Sophistication and Cautiousness in College Applications

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Summary

Objectives.
1. This paper provides a test of equilibrium in matching mechanisms in the field.
   We exploit the variation from the recent Chinese college admissions reforms.
   The mechanism has been changed from the Immediate Acceptance (IA) mechanism
   to Chinese parallel mechanisms.
2. This paper proposes and estimates a parsimonious behavioral model of college
   applications. We incorporate strategic na"ıveté and pessimistic beliefs of students.

Results.
1. The equilibrium prediction is rejected. We observe that the matching became
   more assertive after the policy reforms.
2. Both strategic na"ıveté and pessimistic beliefs are important in explaining our
   observations. The distributional welfare effects of the reforms differ from what
   they could have obtained from the Deferred Acceptance (DA) mechanism.

Background and Data

Quota system in Chinese college admissions.
- Each university’s seats are divided into 33 province-wide markets.
- Students participate in a centralized admission system in their province.
- Single exam score is used as common priority in each province.

Reforms of the mechanisms.
- Each province increased the number of “parallel” options e from 1 to 3, 4, 5, or 6
- Chinese parallel mechanism with e (Chen and Kesten, 2017)
1. Run DA with the first e choices. Finalize the assignments.
2. With the remaining seats and students, run DA with the next e choices, and so on.
- e=1: IA, and e=∞: DA

Data.
- Administrative dataset with match outcomes and scores of all students admitted
  to universities in most provinces between 2005-2011.
- Data on the policy evolutions in all provinces.

Equilibrium

Model (of each province-wide market).
- College admissions model with a continuum of students and finite colleges.
- Every student knows her own ranking and has a common prior over the student
  types (preferences).

Proposition 1.
For any e, there exists a unique equilibrium matching μ under the parallel
mechanism with e. Moreover, μi = μ∗ for any e, i ∈ {1, .., e}.

Evidence against Proposition 1.
We need to control the potential endogeneity of e: heterogeneity in student
preferences, quotas, exam difficulties etc. across provinces and years.
Take each subset of students who could be admitted to the same set of colleges.
Consider the following regressions:

Students above all the cutoff scores

<table>
<thead>
<tr>
<th>Market college</th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
<th>Group D</th>
<th>Group E</th>
<th>Group F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallel option a = 3</td>
<td>0.8275**</td>
<td>0.8049**</td>
<td>0.8288***</td>
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<tr>
<td>Parallel option a = 4</td>
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<tr>
<td>Parallel option a = 6</td>
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<td>0.8049***</td>
<td>0.8049***</td>
</tr>
</tbody>
</table>

Students just below top 6 college groups

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<tr>
<th>Market college</th>
<th>Group A</th>
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Estimations

MLE estimates from Hebei Province.
- 58% of naive and 12% of cautious students; both significant.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>school</th>
<th>quality</th>
<th>distance</th>
<th>naive</th>
<th>pessimistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimates</td>
<td>0.0074</td>
<td>-4.0257e-07</td>
<td>0.5845</td>
<td>0.2876</td>
<td></td>
</tr>
<tr>
<td>n.e.</td>
<td>0.0008</td>
<td>1.4813e-08</td>
<td>0.0086</td>
<td>0.0015</td>
<td></td>
</tr>
<tr>
<td>t.stat</td>
<td>8.71</td>
<td>27.16</td>
<td>68.02</td>
<td>27.51</td>
<td></td>
</tr>
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</table>

Welfare Analyses

Three welfare measures (for student with score x_i under parallel e).
1. Expected utility E(U_i(x_i)).
2. Extensive margin μ_i(x_i). the probability of being assigned to the outside option
3. Intensive margin \( C_{ij}(x_i) \): the expected utility conditional on being assigned

Proposition 2. (Direct effects.)
For any e, e’ ∈ {1, .., e} with e < e’ and student with score x_i for whom
the available set and the safe set of colleges do not change between e and e’,
the following holds: (each subscript represents the behavioral type)

1. \( E_{ij}(x) = E_{i+1}(x) \), \( E_{i+1}(x) \leq E_{i+2}(x) \), and \( E_{i+2}(x) \leq E_{i+3}(x) \).
2. \( E_{ij}(x) = E_{i+1}(x) \), \( E_{i+1}(x) \geq E_{i+2}(x) \), and \( E_{i+2}(x) = E_{i+3}(x) \).
3. \( C_{ij}(x) = C_{i+1}(x) \), \( C_{i+1}(x) \geq C_{i+2}(x) \), and \( C_{i+2}(x) \leq C_{i+3}(x) \).

Proposition 3. (General equilibrium effects.)
For any regular problems and student with score x_i, the set of available colleges
under the parallel mechanism with e shrinks as e increases.

Simulations show that the implemented policies (e=3,4,5,6) changed the welfare
distribution from IA, but still not all the way to the one from DA.

Extended margin

Intensive margin