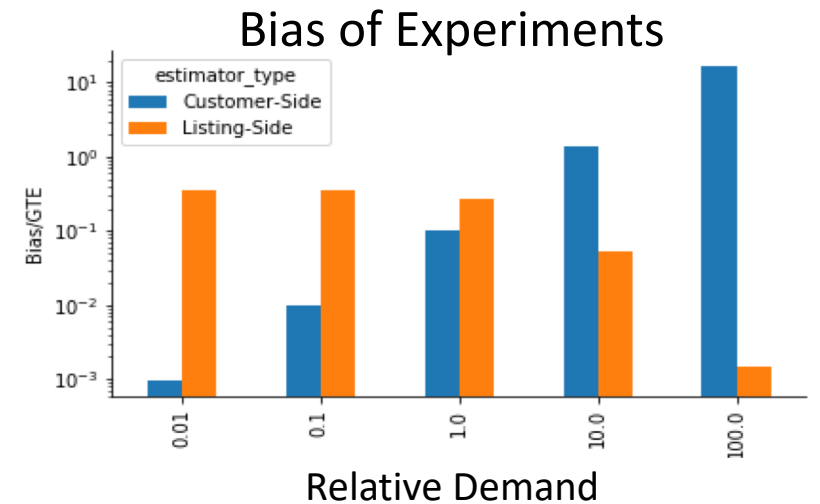


Experimental Design in Two-Sided Platforms: An Analysis of Bias

Ramesh Johari, Hannah Li, and Gabriel Weintraub

Platforms run experiments to test new features before launching, but experiments may be **biased** if they violate a “no-interference” assumption.

Current Issues: No consensus on when bias is large or what experiment designs minimize bias.

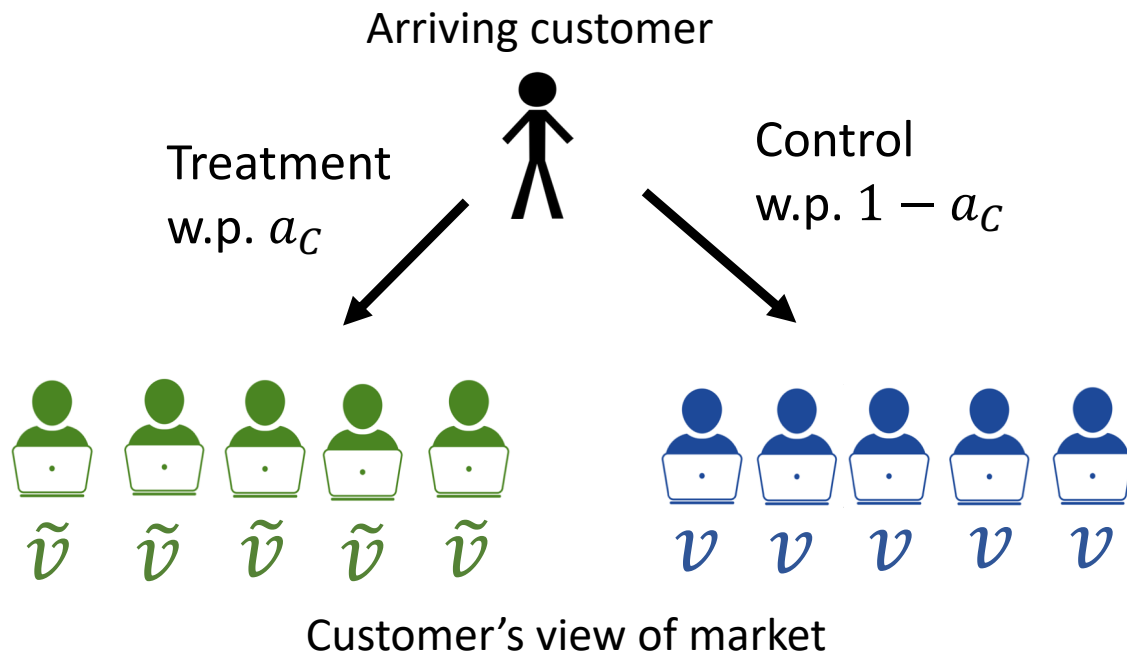


We develop a theoretical framework to study bias in marketplace experiments.

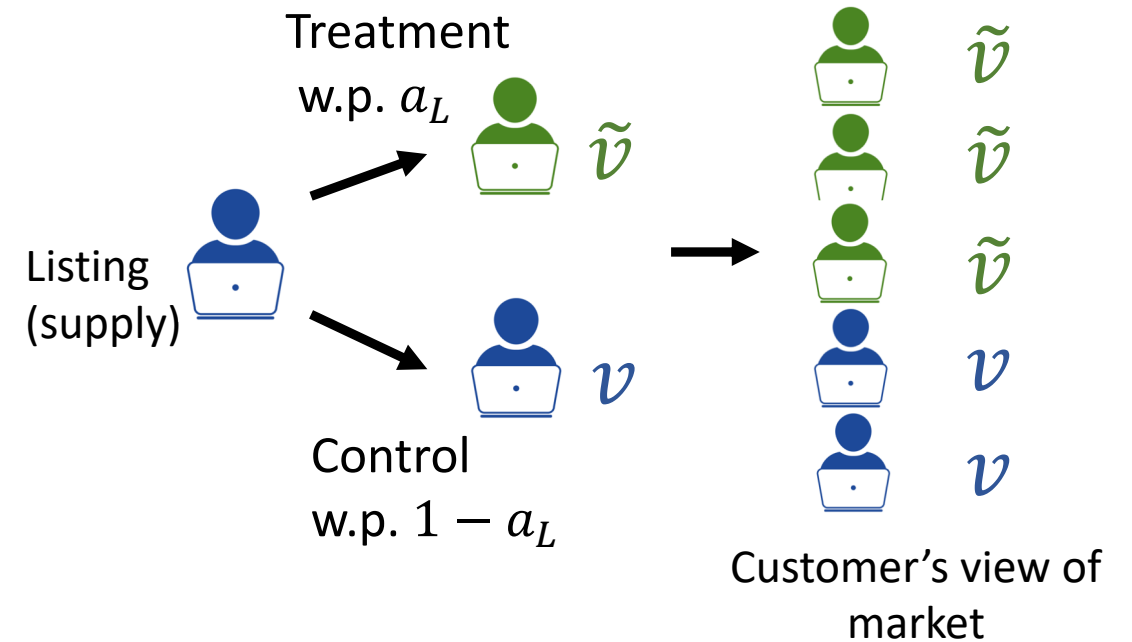
Bias is driven by supply and demand imbalance. We propose a two-sided experiment design that can mitigate bias.

Common experimental designs

1) Randomizing on customer side



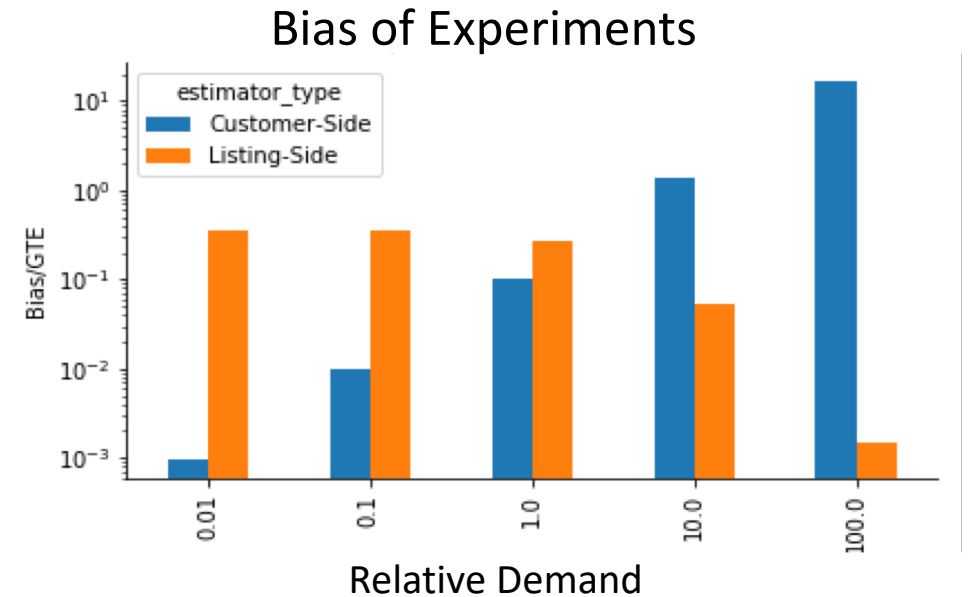
2) Randomizing on supply side



For each type of experiment, the associated estimator compares rate of bookings between treatment and control groups.

Bias depends on market balance

- A customer-side experiment is unbiased when demand is low
- A listing side experiment is unbiased when demand is high
- Bias may be high for either experiment in 'balanced' ranges of supply and demand



Two-sided randomization

- We define a two-sided experiment design that randomizes on both sides of the market
- Intervention only applies when **both** customer and listing are in treatment
- We define an estimator that is unbiased in both low demand and high demand extremes of market imbalance

		Customer	
		Control	Treatment
Listing	Control	No change	No change
	Treatment	No change	New feature