Learning from Experience? Evidence on the Impact and Distribution of Teacher Experience and the Implications for Teacher Policy

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LEARNING FROM EXPERIENCE? EVIDENCE ON THE IMPACT AND DISTRIBUTION OF TEACHER EXPERIENCE AND THE IMPLICATIONS FOR TEACHER POLICY

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Abstract

Teacher experience has long been a central pillar of teacher workforce policies in U.S. school systems. The underlying assumption behind many of these policies is that experience promotes effectiveness, but is this really the case? What does existing evidence tell us about how, why, and for whom teacher experience matters? This policy brief distills the research on teacher experience into four general findings: (1) the effect of experience is most evident during the first few years of teaching; (2) the early-career experience effect varies by level of education and subject area; (3) inexperienced teachers are most likely to teach in high-poverty schools; and (4) the impact of experience differs for teachers in high- versus low-poverty schools. The brief concludes by discussing the implications of these findings for several key policy measures including teacher compensation, support and professional development, and the unequal distribution of teachers across schools.

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INTRODUCTION

Teacher experience has long been a central pillar of teacher workforce policies in U.S. school systems. Although a great deal of recent attention in teacher policy debates has focused on the development and use of more direct measures of teacher performance (e.g., value-added models, standards-based evaluation), teacher experience continues to play a dominant role in most human resource policies, in part because it is a straightforward measure that is easily understood and widely trusted by teachers. Consequently, teacher experience remains a cornerstone of traditional single salary schedules used in most school districts; it drives teacher transfer and layoff policies that prioritize seniority; and because high-poverty schools are disproportionately staffed with inexperienced teachers, experience is commonly considered a major source of inequity across schools, and therefore is a target for redistribution.

The underlying rational assumption behind most of these policies is that experience promotes effectiveness and specifically that experience gained over time enhances the knowledge, skills, and productivity of workers. But is this really the case? Do students attain higher levels of achievement when taught by more experienced teachers? Does teacher effectiveness improve with experience or are the observed effects of experience actually the result of higher attrition of ineffective teachers over time? Do students in different types of schools have equal access to experienced teachers? The answers to these questions have potentially important implications for policies aimed at promoting productivity and equity in education.

Experience is among the most commonly studied teacher characteristics, and more than 40 years of research tells us that the assumption of "more is better" requires greater nuance; experience effects are complex and depend on a number of factors.[1] This brief examines recent research on the relationship between teacher experience and student achievement and the distribution of teacher experience across schools to identify key findings that could better inform experience-based teacher policy. The studies included in this brief are all from the past decade. They are all quantitative analyses of large-scale (primarily state-level) databases. They are all focused on either (1) the relationship between teacher qualifications and student achievement or (2) the distribution of teacher qualifications across different kinds of schools.

The limitations of relying on student achievement as the sole measure of impact are worth noting. For instance, this outcome can only be used for

1. In his 1975 book, *The Impact of School Resources on the Learning of Inner-City Children*, Murnane was among the first to find a relationship between teacher experience and student achievement. This study and others that followed found that the effect of teacher experience is most pronounced in the early years and may vary across subjects and grade levels (Ferguson 1991; Ferguson and Ladd 1996; Murnane 1975; Murnane and Phillips 1981). See Rice (2003) for a review of this work.

teachers in tested subjects and grade levels. In addition, measuring teacher effectiveness in terms of student achievement gains requires that the analysis be limited to teachers for whom at least two (and often more) years of data are available. Student achievement is also a narrow outcome measure; teacher experience may be important for reasons above and beyond its relationship with student test scores. For example, more experienced teachers may bring stability and continuity to the school culture, may take on important leadership roles in the school, may mentor, formally or informally, their junior colleagues, and so forth. Presumably, having effective teachers assume these responsibilities is desirable but the point here is that the direct impact of teacher experience on student achievement is a narrow measure and may underestimate the value of having experienced teachers in a school.

This brief provides policy makers with recent evidence about the relationship between teacher experience and student achievement, and the distribution of teacher experience across schools. The goal is to distill this body of research so that it is accessible and useful to policy makers as they work toward greater productivity and equity in teacher policies. In the sections that follow, I identify four key findings from the literature: (1) the effect of experience is most evident during the first few years of teaching; (2) the early-career experience effect varies by level of education and subject area; (3) inexperienced teachers are most likely to teach in high-poverty schools; and (4) the impact of experience differs for teachers in high- versus low-poverty schools. The final section of the brief discusses the implications of these findings for several key policy measures including teacher compensation, support and professional development, and the unequal distribution of teachers across schools.

KEY FINDINGS FROM THE LITERATURE

Several key findings emerge from the existing body of research on teacher experience; some of these findings confirm previous understandings, and others raise new questions. Four central findings are presented in the following sections.

Impact of Experience is Strongest During First Few Years of Teaching

Experience matters, but more is not always better. Evidence indicates that the impact of experience is strongest during the first few years of teaching; after that, marginal returns diminish. A number of studies demonstrate that, on average, brand-new teachers are less effective than those with some experience under their belts (Rockoff 2004; Rivkin, Hanushek, and Kain 2005; Sass 2007; Clotfelter, Ladd, and Vigdor 2007, 2010; Kane, Rockoff, and Staiger 2008; Ladd 2008; Harris and Sass 2011). Teachers show the greatest productivity gains

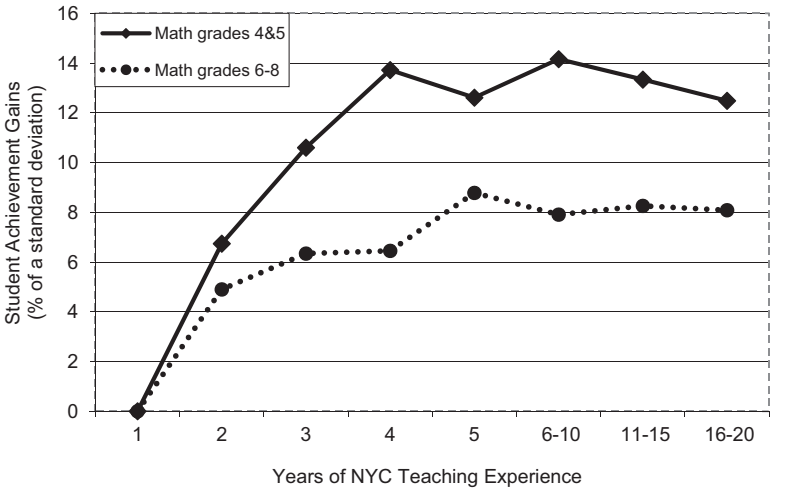

Figure 1. Teacher Experience and Student Math Achievement Gains. Source: Boyd et al. (2008).

during their first few years on the job, after which their performance tends to level off. A study using New York City data illustrates the diminishing marginal returns to experience (Boyd et al. 2008). As shown in figure 1, the largest gain in math achievement attributable to teacher experience is associated with teachers' progression from their first year of teaching to having one full year of experience.[2] The effectiveness gained during that first year of teaching in grades 4–5 (0.07 standard deviation) and in grades 6–8 (0.05 standard deviation) accounts for more than half of the cumulative experience effect over time.

This and other research demonstrates the diminishing effect of additional experience beyond the first five years. On average, while veteran teachers with more than twenty years of experience are more effective than teachers with no experience, they are not much more effective than those with five years of experience (Clotfelter, Ladd, and Vigdor 2010; Ladd 2008). Studies have also documented some evidence that effectiveness may actually *decline* after some point, particularly among high school teachers. In fact, evidence suggests that the most experienced high school mathematics teachers (those with more than twenty-five years experience) may be less effective than their less-experienced counterparts (Ladd 2008), and even their inexperienced colleagues (Harris and Sass 2011).

2. Figure 1 shows the gains to experience for math achievement in a model that uses teacher fixed effects and thus increments to value added are identified only from teachers who persist from one year to the next. Teachers who are in their first year of teaching when the tests are administered to students are indicated by 1; teachers who are in their second year of teaching are indicated by 2, and so forth.

In terms of the magnitide of the early-career experience effect, Atteberry, Loeb, and Wyckoff (2012) draw on findings from multiple studies and report that, on average, teachers in their fifth year of teaching realize student achievement that is between 5 and 15 percent of a standard deviation higher than the student achievement associated with those teachers in their first year on the job. Some research has shown this effect to be stronger than the effect of several other observable teacher-related variables including advanced degrees, teacher licensure tests scores, National Board certification at the elementary level, and class size (Boyd et al. 2008; Clotfelter, Ladd, and Vigdor 2007; Ladd 2008; Sass 2007; Rivkin, Hanushek, and Kain 2005). Other research has found that factors related to teachers' academic training and alternative preparation programs may equal or outweigh the impact of early-career experience. Specifically, Boyd et al. (2009a) identify attributes of teacher preparation programs (e.g., capstone project, teaching practice) that rival the effect of the first year of teaching experience. Xu, Hannaway, and Taylor (2011) find that the effect associated with being a Teach for America teacher more than offsets their lack of teaching experience, either due to their better academic preparation in particular subject areas or due to other unmeasured factors, such as motivation.

Although this aggregate effect of early-career experience is consistent and compelling, several caveats are worth noting. First, the general pattern has the potential to obsure the range of trajectories that may exist across individual teachers. Research reveals substantial variance in the returns to experience for indvidual teachers. Atteberry, Loeb, and Wyckoff (2012) report that the standard deviation in teacher value added is 0.20 across reading teachers in their first year, and 0.21 across math teachers in their first year. The variance in the value-added scores in both subjects was found to increase each year through the five years included in the study, such that by the fifth year of teaching the standard deviation was 15 to 30 percent higher than in the first year of teaching. The authors conclude that the observed variation suggests that "the processes associated with teacher development create greater differences in teaching effectiveness over these early years of teaching and, thus, there is likely to be meaningful variation in returns to experience across teachers" (p. 21). That said, the study finds that teachers tend to remain in the same performance quintiles over their first five years of teaching, particularly those teachers at the extremes of the performance distribution.

Second, because of this varation across individual teachers, the performance distributions of experienced teachers versus those with little or no experience reveal considerable overlap in value-added scores in both mathematics and reading. While less experienced teachers tend to be less effective than more experienced teachers as a whole, many less experienced teachers

have value-added scores comparable to or exceeding those of their more experienced counterparts (Sass et al. 2010).

Third, the observed impact of experience on student achievement may be the result of improvement on the job, but it may also be the result of differential attrition related to teacher quality (i.e., teachers leaving in their first few years may be systematically more or less effective than the teachers who stay). To the extent that teacher attrition is not random, this would confound findings about the early-career effects of teacher experience. Although some evidence suggests that teachers who remain teaching after three years are less effective on average than those who leave (Clotfelter, Ladd, and Vigdor 2007), other research has found that less-effective teachers are more likely to transfer and leave teaching (Goldhaber, Gross, and Player 2007; Boyd et al. 2009b; Harris and Sass 2011; Henry, Bastian, and Fortner 2011). Yet another study finds that the average quality of teachers who quit teaching after their first year is similar to the average quality of those who remain in their positions (Rivkin, Hanushek, and Kain 2005). These conflicting findings raise questions about whether the measured effects of experience reflect improvement with experience or higher attrition rates among less effective teachers.

Although many studies of teacher experience present effects that are the result of some combination of on-the-job learning and differential attrition, a number of analyses have focused on untangling the experience effect related to learning on the job from the effect resulting from differential attrition (Rockoff 2004; Rivkin, Hanushek, and Kain 2005; Henry, Bastian, and Fortner 2011). Even after accounting for differential teacher attrition, all three of these studies find the same pattern evident in the broader literature—that is, the first several years of teaching experience are related to increases in teacher effectiveness as measured by student test scores, and effectiveness gains tend to level off after about three years of teaching. Whereas Henry, Bastian, and Fortner (2011) report that "prior research has overestimated returns to experience, as both teacher on-the-job learning and differential attrition of less effective teachers contribute to the apparent gains in average first- and second-year teachers' effectiveness" (p. 278), Rivkin, Hanushek, and Kain (2005) conclude that for both mathematics and reading, "on-the-job learning is the dominant element of the experience effect" (p. 448).

Early-Career Experience Effect Varies by Level of Education and Subject Area

Existing evidence suggests that although the effect of early-career experience is a common pattern found in most studies examining the relationship between teacher experience and student achievement, the magnitude and consistency of the effect varies depending on the level of education and the subject area. Taken together, studies of teacher experience at the elementary school level

find a consistent postive effect of early-career experience for reading, and a somewhat less consistent effect for math (Dee 2004; Rockoff 2004; Hanushek et al. 2005; Boyd et al. 2006; Clotfelter, Ladd, and Vigdor 2006; Kane, Rockoff, and Staiger 2008). The collection of studies that include middle school teacher experience reveals a consistent effect associated with mathematics, and to a lesser extent with reading (Boyd et al. 2006; Hanushek et al. 2005; Kane, Rockoff, and Staiger 2008).

Findings on the impact of teacher experience at the high school level are less definitive. Some studies of high school teacher experience report effects that are comparable to those found at the elementary and middle school levels (Clotfelter, Ladd, and Vigdor 2010). Others have found little evidence of an impact of early-career experience among high school teachers, and no effect (or even a negative effect) of teaching experience beyond the first several years on high school student achievement (Harris and Sass 2011).

Inexperienced Teachers are More Likely to Teach in High-Poverty Schools

Given the general finding that teacher experience—or more accurately, teacher inexperience—is systematically related to teacher productivity, questions surrounding the distribution of inexperienced teachers have policy significance. A raft of studies offer consistent and compelling evidence of an uneven distribution of inexperienced teachers that is systematically related to school and student characteristics (Boyd et al. 2008; Clotfelter et al. 2007; Sass et al. 2010). Teachers with three or fewer years of experience (those shown to be less effective, on average) are more likely to be teaching in high-poverty schools.

For example, one study using data from North Carolina demonstrates that the quartile of schools with the highest percentage of students qualifying for free and reduced price lunch have the highest percentage of teachers with fewer than three years of experience (Clotfelter et al. 2007). Specifically, among elementary schools in the highest poverty quartile, 18.7 percent of teachers had fewer than three years of experience compared with 13.3 percent in the lowest poverty quartile. At the middle school level, the disparity was found to be more dramatic, with 24.6 percent of teachers in highest poverty schools having fewer than three years of experience, compared with 13.9 percent in the lowest poverty schools. The highest poverty high schools were staffed with 17.3 percent of teachers who had fewer than three years of experience compared with 14.6 percent in the lowest poverty high schools. This general pattern was confirmed in studies using data from Florida and North Carolina (Sass et al. 2010) and New York (Boyd et al. 2008).

The distribution pattern of inexperienced teachers is similar to those of other teacher credentials, including the percentage of teachers with nonregular

licenses, with lower test scores, and without National Board certification (Boyd et al. 2008; Clotfelter et al. 2007). One policy response is to redistribute teachers holding various credentials more evenly across different types of schools. Such a strategy, however, assumes the uneven distribution, not the uneven productivity, of teacher credentials matters most. In other words, efforts to redistribute inexperienced teachers will succeed in reducing achievement gaps *only* if experience has similar payoffs, in terms of student performance, across different types of schools.

The Impact of Experience Differs for Teachers in High- versus Low-Poverty Schools

A recent study of the value added of teachers in high-poverty and lower-poverty schools in North Carolina and Florida reveals the solution to the achievement gap attributable to disparities in teacher quality is not as straightforward as we might believe (Sass et al. 2010).[3] The evidence from this study confirms that high-poverty schools tend to have less effective teachers as measured by their value added to math and reading achievement,[4] and that high-poverty schools tend to have greater within-school variability in the effectiveness (value added) of teachers.

The study finds the gap in the effectiveness of teachers between high- and lower-poverty schools is most pronounced at the bottom of the teacher performance distribution. In fact, high-performing teachers were found to be equally effective in high- and lower-poverty schools and, in some cases (e.g., mathematics and reading teachers in Florida), more effective in high-poverty schools. The teachers at the bottom of the performance distribution in the two types of schools accounted for the differences in effectiveness. One possible explanation is that the least effective teachers in high-poverty schools have worse qualifications than the least effective teachers in lower-poverty schools. An alternative explanation is that the return to teacher qualifications is lower in high-poverty schools—that is, the productivity gain from an increase in a given characteristic may differ systematically across school settings such that the "payoff" associated with teacher qualifications is not as great in high-poverty schools.

The study found that although some of the difference in teacher effectiveness across high- and lower-poverty schools is explained by differences in observable teacher characteristics (e.g., experience, advanced degree, licensure status), the majority of the gap in teacher effectiveness is attributable to differences in the marginal effect (i.e., the "payoff") associated with these

3. In the Sass et al. (2010) study, high-poverty schools have 70–100 percent of students qualifying for free and reduced priced lunches.
4. Math teachers in Florida tended to be an exception to the general findings reported in this study.

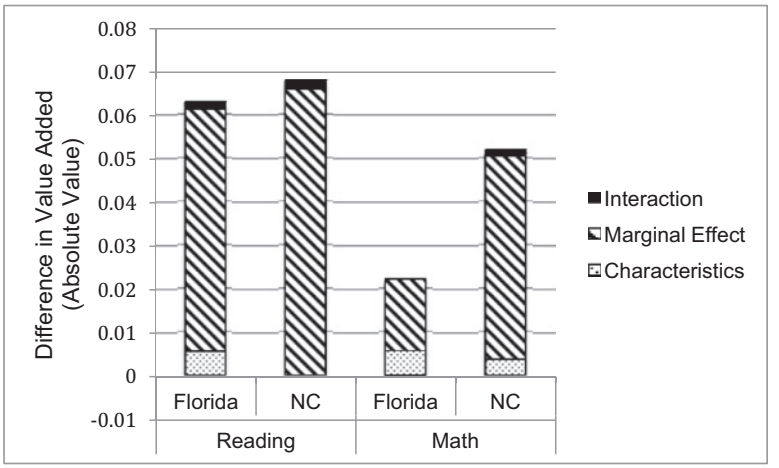

Figure 2. Decomposition of Difference in Teacher Value Added Across High-Poverty and Lower-Poverty Schools. Source: Sass et al. (2010). Note: Teacher characteristics include years of experience, advanced degree, and licensure status.

qualifications across the two types of schools (Sass et al. 2010). Figure 2 illustrates this finding by decomposing the differences in teacher value added across high- and lower-poverty schools. The marginal effect of experience constitutes the largest component of each bar, indicating the difference in teacher effectiveness is driven primarily by differences in the "payoff" to teacher characteristics, not by uneveness in distribution of the characteristics themselves.

In most cases, the effectiveness of inexperienced teachers in high-poverty schools is comparable to that of inexperienced teachers in lower-poverty schools. Differences in the performance of *experienced* teachers surfaced as the dominant source of the teacher quality gap. A closer look at the relationship between teacher value added and teacher characteristics revealed that the returns to experience are, in fact, lower and less consistent among teachers in high-poverty schools.[5] Figure 3 shows that the returns to three-to-five years of experience are similar in high- and lower-poverty schools. Among more experienced teachers, however, the effectiveness associated with years of experience is lower in high-poverty schools.

These findings suggest that high-poverty schools are doubly disadvantaged when it comes to teacher experience—they have higher proportions of inexperienced teachers, and they have a lower "payoff" (i.e., marginal effect) associated with their experienced teachers. Whether this difference in the return to experience is attributable to differences in on-the-job learning versus

5. The evidence on the differential returns to graduate degrees and licensure reveals a similar but less consistent pattern.

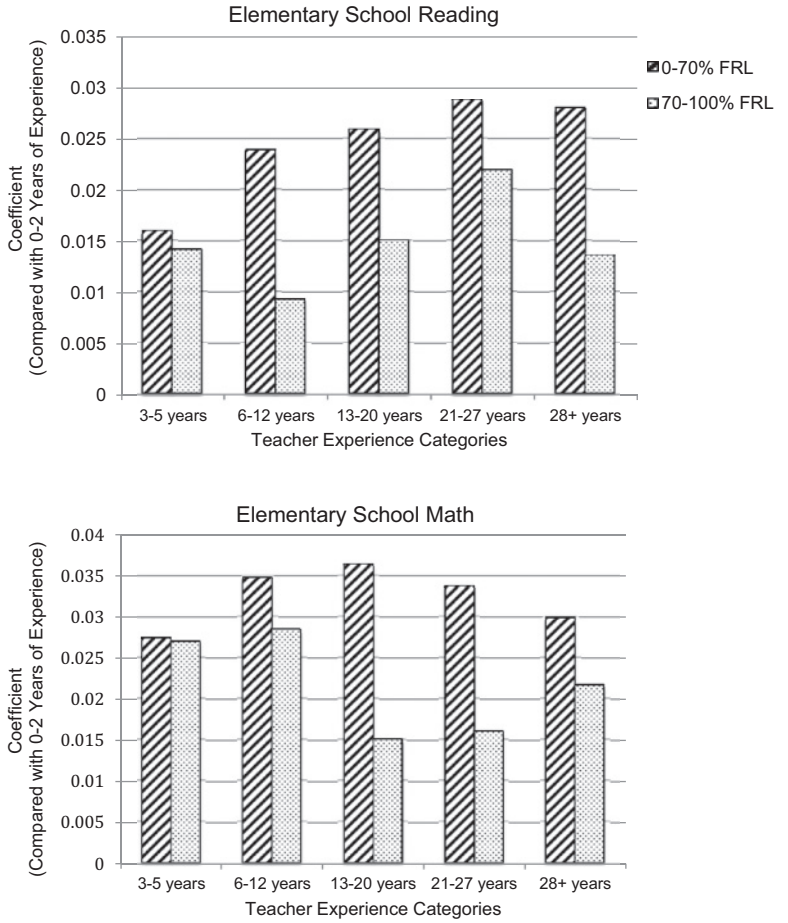

Figure 3. Payoff to Teacher Experience in North Carolina: Elementary School Reading and Math, 0–70% Free and Reduced Priced Lunch vs. 70–100% Free and Reduced Priced Lunch. Source: Sass et al. (2010).

teacher sorting across the two types of schools is not clear and warrants further investigation. Both explanations have important potential policy implications. Because the differences in the return to experience across the two types of schools are among the more experienced teachers, the source could be teacher sorting. More effective experienced teachers may take advantage of opportunities to move to lower-poverty schools, whereas less-effective experienced teachers may find their way to, and remain in, high-poverty schools. In addition to these sorting effects, the two types of school environments may also have systematicly different environments related to on-the-job learning. Insufficient ongoing professional growth opportunities and perhaps higher rates of "burnout" among the more experienced teachers in high-poverty schools may be at play. One thing is clear: Because the marginal-effect disadvantage

accounts for the majority of the teacher quality gap (figure 2), policy efforts to distribute experienced teachers evenly across high- and low-poverty schools will have a limited effect unless they also account for the effectiveness of those teachers.

IMPLICATIONS FOR TEACHER POLICY

The research findings presented in this brief have important implications for teacher policy. In particular, the well-documented uneven distribution of inexperienced (and, on average, less effective) teachers across high- and low-poverty schools warrants attention, and findings presented in this brief suggest that efforts to simply redistribute teachers based on qualifications like experience are not likely to translate into more equitable access to quality teachers for students in high-poverty schools. Following are a number of recommendations.

Frontload Experience-Based Compensation

The research that documents the disproportionate impact of experience in the first few years of teaching, compared with additional years of experience later in a teacher's career, suggests that compensation aimed at rewarding experience-based productivity may be best frontloaded in the salary schedule. Researchers have long documented the tendency of school districts to backload teacher salary schedules and many have raised serious questions about how these practices may undermine the recruitment of talented new teachers and the realization of broader productivity goals (Lankford and Wyckoff 1997; Monk and Jacobson 1985; Grissom and Strunk 2012). Most current salary schedules are based heavily on pay increments for advanced degrees and years of experience throughout the duration of a teachers' career, credentials that are not strongly or consistently associated with improved performance. An alternative approach would be to restructure teacher salary schedules so that pay is linked to characteristics directly related with teacher effectiveness. For example, Vigdor's (2008) proposal for an "evidence-based salary schedule" would flatten the salary schedule so that teachers are offered higher starting salaries and greater rewards for the first few years of experience when it is directly related to increased effectiveness. In addition, other evidence-based credentials (e.g., National Board Certification) could be rewarded.[6]

In addition to creating a more direct link between teacher pay and teacher effectiveness, compensation policy changes that shift experience-based pay raises to the front end of the salary schedule may function as a recruitment

6. Of course, efforts to retain experienced teachers may require ongoing salary increases for years of experience, particularly in settings that struggle with high teacher turnover.

tool to bring more high-quality teacher candidates into the field (assuming of course, the rest of the salary schedule is also attractive). The system would boost starting salaries and would allow teachers to realize their peak earnings at a younger age, similar to the compensation structures in other professions.[7] Recent evidence demonstrates that frontloaded salary schedules are associated with better student performance (Grissom and Strunk 2012).

Implement Teacher Evaluation, Professional Development, Compensation, and Dismissal Policies that Encourage Ongoing Effectiveness among Veteran Teachers

The findings that, in some cases, the most veteran teachers may be less effective than their less-experienced counterparts suggest that researchers and policy makers should consider strategies to encourage high performance well into a teacher's career. Perhaps some experienced teachers are not staying up on the latest curricular and pedagogical advances, or the decline in performance could simply be a function of teacher burnout. Either way, targeted professional development and reward structures should be in place to encourage the ongoing development of teachers' skills that will enable them to deliver state-of-the-art instruction. Unfortunately, existing research on the effectiveness of teacher professional development provides only limited guidance to policy makers and school leaders in selecting and providing professional development that may improve the effectiveness of veteran teachers (Desimone et al. 2002; Garet et al. 2001; Glazerman et al. 2008; Harris and Sass 2011; Jacob and Lefgren 2004; Rice 2009). More research needs to be done in this area.

The depressed improvement gains among the more experienced teachers is most evident at the high school level, suggesting this is where such attention should be focused. In cases where more veteran teachers are unable to maintain performance levels with adequate support and professional development, mechanisms for alternative assignments or even dismissal should be considered. The evidence that the most experienced teachers may not be the most effective should prompt policy makers to reexamine the common practice of determining teacher layoffs based on seniority. This is not to say seniority is not important, but such policies may be fundamentally inconsistent with productivity. Existing research indicates that layoffs based on seniority require the dismissal of a greater number of teachers and a greater number of more effective teachers than would be the case if layoffs were implemented based

7. See Vigdor (2008) for a more complete description of the evidence-based salary schedule and a discussion of the political challenges and cost implications.

on measures of teacher effectivness (Boyd et al. 2011; Goldhaber and Theobald 2011).

Look Beyond Policies to Distribute Inexperienced Teachers Evenly across High- and Low-Poverty Schools, and Identify Strategies to Increase the Returns to Teacher Experience in High-Poverty Schools

The research findings on the disproportionate representation of inexperienced teachers in high-poverty schools suggest that efforts should be made to distribute novice teachers more fairly across schools. In addition to reducing obvious inequities associated with the revolving door of novice teachers that some schools experience, a more even distribution of inexperienced teachers may create conditions (e.g., a better mix of novice and veteran teachers in all schools) for novice teachers to be successful. That said, existing research provides compelling evidence that policies requiring an equal distribution of experienced teachers will be insufficient to narrow the gap in teacher effectiveness between high- and low-poverty schools. Policy makers should pay careful attention to the potential sources of the differences in the productivity of teacher qualifications across high- and lower-poverty schools.

One source of the productivity difference among teachers in high- and lower-poverty schools may be teacher mobility patterns. Several trends may be at work: the lowest-quality teachers may be more likely to be hired and to remain in high-poverty schools; as high-quality teachers in high-poverty schools gain more experience, they may move to lower-poverty schools with a greater number of higher-achieving students; and the lowest-quality experienced teachers in low-poverty schools may eventually end up in high-poverty schools, perhaps as a result of policies requiring that all schools be staffed with "highly qualified teachers" (Rice 2008). These sorting trends benefit students in lower-poverty schools, while having a negative impact on students in high-poverty schools (Boyd et al. 2009b).

Another possibility is that teachers in high-poverty schools may learn less about how to be effective in those environments, perhaps because of the complexity of the work or because professional development opportunities are not adequate in these settings. For instance, evidence suggests less-experienced teachers, who are over-represented in high-poverty schools, are more likely to be matched with students who have difficulty learning (Goldhaber, Gross, and Player 2010). In high-poverty schools without adequate teacher supports, teaching low-performing students may become an even more challenging task for novice teachers.

Finally, being poorly equipped to deal with these challenging environments, teachers who remain in high-poverty schools may burn out faster than their colleagues who are working in less-challenging settings. In all of these

cases, the anticipated effect of experience is not fully realized in high-poverty settings.

The findings on the distribution of and returns to experience in high- and lower-poverty schools have a number of implications. Again, researchers and policy makers should carefully consider dismissal policies for ineffective experienced teachers, the adequacy of professional development opportunities for teachers in high-poverty schools, and the ability of administrators in high-poverty schools to assess teacher performance, provide support where needed, and initiate dismissal in cases when ineffective teachers are not able to improve their performance. Further, the federal requirements that schools be staffed with "highly qualified teachers" may leave principals of high-poverty schools little choice but to hire and retain teachers who are "highly qualified," even if they are of low quality. Policies that require a certain distribution of experienced teachers may exacerbate this problem by adding yet another qualification that may or may not be related to effectiveness. Instead, teacher policies should reflect what we know about the impact of early-career teaching experience, the uneven distribution of inexperienced teachers, and the variable payoff associated with teacher experience in high- and lower-poverty schools.

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REFERENCES

Atteberry, Allison, Susanna Loeb, and James H. Wyckoff. 2012. Do first impressions matter? Improvements in early teacher effectiveness. Paper presented at the Association for Public Policy Analysis & Management Fall Research Conference, Baltimore, MD, November.

Boyd, Donald, Pamela L. Grossman, Hamilton Lankford, Susanna Loeb, and James H. Wyckoff. 2006. How changes in entry requirements alter the teacher workforce and affect student achievement. *Education Finance and Policy* 1(2): 176–216. doi:10.1162/edfp.2006.1.2.176

Boyd, Donald J., Pamela L. Grossman, Hamilton Lankford, Susanna Loeb, and James H. Wyckoff. 2009a. Teacher preparation and student achievement. *Educational Evaluation and Policy Analysis* 31(4): 416–40. doi:10.3102/0162373709353129

Boyd, Donald J., Pamela L. Grossman, Hamilton Lankford, Susanna Loeb, and James H. Wyckoff. 2009b. Who leaves? Teacher attrition and student achievement. CALDER Working Paper 23, Urban Institute.

Boyd, Donald J., Hamilton Lankford, Susanna Loeb, Jonah E. Rockoff, and James H. Wyckoff. 2008. The narrowing gap in New York City teacher qualifications and its

implications for student achievement in high-poverty schools. *Journal of Policy Analysis and Management* 27(4): 793–818. doi:10.1002/pam.20377

Boyd, Donald J., Hamilton Lankford, Susanna Loeb, and James H. Wyckoff. 2011. Teacher layoffs: An empirical illustration of seniority v. measures of effectiveness. *Education Finance and Policy* 6(3): 439–54. doi:10.1162/EDFP_a_00041

Clotfelter, Charles T., Helen F. Ladd, and Jacob L. Vigdor. 2006. Teacher–student matching and the assessment of teacher effectiveness. *Journal of Human Resources* 41(4): 778–820.

Clotfelter, Charles T., Helen F. Ladd, and Jacob L. Vigdor. 2007. How and why do teacher credentials matter for student achievement? CALDER Working Paper 2, Urban Institute.

Clotfelter, Charles T., Helen F. Ladd, and Jacob L. Vigdor. 2010. Teacher credentials and student achievement in high school: A cross-subject analysis with student fixed effects. *Journal of Human Resources* 45(3): 655–81. doi:10.1353/jhr.2010.0023

Clotfelter, Charles T., Helen F. Ladd, Jacob L. Vigdor, and Justin Wheeler. 2007. High-poverty schools and the distribution of teachers and principals. CALDER Working Paper 1, Urban Institute.

Dee, Thomas S. 2004. Teachers, race and student achievement in a randomized experiment. *Review of Economics and Statistics* 86(1): 195–210. doi:10.1162/003465304323023750

Desimone, Laura M., Andrew C. Porter, Michael S. Garet, Kwang Suk Yoon, and Beatrice F. Birman. 2002. Effects of professional development on teachers' instruction: Results from a three-year longitudinal study. *Educational Evaluation and Policy Analysis* 24(2): 81–112. doi:10.3102/01623737024002081

Ferguson, Ronald F. 1991. Paying for public education: New evidence on how and why money matters. *Harvard Journal on Legislation* 28: 465–98.

Ferguson, Ronald F., and Helen F. Ladd. 1996. How and why money matters: An analysis of Alabama schools. In *Holding schools accountable: Performance-based reform in education*, edited by Helen F. Ladd, pp. 256–98. Washington, DC: Brookings Institution Press.

Garet, Michael S., Andrew C. Porter, Laura Desimone, Beatrice F. Birmanm, and Kwang Suk Yoon. 2001. What makes professional development effective? Analysis of a national sample of teachers. *American Educational Research Journal* 3(4): 915–45. doi:10.3102/00028312038004915

Glazerman, Steven, Sarah Dolfin, Martha Bleeker, Amy Johnson, Eric Isenberg, Julieta Lugo-Gil, Mary Grider, and Edward Britton. 2008. *Impacts of comprehensive teacher induction: Results from the first year of a randomized controlled study. NCEE 2009–4034.* Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance.

Goldhaber, Dan, Betheny Gross, and Daniel Player. 2007. Are public schools really losing their best? Assessing the career transitions of teachers and their implications for the quality of the teacher workforce. CALDER Working Paper 12, Urban Institute.

Goldhaber, Dan, Bethany Gross, and Daniel Player. 2010. Teacher career paths, teacher quality, and persistence in the classroom: Are public schools keeping their best? *Journal of Policy Analysis and Management* 30(1): 57–87. doi:10.1002/pam.20549

Goldhaber, Dan, and Roddy Theobald. 2011. Managing the teacher workforce: The consequences of "last in, first out" personnel policies. *Education Next* 11(4): 79–83.

Grissom, Jason A., and Katharine O. Strunk. 2012. How should school districts shape teacher salary schedules? Linking school performance to pay structure in traditional compensation schemes. *Educational Policy* 26(5): 663–95. doi:10.1177/0895904811417583

Hanushek, Eric A., John F. Kain, Daniel M. O'Brien, and Steven G. Rivkin. 2005. The market for teacher quality. NBER Working Paper No. 11154.

Harris, Douglas N., and Tim R. Sass. 2011. Teacher training, teacher quality, and student achievement. *Journal of Public Economics* 95(7–8): 798–812. doi:10.1016/j.jpubeco.2010.11.009

Henry, Gart T., Kevin C. Bastian, and C. Kevin Fortner. 2011. Stayer and leavers: Early-career teacher effectiveness and attrition. *Educational Researcher* 40(6): 271–80. doi:10.3102/0013189X11419042

Jacob, Brian A., and Lars Lefgren. 2004. The impact of teacher training on student achievement: Quasi-experimental evidence from school reform efforts in Chicago. *Journal of Human Resources* 39(1): 50–79.

Kane, Thomas J., Jonah E. Rockoff, and Douglas O. Staiger. 2008. What does certification tell us about teacher effectiveness? Evidence from New York City. *Economics of Education Review* 27(6): 615–31. doi:10.1016/j.econedurev.2007.05.005

Ladd, Helen F. 2008. Value-added modeling of teacher credentials: Policy implications. Paper presented at the second annual CALDER research conference, Urban Institute,Washington, DC, November.

Lankford, Hamilton, and James H. Wyckoff. 1997. The changing structure of teacher compensation, 1970–94. *Economics of Education Review* 16(4): 371–84. doi:10.1016/S0272-7757(96)00066-0

Monk, David H., and Steven L. Jacobson. 1985. The distribution of salary increments between veteran and novice teachers: Evidence from New York State. *Journal of Education Finance* 11(2): 157–75.

Murnane, Richard J. 1975. *The impact of school resources on the learning of inner-city children*. New York: Ballinger.

Murnane, Richard J., and Barbara R. Phillips. 1981. What do effective teachers of inner-city children have in common? *Social Science Research* 10(1): 83–100. doi:10.1016/0049-089X(81)90007-7

Rice, Jennifer K. 2003. *Teacher quality: Understanding the effectiveness of teacher attributes*. Washington, DC: Economic Policy Institute.

Rice, Jennifer K. 2008. From highly qualified to high quality: An imperative for policy and research to recast the teacher mold. *Education Finance and Policy* 3(2): 151–65. doi:10.1162/edfp.2008.3.2.151

Rice, Jennifer K. 2009. Investing in human capital through teacher professional development. In *Creating a new teacher profession*, edited by Dan Goldhaber and Jane Hannaway, pp. 227–47. Washington, DC: Urban Institute Press.

Rice, Jennifer K. 2010. The impact of teacher experience: Examining the evidence and policy implications. National Center for Analysis of Longitudinal Data in Education Research, Brief 11.

Rivkin, Steven G., Eric A. Hanushek, and John F. Kain. 2005. Teachers, schools, and academic achievment. *Econometrica* 73(7): 417–58. doi:10.1111/j.1468-0262.2005.00584.x

Rockoff, Jonah E. 2004. The impact of individual teachers on student achievement: Evidence from panel data. *American Economic Review* 94(2): 247–52. doi:10.1257/0002828041302244

Sass, Tim R. 2007. The determinants of student achievement: Different estimates for different measures. Paper presented at the first annual CALDER research conference, Washington, DC, October.

Sass, Tim R., Jane Hannaway, Zeyu Xu, David N. Figlio, and Li Feng. 2010. Value added of teachers in high-poverty schools and lower-poverty schools. *Journal of Urban Economics* 72(2–3): 104–22.

Vigdor, Jacob. 2008. Scrap the sacrosanct salary schedule: How about more pay for new teachers, and less for older ones? *Education Next* 8(4): 36–42.

Xu, Zeyu, Jane Hannaway, and Colin Taylor. 2011. Making a difference? The effects of Teach for America in high school. *Journal of Policy Analysis and Management* 30(3): 447–69. doi:10.1002/pam.20585