The Impact of School Tracking and Peer Quality on Student Achievement:
Regression Discontinuity Evidence from Thailand

Meradee Tangvatcharapong

Department of Economics
Texas A&M University

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Introduction

- Tracking: sorting students into classrooms based on ability
- Widely used around the world
- UK, AUS, NZ, Israel, Malaysia, Singapore: 95% \(^1\)
- 75% of US schools track students for 8th-grade math \(^2\)
- Could tracking harm students who are tracked into lower-ability class through exposure to lower quality peers?
- Little evidence on this
  - Vardardottir (2013): \(+0.47\sigma\)
  - Duflo, Dupas, and Kramer (2011): No significant effects

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https://www.oecd.org/pisa/keyfindings/Vol4Ch2.pdf

\(^2\) NAEP (2013), The Resurgence of Ability Grouping and Persistence of Tracking
https://www.brookings.edu/research/the-resurgence-of-ability-grouping-and-persistence-of-tracking/
Question: What is the impact of being tracked into a classroom with higher-ability peers?

- Use data from public middle schools in Thailand
- Students tracked into classrooms based on ability
- Regression Discontinuity Design
- Higher-ability classrooms
  - $+0.94\sigma$ in peer quality
  - No statistically significant effects on GPA
  - Can rule out effects bigger than $+0.08\sigma$
School System In Thailand

Public Middle Schools (7th-9th grade)

- Once admitted → preliminary exam before the 7th grade
- Classrooms assigned based on preliminary exam score

<table>
<thead>
<tr>
<th>Rank by prelim score</th>
<th>Class assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-40</td>
<td>1</td>
</tr>
<tr>
<td>41-80</td>
<td>2</td>
</tr>
<tr>
<td>81-120</td>
<td>3</td>
</tr>
</tbody>
</table>

- Students cannot manipulate the cutoff because
  - Cutoff not known before taking exam
  - No retake

- Focus on schools where
  - same curriculum for every classroom
  - nearly identical set of teachers across classrooms
  - peer quality: different across classroom
Data

- Administrative data of 7th grade students
- From 4 public middle schools in Bangkok
- Year 2013-2014 to school year 2016-2017

Data set includes

- Preliminary exam score
- Class assignment
- Student characteristics (e.g. gender, height)
- Class timetable
- 7th grade cumulative GPA (main outcome)
  - Grades mostly based on exams (multiple-choice)
  - No grade curving
    (A: 80-100, B: 70-79, C: 60-69, D: 50-59, F: 0-49)
  - Same exams for every classroom in the same school
Normalizing cutoffs for Stack RDD

- Multiple cutoffs, each with different cutoff scores → Pop-Eleches and Urquiola (2013)
- Normalize cutoffs by recentering all cutoff scores to zero
- Use distance to cutoff instead of raw preliminary score

**Normalizing prelim score**

\[ r_{ic} = \text{prelim}_i - \text{cutoff score}_c \]

\( \text{prelim}_i \): student i’s preliminary exam score
\( \text{cutoff score}_c \): cutoff score at cutoff c
\( r_{ic} \): i’s normalized preliminary score (distance from i to cutoff c)
Empirical Approach: Fuzzy RDD

First Stage

\[ l[\text{higher ability class}]_{ic} = \alpha_1 + \beta_1 l[r_{ic} \geq 0] + \gamma_{11} r_{ic} + \gamma_{12} r_{ic} l[r_{ic} \geq 0] + \delta_c + u_{ic} \]

Reduced Form

\[ GPA_i = \alpha_2 + \beta_2 l[r_{ic} \geq 0] + \gamma_{21} r_{ic} + \gamma_{22} r_{ic} l[r_{ic} \geq 0] + \delta_c + v_{ic} \]
Empirical Approach: Checking the validity of RDD

Figure 1: Histogram of running variable

Figure 1: Histogram of running variable
Empirical Approach: Checking the validity of RDD

Figure 2: Student characteristics across running variable
Checking the identification strategy

Figure 3: Predicted cumulative GPA based on student characteristics
First-Stage Relationship

Figure 4: Probability of being in the better classroom i.e. in class with higher-ability peers
Peer Quality

Figure 5: Peer Quality

Peer Quality
as measured by preliminary exam before 7 grade

Figure 5: Peer Quality
Figure 6: Cumulative GPA
Reduced-Form Estimations

Figure 7: Estimates by bandwidth
(control for student characteristics, no teacher fixed effects)
### Table 1: 2SLS estimates

<table>
<thead>
<tr>
<th>Panel 1. Peer quality</th>
<th>Being tracked into higher-ability classroom</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0.9496***</td>
<td>0.9406***</td>
<td>0.9246***</td>
<td>0.9439***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.02131)</td>
<td>(0.02199)</td>
<td>(0.02933)</td>
<td>(0.04030)</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>1536</td>
<td>1489</td>
<td>1023</td>
<td>643</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel 2. Standardized 7th grade cumulative GPA</th>
<th>Being tracked into higher-ability classroom</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>-0.09562</td>
<td>-0.1155</td>
<td>-0.1091</td>
<td>-0.1645</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.06291)</td>
<td>(0.06756)</td>
<td>(0.09570)</td>
<td>(0.1415)</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>1362</td>
<td>1328</td>
<td>947</td>
<td>597</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Controls</th>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cutoff fixed effects</td>
<td></td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Student characteristics</td>
<td></td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

Student characteristics include classsize, gender, height, weight, birth order, parents’ relationship status.

Parentheses contain standard errors, clustered at individual level.

All regressions use rectangular kernel.

* * p < 0.05, ** * p < 0.01, *** p < 0.001
Figure 8: Estimates by bandwidth
(control for student characteristics, no teacher fixed effects)
## Compare to the Literature

<table>
<thead>
<tr>
<th>Authors</th>
<th>Treatment</th>
<th>Effects Size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Peer effects in tracking</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vardardottir (2013)</td>
<td>Better peers (Iceland Upper Secondary)</td>
<td>+0.47 s.d.</td>
</tr>
<tr>
<td>Duflo, Dupas, and Kramer (2011)</td>
<td>Better peers (Kenya 1st grade students)</td>
<td>No statistically significant effects (Can rule out 0.21 s.d.+)</td>
</tr>
<tr>
<td><strong>Effects of GT programs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Booji et al.(2017)</td>
<td>Gifted and talented class (The Netherlands secondary schools)</td>
<td>+0.2 s.d. in GPA</td>
</tr>
<tr>
<td>Card and Giuliano(2016)</td>
<td>Gifted class on minority students (US 4th graders)</td>
<td>+0.5 s.d.</td>
</tr>
</tbody>
</table>
Conclusion

- Being tracked into high-ability classroom is associated with significant increase of 0.94σ in peer quality
- Does not translate to significant increase in GPA
- Upper bounds suggest effects of higher-quality peers could not be larger than 0.08σ
- Concerns over students being disproportionately exposed to low-ability peers are overblown
- Should focus more on the impact of tracking on teaching and curriculum