China’s Human Capital Inequality: Evidence from College Entrance Exams and Admissions

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A Quiz

猫-狗=2，狗-兔=3，兔+兔=6，问猫=？
Cat-Dog=2, Dog-Rabbit=3, Rabbit+Rabbit=6, Cat=？

This is a question from the entry exam for an elite primary school in Beijing!

To get in, the 6-year old need to

- Pass this exam
- Have 300,000 RMB cash at hand
- Have a connection to pay this cash
To measure inequality in human capital, by looking at what will happen to kids 12 years later, when they take the college entrance exam

and in the job market of college graduates (if time permits),

It has been extremely hard to measure educational inequality, due to the lack of data
China’s Education System

- 9 years of compulsory education
  - 6 years of primary school
  - 3 years of junior high school
- High school: 3 years
  - Sciences (physics, chemistry, biology, difficult math)
  - Arts/social sciences (geography, history, easy math)
To get into college, most students need to take the College Entrance Exams (CEE) on June 7-9

- Math
- Chinese
- English
- Composite (one of the two)
  - Sciences
  - arts/social sciences

Fate-determining exams for Chinese
Applications and Admissions

- Before/after the exams (before/after scores known), students need to fill in their
  - college preferences in order
  - Major preferences in order

- Scores are known

- Admission
  - Based on scores
  - Each college sends an admission team to every province (where it has admission quotas)
  - The quotas and distribution are ultimately set by the Ministry of Education, but colleges have some freedom
Data: CEE Takers in 2003

- The population of all CEE takers
- 6.2 million students in 2003
- Information
  - Exam takers: high school name, location, hukou, birth date, gender, ethnicity, health status, repeating taker, science, scores of College Entrance Exams (CEE)...
  - Admissions: university name, major
- Could get access more years potentially
Supply of Higher Education

- Two categories of higher education
  - Colleges (2-3 years)
  - Universities (4 years)

- Universities
  - Elites: 985 universities (in May 1998, President Jiang’s speech: build world-class universities)
  - Good ones: 211 universities (21st century: invest in 100 universities)
  - Other universities
985 Program

➢ Tier 1: to become top universities in the world
  • 2: Tsinghua University; Peking University
  • Funding: all from central government

➢ Tier 2: to become top universities in China, well known in the world
  • 10 universities
  • Funding: ½ from central, ½ from local

➢ Tier 3: to become well known universities in China and the world
  • 27 universities
  • Funding: ½ from central, ½ from local
## Rate of Admission in 2003

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of colleges</th>
<th>Number of students</th>
<th>Percent of the population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Admitted</td>
<td>0</td>
<td>1960199</td>
<td>0.316</td>
</tr>
<tr>
<td>College</td>
<td>1123</td>
<td>2424147</td>
<td>0.391</td>
</tr>
<tr>
<td>University</td>
<td>602</td>
<td>1365827</td>
<td>0.220</td>
</tr>
<tr>
<td>211 Universities</td>
<td>76</td>
<td>284212</td>
<td>0.046</td>
</tr>
<tr>
<td>985 Universities</td>
<td>29</td>
<td>138686</td>
<td>0.022</td>
</tr>
<tr>
<td>Top 9 Universities</td>
<td>7</td>
<td>26672</td>
<td>0.004</td>
</tr>
<tr>
<td>Top 2 Universities</td>
<td>2</td>
<td>6497</td>
<td>0.001</td>
</tr>
<tr>
<td>Total</td>
<td>1839</td>
<td>6206240</td>
<td>1</td>
</tr>
</tbody>
</table>
Percentile of CEE Scores of Top 9 Universities

<table>
<thead>
<tr>
<th>Major</th>
<th>Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>0.756</td>
</tr>
<tr>
<td>Art&amp;SS</td>
<td>0.903</td>
</tr>
<tr>
<td>Law</td>
<td>0.930</td>
</tr>
<tr>
<td>Agriculture</td>
<td>0.950</td>
</tr>
<tr>
<td>Management</td>
<td>0.973</td>
</tr>
<tr>
<td>Medical</td>
<td>0.980</td>
</tr>
<tr>
<td>Engineer</td>
<td>0.984</td>
</tr>
<tr>
<td>Economics</td>
<td>0.984</td>
</tr>
<tr>
<td>Science</td>
<td>0.986</td>
</tr>
<tr>
<td>Maths</td>
<td>0.986</td>
</tr>
</tbody>
</table>
Educational Inequality

- Gender bias
- Urban (rural) bias
- Income bias
- Home bias
Gender差异 —— 高考成绩

<table>
<thead>
<tr>
<th>Subject</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Scores</td>
<td>0.497</td>
<td>0.504</td>
</tr>
<tr>
<td>Math</td>
<td>0.507</td>
<td>0.491</td>
</tr>
<tr>
<td>Chinese</td>
<td>0.476</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td></td>
<td>0.460</td>
</tr>
<tr>
<td>Composite</td>
<td>0.500</td>
<td>0.500</td>
</tr>
</tbody>
</table>

Percentile of CEE Scores: Female vs. Male

CEE Scores for Males and Females
Gender Bias

% of females among students in top 10%; top 5%; top 1%

Proportion of Females among Top Students

<table>
<thead>
<tr>
<th></th>
<th>Top 1%</th>
<th>Top 5%</th>
<th>Top 10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science</td>
<td>0.330</td>
<td>0.333</td>
<td>0.340</td>
</tr>
<tr>
<td>Art &amp; SS</td>
<td>0.620</td>
<td>0.608</td>
<td>0.605</td>
</tr>
</tbody>
</table>
Proportion of Females by University Type

- Not Admitted: 0.384
- College: 0.469
- University: 0.453
- 211 univ: 0.410
- 985 univ: 0.337
- Top 9: 0.335
- Top 2: 0.381

Gender Bias
Educational Inequality

- Gender bias
- Urban (rural) bias
- Income bias
- Home bias
The bar chart compares CEE scores (CEE Scores: Urban vs. Rural) across different subjects: Total Scores, Math, Chinese, English, and Composite.

- **Total Scores**: Urban - 0.493, Rural - 0.506
- **Math**: Urban - 0.484, Rural - 0.513
- **Chinese**: Urban - 0.489, Rural - 0.512
- **English**: Urban - 0.490, Rural - 0.512
- **Composite**: Urban - 0.489, Rural - 0.512

The chart indicates that rural students generally perform better than urban students in all subjects except for Math, where urban students have a slightly higher score.
Proportion of Rural among Top Students

- Top 1%: Science 0.362, Art & SS 0.387
- Top 5%: Science 0.442, Art & SS 0.453
- Top 10%: Science 0.479, Art & SS 0.483
Proportion of Rural Students by University Type

- Not Admitted: 0.574
- College: 0.524
- University: 0.491
- 211 univ: 0.430
- 985 univ: 0.386
- Top 9: 0.293
- Top 2: 0.181

Hukou (urban) Bias
Educational Inequality

- Gender bias
- Urban (rural) bias
- Income bias
- Home bias
Income Bias

- Children from rich families
  - Repeat exam takers (only once a year)
  - Go to elite high schools
CEE Scores: First Time vs. Repeating Students

Not Repeat

Repeater

Percentile of Grade: Repeater vs. First Timer

<table>
<thead>
<tr>
<th>Subject</th>
<th>Repeater</th>
<th>First Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Scores</td>
<td>0.579</td>
<td>0.477</td>
</tr>
<tr>
<td>Math</td>
<td>0.579</td>
<td>0.476</td>
</tr>
<tr>
<td>Chinese</td>
<td>0.546</td>
<td>0.486</td>
</tr>
<tr>
<td>English</td>
<td>0.550</td>
<td>0.485</td>
</tr>
<tr>
<td>Composite</td>
<td>0.553</td>
<td>0.488</td>
</tr>
</tbody>
</table>
Income Bias

- Children from rich families
  - Repeat exam takers (only once a year)
- Go to elite high schools
Number of High Schools in a Province

- Hainan: 111
- Ningxia: 118
- Qinghai: 153
- Guizhou: 327
- Tianjin: 390
- Jilin: 401
- Shanghai: 403
- Chongqing: 426
- Yunnan: 427
- Inner Mongolia: 450
- Gansu: 473
- Beijing: 538
- Guangxi: 540
- Xinjiang: 552
- Heilongjiang: 617
- Shaanxi: 643
- Jiangxi: 655
- Shanxi: 656
- Fujian: 679
- Zhejiang: 685
- Liaoning: 728
- Hubei: 764
- Shandong: 792
- Hebei: 856
- Anhui: 899
- Sichuan: 1,001
- Jiangsu: 1,145
- Hunan: 1,171
- Henan: 1,197
- Guangdong: 1,203

Provinces are listed in descending order of the number of high schools.
High School Gini

- High school Gini coefficients for different level of colleges
- Eg: High school Gini for admission to Top-2 universities
  - Count the number of successful applicants of each high school
  - Calculate the Gini coefficients
## High School Gini: # Admitted

<table>
<thead>
<tr>
<th>Type (inclusive)</th>
<th>Gini Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>College</td>
<td>0.556</td>
</tr>
<tr>
<td>University</td>
<td>0.712</td>
</tr>
<tr>
<td>211 Universities</td>
<td>0.804</td>
</tr>
<tr>
<td>985 Universities</td>
<td>0.861</td>
</tr>
<tr>
<td>Top 9 Universities</td>
<td>0.929</td>
</tr>
<tr>
<td>Top 2 Universities</td>
<td>0.959</td>
</tr>
</tbody>
</table>
## Admissions from Top High Schools

<table>
<thead>
<tr>
<th>Type</th>
<th>Top 10% of high schools</th>
<th>Top 5% of high schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>College</td>
<td>0.365</td>
<td>0.222</td>
</tr>
<tr>
<td>University</td>
<td>0.510</td>
<td>0.318</td>
</tr>
<tr>
<td>211 Universities</td>
<td>0.664</td>
<td>0.456</td>
</tr>
<tr>
<td>985 Universities</td>
<td>0.764</td>
<td>0.565</td>
</tr>
<tr>
<td>Top 9 Universities</td>
<td>0.914</td>
<td>0.756</td>
</tr>
<tr>
<td>Top 2 Universities</td>
<td>1</td>
<td>0.858</td>
</tr>
</tbody>
</table>
Educational Inequality

- Gender bias
- Urban (rural) bias
- Income bias
- Home bias
Number of 985 Universities in a Province

- Beijing: 8 universities
- Shanghai: 4 universities
- Shaanxi: 3 universities
- Other provinces: 1 university each
# Local Admissions of Each Type

<table>
<thead>
<tr>
<th>Type (inclusive)</th>
<th>Percent of local admissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>College</td>
<td>0.658</td>
</tr>
<tr>
<td>University</td>
<td>0.667</td>
</tr>
<tr>
<td>211 Universities</td>
<td>0.456</td>
</tr>
<tr>
<td>985 Universities</td>
<td>0.393</td>
</tr>
<tr>
<td>Top 9 Universities</td>
<td>0.388</td>
</tr>
<tr>
<td>Top 2 Universities</td>
<td>0.209</td>
</tr>
</tbody>
</table>
Home bias: Colleges of All Types

Successful Applicants in the Province (1,000) vs. Admissions by Colleges Located in the Province (1,000)
Bottomline:
Who have the best chance to enter an (elite) college?

Rich, urban, boys from elite high schools located in “good” provinces
Inequality in the Job Market: Evidence from the Chinese College Student Survey (CCSS)

New data!
Chinese College Student Survey

- Conducted by the China Data Center, Tsinghua University

- Annual survey of college students
  - 2010
  - 2011

- National representative random sample
  - Final sample: 100 colleges
  - 2010 pretest sample: 19 colleges
Ownership Type: Ideal Jobs

Source: Chinese College Students Survey 2010, Tsinghua CDC
Monthly Wage of College Graduates by GPA or English Score

Source: Chinese College Students Survey 2010, Tsinghua CDC
Monthly Wage of College Graduates by Party Membership or Student Leader

Source: Chinese College Students Survey 2010, Tsinghua CDC
Monthly Wage of College Graduates by Sex

Source: Chinese College Students Survey 2010, Tsinghua CDC
Monthly Wage of College Graduates by Parental Background

Yuan

2000 2100 2200 2300 2400 2500 2600 2700

Cadre parent Other parents Parent college Parent below college

Yuan

2000 2100 2200 2300 2400 2500 2600 2700

Rich Poor

Source: Chinese College Students Survey 2010, Tsinghua CDC
Monthly Wage of College Graduates by University Quality

Source: Chinese College Students Survey 2010, Tsinghua CDC
To Enter Primary School?

- Cat-Dog=2, Dog-Rabbit=3, Rabbit+Rabbit=6, Cat=?
  Answer: Cat=8

- Another question: A group of children standing in a line; counting from the left, you are number 3; counting from the right, you are number 4.

- How many children are there?