Searching for Effective Teachers with Imperfect Information

Nonprofit Leadership Forum:
Measuring and creating excellence in schools
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Motivation

- Huge literature about “teacher effects” on achievement
  - Difficult to predict at hire
  - Partially predictable after hire

- Growing use of value added to identify effective teachers for pay, promotion, and professional development
  - But concern that current value added estimates are too imprecise to be used in high-stakes decisions
How could such measures be used?

- Use simple search model to illustrate how one could use imperfect information on effectiveness to screen teachers.

- Use estimates of model parameters from NYC & LAUSD to simulate the potential gains from screening teachers.

- Evaluate potential gains from:
  - Observing teacher performance for more years
  - Obtaining more reliable information on teacher performance
  - Obtaining more reliable information at time of hire
Simple search model

- Maintained assumptions across all simulations
  - SD of teacher effect = 0.15
  - Turnover rate if not dismissed = 5%

- Assumptions for simplest base case (will be varied later)
  - No useful information at time of hire
  - Reliability of annual performance measure = 40%
  - Cost of hiring new teacher = -.07 in 1st year, -.02 in 2nd year
  - Dismissal only after first year (e.g. tenure decision after 1 year)

- Objective: Maximize student achievement by screening out ineffective teachers using imperfect performance measure
Simple model: dismiss 80% of probationary teachers(!)
Why dismiss so many probationary teachers?

- Differences in teacher effects are large & persistent, relative to short-lived costs of hiring a new teacher

- Even unreliable performance measures predict substantial differences in teacher effects
  - Costs of retaining an ineffective teacher outweigh costs of dismissing an effective teacher

- Option value of new hires
  - For every 5 new hires, one will be highly effective
  - Trade off short-term cost of 4 dismissed vs. long-term benefit of 1 retained
Why *not* dismiss so many probationary teachers?

- Smaller benefits than assumed in the model?
  - High turnover rates
  - Teacher differences that do not persist in future (including if PD can help ineffective teachers)
  - High stakes \(\rightarrow\) distortion of performance measures

- Larger costs than assumed in the model?
  - Direct costs of recruiting/firing (little effect if added)
  - Difficulty recruiting applicants (but LAUSD did)
  - Higher pay required to offset job insecurity (particularly if require teacher-training up front)
Requiring a 2\textsuperscript{nd} or 3\textsuperscript{rd} year to evaluate a probationary teacher is a bad idea.

<table>
<thead>
<tr>
<th>Wait to dismiss until year:</th>
<th>T=1</th>
<th>T=2</th>
<th>T=3</th>
<th>T=4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average value added</td>
<td>0.080</td>
<td>0.075</td>
<td>0.068</td>
<td>0.061</td>
</tr>
<tr>
<td>% dismissed</td>
<td>81%</td>
<td>75%</td>
<td>71%</td>
<td>68%</td>
</tr>
</tbody>
</table>
Allowing a 2\textsuperscript{nd} or 3\textsuperscript{rd} year to evaluate a probationary teacher is a good idea.

<table>
<thead>
<tr>
<th>Dismissal at any time through year:</th>
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<tbody>
<tr>
<td>T=1</td>
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</tbody>
</table>

| Average value added | 0.080 | 0.095 | 0.099 | 0.101 |

<table>
<thead>
<tr>
<th>% dismissed (total)</th>
<th>81%</th>
<th>83%</th>
<th>84%</th>
<th>84%</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>% dismissed (by year)</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>In year 1</td>
<td>81%</td>
<td>67%</td>
<td>67%</td>
<td>67%</td>
</tr>
<tr>
<td>In year 2</td>
<td>0%</td>
<td>16%</td>
<td>8%</td>
<td>8%</td>
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<tr>
<td>In year 3</td>
<td>0%</td>
<td>0%</td>
<td>9%</td>
<td>4%</td>
</tr>
<tr>
<td>In year 4</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>5%</td>
</tr>
</tbody>
</table>
Obtaining more reliable information on teacher performance is valuable, little effect on dismissal
Obtaining more reliable information at time of hire is even more valuable, and reduces dismissal rate.
Summary

- Potential gain is large
  - Could raise average annual achievement gains by ≈0.08
  - Similar magnitude to STAR class-size experiment and to recent results from charter school lotteries

- Gains could be doubled if had more reliable performance measure, and tripled if observed this pre-hire

- Select only the most effective teachers, and do it quickly
  - But may be practical reasons limiting success of this strategy

- Focused on screening, but other uses may yield large gains