

Segregation and Algorithm Fairness

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My background

- Segregation in schools, neighborhoods and venues.
- Groups: race, income, gender, age.
- Segregation is a type of inequality.
- Broadly, segregation is the outcome when different groups of people end up in different situations.

Segregation and fairness

- Part of the process that led to segregation involves **differential treatment of groups**.
- But part of the process that led to segregation is **benign**.
- The benign part of the process is also consequential.
- The “fair” level of segregation is lower than the current level.

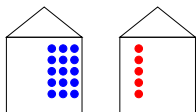
A useful lesson learned in segregation studies

- Sorting \implies Segregation \implies Inequality of main outcome of interest
- Segregation is a type of inequality.
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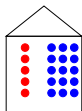
A useful lesson learned in segregation studies

- Sorting \implies Segregation \implies Inequality of main outcome of interest
- Segregation is a type of inequality.
- The “fair” level of segregation is lower than the current level.
- But does reducing this inequality \implies reducing inequality of main outcome of interest?
- That is a nontrivial causal question, because the economy is a complex dynamic system.

Salient Inequality v.s. Hidden Inequality

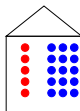


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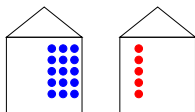
Salient Inequality v.s. Hidden Inequality

- 1 Heterogeneous preferences for school features.
- 2 Schools adapt their characteristics towards their students.



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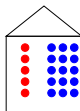
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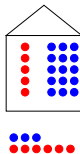
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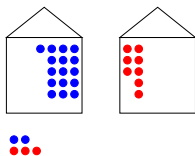


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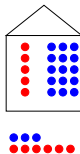
Salient Inequality v.s. Further Hidden Inequality



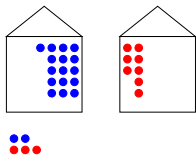
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- We need to consider the potential fragility of any algorithm.
 - We need to study the causal effect of an algorithm on business decisions.
 - This will change with the context.
 - Any blind spot which hurts minorities might take longer to be corrected.
 - Other ways to combat unfairness should complement algorithms.

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Thanks!

Why do different groups tend to end up in different situations? A choice model

Person i from group g chooses option j to maximize utility subject to a constraint:

$$\begin{aligned} \max_{j \in J_g} U_{igj} &= \alpha'_g s_j + \beta'_g x_j + \varepsilon_{igj} \\ \text{s.t. } f_g(s_j, x_j) &\leq B_{ig} \end{aligned}$$

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- 1 Different choice sets ($J_g \neq J_{g'}$).
- 2 Groups sort differently on the basis of the composition of neighbors ($\alpha_g \neq \alpha_{g'}$).
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