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The Quality and Distribution of Teachers under the No Child Left Behind Act

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The heart of accountability under the No Child Left Behind (NCLB) Act is an attempt to change the existing incentives in schools with the ultimate objective that all students meet a proficiency standard. Existing research indicates that nothing is more important to high achievement as having effective teachers, implying that the impact of new incentives on teachers will be central to any consideration of the accountability statutes. Tracing the impacts of NCLB on the stock and distribution of teachers is, nonetheless, a difficult and uncertain task.

The belief that the quality of teachers matters a great deal to the quality of education received by students has actually proven hard to substantiate, and the reasons for this difficulty are key to assessing the impacts of No Child Left Behind. A substantial body of research going back to the Coleman et al. (1966) report has attempted to link commonly used measures of teacher quality—such as experience, degree level, and state teacher certification—to student outcomes. Surprisingly, except for perhaps the first few years of classroom experience, no robust connection has appeared; for example, Hanushek and Rivkin (2006) review various studies attempting to identify characteristics of effective teachers. One

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common interpretation of these findings was that the seemingly obvious wisdom was incorrect and that, while student outcomes clearly exhibited considerable variation, little of it was due to teachers.

More recent research has, however, produced very different results. This research, based on newly available administrative data bases, measures teacher quality on the basis of student achievement gains and finds very strong effects of better teachers.¹ A good teacher is somebody who regularly produces high average learning gains in a class, while a bad teacher regularly produces low gains. Such analyses of teacher effectiveness, or teacher value-added, have produced remarkably consistent estimates of the variation in teacher quality (Hanushek and Rivkin, 2010b). A one-standard-deviation improvement in teacher effectiveness (going from the average teacher to one at the 84th percentile) would move the average student from the 50th to the 56th percentile in the year with the better teacher. At the same time, these variations in quality have not been closely related to measurable characteristics of the teacher—making this analysis consistent with the prior research.

In practice, schools use a range of information to evaluate teachers including administrator observations and parental feedback, and the testing associated with school accountability can be used to measure teacher productivity on the basis of the contribution to raising achievement.

The main effects of No Child Left Behind on the quality of teaching are likely to come through two provisions of the act. First, NCLB establishes benchmarks based on test score pass rates that schools must meet in order to remain in good standing and avoid sanctions. Since teachers are central to student performance, this accountability component of NCLB is likely to have direct effects on both the demand for and supply of teachers and therefore on both the composition of the stock of public school teachers and the distribution of those teachers among schools. Second, NCLB explicitly requires districts to have “highly qualified” teachers, and the enunciation and enforcement of such a standard might have an additional effect on the composition of teachers.

In this paper, we will discuss three avenues by which these requirements might affect the quality of teachers.² First, we will argue that the requirements for “highly qualified” teachers are unlikely to have had any perceptible effect on the performance of students. Second, the combination of quality requirements and the

¹ While this research began several decades ago using specialized datasets (for example, Hanushek, 1971; Murnane, 1975; Armor et al., 1976; Hanushek, 1992), the recent analyses have relied more upon administrative data bases that are generally linked to the development of state or local accountability systems (for example, Sanders and Horn, 1994 [Tennessee]; Rivkin, Hanushek, and Kain, 2005 [Texas]; Aaronson, Barrow, and Sander, 2007 [Chicago]; Kane, Rockoff, and Staiger, 2008 [New York City]; and Boyd, Grossman, Lankford, Loeb, and Wyckoff, 2006 [New York City]).

² Most of the discussion throughout this paper actually applies also to principals and other school administrators. The research on these, however, is extremely limited, and we confine our discussion just to teachers.

more-stringent testing environment could make teaching appear more costly and risky as a profession and thus alter the composition of new entrants, but at least so far, we find no evidence of such effects. Finally, the accountability provisions might change the dynamics of the labor market for teachers, including decisions about hiring and job separation. While not completely understood, this channel might be quite important, especially at low-performing schools where the stress of the accountability requirements is highest. We will provide new evidence from Texas on the relationship between school accountability ratings and teacher transitions both out of schools and out of grades three through eight, the grades subject to NCLB testing requirements. Finally, we offer some observations about potential policy implications and a future research agenda.

Drawing conclusions about the effect of the No Child Left Behind legislation on teacher labor markets is not straightforward. NCLB actually represented a continuation of an already powerful movement toward test-based accountability for schools that began almost two decades before its passage. Thus, some of the relevant evidence about the effect of teacher quality requirements and testing requirements comes not from NCLB per se, but from its precursors across different states. For example, Texas had a fairly strong accountability system beginning in 1993, and indeed the underlying principles helped guide the development of NCLB by President George W. Bush, who of course had formerly been the governor of Texas.

Teacher Quality Requirements

The No Child Left Behind act contains a somewhat anachronistic set of requirements related to teacher quality. Instead of just relying on accountability based on student performance, which implicitly introduces incentives for hiring and retaining high-quality teachers, NCLB adds a direct requirement that all schools have “highly qualified teachers.” The definition of a highly qualified teacher was left up to the individual states, but the focus was almost exclusively on teacher characteristics, like certification or degree level, which have not been shown to have a strong relationship to student outputs. Moreover, states have commonly defined “quality” in such a way that the requirements create no additional burden on either existing teachers or new entrants.

Prior to NCLB, new teachers were typically required to have a bachelor's degree, to be fully certified, and to demonstrate subject matter knowledge, generally through tests. Under NCLB, existing teachers including those with tenure were also supposed to meet standards. They could meet the same requirements that were set for new teachers or could meet a state-determined “high, objective, uniform state standard of evaluation,” also known as HOUSSE.

The idea was clearly to upgrade the teaching force. Yet, there is little evidence that the state chosen standards were very binding (Moe, 2005). Few states showed any interest in any major changes in the terms of employment for existing teachers,

leading them generally to opt for definitions consistent with their existing licensing and certification standards for teachers.³

The teacher quality requirements of the No Child Left Behind legislation have received little research attention, in part because state rules require few changes from pre-existing practice. There is little evidence that the rules have altered the trend lines in the observable traits of teachers. Moreover, as noted earlier, there is little evidence that, even if the observable traits were increased, it would improve student performance. For example, requiring teachers to obtain a master's degree to be fully certified does not, by existing research on student outcomes, improve the quality of instruction. All in all, these direct provisions are unlikely to have had much effect either on the teaching profession or on student achievement.

Risk and Changes in Teacher Quality

Many education researchers and policymakers point to high turnover of teachers during the first few years of teaching as one of the main impediments to raising school quality, often without recognizing that early exit rates from teaching mirror those in nonteaching occupations (Stinebrickner, 2002; Ballou and Podgursky, 2002).⁴ Historically, after the initial period of career sampling, a job in the teaching profession has been stable and low-risk. To be sure, certain schools in high-poverty communities often had high turnover of teachers, but those teachers were typically moving to other schools, not leaving the profession (Hanushek, Kain, and Rivkin, 2004). Teacher tenure provisions are generally governed by state law, and tenure is often granted quickly. Forty-three states have a probationary period before tenure, of three or fewer years (National Council on Teacher Quality, 2008). Once in a teaching position, one's salary is determined almost exclusively by years of experience and graduate degrees (along with any contract renegotiation about overall level of salaries). The work schedule roughly follows the school schedule and calendar. This kind of stable and well-defined job will always be desirable to some of those making occupational choice decisions (for discussion, see Stinebrickner, 2001, who emphasizes family considerations by teachers).

Increased accountability could alter some of these characteristics, which in turn could effect the composition of teachers. For example, if accountability led to a closer link between compensation and employment on the one hand and student outcomes on the other, the risk of a teaching job would increase. How this would

³ HOSSE requirements in the each of the states have been compiled by the Education Commission of the States at (http://www.ecs.org/ecsmain.asp?page=/html/educationissues/teachingquality/nclb-hqtp/db_intro.asp) (accessed April 13, 2010). Searching the 50 state databases reveals that only a handful of states even mention student achievement as a way of demonstrating being highly qualified. Teaching experience and prior academic coursework are the most common features, although teachers generally have alternative ways to demonstrate their qualifications.

⁴ Indeed, of the new entrants in 2000, a greater number were returning teachers than either new graduates or delayed entry graduates (Provasnik and Dorfman, 2005).

affect the composition of teachers depends on a number of factors. For example, if less-effective teachers were made more vulnerable, while more-effective teachers would typically benefit, the profession might attract a different set of entrants. Alternatively, those who are potentially the best teachers, when weighing a life-time commitment to teaching, could steer away if they felt the risk of being judged unfairly was too high. At this point we know very little about how accountability affects risk or even the perceptions of risk and thus its effect on the willingness to enter or remain in teaching.

The absence of evidence on the link between accountability and the composition of teachers is not surprising given that prior research has found it difficult to say much about how any characteristic of the teaching occupation affects the composition of teachers. For example, the pay of teachers, particularly female teachers, fell dramatically relative to earnings of nonteacher college graduates for the last half century (Hanushek and Rivkin, 2006). In 1950, the average young women teacher earned more than 55 percent of young women with a college degree; by 2000, this ratio had fallen to 35 percent. School districts seem generally slow in adjusting to demand, particularly on the salary side. The salaries of teachers have not kept up with those on the outside, so over time (as noted above) teachers have been drawn from lower down in the salary distribution.⁵ Along with this, there is substantial evidence of commensurate declines in teacher test scores. For example, Bacolod (2007) finds the 41 percent of teachers born 1941–45 had IQ scores in the top quintile, but only 19 percent of those born 1963–64 were drawn from that high in the distribution.⁶ However, there is little or no evidence of direct links between these changes and decreases in teacher effectiveness as measured by student outcomes.⁷

A clear impediment to drawing inferences about the effects of changes in salary, risk, or other factors on the composition of teachers is the dependence of any effects on district behavior during the hiring process. In contrast to competitive markets where the assumption of profit maximization justifies the assumption that firms will hire the most qualified workers at the chosen wage, public schools do not pursue a single objective and often face little competition for students. If schools pursue alternative objectives to high instructional quality,

⁵ Some interpret this as reflecting “Baumol’s disease.” A low-productivity sector faces increases in real production costs due to a more rapid increase in wages than in productivity. This cost pressure on the low-productivity sector (think schools) could lead to a decline in salaries (and thus quality) if budgets do not keep up with wage growth (Baumol and Bowen, 1965; Baumol, 1967). However, this interpretation is inconsistent with the fact that schools have systematically reduced class sizes and pupil-teacher ratios over the same period where relative wages are declining. In other words, schools have substituted toward more of the expensive resource.

⁶ Corcoran, Evans, and Schwab (2004a, 2004b) similarly find that, while mean performance on achievement tests of teachers did not change much between 1964–2000, the proportion of teachers in the top deciles fell significantly.

⁷ While teacher test scores tend to be related to student achievement more reliably than other measures, the relationship found across existing studies remains quite weak (Hanushek, 2003). Similarly, teacher salaries have not been closely linked to student performance, although most of the evidence comes from cross-sectional studies that do not give a good indication of what might happen with substantial changes in the overall level of salaries.

such as favoritism toward friends, family, or politically well-connected applicants, the effects of changes in compensation are likely to be muted. It should be noted there is suggestive evidence that more competition among public school districts (as measured by the number of districts in a metropolitan area) raises the quality of teachers (Hanushek and Rivkin, 2003), consistent with the view that a lack of competition leads administrators to pursue objectives other than maximizing the quality of education.

Moreover, the institutional structure including tenure and extensive unionization appears to have led to far less variation in salary than would be expected in competitive markets. For example, the absence of sizeable compensation differences by subject or working conditions appears to have introduced substantial variation in the supply of teachers by subject and school characteristics. Overall, the supply of people training for teaching exceeds by a considerable margin the number of positions that annually become open in schools. For example, in 2000, 86,000 recent graduates entered into teaching, even though 107,000 graduated with an education degree the year before (Provasnik and Dorfman, 2005; U.S. Department of Education, 2009).⁸ Yet there are persistent shortages of mathematics, science, and special education teachers as well as shortages of certified teachers willing to work in high-poverty schools, leading to the employment of many teachers who lack certification or training in a given area.

The observed distribution of teachers is an outcome reflecting those who train and apply for teaching jobs and those who are selected by school systems. At this point we know little about the effects of NCLB on either the distribution of teacher quality or the separate effects on demand or supply. There is limited evidence of the accountability effects on turnover and the distributions of teacher characteristics among schools and grades, findings we discuss in the next section. At a minimum, it appears that the supply of graduates with education degrees changes little with the introduction of state accountability and NCLB.

Existing Evidence on Teacher Dynamics

The high-stakes accountability pressures of No Child Left Behind would be expected to alter the decision-making processes of both teachers and administrators and thus the equilibrium distribution of teachers among grades, schools, and districts.⁹ Such changes could affect the distribution of teacher quality through

⁸ Note that the recently graduated group entering teaching also includes a number of people who graduate with degrees other than in education, making the excess supply of education graduates even larger. Similar differentials existed throughout the 1990s, implying that the stock of trained teachers not in the teaching profession is substantial.

⁹ We characterize accountability as increasing the stakes for teachers (and administrators). At the same time, contract provisions, particularly for teacher tenure, put some limits on this. We presume nonetheless that administrators can put extra pressure on teachers with the advent of student testing and accountability.

several channels: 1) increasing turnover and thus the share of teachers with little or no prior experience; and 2) changing the distribution of quality conditional on experience. Rookie teachers on average take some time to learn the skills of classroom management, to develop good lesson plans, to know how best to convey knowledge, and the like.¹⁰ Because schools serving disadvantaged populations are harder to staff, they have higher teacher turnover and are likely to have more rookie teachers and more difficulty attracting experienced teachers.

Given the paucity of evidence on NCLB effects on teacher labor market dynamics, we begin this section with evidence on the pre-NCLB period. First, we describe the pattern of teacher transitions by salary and student characteristics presumed to be correlated with working conditions. Next we discuss evidence on the impact of alternative earnings opportunities on the probability of exiting a school. Then we describe student-outcome-based performance differences between stayers and leavers for all schools and for those teachers serving predominantly lower-income students. Finally, we discuss the limited available evidence on accountability effects.

Baseline Evidence

A growing body of research examines the determinants of teacher transitions and the implications for the distribution of teachers among schools and districts. The implicit model of teacher job choice is straightforward: Teachers respond to working conditions, expected salary, expected job stability, job performance, and alternative earnings opportunities in their initial choice of a school and when deciding whether to remain in a school. Those with better alternative employment opportunities, those earning lower salaries, and those in more-difficult working conditions should be more likely to exit a school. In addition, teachers obtaining greater personal satisfaction should be less likely to transition out.

A number of studies have looked at the distribution of teachers across schools and the factors that affect the movement of teachers, including exiting from teaching. Variants of this basic formulation underlie our work in Hanushek, Kain, and Rivkin (2004), for Texas, as well as the research of Boyd, Lankford, Loeb, and Wyckoff (2005), for New York. Both studies consider how working conditions affect the probability of leaving a school and how such effects might interact with teacher characteristics, and both find evidence consistent with the belief that teachers react strongly to working conditions as measured by the achievement of students and the racial composition of schools. These student demographic measures are interpreted as serving as proxies for a wider set of factors that include the quality of the administration, the level of student disruption, and other facets of working conditions, including school location.

¹⁰ The lower performance of teachers in their first few years and the subsequent flatness of the experience-effectiveness curves has been found in virtually all recent studies of the value-added of teachers. See, for example, Rockoff (2004), Rivkin, Hanushek, and Kain (2005), or Kane, Rockoff, and Staiger (2008).

The absence of much variation in pay by subject or performance would be expected to raise the probability that teachers with skills valued more highly in alternative labor markets exit the profession, and evidence supports this notion. Dolton and van der Klaauw (1999) document that teachers with better outside earnings opportunities as measured by observable characteristics are more likely to exit teaching; Murnane, Singer, Willett, Kemple, and Olsen (1991) and Dolton (2006) also document larger outflows of teachers who are in greater outside demand. In addition, the shortages of trained people in math and science—where outside opportunities are larger than in other teaching areas—has been noted for decades (Kershaw and McKean, 1962).

Taken together, the evidence on teacher movement and the effect of alternative opportunities is consistent with the notion that school leavers are disproportionately drawn from the upper portion of the teacher quality distribution and that turnover exerts a larger cost on high-poverty and lower-achievement schools. However, the validity and generalizability of this inference hinges on the strength of the relationship between quality and the proxies for outside opportunities and whether the pattern observed by Dolton and Van der Klaauw (1999) is typical of most school districts. Two recent papers raise doubts that leavers are drawn disproportionately from the upper end of the teacher quality distribution. Podgursky, Monroe, and Watson (2004) and Scafidi, Sjoquist, and Stinebrickner (2006) both find that the majority of exiting teachers from public schools do not move to higher-paying jobs outside of teaching but instead are more likely either to exit the labor market entirely or switch to a lower-paying job in a private school. This pattern is consistent with the observation by Stinebrickner (2002) that much of the occupational movement by teachers is related to family circumstances—something that bears no clear relationship to job effectiveness.

In fact, direct evidence on the productivity of leavers relative to stayers based on gains in student performance finds that both effective and ineffective teachers leave the typical school—but that the average quality of those who stay is above that of those who leave, particularly in disadvantaged schools (Hanushek and Rivkin, 2010a). This is consistent with evidence (summarized in Hanushek and Rivkin, 2010b) that teacher quality varies substantially *within* schools, a pattern that contradicts the belief in extensive teacher sorting by quality among schools. More important for policy, it also contradicts the notion that reducing turnover should be a primary objective for high-poverty schools, as some turnover might be desirable if it involves the subpar teachers.

These baseline findings about the relationship among teacher transitions, working conditions, salary, and effectiveness in the classroom provide a context within which to consider the impact of the No Child Left Behind legislation on the distribution of teacher quality. We turn now to the limited evidence on accountability effects and then present some additional evidence on teacher transitions before and after the passage of NCLB.

The Predicted Effects of Accountability

The introduction of school accountability, through both state programs and later through No Child Left Behind, altered the landscape that shapes teacher and

school decisions. Teachers on average are much less favorable to accountability than the general public. When surveyed in 2009 about continuing federal accountability legislation, 71 percent of the American public thought that at most minimal changes were needed, but only 25 percent of teachers held a similar opinion. If the question was asked naming No Child Left Behind instead of a more generic description of accountability legislation, 49 percent of the nation and 23 percent of the teachers thought that minimal changes or less were needed (Howell, Peterson, and West, 2009). The question remains whether such attitudes translate into observable changes in the teaching force.

Accountability almost certainly increases the importance of quality in teacher hiring decisions. Particularly in districts facing little competition from other schools, the absence of accountability and formal school ratings likely enabled administrators when hiring to place greater weight on factors like personal connections, demographic characteristics, and personal qualities unrelated to classroom performance. Following the passage of NCLB, however, districts faced much stronger incentives to raise standardized test results in the specific grades and subjects included in the accountability system.¹¹ Such reprioritization is likely to be most pronounced in tested grades and subjects in schools that fail or are at high risk of not making “Adequate Yearly Progress.” Teachers in those grade-subject categories will be under more scrutiny and, if performance of students is low, will be under new pressures and requirements.

These new pressures would be expected to affect the allocation of teachers through several channels, and we describe three. First, we would expect an increase in the rate of transitions out of the profession as alternative opportunities would now dominate teaching for some who were at the margin.¹² These effects are likely to be stronger for lower-quality teachers at greater risk of failure and also in schools classified as failing or at risk of failure. Second, we would expect the combination of enhanced administrator focus on quality and increased desire of teachers to work in highly rated schools to lead to greater teacher sorting by skill across work environments. After all, teachers maintain only limited control over their rating under an accountability system that is based on the school “pass rate” on certain exams because such a measure is heavily influenced by family and other factors outside of the control of teachers and schools. Essentially, schools and teachers in upper middle class communities get credit for the inputs of parents to education.¹³ Finally, we would expect to see an increased desire to teach in grades not tested under NCLB and increased desire on the part of administrators to place more-skilled teachers in tested grades.

¹¹ Prior to No Child Left Behind, many states did have an accountability system, but the consequences were typically weak compared to post-NCLB (Hanushek and Raymond, 2005).

¹² Stinebrickner (2002) and Scafidi, Sjoquist, and Stinebrickner (2006) emphasize nonwage aspects of teacher exit decisions—but the marginal impact of accountability would still be in the same direction.

¹³ Past analyses have found only a weak positive relationship between measured school quality based on estimates of school value-added to mathematics and reading achievement and the state accountability rating based largely on the “pass rate” (Peterson and West, 2006).

There is a small body of work on the effects of accountability on the distribution of teachers. Clotfelter, Ladd, Vigdor, and Diaz (2004) analyze the sophisticated accountability system run by North Carolina and trace the qualifications of teachers in low-performing schools. They find that accountability appears to have increased teacher turnover in low-performing schools, but find limited evidence that it led to a decline in measured qualifications. Boyd, Lankford, Loeb, Rockoff, and Wyckoff (2008) look before and after mandatory testing for accountability was introduced in New York public schools in 1997, with a focus on the tests in fourth grade. They find that, after accountability comes into play, fourth grade had fewer rookie teachers and less teacher turnover. Boyd et al. (2008) find that the gap in teacher qualifications for high-poverty schools and other New York City schools also closed after NCLB.

Thus, it appears that management actions do work to mitigate some of the accountability-induced redistribution of teachers that might have otherwise taken place. However, these analyses of teacher behavior under accountability in North Carolina and New York do not directly address the effects of No Child Left Behind legislation on teacher effectiveness. Moreover, the generalizability of these findings to other accountability structures and grades is unclear.

Accountability and Teacher Labor Markets in Texas

Both the Texas accountability system adopted in 1993 and the No Child Left Behind legislation that took effect in 2002 specify a series of sanctions for schools falling below minimum standards. They are obviously similar, because of the heavy involvement of George W. Bush with each. However, the NCLB sanctions are more clearly specified, while those of Texas rely more on the intervention of the state education commissioner.

This section begins with a description of teacher transitions for Texas teachers in tested grades and subjects. It then reports estimates from linear probability regressions of the probability of remaining in a tested grade and subject in the same school on a set of school accountability rating indicator variables. We focus on elementary schools because it allows us to compare nontested grades with tested grades (third grade and above), in a context where most teachers are certified to teach in both tested and nontested grades.

The descriptions of transition patterns use a panel dataset of teachers composed of multiple years of Texas public school administrative data that has been assembled by the Texas Schools Project.¹⁴ The panel includes all Texas public school teachers in each year and a unique identifier enabling us to follow teachers who switch schools and districts and job classifications. Information on role (teaching in a regular classroom, other teaching, nonteaching), grade, and

¹⁴ The underlying data come from the Texas Schools Project at the University of Texas at Dallas. For more detail, see (<http://www.utdallas.edu/research/tsp-erc/>).

subject is used to classify job types each year. Teachers who exit the Texas public schools are observed to leave, but nothing is known about their subsequent activities. Essentially, this empirical work uses two different samples, a pre-NCLB sample for the years 1994 to 2001 and a post-NCLB sample for the years 2003 to 2009. Each of these samples includes several hundred thousand teacher-year observations in more than 3,000 schools located in more than 1,000 districts.

Transition and Rating Taxonomies

Our empirical analysis in Texas focuses on the relationship between teacher transitions and the Texas accountability rating for elementary school teachers initially working in a grade where standardized test results count toward the accountability rating (which is third grade or above). We classify transitions first by location—same school, new school within the same district, and new district—and then by the relationship to the accountability system—teaching in a tested grade/subject or, alternatively, teaching in a nontested grade/subject or assuming a school position other than regular classroom teacher.¹⁵ The combination of these two taxonomies yields six possible states for transitions from one year to the next. The seventh possibility is leaving the Texas public schools entirely. Importantly, the observed transitions reflect the joint decisions of teachers and administrators.

As part of this process, we expect demand for incumbent teachers or “insiders” to differ from demand for outsiders. First, incumbent teachers in general enjoy a much higher probability of being hired at the current school or district for the subsequent year due to both contractual arrangements (including tenure) and negligible rehiring costs. Second, the current school has more information on performance than other schools in the district and far more information than other districts. Therefore quality issues potentially have the largest effect on demand for a teacher in the same school, the next largest effect for a teacher in the same district, and the smallest effect for a teacher working in another district.

In terms of the correspondence between the Texas accountability rating and No Child Left Behind, NCLB largely relies on a binary categorization of schools in each year—that is, the school either meets Adequate Yearly Progress or does not, while the Texas system has a finer-grained categorization: exemplary, recognized, academically acceptable, and academically unacceptable. The last category is roughly equivalent to not meeting Adequate Yearly Progress. We use the categories of the Texas system to index the pressures of accountability in each school and examine whether those pressures appear to have strengthened following the passage of NCLB.

Observed Teacher Transitions

Table 1 describes teacher transitions by the accountability rating of the school for the periods pre- and post-passage of No Child Left Behind (transition

¹⁵ We originally separated “teaching in nontested grade/subject” from “assuming a school position other than regular classroom teacher.” Preliminary analysis indicated, however, that this distinction did not affect the qualitative results.

Table 1
Moving out of Sight: Elementary Teachers Transitioning to Job Not Involving Testing for Accountability

<i>Accountability rating</i>	<i>Same school</i>		<i>Different school, same district</i>		<i>New district</i>		<i>Exit Texas public schools</i>	<i>All teachers</i>
	<i>Remain tested</i>	<i>Not tested</i>	<i>Remain tested</i>	<i>Not tested</i>	<i>Remain tested</i>	<i>Not tested</i>		
Before NCLB								
Exemplary	76.6%	6.4%	4.0%	2.4%	2.8%	1.5%	6.2%	100%
Recognized	75.3%	7.0%	4.4%	2.7%	3.3%	1.9%	5.4%	100%
Acceptable	72.9%	7.6%	5.2%	3.0%	3.6%	2.2%	5.4%	100%
Unacceptable	57.0%	11.2%	8.0%	5.4%	5.4%	4.5%	8.5%	100%
After NCLB								
Exemplary	77.2%	6.5%	3.8%	2.4%	2.7%	1.3%	6.1%	100%
Recognized	73.9%	7.6%	4.7%	2.8%	3.5%	1.9%	5.5%	100%
Acceptable	69.7%	8.6%	5.4%	3.4%	4.5%	2.5%	5.9%	100%
Unacceptable	60.6%	9.6%	5.9%	4.8%	6.6%	4.1%	8.4%	100%

Note: "Before NCLB" refers to the years 1994 to 2001. "After NCLB" means 2003 to 2009.

probabilities sum to 100 percent). As the accountability rating falls, teachers are less likely to remain at the same school, or in the same district, in a tested grade, or in the teaching profession. Table 1 shows that before No Child Left Behind (during the period 1994–2001), 76.6 percent of teachers in tested grades and exemplary schools remained in a tested grade at the same school, but only 57 percent of teachers in tested grades in unacceptable schools remained in a tested grade at that same school. After the passage of NCLB (2003–2009), 77.2 percent of teachers from exemplary schools and tested grades remained in a tested grade at the same school compared to 60.6 percent of those in unacceptable schools. Passage of No Child Left Behind does not appear to have much effect on the joint distribution of transition probabilities and Texas accountability rating (perhaps not surprising given the strength of the accountability pressures in Texas prior to the passage of NCLB).

It would be inappropriate to draw causal inferences about any differences in the probabilities of specific transitions across ratings categories in Table 1 without considerably more analysis. High-poverty schools are more likely to receive lower ratings and experience higher turnover, but that turnover could be the result of working conditions, the higher transition probabilities of less-experienced teachers, or other factors correlated with both rating and the probability of leaving a school. In the next section, we attempt to take some of these factors into account in order to learn more about the sources of differences in teacher transitions by accountability rating.

Regression Results for Teacher Transitions

Table 2 reports the coefficients for a set of accountability rating indicator variables ("exemplary" is the excluded category) from two regressions that also

Table 2

Estimated Differences in the Probability a Teacher Leaves a Tested Grade in a School by Accountability Rating Relative to Schools Classified as Exemplary, by Timing Relative to the Passage of No Child Left Behind

	<i>Within state</i>	<i>Within school</i>
Before NCLB		
Recognized	0.007 (1.96)	0.018 (4.56)
Acceptable	0.035 (8.76)	0.033 (7.29)
Unacceptable	0.156 (10.64)	0.099 (6.25)
After NCLB		
Recognized	0.023 (5.77)	0.018 (3.70)
Acceptable	0.056 (11.72)	0.038 (6.47)
Unacceptable	0.126 (9.67)	0.037 (2.60)

*Note:*s Numbers in parentheses are *t*-statistics derived from robust standard errors adjusted for clustering by campus. Controls are shares of black, Hispanic, male, limited English proficiency, special education, economically disadvantaged, and immigrant students in the school for each year; year dummies; and a full set of school fixed effects in the within-school models. Separate linear probability regressions are run for the periods before and after NCLB.

control for a number of school demographic characteristics, including proportion black, proportion Hispanic, proportion eligible for a subsidized lunch, proportion male, proportion limited English proficient, proportion classified as special needs, proportion economically disadvantaged, and proportion immigrant, and a full set of year dummies to account flexibly for time trends. To account more fully for persistent differences among schools that might be related both to transitions and to accountability ratings, the specification that produces the coefficients reported in the second column also includes a full set of school indicator variables (school fixed effects). Therefore the column 2 estimates come solely from changes over time in a school's accountability rating (the contributions of both observed and unobserved average differences between schools are removed by the school fixed effects). As above, we run separate regressions for the 1994–2001 period before No Child Left Behind, and for the 2003–2009 period afterwards.

The results in the first column show that the probability of exiting a tested grade in a school increases significantly as accountability rating declines even controlling for the included school demographic characteristics and time trends.

Prior to the passage of No Child Left Behind, the probability of exiting was more than 15 percentage points higher if a school received a rating of unacceptable than if the school had received a rating of exemplary, and the differential is almost as high following the passage of NCLB. The probability of exit is also higher from schools receiving acceptable or recommended ratings than from schools in the exemplary category, though the differential is far smaller than that observed for schools rated as unacceptable.

The coefficients in the second column reveal that the transition differences remain significant even in the school fixed effect regression that accounts for all persistent differences among schools, though the pattern of changes differs somewhat by period. In the years prior to the passage of No Child Left Behind, the inclusion of the school fixed effects reduces the “Unacceptable” coefficient by roughly 35 percent but has little effect on the others, while in the years under NCLB, the inclusion of the school fixed effect reduces the “Unacceptable” coefficient by roughly 70 percent, the coefficient on “Acceptable” by roughly one-third, and the coefficient on “Recognized” by slightly more than 20 percent.

The weaker relationship between the probability a teacher leaves a tested grade in a school and the accountability rating under No Child Left Behind suggests that any increase on the strength of the accountability pressures did not simply lead administrators to move more teachers out of tested grades following the receipt of a low rating. Additional research is certainly needed to learn more about the underlying behaviors of both teachers and administrators that produced the observed teacher transitions.

Conclusions and Policy Implications

Test-based school accountability systems—both No Child Left Behind and the individual state systems—alter the incentives for both administrators and teachers, and the prior evidence and transition patterns presented above suggest that accountability pressures would affect the allocation of teachers among grades and schools and the composition of the teacher workforce. The key questions center on whether the responses are socially productive in that they improve the quality of instruction on average and whether the accountability pressures alter the distribution of teacher quality among schools.

The extent to which principals can distinguish less-effective and more-effective teachers and are willing to act on that knowledge constitutes a crucial determinant of the benefits of accountability-induced changes in the composition of teachers. Although evidence on this question is limited, Jacob and Lefgren (2008) show that principals in a mid-sized school district somewhere in the western United States can effectively identify teachers at the extremes of the teacher productivity distribution. The willingness to use such information remains a largely unanswered question.

The evidence on teacher transitions also indicates that teacher turnover is not unambiguously bad, particularly for high-poverty schools. Prior analyses of

teacher transitions unrelated to any effects of accountability found clear patterns of mobility related to the working conditions of schools. But the policy implications of these earlier studies—like whether greater transition should be considered a net overall good or bad—became much less clear when they were overlaid with information about the quality of teachers in different transition streams. On average, those teachers staying at the more-disadvantaged schools were better than those leaving, but there was a huge variation in quality for both leavers and stayers (Hanushek and Rivkin, 2010a). If accountability pressures place a greater focus on performance and cause administrators to become more vigilant in pushing out less-effective teachers, that would appear to be a positive change.

Of course, the accountability system may not align administrator objectives with improvements in overall school quality in certain dimensions, and some of the responsiveness to accountability pressures may not be productive from a societal viewpoint. For example, a number of teachers are systematically moving out from under the light of the accountability system and going to a nontested grade or subject. It is not clear that the new outcome is more desirable in terms of longer-run student outcomes, as the quality of teaching in the early nontested grades is likely to be quite important. The issue of the allocation of teacher quality within the school and potential tension between short-run and longer-run objectives merits further investigation.

An important limitation of both the prior evidence and the information on transitions presented in this study is that they are based largely on a static setting that has prevailed since the passage of No Child Left Behind and specific state accountability systems. Specifically, the pre-accountability salary scale used by most districts remains essentially unchanged and the accountability ratings tend to be based on pass rates in tested subjects. Consider three possible changes that have been frequently discussed: 1) the entire salary scale shifts up, but the determinants of salary remain largely unrelated to student outcomes; 2) both the mean and variance of salary increase as a result of the adoption of a pay for performance plan; or 3) accountability moves toward a value-added model that ranks schools on the basis of achievement growth rather than the level of achievement as contained in the pass rate. Implementation of one or more of these types of changes in the current accountability regime might significantly alter the distribution of teacher quality.

For example, an increase in mean salary without any change in variance would reduce the number of accountability-induced exits from teaching. Whether the effect of this policy change would be stronger for more-effective teachers is uncertain. However, the higher salary-induced increases to the well-being of teachers will clearly be infra-marginal for many whose well-being as a teacher far exceeds their well-being in an alternative field, and thus it is a costly way to reduce turnover. Moreover, shifts up in salary scales will not alter the distributional impacts of NCLB favoring nontested grades and schools with higher-achieving students.

Raising both the mean and the variance of teachers' salary increases would tend to raise the desirability of teaching for some teachers and reduce it for others. The net outcome depends on the details of how such a system is implemented. If

teachers are rated based on school performance, for example, such an increase in variance linked to school ratings could amplify incentives to move to a high-achieving school. Educational outcomes are affected by many inputs that a teacher cannot control, which means that higher variance could increase the salary risk of teaching in a way that might tend to increase exits out of teaching.

Finally, a shift away from school “pass rates” and toward teacher or school contributions to achievement gains provides an appealing alternative that is garnering widespread support. A value-added-based measure of student growth can dampen the advantages that teaching in a high-achievement school offers in terms of procuring a high accountability rating. If an improved measurement of performance were combined with an appropriate structure of pay, it could ameliorate, if not reverse, the labor market disadvantages experienced by schools serving disadvantaged students.

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