The role of information acquisition in matching markets: China's college admission mechanisms

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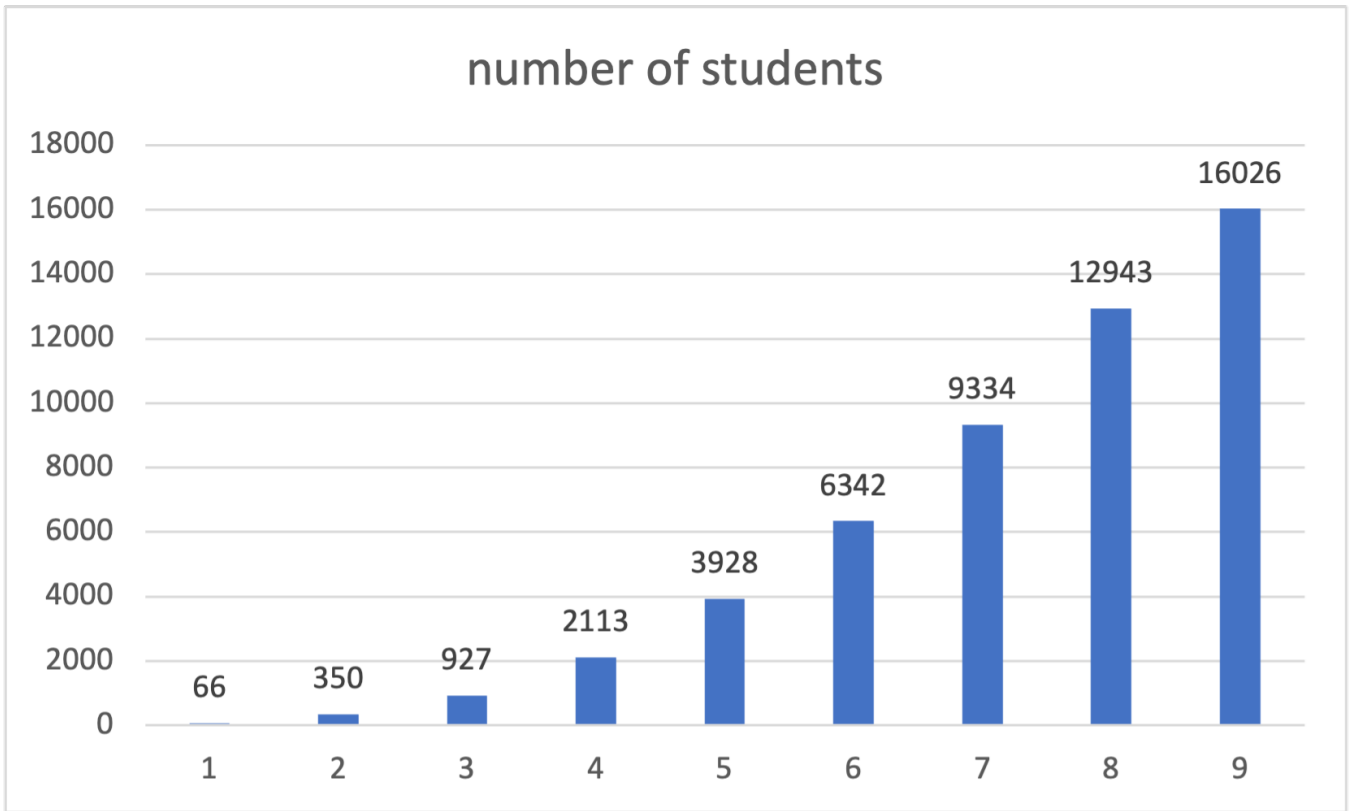
Motivation

- Parallel admission mechanism (PA) - Direct serial dictatorship with length restriction of the rank-ordered list (ROL)
- Inner Mongolia dynamic admission mechanism (IM) - Sequential serial dictatorship + sequential moves by groups instead of individuals + time constraints
- Theoretically and experimentally, a sequential serial dictatorship mechanism leads to higher student welfare than a direct serial dictatorship mechanism. (Hakimov et all, 2023)

Motivation


number of students
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
66
350
927
2113
3928
6342
9334
12943
16026
1
2
3
4
5
6
7
8
9

Motivation

Theoretical results tell us:

- Traditional matching literature assume full information. But ... show that people need to conduct costly information acquisition to discover their preferences.
- Market designers should pay attention to information flows.
- Follow Azevedo and Loshno (2016) and Immorlica et al (2020), finding regret-free stable matching outcomes is equivalebt to finding market-clearing cutoffs.
- Imposibility stems from information deadlocks. Regret-free stable outcomes can not be achieved.

Motivation

Real mechanism implementations:

- Achieve approximately regret-free stable outcomes by providing external historical data with respect to perturbed capacities: Australia
- In 2023 Australia has 62,846 applicants, while China has 12,910,000 applicants.
- Both PA and IM provides historical cutoff scores, but IM offers additional information regarding matching outcomes.
- In 2025 Inner Mongolia will give up IM and use PA. IM began in 2007.

Research question

- First guess IM better than PA since IM provides additional information. Seems counterituitive.
- Maybe the time constraints in IM (one hour per group) make the price discovery process too costly. Maybe information communication in IM is not effective. Maybe the additional information is too noisy and detriment students' welfare instead. Or maybe IM is indeed better than PA and the policy change is purely of political intention.
- Are there better ways to communicate information to students to improve matching outcomes of IM?

Contribution

- Provide empirical and experimental results about comparisions of PA and IM mechanisms.
- Gong and Liang (2023) shows experimentally IM mechanism achieves similar stability as DA mechanism and similar efficiency as Bostom mechanism under incomplete information, when there is low correlation of preferences.
- Chen and Kesten (2019) shows experimentally DA mechanism is better than PA in terms of stability, but the setup assumes complete information.

A natural experiment

- Data: students' exam score, rank and admission result.
- $$y_i = \alpha_0 + \alpha_1 X_i + \beta Y_{2025} + \varepsilon_i$$

  where y_i is previliage index calculated by dividing the rank of the college (determined by cutoff scores) by the total number of colleges.
  X_i includes students' gender, ethnicity, rank by exam scores being normalized to be within (0,1).
- Implicitly assumes higher-ranked students prefer more prestigious colleges. Only care about big names without considering majors.
- $$\rho = 1 - \frac{6\Sigma_i^N d_i^2}{n(n^2-1)}$$

  Spearman's rank correlation coefficient.

Experiment design

General setup:

- Students know their exam scores, ranks, each university's quotas and historical cutoffs.
- 30 students competing for 15 seats in 10 colleges. Admission rate is 50%.
- Preferences are private knowledge. Students need to pay search costs to acquire information about their own preferences.

Variations:

- Dimension 1: The degree of correlation of preferences among students.
- Dimension 2: The cost of information acquisiton.

Experiment design

Predictions:

- Hypothesis 1: Lower-ranked students gain more from IM compared to PA.
- Hypothesis 2: Lowest-ranked student in each group is worse off than under PA.
- Hypothesis 3: Given an extended time constraint, students may oversearch.
- Hypothesis 4: Smaller group size produces better matching outcomes.
- Hypothesis 5: Increasing the ROL in PA improves the matching outcomes.