Short-term rentals and the housing market: Quasi-experimental evidence from *Airbnb* in Los Angeles

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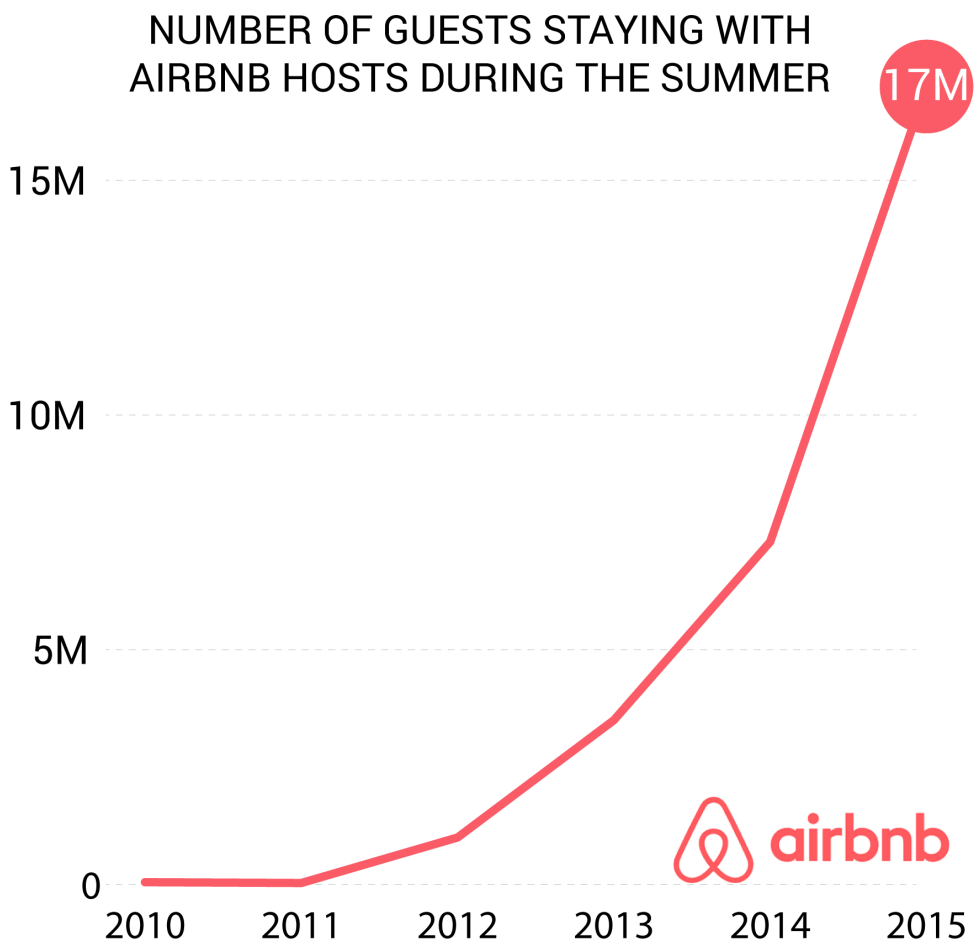
Outline

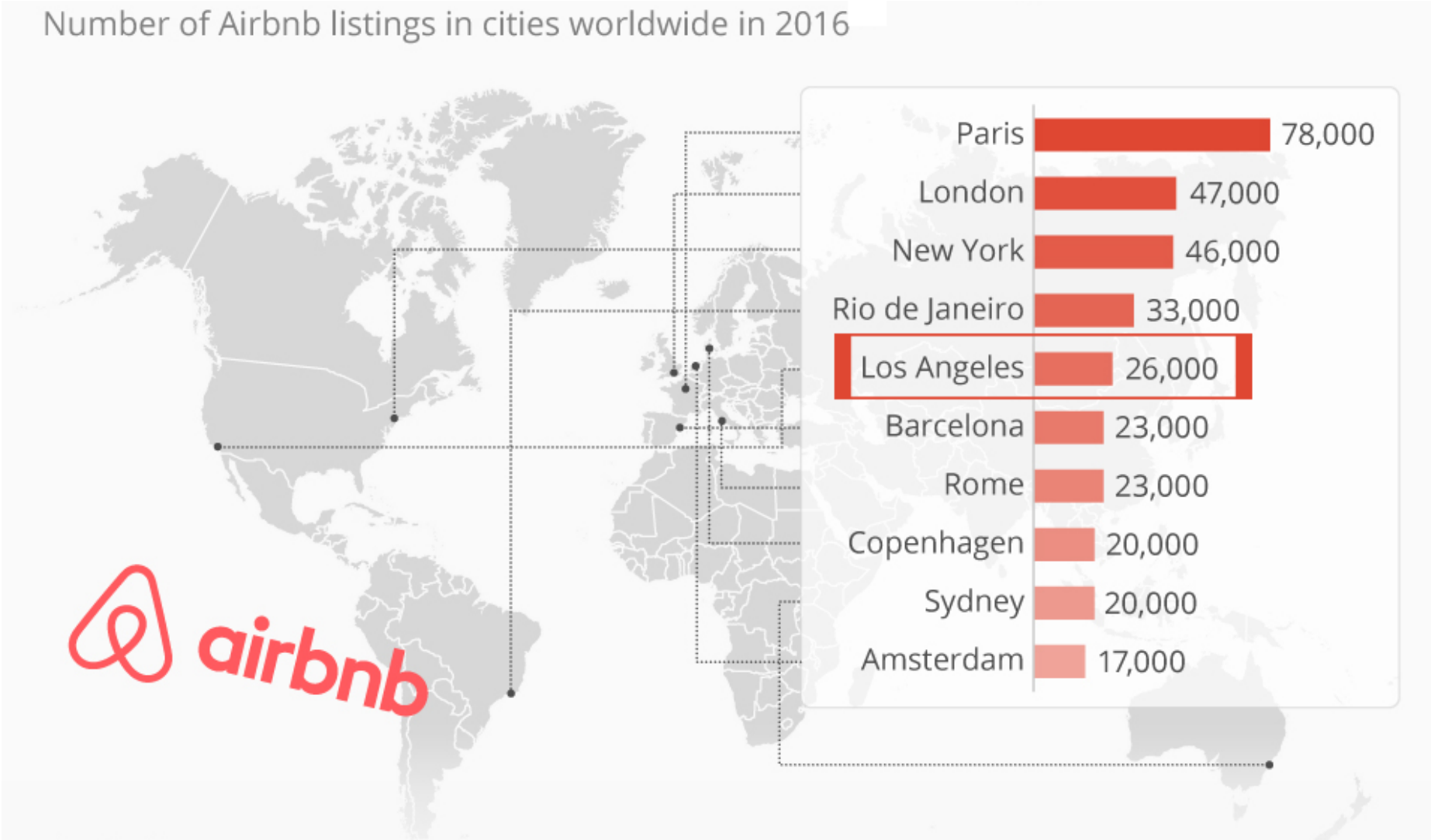
Introduction

Spectacular growth of online rental platforms in recent years



Introduction

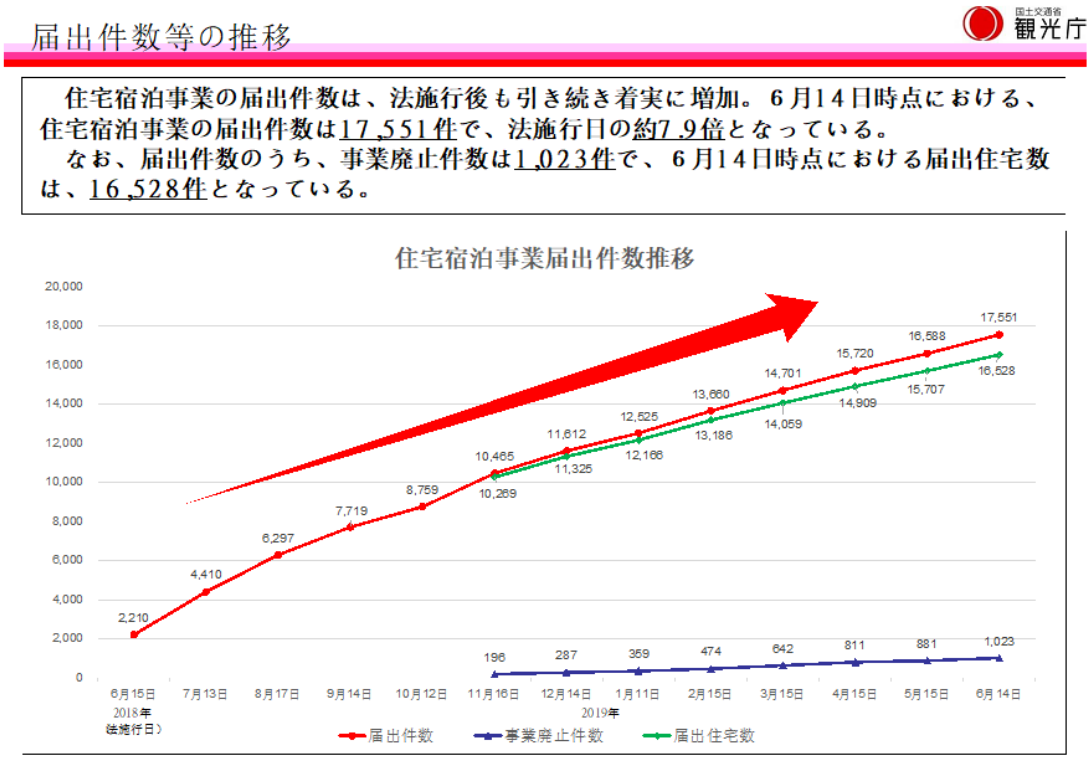
Which cities have the most *Airbnb* listings?



Introduction

- What about Japan?
- Extremely relaxed policies !
- June 2018: registration to local government is required
- Allowing short-term letting through *Airbnb* up to 180 days per year
- *Airbnb* short-term letting is (still) not popular:
- 800,000 nights (out of 500 million accommodation nights)
- but is growing fast

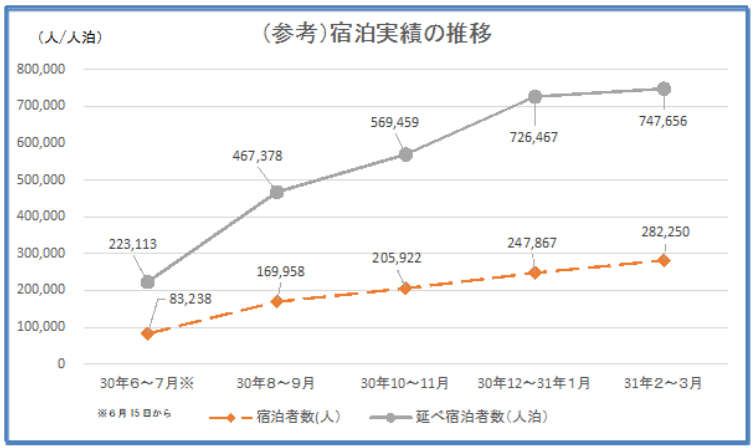
Introduction



(source:MLIT, http://www.mlit.go.jp/common/001283680.pdf)

- Registrations increased about 8 times
- Green: cumulative number of net registrations
- Blue: number of properties closed down.

Introduction



(source:MLIT, https://www.mlit.go.jp/common/001289227.pdf)

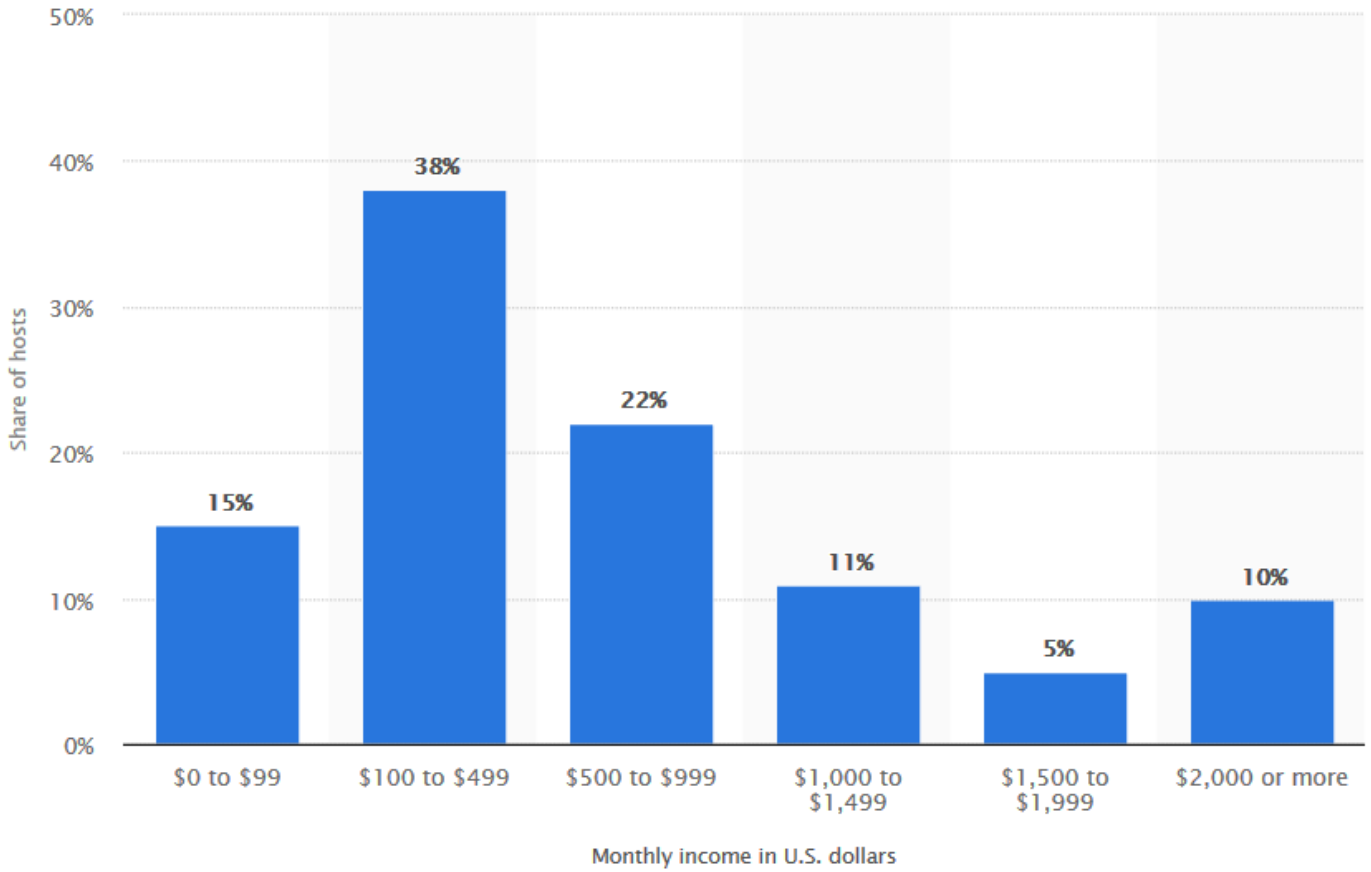
- grey: number of nights
- orange: number of users

Introduction

- Short-term letting policies are likely very important
- What are the welfare consequences?
- What are the distributional consequences?

Introduction

Monthly revenues can be substantial



Introduction

Spectacular growth of online rental platforms in recent years

- *Airbnb* is the most popular platform
- Complaints from local inhabitants: decrease in housing affordability
- On the other hand: developers and local homeowners may benefit

Introduction: *Airbnb* and the housing market

We test the impact of ***Airbnb*** on the **housing market**

Expected effects on property values:

- Efficient use effect (house prices and rents $+$)
- Housing supply effect (rents $+$)
- Externality effect (house prices and rents $-$)

Introduction: set-up

Airbnb $\Rightarrow$ property values suffers from endogeneity issues

1. The most attractive locations for tourists are likely also more attractive to residents
2. Measurement error in *Airbnb* listings

Introduction: set-up

Airbnb $\Rightarrow$ property values suffers from endogeneity issues

1. The most attractive locations for tourists are likely also more attractive to residents
2. Measurement error in *Airbnb* listings

We therefore use a quasi-experimental research design

- 18 out of 88 cities in LA county implemented Home Sharing Ordinances that restrict Short-Term Renting
- ... while surrounding cities (including the City of Los Angeles) did not!
- We compare changes in **listings** and **prices** close to the borders of those 'HSO areas'
- ... Panel RDD

Introduction: Contribution

We improve on the literature in the following ways:

- We evaluate the effectiveness of *Airbnb* policies
- We use plausibly exogenous temporal variation in *Airbnb* listings with respect to house prices and rents
- We show heterogeneity in the effect of *Airbnb* on the housing market

Introduction: results

Due to Home-Sharing Ordinances:

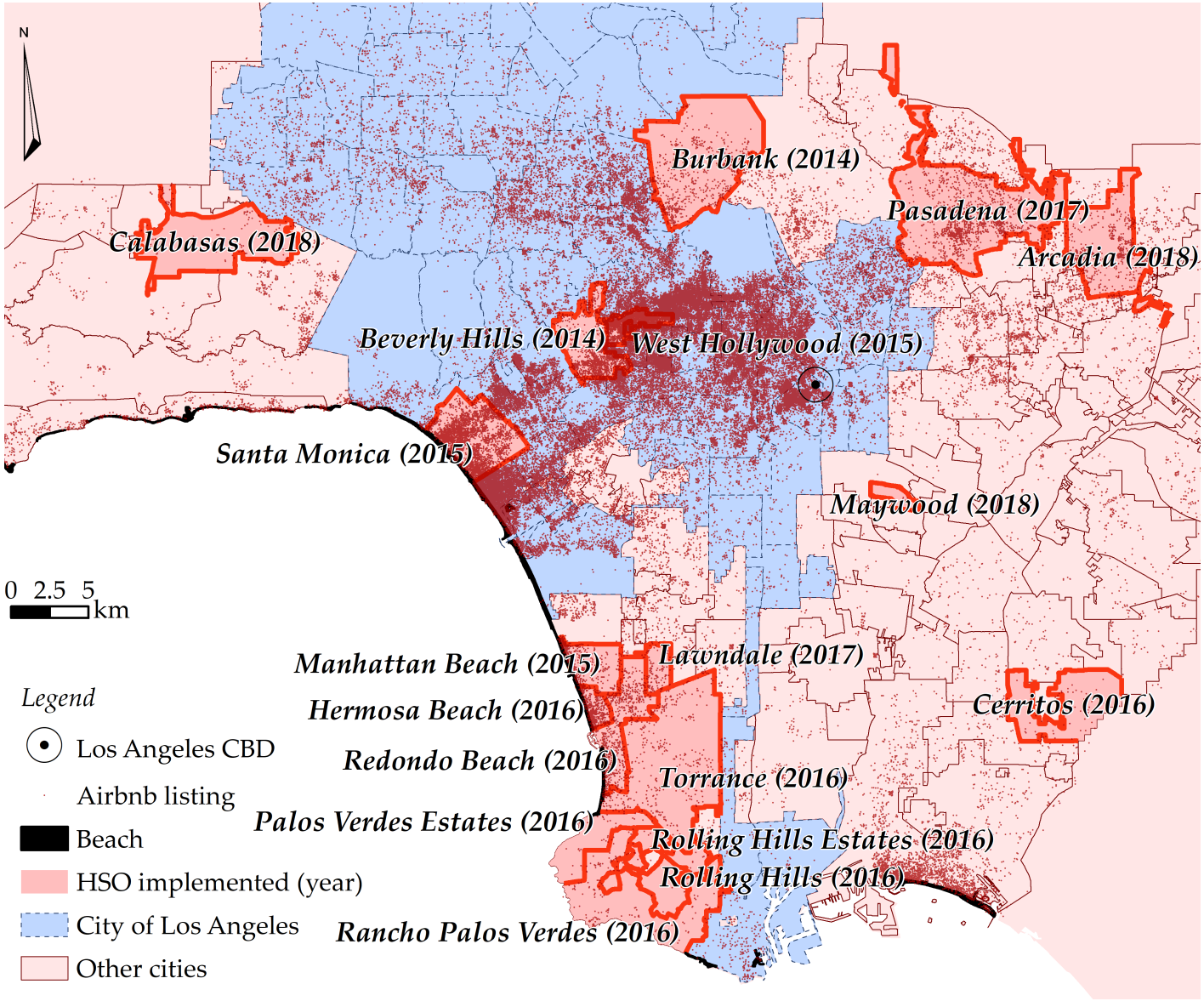
1. Listings of entire properties $\downarrow 70\%$
2. Home-sharing listings $\downarrow 50\%$
3. House prices $\downarrow 3\%$
   - ... but the effect is stronger in areas with more tourist demand
4. Similar effects for rents $\downarrow 3\%$
5. *Airbnb* has large price effects (up to 25%) in 'touristy' places

$\Rightarrow$ ... Negative welfare effect of HSOs on house prices

Context: *Airbnb*

- *Airbnb* started in 2008
- More than 42 thousand listings in LA county last month
- 61% are rentals of entire properties

Context: Los Angeles County



Context: Home Sharing ordinance

- HSOs essentially ban informal rentals of *entire properties*
  - it requires hosts to have a business license
  - comply with health and safety laws
  - pay a tax on listings
- 4 out of 18 cities still allow for *home sharing*
  - It is allowed for maximally 30 days a year
  - The host should be physically present

$\Rightarrow$ ...HSOs are typically enforced

Data

Airbnb listings:

- 15 web scrapes from the websites `www.tomslee.net` and `www.insideairbnb.com` between October 2014 and September 2018
- We know where (up to 200m) and when each property was listed
- Entire properties vs. home sharing
- We create a *panel dataset* for each accommodation
- $listed = 1$ if accommodation is listed at that time (average $= 0.3$)

Data

House prices:

- Housing transactions from the LA County Assessor's Office
- Focus on properties between 2014 and 2018
- Wide range of housing characteristics, including property type
- Drop outlier and multi-unit transactions
- Create listings rate: listings/housing units <200m (average $= 0.6\%$)

Methodology

Different steps:

1. Estimate the effect of HSOs on *Airbnb* listings
2. Estimate the effect of HSOs on house prices
3. Estimate the effect of *Airbnb* listings on house prices
   - 'Structural equation'
   - ... Using the HSO as an instrument

Methodology

We use a **Panel Regression-Discontinuity Design**

1. For listings, we estimate:

$$(\hat{\alpha}, \hat{\lambda}_i, \hat{\mu}_{kt}) = \underset{\alpha, \lambda_i, \mu_{kt}}{\arg\min} \sum_i \sum_t K\left(\frac{d_{ik}}{b}\right) \times (\ell_{ikt} - \alpha h_{ikt} - \lambda_i - \mu_{kt})^2 \quad (1)$$

   - $\ell_{it} \Rightarrow$ Property is listed (0/1)
   - $h_{it} \Rightarrow$ HSO is implemented (0/1)
   - $\lambda_i, \mu_{kt} \Rightarrow$ Property, time F.E. near border k
   - $K(\cdot) \Rightarrow$ Kernel function dependent on distance to border and bandwidth
   - $\alpha \Rightarrow$ Parameter of interest

   - We include observations within b km of the border
     - Apply Imbens-Kalyanaraman procedure

Methodology

2. When testing the impact of the HSO on house prices, we have:

$$(\hat{\beta}, \hat{\zeta}, \hat{\eta}_j, \hat{\theta}_{kt}) = \underset{\beta,\zeta,\eta_j,\theta_t}{\arg\min} \sum_i \sum_t K\left(\frac{d_{ik}}{b}\right) \times (\log p_{ijkt} - \beta h_{ijkt} - \zeta x_{ijk} - \eta_j - \theta_{kt})^2, \tag{2}$$

- $p_{ijt} \Rightarrow$ Price of property i in block j in month t
- $h_{ijt} \Rightarrow$ HSO is implemented (0/1)
- $x_{ij} \Rightarrow$ Housing and location controls
- $\eta_j, \theta_{kt} \Rightarrow$ Census block, segment$\times$month F.E.
- $K(\cdot) \Rightarrow$ Kernel function dependent on distance to border and bandwidth
- $\beta \Rightarrow$ Parameter of interest

Methodology

3 To test the impact of *Airbnb* listings rate on house prices we use IV

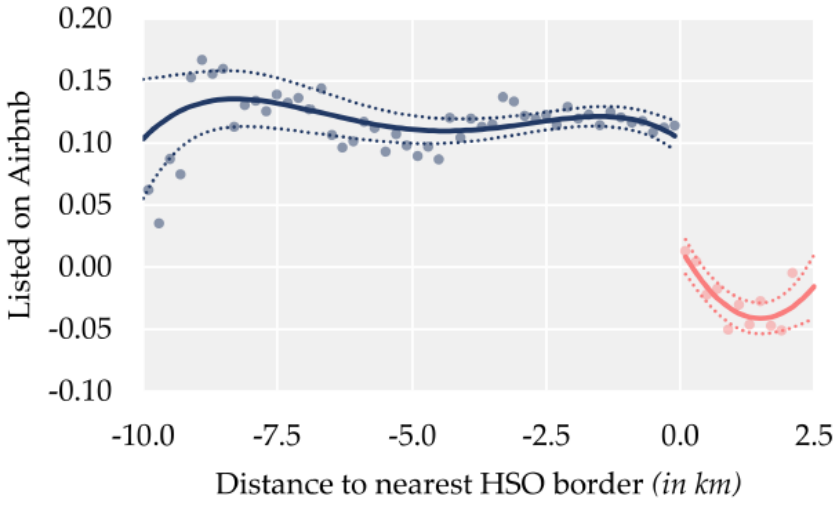
First stage:

$$(\hat{\tilde{\delta}}, \hat{\tilde{\zeta}}, \hat{\tilde{\eta}}_j, \hat{\tilde{\theta}}_{kt}) = \underset{\tilde{\delta},\tilde{\zeta},\tilde{\eta}_j,\tilde{\theta}_t}{\arg\min} \sum_i \sum_t K\left(\frac{d_{ik}}{b}\right) \times (r_{ijkt} - \tilde{\delta}_k h_{ijkt} - \tilde{\zeta} x_{ijk} - \tilde{\eta}_j - \tilde{\theta}_{kt})^2 \tag{3}$$

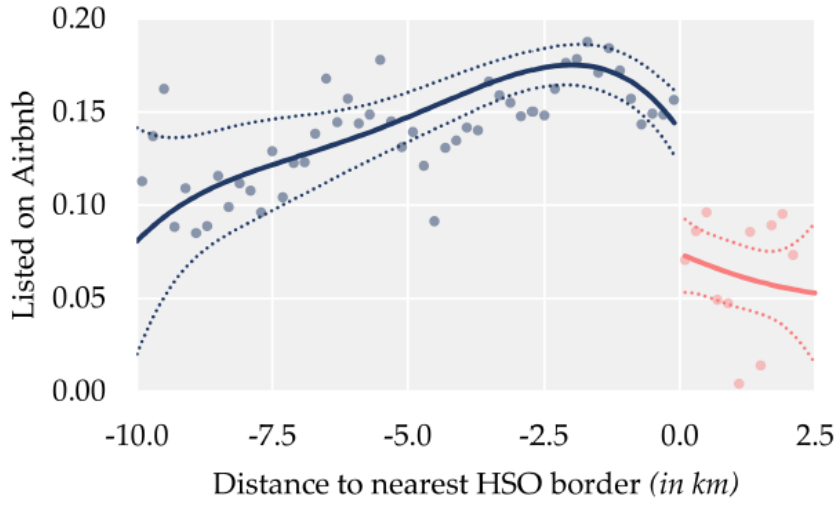
Second stage:

$$(\hat{\gamma}, \hat{\zeta}, \hat{\eta}_j, \hat{\theta}_{kt}) = \underset{\gamma,\zeta,\eta_j,\theta_t}{\arg\min} \sum_i \sum_t K\left(\frac{d_{ik}}{b}\right) \times (\log p_{ijkt} - \gamma \hat{r}_{ijkt} - \zeta x_{ijk} - \eta_j - \theta_{kt})^2 \tag{4}$$

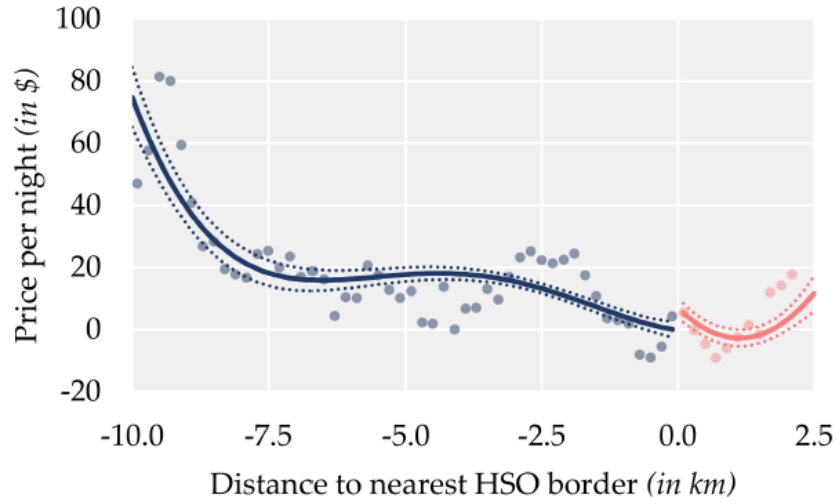
Graphical evidence: listings



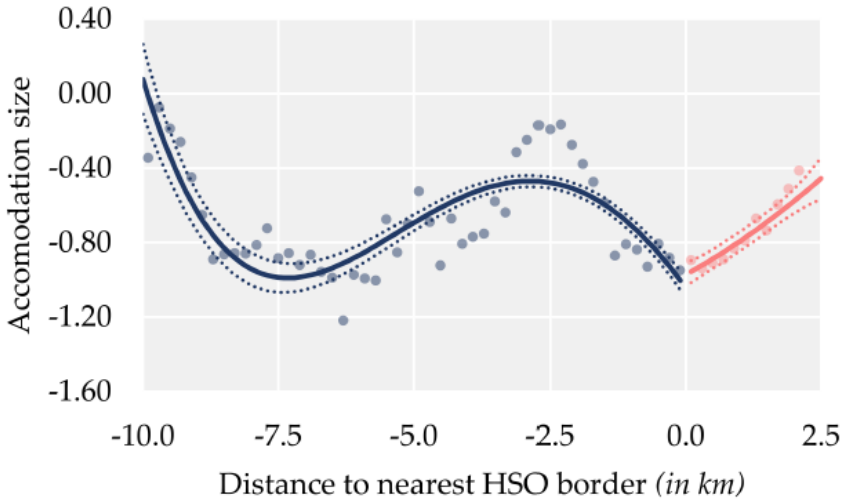
(A) Entire home/apartment listings



(B) Home sharing listings

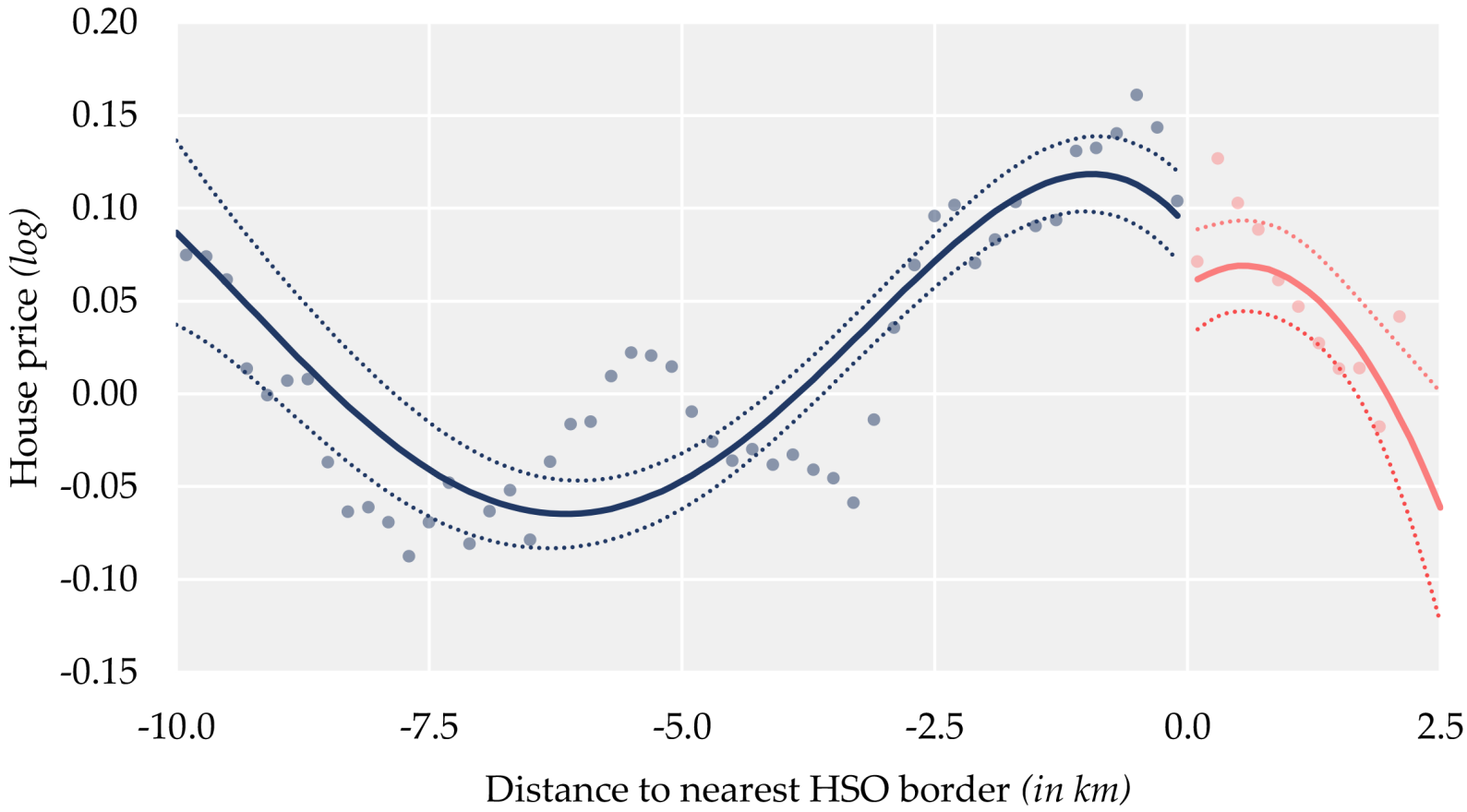


(C) Price per night (in $)



(D) Accommodation size

Graphical evidence: house prices



Graphical evidence: other

- We test for continuity of densities of transactions and listings before the HSO
  - ... Densities of listings and transactions are essentially continuous at the HSO borders (...McCrary test)
- We test for continuity of changes in *housing* characteristics
- We test for sorting
  - We do not find evidence for discontinuities in changes in *household* characteristics
  - ... or public good provision (test scores)

Results

Recall the different steps:

1. Estimate the effect of HSOs on *Airbnb* listings
2. Estimate the effect of HSOs on house prices
3. Estimate the effect of *Airbnb* listings on house prices

Results: HSO and *Airbnb* listings

1. The effect on listings:
   - Listings of entire properties are reduced by about 10%-points ($\approx 30\%$)

HSO and listings of entire properties

(Dependent variable: Airbnb property is listed)

	Panel RDD (1)	*+ Border segment f.e.* (2)	*Home-sharing allowed* (3)
HSO implemented	-0.0969***	-0.0985***	
	(0.0086)	(0.0088)	
HSO implemented × home sharing allowed			-0.1063***
			(0.0137)
HSO implemented × home sharing not allowed			-0.0939***
			(0.0112)
Property fixed effects	Yes	Yes	Yes
HSO area × month fixed effects	Yes	Yes	Yes
Border segment × month fixed effects	No	Yes	Yes
Number of observations	270,906	270,621	270,741
Bandwidth, b *(in km)*	1.6716	1.6708	1.6712
R^2	0.3460	0.3496	0.3496

Notes: We exclude properties for which the property type is unknown. Standard errors are clustered at the census block level and in parentheses. *** $p < 0.01$, ** $p < 0.05$, *

Results: HSO and *Airbnb* listings

1. The effect of HSOs on listings:
   - Home-sharing listings are reduced by about 5.5%-points ($\approx 20\%$)
   - No effect of HSOs on listings in areas where home sharing is still allowed

HSO and home-sharing listings

(Dependent variable: Airbnb property is listed)

	Panel RDD (1)	*+ Border segment f.e.* (2)	*Home-sharing allowed* (3)
HSO implemented	-0.0537***	-0.0587***	
	(0.0117)	(0.0125)	
HSO implemented × home sharing allowed			-0.0173
			(0.0178)
HSO implemented × home sharing not allowed			-0.0872***
			(0.0172)
Property fixed effects	Yes	Yes	Yes
HSO area × month fixed effects	Yes	Yes	Yes
Border segment × month fixed effects	No	Yes	Yes
Number of observations	171,778	171,448	171,433
Bandwidth, b *(in km)*	1.815	1.812	1.8117
R^2	0.3325	0.3428	0.3367

Notes: We exclude properties for which the property type is unknown. Standard errors are clustered at the census block level and in parentheses. *** $p < 0.01$, ** $p < 0.05$, *

Results: HSOs and house prices

2. The effect of HSOs on house prices;
   - Effect of HSOs is about 3%.

HSO and house prices

(Dependent variable: log of house price in $)

	Panel RDD (1)	*+ Border segment f.e.* (2)
HSO implemented	-0.0421***	-0.0297***
	(0.0067)	(0.0080)
Housing characteristics	Yes	Yes
Census block fixed effects	Yes	Yes
HSO area$\times$month fixed effects	Yes	Yes
Border segment$\times$month fixed effects	No	Yes
Number of observations	58,316	58,285
Bandwidth, b *(in km)*	1.8447	1.8594
R^2	0.9025	0.9098

Notes: We exclude transactions occurring within one year after implementation of the HSO. Standard errors are clustered at the census block and in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Results: HSOs and house prices

2. We do a lot of sensitivity checks and placebo-checks
   - The results are robust...
   - We do not find significant placebo-coefficients (although they are precisely estimated)

Results: *Airbnb* listings and house prices

3. The effect of listings on house prices;
   - $\uparrow 1\sigma$ increase in listings $\Rightarrow$ house price $\uparrow 4.2\%$.

Airbnb listings and house prices

(Dependent variable: log of house price in $)

	Panel RDD (1)	*+ Border segment f.e.* (2)	*Nonlinear effect* (4)
Listings rate <200m *(imputed)*	**0.0351*****	**0.0226*****	**0.0203****
	(**0.0100**)	(**0.0088**)	(**0.0078**)
Listings rate^2 <200m *(imputed)*			**0.0001****
			(**0.0000**)
Housing characteristics	Yes	Yes	Yes
Census block fixed effects	Yes	Yes	Yes
HSO area$\times$month fixed effects	Yes	Yes	Yes
Border segment$\times$month fixed effects	No	Yes	Yes
Number of observations	81,672	80,905	80,905
Bandwidth, b *(in km)*	2.9847	2.9628	2.9628
Kleibergen-Paap *F*-statistic	18.49	18.15	18.15

Notes: **Bold** indicates instrumented. The instrument are city-specific HSO dummies. We exclude transactions occurring within one year after implementation of an HSO. Standard errors are clustered at the census block and in parentheses. $^{***}\ p < 0.01$, $^{**}\ p < 0.05$, $^{*}\ p < 0.10$.

Overall benefits and costs

- Price increases are the largest in areas with a high listings rate

Overall benefits and costs of Airbnb

	Average house price (in 1000 $)	*Listings rate (in %)*	*in % of the house price*
Total predicted price effects of Airbnb listings:			
LA county	1,053	1.21	2.72
Total predicted price effects near the CBD:			
CBD <5km	2,457	2.84	6.40
CBD <2.5km	5,054	4.56	10.30
Total predicted price effects near the beach:			
Beach <5km	1,128	1.93	4.36
Beach <2.5km	1,113	2.44	5.51

Notes: To estimate the yearly effects, we assume a discount rate of 2%. We further assume that the rents are equal to discounted house prices.

Overall benefits and costs

- Price increases are the largest in areas with a high listings rate

Overall benefits and costs of Airbnb

	Average house price (in 1000 $)	*Listings rate (in %)*	*in % of the house price*
Total predicted price effects for specific neighborhoods:			
Venice	1,212	12.77	28.84
West Hollywood	1,593	3.55	8.01
Malibu	2,193	5.89	13.30
Santa Monica	1,645	1.76	3.98
Redondo Beach	888	1.17	2.64
Pasadena	928	0.96	2.17

Summary

We test the impact of ***Airbnb*** on the **housing market**

- We use a quasi-experimental set-up based on implementation of HSOs
- Listings $\downarrow 50 - 70\%$ due to HSOs
- House prices and rents $\downarrow 3\%$ due to HSOs
  - Effects depends on timing and location
- Property values $\uparrow 2 - 30\%$ due to *Airbnb*

- **HSOs are effective in reducing *Airbnb* listings**
  - ...but yield negative welfare effects
- ***Airbnb* generally has a positive effect on total housing prices**
  - ... but strong distributional implications

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