A. General Compensation Questions

Does evidence suggest that some teachers are significantly more effective than others at improving student achievement?

Ample evidence indicates that there is wide variation among teachers in their ability to produce student learning gains, as measured by standardized achievement tests (e.g., Aaronson, Barrow, & Sander, 2007; Armor et al., 1976; Hanushek, 1992; Hanushek, Kain, O'Brien, & Rivkin, 2005; Hill, Rowan, & Ball, 2005; Jordan, Mendro, & Weerasinghe, 1997; Kane, Rockoff, & Staiger, 2006; McLean & Sanders, 1984; Murnane, 1975; Murnane & Phillips, 1981; Nye, Konstantopoulos, & Hedges, 2004; Rivers-Sanders, 1999; Rivkin, Hanushek, & Kain, 2005; Rockoff, 2004; Rothstein, 2009; Rowan, Correnti, & Miller, 2002; Sanders & Rivers, 1996; Wright, Horn, & Sanders, 1997). Hanushek (2002), for example, notes that the magnitude of differences among teachers is so great within a single large urban district that "teachers near the top of the quality distribution can get an entire year's worth of additional learning out of their students compared to those near the bottom" (p. 3). However, it is important to draw a distinction between two types of research studies of teacher effect.

One type of research study simulates how much a student would have gained if he or she had been assigned to highly effective teachers for several consecutive years. William Sanders and his colleagues in Tennessee conducted some of the best-known research of this type. They developed a value-added model to measure individual teacher contributions to student learning. By grouping teachers into quintiles according to the size of their former students' achievement gains, the researchers estimated how assignment to teachers of different levels of effectiveness influenced student outcomes. In one study conducted in two large Tennessee school districts, Sanders and Rivers (1996) estimated that students assigned to three highly effective teachers consecutively would have attained fifth-grade mathematics scores that were as much as 50 percentile points higher than students with comparable beginning mathematics scores assigned to a series of three highly ineffective teachers.

Further simulations conducted by Sanders and his associates revealed that variability in teacher effectiveness increased across grades and was greatest in mathematics (Rivers & Sanders, 2002; University of Tennessee Value-Added Research and Assessment Center, 1997).

Estimates of teacher effect revealed that highly effective teachers tended to be effective with all groups of students regardless of initial achievement level, whereas highly ineffective teachers produced unsatisfactory gains among all groups of students (Sanders & Rivers, 1996). Moreover, results were additive and cumulative,

so the contributions of both highly effective and ineffective teachers to students' learning gains were measurable for at least four years after students left their classrooms (Sanders & Rivers, 1996). Sanders and Rivers found little evidence of compensatory effects, however. That is, simulations revealed that students assigned to highly effective teachers after assignment to a series of highly ineffective teachers made greater than expected gains but not enough to make up for lost ground.

Researchers found the same pattern of results in Chicago and Dallas. For example, in their study of ninth-grade student mathematics achievement in Chicago public high schools, Aaronson, Barrow, and Sander (2007) estimated that "one semester with a teacher rated two standard deviations higher in quality could add 0.3 to 0.5 grade equivalents, or 25 to 45 percent of an average school year, to a student's mathematics score performance." A study conducted by Jordan et al. (1997) estimated that average reading scores of sixth-graders in Dallas schools would increase from the 59th percentile to the 76th percentile if they were assigned to three highly effective teachers consecutively, whereas average scores for sixth-graders would be expected to decrease from the 60th to the 42nd percentile if they were assigned to a series of three highly ineffective teachers during the same period. In mathematics, the researchers estimated that third-graders in Dallas schools would increase their average mathematics score from the 55th percentile to the 76th percentile if they were assigned to three highly effective teachers consecutively, whereas the average mathematics score for third-graders would decline from the 57th percentile to the 27th percentile if they were assigned to highly ineffective teachers for three consecutive years. These findings suggest that teachers are not equally effective at increasing student learning gains and that it is possible to identify the contributions that individual teachers make to student learning. Although it is tempting to conclude that policymakers can significantly narrow achievement gaps simply by assigning the lowest performing students to highly effective teachers, the solution is not that simple. These research studies reveal substantial differences in individual teachers' abilities to improve student achievement, but the identification of a highly effective or ineffective teacher is retrospective. That is, gain score data analysis does not reveal the teachers who produced the greatest student learning gains until after the fact.

In a school setting, there is a clear sense of who was a good teacher in the past, but there is relatively little information about who will be a good teacher in the future. That distinction is important because research shows that these teacher effects have a strong random element (e.g., Aaronson, et al., 2007; Ballou, Sanders, & Wright, 2004; Koedel, 2007). Koedel (2007), for example, found that the year-to-year correlation in teacher effects was only about 0.35. This means that it is difficult to identify in advance which teachers will be top performers the next year. It is even more difficult to predict who will be top performers over the next several years. There is, however, some emerging research in this area. For instance, Kane, Taylor, Tyler, and Wooten (2010) examined the relationship between teacher observations within Cincinnati's Teacher Evaluation System (TES) program and student achievement scores. The team found that

TES scores do provide an accurate predictor of teachers' future performance and, in turn, students' future achievement. Abstracting these findings further, the researchers concluded that because a teacher's move up the TES rating scale correlates with student achievement gains, a group of highly rated teachers could close black-white achievement gaps within five to six years.

A second type of research study on teacher effect would examine what would happen to learning gains if students were assigned to high- or low-performing teachers based on historical data. However, to date, researchers have not conducted a true experiment that involves actually randomly assigning students to high-performing teachers for several consecutive years.

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