Do short-term rental platforms affect housing markets?

Evidence from Airbnb in Barcelona

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Introduction

Introduction

- Urban tourism has grown enormously
    - Between 1990 and 2017, the worldwide number of international tourist arrivals went from 400 to 1.300 millions (WTO, 2018)
- Increased tourism demand partly accommodated through short-term rental platforms
    - Airbnb is the largest platform worldwide, with over 2 million guest sleeping in an Airbnb every night and over 6 million listing worldwide. (Airbnb, 2019)
- Short-term rental platforms increase the overlap between tourism and housing markets
    - Efficiency improvement in markets where goods are not fully used (Barron, Kung, and Proserpio, 2018)
    - New income source and tourism decentralization (Airbnb, 2019)

Short-terms rental platforms face neighbour's opposition: Gentrification

Introduction

Short-term rental platforms face neighbors' opposition: Noise

Introduction

- Short-term rental platforms face neighbour's opposition
    - Gentrification (pecuniary externality)
    - Negative externalities (noise, insecurity, uncivil behaviours)
    - Genuine home-sharing small
- Many cities worldwide have enacted regulations to limit the penetration of Airbnb (Amsterdam, Paris, New York, Berlin, San Francisco...)
- Limited (causal) evidence of the effects of short-term platforms on housing markets

Introduction

Barcelona constitutes an ideal city to study the effects of Airbnb on local housing markets:

- Tourism boom: Airport passengers went from 20M to 47M between 2005 and 2017 (7th most visited city in Europe and 17th worldwide)
- Airbnb in Barcelona is big
  - Barcelona is 6th most popular Airbnb destination worldwide
  - Airbnb is the largest platform in the city
  - Large profit gap between renting long-term versus short-term (10 days short-term vs monthly rent for residents)

In this paper

We estimate the effect of Airbnb on housing rents and prices in Barcelona

- Exploit timing and geography of Airbnb penetration using:
    - Airbnb webscrapped data from InsideAirbnb
    - Posted ads for rentals and sales from a major real estate website Idealista - 2007-2017
    - Transaction prices of second-hand apartments - 2009-2016
- We find that 54 Airbnb listings (mean Nbrhd) leads to increases in rents of 1.75%, while for transaction (posted) prices the range is 5.3% (3.7%)
- Rents and transaction (posted) prices in Nbrhd's at the top decile of Airbnb activity increased by 7% and 19% (14%) respectively
- Provide evidence that the mechanism is lower long-term rental supply.

Literature and contribution

Earlier US studies

- Barron, Kung and Proserpio (2018) look at the impact of Airbnb on rents and house prices - All US cities
- Koster, van Ommeren and Volkhausen (2018) study Airbnb bans in LA County
    - Borders provide clean identification but cannot identify supply effects

Our paper

- First study for a European city, where housing markets might work differently (less excess capacity, no guest-houses)
- High penetration: 2% of total dwellings and 7% of rented dwellings
- High quality micro data on both rents and housing prices
- Direct evidence on mechanism (household displacement)

Roadmap...

1. Introduction
2. Theoretical framework
3. Data
4. Empirical Strategy
5. Alternative empirical strategies
6. Conclusion

Theoretical framework

Theoretical framework

- Identical housing units across the city
- One central neighborhood n, with size C
- Supply: Absentee owners can rent short-term at (exogenous) rent T, or long-term at (endogenous) rent Q
    - Idiosyncratic cost to rent short-term, $b_j \sim U(0,1)$
    - Marginal owner, $T - b_j^* = Q$
- Demand: Residents can rent in n with $U_i^n = Y_i - Q - \alpha \left(F(b_j^*) \right) + a_i$ or rent elsewhere with $U_i = Y_i$
    - Y_i is nominal income and α reflects externalities
    - Idiosyncratic attachment to neighborhood n, $a_i \sim U(0,1)$
    - Marginal renter, $Q(a_i^*) = -\alpha \left(F(b_j^*) \right) + a_i^*$

Theoretical framework

- In equilibrium, the long term rental market clears:

$$C(1 - F(b_j^*)) = 1 - F(a_i^*) \tag{1}$$

- The share of units that is rented short-term is

$$b_j^* = \frac{C - 1 + T}{1 + C - \alpha} \tag{2}$$

  Which implies a positive relationship between b_j^* and T
- The effect of Airbnb on long-term rentals is:

$$\frac{dQ}{dT} = (C - \alpha)\frac{db_j^*}{dT} \tag{3}$$

Theoretical framework

- Following Barron et al. (2018) to relate rents and housing prices. Prices are the present value of discounted cash flows to the landlord:

$$P = \sum_{t=1}^{\infty} \delta^t \left[(1 - b_j^*)Q + \int_0^{b_j^*} (T - b_j) db_j \right] \tag{4}$$

According to the model, Airbnb:

- Increases housing prices more than rents
- Displaces residents
- Has strong redistributive impacts: Absentee owners benefit, while long-term residents lose.

Data

Data

Inside Airbnb data:

- 21 data points between April 2015 and February 2018
- Use reviews to measure active listings at the neighborhood/quarter level

Rents and posted prices data:

- Idealista: Ads active in each December 2007 to 2017, with a rich set of unit characteristics.

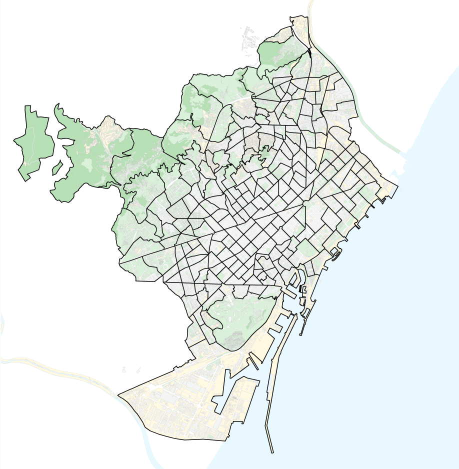
Transaction sales data:

- ITP: Universe of second-hand apartments sold 2009-2016 from transaction tax records, similar set of characteristics.

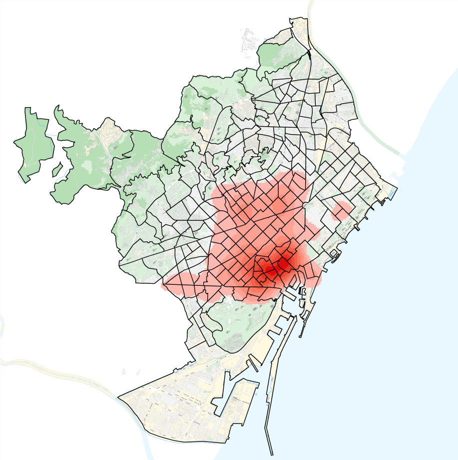
Basic Statistical Areas (BSA) - 233 small neighborhoods

Data: Graphical Description

Basic Statistical Areas in Barcelona and Airbnb's location:



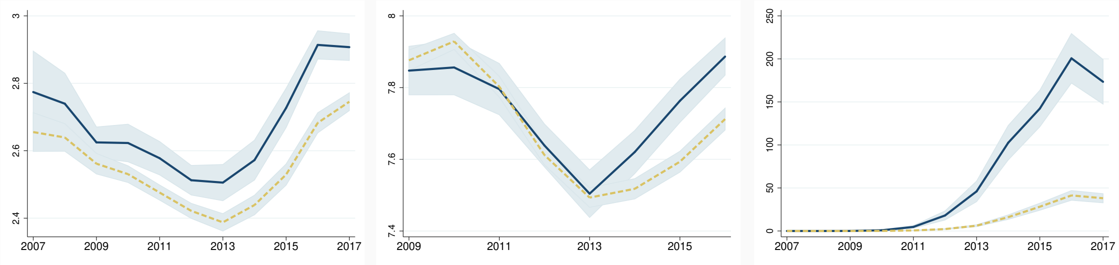
Basic Statistical Areas



Airbnb Listings

Graphical evidence

Figure 1: Evolution of rents and prices, and Airbnb Activity



(a) ln(Rents) **(b)** ln(Prices)- ITP **(c)** Airbnb Count

Notes: Averages (solid) and averages for the top decile of Airbnb activity in 2016 (dashed).

Empirical Strategy

Main Strategy

Nbrhd fixed-effects Model:

$$log(Y_{n,t}) = \alpha + \beta Airbnb_{n,t} + \gamma X_{n,t} + \mu_n + \tau_t + \varepsilon_{n,t}$$

- $log(Y_{n,t})$ are average residuals at BSA/time level of regressions of log of prices/rents on unit characteristics and time dummies
- $X_{n,t}$ includes mean age, log population density, average occupation, unemployment rate, relative income level, % foreign
- μ_n and τ_t are nbrhd and time fixed effects

- Weighted observations by number of ads or sales at BSA level
- Standard errors clustered at BSA level

Results

Table 1: Impact of Airbnb density on Rents and Prices with preferred specification

	Rents	Sales ITP	Sales Idealista
Airbnb	0.035***	0.097***	0.068***
Count (x100)	(0.009)	(0.019)	(0.009)
N	2.138	7.018	2.247

Notes: Significance is indicated by * p<0.1, ** p<0.05, *** p<0.01.
Residuals are with respect to housing characteristics, there are time and BSA FE, as well as demographic controls.

- An increase of 54 listings (mean value) leads to increases in rents of 1.75% and in transaction (posted) prices of 5.3% (3.7%)
- An increase of 200 listings (mean in top decile) leads to increases in rents of 7% and in transaction (posted) prices of 19% (14%)

Results: Implied impact

Figure 3: Rents

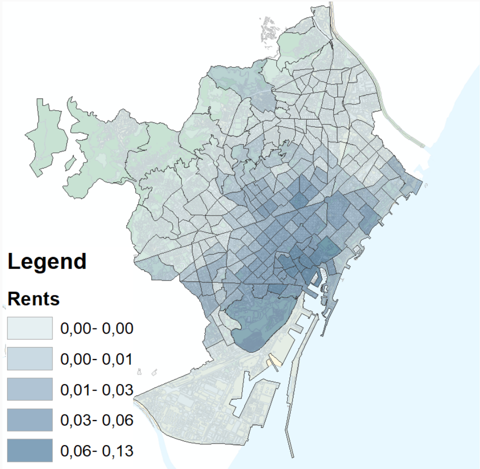
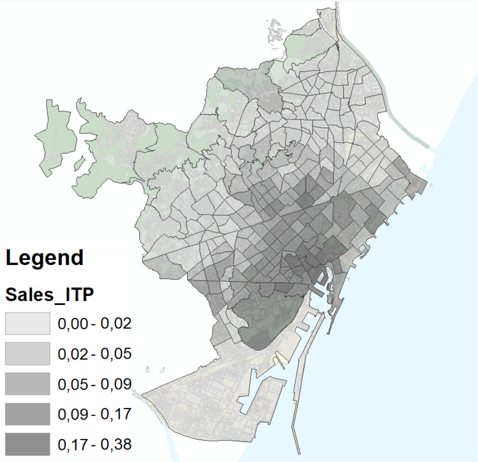


Figure 4: Sales ITP



Results: Robustness checks

Results are robust to:

- Demographic trends, $X_{n,2012} \times t$ ▸ Demographic Trends
- BSA Specific Time Trends, $\rho_n \times t$ ▸ BSA-Trends
- Detrended series with pre Airbnb data ▸ Detrendend
- Alternative measures of Airbnb: ▸ Alternative Airbnb
    - Moving Average
    - Airbnb Density
    - Log Airbnb Count
- Excluding Historical District (Ciutat Vella) ▸ No CV

Results: Mechanisms

Table 2: Impact of Airbnb on the number of households

	Outcome: log(Households)			
	(1)	(2)	(3)	(4)
Airbnb Count (x100)	-0.018***	-0.028***	-0.016***	-0.010***
	(0.005)	(0.006)	(0.005)	(0.004)
Res wrt Housing	X	X	X	X
Time FE	X	X	X	X
BSA FE	X	X	X	X
Dem Controls	-	X	X	X
Time Trends	-	-	Dem	BSA

Notes: Significance is indicated by * p<0.1, ** p<0.05, *** p<0.01. BSA-year level for 2009-2016. Standard errors clustered at the BSA level. N = 1,827 obs.

Alternative empirical strategies

Alternative empirical strategies

Instrumental variables - Shift-share

- Shift: Google Trends of worldwide searches of ”Airbnb Barcelona”
- Share: Proximity to touristic amenities weighted by their reviews in Google

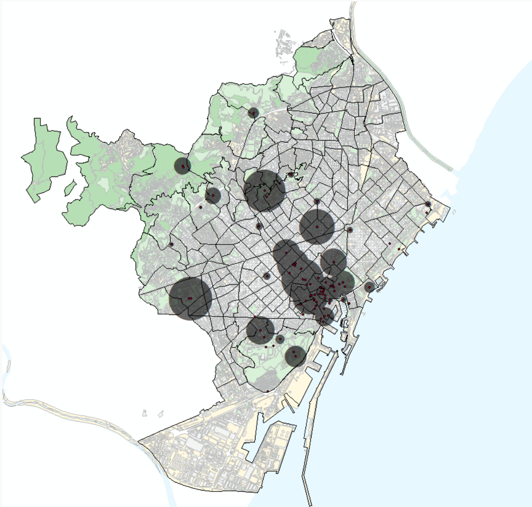
Event-Study

Sagrada Família case study

- A tourist amenity that is not an amenity for residents

Instrumental variables: Location of tourist amenities

Figure 5: TripAdvisor Points of Interest, weighted by nº of reviews



Instrumental variables: Shift and share components

Figure 6: Airbnb activity and tourist amenities

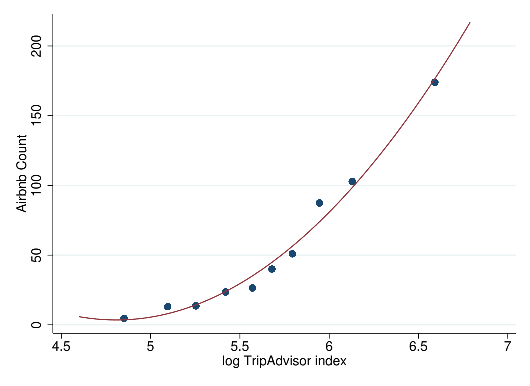
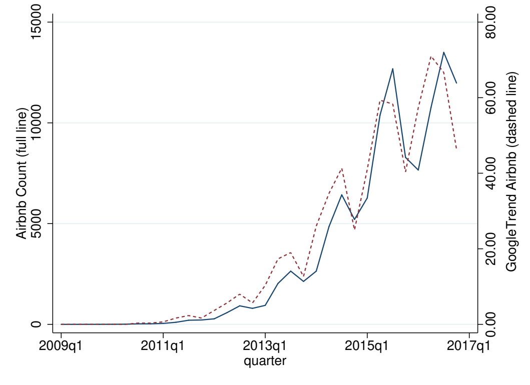
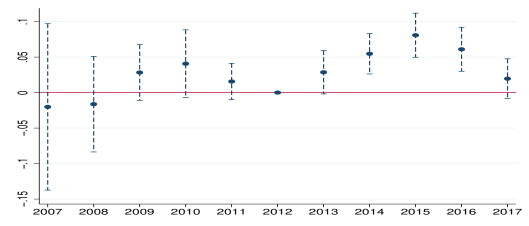


Figure 7: Airbnb activity and Google Trends searches

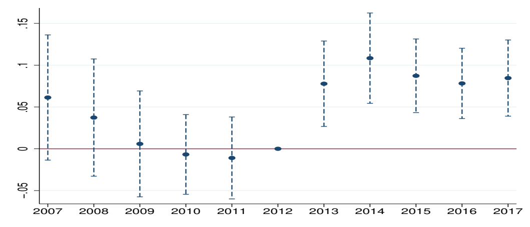


Instrumental variables: Event study of the ‘share’ component

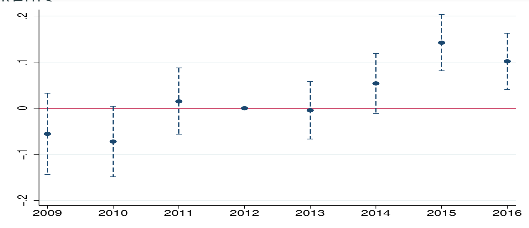
Figure 8: Event Study for touristic amenities index



Rents



Sales Idealista



ITP

Instrumental variables: results

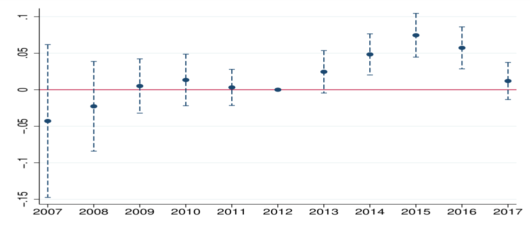
Table 3: Impact of Airbnb density on Rents and Prices with IV specification

	Rents	Sales ITP	Sales Idealista
Airbnb Count (x100)	0.022***	0.158***	0.074***
	(0.011)	(0.024)	(0.014)
Res wrt Housing	X	X	X
Time FE	X	X	X
BSA FE	X	X	X
Controls	Dem	Dem	Dem
N	2.138	7.018	2.247
F-Statistic	191.80	158.70	158.61

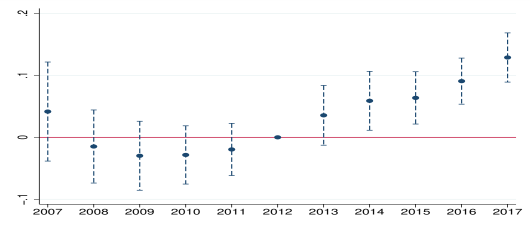
Notes: Significance is indicated by * p<0.1, ** p<0.05, *** p<0.01

Event Study results

Figure 9: Event study, Top decile AirbnbCount

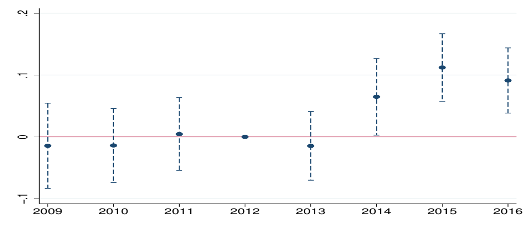


ln(Rents)



ln(Prices)- Sales Idealista

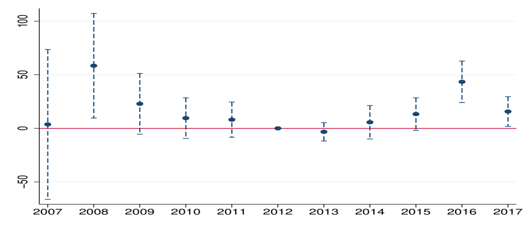
▸ Continuous Airbnbcount



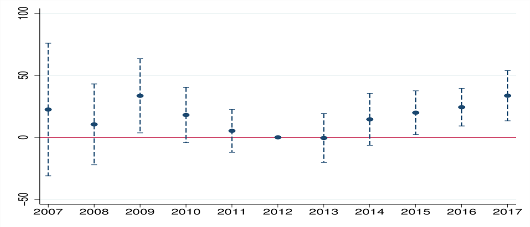
ln(Prices) - ITP Sales

Sagrada Família case study: results

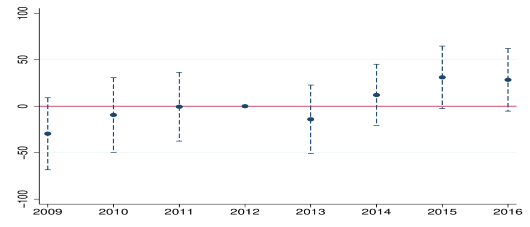
Figure 10: Event study, Sagrada Familia



ln(Rents)



ln(Prices)- Sales Idealista



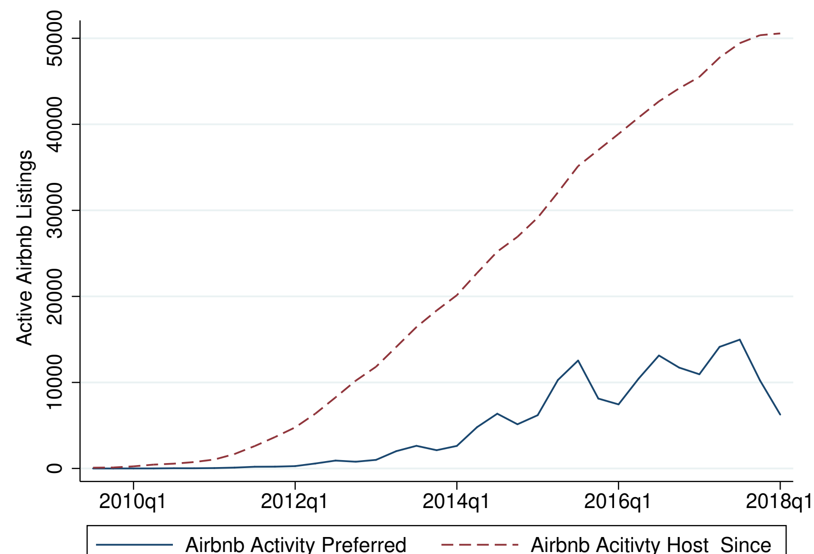
ln(Prices) - ITP Sales

Conclusion

Conclusion

- Several regression-based approaches exploiting timing and geography of Airbnb entry indicate that Airbnb has led to an increase in both rents and prices
- Effects are larger for prices than for rents
- Average effects are small but impacts in some parts of the city are significant
- Airbnb cannot explain the housing affordability problem in Barcelona

Figure 11: Comparing different approaches to Airbnb Activity



Commercial vs Casual

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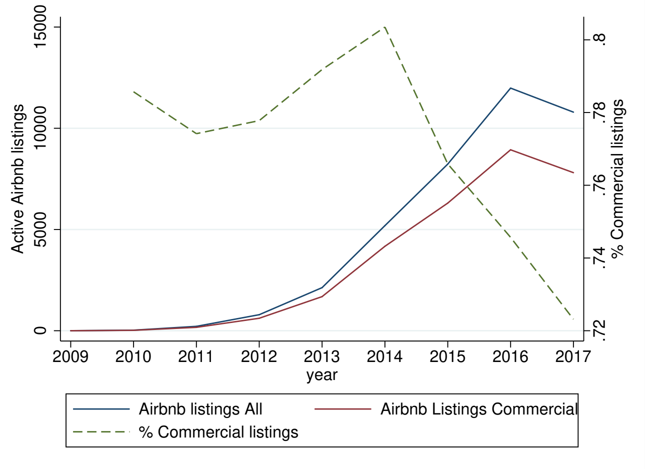
Figure 12: Commercial: If owned by a *multihost* or with an average of more than five reviews per active quarter



Results Other Specifications

Table 4: Impact of Airbnb density on **Rents**

	Baseline	Robustness		
	(1)	(2)	(3)	(4)
Airbnb Count (x100)	0.035***	0.041***	0.058***	0.034*
	(0.009)	(0.010)	(0.020)	(0.018)
Res wrt Housing	X	X	X	X
Time FE	X	X	X	X
BSA FE	X	X	X	X
Controls	Dem	Dem	Dem	-
Time Trends	-	Dem	BSA	-
Detrended	-	-	-	X
N	2.138	2.144	2.123	2.144

Notes: Significance is indicated by * p<0.1, ** p<0.05, *** p<0.01

Results Other Specifications

Table 5: Impact of Airbnb density on **ITP Sales**

	Baseline	Robustness		
	(1)	(2)	(3)	(4)
Airbnb Count (x100)	0.097***	0.080***	0.065***	0.084***
	(0.019)	(0.021)	(0.024)	(0.026)
Res wrt Housing	X	X	X	X
Time FE	X	X	X	X
BSA FE	X	X	X	X
Controls	Dem	Dem	Dem	-
Time Trends	-	Dem	BSA	-
Detrended	-	-	-	X
N	7.018	7.022	7.005	7.018

Notes: Significance is indicated by * p<0.1, ** p<0.05, *** p<0.01

Results Other Specifications ▸ Back

Table 6: Impact of Airbnb density on **Sales Idealista**

	Baseline	Robustness		
	(1)	(2)	(3)	(4)
Airbnb Count (x100)	0.068***	0.045***	0.022	0.085***
	(0.009)	(0.011)	(0.019)	(0.021)
Res wrt Housing	X	X	X	X
Time FE	X	X	X	X
BSA FE	X	X	X	X
Controls	Dem	Dem	Dem	-
Time Trends	-	Dem	BSA	-
Detrended	-	-	-	X
N	2.247	2.251	2.229	2.247

Notes: Significance is indicated by * p<0.1, ** p<0.05, *** p<0.01

Alternative Airbnb Measures

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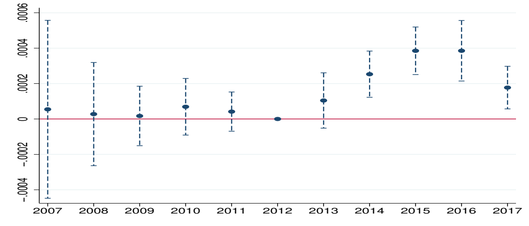
Table 7: Impact of Airbnb on rents and prices - Alternative Airbnb Measures

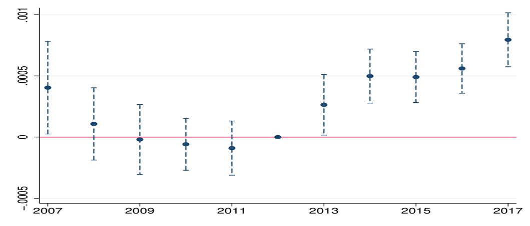
	Baseline (1)	AbnbCount MA (2)	AbnbDens (3)	log AbnbCount (4)	No CV (5)
			Panel A: Rents		
Airbnb	0.035***	0.029***	0.0068	0.0098***	0.053***
	(0.009)	(0.008)	(0.005)	(0.003)	(0.010)
			Panel B: Transaction Prices (ITP)		
Airbnb	0.097***	0.107***	0.039***	0.034***	0.093***
	(0.019)	(0.023)	(0.005)	(0.006)	(0.025)
			Panel C: Posted Prices (Idealista)		
Airbnb	0.068***	0.070***	0.019***	0.017***	0.096***
	(0.009)	(0.010)	(0.004)	(0.004)	(0.025)
Mean 4Q2016	56	49	1.57%	1.76%	43

Results: Event Study Continuous Variable ▸ Back

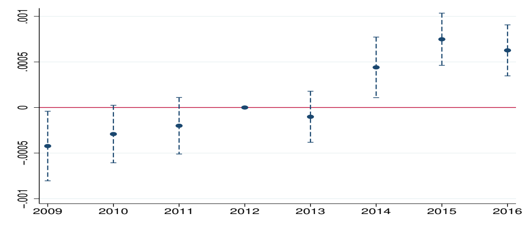
Figure 13: Event study, Continuous AirbnbCount



ln(Rents)



ln(Prices)- Sales Idealista



ln(Prices) - ITP Sales