The End of the American Dream? Inequality and Segregation in US Cities

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Motivation

Data

Model

Quantitative Analysis

Conclusions

**Question**

- over last 40 years large increase in US income inequality
- simultaneous rise in residential income segregation

**Question:**

has residential segregation contributed to amplify inequality response to underlying shocks?

**This paper:**

model of human capital accumulation and local spillovers disciplined with new micro estimates by Chetty-Hendren
Some Literature


- recent use of administrative data: Chetty, Hendren and Katz (2016) and Chetty et Hendren (2018) estimate effects of childhood exposure to better neighborhoods

- we bridge the two literatures and use recent micro estimates to discipline a quantitative GE model

Preview

1. Data: correlation between inequality and segregation

2. Model: GE OGM with human K and residential choice
   - key ingredient: neighborhood spillover
     - peer effects, public schools, social norms, learning …
   - endogenous response of house prices $\rightarrow$ feedback between inequality and segregation

3. Counterfactual: calibrate model to representative US MSA
   - main exercise: MIT shock to skill premium in 1980
   - segregation contributes to 28% of the increase in inequality
Data and Indexes

• data sources:

  1. Census tract data on family income 1980 - 2010
     • geographic unit and sub-unit: metro and tracts (according to Census 2000)
  2. restricted-access geocoded version of National Longitudinal Survey of Youth (NLSY79)

• inequality measure = Gini coefficient

• segregation measure = dissimilarity index
  • it measures how uneven is the distribution of two mutually exclusive groups across geographic subunits
  • groups: rich and poor as above and below the 80th percentile
Inequality and Segregation Across Time

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Inequality and Segregation Across Space
Inequality and Segregation Across Space and Time
Intergenerational Mobility Matrices

(a) Low Segregation Metros
(b) High Segregation Metros

High/low: above/below median Dissimilarity p50 in 1980
Set Up

• overlapping generations of agents who live for 2 periods: children and parents

• a parent at time $t$:
  • earns a wage $w_t \in [\underline{w}, \bar{w}]$
  • has a child with ability $a_t \in [\underline{a}, \bar{a}]$

• assume $\log(a)$ follows an AR1 process with correlation $\rho$

• $F_t(w, a) =$ joint distribution of $w$ and $a$ at time $t$
Geography and Housing Market

- two neighborhoods: \( n \in \{A, B\} \)
- each agent live in a house of same size and quality
- \( R^n_t = \) rent in neighborhood \( n \) at time \( t \)
- extreme assumptions on supply:
  - fixed supply \( H \) in neighborhood \( A \);
  - fully elastic supply of houses in neighborhood \( B \);
- marginal cost of construction in \( B = 0 \) \( \Rightarrow R^B_t = 0 \) for all \( t \)
Education and Wage Dynamics

- parents can directly invest in education $e \in \{e_L, e_H\}$
- cost of $e_L = 0$, cost of $e_H = \tau$
- wage of child with ability $a_t$, education $e$, growing up in $n$:

$$w_{t+1} = \Omega(w_t, a_t, e, S_t^n, \epsilon_t)$$

where $\epsilon_t$ is iid noise and $S_t^n$ is neighborhood $n$ spillover
- $S_t^n = \text{average human capital in neighborhood } n \text{ at time } t$

$$S_t^n = E[w_{t+1}(w, a, \epsilon)|n_t(w, a) = n]$$
Parents’ Optimization Problem

parent \((w_t, a_t)\) at time \(t\) solves

\[
U(w_t, a_t) = \max_{c_t, e_t, n_t} u(c_t) + E_t[g(w_{t+1})]
\]

subject to

\[
c_t + R_t^{nt} + \tau e_t \leq w_t
\]

\[
w_{t+1} = \Omega(w_t, a_t, e_t, S_t^{nt}, \varepsilon_t)
\]

taking as given \(R_k^t\) and \(S_k^t\) for \(k = A, B\)
Equilibrium

For given $F_0(w, a)$, an equilibrium is a sequence
\[ \{ n_t(w, a), e_t(w, a), R_t^A, S_t^A, S_t^B, F_t(w, a) \}_t \]
satisfying

- **agents optimization**: for any $t$ given $R_t^A, S_t^A, S_t^B$
- **spillover consistency** for any $t$ and $k = A, B$
- **housing market clearing**: for any $t$
  \[ H = \int \int_{n_t(w,a)=A} F_t(w,a) dw da \]
- **wage dynamics**: for any $t$
  \[ w_{t+1}(w, a, \varepsilon) = \Omega(w, a, e_t(w, a), S_t^{nt(w,a)}, \varepsilon) \]
Assumptions

Focus on equilibria with $R_t^A > 0$ for all $t \Rightarrow S_t^A > S_t^B$ for all $t$

**Assumption A1**
The function $\Omega(a, e, S, \varepsilon)$ is

- constant in $S$ and $a$ if $e = e_L$
- increasing in $S$ and $a$ if $e = e_H$

**Assumption A2**
The composite function $g(\Omega(a, e, S, \varepsilon))$ has increasing differences in $a$ and $S$, $a$ and $e$, $w$ and $S$, and $w$ and $e$
Cut-Off Characterization

\[ w_t(n=A, e=e^H) \]
\[ \hat{w}_t(a_t) \]
\[ n=B, e \geq e^H \]
\[ \hat{w}_t(a_t) \]
\[ \hat{w}_t(a_t) \]
\[ n=B, e \geq e^L \]

\[ w_t \]
\[ a_t \]
Response to Skill Premium Shock

Ω(\(w, a, e, S^n, \varepsilon\)) = (b + e\(\eta(\beta_0 + \beta_1 S^n_\varepsilon)\))w^\alpha \varepsilon
Extended Model

Two new ingredients:

1. **continuous educational choice**:
   - higher dispersion in investment in human capital

2. **residential preference shock**:
   - this generates more mixing in the initial steady state
Calibration

<table>
<thead>
<tr>
<th>Description</th>
<th>Data</th>
<th>Model</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gini coefficient</td>
<td>0.366</td>
<td>0.365</td>
<td>Census 1980, family income</td>
</tr>
<tr>
<td>Dissimilarity index</td>
<td>0.318</td>
<td>0.318</td>
<td>Census 1980, family income</td>
</tr>
<tr>
<td>$H^R$ index</td>
<td>0.100</td>
<td>0.094</td>
<td>Census 1980, family income</td>
</tr>
<tr>
<td>B/A average income</td>
<td>0.516</td>
<td>0.459</td>
<td>Census 1980</td>
</tr>
<tr>
<td>$R^A - R^B$ normalized</td>
<td>0.073</td>
<td>0.074</td>
<td>Census 1980</td>
</tr>
<tr>
<td>Rank-rank correlation</td>
<td>0.341</td>
<td>0.330</td>
<td>Chetty et al. (2014)</td>
</tr>
<tr>
<td>Return to spillover 25th p</td>
<td>0.104</td>
<td>0.104</td>
<td>Chetty and Hendren (2018b)</td>
</tr>
<tr>
<td>Return to spillover 75th p</td>
<td>0.064</td>
<td>0.070</td>
<td>Chetty and Hendren (2018b)</td>
</tr>
<tr>
<td>Return to college 1980</td>
<td>0.304</td>
<td>0.306</td>
<td>Valletta (2018)</td>
</tr>
<tr>
<td>Return to college 1990</td>
<td>0.449</td>
<td>0.449</td>
<td>Valletta (2018)</td>
</tr>
</tbody>
</table>
Response to Skill Premium Shock

Panel a: Inequality
- Model data
- Values: 0.26, 0.28, 0.3, 0.32, 0.34, 0.36, 0.38, 0.4, 0.42, 0.44

Panel b: Segregation
- Model data
- Values: 0.32, 0.34, 0.36, 0.38, 0.4, 0.42, 0.44
Main Counterfactual: Random Re-Location

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- Graph showing trend from 1980 to 2010 with model and random relocation lines.
No Spillover and No Spillover Feedback

Panel a: inequality
- Model
- Fixed spillover
- No spillover

Panel b: segregation
- Model
- Fixed spillover
- No spillover
Decomposing the Spillover Feedback

GE effect: as $R^A$ increases, the degree of sorting by income increases
To conclude

- GE model with human capital accumulation, residential choice and local externalities

- local externalities generate segregation by income across neighborhoods

- segregation contributed to roughly 28% of the increase in inequality in response to a skill premium shock

- for the future:
  - use the model to think about differential response of inequality and segregation across metros
  - normative analysis