Neighborhood Mismatch and Visits in a Small City

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Geography

Data

Resident Ethnic Integration

Outline

This study: Asymmetries in neighborhood mismatch and visits

- Singapore—densely urban (\sim 725 km^2 or 280 mi^2)
- Ethnic integration policy (EIP)-binding residential ethnic quota

Data

- Neighborhood visits: O–D flows of individuals across neighborhoods
- Neighborhood wealth (Microtransaction house sales)
- Neighborhood ethnic mix (census)

Empirical approach:

- . Mismatch in wealth and ethnic mix—neighborhood visits
- Asymmetries in mismatch: decompose mismatch—neighborhood visits
- Asymmetries: Where people come from and go to matter
 - Estimates of asymmetric effect of ethnic mix on visits (Maj \rightarrow Mnr)
 - Counterfactual: Apply estimates to whether EIP increased neighborhood visits today •
 - Finding: EIP much more effective in increasing visits only if we account asymmetry





Geography

Outline

Geography 0000

Data

Estimation

Resident Ethnic Integration

5 regions

- ▶ 55 census areas
- \blacktriangleright \approx 300 subzones

neighbourhoods $(\approx 1 \, km^2)$



Data

Estimation

Outline

Geography



Geography

Outline

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Resident Ethnic Integration

5 regions

- 55 census areas
- \blacktriangleright \approx 300 subzones

➤ ≈ 200 neighbourhoods (≈ 1km² or .4mi²)



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Backbone of Data: CITYDATA.ai GPS pings

- Neighborhood-daily level
- Jan-Mar 2020 (3 months, 91 days)
- · Records for device presence over neighborhood-days
- Neighborhood visits: GPS pings \longrightarrow O–D flows

Wealth and ethnic mix

- Wealth: House micro-transactions
- Ethnic mix: Neighborhood-level census (most granular available)

Other data: Neighborhood & Neighborhood-day level

- Age, gender, ethnic (census)
- Neighborhood amenities (official shape files)
- Neighborhood size and distances (official shape files)
- Precipitation (historical weather station records)

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Resident Ethnic Integration

Representativeness of GPS pings



Data

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More GPS pings with larger neighborhood population size.

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Estimation

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Representativeness of GPS pings



Minimal variation by five regions.



(a) Adjacency

(b) Distance



Longer distance \longrightarrow fewer visits.



Neighborhood-days that are driest and wettest have the lowest visits.



Housing price & Neighborhood wealth levels





Outline
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CoolGeography
CoolData
CoolEstimation
CoolResident Ethnic Integration
CoolMismatch: Definitionmismatch_{od} =
 $Z_o(1 - Z_d)$
poor going to wealthy
 $(P \rightarrow W)$
Mnr. to Maj. ethnic
 $(MAJ \rightarrow MNR)$ Estimation
CoolResident Ethnic Integration
Cool(1)

- ► Mismatch: a pair of O–D neighborhoods have different wealth/ethnic mix
- z = indicator for whether neighborhood is poor
- Wealth: Poor neighborhood = neighborhood < 25th percentile*</p>
- z = proportion of minority (mnr) ethnic
- ▶ o = origin neighborhood
- d = dest. neighborhood

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 Neighborhood mismatch and neighborhood visits

$$\log(\text{neighborhood visits})_{odt} = \alpha + \underbrace{\beta \text{ mismatch}_{od}}_{\substack{(P \to W) + (W \to P) \\ (Mnr \to Maj) + (Maj \to Mnr)}} + \Gamma_t X_{odt} + \varepsilon_{odt}$$

mismatch_{od} = mismatch in O–D neighborhood pair

Other structural effects:

- Neighborhood area-by-day fixed effects
- Distance, contiguity, neighborhood size (spatial frictions)
- Age demo., pop. size, density
- POIs—schools, transit, tourist attractions, libraries, parks, etc.
- Neighborhood-day rainfall
- Businesses—services, manufacturing, construction

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Results: Mismatch in wealth

Without asymmetry





Data

log(neighborhood visits)_{odt} = $\alpha + \beta$ mismatch_{od} + $\Gamma_t X_{odt} + \varepsilon_{odt}$ $(W \rightarrow P) + (P \rightarrow W)$

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Results: Mismatch in ethnic

Without asymmetry

With asymmetry



Data

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Robustness



- Sensitivity to 25th percentile threshold*
 - Full range of thresholds
 - Sort by effect size

- Mismatch in wealth via absolute distance
- Neighborhood-by-day fixed effects
- Log-log specification, constant elasticity model
- Allow mismatch by ethnic to have different effect by non-central neighborhoods

Outline Geography Data Estimation Value of EIP (Ethnic Integration Policy): Background

Pre-EIP (pre-1990s) ethnic enclaves:



- Build on our context of study
- Ethnic integration policy (EIP) in Singapore
- Started in 1989 to dissolve ethnic enclaves: Chinese, Malays, Indians
- What is the implied increased in neighborhood visits from EIP?

Resident Ethnic Integration

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Outline Geography Data Estimation Resident Ethnic Integration Value of EIP (Ethnic Integration Policy): Counterfactual analysis

Pre-EIP (pre-1990s) ethnic enclaves:



- What is the implied increased in neighborhood visits from EIP?
- Use our estimates to compare visits with and without EIP (counterfactual)
- Using counterfactual ethnic mix (from Ooi 1993; Sin 2002b)
- Increase in visits w/ and w/o accounting for asymmetries

Outline Geography Data Estimation Resident Ethnic Integration Value of EIP (Ethnic Integration Policy): Counterfactual analysis

Pre-1990s ethnic enclaves:



► A tale of two towns: Bedok ↔ Bukit Merah (Malay) (Chinese)

- Counterfactual analysis: 2000 predicted vs 2000 actual (Ooi 1993; Sin 2002b) (Census)
- Without asymmetry: Increase in visits: 2.9%

 With asymmetry (Maj. to mnr. ethnic): Increase in visits: 8.7%



Without asymmetries in mismatch

Equivalent to going from 1st to 0th percentile in today's mismatch.

With asymmetries in mismatch

Equivalent to going from 74th to 0th percentile in today's mismatch.

Related studies

- Experienced segregation—mismatch in neighborhood characteristics affect visits (Athey et al. 2020; Davis et al. 2019; Dong et al. 2020; Moro et al. 2021)
- Segregation matters for social & economic outcomes

(Ananat 2011; Atkin et al. 2022; Banerjee and Ingram 2018; Chay et al. 2014; Chetty et al. 2016; Cook et al. 2018; Cutler and Glaeser 1997; Cutler et al. 2008; Hensvik and Skans 2016; Rao 2019)

- Limitation: Opacity in travel purpose—trip hops within longer commutes (Miyauchi et al. 2021)
- ▶ Limitation: Physical spaces vs actual social interactions

(Athey et al. 2020; Cagney et al. 2020; Sunstein 2018)

▶ EIP (Ethnic Integration Policy) & social issues in Singapore

(Choe 2016; Leong et al. 2020; Loo et al. 2003; Sin 2002a; Wong 2013; Teo 2018; Wong 2013, 2014)

Asymmetries in (experienced) segregation?

(Dong et al. 2020; Hilman et al. 2021)

Asymmetries in neighborhood mismatch and visits

Asymmetries in (experienced) segregation?

(Dong et al. 2020; Hilman et al. 2021)

- ► Asymmetry: Where people come *from* and where they go *to* matters
- Application: Ethnic housing quota is much more effective in increasing visits after accounting for asymmetry
- ► 3 times increase
- Urban planning should account for asymmetries in planning distribution of public goods

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