a view of the commercial activity being conducted on Airbnb in the nation's largest metropolitan statistical areas (MSAs). John W. O'Neill, MAI, ISHC, Ph.D., professor of hospitality management and director of the Center for Hospitality Real Estate Strategy in the School of Hospitality Management at Penn State University, conducted the analysis of over 448,000 lines of data and over 10.2 million variables and developed the key findings, which include:

- ▶ More than a quarter (26%) of Airbnb's revenue in 14 of the nation's largest markets – \$347 million – came from operators who listed properties for rent full-time, or for 360 days or more, during 12 months from October 2014 through September 2015.
- ▶ Based on a rigorous analysis of Airbnb listing data in 14 major U.S. metropolitan areas over the course of a full year, commercial operators in the nation's largest cities generate a substantial share of the company's revenue by renting out multiple residential properties and/or renting properties year-round.
- ▶ The number of people renting out two or more residential properties on Airbnb appears to be growing, and nearly 40% of the company's revenue in 14 of the nation's largest cities is generated by these "multi-unit operators," totaling more than half a billion dollars a year.

The following analysis provides greater detail about the commercial activity being conducted on Airbnb in the San Francisco MSA.

Data Source

The data used in this report were sourced from Airdna, which tracks Airbnb revenues and operations and provides pricing and revenue data to Airbnb operators. Airdna conducts a continuous search of the Airbnb web site, resulting in each Airbnb listing being analyzed once every seven days.

The data cover 14 of the nation's largest metropolitan statistical areas (MSAs): New York, Chicago, Los Angeles, Philadelphia, Miami, Houston, Dallas, Phoenix, San Antonio, San Diego, San Francisco, Boston, Austin and Washington, D.C. The research focuses on hosts who rent multiple units and length of time that hosts rent out their unit(s).

Kalibri Labs, a hospitality research firm, sorted the data, which included Airbnb operators from October 2014 through September 2015.

Exclusions: All data exclude all shared rooms and units and unique units, such as boats, tree houses, and tents.

Additional Information:

John W. O'Neill, MAI, ISHC, Ph.D., professor of hospitality management and director of the Center for Hospitality Real Estate Strategy in the School of Hospitality Management at Penn State University and Yuxia Ouyang, doctoral student, conducted the analysis and developed the key findings. They examined over 448,000 lines of data and over 10.2 million variables.

This study was primarily funded by the American Hotel & Lodging Educational Foundation. Additional funds provided by the American Hotel & Lodging Association. Penn State University received no funding for the study.

Glossary of Terms

Host: Person or entity renting out at least one residential unit on the Airbnb platform.

Full-time operator: Any host renting out unit(s) 360 or more days per year.

Multi-unit operator: Any host renting out two or more units.

KEY FINDINGS: SAN FRANCISCO REGION

The data show that Airbnb operators listing residential properties for rent for the bulk of the year drive a large percentage of the company's revenue in the San Francisco region.

Number of Days Operator Lists Unit(s) for Rent	Number of Operators 10/2014 – 9/2015	Revenue Generated 10/2014 – 9/2015	% of Airbnb Operator Population 10/2014 – 9/2015	% of Airbnb's Revenue 10/2014 – 9/2015
30+ Days / Year	7,423	\$176,846,967	75.50%	96.53%
180+ Days / Year	1,908	\$117,074,238	19.41%	63.90%
360+ Days / Year	308	\$40,208,821	3.13%	21.95%



\$117M

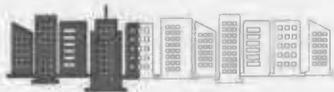
Nearly two-thirds (64%) of Airbnb's San Francisco-area revenue – over \$117 million – comes from operators who listed properties for rent **more than 180 days per year.**



22%

Nearly one-quarter of Airbnb's revenue in the San Francisco area – 22% or more than \$40 million comes from operators who list units for rent full-time.

32%



Operators listing multiple units for rent drove almost one-third (32%) of Airbnb's revenue in the San Francisco region – \$58 million.

The five San Francisco-area ZIP codes with the most properties listed on Airbnb from October 2014 through September 2015 accounted for more than \$97 million, or over half of Airbnb's revenue in the San Francisco MSA.

ZIP Code	Neighborhoods	Airbnb Operator Count 10/2014 – 9/2015	Property Count 10/2014 – 9/2015	Airbnb Revenue 10/14 – 9/15
94110	Mission District, Bernal Heights	797	891	\$17,144,886
94109	Russian Hill	651	705	\$9,261,121
94117	Haight-Ashbury	526	591	\$11,954,364
94114	The Castro, Noe Valley	506	567	\$11,536,424
94107	Potrero Hill	393	424	\$7,474,730
Total		2,873	3,178	\$57,371,525

If Airbnb operators in the San Francisco area followed the same tax rubric as other lodging businesses in San Francisco, in the 12 months between October 2014 and September 2015 they would have owed municipal governments in the region more than \$30 million.

San Francisco Area Lodging Taxes					
Room Tax	CA Tourism Fee	Tld Assessment	Total City of San Francisco Lodging Tax Rate	Airbnb's San Francisco Revenue	Airbnb's Estimated Tax Obligation
14%	.28%	2.25%	16.53%	\$183,213,462	\$30,285,185

APPENDIX: SAN FRANCISCO METROPOLITAN STATISTICAL AREA DATA TABLES

Revenue Analysis by ZIP Code

Zip Code	Property Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015	Zip Code	Host Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015
94110	891	\$17,144,886	94110	797	\$17,144,886
94109	705	\$9,261,121	94109	651	\$9,261,121
94117	591	\$11,954,364	94117	526	\$11,954,364
94114	567	\$11,536,424	94114	506	\$11,536,424
94107	424	\$7,474,730	94107	393	\$7,474,730
94103	420	\$7,285,869	94103	387	\$7,285,869
94123	400	\$6,395,859	94123	370	\$6,395,859
94115	372	\$6,792,783	94115	334	\$6,792,783
94102	354	\$5,152,180	94102	300	\$5,152,180
94133	258	\$5,350,587	94133	233	\$5,350,587

Frequent Hosts

Number of Days Operator Lists Unit(s) for Rent	Operator Count 10/2014 – 9/2015	Revenue 10/2014 – 9/2015	Percent of Operators Who List Unit(s) for Multiple Days 10/2014 – 9/2015	Percent of Revenue From Operators Who List Unit(s) for Multiple Days 10/2014 – 9/2015
Total	9,832	\$183,213,462	-	-
30+ days	7423	\$176,846,967.03	75.50%	96.53%
60+ days	5224	\$164,595,098.98	53.13%	89.84%
90+ days	3865	\$151,447,719.66	39.31%	82.66%
120+ days	2913	\$137,881,690.99	29.63%	75.26%
180+ days	1908	\$117,074,237.91	19.41%	63.90%
360+ days	308	\$40,208,821.50	3.13%	21.95%

