

# Lecture 3: Modelo Hedónico. Evidencia

## Big Data and Machine Learning en el Mercado Inmobiliario

### Educación Continua

Ignacio Sarmiento-Barbieri

Universidad de los Andes

October 11, 2022

# Agenda

- 1 Recap: Modelo Hedónico
- 2 Ubicación del trabajo, costos de transporte y gradientes de precios
- 3 Geografía y Regulaciones
- 4 Amenidades
- 5 Otros Factores
- 6 Para seguir leyendo
- 7 Break

1 Recap: Modelo Hedónico

2 Ubicación del trabajo, costos de transporte y gradientes de precios

3 Geografía y Regulaciones

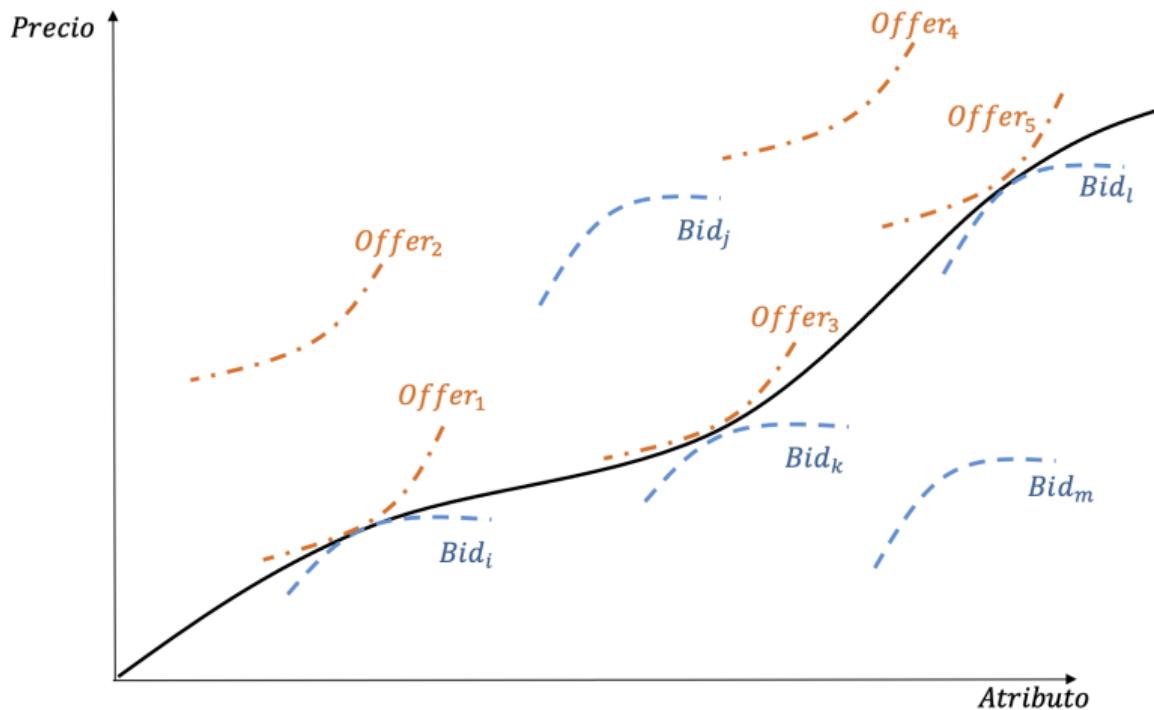
4 Amenidades

5 Otros Factores

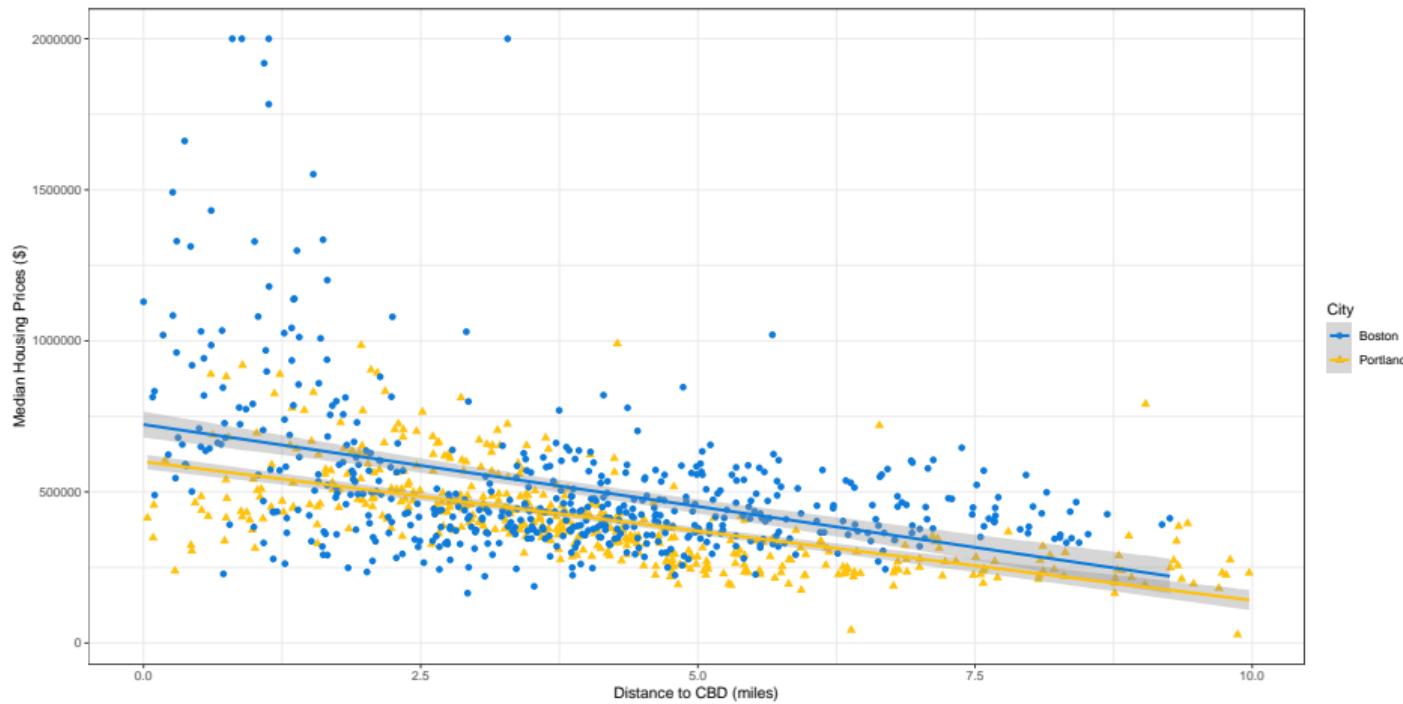
6 Para seguir leyendo

7 Break

# Modelo Hedónico: Intuición



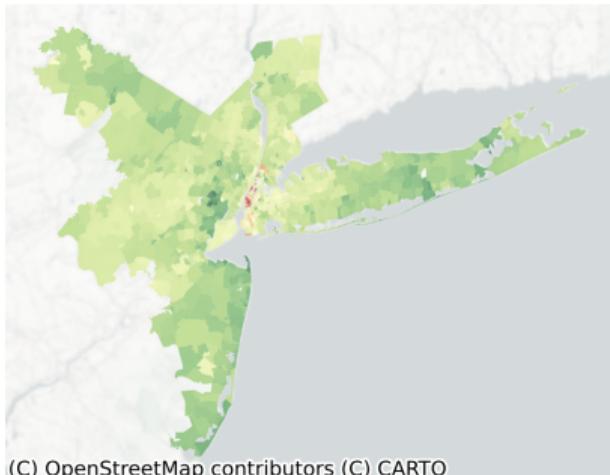
# Ubicación del trabajo, costos de transporte y gradientes de precios



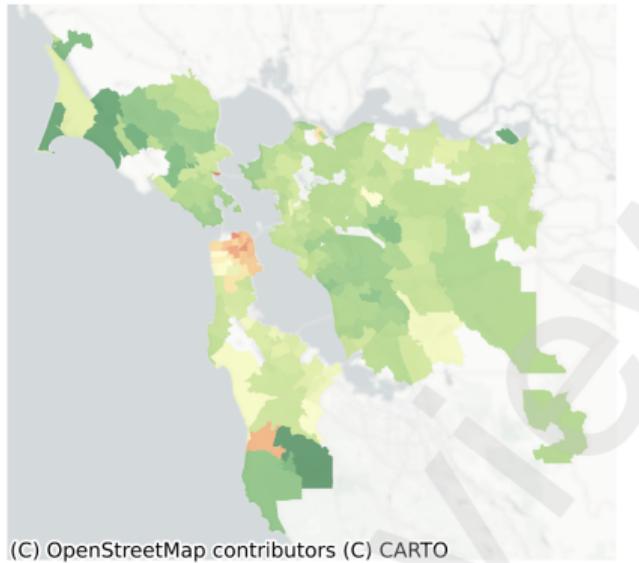
Fuente: Elab. propia en base a datos de la ACS 2018.

# Ubicación del trabajo, costos de transporte y gradientes de precios

## Price Changes



(C) OpenStreetMap contributors (C) CARTO

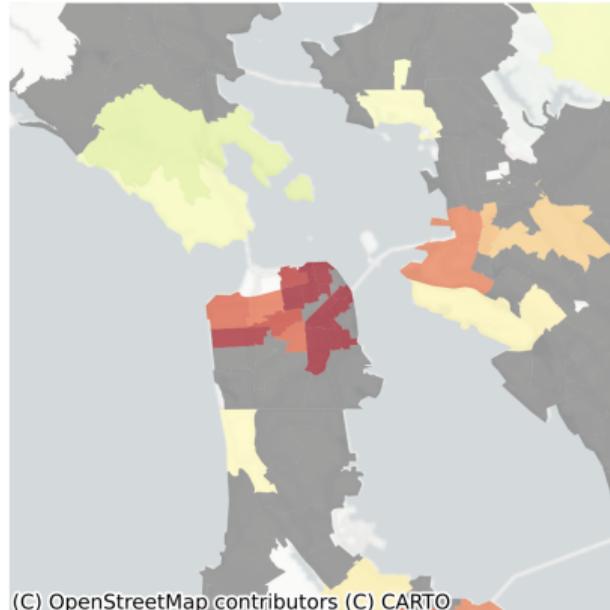
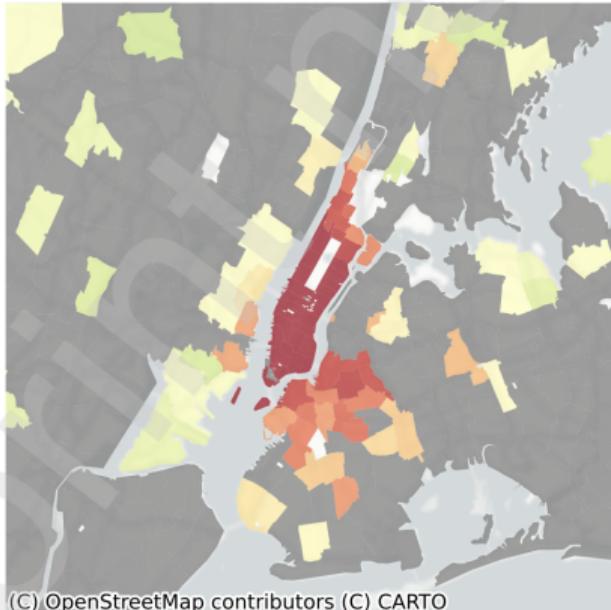


(C) OpenStreetMap contributors (C) CARTO

Fuente: Gupta, A., Mittal, V., Peeters, J., & Van Nieuwerburgh, S. (2022)

# Ubicación del trabajo, costos de transporte y gradientes de precios

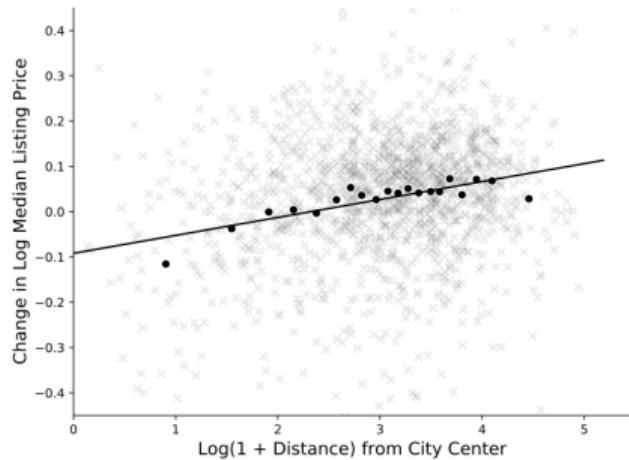
Rent Changes



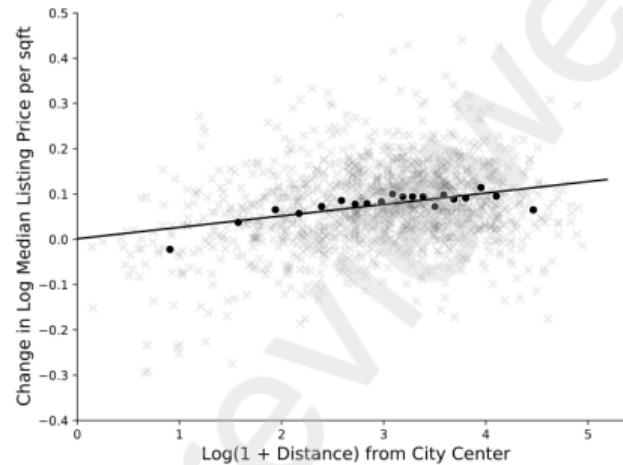
Fuente: Gupta, A., Mittal, V., Peeters, J., & Van Nieuwerburgh, S. (2022)

# Ubicación del trabajo, costos de transporte y gradientes de precios

*Panel A: Median Listing Price*



*Panel B: Median Listing Price per sq. ft.*

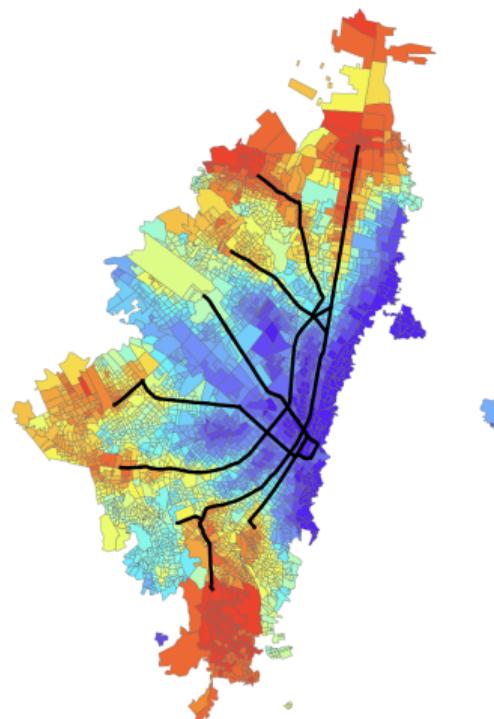


Fuente: Gupta, A., Mittal, V., Peeters, J., & Van Nieuwerburgh, S. (2022)

- 1 Recap: Modelo Hedónico
- 2 Ubicación del trabajo, costos de transporte y gradientes de precios
- 3 Geografía y Regulaciones
- 4 Amenidades
- 5 Otros Factores
- 6 Para seguir leyendo
- 7 Break

# Ubicación del trabajo, costos de transporte y gradientes de precios

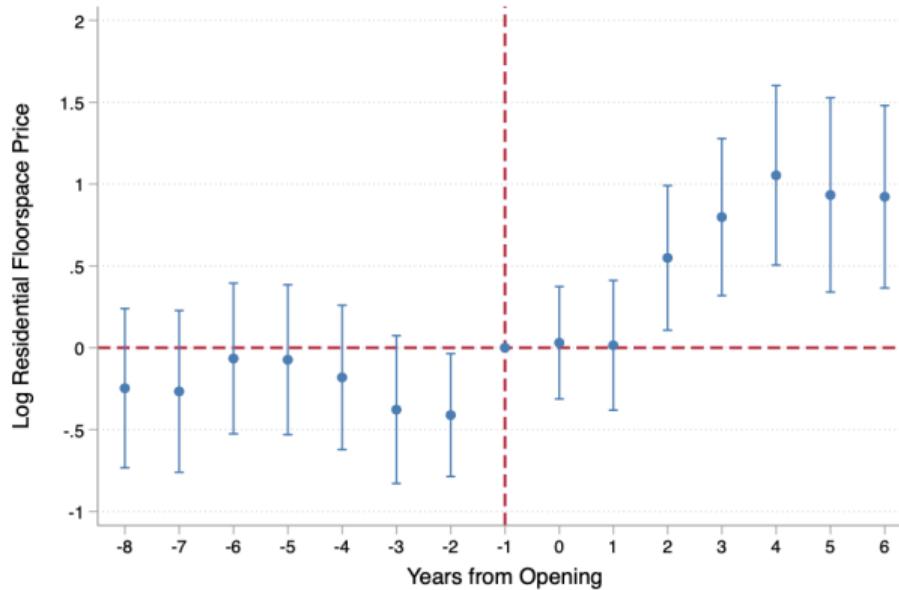
(a) Resident CMA



Fuente: Tsivanidis, N. (Forthcoming).

# Ubicación del trabajo, costos de transporte y gradientes de precios

Figure 3: Residential Floorspace Price Event Study



Fuente: Tsivanidis, N. (Forthcoming).

# Ubicación del trabajo, costos de transporte y gradientes de precios

84

J.P. Bocarejo et al. / Research in Transportation Economics 40 (2013) 78–86

**Table 6**

Summaries of Transmilenio and land value – selected studies.

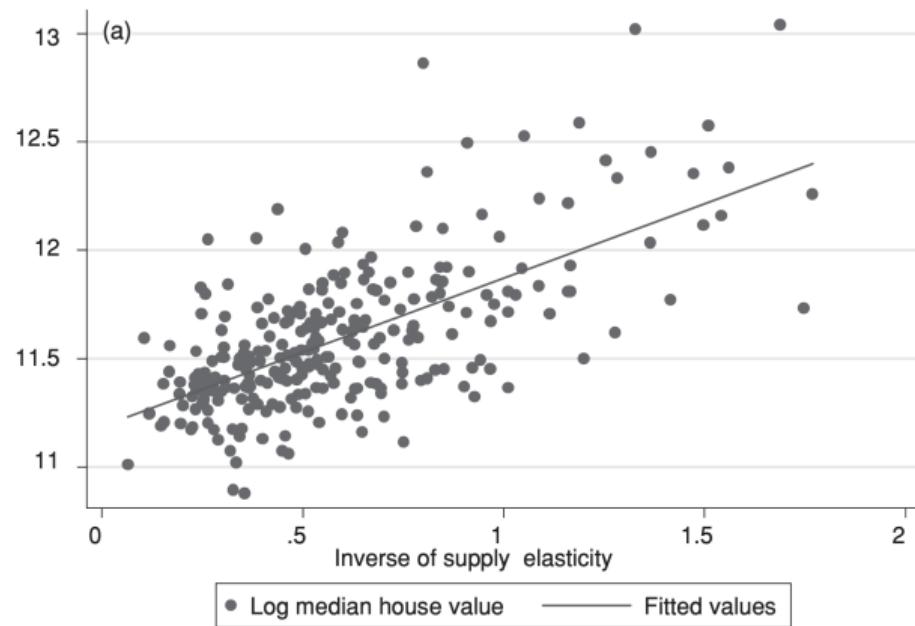
Author	Data and model	Selected results
(Muñoz-Raskin, 2010)	<b>Sample:</b> 1495 residential properties.  <b>Model:</b> Hedonic prices	<ul style="list-style-type: none"><li>Properties within the immediate vicinity of feeder lines (0–5 min walk) were valued higher than those requiring a 5–10 min walk.</li><li>High-value properties were valued higher if they were close to a feeder, but in the case of trunk lines, the effect was the opposite. Changes in value depended on socioeconomic strata.</li><li>Property prices decreased between 1.13 and 0.36%, depending on the distance to the BRT.</li></ul>
(Mendieta & Perdomo, 2007)	<b>Sample:</b> 1547 residential, commercial, and mixed-use properties  <b>Model:</b> Hedonic prices	<ul style="list-style-type: none"><li>Properties located in the area of influence of the Transmilenio enjoy a "premium" that is reflected in their value of between 5.8% and 17% for residential buildings.</li><li>Average square metre price of commercial properties having access to Transmilenio is between 257% and 367% higher than those with no access.</li><li>Detected a premium of 6.8–9.3% for every 5 min walking time closer to a BRT station.</li></ul>
(Perdomo Calvo et al., 2007)	<b>Sample:</b> 304 residential and commercial properties  <b>Model:</b> Propensity score matching	<ul style="list-style-type: none"><li>Properties on the busway, not necessarily close to a Transmilenio station, had a lower premium, presumably due to the negative noise and pollution effects of bus traffic.</li><li>Properties already served by Transmilenio benefited from the extension, with increased prices relative to control properties (15–20%), and more than properties that did not have BRT service before.</li><li>Properties that gained local access increased in value after the extension, but the increase was similar to that of control properties and higher only in some years.</li></ul>
(Rodriguez & Targa, 2004)	<b>Sample:</b> 494 residential properties  <b>Model:</b> Hedonic price	
(Rodriguez & Mojica, 2008)	<b>Sample:</b> Residential properties within 1 km of BRT  <b>Model:</b> Regression analysis	

Based on Bocarejo and Tafur Herrera (working paper).

Fuente: Bocarejo, J. P., Portilla, I., & Pérez, M. A. (2013)

- 1 Recap: Modelo Hedónico
- 2 Ubicación del trabajo, costos de transporte y gradientes de precios
- 3 Geografía y Regulaciones
- 4 Amenidades
- 5 Otros Factores
- 6 Para seguir leyendo
- 7 Break

# Geografía y Regulaciones



Fuente: Saiz, A. (2010)

# Geografía y Regulaciones

	MSA	Elasticity	Unavailable Land	Regulation Index
1	Miami, FL	0.60	77%	0.94
2	Los Angeles, CA	0.63	52%	0.49
3	Ft. Lauderdale, FL	0.65	76%	0.72
4	San Francisco, CA	0.66	73%	0.72
5	San Diego, CA	0.67	63%	0.46
265	Terra Haute, IN	6.51	5%	-1.39
266	Alexandria, LA	7.15	19%	-1.68
267	Columbia, MO	7.84	6%	-1.53
268	St. Joseph, MO	7.94	6%	-1.51
269	Pine Bluff, AR	12.15	18%	-1.76



- ① Recap: Modelo Hedónico
- ② Ubicación del trabajo, costos de transporte y gradientes de precios
- ③ Geografía y Regulaciones
- ④ Amenidades
- ⑤ Otros Factores
- ⑥ Para seguir leyendo
- ⑦ Break

# Amenidades

Crimen es un fenómeno local

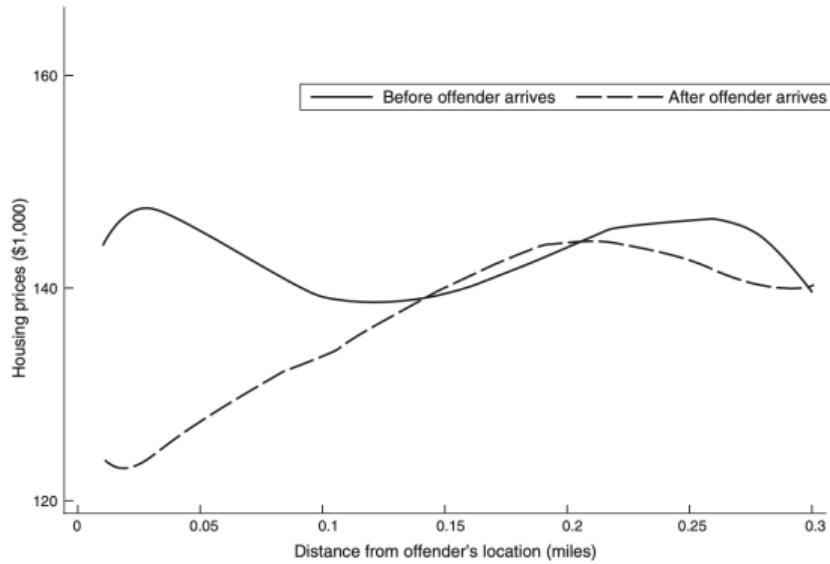


FIGURE 2B. PRICE GRADIENT OF DISTANCE FROM OFFENDER  
(Sales during year before and after arrival)

Fuente: Linden, L., & Rockoff, J. E. (2008)

# Ejemplo: Unlocking amenities JPUBE

Un cuento de dos parques

Humboldt Park



207 acres

Homicides nearby in  
2001-3: 6; 2013-5: 2

House prices near park:  
 $\leq 1/8mi$  : \$247K;  $1 - 3/8mi$  : \$218K

Diff. = \$29K (levels)

Garfield Park



185 acres

Homicides nearby in  
2001-3: 10; 2013-5: 8

House prices near park:  
 $\leq 1/8mi$  : \$86K;  $1 - 3/8mi$  : \$118K

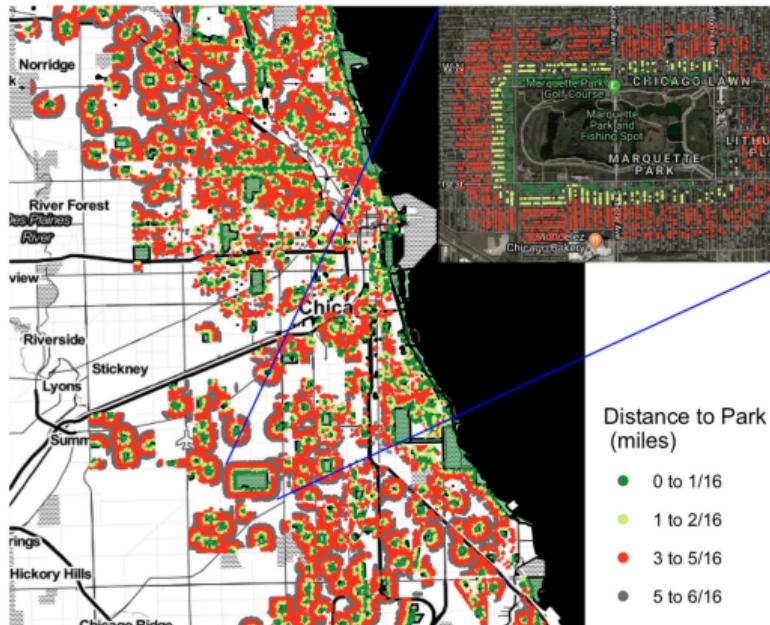
Diff. = -\$32K (levels)

# Ejemplo: Unlocking amenities JPUBE

## Interacciones entre las Amenidades

D. Albuoy, P. Christensen and I. Sarmiento-Barbieri / Journal of Public Economics 182 (2020) 104110

5



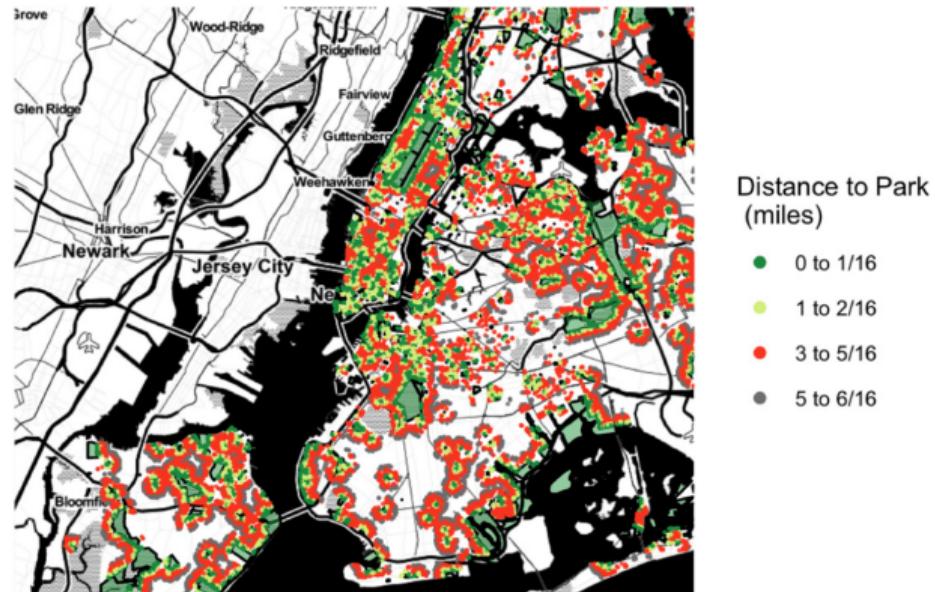
**Fig. 1.** Housing transactions around parks: neighborhood distance intervals. Notes: The following figure shows transactions within 3/8 miles of the nearest park in Chicago. The zoom in figure represents the ‘neighborhood’ around Marquette Park. It contains all of the transactions (4623) within three-eighths of a mile that are not closer to another park. Colors correspond to different distance intervals or ‘bands’ around the park. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

# Ejemplo: Unlocking amenities JPUBE

## Interacciones entre las Amenidades

24

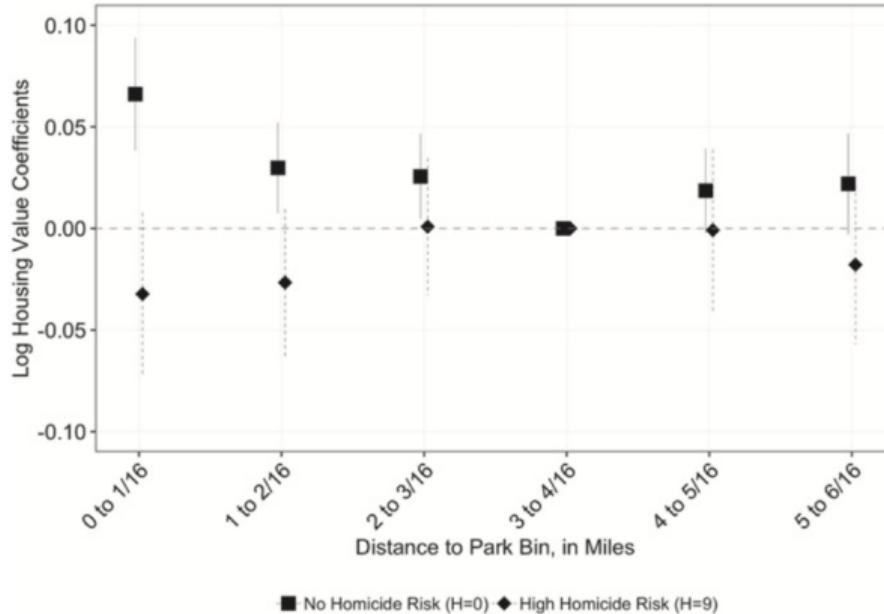
D. Albouy, P. Christensen and I. Sarmiento-Barbieri / Journal of Public Economics 182 (2020) 104110



**Fig. A1.** Housing transactions within 3/8 miles of the nearest park, New York. Notes: Points represent transactions within 3/8 miles of the nearest park. Different shades denote proximity to the park.

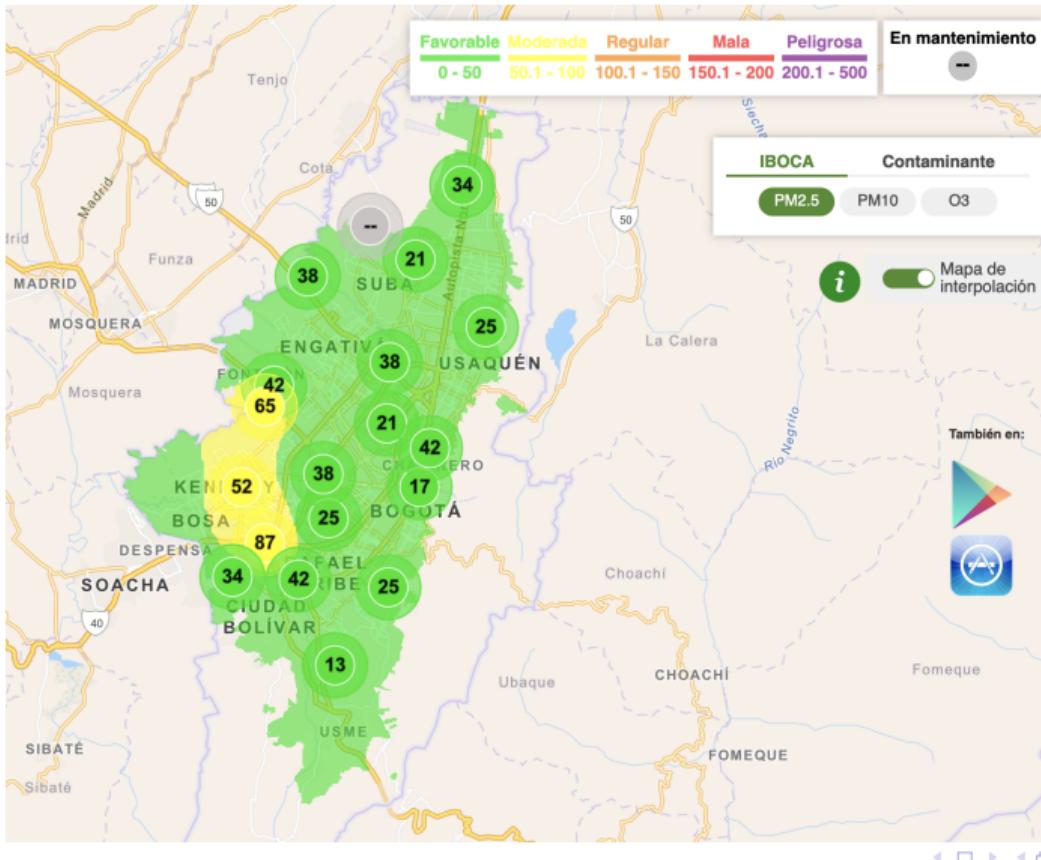
# Ejemplo: Unlocking amenities JPUBE

## Interacciones entre las Amenidades



- 1 Recap: Modelo Hedónico
- 2 Ubicación del trabajo, costos de transporte y gradientes de precios
- 3 Geografía y Regulaciones
- 4 Amenidades
- 5 Otros Factores
- 6 Para seguir leyendo
- 7 Break

# Contaminación



# Contaminación: Currie et al (2015) AER

TABLE 2—THE EFFECT OF TOXIC PLANTS ON LOCAL HOUSING VALUES

	0–0.5 Miles		0.5–1 Miles		0–1 Miles		0–1 Miles (+/- 2 years)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel C. First difference: Estimated effect of plant openings and closings</i>								
1(Plant Opening)	−0.096***	−0.107***	−0.007	−0.008	−0.020	−0.022	−0.030	−0.038
× Near	(0.036)	(0.034)	(0.023)	(0.020)	(0.022)	(0.019)	(0.028)	(0.025)
1(Plant Closing)	0.017	0.010	0.008	0.003	0.010*	0.005	0.005	0.001
× Near	(0.011)	(0.009)	(0.005)	(0.004)	(0.006)	(0.005)	(0.007)	(0.005)
$H_0$ : Opening = −Closing ( <i>p</i> -value)	0.051	0.013	0.968	0.827	0.688	0.438	0.402	0.164
Observations	1,114,248	1,114,248	1,305,780	1,305,780	1,375,751	1,375,751	1,196,000	1,196,000
State × year fixed FE	X		X		X		X	
County × year FE		X		X		X		X

- ① Recap: Modelo Hedónico
- ② Ubicación del trabajo, costos de transporte y gradientes de precios
- ③ Geografía y Regulaciones
- ④ Amenidades
- ⑤ Otros Factores
- ⑥ Para seguir leyendo
- ⑦ Break

# Para seguir leyendo

- ▶ Albouy, D., Christensen, P., & Sarmiento-Barbieri, I. (2020). Unlocking amenities: Estimating public good complementarity. *Journal of Public Economics*, 182, 104110.
- ▶ Bocarejo, J. P., Portilla, I., & Pérez, M. A. (2013). Impact of Transmilenio on density, land use, and land value in Bogotá. *Research in Transportation Economics*, 40(1), 78-86.
- ▶ Glaeser, E. L. (2008). Cities, agglomeration, and spatial equilibrium. Oxford University Press.
- ▶ Gupta, A., Mittal, V., Peeters, J., & Van Nieuwerburgh, S. (2022). Flattening the curve: pandemic-induced revaluation of urban real estate. *Journal of Financial Economics*, 146(2), 594-636.
- ▶ Linden, L., & Rockoff, J. E. (2008). Estimates of the impact of crime risk on property values from Megan's laws. *American Economic Review*, 98(3), 1103-27.
- ▶ Saiz, A. (2010). The geographic determinants of housing supply. *The Quarterly Journal of Economics*, 125(3), 1253-1296.
- ▶ Tsivanidis, N. (Forthcoming). Evaluating the impact of urban transit infrastructure: Evidence from bogota's transmilenio. AER

# Volvemos en 10 min con R