

Segregation and Residential Location Patterns

Urban Economics

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Residential Location Patterns: US

Table 1
Poverty in cities and suburbs

Row		Center city resident	Suburban resident
1	All	0.1990	0.0753
2	Northeast	0.2089	0.0599
3	Midwest	0.1984	0.0565
4	South	0.1865	0.0744
5	West	0.1895	0.1031

Residential Location Patterns: Atlanta, Phoenix, Los Angeles

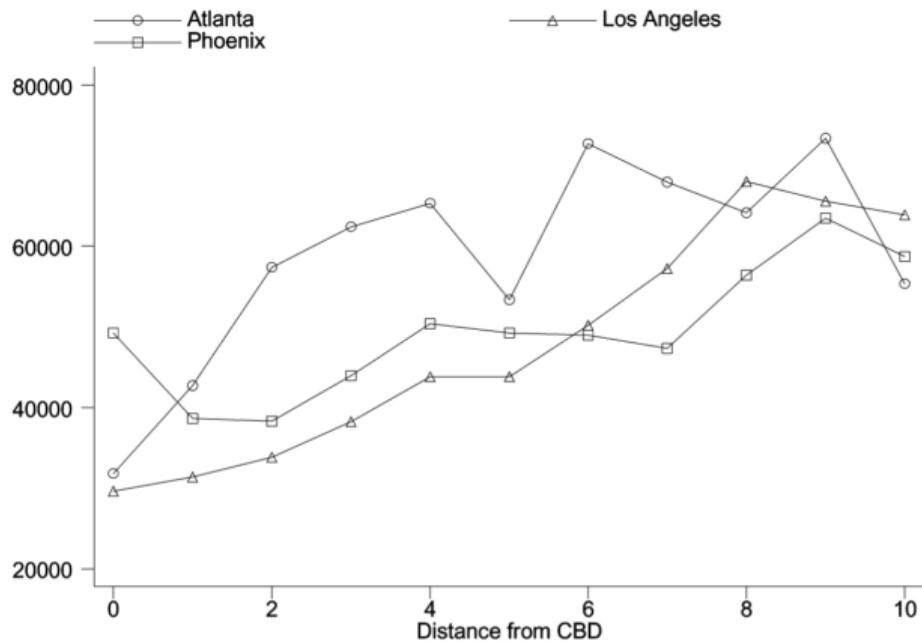


Fig. 2. Income and distance from the CBD in three new cities.

Residential Location Patterns: Europe

Table 1
Central-city vs. suburban incomes in France and the US

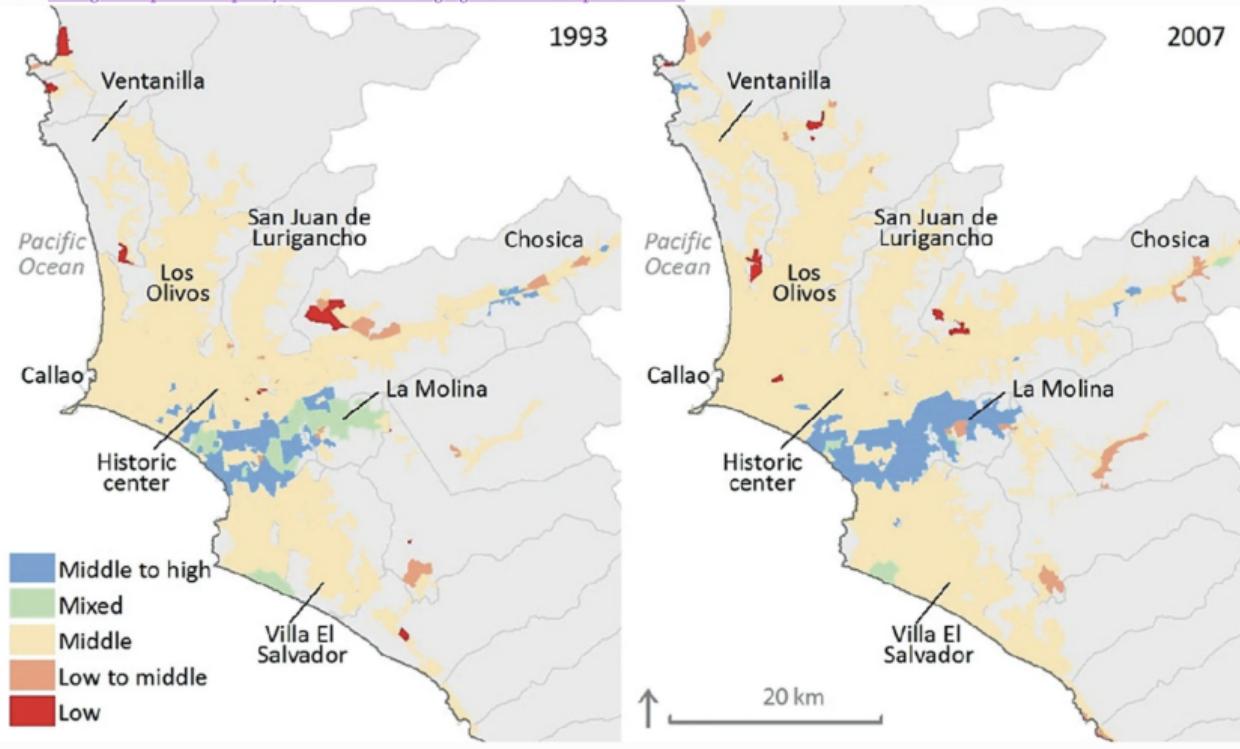
Case	Household income ^a	
	Central-city	Suburbs
Ile de France (Paris metro area)	124 000 Fr. ^b	106 000 Fr.
Province (other metro areas)	76 000 Fr.	84 000 Fr.
France (all metro areas)	84 000 Fr.	82 000 Fr.
Detroit (metro area)	\$20 207	\$40 084
U.S. (all metro areas)	\$26 727	\$26 314

^a Household incomes are the 1990 average value in France and the 1989 median value in the U.S. The French data are from Nicot (1996), and the U.S. data are from the 1990 Census.

^b The current franc-dollar exchange rate is approximately 6 francs per dollar.

Residential Location Patterns: Lima

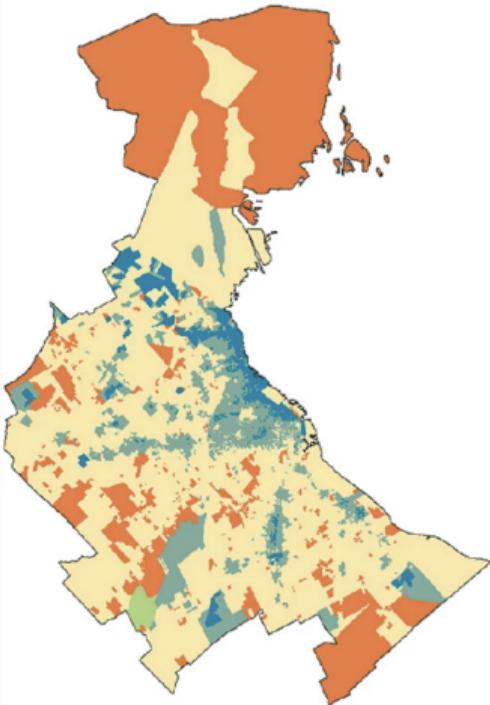
From: [Changes in Spatial Inequality and Residential Segregation in Metropolitan Lima](#)



Classification of neighbourhoods by socio-economic composition in Lima.

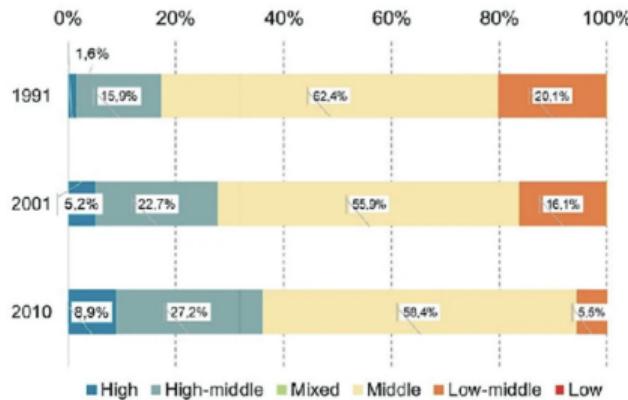
Residential Location Patterns: Buenos Aires

2010



Socioeconomic Status Classification

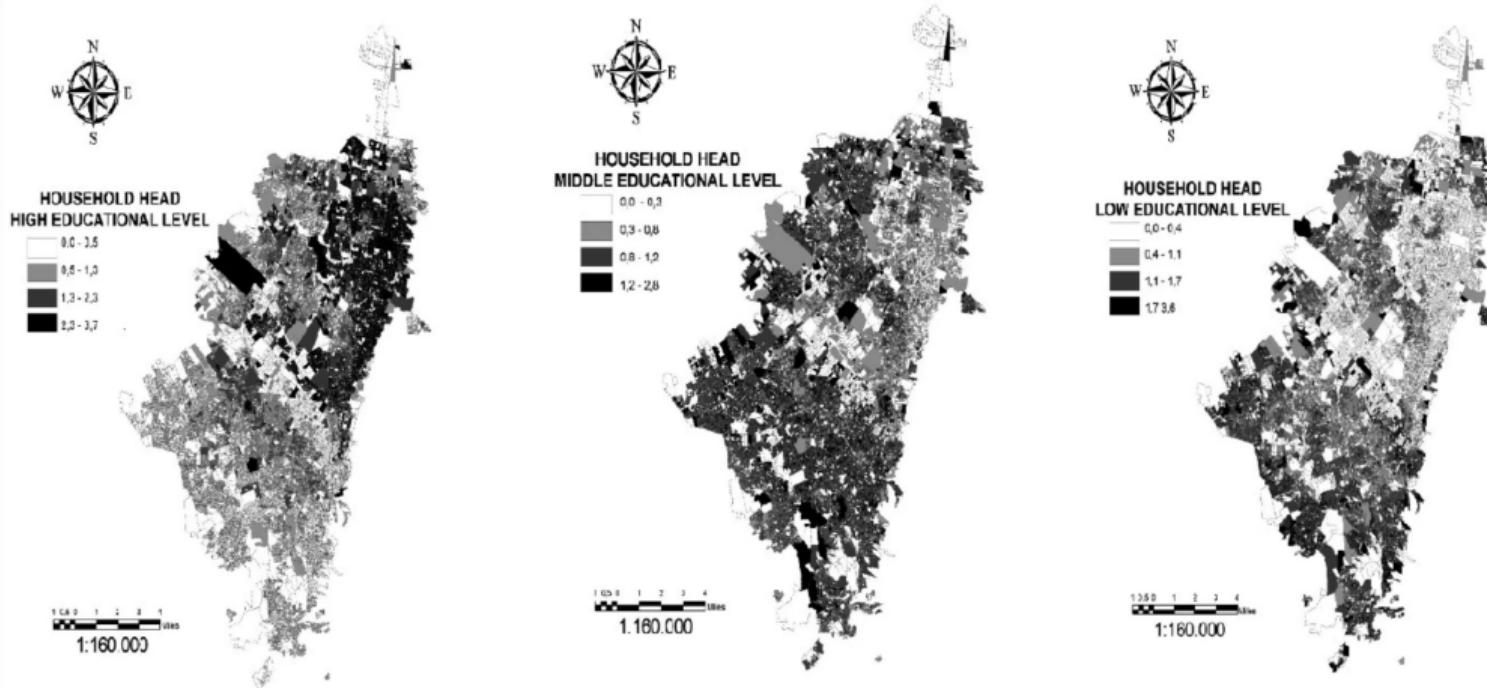
	High
	Low-middle
	High-middle
	Low
	Mixed
	Zero householders
	Middle



Source Population and housing censuses 1991, 2001, and 2010, INDEC, author's maps

Residential Location Patterns: Bogotá

From: [Socioeconomic Residential Segregation and Income Inequality in Bogotá: An Analysis Based on Census Data of 2005](#)



Source Elaboration by the authors based on Population Census DANE ([2005](#))

Location quotient for household leader by high, medium, and low education level in Bogotá, 2005.

Residential Location Patterns by Race: NYC



Source: <https://www.washingtonpost.com/graphics/2018/national/segregation-us-cities/>

Residential Location Patterns by Race: Chicago



Source:

<https://www.washingtonpost.com/graphics/2018/national/segregation-us-cities/>

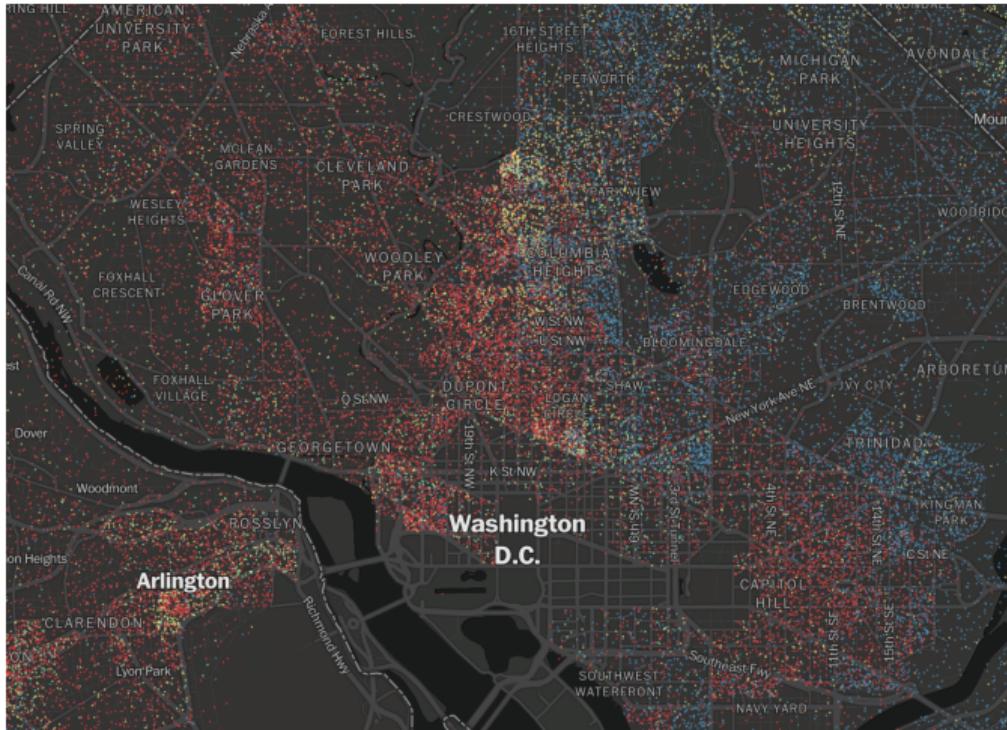
Residential Location Patterns by Race: Houston



Source:

<https://www.washingtonpost.com/graphics/2018/national/segregation-us-cities/>

Residential Location Patterns by Race: Washington, DC



Source:

<https://www.washingtonpost.com/graphics/2018/national/segregation-us-cities/>

Residential Location Patterns

- ▶ Recent research has shown that the neighborhood where people live has important implications for short-run, long-run and even intergenerational outcomes.
- ▶ Residential choice can be driven by multiple factors:
 - ▶ Neighborhood/Housing/Amenities preferences
 - ▶ Discrimination
 - ▶ Others: Disparities in income, Information, Taxes/subsidies, Labor market opportunities, etc...
- ▶ Many suspect that ghettos cause these bad outcomes (at least in part)
- ▶ Moreover this might have great relevance for policy, especially if we believe that ghettoization reflects a coordination failure where the collective outcome is often not representative of the preferences of the median neighborhood dweller.

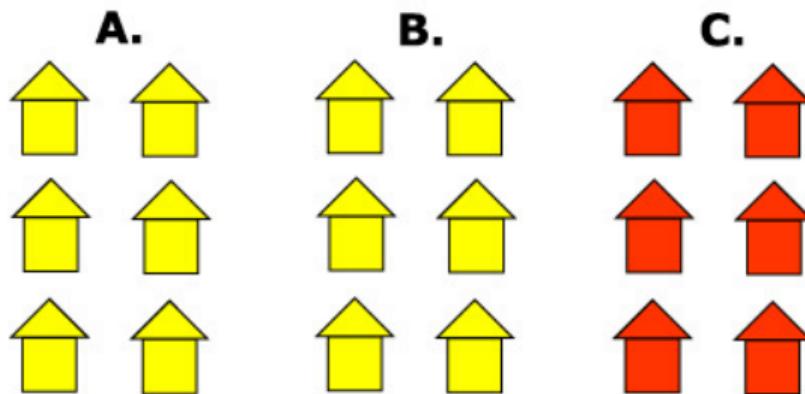
Dissimilarity and Isolation Indices

- ▶ Social scientists have struggled with the measurement of segregation for more than 50 years.
- ▶ The two of the most common measures are:
 - ▶ Dissimilarity index
 - ▶ Isolation index

Dissimilarity Index

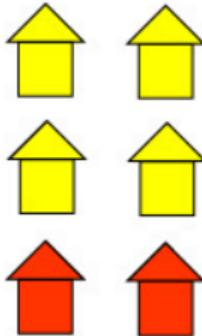
$$\text{Dissimilarity} = \frac{1}{2} \sum_{i=1}^N \left| \frac{B_i}{B_{total}} - \frac{B_i^c}{B_{total}^c} \right| \quad (1)$$

Dissimilarity Index

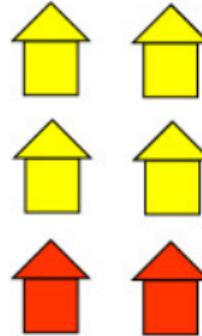


Dissimilarity Index

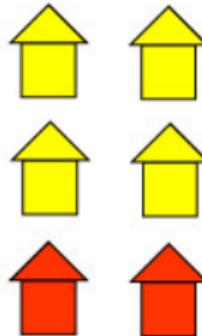
A.



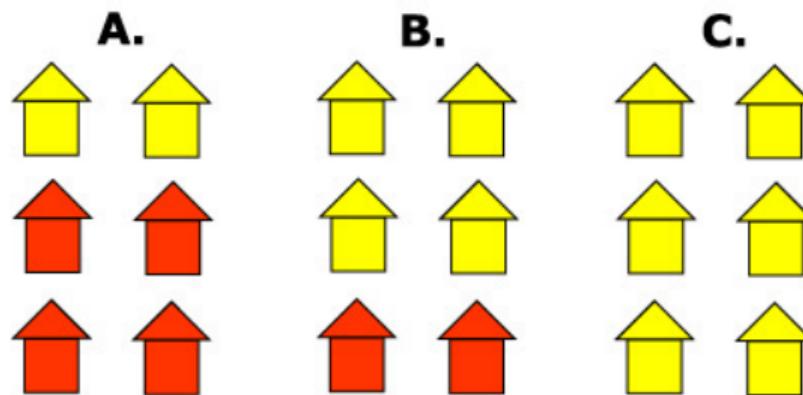
B.



C.



Dissimilarity Index



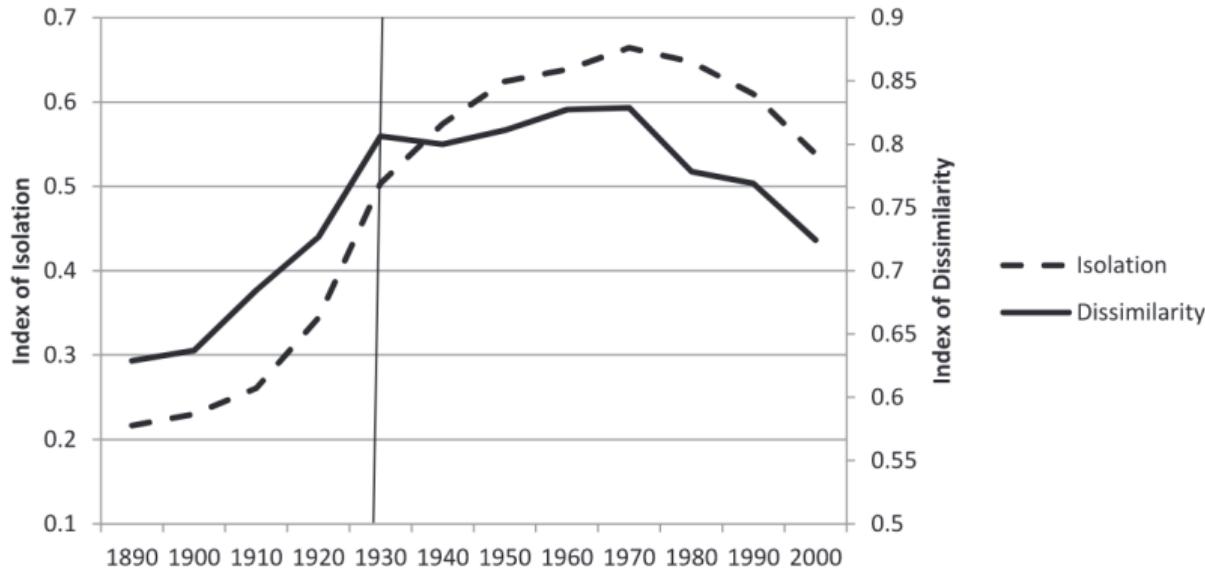
Dissimilarity Index

Isolation Index

$$\text{Isolation} = \sum_{i=1}^N \left(\frac{B_i}{B_{total}} \cdot \frac{B_i}{\text{persons}_i} \right) \quad (2)$$

Dynamics of Segregation

FIGURE 1.—SEGREGATION TRENDS IN THE LARGEST TEN AMERICAN CITIES, 1890–2000



Source: Shertzer and Walsh (2019) Racial Sorting And The Emergence Of Segregation In American Cities

Dynamics of Segregation

- ▶ Recent research has shown that the neighborhood where people live has important implications for short-run, long-run and even intergenerational outcomes.
- ▶ Residential choice can be driven by multiple factors:
 - ▶ Neighborhood/Housing/Amenities preferences
 - ▶ Disparities in income
 - ▶ Racial discrimination
 - ▶ Others: Information, Taxes/subsidies, Labor market opportunities, etc...

Residential Location Patterns: Schelling Model

- ▶ In 1801, Thomas C. Schelling developed a simple but striking model of racial segregation
- ▶ His model studies the dynamics of residential location, that can be applied to any two groups.
- ▶ Like much of Schelling's work, the model shows how local interactions can lead to surprising aggregate structure.
- ▶ In particular, it shows that relatively mild preference for neighbors of similar race can lead in aggregate to the collapse of mixed neighborhoods, and high levels of segregation.
- ▶ In recognition of this and other research, Schelling was awarded the 2005 Nobel Prize in Economic Sciences (joint with Robert Aumann).

Residential Location Patterns: Schelling Model

Schelling Tipping model

- ▶ What is distinctive is we may see neighborhoods that exhibit locally stable ranges of integration.
- ▶ But a small perturbation to the neighborhood mix may produce a movement towards a fully segregated equilibrium.
- ▶ Thus, these models exhibit 'tipping.'
- ▶ In general, greater tolerance does not lead to greater chances of tipping.
- ▶ However, having a relatively larger population of one group does lead to a greater chance of tipping.
- ▶ Another important feature of the model is that the equilibrium does not appear to particularly maximize anyone's preferences or well-being.

Schelling Tipping model

Equilibrium Dynamics in Tipping Model

- ▶ The equilibria has the characteristic in that the preferences of a single individual can lead an entire neighborhood to unravel.
- ▶ In this sense, preferences act more like constraints on the problem rather than maximands of the invisible hand.
- ▶ Not coincidentally, preferences are written in this model as *willingness to tolerate* given neighbors rather than *desire* to have given neighbors.

Schelling Tipping model

Limitations of the Tipping Model

- ▶ The tipping model has two key limitations.
- ▶ First, there are no prices.
- ▶ Second, there is no forward-looking behavior.
 - ▶ One suspects that part of the tipping phenomenon (if it exists) is likely to be driven by *fear* of one group or the other that the neighborhood may tip—which makes them want to exit before property values fall.

Schelling Tipping model

Card, Mas and Rothstein (2008)

- ▶ However, before Card, Mas and Rothstein (2008) there was no direct evidence of the tipping behavior
- ▶ The paper introduces a version of the Schelling model that incorporates prices and provides evidence on the relevance of the tipping phenomenon.
- ▶ This gives nice (and empirically relevant) predictions on the differential reaction of homeowners versus home-renters to changes in neighborhood racial composition.

Tipping And The Dynamics Of Segregation

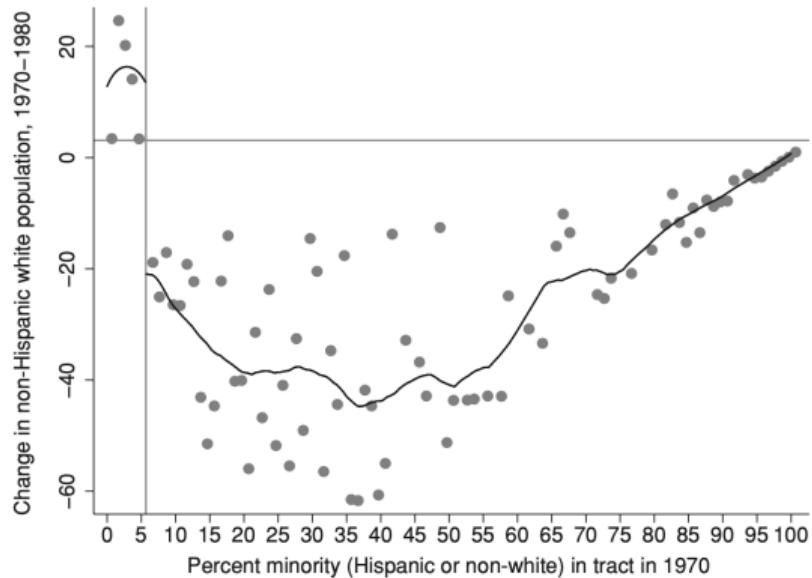


FIGURE I
Neighborhood Change in Chicago, 1970–1980

Source: Card et al. (2016) Tipping And The Dynamics Of Segregation

Tipping And The Dynamics Of Segregation

Model

- ▶ Two groups of buyers: $g \in w, m$
- ▶ These are willing to pay at least:

$$b^g(n^g, m) \tag{3}$$

- ▶ $\frac{\partial b^w}{\partial n^w}$ and $\frac{\partial b^m}{\partial n^m}$ weakly negative
- ▶ $\frac{\partial b^w}{\partial m}$ and $\frac{\partial b^m}{\partial m}$ social interaction effects.

Tipping And The Dynamics Of Segregation

Model

Tipping And The Dynamics Of Segregation

Equations for Tipping Model Identification

- ▶ At $m_{t-1} < m^*$

$$E[\Delta m_t | m_{t-1}] = g(m_{t-1}),$$

- ▶ For $m_{t-1} \geq m^*$:

$$E[\Delta m_t | m_{t-1}] = h(m_{t-1})$$

Tipping And The Dynamics Of Segregation

Equations for Tipping Model Identification

- ▶ For the intermediate range $m_{t-1} \in [m^* - r, m^*]$ where tipping is possible but uncertain:

$$E[\Delta m_t | m_{t-1}] \approx 1[m_{t-1} < m^*] g(m_{t-1}) + 1[m_{t-1} \geq m^*] h(m_{t-1}).$$

- ▶ Discontinuity condition at m^* :

$$\lim_{\epsilon \rightarrow 0^+} [h(m^* + \epsilon) - g(m^* - \epsilon)] > 0.$$

Tipping And The Dynamics Of Segregation

Empirical Specification

$$D_{wic,t} = p(\delta_{ic,t-10}) + d1[d_{ic,t-10} > 0] + \tau_c + X_{ic,t-10}\beta + \epsilon_{ic,t}.$$

Tipping And The Dynamics Of Segregation

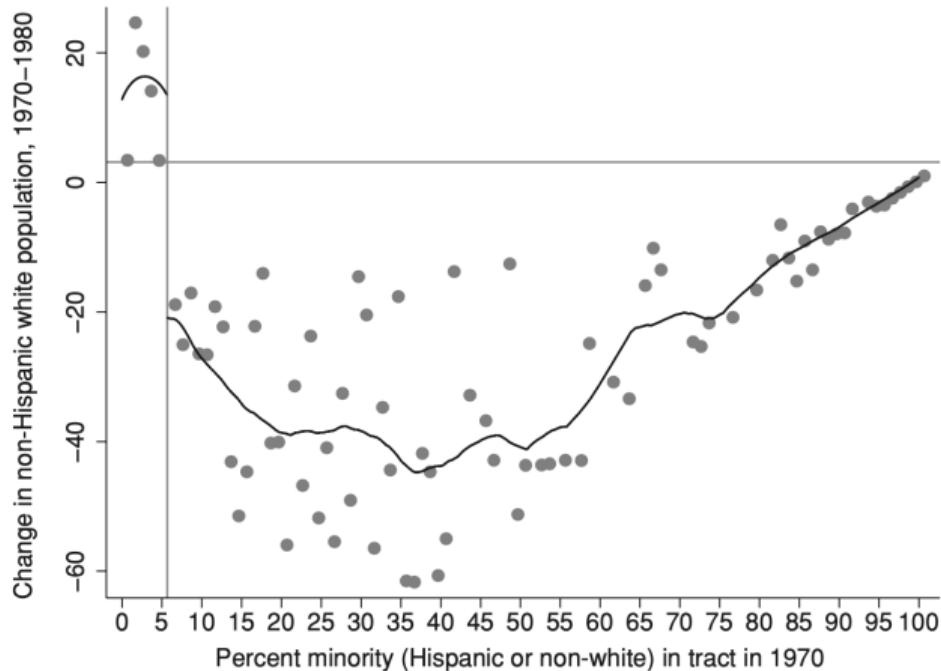
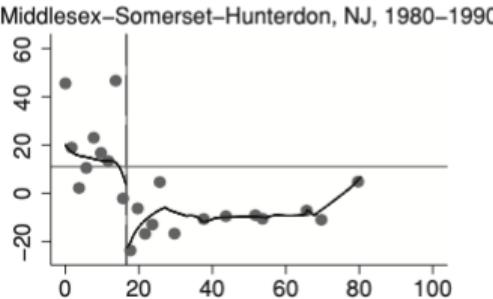
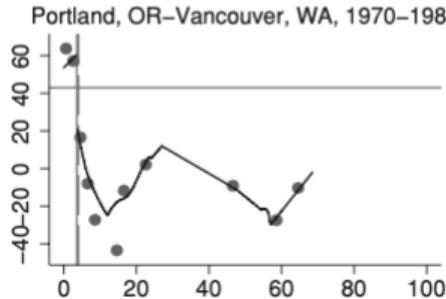
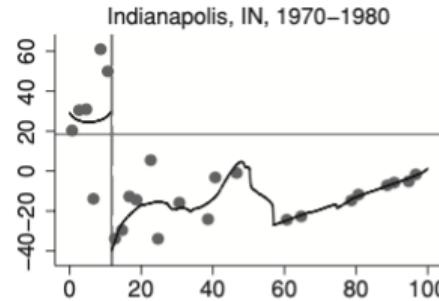
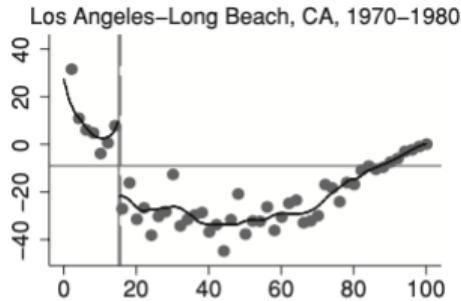


FIGURE I
Neighborhood Change in Chicago, 1970–1980

Source: Card et al. (2016) Tipping And The Dynamics Of Segregation

Tipping And The Dynamics Of Segregation



Source: Card et al. (2016) Tipping And The Dynamics Of Segregation

Tipping And The Dynamics Of Segregation

TABLE II
OVERVIEW OF CANDIDATE TIPPING POINTS

	1970–1980		1980–1990		1990–2000	
	Fixed point method	Structural break method	Fixed point method	Structural break method	Fixed point method	Structural break method
	(1)	(2)	(3)	(4)	(5)	(6)
Mean	11.87	8.98	13.53	11.69	14.46	13.96
SD	9.51	8.78	10.19	8.23	9.00	9.68
# of MSAs in sample	104	104	113	113	114	114
# without identified points	4	—	3	—	0	—
Correlations						
1970–1980, fixed point	1.00					
1970–1980, structural break	0.55	1.00				
1980–1990, fixed point	0.46	0.45	1.00			
1980–1990, structural break	0.45	0.39	0.64	1.00		
1990–2000, fixed point	0.50	0.44	0.59	0.68	1.00	
1990–2000, structural break	0.45	0.61	0.58	0.73	0.73	1.00

Notes. Tipping points describe the minority share in the census tract, measured in percentage points. Summary statistics are unweighted. All candidate points are estimated using a two-thirds subsample of the original data.

Tipping And The Dynamics Of Segregation

TABLE III
BASIC REGRESSION DISCONTINUITY MODELS FOR POPULATION CHANGES AROUND THE CANDIDATE TIPPING POINT

	Change in white population				Change in minority population		Change in total population	
	Pooled		Fully interacted		Pooled		Pooled	
	Fixed point	Struct. break	Fixed point	Struct. break	Fixed point	Struct. break	Fixed point	Struct. break
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1970–1980								
Beyond candidate tipping point in 1970	-12.1 (2.7)	-10.4 (3.4)	-14.2 (3.1)	-16.4 (4.3)	2.0 (1.0)	-0.1 (1.2)	-10.1 (3.0)	-10.4 (3.5)
Demographic/housing controls	y	y	n	n	y	y	y	y
N	11,611	11,886			11,611	11,886	11,611	11,886
R ²	0.25	0.25			0.22	0.22	0.23	0.24
1980–1990								
Beyond candidate tipping point in 1980	-13.6 (2.0)	-11.4 (3.5)	-17.0 (3.1)	-18.6 (3.5)	-1.1 (1.1)	0.3 (1.1)	-14.7 (2.6)	-11.1 (4.1)
N	12,151	13,067			12,151	13,067	12,151	13,067
R ²	0.30	0.30			0.26	0.26	0.29	0.29
1990–2000								
Beyond candidate tipping point in 1990	-7.3 (1.5)	-9.3 (1.8)	-3.6 (2.1)	-6.6 (2.0)	2.9 (1.1)	1.4 (0.8)	-4.3 (2.1)	-7.9 (2.2)
N	13,371	13,371			13,371	13,371	13,371	13,371
R ²	0.15	0.14			0.18	0.19	0.13	0.13

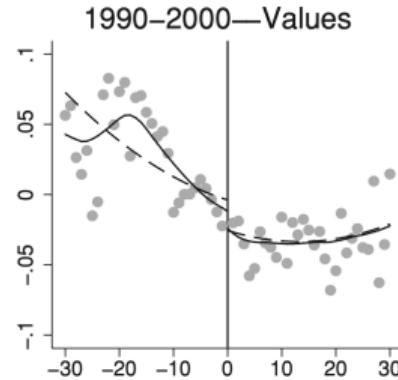
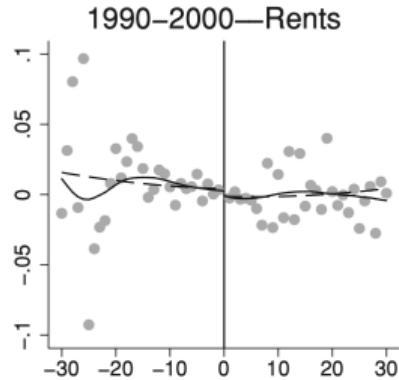
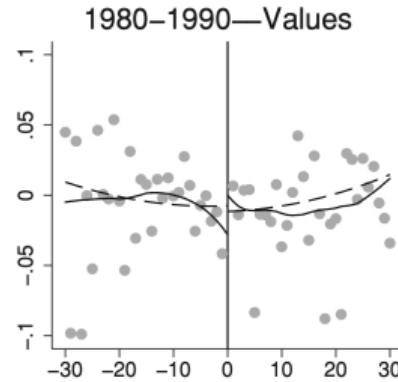
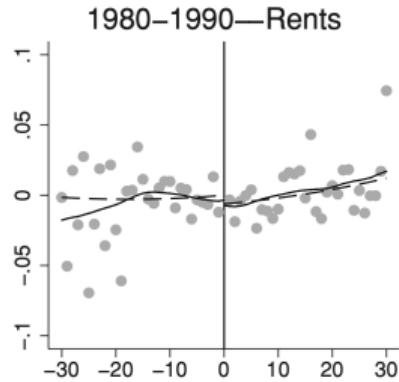
Tipping And The Dynamics Of Segregation

TABLE IV
TIPPING IN THE 1990S, BY AMOUNT OF REMAINING UNDEVELOPED LAND

Tipping discontinuity, 1990–2000					
# of tracts	Change in white population	Change in minority population	Change in total population	Change in minority share	(5)
	(1)	(2)	(3)	(4)	
Full sample	13,371	-7.3 (1.5)	2.9 (1.1)	-4.3 (2.1)	3.4 (0.4)
>91% developed	3,368	-4.7 (1.1)	4.7 (1.1)	0.0 (1.3)	4.6 (1.0)
<91% developed	9,875	-6.1 (1.8)	2.4 (1.3)	-3.7 (2.6)	2.5 (0.4)

Notes. See notes to Table III (columns (1), (5), and (7)) for details on sample and specifications. Fixed point candidate tipping points are used. Column (5) takes as the dependent variable the minority share in 2000 minus the minority share in 1990 but is otherwise identical. Developed land measure is computed from the National Land Cover Data: 91% is the 75th percentile of this measure. See text for details.

Tipping And The Dynamics Of Segregation



Tipping And The Dynamics Of Segregation

TABLE VIII
TIPPING IN ELEMENTARY SCHOOLS

	Tipping discontinuity, 1990–2000			
	Change in white population	Change in minority population	Change in total population	Change in minority share
	(1)	(2)	(3)	(4)
Beyond candidate tipping point	-7.4 (2.3)	0.9 (0.9)	-6.5 (2.3)	2.3 (0.8)
N	5,641	5,641	5,641	5,641

Note. Sample consists of elementary schools in the MSA. Tipping points are estimated using the fixed point method over a two-thirds subsample; the remaining one-third subsample is used to estimate the specifications shown here. Each includes a quartic polynomial in the minority share relative to the candidate tipping point, MSA fixed effects, and a control for the school free lunch share. Standard errors are clustered on the MSA.

Source: Card et al. (2016) Tipping And The Dynamics Of Segregation

Tipping And The Dynamics Of Segregation

TABLE IX
MODELS FOR THE LOCATION OF THE TIPPING POINT

	Mean [SD]			
	(1)	(2)	(3)	(4)
	Coefficients (SEs)			
Race attitudes index (positive = less tolerant)	-0.1 [0.6]	-2.77 (1.16)	-2.98 (1.08)	-2.66 (0.94)
% Black	11.4 [8.6]	0.53 (0.10)	0.59 (0.10)	0.81 (0.10)
% Hispanic	6.7 [9.9]	0.65 (0.07)	0.75 (0.07)	0.94 (0.09)

Source: Card et al. (2016) Tipping And The Dynamics Of Segregation