Credit Standards and Segregation

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GREQAM, Marseille, March 20, 2012
Volume and LTI of Mortgages

The graph shows the trend of mortgage volume and LTI for different groups over the years 1995 to 2010. The categories are Whites, African Americans, Hispanics, and Asians. The x-axis represents the years, and the y-axis represents the volume and LTI.
Credit Standards and Segregation

Introduction

Loan-to-Income Ratio

![Graph showing the Loan-to-Income Ratio over years for Whites, African Americans, and Hispanics.](chart)

**Whites**
- 1995: 2
- 2000: 2.2
- 2005: 2.4

**African Americans**
- 1995: 2.2
- 2000: 2.4
- 2005: 2.6

**Hispanics**
- 1995: 2.4
- 2000: 2.6
- 2005: 2.8
Missing Income Loans

The graph shows the percentage of missing income loans for Whites, African Americans, and Hispanics from 1995 to 2005. The percentage for Whites increases steadily, African Americans have a peak around 2000, and Hispanics show a sharp increase from 2000 onwards.
Mortgage credit boom


- Literature on household preferences and schooling quality: Bayer, Ferreira, McMillan (2007), Bayer, Ferreira, Reuben (2004),
Segregation matters

- **Educational Achievement:**
  - Higher black-white test score gap in more segregated MSAs (Card and Rothstein 2007).
- **Taxation Spillovers:** Benabou 1996.
Outline: Should more credit lead to more/less racial segregation?

1. Theoretical Predictions
2. Empirical Analysis
3. Conclusion
Theoretical Predictions
The City

Land & Housing

- Neighborhood 1, price $p_1$. Neighborhood 2, price $p_2$.
- Elasticity of housing supply $\varepsilon_j$.

Households

- Valuation $v_{r,j}$ of neighborhood $j$ for race $r$.
- Minority and white households, income $\omega_r$.
- Density 2 of households overall, with a share $s$ of minorities.
Household Utility

\[ V_{i,j} = \sum_{t=0}^{\infty} \beta^t U(c_{j,r(i),t}) + \nu_{j,r(i)} + I^h(i,j) \cdot \zeta + \varepsilon_{i,j} \]

- consumption \( c_{j,r,t} \) in period \( t \) for race \( r \) in neighborhood \( j \).
- \( \beta \): time discount factor.
- \( \nu_{j,r} \): valuation of neighborhood \( j \). \( \nu_{j,r} = \phi_r W_j + u_{j,r} \); \( \phi_r \) strength of social interactions, \( W_j \): fraction white in neighborhood \( j \), \( u_{j,r} \): exogenous valuation of neighborhood \( j \) by race \( r \).
- \( I^h(i,j) = 1 \) if homeowner in neighborhood \( j \).
- \( \zeta \): utility value of homeownership. Tax advantage, protection against fluctuations of rents, social status.
- \( \varepsilon_{i,j} \): extreme-value distributed unobserved utility.
Credit Standards

- Lenders approve mortgages based on LTI and volume. In each neighborhood $j$,

$$O_{i,j}^* = \alpha_j + \beta_j \cdot \frac{pj}{\omega_r} + \eta_{i,j}, \quad O_{i,j} = 1 \text{ if } O_{i,j}^* > 0$$

- $\eta_{i,j}$ extreme-value distributed unobservables.

- $l^h(i,j) = O_{i,j}$.

Remarks

- Interpretation as lenders’ cost benefit analysis of lending.
- No discrimination assumption (cf Boston Fed Study).
- Potential correlation $\text{corr}(\eta_{i,1}, \eta_{i,2}) = \rho$. 

**Housing Supply**

\[ MC(H_j) = H_j^{1/\varepsilon_j} \]

- \( \varepsilon_j \): elasticity of housing supply in neighborhood \( j \).

Indifference between production for rental and production for homeownership.

- \( p_j \): price of the house, \( \chi_j \): rental payments.

No arbitrage condition:

\[ p_j = \sum_{t=1}^{\infty} \left( \frac{1}{1 + \rho} \right)^t \chi_j \iff \chi_j = \frac{p_j}{1 + \rho^{-1}} \]
Credit Standards and Segregation

Theoretical Predictions

Framework

Equilibrium

- Households choose consumption, neighborhood and housing status optimally.
- Competitive Developers supply housing in order to maximize profits.
- Competitive Lenders break even on loans originated.
- Housing market clears at prices $p_j^*$, $j = 1, 2$.

**Equilibrium:**

$$d_j(p_1^*, p_2^*, W_1, W_2) = s_j(p_1^*, p_2^*), \quad j = 1, 2$$

$$W_j = d_j^{White}(p_1^*, p_2^*, W_1, W_2), \quad j = 1, 2$$

- Existence and uniqueness proven for $\alpha_2 = \infty$.
- Equilibria in stochastic models with social interactions: Brock and Durlauf (2001).
Segregation and Lending Standards

\[ \text{Isolation}_w = \sum_j \frac{W_j}{W} \cdot \frac{W_j}{s_j} \]

1. a *leverage effect* results from higher probabilities of origination for a given level of income and for a given price.

2. a *general equilibrium effect* results from an upward shift in demand, which drives prices up in the most valued neighborhood.

\[
\frac{d \text{Isolation}}{d \beta}(p_1^*, p_2^*, \alpha, \beta) = \frac{\partial \text{Isolation}}{\partial \beta}(p_1^*, p_2^*, \alpha, \beta) + \sum_{j=1,2} \frac{\partial \text{Isolation}}{\partial p_j^*} \cdot \frac{dp_j^*}{d \beta}
\]

(1)

- The first term is typically negative,
- The sign and magnitude of this second effect depend on races’ incomes and valuations of the two neighborhoods.
Analytical Results

Proposition

(Fixed Supply, Equal valuations, Different incomes) If minority and nonminority households value neighborhoods equally, but minority households have lower income, then a relaxation of credit standards will **lower racial segregation.**

Proposition

(Fixed Supply, Different valuations, Equal incomes) If minority households value neighborhood 1 relatively more than nonminority households, and minority and nonminority households have the same income, then a relaxation of credit standards will **increase racial segregation.**
Simulations: Common Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Definition</th>
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<tbody>
<tr>
<td>$r$</td>
<td>0.05</td>
<td>interest rate</td>
</tr>
<tr>
<td>$s$</td>
<td>0.2</td>
<td>share of minority</td>
</tr>
<tr>
<td>$\omega_W$</td>
<td>60,000</td>
<td>whites’ annual income</td>
</tr>
<tr>
<td>$\omega_B$</td>
<td>40,000</td>
<td>minorities’ annual income</td>
</tr>
<tr>
<td>$\gamma$</td>
<td>0.1</td>
<td>risk aversion</td>
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<tr>
<td>$\alpha_W = \alpha_B$</td>
<td>2.5</td>
<td>no discrimination.</td>
</tr>
<tr>
<td>$\sigma$</td>
<td>1000</td>
<td>standard deviation of the idiosyncratic valuation $\varepsilon_{i,j}$</td>
</tr>
<tr>
<td>$\epsilon_1$</td>
<td>0.3</td>
<td>housing supply elasticity in neighborhood 1</td>
</tr>
<tr>
<td>$\epsilon_2$</td>
<td>3</td>
<td>housing supply elasticity in neighborhood 2</td>
</tr>
<tr>
<td>$\zeta$</td>
<td>10000</td>
<td>utility value of home ownership</td>
</tr>
<tr>
<td>$\phi_{r, r = w, m}$</td>
<td>0</td>
<td>no social interactions</td>
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</table>
## Simulations #1 and #2

<table>
<thead>
<tr>
<th>Scenario</th>
<th>$\nu_{1,\text{white}}$</th>
<th>$\nu_{2,\text{white}}$</th>
<th>$\nu_{1,\text{minority}}$</th>
<th>$\nu_{2,\text{minority}}$</th>
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<tr>
<td>1</td>
<td>10,000</td>
<td>2,000</td>
<td>10,000</td>
<td>2,000</td>
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<tr>
<td>2</td>
<td>10,000</td>
<td>2,000</td>
<td>5,000</td>
<td>2,000</td>
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</table>

- Looseness of leverage constraint: $\beta_1 = \beta_2 = \beta \in [-0.5, 0]$
Simulation #1: Equal Valuations

![Graph showing Denial Rates and Ownership rates for different neighborhoods with varying looseness of leverage constraint](image-url)
Simulation #1: Equal Valuations
Simulation #1: Equal Valuations

Looseness of Leverage Constraint

- Probability that Minorities live in Neighborhood 1
- Share of Population living in Neighborhood 1

Isolation of Minorities

- Probability that Minorities live in Neighborhood 1
- Share of Population living in Neighborhood 1
Simulation #1: Equal Valuations

Isolation of Whites

Looseness of Leverage Constraint

Exposure of Whites to Minorities

Looseness of Leverage Constraint
Simulation #2: Different Valuations

![Graph of Relative Price and Denial Rates]

- **Relative Price**
  - X-axis: Looseness of Leverage Constraint
  - Y-axis: Relative Price

- **Denial Rates**
  - X-axis: Looseness of Leverage Constraint
  - Y-axis: Denial Rates

Legend:
- White (Neighborhood 1)
- Minority (Neighborhood 1)
- White (Neighborhood 2)
- Minority (Neighborhood 2)
Simulation #2: Different Valuations

[Graph showing Ownership rates and Probability that Minorities live in Neighborhood 1 as functions of Looseness of Leverage Constraint]
Simulation #2: Different Valuations

- Isolation of Minorities
- Looseness of Leverage Constraint

- Isolation of Whites
- Looseness of Leverage Constraint
Simulation Results:
Housing Elasticity & Social Interactions

- **Social interactions:**
  \[ \nu_{j,r} = \phi_r W_j + u_{j,r}. \quad \phi_w > \phi_m > 0. \]  
  Effect on magnitude of effects. Single equilibrium.

- **Elasticity of Housing Supply**

  - *Price effect for low elasticity neighborhoods:* Neighborhood 1 is more expensive when elasticity is low and the relative price increases by more when leverage constraints are relaxed.
  
  - *Neighborhood size effect for high elasticity neighborhoods:* A higher elasticity allows more segregation.
Housing Elasticity

Probability that Minorities live in Neighborhood 1 & Share of Population living in Neighborhood 1

Isolation of Minorities

Looseness of Leverage Constraint

eps1=0.1; eps2=2.5
eps1=1.5; eps2=2.5
eps1=0.1; eps2=2.5
eps1=1.5; eps2=2.5
Empirical Analysis
Data

From 1995 to 2006:

- **Mortgages**: 80-90% of all mortgage applications.
  - *From the Federal Financial Institutions Examination Council.*

- **Census**: 2000 Census data at the census tract level.
  - *From the US Census Bureau.*

- **School data**: School demographics & geographic position for all of the ~90,000 public schools.
  - *From the US Department of Education.*

- **Supply**: Housing supply elasticity in each Metropolitan Statistical Area.
  - *from Albert Saiz (Wharton School).*

- **Preferences for segregation**: General Social Survey as in Charles and Guryan (2007)
  - *NORC at the University of Chicago.*
## School Segregation 1995-2007

<table>
<thead>
<tr>
<th>Year</th>
<th>1995</th>
<th>1997</th>
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<th>2001</th>
<th>2003</th>
<th>2005</th>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td>Isolation of Whites</td>
<td>80.3</td>
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<td>76.8</td>
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<td>Isolation of Blacks</td>
<td>51.9</td>
<td>50.5</td>
<td>50.8</td>
<td>50.4</td>
<td>50.2</td>
<td>50.1</td>
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<td>Isolation of Hispanics</td>
<td>48.4</td>
<td>48.7</td>
<td>48.9</td>
<td>48.9</td>
<td>49.5</td>
<td>49.5</td>
<td>51.0</td>
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<tr>
<td>Isolation of Asians</td>
<td>21.1</td>
<td>21.7</td>
<td>21.9</td>
<td>21.3</td>
<td>21.5</td>
<td>21.6</td>
<td>22.1</td>
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<td><strong>Between School District Isolation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Between LEA Isolation of Whites</td>
<td>77.8</td>
<td>77.4</td>
<td>76.7</td>
<td>75.5</td>
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<td>Between LEA Isolation of Blacks</td>
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<td>43.1</td>
<td>43.9</td>
<td>43.1</td>
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<td>18.8</td>
<td>18.3</td>
<td>18.3</td>
<td>18.8</td>
<td>18.9</td>
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<tr>
<td><strong>Exposure</strong></td>
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<td></td>
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<tr>
<td>Exposure of Whites to Hispanics</td>
<td>6.6</td>
<td>6.9</td>
<td>7.6</td>
<td>8.2</td>
<td>8.9</td>
<td>9.4</td>
<td>10.3</td>
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<td>Exposure of Hispanics to Whites</td>
<td>32.4</td>
<td>32.0</td>
<td>31.6</td>
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<td>30.6</td>
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<td>28.8</td>
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<td>9.0</td>
<td>9.0</td>
<td>8.7</td>
<td>8.9</td>
<td>9.2</td>
<td>9.5</td>
<td>9.7</td>
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<tr>
<td>Exposure of Blacks to Whites</td>
<td>34.7</td>
<td>35.0</td>
<td>33.5</td>
<td>33.1</td>
<td>32.3</td>
<td>31.4</td>
<td>30.7</td>
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<tr>
<td>Exposure of Blacks to Hispanics</td>
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<td>10.4</td>
<td>11.4</td>
<td>12.1</td>
<td>13.0</td>
<td>13.8</td>
<td>15.0</td>
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<tr>
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<td>12.2</td>
<td>12.2</td>
<td>12.3</td>
<td>12.5</td>
<td>12.8</td>
<td>13.3</td>
<td>13.2</td>
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How Well Does School Composition Predict Census Tract Composition?

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<tbody>
<tr>
<td></td>
<td>White</td>
<td>African American</td>
<td>Hispanic</td>
<td>Asian</td>
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<tr>
<td>Fraction in Closest School</td>
<td>0.506**</td>
<td>0.508**</td>
<td>0.299**</td>
<td>0.368**</td>
</tr>
<tr>
<td></td>
<td>(0.019)</td>
<td>(0.015)</td>
<td>(0.019)</td>
<td>(0.021)</td>
</tr>
<tr>
<td>Fraction in 2nd Closest School</td>
<td>0.203**</td>
<td>0.273**</td>
<td>0.258**</td>
<td>0.163**</td>
</tr>
<tr>
<td></td>
<td>(0.020)</td>
<td>(0.019)</td>
<td>(0.022)</td>
<td>(0.022)</td>
</tr>
<tr>
<td>Fraction in 3rd Closest School</td>
<td>0.144**</td>
<td>0.160**</td>
<td>0.125**</td>
<td>0.172**</td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
<td>(0.018)</td>
<td>(0.021)</td>
<td>(0.022)</td>
</tr>
<tr>
<td>Fraction in 4th Closest School</td>
<td>0.146**</td>
<td>0.116**</td>
<td>0.066**</td>
<td>0.118**</td>
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<tr>
<td></td>
<td>(0.020)</td>
<td>(0.016)</td>
<td>(0.023)</td>
<td>(0.021)</td>
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<td>Fraction in 5th Closest School</td>
<td>0.021</td>
<td>0.047**</td>
<td>0.078**</td>
<td>0.075**</td>
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<td>(0.020)</td>
<td>(0.016)</td>
<td>(0.022)</td>
<td>(0.021)</td>
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<tr>
<td>Fraction in 6th Closest School</td>
<td>-0.011</td>
<td>0.041*</td>
<td>0.022</td>
<td>0.118**</td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
<td>(0.016)</td>
<td>(0.022)</td>
<td>(0.022)</td>
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<tr>
<td>Fraction in 7th Closest School</td>
<td>-0.012</td>
<td>0.026</td>
<td>0.021</td>
<td>0.062**</td>
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<td></td>
<td>(0.021)</td>
<td>(0.016)</td>
<td>(0.022)</td>
<td>(0.022)</td>
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<tr>
<td>Fraction in 8th Closest School</td>
<td>0.022</td>
<td>-0.004</td>
<td>-0.022</td>
<td>0.040+</td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
<td>(0.015)</td>
<td>(0.021)</td>
<td>(0.022)</td>
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<tr>
<td>Fraction in 9th Closest School</td>
<td>-0.133**</td>
<td>-0.107**</td>
<td>-0.111**</td>
<td>-0.004</td>
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<td>(0.020)</td>
<td>(0.015)</td>
<td>(0.020)</td>
<td>(0.022)</td>
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<tr>
<td>Fraction in 10th Closest School</td>
<td>-0.138**</td>
<td>-0.066**</td>
<td>-0.019</td>
<td>0.013</td>
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<td>(0.020)</td>
<td>(0.015)</td>
<td>(0.020)</td>
<td>(0.021)</td>
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(continued)
## How Well Does School Composition Predict Census Tract Composition?

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<tbody>
<tr>
<td></td>
<td>White× Distance</td>
<td>African American × Distance</td>
<td>Hispanic × Distance</td>
<td>Asian × Distance</td>
</tr>
<tr>
<td>Fraction in Closest School × Distance</td>
<td>-0.032** (0.004)</td>
<td>-0.036** (0.004)</td>
<td>-0.015+ (0.007)</td>
<td>-0.043** (0.010)</td>
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<tr>
<td>Fraction in 2nd Closest School × Distance</td>
<td>-0.007* (0.003)</td>
<td>-0.016** (0.004)</td>
<td>-0.013+ (0.007)</td>
<td>-0.001 (0.007)</td>
</tr>
<tr>
<td>Fraction in 3rd Closest School × Distance</td>
<td>-0.011** (0.003)</td>
<td>-0.016** (0.004)</td>
<td>0.000 (0.005)</td>
<td>-0.010 (0.005)</td>
</tr>
<tr>
<td>Fraction in 4th Closest School × Distance</td>
<td>-0.007** (0.002)</td>
<td>-0.008** (0.003)</td>
<td>0.007 (0.005)</td>
<td>-0.009+ (0.005)</td>
</tr>
<tr>
<td>Fraction in 5th Closest School × Distance</td>
<td>-0.003 (0.002)</td>
<td>-0.004+ (0.003)</td>
<td>-0.002 (0.004)</td>
<td>-0.011* (0.005)</td>
</tr>
<tr>
<td>Fraction in 6th Closest School × Distance</td>
<td>0.001 (0.002)</td>
<td>-0.002 (0.002)</td>
<td>0.002 (0.004)</td>
<td>-0.011** (0.004)</td>
</tr>
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<td>Fraction in 7th Closest School × Distance</td>
<td>0.002 (0.002)</td>
<td>-0.001 (0.002)</td>
<td>0.006+ (0.004)</td>
<td>-0.007+ (0.004)</td>
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<tr>
<td>Fraction in 8th Closest School × Distance</td>
<td>-0.001 (0.002)</td>
<td>0.001 (0.002)</td>
<td>0.002 (0.003)</td>
<td>-0.003 (0.004)</td>
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<tr>
<td>Fraction in 9th Closest School × Distance</td>
<td>0.010** (0.002)</td>
<td>0.008** (0.002)</td>
<td>0.009** (0.003)</td>
<td>0.003 (0.003)</td>
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<tr>
<td>Fraction in 10th Closest School × Distance</td>
<td>0.008** (0.002)</td>
<td>0.003* (0.002)</td>
<td>0.003 (0.003)</td>
<td>0.005 (0.003)</td>
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<td>Observations</td>
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<td>4,661</td>
<td>4,661</td>
<td>4,661</td>
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<tr>
<td>R-squared</td>
<td>0.597</td>
<td>0.597</td>
<td>0.557</td>
<td>0.514</td>
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</tbody>
</table>

Robust standard errors in parentheses

** p<0.01, * p<0.05, + p<0.1
School Segregation - Change in Black Isolation 1995-2005

Legend

CBSAs

-16.925780 - -2.400000
-2.399999 - 1.700000
1.700001 - 5.500000
5.500001 - 14.200000
Credit Standards and Segregation

Empirical Analysis

Identification Challenges

1. Credit standards can be loosened in multiple ways: (i) volume (ii) sensitivity to leverage (iii) missing income loans, e.g. “no doc loans.”

2. Hispanic migration mechanically lowered segregation; and is correlated with the housing boom.

3. Demand shocks may happen at the same time as supply shocks.

4. School district desegregation plans may happen at the same time as the housing boom.

Effect of Credit Standards on School Segregation

\[
\text{Segregation}_{j,t} = \text{Credit Conditions}_{j,t} \gamma + \text{Racial Demographics}_{j,t} \beta \\
+ \text{Creditworthiness}_{j,t} \delta + \text{Income}_{j,t} + MS\text{A}_{j} + \text{Year}_{t} + \varepsilon_{j,t}
\]

- **Credit Conditions}_{j,t**: (i) Median LTI ratio, (ii) Fraction of Missing Income loans.
- **Racial Demographics}_{j,t**: Fraction each racial group in each MSA, volume of applications per housing unit.
- **Creditworthiness}_{j,t**: Evaluation of the average credit risk of each racial group.
- **Income}_{j,t**: Percentiles of applicants’ income in MSA \( j \) in year \( t \).
Robustness checks

- No individual MSA is driving results.
- Covariates included separately have similar effects as covariates included together.
- Residuals are clustered at the MSA level. Two way clustering (Cameron and Gelbach) by year and MSA yields similar significance levels.
## Segregation of Blacks

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) Isolation</th>
<th>(2) Isolation</th>
<th>(3) Isolation</th>
<th>(4) Isolation</th>
<th>(5) Exposure to whites</th>
<th>(6) Exposure to hispanics</th>
<th>(7) Between S.D. Isolation</th>
<th>(8) Isolation</th>
<th>(9) Isolation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median LTI Ratio</td>
<td>1.851*</td>
<td>2.292**</td>
<td>2.212*</td>
<td>-1.282*</td>
<td>-1.000+</td>
<td>3.103**</td>
<td>2.540**</td>
<td>4.678**</td>
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<tr>
<td></td>
<td>(0.853)</td>
<td>(0.887)</td>
<td>(0.996)</td>
<td>(0.647)</td>
<td>(0.576)</td>
<td>(0.845)</td>
<td>(0.986)</td>
<td>(1.422)</td>
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<tr>
<td>Median LTI Ratio × (Elasticity - Elasticity)</td>
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</tr>
<tr>
<td>Fraction with Missing Income</td>
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<td>0.250**</td>
<td>0.269**</td>
<td>-0.199*</td>
<td>-0.119**</td>
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<td>0.266**</td>
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<td>(0.085)</td>
<td>(0.088)</td>
<td>(0.085)</td>
<td>(0.081)</td>
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<td>0.577</td>
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<td>0.590</td>
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<td>Year Fixed Effects</td>
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<td>37.45</td>
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<td>163.8</td>
<td>14.41</td>
<td>50.32</td>
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</table>

Robust standard errors in parentheses

** p<0.01, * p<0.05, + p<0.1
## Preferences for Segregation

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<thead>
<tr>
<th>Census Division</th>
<th>Whites Have Right To Segregate Neighborhood</th>
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<tr>
<td>East South Central</td>
<td>2.356</td>
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<tr>
<td>South Atlantic</td>
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<td>West South Central</td>
<td>2.011</td>
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<tr>
<td>East North Central</td>
<td>2.007</td>
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<tr>
<td>West North Central</td>
<td>1.930</td>
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<td>Middle Atlantic</td>
<td>1.919</td>
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<tr>
<td>Mountain</td>
<td>1.642</td>
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<tr>
<td>New England</td>
<td>1.647</td>
</tr>
<tr>
<td>Pacific</td>
<td>1.628</td>
</tr>
</tbody>
</table>

Source: General Social Survey and Charles and Guryan (2008). The possible answers are 1 (disagree strongly), 2 (disagree slightly), 3 (agree slightly), and 4 (agree strongly).
## Segregation of Hispanics

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) Isolation</th>
<th>(2) Isolation</th>
<th>(3) Isolation</th>
<th>(4) Isolation</th>
<th>(5) Exposure to whites</th>
<th>(6) Exposure to blacks</th>
<th>(7) Between S.D. Isolation</th>
<th>(8) Isolation</th>
<th>(9) Isolation</th>
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</thead>
<tbody>
<tr>
<td>Median LTI Ratio</td>
<td>-0.396 (0.496)</td>
<td>-0.318 (0.574)</td>
<td>-0.581 (0.560)</td>
<td>0.538 (0.528)</td>
<td>-0.321 (0.203)</td>
<td>0.869 (0.769)</td>
<td>-0.547 (0.899)</td>
<td>1.916+ (1.033)</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td>0.138 (2.132)</td>
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<td>1.125* (0.573)</td>
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<tr>
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<td>0.049 (0.051)</td>
<td>0.023 (0.062)</td>
<td>0.022 (0.064)</td>
<td>-0.014 (0.062)</td>
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<td>-0.239+ (0.134)</td>
<td>0.022 (0.061)</td>
<td>0.027 (0.065)</td>
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<td>0.805</td>
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<tr>
<td>Creditworthiness Measures</td>
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<tr>
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<tr>
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</tr>
<tr>
<td>F</td>
<td>55.25</td>
<td>49.15</td>
<td>50.06</td>
<td>66.80</td>
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<td>93.06</td>
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</table>

Robust standard errors in parentheses

** p<0.01, * p<0.05, + p<0.1
Elasticity of Housing Supply

Source: Wharton Land Use Regulation Index and Geographic determinants of housing supply from Saiz (2008)
1. 1.34 residential addresses in December 2008 for 1 housing unit in the 2000 census, in each census tract.

- Source: Census 2000 and USPS data on residential addresses.
### Segregation of Whites

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) Isolation</th>
<th>(2) Isolation</th>
<th>(3) Isolation</th>
<th>(4) Isolation</th>
<th>Exposure to hispanics</th>
<th>Exposure to blacks</th>
<th>Between S.D.</th>
<th>(7) Isolation</th>
<th>(8) Isolation</th>
<th>(9) Isolation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median LTI Ratio</td>
<td>0.609*</td>
<td>0.556*</td>
<td>0.678*</td>
<td>0.335*</td>
<td>-0.304</td>
<td>0.910+</td>
<td>1.121**</td>
<td>0.377</td>
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</tr>
<tr>
<td></td>
<td>(0.308)</td>
<td>(0.280)</td>
<td>(0.292)</td>
<td>(0.155)</td>
<td>(0.194)</td>
<td>(0.477)</td>
<td>(0.364)</td>
<td>(0.390)</td>
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<td>Median LTI Ratio \times (Right to Seg. - Right to Seg.)</td>
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<td></td>
<td></td>
<td></td>
<td>2.677**</td>
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<td></td>
<td></td>
<td></td>
<td>(0.812)</td>
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</tr>
<tr>
<td>Median LTI Ratio \times (Elasticity - Elasticity)</td>
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<td></td>
<td></td>
<td>(0.166)</td>
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<tr>
<td>Fraction with Missing Income</td>
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<td>-0.033</td>
<td>0.042+</td>
<td>-0.043+</td>
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<td>(0.023)</td>
<td>(0.077)</td>
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</table>

Robust standard errors in parentheses

** p<0.01, * p<0.05, + p<0.1
Counterfactual Black Isolation

Estimates the isolation that would have been observed all other things equal, if there had been no change in the LTI ratio.

\[
\text{Counterfactual Isolation}_t = \text{Counterfactual Isolation}_{t-1} + \Delta\text{Isolation}_t - 2.212 \cdot \Delta\text{Median LTI}_t,
\]

2.212: effect of the LTI on segregation, conditional on MSA effects, income controls, demographic changes.

- Similarly for Whites, with a coefficient of 0.678.
Counterfactual Black Isolation
Counterfactual White Isolation

![Graph showing the trend of isolation over years with 95% lower and upper bounds.](image-url)
Credit Standards and Segregation

Conclusion

- The mortgage credit market affects segregation, mainly through its effect on leverage, which affects racial groups’ ability to outbid each other for housing in desirable neighborhoods.

- *Beyond the cost of crisis*: findings underscore another set of unintended consequences which materialize *before* the financial crisis.

- While the relaxation of credit standards increased home ownership for the poor and for minorities, it significantly aggravated racial segregation.