Neighborhood Change and Turning Points

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Introduction

There are countless examples of neighborhood's demographic composition changing rapidly over a few generations. Sometimes these changes can act to segregate populations. Certain neighborhoods of New York can be a classic example of this effect and its results may even be seen in commercial storefronts(Figure 1). To study this, **this paper models the role of past demographic shares on future neighborhood demand. To this end, I:**

- **Use a Schelling-style model of segregation to study the impact of demographic shares on neighborhood demand (Schelling 1971).**
- **Use a conditional instrumental variables estimator which allows for unbiased estimation of demand responses by addressing endogeneity concerns present in my theoretical model.**
- **Explain and model the "flood-in" dynamics seen in so many neighborhoods (Figure 2)**
- **Simulate such dynamics for every census block group in Texas**

Figure 1. NYC 2008-2018, Murray and Murray

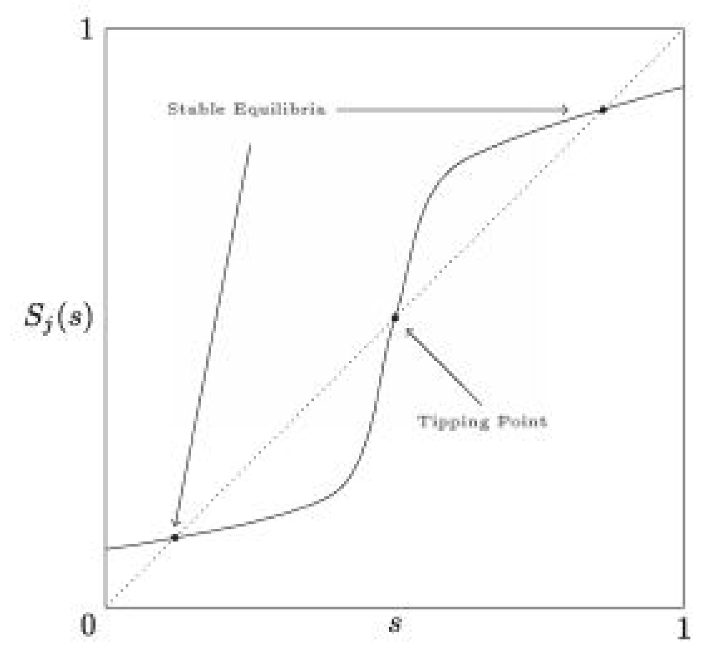


Figure 2. Theoretical Tipping Points, Caetano and Maheshri 2017

Data

Population Counts:

- Decennial Census 2000-2020
- Working age population (25-65)
- 4 cohorts, 2 or 3 demographic groups
  - 25-34, 35-44, 45-54, 55-64
  - White and Minority
- Geography: TX 2020 census block groups

Summary Stats:

	All_2020	M_Share_2010	M_Share_45_54_2000	W_25_34_2010
Min.	1.00	0.00	0.00	0.00
1st Q.	21.80	0.26	0.13	0.93
Mean	40.51	0.50	0.31	2.74
Med	74.61	0.53	0.40	7.10
3rd Q.	81.21	0.81	0.66	6.57
Max	4868.20	1.00	1.00	702.73

Assumptions

How do people decide where to live? I assume:

- Individuals choose location j using $t-1$ information
- Care about location's demographic composition and available amenities
- Are myopic decision makers
- Face moving costs and therefore slowly adjust to locations overtime

Location Demand Function

Demand for location j at time t is given by:

$$log(n^k_{j,t}) = \beta^k s_{j,t-1} + \gamma^k A_{j,t-1} + u^k_{j,t} \tag{1}$$

- $n^k_{j,t}$ is the number of people of demographic, k, living in location, j, at time, t
- $s_{j,t-1}$ is the minority group's population shares
- $A_{j,t-1}$ are amenities observed by individuals as they make a decision on where to live
- $u^k_{j,t}$ is a location-time-demographic specific error term

Problem: Endogeneity

β^k is my parameter of interest. But, *OLS estimation of (1) faces omitted variables bias*

- $A_{j,t-1}$ may be unobserved by the econometrician
- $n^k_{j,t}$ and $s_{j,t-1}$ may be correlated with $A_{j,t-1}$

Solution: Conditional Instrumental Variables Estimation

A plausibly exogenous source of variation in $s_{j,t-1}$ is needed:

1. Introduce cohorts, g (ie: 25-34, 35-44, 45-54, 55-64)
2. Incorporate controls, $C^{g,k}_{j,t-1}$

$$logn^{g,k}_{j,t} = \beta^{g,k} s_{j,t-1} + \underbrace{\sum_{i=\underline{g}}^{\overline{g}-1} (\alpha^{g,k}_{i,k} logn^{ik}_{j,t-1} + \alpha^{g,k}_{i,k'} logn^{i,k'}_{j,t-1})}_{C^{g,k}_{j,t-1}} + \tilde{u}^{g,k}_{j,t} \tag{2}$$

3. Instrument for $s_{j,t-1}$ with $s^{\overline{g}-1k'}_{j,t-2}$
4. Estimate (2) via Two Stage Least Squares

- $C^{g,k}_{j,t-1}$ controls for persistent amenities
- $s^{\overline{g}-1k'}_{j,t-2}$ cohort has aged out of $logn^{g,k}_{j,t}$ and captures exogenous amenity shocks

Results: Estimates of β

Variable	White:OLS	White:2SLS	Minority:OLS	Minority:2SLS
Minority Share	-3.714***	-6.279***	2.920***	2.085***

- β is the location demand response to minority share for a given 25-34 cohort
- Given initial populations and shares, β may be used to estimate *turning points*

Turning Point Simulation

- For $s = .001, .002, ..., .999, 1$
  1. Estimate counterfactual location demand for each cohort and demographic group:

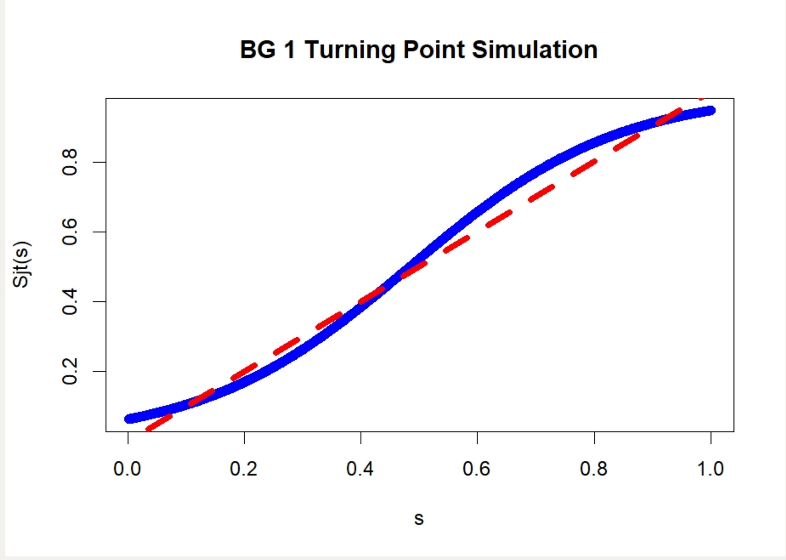
$$n^{g,k}_{j,t}(s) = exp(logn^{g,k}_{j,t} + \hat{\beta}^{g,k}(s - s^{k'}_{j,t-1})) \tag{3}$$

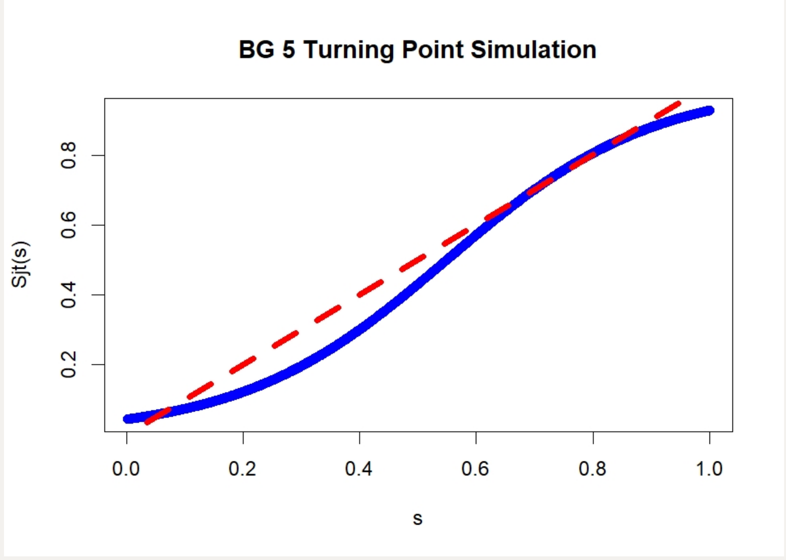
  2. Construct implied minority share:

$$S_{j,t}(s) = \frac{\sum_{g=\underline{g}}^{\overline{g}} n^{g,k'}_{j,t}(s)}{\sum_{g=\underline{g}}^{\overline{g}} (n^{g,k}_{j,t}(s) + n^{g,k'}_{j,t}(s))} \tag{4}$$

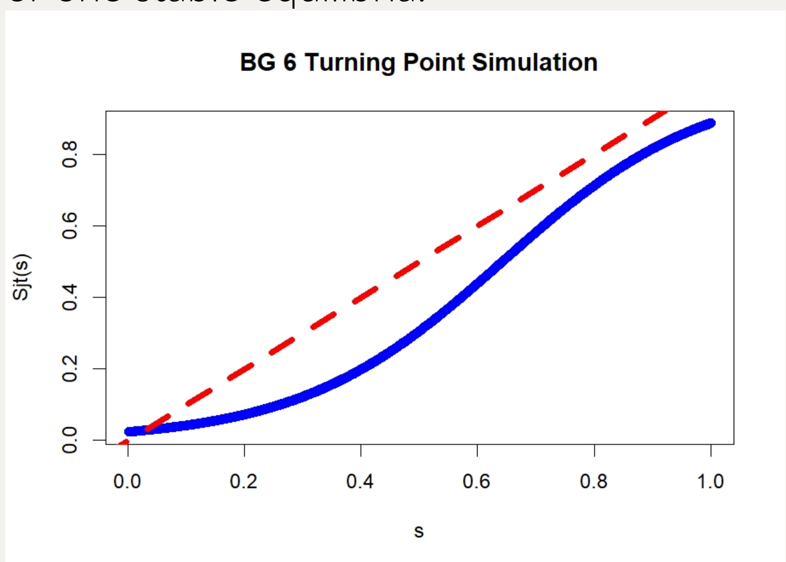
Turning Point Examples

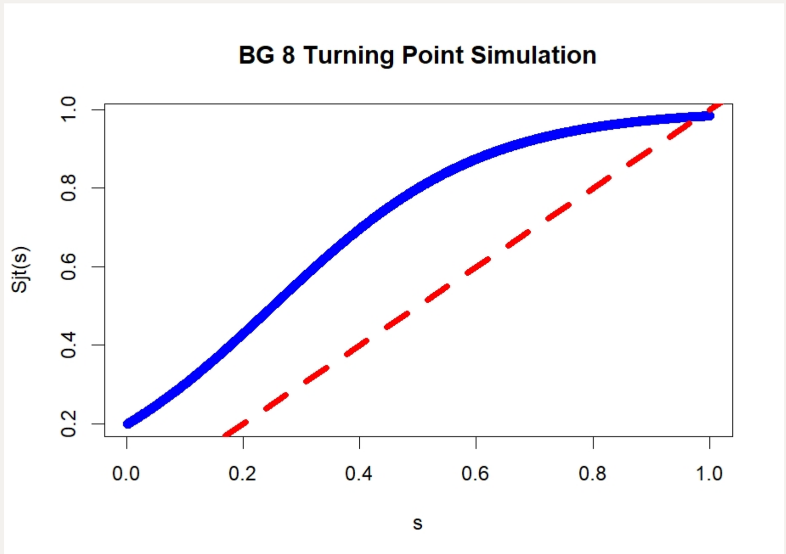
- Resulting simulations may have an unstable equilibria turning point and two stable equilibria:





- or one stable equilibria:





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