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Article
Teachers, Schools, and Student Performance

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Math Achievement Increased after No Child Left Behind Act

Fourth grade proficiency on the National Assessment of Educational Progress

<table>
<thead>
<tr>
<th>Year</th>
<th>States that did not adopt school accountability policies before NCLB</th>
<th>States that adopted school accountability policies by 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>60</td>
<td>75</td>
</tr>
<tr>
<td>1994</td>
<td>58</td>
<td>70</td>
</tr>
<tr>
<td>1996</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>1998</td>
<td>60</td>
<td>70</td>
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<tr>
<td>2000</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>2002</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>2004</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>2006</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>2008</td>
<td>60</td>
<td>70</td>
</tr>
</tbody>
</table>

Source: T. S. Dee and B. A. Jacob, NBER Working Paper No. 15531

Figure 1

Differences in Probability of Teacher Dismissal by Performance Ranking

<table>
<thead>
<tr>
<th>Performance Category</th>
<th>Probability of Dismissal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unsatisfactory</td>
<td>22.9 percentage points</td>
</tr>
<tr>
<td>Satisfactory but low</td>
<td>14.3 percentage points</td>
</tr>
<tr>
<td>Excellent</td>
<td>11.1 percentage points</td>
</tr>
</tbody>
</table>

Source: B. A. Jacob, NBER Working Paper No. 15715

Figure 2

In response to this finding, DCPS and other jurisdictions are considering changes to their teacher evaluation systems. In Chicago, for example, the city has implemented a new evaluation system that includes a range of measures, such as student achievement gains, instructional quality, and professional growth and development. This naturally raises the question of whether teacher performance is sensitive to the sample and methodology, the weight of the evidence, and the context in which it is assessed.

Given the large variance in teacher effectiveness and the high financial and political costs of dismissing ineffective teachers, many observers believe that teacher selection may be a cost-effective means of improving educational quality. However, it is important to note that to date there has been little research that links information gathered during the hiring process to subsequent teacher performance.

In a recent project, several colleagues and I partnered with the District of Columbia Public Schools (DCPS) to study teacher hiring. We examined detailed teacher candidate data collected during a multi-stage application process, including written assessments, a personal interview, and sample lessons. We identified a number of background characteristics, such as undergraduate GPA, that are predictive of teacher effectiveness, as well as screening measures, such as applicant performance on a mock teaching lesson, that strongly predicted teacher effectiveness. Interestingly, we found that these measures are only weakly associated with the likelihood of being hired, suggesting considerable scope for improving hiring quality through the hiring process.

In response to this finding, DCPS changed the way it presented information...
tion on applicant quality to principals. Specifically, the district assigned each applicant a letter “grade” that corresponded to our measures of predicted effectiveness. We are currently in the process of studying how this change affected teacher hiring and student performance.

Measurement of Student Ability

Most recently I have written about how individual ability is measured in modern assessment systems. Economists use test scores to measure human capital in explaining wages and other employment outcomes and, increasingly, as outcome measures in evaluations of programs or policies aimed at improving human capital formation. Applied researchers typically take cognitive test scores from pre-existing surveys or data sets without exploring how they are constructed. These test scores often reflect non-trivial decisions about how to measure and scale student achievement.

Jesse Rothstein and I discuss several important issues relating to the measurement and scaling of individual ability measures, highlighting the implications for secondary analyses. We point out that the test score measures reported in many surveys are rarely simple summaries of student performance like the fraction of items answered correctly, but rather are estimates generated by complex statistical models. The resulting scores are generally not unbiased measures of student ability. For example, scores computed for students who take the NAEP test depend not only on the examinees’ responses to test items, but also on their background characteristics, including race and gender. As a consequence, if a black student and a white student respond identically to questions on the NAEP assessment, the reported ability for the black student will be lower than for the white student — reflecting the lower average performance of black students.

Even when reported scores are unbiased measures of student ability, they are often transformed to scale scores. This undermines many of the purposes for which researchers use test scores, such as measuring the magnitude of a treatment effect or quantifying the difference in ability between two demographic groups. Rothstein and I currently are working on a project to characterize the magnitude of biases that arise in common applications.


Oliver Hart, Bengt Holmström Win Nobel Prize in Economic Sciences for Research on Contract Theory

Oliver Hart of Harvard and Bengt Holmström of MIT, who both have been NBER research associates for more than two decades, were awarded the 2016 Nobel Prize in Economic Sciences for their contributions to analyzing incentives, institutions, and organizations in the field of economics known as “contract theory.”

“Contract theory provides us with a general means of understanding contract design. One of the theory’s goals is to explain why contracts have various forms and designs. Another goal is to help us work out how to draw up better contracts, thereby shaping better institutions in society,” the Royal Swedish Academy of Sciences said in a statement announcing the award. “The contributions of this year’s laureates are invaluable in helping us understand real-life contracts and institutions, as well as the potential pitfalls when designing new contracts.”

The Academy cited a range of contexts in which contract theory provides key insights for understanding economic behavior and the associated institutions. These include the tradeoff between providing insurance against adverse outcomes and maintaining incentives to take care, designing executive pay contracts that depend in part on corporate performance, deciding how to allocate property rights, and choosing between public and private provision of basic services. Hart is the Andrew E. Furer Professor of Economics at Harvard, and a research associate in two NBER programs — Corporate Finance and Law and Economics. He has been an NBER affiliate since 1990.

Holmström is the Paul A. Samuelson Professor of Economics at MIT, and a research associate in the NBER Corporate Finance program, which he joined in 1996. Between 1984 and 1986, he was also a research associate in the Labor Studies Program. Both have been active in the NBER Working Group on Organizational Economics.

Hart and Holmström join a group of twenty-four current or past NBER research affiliates who have received the Nobel Prize: Angus Deaton, 2015; Lars Hansen and Robert Shiller, 2013; Alvin Roth, 2012; Thomas Sargent and Christopher Sims, 2011; Peter Diamond, 2010; Paul Krugman, 2008; Edward C. Prescott and Finn Kydland, 2004; Robert F. Engle, 2003; Joseph E. Stiglitz, 2001; James J. Heckman and Daniel L. McFadden, 2000; Robert C. Merton and Myron S. Scholes, 1997; Robert E. Lucas, Jr., 1995; the late Dale Mortenson, 2010; Robert W. Fogel, 1993; Gary S. Becker, 1992; George J. Stigler, 1982; Theodore W. Schultz, 1979; Milton Friedman, 1976; and Simon Kuznets, 1971. In addition, six current or past members of the NBER Board of Directors have received the Nobel Prize: George Akerlof, 2001; Robert Solow, 1987; the late William Vickrey, 1996; Douglas North, 1993; James Tobin, 1981; and Paul Samuelson, 1970.