

**HAVE ASSESSMENT-BASED ACCOUNTABILITY REFORMS
INFLUENCED THE CAREER DECISIONS OF TEACHERS AND PRINCIPALS?**

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Susanna Loeb
IREPP
Stanford University
520 Galvez Mall
Stanford, CA

Jesse Cunha
Department of Economics
Stanford University
579 Serra Mall
Stanford, CA

I. Introduction

Assessment-based school accountability reforms have swept through the states, often including both new standardized tests for students and consequences for teachers, schools, and districts. Beginning with state level reforms that varied in strength and composition, school accountability has become more standardized with the passage at the national level of the No Child Left Behind Act of 2001 (NCLB). The expressed purpose of these reforms has been to promote educational achievement and reduce the disparity in educational opportunities between students. Encouragingly, several studies suggest that the state-level accountability reforms have increased student achievement (Carnoy and Loeb 2003, Hanushek and Raymond 2005). Similarly, the National Assessment of Educational Progress shows gains in mathematics and reading performance for 9 year olds and in mathematics performance for 13 year olds nationally during the past decade, perhaps as a result of standards and accountability.¹

School reforms inherently affect school personnel as well as students. Recent reforms likely constitute substantial changes in teachers' and principals' work lives, including increased scrutiny in the classroom, a more intense focus on student performance, and direct consequences for school funding and management. These changes, in turn, may affect career decisions about whether to join the profession, where to work, and, once working, whether to transfer to another school (migration) or to leave the profession (attrition). Likewise, recent reforms may help administrators identify and replace ineffective teachers and principals.

As for any profession, turnover of personnel can be both beneficial and harmful. What matters is who is leaving and who is taking their place. Turnover of school staff will work against reform goals if the best and brightest are influenced to leave and are replaced by lesser qualified individuals. On the other hand, schools will benefit from reform if it helps to weed out ineffective staff. Answers to some specific questions are needed in order to evaluate the reforms implemented by NCLB: (1) Are school staff voluntarily quitting their jobs due to reforms? If so, who is leaving and which reform mechanisms are causing them to leave? (2) Have reforms allowed administrators to replace ineffective staff? (3) How strong is the pool of replacement staff? Are the new teachers and administrators of high quality? (4) What are the likely long-run

¹ (<http://nces.ed.gov/nationsreportcard/ltt/results2004/nat-reading-scalescore.asp>, <http://nces.ed.gov/nationsreportcard/ltt/results2004/nat-math-scalescore.asp>). There was little change in reading for 13 year olds. For 17 year olds there was no change in mathematics and a very slight decline in reading.

effects of reforms? Are any observed effects of reforms on turnover a one-time occurrence or are they likely to persist?

The purpose of the paper is to study changes in turnover rates among teachers, principals, and pupil-services personnel in response to assessment and accountability systems, as required by Section 1503 of the Elementary and Secondary Education Act, reauthorized by the No Child Left Behind Act. The paper reviews past research and presents new empirical evidence. Unfortunately, there is yet little empirical evidence on the effects of NCLB reforms. This paper therefore draws evidence from pre-NCLB accountability and assessment reforms and discusses how these results can help predict the likely affect that NCLB will have. Accountability and assessment systems will likely affect teachers and principals in different ways – in fact, many systems were designed with these differences in mind. Therefore, the next section of this report addresses teachers’ labor responses to accountability reforms while section III describes principals’ responses.

II. Teacher Turnover

1. Overview

Clearly, there are reasons that teachers may be dissatisfied with assessment-based accountability reforms. Interview and survey research suggests that teachers feel pressure to deliver high student test scores (Barksdale-Ladd & Thomas, 2000; Hoffman, Assaf, & Paris, 2001). In addition, many teachers indicate that they view the high-stakes tests as an imposition on their professional autonomy, an invasion into their classrooms, a message that the state views them as incompetent, and a hindrance to professional creativity (Luna & Turner, 2001). As districts and schools put more emphasis on test performance, teachers may lose flexibility in their classrooms. They may face pressures to teach topics that they are less interested in or believe are less important for students, or they may need to teach in ways that increase test scores but not other important skills. Teachers also may have more day-to-day distractions as parents and administrators scrutinize the details of their classrooms. In addition, teachers may worry about the security of their jobs, particularly if they teach in schools with low-performing students, which are more likely to encounter repercussions from the state. New teachers may be especially vulnerable to the additional burdens placed on them by high-stakes testing and accountability systems. Given the already high propensity to quit and desire to be effective with

their students among new teachers (Johnson and Birkeland 2002), additional scrutiny and the threat of sanctions can easily further dissuade new teachers from staying in the field through the arguably hardest first few years of teaching. More experienced teachers, alternatively, may respond more strongly to the changes because new teachers enter with little familiarity with older policies while experienced teachers undergo changes while on the job.

Yet, this increased emphasis on accountability and rewards may not be all bad for teachers. Standards-based reforms can provide opportunities for schools to focus on student learning. While this was sure to have been the case in many schools prior to the recent reforms, there were other, poorly functioning, schools that were occupied in other ways. Administrators may use accountability policies as leverage with the district to get rid of ineffective or distracting teachers and may simply focus more on trying to create a school that benefits students. Teachers may prefer to teach in these environments rather than in environments that do not recognize success in the classroom. In addition, as a result of the pressures on schools, administrators may encourage their best teachers to move into the grades and fields where testing is mandatory, in hopes of raising their schools' scores. One way to encourage such reassignment of teachers, for example, would be to target additional resources to the tested grades and subject areas. If this were the case, we may see high-quality teachers moving into jobs that most directly impact student scores on the standardized tests.

Thus, it is unclear, *a priori*, how the recent reforms will affect teachers. They may dissuade potential teachers from entering the classroom, increase transfers, or may increase the probability that teachers will quit. These effects may be greatest in low-performing schools that already have difficulty attracting and retaining well-qualified teachers. However, the effects may work in the exact opposite direction if testing and accountability have made teaching more satisfying, especially in schools that had been mismanaged prior to reform.

To date, two prior studies, one in New York and one in North Carolina, estimate the effects accountability and assessment on teacher turnover. The New York study finds that the introduction of testing did not increase turnover in the tested grades. The North Carolina study, however, finds that turnover increased more in high poverty than in low poverty schools after the introduction of accountability, though it does not establish that accountability caused this change. The work of this report adds to this small literature by directly estimating reform-influenced teacher turnover at the national level. It finds that, compared to other reasons for leaving,

accountability reforms have had a relatively small influence on teacher turnover. Reforms have affected different teachers to different degrees and in different ways though overall the effects are small. Specific differentials include: (1) highly experienced teachers are more likely than new teachers to quit because they disagree with new reforms, (2) new teachers are more likely than more experienced teachers to quit because they do not believe that they are prepared to implement new reforms, (3) teachers in urban schools and largely minority schools are more likely than teachers in other schools to both disagree with and be unprepared to implement new reform measures, and (4) teachers are much more likely to be fired in post-reform years than pre-reform.

2. Review of Literature

The few case studies mentioned above have informed researchers about the channels through which assessment-based accountability reforms can impact the motivation and behavior of teachers. A general finding of this descriptive literature is that not only the type of reform, but how it is implemented, is of paramount importance to teachers' satisfaction. Teachers value cohesive, supportive work environments that acknowledge their efforts to promote student achievement (Johnson and Birkeland (2002), Luna and Turner 2001, Heneman 1998). Therefore, reforms, to the extent that they positively or negatively influence these aspects of the work place, will likely influence migration and attrition decisions. While these studies provide insights into the mechanisms by which accountability reforms could affect teachers' decisions, they do not directly assess the extent to which these reforms have actually impacted teachers' careers. Two empirical studies, Boyd, Lankford, Loeb, and Wyckoff (2006) and Clotfelter, Ladd, Vigdor, and Diaz (2004), directly measure these effects and are reviewed below.

Boyd, Lankford, Loeb, and Wyckoff (2006)

Beginning in the 1998-99 academic year, New York State instituted a revised student assessment system that reflected higher learning standards and included mandatory tests in English Language Arts and Mathematics for grades four and eight. The content of the tests is tied to curriculum that is intended to lead to a high school exit exam, and the results of the tests are publicly reported. In this paper, the authors examine the effect that the introduction of testing in the 4th grade had on teachers' career decisions. Surprisingly, they find that the probability of

turnover (whether to teach in another grade or to exit teaching altogether) was *lower* for fourth grade teachers in testing years compared to other elementary school teachers.

The study uses demographic, school, and career information on *every* 1st through 6th grade teacher who was a part of the New York State public school system any time between the 1994-95 and 2001-02 school years.² This eight-year record surrounding the implementation of the test allows the researchers to track individual teachers across grades and schools over the course of their employment in any New York State public school, identifying the grade-level taught both before and after the implementation of testing. Three specific questions addressed by the authors are: 1) Did the introduction of testing in the fourth grade increase the turnover of fourth grade teachers? 2) Did testing differentially affect turnover for fourth grade teachers with different characteristics? 3) Did the new testing system affect what types of teachers decided to enter fourth grade?

In order to isolate the effect of testing from other contemporaneous policies or economic changes that could possibly affect turnover, the authors exploit the fact that testing was targeted at fourth grade teachers, while any other changes likely affected all elementary school teachers equally. They therefore compare turnover probabilities between test-exposed fourth grade teachers and other elementary school teachers in non-tested grades. In this way, the approach utilizes the variation in the testing policy by grade and relies on differences across grades to identify the policy's effects.

1. Has the introduction of testing in the fourth grade increased the turnover of fourth grade teachers? Using the entire universe of first through sixth grade teachers who taught in New York State between 1994 and 2001, the authors estimate a logit model predicting the probability a teacher will leave the grade he or she taught that year, as a function of teacher and school characteristics. Interaction terms between teaching in the fourth grade and post-reform years capture the differential impact testing had on the exit propensities of fourth grade teachers after implementation of the tests. The model is further estimated for subsets of teachers split by geographic location (urban, suburban, or rural) and by school-level student test performance.

² The core data come from the Personnel Master File (PMF), part of the Basic Education Data System of the New York State Education Department. The NYS Teacher Certification Database (TCERT) combined with the Barron's ranking of college selectivity, provide a measure of college selectivity. The NYS Teacher Certification Exam History File (EHF) provides teacher certification exam scores of individual teachers and whether they passed the exams on their first attempts. A school-level dataset adds information on the location, grade span, student composition, and student performance for each school.

Table 1 shows the odds ratio of the interaction of fourth grade teacher with post-reform years for various model specifications³. Contrary to the popular belief that the burden of testing will increase turnover, the authors find that fourth grade teachers in post-reform years are significantly *less* likely to leave the grade, compared to teachers in other elementary grades and years. This reduced turnover is evident across all geographical locations and quartiles of student test performance.

2. Has the introduction of testing in the fourth grade differentially affected the turnover of teachers with different characteristics? The authors expand the previous model accounting for the possibility that testing had a differential effect on fourth grade teachers with different levels of teaching experience and ability. Here, ability is measured by the competitiveness of a teacher's undergraduate institution and whether they failed a teacher certification exam. Table 2 summarizes results for some model specifications, reporting odds ratios of the relevant interaction terms. When compared with first year teachers, more experienced teachers are *more* likely to leave the fourth grade post-reform. However, this effect is confined to suburban and high-achieving schools. The authors speculate that this differential leaving by more experienced teachers may be due to an unwillingness to change teaching styles or curriculum to conform to test requirements. Differential, post-reform turnover patterns among teachers with varying college backgrounds are also evident. On average, teachers from the most competitive colleges are *less* likely to leave fourth grade post-reform compared to those from less-competitive colleges. Again, this effect is driven by the reduced exit of these high-ability teachers from suburban and high-achieving schools. Whether this differential is due to teachers themselves or administrative decisions, this is evidence that testing has had the positive influence of keeping high quality teachers in tested grades.

3. Have the characteristics of teachers entering the fourth grade changed with the introduction of testing? Looking at the subset of teachers who are new to any grade, the authors test to see whether new, post-reform fourth grade teachers were significantly different than other teachers new to a grade. Table 3 shows coefficient estimates of the interaction between teaching fourth grade and being in a post-reform year in these models. This term measures the extent to which teachers new to the fourth grade in a testing year are more or less likely to have the specified characteristic relative to other teachers new to a grade. The table shows that teachers

³ For details see Boyd, Lankford, Loeb, and Wyckoff (2006).

new to the fourth grade are less likely to be first year or very experienced teachers, while they are more likely to have one to four years of experience prior to the start of the school year. There is also some evidence that teachers new to the fourth grade are more likely to have attended a highly competitive college, although this result is only statistically significant for teachers in low-achieving schools. This last finding may be a result of administrative attempts to place better teachers in classrooms whose performance on state tests will represent the overall performance of the school. While this may be beneficial for the tested grades, other students may suffer to the extent it draws high quality teachers away from other grades.

In summary, the results of Boyd, Lankford, Loeb and Wyckoff (2006) contradict the popularly-held belief that teachers tend to leave grades that are subject to state-sanctioned standardized tests. In fact, post-reform, fourth grade teachers were *less* likely to leave the grade, compared with teachers in all other grades and years. Moreover, this result is robust for teachers in schools across the range of student achievement and urbanicity. High-quality administrative data and a wide variety of schools and communities in New York State made for an excellent environment in which to explore the effect of testing on teacher turnover. The implementation of testing in just one elementary grade allowed the authors to isolate the effect of this reform from other contemporaneous economic and political factors. A drawback to this approach, however, is that the effect of assessment may extend beyond the tested grades. In this case, a comparison between the tested and non-tested grades would miss some, if not all, of the effects of the reform on teachers' labor decisions. Although there are clearly benefits to this analysis, it alone cannot be definitive. Assessment-based accountability reforms vary across states and, in particular, New York's system does not have direct repercussions for teachers, such as increased pay for higher performance or sanctions for underperformance. Therefore, while this study suggests that testing in and of itself does not exacerbate teacher turnover, it can not address whether other assessment-based repercussions implemented either by states or NCLB could illicit different responses.

Clotfelter, Ladd, Vigdor, and Diaz (2004)

In contrast to New York's straightforward assessment policy lies the accountability system implemented in North Carolina in the 1996-97 academic year. This sophisticated system provided the opportunity to examine two other common mechanisms used to hold schools

accountable for student performance, namely, the labeling of low-performing schools and merit pay for exemplary achievement. Students in kindergarten through 8th grade were tested each year and, using a combination of the average level of student achievement and the yearly change in average test scores, schools are ranked as “exemplary”, “no recognition”, or “low-performing”. Low-performing schools fail to meet both the state-mandated standard for growth in test scores and have more than 50 percent of their students performing below grade level. Exemplary schools meet both of these requirements and teachers in those schools are rewarded with a bonus of \$1500. Low-performing schools are labeled as such and administrators are pressured to improve. One drawback of a system like this is that it gives teachers the incentive, all else equal, to work for the school that is most likely to receive an “exemplary” status and hence receive the pecuniary bonus. Given that high quality teachers are in greater demand than those of low quality, and therefore have a comparative advantage in choosing the school they wish to work in, this merit pay policy may give the best teachers an incentive to leave low-performing schools for high-performing ones. Thus, this policy could exacerbate the current problem low-performing schools have in retaining high-quality teachers. While the labeling of schools as “low performing” may induce teachers and administrators to work harder, it may also have the unintended consequence of deepening the incentive for teachers at these schools to flee. The authors therefore explore the hypothesis that this accountability system has differentially influenced the exit decisions of teachers from low-performing schools.

The data for this study includes information on all teachers and their students in North Carolina between 1994 and 2001. The authors estimate whether teachers are more likely to quit low-performing schools, are more likely to quit post-reform, and are more likely to quit low-performing schools differentially post-reform. Table 4 replicates Table 3 from their paper. For a typical teacher with 10 years of experience working in low performing schools prior to the reform, the probability of leaving the school was approximately 17.6 percent. After the reform this increased to 19.1 percent. This 1.5 percentage point increase compares to a 0.5 percentage point increase for teachers who were not in low-performing schools. For new teachers, the change was 5.1 percentage points for low performing schools and 0.8 percentage points for those in other schools. The increase in the probability of leaving was even greater for those low-performing schools labeled as such by the state. Following reform, low-performing schools saw

a substantially greater increase in the turnover rate of their teachers than did higher performing schools.

In another part of their analysis, the authors assess whether the characteristics of teachers changed following reform. As shown in Table 5 (Table 6 in the paper), they find little difference between the changes in low-performing and higher-performing schools. Low-performing schools were more likely than other schools to have novice teachers prior to accountability (38 percent vs. 30 percent), but this tendency did not increase following reform. However, the *trends* in the percent of novice teachers did change. The four years prior to reform show a drop in novice teachers and teachers from non-competitive college in low-performing schools. This trend did not continue in the years following reform. The change in trends before and after reform is not evident in higher-performing schools, although due to large standard errors the differences between school types are not statistically significant. This result is suggestive, but not confirmatory, of a negative effect of reform on the qualifications of teachers in low-performing schools.

However, while the results are suggestive, they are not strong evidence of the effects of accountability. Low-performing schools face a greater difficulty in attracting and retaining teachers even without accountability reforms. As such, they are more susceptible to changes in the supply of and the demand for teachers. California's class size reduction provides a vivid example of this phenomenon. When California dropped early elementary class size from 30 to 20 students, all elementary schools faced an increased demand for teachers. However, because high-performing schools are generally more attractive to teachers, these schools were able to pull teachers from lower-performing schools. Thus, low-performing schools needed more new teachers, not only because of the decreased class size but because many of their teachers left to move to other schools. This reform created a highly visible problem for difficult-to-staff schools; yet, less dramatic increases in the demand for teachers or decreases in the supply for teachers are likely to create similar disparities between high- and low-performing schools. Supply and demand changes magnify in low-performing schools. Thus, any change that might have been occurring in North Carolina concurrent with the reform could easily impact low-performing schools more than high-performing schools. We see that the probability of leaving other schools increased over the time period, although not as much as in low-performing schools. This magnification of the change in low-performing schools could be the result of any policy or

economic force that influences the supply or demand of teachers, and not just policies that specifically target low-performing schools.

Summary of Literature Review

The two studies of the effects of state-led accountability reforms provide somewhat contradictory results. The New York study analyzes the effects of the introduction of moderate-stakes tests to grade four. It finds no evidence that an increased emphasis on test performance increases turnover or makes classes more difficult to staff. On the other hand, the North Carolina study looks at the effects of a higher-stakes accountability system and finds higher turnover in low-performing, high-poverty schools post reform, though it is unable to show conclusively that the difference is the result of reforms. More than identifying the likely effects of NCLB on teacher turnover, these studies show that the effects are not necessarily negative; the reforms may affect different teachers and different schools differently; and the details of the reforms and the related incentives they create are important to understand. Thus, because NCLB allows substantial variability across states in how it is implemented, including the tests and the definitions of subgroups for examples, and states vary in characteristics of schools and the policy context in which the reforms were implemented, the effects of NCLB may be quite different in different places.

3. Empirical Methods and Data for New Empirical Research

The two studies reviewed so far each look at only one state. Yet, across most states, the 1990's saw a variety of state-level reforms aimed to hold teachers and schools more accountable for the performance of their students. These initiatives often included new tests, consequences for underperformance, and rewards for achievement. As discussed above, the effects of these reforms on teachers' career decisions are, a priori, ambiguous. This report now addresses three issues related to teacher turnover across states in the 1990s: (1) whether teachers left their jobs or plan to leave in the future (voluntary teacher turnover) due to reforms, (2) whether reforms

allowed schools to fire ineffective teachers (school-initiated teacher turnover), and (3) whether new teachers are different than they would have been without reform.⁴

This cross-state analysis is constrained by the availability of national data. Yearly surveys of turnover, spanning the reform years, would be ideal; however, the only nationwide survey of teachers and turnover rates is the US Department of Education's Schools and Staffing Surveys (SASS) – a nationally representative, random surveys of U.S. districts, schools, and teachers – and its companion, the Teacher Follow-Up Survey (TFS). There have been five waves of the SASS to date, in 1987-88, 1990-91, 1993-94, 1999-00, and 2003-04. In the year following each wave, sampled schools were re-contacted to determine whether SASS-surveyed teachers had moved to a different school or left the teaching profession. A random sample of these “movers”, “leavers”, and “stayers” were administered the TFS. Unfortunately, data from the survey most relevant for analyzing NCLB, the 2003-04 TFS, is not yet available.

Voluntary Teacher Turnover Analysis — While there are many reasons a teacher may leave the profession or change schools, for the purpose of this report it is important to isolate how much of the observed turnover is attributable to recent school reforms. Two approaches aim at this goal. First, the 1999-00 wave of the Teacher Follow-up Survey both identifies which teachers quit their jobs and specifically asks them why they quit their job. This data allows the separation of reform-influenced turnover from other types of turnover and gives us a plausible upper bound on the size of the effect. It shows that the overall influence of new reforms on turnover after 1999-00 is relatively small, on the order of 1-3% per year, and comparable to traditional reasons such as retirement or changing one's residence. Although the influence of reform is small, certain subgroups of teachers, such as new teachers and those in urban schools, appear to have been affected by reforms differentially. However, these differentials work in predictable ways.

The second approach asks whether changes over time in turnover patterns are different for states that implemented reforms of different strength. If, for example, states which implemented strong reforms saw different changes in turnover patterns than weak-reform states, this might be an indication that reforms were responsible for this differential turnover pattern.

⁴ As noted earlier, data is not yet available to analyze directly the effects of NCLB. But, the mechanisms included in the NCLB act are similar to those previously implemented by many states and conclusions drawn from these empirical exercises can help us predict the likely affects of NCLB.

This analysis combines raw turnover data⁵ from two waves of the TFS, from 1993-94 and 1999-00, and exploits the facts that 1) there were few state-level school accountability systems in 1993-94 (Texas, Florida, North Carolina, and South Carolina are exceptions to this), and 2) between this period there was large variation in the strength and degree of new state-initiated accountability reforms. This variation was quantified in a one to five scale by Martin Carnoy and Susanna Loeb in their 2003 study of the effects of accountability reforms on student outcomes, and is utilized here. Appendix A discusses and displays, by state, this index and the relevant policy mechanisms that define it. The analysis identifies the independent effect of accountability on turnover by looking at how reforms are correlated with changes in turnover patterns, rather than using self-reported data as in the first approach.

The observed reform-influenced turnover studied above is not the whole story, however, as it may take time for teachers to react to reforms. A third analysis below utilizes data on teachers' future labor plans and asks whether reforms of varying strength have differentially affected teachers' plans to remain in teaching. Fortunately, the data is available from the 2003-04 SASS, as well as from 1993-94 and 1999-00. The data allows the measurement of early impacts of NCLB and the comparison to state-level reforms in the period leading up to national accountability implementation.

School Initiated Teacher Turnover Analysis – The new analyses next explore whether reforms have helped schools to identify and dismiss ineffective teachers. Standardized assessment and school report cards may help and encourage administrators to identify ineffective teachers; and increased emphasis on equitable growth in student achievement may provide schools with greater incentives and greater power to dismiss the lowest quality teachers. The available data, however, is self-reported by the teacher and may be only a weak measure of dismissals attributable to ineffective teaching –caution in interpretation is therefore warranted.

New Entrants to Teaching Analysis – This section of the analysis asks whether accountability reforms have influenced what types of people choose to enter the teaching profession. Have reforms deterred the best and brightest from becoming new teachers? Or are reforms attracting young professionals to the teaching career because they now feel their efforts will be acknowledged and appreciated? To shed some light on these questions, the analysis looks at average changes in the competitiveness of a new teachers' undergraduate institution

⁵ Note, this exercise uses all teacher turnovers, not just reform-influenced turnovers as the above analysis.

between the 1993-94, 1999-00, and 2003-04 waves of the SASS. While more competitive colleges may or may not provide better training for potential teachers, attendance at one is certainly, on average, a signal of a high innate ability. If the average college quality of new teachers has changed differentially in states with different strength accountability reforms, it may be plausible to attribute these changes to reforms rather than other contemporaneous factors. Our measure of the competitiveness of an undergraduate institution comes from the Barron's ratings of higher education institutions.

A word of caution is required for all of the above analyses. State-level accountability systems nationwide were not randomly implemented. That is, districts and states adopted systems to suit their specific populations of students and staff and their particular policy environments. Therefore, the relationships observed may be specific to those policy environments and not generalizable to other areas.

4. Discussion and Results

1. Voluntary Teacher Turnover

Self-reported, reform-influenced teacher turnover – In the 2000-01 TFS, both teachers that left the profession (“leavers”) and teachers that moved to a different school (“movers”) were presented with a list of possible reasons for quitting and were asked to rate each reasons level of importance in the decision to quit on a 5-level “not at all important” to “extremely important” scale. Movers and leavers, however, were given different sets of possible reasons, with little overlap. Fortunately, two reasons asked of both groups related to “new reform measures” – they are “I do not agree with new reform measures” and “I did not feel prepared to implement new reform measures.” While other reforms likely took place during this time period, standards and assessment-based accountability were the dominant reform in virtually every state in the nation. We believe it is reasonable to assume that teachers answered this question with accountability reforms, or reforms linked to this overall movement such as related professional development, in mind. Other reasons for quitting presented to both movers and leavers include to retire, being laid-off, to find a job with better salary or benefits, to change residence, and being dissatisfied with changes in their job description or responsibilities. We include these reasons in our analysis to gauge the relative magnitude of reform-induced turnover.

Turnover decisions tend to be influenced by many factors. Reflecting this, most teachers reported multiple reasons as being “important” in their decision to leave their current job. Given the questioning format, it is impossible to know whether or not accountability reforms were the most important reason why a teacher quit. In what follows, we provide both liberal and conservative measures of reform-influenced turnover after the 1999-00 school year to get a sense of the range of possible effects.

To put this analysis in the context of overall teacher turnover, we provide estimates of aggregate attrition rates for full-time, public school teachers after both the 1993-94 and 1999-2000 academic years.⁶ Table 6 shows these results, along with the attrition rates for separate experience groups and urbanicity. Overall attrition increased slightly between the two survey waves, while the fraction of movers and leavers remained roughly constant, at half each. Consistent with other studies, attrition rates are significantly higher for new teachers (Boyd, Lankford, Loeb, and Wyckoff 2005).

The columns of Table 7 list three different estimators of the amount of influence various factors had on the quit decision of teachers.⁷ The first, and arguably most liberal, is the percentage of teachers that listed with any degree of importance new reforms as a reason for leaving. We can see 2.54 percent of teachers left because to some degree they “did not agree with new reform measures”. Likewise, 1.82 percent of teachers “did not feel prepared to implement the new reform measures.” The third row shows that 3 percent of teachers either did not agree with or did not feel prepared to implement the new reforms. This accounts for the fact that some teachers may have listed both measures as reasons for leaving. The amount of reform-influenced turnover is similar to turnover influenced by both changing residence and retiring, at 4.15 percent and 2.6 percent respectively. Furthermore, when compared with the overall attrition rate of 14.57 percent (Table 6), this very liberal estimator shows approximately 21 percent of teacher turnover was influenced in some degree by the new reforms.

Some teachers may have been ready to leave their job regardless of the new reforms, for example to retire or raise kids. For these teachers, accountability reforms might have been “slightly” or “somewhat” important in the decision to leave, yet not have enough of an impact to

⁶ All other analyses are similarly restricted to full-time, public school teachers.

⁷ To focus on voluntary turnover, as opposed to school-initiated turnover, we exclude from this analysis teachers who indicated that “I was laid off or involuntary transferred” was “very” or “extremely” important in the decision to quit, about one percent of all teachers. School initiated turnover patterns are discussed below in more detail.

induce quitting by itself. We therefore look at a more conservative measure – the percentage of teachers that listed reform measures as being “very” or “extremely” important in the decision to leave – to get a better sense of the independent influence accountability reforms had on teacher turnover. This measure is listed in column 2 of Table 7. One trend is immediately apparent. While the differences between columns 1 and 2 are small for reasons that will likely induce turnover on their own, such as retirement or being laid off, the percentages fell by half for accountability related reasons. This supports the hypothesis that accountability is only one factor among many that, when combined, induce a teacher to quit her job. Using this more conservative measure, the share of overall turnover influenced by accountability reforms fall from about 21 percent to approximately 9 percent.

However, since teachers can list more than one reason for leaving, neither of the above measures captures fully the independent effect of accountability on turnover. For example, suppose both “changed my residence” and “dissatisfied with new reform measures” were important factors for leaving. We don’t know if one reason by itself would have been sufficient to induce leaving if the other was not present. We therefore create one last measure of the amount of turnover due to various reasons – whether the reason listed was given the highest level of importance out of all reasons. If another reason for leaving was given a higher ranking than a reform-related reason, it is an indication that the teacher might have left anyway for that highest-ranked reason, independent of the influence of new reforms. These estimates listed in column 3 of Table 7 are, not surprisingly, smaller yet quite similar to those in column 2.

Multivariate regressions allows us to explore whether there are significant differentials in reform-influenced turnover across different types of teachers. We estimate logit models of the probability that a teacher quits due to accountability reforms, conditional on personal, school, and state characteristics. For simplicity, we only count a quit as reform-influenced if the teacher listed reforms as being “very” or “extremely” important in the decision to leave (that is, the estimates from column 2 of Table 7). Table 8 displays these results. Looking first at column 1, we can see that the most experienced teachers, compared to less experienced teachers, were more likely to quit because they did not agree with new reforms, consistent with the findings of Boyd, Lankford, Loeb, and Wyckoff (2006) from New York State. New teachers, however, were more likely to quit because they feel unprepared to implement new reforms. Quitting because of disagreement with new reforms was the strongest for urban teachers and those in schools with

high minority concentrations. This may be because reforms changed the work environment the most in these schools.

Tables 9 and 10 estimate the above logit models by teacher sub-population. Interestingly, reform-influenced turnover is correlated with the strength of those reforms only for certain subsets of teachers. It appears accountability strength had a positive influence on new teachers; the probability they quit is smaller in strong reform states. This is consistent with the view that new teachers benefit from the structure imposed by reforms. However, the effect was opposite for suburban teachers; they were more likely to quit in strong accountability states. This result is consistent with the findings of Boyd, Lankford, Loeb, and Wyckoff (2006) from New York State, however, it must be kept in mind that overall, urban teachers are still more likely to quit due to reforms than are suburban teachers.⁸

While this analysis is informative, it has a number of limitations. For one, the reasons presented to quitters concerned the importance of “new” reform measures in the decision to quit. Therefore, the timing of accountability reforms matters. If a teacher was hired while the new accountability system was already in place, there would have been no “new” reforms to speak of and the responses will underestimate the impacts of reforms on turnover. Another limitation is that we only have data from the 1999-00 school year. Given that different states were in different stages of the reform process, these estimates only capture some of the reform-influenced turnover. That is, teachers may have already left, or will leave in the future due to reforms.

To summarize, self-reported data on teacher turnover from the 2000-01 TFS shows us that (1) compared to other reasons for leaving, accountability reforms have a relatively small influence on turnover and (2) reforms influenced the turnover of different types of teachers to different degrees and in different ways. Next, we pursue a different empirical strategy to answer the same question; we now look at aggregate turnover patterns pre- and post-reform, and see if changes are correlated with the strength of accountability reforms introduced.

⁸ In analyses not presented, we include the competitiveness of a teachers’ college as a control and find there was no significant differential in terms of the probability of quitting due to reforms for the population as a whole as well as various subgroups. To the extent that college quality predicts the quality of a teacher, this is evidence, however slight, that the “best” teachers are not more likely to quit due to reforms.

Voluntary teacher turnover, Difference in difference study – We use the two available waves of the TFS, from 1993-94 and 1999-00, to estimate a difference in difference logit model predicting the probability of teacher attrition. We control for teacher and school characteristics, by survey wave, and look for differentials in teacher turnover across accountability system strength. Table 11 displays the odds ratios for an interaction term between the 1999-00 wave and accountability strength, for the full sample, and for selected sub samples of teachers. We can see that only for suburban teachers with little experience and those in mostly minority schools was there a significant effect of accountability strength. DISCUSS MORE HERE

Teachers' Future Career Plans – Next we ask whether accountability reforms have influenced teachers' *future* plans to leave teaching. We again use a difference in difference approach, looking at how changes between survey waves in plans to quit correlate with accountability strength. As this exercise uses data from the SASS, rather than the TFS, we include the most recent wave, from 2004, along with the 1993 and 1999 waves, and can observe the influence of the early years of the NCLB act. The independent variable in this logit analysis is an indicator created from the survey question “How long do you plan to remain in teaching?” This indicator variable equals one if a teacher indicated any degree of wanting to leave teaching.⁹ An interaction between accountability strength and the 1999 SASS wave dummies estimates whether teachers in high accountability states were relatively more likely to want to leave the teaching profession post reform. As the NCLB act tended to unify accountability systems across states, an interaction between the 2003 SASS wave dummy and the accountability index tells us the inverse of the 1999 interaction term. That is, a higher accountability index means that state underwent less reform than a low index state.

The results presented in Table 12 show that neither of these differentials exist for the teacher population as a whole. When we allow the effect to vary across subpopulations of teachers, two differentials are significant. First, new suburban teachers are less likely to want to leave teaching in 1999 in higher reform states. Second, for suburban teachers with 7-10 years of experience, those in states that underwent more reform between 1999 and 2003 were *more* likely to want to leave in 2003. While these results are contradictory, the overall effect appears to be

⁹ Independent variable equals one if the teacher responded she “Will probably continue unless something better comes along” or she “Definitely plans to leave teaching as soon as I can.” It takes the value zero if she responded “As long as I am able,” “Until I am eligible for retirement,” or “Undecided at this time.”

that accountability reforms, both pre- and post-NCLB, had little influence on teachers' future career plans.

2. *School-initiated teacher turnover* – Thus far, we have focused on how accountability reforms have affected the supply of teachers. Reforms, however, may also affect the types of teachers demanded by schools. We use the self-reported data on reasons for leaving from the TFS to identify teachers who indicated that their departure from the school was not voluntary.¹⁰ Fortunately, involuntary turnover was offered as a reason in both the 1993-94 and 1999-00 waves of the survey, so a difference in difference analysis is again possible. We would like to know whether the proportion of teachers that leave involuntarily varies with the accountability system strength, and to test this, we estimate a logit model of the probability a teacher's job was terminated by the school. As before, an interaction term between the 1999-00 survey wave and accountability strength captures the desired differential. Two caveats, however, are in order. First, school-initiated turnover levels are very small – significantly less than 1% of teachers per year. Second, this data is self-reported by teachers, whose reasons for leaving may or may not agree with what their school would say was the reason for leaving.

Table 13 summarizes this analysis. Odds ratios for two variables – the 1999 wave dummy and this dummy interacted with accountability strength – are shown, for models run on the full population of teachers, and for various subgroups.¹¹ First, note that overall there is a *much* greater probability – a 4.74% greater probability – of being fired in 2000-01 than in 1993-94, and this trend is apparent in almost all sub-groups. While we recognize that differential wording of the questions between waves may be responsible for this disparity, it is striking, and may be reflecting the greater ability of administrators to fire teachers post-reform. This view is strengthened by the odds ratios from column 2, which show that certain subgroups of teachers

¹⁰ A potential problem exists in that the questions asked in the two TFS waves were not worded the same, or measured in the same scale. In the 1994-95 wave, teachers were allowed to indicate up to three reasons for their turnover, with no indication of relative importance; one of these was “School staffing action (e.g., reduction-in-force, lay-off, school-closing, school reorganization, reassignment).” In the 2000-01 wave we only know if “I was laid off or involuntary transferred” was of some degree of importance in a turnover. To make these waves comparable, we label a turnover as school-initiated if: (1) “school staffing action” was listed at all in the 1994-95 wave, and (2) being laid-off or transferred was “very” or “extremely” important in the turnover decision in the 2000-01 wave.

¹¹ Also included in the regressions are gender, race/ethnicity, experience, whether or not a teacher teaches elementary school, the competitiveness of the teachers' undergraduate institution, log of salary, the percent of black or Hispanic students in the school, and whether the school is urban or suburban.

were affected differentially by reforms of different strength. For example, among teachers with 3-6 year of experience, a one unit increase in accountability strength was associated, on average, with being 3.1 times more likely to leave their job involuntarily. The positive association also holds for new suburban teachers, but there is a negative association among schools with the most minorities.

3. Effect of Accountability Reforms on New Teachers – Finally, we ask whether accountability reforms have influenced the types of colleges new teachers attended. With pooled observations from the 1993-94, 1999-2000, and 2003-04 SASS waves, we estimate ordered logit models predicting the five-level competitiveness of a teacher’s undergraduate institution. Interactions between accountability strength and SASS wave dummies let us see if variation in accountability strength is associated with changes in college competitiveness for new teachers post-reform. The interaction between the index and the 2003 wave dummy can be interpreted as explained the *Teachers’ Future Career Plans* section above. Again, we estimate this model for new teachers overall, as well as for various sub-samples of new teachers.

The first two columns of Table 14 shows that, on average, competitiveness of new teacher’s colleges decreased monotonically from 1993 to 2003. Furthermore, the decrease in average competitiveness was greater in states with stronger accountability reforms in 1999. This decrease, however, was driven mostly by new teachers in urban schools and new elementary school teachers. Between 1993 and 2003, there appears to be no significant variation in changes in college competitiveness of new teachers

5. Summary of Teacher Section

How have teachers responded to assessment-based accountability? The research on this is not deep. There is evidence from New York State that when tests are implemented in some grades but not others, teachers do not disproportionately leave tested grades. In fact, perhaps due to increased attention to those grades, turnover rates are lower and new teachers are more qualified than in the comparison grades. However, what happens when accountability and testing is implemented throughout the system? The results are less clear. A study from North Carolina suggests that teachers avoid low achieving schools when those schools are branded “low achieving” or when there are monetary incentives to work in higher achieving schools.

National, self-reported data on teachers suggests that accountability reforms have *not* led to substantially increased turnover of teachers. Approximately 14.6 percent of teachers transferred across schools or left teaching between the 1999-2000 and 2000-'01 academic year. Only one percent of teachers indicated that disagreement with reform measures was very or extremely important in their decision to leave, and this rate was no higher in states with strong accountability policies than in states with weaker policy.

****Update below after doing new analyses****

In fact, for new teachers (those with less than three years of experience), reform-driven attrition was lower in states with stronger accountability. Similarly, when we look at teachers plans for the future, we see no relationship between plans to remain in teaching and the strength of the accountability system in their state. Using a very weak proxy for teacher quality, the competitiveness of the teachers' undergraduate institution, we find that the average competitiveness dropped relatively more in strong accountability states in the 1990s, especially in urban schools and in elementary schools. We also found that the probability of being laid off increased during the 1990s, which may be the results of accountability but may be due to other changes as well.

IV. Principal Turnover

1. Overview and Review of Literature

Accountability reforms may have affected principals' jobs to an even greater extent than they affected teaching. The implications of these changes, however, are not clear *a priori*. Accountability reforms often include decentralization, moving from a top-down, district mandated approach to one in which principals have more control over curriculum, budgeting, hiring, firing, and classroom organization. The idea behind this change is that greater flexibility at the school level will allow principals the flexibility to do what is necessary to improve student outcomes (Oberman 1996, Ladd and Zelli 2002). Loeb and Strunk (2005), for example, show that in the 1999-00 school year principals indicated having more control over their schools the stronger the accountability system, and that this control had increased most in states that implemented stronger accountability policies.¹²

¹² Accountability strength is again measured by the Carnoy-Loeb accountability index.

At the same time that principals gain control, they are held more accountable for the performance of their students, facing both possible dismissal for underperformance and recognition for success. Many reforms have increased the transparency of school performance to the public through school report cards and other means. Principals then may be forced to play a more political role, answering to the community, to teachers and to the district (Oberman 1996). Thus, reforms have given principals greater control to perform their job well, but at the cost of greater responsibilities and repercussions for not delivering high student growth. Principals may not be happy with the increased pressure or responsibilities, but, research suggests that many principals also desire recognition of their work and control over the resources necessary to do their jobs (Oberman 1996). Reforms, therefore, may be desirable to some principals and less desirable to others.

Accountability systems may also have distributional effects. Reforms may be more likely to induce principals to leave underachieving schools relative to other schools. On the other hand, principals seeking to promote change may be drawn to those schools that have the most room for improvement if they now have the resources and flexibility they need to be effective. Over time, accountability may lead to a better principal staff if good principals can be found to replace those who are either dismissed or leave due to dissatisfaction with reforms.

In considering the effect of accountability on principals, we would like to be able to answer the following questions: (1) To what extent are principals voluntarily quitting their jobs due to reforms? If so, who is leaving and which reform mechanisms are causing them to leave? (2) Have reforms allowed administrators to replace ineffective principals? (3) Have the reforms changed the pool of prospective principals? (4) How has reform-influenced turnover of principals affected student academic achievement?

Unfortunately, empirical evidence on reform-influenced principal turnover is scarce and inconclusive – even thinner than the research on teachers. Oberman (1996), for example, finds evidence that principal turnover rates in Chicago increased concurrent with reforms that included significant changes in the job of school principal. However, the study does not adequately address which principals left, why they left, or whether this turnover was beneficial or harmful to reform goals. Principal attrition is not necessarily bad for students, if the principals leaving are ineffective. One of the goals of reform may be to remove ineffective principals and replace them with more effective ones. Unfortunately, there is evidence that many districts have been , and

are, having trouble finding and retaining qualified principal candidates, especially in the face of reforms. (Whitaker 2001; Winter and Morgenthal 2002).

2. Empirical Evidence on Principal Dismissal due to Assessment and Accountability

While there is no direct data available on reform-influenced, voluntary principal turnover, we present some estimates of the rates of involuntary principal dismissals. Both the 1999-00 and the 2003-04 SASS district questionnaires ask whether any schools in the district “had the principal reassigned or released” in the last 12 months due to student achievement.¹³ As this question only applies to those districts that were subject to sanctions, we only include them in the analysis.¹⁴

Table 15 estimates the percent of schools in a district that had at least one principal removed or replaced due to student performance. Looking at differences between survey waves for similar groups, we can see a large significant drop in principal removal between 1999-00 and 2003-04; nationwide, approximately 8.34 percent of districts had a principal removed in 1998-99 while the comparable number is 0.54 percent in 2002-03. Comparisons across groups, however, are not representative of actual differences in rates of principal removal, due to the fact that districts in different sub-groups have different numbers of schools. Urban districts, for example, have more schools on average than rural districts. Since we only have data on whether *any* school in the district had a principal replaced, districts with more schools will be more likely to answer the question affirmatively. This fact is verified in the logit model presented in Table 16 predicting the probability a district had a school in which the principal was fired due to student achievement. Table 16 shows that, controlling for district size, there was no significant differential in firings across urbanicity in 1999, but there was in 2003. Urban and suburban schools did not see as big a drop in firing as did rural schools. Furthermore, inter-temporal comparisons may be confounded if the number of districts potentially subject to sanctions varied between survey waves. However, in our sample, this number rose only two percentage points from 59 percent in 1998-99 to 61 percent in 2002-03.

¹³ The 1999-00 wave asked *how many* schools in the district had principals that were reassigned or released in the past 12 months due to student achievements, while the 2003-04 wave only asks if there were any such dismissals. We present only the former statistic for comparison purposes.

¹⁴ Some districts within states differ on whether or not they are subject to state sanctions, while we would assume a priori that all districts within a state would agree. This disagreement is greater in 2003 than in 1999, and it is unclear how this discrepancy might bias our results.

The patterns in Tables 15 and 16 indicate that under school-based assessment and accountability policies some principals were fired. The drop in firing between 1999 and 2003 is difficult to explain. We do not have data on principal removal due to student achievement prior to reform, and, thus, do not know whether the 1999 numbers or the 2003 numbers are more similar to the steady state before accountability.

In summary, we know very little about how accountability has affected the career decisions of principals. In theory, accountability may be beneficial, particularly to effective principals. We do not know whether this theory plays out in reality, or whether the increased responsibilities are too difficult even for potentially effective principals and lead to greater, detrimental turnover.

V. Summary

Despite the likelihood that accountability reforms may have substantially changed the lives of teachers and principals, we have little strong empirical research to document changes in attrition as a result of these policies. The research on teachers indicates that these policies may have led to some changes, but these changes have been small. Research on principals is even thinner. We do know that they react to accountability policies, changing their behavior in schools (Ladd and Zelli 2002). However, we don't know the extent to which such policies have induced turnover nor the differential effects on principals in different schools or of different effectiveness.

One important caveat of these research results is that most are based on accountability policies prior to the implementation of the No Child Left Behind of 2001 (NCLB). NCLB not only nationalized assessment-based accountability, but also included the Highly Qualified Teacher Provision which required that by 2006 all children be taught by a highly qualified teacher, defined as one who holds a baccalaureate degree, is fully state certified and demonstrates competency in the core academic subject or subjects they teach. This requirement clearly has not been met and the deadline has been extended, but there is some evidence that the requirement has led to substantial changes in the teacher workforce, particularly the reduction of emergency certified (uncertified or temporary license) teachers.

The difference between NCLB and prior state-led accountability reforms points to the importance of the details of the policies. Accountability policies that reward teachers or

principals in higher performing schools may have different effects, particularly different distributional effects, than policies that do not. Policies that include regulations or sanctions based on teacher or principal qualifications may have different effects than those that do not. Reforms that penetrate schools to the extent that assessment-based accountability has are likely to change the work lives in those schools and have repercussions on the related workforce. We do not, as of yet, know whether these repercussions will be beneficial or detrimental to the schools in the long run. In the short-run, they do not appear to have drastically changed teacher attrition.

References

- Barksdale-Ladd, M. A. and K. F. Thomas. 2000. "What's at Stake in High-Stakes Testing: Teachers and Parents Speak Out." *Journal of Teacher Education* 51(5): 384-397.
- Boyd, Donald, Hamilton Lankford, Susanna Loeb, and James Wyckoff. 2005. "Explaining the Short Careers of High-Achieving Teachers in Schools with Low-Performing Students," *American Economic Review* 95(2): Papers and Proceedings of the 2005 American Economic Association Meetings
- Carnoy, M. and S. Loeb. 2002. "Does External Accountability Affect Student Outcomes? A Cross-State Analysis." *Education Evaluation and Policy Analysis* 24(4): 305-332.
- Clotfelter, C., H. Ladd, J. Vigdor and R. Diaz. 2004. "Do School Accountability Systems Make it More Difficult for Low Performing Schools to Attract and Retain High Quality Teachers?" *Journal of Policy Analysis and Management* 23(2): 251-271.
- Hanushek, E., J. Kain, and S. Rivkin. 2001. "Why Public Schools Lose Teachers." NBER working paper 8599, November 2001
- Hanushek, E. and M. Raymond. 2005. "Does School Accountability Lead to Improved Student Performance?" *Journal of Policy Analysis and Management*, 24(2): 297-328.
- Heneman, H.G. III. 1998. "Assesment of the Motivational Reactions of Teachers to a School-Based Performance Award Program." *Journal of Personnel Evaluation in Education*, 12(1): 43-59
- Hoffman, J. V., L. C. Assaf, et al. 2001. "High-stakes testing in reading: Today in Texas, tomorrow?" *The Reading Teacher* 54(5): 482-492.

- Johnson, Susan Moore and Sarah E. Birkeland. 2002. "Pursuing a 'Sense of Success': New Teachers Explain their Career Decisions" *Project on the Next Generation of Teachers, Harvard Graduate School of Education*, October 2002.
- Ladd, Helen F. and Arnaldo Zelli. "School-Based Accountability in North Carolina: The Responses of School Principals" *Educational Administration Quarterly*, Vol. 38, No. 4 (Oct. 2002) 494-529
- Lankford, H., S. Loeb, J. Wyckoff. 2002. "Teacher Sorting and the Plight of Urban Schools: A Descriptive Analysis." *Educational Evaluation and Policy Analysis*, Spring, 24(1)
- Loeb, S. and K. Strunk. 2005. "Accountability and Local Control: Response to Incentives With and Without Authority Over Resource Generation and Allocation." *Stanford University Working Paper*
- Luna, C. and C. L. Turner. 2001. "The Impact of the MCAS: Teachers Talk about High-Stakes Testing." *English Journal*: September 2001; 79-87.
- Oberman, Geraldine L. 1996. "A Report on Principal Turnover in the Chicago Public Schools." Unpublished Manuscript, Chicago Public Schools, Jan. 1998, 42p.
- Whitaker, Katheryn. 2001. "Where are the Principal Candidates? Perceptions of Superintendents" *NASSP Bulletin*, Vol. 85, No. 265, May 2001
- Winter, Paul A. and Jayne R. Morgenthal. "Principal Recruitment in a Reform Environment: Effects of School Achievement and School Level on Applicant Attraction to the Job." *Educational Administration Quarterly*, Vol. 38, No. 3 (August 2002) 319-340

Table 1**Logit Estimates of Teacher Leaving the 4th Grade Relative to Other Grades by Urbanicity and Quartile of Student Test Performance: Odds Ratios (Z-stat)**

Source: Table 4 in Boyd, Lankford, Loeb, and Wyckoff (2006)

<i>Variable</i>	<i>All</i>	<i>Urban</i>	<i>Suburban</i>	<i>Rural</i>
<i>fourth grade x post 1998</i>	0.91	0.89	0.92	0.91
	(4.25)	(3.64)	(2.47)	(1.69)
<i>N</i>	359,962	148,390	149,769	61,803
	<i>Highest Quartile</i>	<i>Quart 2</i>	<i>Quart 3</i>	<i>Lowest Quartile</i>
<i>fourth grade x post 1998</i>	0.91	0.93	0.94	0.88
	(2.21)	(1.74)	(1.36)	(3.32)
<i>N</i>	89,938	89,026	90,061	90,937

Note: Student test scores are on the 4th grade math exam. The first quartile is the schools with the lowest proportion of these scores. Models include teacher, student, and school controls. See Boyd, Lankford, Loeb, and Wyckoff (2006) for more details.

Table 2**Logit Estimates of Leaving the 4th Grade for Teachers with Different Characteristics by Urbanicity and Student Performance Quartile: Odds Ratios (Z-Stats)**

Source: Table 5 in Boyd, Lankford, Loeb, and Wyckoff (2006)

<i>Variable</i>	<i>Post 1998*</i> <i>grade 4</i>	<i>Exp=2 to</i> <i>5 years</i>	<i>Exp=6 to</i> <i>19 years</i>	<i>Exp=20</i> <i>+ years</i>	<i>Most</i> <i>Competitive</i>	<i>Failed</i> <i>Exam</i>
All Schools						
<i>characteristic * post 1998 * grade 4</i>	0.75	1.147	1.273	1.382	0.877	1.032
<i>N= 359,962</i>	(3.80)	(1.61)	(2.92)	(3.46)	(1.83)	(0.41)
Suburban Schools						
<i>characteristic * post 1998 * grade 4</i>	0.604	1.395	1.71	1.88	0.835	0.939
<i>N=149,769</i>	(3.87)	(2.27)	(3.71)	(3.90)	(1.79)	(0.33)
Highest Test Quartile						
<i>characteristic * post 1998 * grade 4</i>	0.504	1.692	2.147	2.148	0.76	0.835
<i>N=89,938</i>	(4.01)	(2.75)	(4.05)	(3.65)	(2.04)	(0.68)

Note: Student test scores are on the 4th grade math exam. The first quartile is the schools with the lowest proportion of these scores. Models include teacher, student, and school controls. See Boyd, Lankford, Loeb, and Wyckoff (2006) for more details.

Table 3

Logit Estimates of Teacher Characteristics for New 4th Grade for teachers by Urbanicity and Student Performance Quartile: Odds Ratios (Z-Stats)

Source: Table 5 in Boyd, Lankford, Loeb, and Wyckoff (2006)

<i>Variable</i>	<i>Exp = 0</i>	<i>Exp=1-4</i>	<i>Exp=5-18</i>	<i>Exp=19+</i>	<i>Most Competitive</i>	<i>Failed Exam</i>
All Schools						
<i>post 1999 * grade 4</i>	0.92 (2.06)	1.19 (4.73)	0.99 (0.26)	0.86 (3.46)	1.09 (1.57)	0.98 (0.36)
<i>N</i>	110,296	110,296	110,296	110,296	84,713	63,249
Urban Schools						
<i>post 1999 * grade 4</i>	0.86 (2.75)	1.17 (2.12)	0.98 (0.26)	0.96 (0.56)	1.14 (1.37)	0.97 (0.45)
<i>N</i>	62,031	62,031	62,031	62,031	43,562	36,756
Lowest Test Quartile						
<i>post 1999 * grade 4</i>	0.79 (3.66)	1.13 (2.05)	1.05 (0.88)	1.05 (0.70)	1.3 (2.50)	0.93 (0.99)
<i>N</i>	41,939	41,939	41,939	41,939	30,124	25,499

Note: Student test scores are on the 4th grade math exam. The first quartile is the schools with the lowest proportion of these scores. Models include teacher, student, and school controls. See Boyd, Lankford, Loeb, and Wyckoff (2006) for more details.

Table 4

Table 3. Estimated probabilities of departure from a school, typical teachers with 10 years of experience and 1 year of experience.

	Models that differ by the definition of a low- performing school				
	(1)	(2)	(3)	(4)	(5)
10 years					
Typical individual	0.150	0.152	0.150	0.150	0.151
+ post	0.155	0.153	0.151	0.154	0.152
+ low performing	0.176	0.158	0.160	0.173	0.161
+ low × post	0.191	0.171	0.167	0.170	0.169
+ label × post	0.209	0.206	0.201	0.193	0.205
1 year (new teacher)					
Typical individual	0.320	0.322	0.320	0.318	0.316
+ post	0.328	0.323	0.321	0.324	0.319
+ low performing	0.338	0.313	0.317	0.338	0.332
+ low × post	0.389	0.365	0.359	0.377	0.370
+ label × post	0.403	0.399	0.395	0.395	0.397

Calculated by authors based on the coefficients of the model in Table 2. Models 1 to 5 differ from each other only in how a low-performing school is defined. The definitions are: (1) a school in which more than half of its students are below grade level on math or reading test scores; (2) a school that is in the bottom 10 percent of the district distribution of schools ranked by percentage of students at grade level in math or reading test scores; (3) same as (2) but in the bottom 20 percent of the district distribution; (4) a school that is in the bottom 10 percent of the statewide distribution of schools ranked by percentage of students at grade level in math or reading test scores; and (5) same as (4) but in the bottom 20 percent of the state-wide distribution.

Table 5

Table 6. Proportions of low quality teachers by school performance; levels and trends, pre- and post-accountability.

Panel A: Levels	Averages by Quintile of School Performance					
	Teachers with No Experience			Teachers from Uncompetitive Colleges		
	Low	Middle	High	Low	Middle	High
4th grade						
Pre-accountability*	0.380	0.327	0.304	0.268	0.201	0.196
Post-accountability**	0.363	0.304	0.293	0.260	0.197	0.215
Difference (post minus pre) (standard error)	-0.017 (0.043)	-0.023 (0.044)	-0.011 (0.042)	-0.008 (0.040)	-0.004 (0.037)	+0.019 (0.037)
7th grade						
Pre-accountability*	0.376	0.314	0.308	0.290	0.222	0.221
Post-accountability**	0.363	0.305	0.305	0.290	0.242	0.225
Difference (post minus pre) (standard error)	-0.10 (0.057)	-0.009 (0.067)	-0.003 (0.061)	0.000 (0.054)	+0.020 (0.060)	+0.004 (0.054)
Panel B: Trends	Changes in proportions (end year minus initial year within period)					
	Teachers with No Experience			Teachers from Uncompetitive Colleges		
	Low	Middle	high	Low	Middle	High
4th grade						
Pre-accountability*	-0.048	-0.017	0.011	-0.031	-0.014	-0.003
Post-accountability**	0.006	0.006	-0.019	0.016	0.011	0.018
Difference (post minus pre) (standard error)	0.054 (0.061)	0.024 (0.062)	-0.030 (0.059)	0.047 (0.056)	0.025 (0.053)	0.021 (0.052)
7th grade						
Pre-accountability*	-0.042	-0.008	-0.003	-0.070	0.007	0.021
Post-accountability**	0.031	-0.008	0.002	0.050	0.031	-0.008
Difference (post minus pre) (standard error)	0.073 (0.081)	0.000 (0.093)	0.004 (0.086)	0.120 (0.076)	0.025 (0.084)	-0.020 (0.077)

Notes for Table 6. Low performing schools are the schools in the bottom 20 percent of the weighted distribution of schools ranked by the percentage of students below grade level, middle-performing schools are in the middle quintile (40–60 percent) and high performing schools are in the top 20 percent, where the weights are the numbers of 4th or 7th graders in each school.

* The pre-accountability period starts in 1995–1996 for teachers with no experience and in 1994–1995 for teachers from uncompetitive colleges and ends in 1997–1998.

** The post-accountability period starts in 1997–1998 and ends in 2000–2001. Standard errors for the differences were calculated on the assumption that the errors of the pre- and post-accountability periods are independent.

Table 6

Aggregate teacher turnover of full-time, public school teachers after the 1993-94 and 1999-00 school years, by attrition type, experience level, and poverty concentration

	1993-94 School Year			1999-00 School Year		
	<i>Movers and Leavers</i>	<i>Movers</i>	<i>Leavers</i>	<i>Movers and Leavers</i>	<i>Movers</i>	<i>Leavers</i>
<i>Percent attrition (standard error)</i>	12.69 (0.53)	6.42 (0.35)	6.27 (0.36)	14.57 (0.59)	7.39 (0.48)	7.17 (0.40)
<i># observations</i>	3,587	3,587	3,587	3,666	3,666	3,666

	Movers and Leavers					Movers and Leavers				
	Experience Level (years)					Experience Level (years)				
	<i>All</i>	<i>0 to 2</i>	<i>3 to 6</i>	<i>7 to 10</i>	<i>11+</i>	<i>All</i>	<i>0 to 2</i>	<i>3 to 6</i>	<i>7 to 10</i>	<i>11+</i>
<i>Percent attrition (standard error)</i>	12.69 (0.53)	21.02 (1.71)	17.38 (1.68)	13.51 (1.76)	10.37 (0.64)	14.57 (0.59)	22.24 (1.96)	18.59 (1.43)	14.27 (1.55)	11.88 (0.77)
<i># observations</i>	3,587	722	683	341	1791	3,666	7,63	7,69	3,97	1,737

	Movers and Leavers			Movers and Leavers		
	Urbanicity			Urbanicity		
	<i>Urban</i>	<i>Suburban</i>	<i>Rural</i>	<i>Urban</i>	<i>Suburban</i>	<i>Rural</i>
<i>Percent attrition (standard error)</i>	14.29 (1.29)	12.09 (1.01)	12.12 (0.65)	14.58 (1.32)	14.95 (0.94)	13.72 (0.95)
<i># observations</i>	845	957	1785	833	1588	1195

Note: Data is from the nationally representative 1994-95 and 2000-01 Teacher Followup Surveys. Standard errors in parentheses.

Table 7

Percentage of teachers whose quit decision was influenced by the following reasons. 3 measures of the degree of importance in the decision to leave.

	Degree of importance in the decision to leave		
	1	2	3
	<i>Any degree of importance</i>	<i>Very or extremely important</i>	<i>Greatest level of importance among all reasons</i>
Reason for leaving			
<i>I do not agree with new reform measures.</i>	2.54 (0.21)	1.03 (0.14)	0.73 (0.12)
<i>I did not feel prepared to implement new reform measures.</i>	1.82 (0.20)	0.52 (0.09)	0.38 (0.08)
<i>I do not agree with new reform measures. OR I did not feel prepared to implement new reform measures.</i>	3.00 (0.25)	1.25 (0.15)	0.86 (0.13)
<i>I was dissatisfied with changes in my job description or responsibilities.</i>	3.88 (0.30)	1.90 (0.25)	1.29 (0.20)
<i>For better salary or benefits.*</i>	3.00 (0.30)	2.48 (0.29)	2.26 (0.28)
<i>I changed my residence.</i>	4.15 (0.28)	2.61 (0.25)	2.28 (0.26)
<i>To retire.</i>	2.60 (0.18)	2.18 (0.18)	2.14 (0.17)

Note: Includes both movers and leavers. Data is from the nationally representative 2000-2001 Teacher Followup Survey to the 1999-2000 Schools and Staffing Survey, with 3,666 observations. Observations are not counted in the above percentages if a teacher indicated that "I was laid off or involuntary transferred" was "very" or "extremely" important in the decision to quit. The degrees of importance provided were "not at all", "slightly", "somewhat", "very", or "extremely" important. Standard errors in parentheses. *The reason provided to movers was "Salary or benefits were better at this year's school."

Table 8
Logit models predicting the probability of quitting, for different subsets of quitters
Odds ratios, z-stats in parentheses

Independent variable = 1 if the following reason was "very" or "extremely" important in the decision to quit.

	1	2
	<i>I do not agree with new reform measures.</i>	<i>I did not feel prepared to implement new reform measures.</i>
<i>Male</i>	2.05 (2.43)*	1.25 (0.56)
<i>Black or Hispanic</i>	1.08 (0.14)	0.93 (0.16)
<i>Log Income</i>	0.3 (2.52)*	1 0.00
<i>0-2 years experience</i>	0.31 (1.92)	3.75 (2.51)*
<i>3-6 years experience</i>	0.83 (0.79)	2.17 (1.81)
<i>7-10 years experience</i>	0.18 (4.04)**	0.52 (1.10)
<i>Mid-career entrant</i>	1.36 (0.48)	2.31 (1.11)
<i>Teaches math or science</i>	0.62 (1.23)	0.88 (0.21)
<i>Has masters</i>	1.22 (0.60)	1.03 (0.09)
<i>Quartile of % blk or his students</i>		
<i>2nd quartile</i>	0.87 (0.35)	1.17 (0.30)
<i>3rd quartile</i>	2.25 (2.00)*	0.83 (0.38)
<i>4th quartile</i>	1.58 (1.38)	1.67 (1.28)
<i>Elementary school</i>	0.86 (0.54)	0.75 (0.72)
<i>Suburban</i>	0.51 (2.18)*	0.57 (1.26)
<i>Rural</i>	0.34 (2.49)*	0.52 (1.34)
<i>C-L Accountability Index</i>	1.12 (1.07)	0.99 (0.09)
<i>Sample Size</i>	3659	3659

Note: all standard errors are clustered at the state level. Source: nationally representative 1999-00 SASS and 2000-01 TFS. * significant at 5%, ** 10%

Table 9. Logits predicting whether a teacher quit because of strong disagreement with new reforms. Odds ratios, z-stats in parentheses

Variable	Subsets of Teachers												
	All Teachers			Location			Years Experience				Quartile of % Blk or His Students		
	Urban	Suburban	Rural	0 to 2	3 to 6	7 to 10	11+	1st	2nd	3rd	4th		
<i>Male</i>	2.06 (2.60)	1.75 (1.15)	2.56 (1.12)	1.42 (0.54)	1.08 (0.07)	1.12 (0.16)	1.76 (0.40)	2.93 (2.25)	1.04 (0.07)	4.09 (4.22)	3.35 (1.66)	1.76 (1.31)	
<i>Black or Hispanic</i>	1.04 (0.07)	1.20 (0.42)	0.55 (0.52)	0.51 (0.90)	0.45 (0.73)	0.82 (0.28)	0.23 (1.44)	1.31 (0.46)	--	0.75 (0.20)	1.06 (0.05)	0.92 (0.28)	
<i>Log Income</i>	0.27 (2.05)	0.13 (1.84)	0.12 (2.08)	11.13 (3.28)	3.96 (1.02)	0.10 (1.81)	5.95 (0.53)	0.18 (2.16)	1.40 (0.27)	0.34 (0.85)	0.09 (1.87)	0.45 (0.89)	
<i>0-2 years experience</i>	0.30 (1.87)	0.14 (2.01)	0.07 (3.55)	2.91 (1.12)	--	--	--	--	3.84 (1.34)	0.12 (2.92)	0.03 (3.66)	0.38 (1.53)	
<i>3-6 years experience</i>	0.80 (0.77)	0.98 (0.04)	0.51 (1.28)	1.89 (0.92)	--	--	--	--	0.61 (0.64)	0.56 (0.61)	0.61 (0.63)	1.18 (0.41)	
<i>7-10 years experience</i>	0.19 (3.65)	0.12 (3.10)	0.21 (2.43)	0.36 (1.23)	--	--	--	--	0.33 (1.16)	0.06 (2.63)	0.15 (1.70)	0.15 (3.21)	
<i>Mid-career entrant</i>	1.31 (0.36)	2.40 (0.63)	1.55 (0.57)	0.38 (0.80)	4.46 (0.91)	--	51.78 (2.80)	2.07 (0.67)	--	15.45 (3.83)	1.45 (0.29)	1.13 (0.13)	
<i>teach math or science</i>	0.60 (1.28)	0.39 (2.27)	0.39 (1.28)	1.55 (0.68)	0.70 (0.28)	0.44 (0.86)	0.03 (2.71)	0.70 (0.59)	0.30 (1.56)	2.28 (1.05)	0.61 (0.45)	0.61 (1.60)	
<i>Has masters</i>	1.11 (0.27)	0.59 (0.79)	3.81 (1.86)	0.32 (2.32)	3.15 (1.17)	0.30 (2.12)	0.76 (0.35)	1.68 (0.77)	2.05 (1.04)	0.90 (0.17)	0.81 (0.35)	1.32 (0.63)	
<i>% black or his.</i>	1.44 (0.74)	1.33 (0.47)	4.35 (1.51)	0.25 (0.88)	4.26 (0.61)	0.76 (0.26)	1.86 (0.55)	1.80 (1.04)	--	--	--	--	
<i>Elementary school</i>	0.84 (0.52)	1.21 (0.30)	0.75 (0.68)	0.37 (1.08)	0.28 (1.18)	0.73 (0.63)	0.46 (1.00)	1.06 (0.10)	0.32 (1.57)	1.40 (0.63)	1.02 (0.02)	0.79 (0.70)	
<i>Suburban</i>	0.51 (1.55)	--	--	--	0.10 (2.65)	0.19 (1.94)	1.01 (0.01)	0.66 (0.56)	4.70 (1.32)	0.46 (0.90)	0.29 (1.43)	0.59 (1.11)	
<i>Rural</i>	0.34 (2.19)	--	--	--	1.32 (0.40)	0.11 (2.55)	0.27 (0.97)	0.35 (1.38)	5.33 (1.45)	1.73 (0.37)	0.10 (2.99)	0.10 (5.51)	
<i>Accountability Index</i>	1.14 (1.20)	1.02 (0.21)	1.50 (2.32)	0.89 (0.64)	0.45 (3.92)	1.20 (1.22)	0.87 (0.72)	1.24 (1.66)	0.95 (0.17)	1.19 (1.10)	1.38 (1.44)	1.05 (0.27)	
<i>Sample Size</i>	3372	796	1462	1114	717	703	360	1580	690	836	926	892	

Note: Independent Variable = 1 if a teacher quit and indicated that "I do not agree with new reform measures" was "very" or "extremely" important in the decision to quit. Variables in some regressions dropped due to collinearity. Source: nationally representative 1999-00 SASS and 2000-01 TFS.

Tble 10. Logits predicting whether a teacher quit because of feeling unprepared to implement new reforms. Odds ratios, z-stats in parentheses

Variable	All Teachers	Subsets of Teachers										
		Location			Years Experience				Quartile of % Blk or His Students			
		Urban	Suburban	Rural	0 to 2	3 to 6	7 to 10	11+	1st	2nd	3rd	4th
Male	1.37 (0.77)	2.58 (1.24)	0.74 (0.79)	0.48 (0.89)	0.98 (0.03)	0.44 (0.95)	21.46 (0.67)	2.90 (1.75)	0.11 (1.73)	1.53 (0.85)	0.89 (0.13)	1.66 (0.88)
Black or Hispanic	0.91 (0.22)	0.79 (0.35)	0.41 (0.88)	15.01 (2.37)*	1.77 (0.62)	0.19 (1.58)		2.27 (1.47)	-	-	0.03 (2.52)*	1.32 (0.54)
Log Income	1.27 (0.31)	0.26 (0.78)	6.46 (2.14)*	5.74 (1.01)	5.53 (1.48)	1.50 (0.21)	0.05 (0.33)	0.48 (0.68)	5.75 (1.40)	0.20 (1.05)	0.62 (0.34)	2.45 (0.81)
0-2 years experience	4.39 (2.79)**	2.59 (0.97)	4.93 (1.94)	4.60 (1.57)	-	-	-	-	9.20 (1.76)	3.94 (1.23)	0.84 (0.19)	4.29 (2.17)*
3-6 years experience	2.56 (2.21)*	1.90 (0.70)	6.11 (3.15)**	0.65 (0.31)	-	-	-	-	1.97 (0.51)	0.32 (1.04)	10.23 (2.13)*	3.00 (1.86)
7-10 years experience	0.60 (0.83)	0.08 (1.87)	1.52 (0.53)	0.35 (0.89)	-	-	-	-	-	-	2.49 (0.94)	0.49 (0.64)
Mid-career entrant	2.00 (0.84)	1.12 (0.08)	7.67 (3.20)**	0.12 (2.14)*	7.61 (2.36)*	-	-	-	0.21 (1.10)	4.02 (0.75)	-	2.46 (1.10)
teach math or science	0.90 (0.18)	0.02 (3.10)**	2.03 (0.83)	2.15 (0.61)	0.07 (2.61)**	2.82 (1.03)	-	1.31 (0.35)	0.50 (0.37)	1.65 (0.50)	0.85 (0.32)	1.05 (0.04)
Has masters	0.91 (0.27)	1.34 (0.45)	0.86 (0.30)	0.03 (2.98)**	0.42 (0.86)	0.98 (0.03)	-	2.69 (1.94)	1.15 (0.19)	0.86 (0.26)	0.43 (1.10)	1.17 (0.25)
% black or his.	1.80 (0.75)	1.86 (0.61)	4.59 (1.33)	0.04 (1.58)	3.58 (0.94)	3.41 (1.37)	109.90 (1.06)	0.77 (0.23)	-	-	-	-
Elementary school	0.69 (0.92)	0.49 (1.35)	1.75 (0.93)	0.11 (1.59)	0.31 (1.28)	0.92 (0.10)	0.00	1.09 (0.13)	0.57 (0.63)	0.93 (0.08)	0.45 (1.25)	0.68 (0.94)
Suburban	0.64 (0.85)	-	-	-	0.37 (0.94)	0.42 (0.64)	82.43 (0.79)	0.74 (0.47)	2476623.12 (.1)**	0.22 (2.11)*	0.25 (1.25)	0.98 (0.02)
Rural	0.57 (1.02)	-	-	-	1.00 (0.00)	0.13 (1.20)	0.00 (2.08)*	0.53 (0.72)	5306930.73 (17.23)**	0.15 (1.83)	0.13 (1.34)	0.60 (0.44)
Accountability Index	0.95 (0.35)	0.93 (0.36)	0.95 (0.30)	1.14 (0.80)	0.62 (1.45)	1.46 (1.57)	3.40 (1.02)	1.02 (0.10)	1.25 (0.91)	1.19 (0.56)	1.10 (0.43)	0.86 (0.95)
Sample Size	3372	743	1462	1114	717	669	134	1573	640	701	850	892

Note: Independent Variable = 1 if a teacher quit and indicated that "I do not agree with new reform measures" was "very" or "extremely" important in the decision to quit. Variables in some regressions dropped due to collinearity. Source: nationally representative 1999-00 SASS and 2000-01 TFS.

Table 11

**Logit models of whether a teacher quit.
Sample Split by sub-populations of teachers.**

Only odds ratio of (accountability index)*(1999 survey) interaction displayed.

<i>Sub-Sample</i>		Odds Ratio on variable		# obsns
		Acc. Index*1999-00 wave	(z-stat)	
All teachers		0.93	(1.25)	7241
Urban	<i>All</i>	0.9	(0.99)	1716
	<i>0-2 yrs exper</i>	1.02	(0.09)	349
	<i>3-6 yrs exper</i>	1.35	(1.64)	316
	<i>7-10 yrs exper</i>	0.67	(1.42)	171
	<i>11 + yrs exper</i>	0.87	(0.92)	880
Suburban	<i>All</i>	0.98	(0.18)	2545
	<i>0-2 yrs exper</i>	1.49	(2.04)*	510
	<i>3-6 yrs exper</i>	0.7	(2.23)*	539
	<i>7-10 yrs exper</i>	0.72	(1.21)	272
	<i>11 + yrs exper</i>	1.07	(0.74)	1224
Rural	<i>All</i>	0.94	(0.74)	2980
	<i>0-2 yrs exper</i>	0.92	(0.35)	673
	<i>3-6 yrs exper</i>	0.89	(0.54)	596
	<i>7-10 yrs exper</i>	0.73	(0.87)	294
	<i>11 + yrs exper</i>	1.08	(0.63)	1417
All Urbanicity	<i>0-2 yrs exper</i>	0.99	(0.05)	1532
	<i>3-6 yrs exper</i>	0.87	(0.98)	1451
	<i>7-10 yrs exper</i>	0.78	(1.11)	737
	<i>11 + yrs exper</i>	0.99	(0.14)	3521
Elementary School Teacher		0.92	(0.92)	3023
Secondary School Teacher		0.96	(0.63)	4218
Quartile of % Blk or Hispanic Students	<i>1st</i>	1.14	(1.11)	1615
	<i>2nd</i>	0.94	(0.62)	1732
	<i>3rd</i>	1.13	(1.32)	1823
	<i>4th</i>	0.79	(2.08)*	1784

Note: Independent variable = 1 if a teacher changed schools or left teaching. * significant at 5%; ** significant at 1%. Source: TFS waves 1994-95 and 2000-01

Table 12. Logit models of whether a teacher has any desire to leave teaching in the future. Sample Split by sub-populations of teachers. Selected odds ratios displayed.

<i>Sub-Sample</i>		Odds Ratio on variable				# obsns
		1		2		
		Acc. Index*1999-00 wave	(z-stat)	Acc. Index*2003-04 wave	(z-stat)	
All teachers		1.02	(0.61)	0.98	(0.57)	104175
Urban	<i>All</i>	1.06	(1.05)	1.03	(0.57)	23948
	<i>0-2 yrs exper</i>	1.16	(1.09)	1.07	(0.57)	2446
	<i>3-6 yrs exper</i>	1.03	(0.37)	0.87	(1.29)	4177
	<i>7-10 yrs exper</i>	1.01	(0.07)	1.11	(1.56)	3268
	<i>11 + yrs exper</i>	1.04	(0.66)	1.05	(0.92)	14057
Suburban	<i>All</i>	0.97	(0.74)	0.92	(1.84)	37242
	<i>0-2 yrs exper</i>	0.72	(3.63)**	0.86	(1.31)	3641
	<i>3-6 yrs exper</i>	1.07	(0.64)	0.92	(0.87)	6862
	<i>7-10 yrs exper</i>	0.97	(0.40)	0.79	(2.68)**	5298
	<i>11 + yrs exper</i>	0.94	(1.04)	0.98	(0.25)	21441
Rural	<i>All</i>	1.00	(0.11)	0.99	(0.22)	42985
	<i>0-2 yrs exper</i>	1.06	(0.71)	0.88	(1.60)	3846
	<i>3-6 yrs exper</i>	0.94	(0.82)	1.01	(0.16)	7221
	<i>7-10 yrs exper</i>	1.02	(0.26)	0.98	(0.21)	5822
	<i>11 + yrs exper</i>	1.02	(0.36)	0.99	(0.19)	26096
All Urbanicity	<i>0-2 yrs exper</i>	1.00	(0.06)	1.05	(0.65)	9933
	<i>3-6 yrs exper</i>	1.04	(0.73)	0.93	(1.08)	18260
	<i>7-10 yrs exper</i>	1.03	(0.43)	0.96	(0.88)	14388
	<i>11 + yrs exper</i>	0.99	(0.45)	1	(0.05)	61594
Elementary School Teacher		1.02	(0.47)	0.94	(1.78)	38728
Secondary School Teacher		1.00	(0.02)	1.03	(0.50)	65447
Quartile of % Blk or Hispanic Students	<i>1st</i>	1.09	(1.67)	0.93	(1.66)	26357
	<i>2nd</i>	0.94	(1.24)	0.99	(0.09)	26549
	<i>3rd</i>	1.06	(1.22)	0.97	(0.62)	26163
	<i>4th</i>	1.02	(0.34)	1.02	(0.50)	25106

* Independent variable equals one if teacher responded to the question "How long will do you plan to remain in teaching?" with "Will probably continue until something better comes along" or "Definately plan to leave teaching as soon as I can." It takes the value zero if she responded "As long as I am able," "Until I am eligible for retirement," or "Undecided at this time." * significant at 5%; ** significant at 1%. Source: SASS waves 1993-94, 1999-00, 2003--04

Table 13

Logits by sub-population predicting the probability of being laid off or involuntarily transferred.
 Selected odds ratios displayed.

<i>Sub-Sample</i>		Odds Ratio on variable				# obsns
		1		2		
		<i>1999-00 wave</i>	(z-stat)	Acc. Index* <i>1999-00 wave</i>	(z-stat)	
All teachers		4.74	(2.44)*	0.78	(1.22)	7241
Urban	<i>All</i>	12.87	(1.81)	0.55	(1.50)	1716
	<i>0-2 yrs exper</i>	9.15	(0.97)	0.63	(0.82)	323
	<i>3-6 yrs exper</i>	44.09	(1.81)	2.22	(1.71)	226
Suburban	<i>All</i>	8.83	(1.78)	0.61	(1.13)	2545
	<i>0-2 yrs exper</i>	0.33	(0.98)	7.25	(2.62)**	510
	<i>3-6 yrs exper</i>	4.46	(0.93)	1.84	(0.86)	539
Rural	<i>All</i>	0.98	(0.02)	1.64	(2.24)*	2980
	<i>0-2 yrs exper</i>	6.16	(2.31)*	0.84	(0.81)	673
	<i>3-6 yrs exper</i>	0.07	(1.29)	5.99	(2.25)*	574
All Urbanicity	<i>0-2 yrs exper</i>	7.76	(1.65)	0.66	(1.14)	1532
	<i>3-6 yrs exper</i>	0.59	(0.38)	3.1	(2.44)*	1451
Elementary School Teacher		8.72	(2.22)*	0.71	(0.91)	1417
Secondary School Teacher		1.84	(0.79)	0.88	(0.50)	3023
Quartile of % Blk or Hispanic Students	<i>1st</i>	1.01	(0.01)	1.29	(0.64)	1592
	<i>2nd</i>	0.64	(0.53)	1.85	(1.93)	1732
	<i>3rd</i>	5.95	(2.34)*	0.96	(0.21)	1823
	<i>4th</i>	66.9	(2.19)*	0.38	(1.97)*	1784

Notes: Independent variable is whether a teacher self-reported being laid off or involuntarily transferred as a reason for leaving. Teacher and school characteristics are also included in the regressions. * significant at 5%; ** significant at 1%. Source: 1994-95 and 2000-01 waves of the TFS.

Table 14

Ordered Logit models predicting the competitiveness of a teachers' college. Sample is confined to teachers new to the profession (0-2 years of teaching experience) Independent variable = 1-5 increasing measure of college competitiveness Selected coefficient estimates displayed

Sub-Sample	Coefficient on variable				# obsns	
	1	2	3	4		
	yr 99	yr 03	Index * yr99	Index * yr03	(z-stat)	
All teachers	-0.28 (2.11)*	0.86 (5.21)**	-0.1 (2.21)*	0.03	(0.36)	9933
Urbanicity						
Urban	-0.27 (1.09)	1.06 (2.56)*	-0.21 (2.74)**	0.08	(0.62)	2446
Suburban	-0.2 (0.96)	0.54 (1.79)	-0.1 (1.18)	-0.11	(0.67)	3641
Rural	-0.31 (1.42)	0.97 (3.67)**	-0.02 (0.24)	0.14	(1.30)	3846
Elementary School Teacher	-0.3 (1.51)	1.03 (4.26)**	-0.16 (2.82)**	0.01	(0.07)	3710
Secondary School Teacher	-0.26 (1.95)	0.65 (3.88)**	-0.03 (0.56)	0.05	(1.01)	6223
Quartile of % Blk or Hispanic Students						
1st	-0.37 (1.63)	0.72 (2.71)**	-0.08 (0.96)	-0.17	(1.66)	2260
2nd	-0.52 (2.09)*	0.89 (2.75)**	-0.08 (0.55)	-0.15	(0.85)	2172
3rd	-0.11 (0.37)	0.25 (0.84)	-0.13 (1.46)	-0.08	(0.88)	2459
4th	-0.09 (0.26)	1.05 (2.33)*	-0.15 (1.50)	0.09	(0.62)	3042

Note: * significant at 5%; ** significant at 1%. z-statistics in parentheses. Source: SASS waves 1993-94, 1999-00, 2003-04. Independent variable from Baron's ranking of college selectivity.

Table 15: Estimated percent of schools in a district that had at least one principal removed or replaced due to student performance

	<i>All Districts</i>	<i>Urbanicity of the District</i>			<i>Quartile of %Black or Hispanic Students in the District</i>			
		<i>Urban</i>	<i>Suburban</i>	<i>Rural</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
<i>1999-00 wave</i>	8.39 (0.61)	13.66 (2.00)	7.78 (0.80)	8.15 (0.94)	6.78 (1.91)	6.24 (0.89)	7.02 (1.13)	13.73 (1.11)
<i>2003-04 wave</i>	0.54 (0.13)	2.96 (0.37)	0.52 (0.27)	0.04 (0.002)	0.05 (0.01)	0.00 (0.00)	0.54 (0.46)	1.7 (0.32)

s.e. in parentheses
4839 district-observations

Table 16: Logit predicting if any school in the district had a principal reassigned or removed due to sanctions. Odds Ratios

<i>Variable</i>	<i>Odds Ratio (s.e.)</i>
<i># schools in the district</i>	1.01 (8.31)**
<i>2003 survey dummy</i>	0.004 (36.03)**
<i>urban</i>	1 (0.02)
<i>suburban</i>	0.91 (0.57)
<i>urban * yr03</i>	35.08 (15.84)**
<i>suburban * yr03</i>	13.45 (4.64)**
<i>% blk or his students</i>	3.07 (4.47)**
<i>Observations</i>	4839

t statistics in parentheses
* significant at 5%; ** significant at 1%

Appendix A: Accountability Index, by State, 1999-2000

This zero-to-five scale captures the degree of state external pressure on schools to improve student achievement according to state-defined performance criteria. States receiving a zero did not test students statewide or did not set any statewide standards for schools or districts. States that required state testing in the elementary and middle grades and the reporting of test results to the state but no school or district sanctions or rewards receive a one. Those states that tested at the elementary and middle school levels and had moderate school or district accountability sanctions/rewards or, alternatively, a high school exit test receive a two. Those states that tested at the lower and middle grades, had moderate accountability repercussions for schools and districts, and required an exit test in high school, receive a three. Those that tested and placed strong pressure on schools or districts to improve student achievement (threat of reconstitution, principal transfer, loss of students) but did not require a high school exit test receive a four. States receiving a five tested students in primary and middle grades, strongly sanctioned and rewarded schools or districts based on improvement in student test scores, and required a high school minimum competency exit test for graduation. As examples, states such as Iowa and Nebraska, which did not have any state-level accountability requirements for schools or districts, are coded zero; and states with “maximum” state level demands on schools and that required a high school competency exam for graduation, such as Texas, North Carolina, New Jersey, and Florida, are coded five. **

State	Grades with State Testing in 1999-2000	School Accountability 1999-2000	Repercussion for Schools 1999-2000	Strength of Repercussion for Schools 1999-2000	HS Exit Test in 2000	Grade HS Test First Given	First Grad Class	Index
Alabama	3-11	School report cards	Ratings, intervention	Strong	Yes	10	2001	4
Alaska	4-7	None	None	None	Yes	10	2002	1
Arizona	3,5,8,10	Report cards	‘Public shame’	Weak	Yes	10	2002	2
Arkansas	4, 6	None	None	None	No			1
California	2-11	Report cards	Ratings, awards, intervention	Strong	No	10	2004	4 (2)*
Colorado	3, literacy	None	None	None	No			1
Connecticut	4,6,8,10	Reporting scores to state	Identify schools with needs	Weak	No			1
Delaware	3,5,8,10,11	None	None	None	No	10	2004	1
Florida	4,5,8,10	Report cards	Ratings, subject to vouchers	Strong	Yes	10	1988	5
Georgia	3,4,5,8,11	School reports	None	None	Yes	11	1995	2
Hawaii	3,5,8,10	None	None	None	No			1
Idaho	ITBS, 3-8	None	None	None	No			1
Illinois	3,4,5,8,10	Academic improvement	Watch lists, warnings, intervention	Moderate	No			2.5
Indiana	3,6,8,10	Performance Assessment	Accreditation	Moderate	Yes	10	1999	3
Iowa	None	None	None	None	No			0
Kansas	3,4,5,8,10	School reports	Accreditation	Weak	No			1
Kentucky	4,5,7,8,10-12	Meeting state improvement goals	Monetary rewards, intervention	Strong	No			4

Louisiana	LEAP,4,8	Report cards, growth targets	Intervention	Moderate	Yes	10	1991	3
Maine	4,8,11	None	None	None	No			1
Maryland	3,5,8	School Performance Index	Monetary rewards, reconstitution	Strong	Yes	10,11,12	2001	4 (5)
Massachusetts	4,8,10	Students only	Student promotions	Implicit only	Yes	10	2003	2
Michigan	4,5,7,8	School rating	Accreditation	Weak	No			1
Minnesota	3,5,8,10	School reports	None	None	Yes	8,10		2
Mississippi	2-8	Only districts accountable, based on test scores	Public recognition, loss of accreditation	Moderate to strong at district level	Yes	11	1994	3
Missouri	3-11	School can be deemed academically deficient	Possible audit	Weak	No			1.5
Montana	4,8,11	None	None	None	No			1
Nebraska	None	None	None	None	No			0
Nevada	4,8,10	School reports	None	Weak	Yes	11	1999	1.5
New Hampshire	3,6,10	None	None	None	No			1
New Jersey	4,5,11	Mostly district level, 75% pass rate	Audits, possible state takeover	Strong	Yes	11		5
New Mexico	1-9	School ratings and district rankings	Some money rewards, probation	Moderate to strong	Yes	10	1990	4 (5)
New York	4,5,8,11	State review of school performance	Freeze on pupil registration	Strong	Yes	10	1998	5 (2)
North Carolina	3-8	School ratings	Money rewards, intervention	Strong	Yes	9	1994	5
North Dakota	4,8,12	Improve student learning	Accreditation	Weak	No			1
Ohio	4,6,9,12	Report cards, but mainly district level	Money for schools, sanctions for districts	Moderate	Yes	9		3
Oklahoma	5,8	Reports to state	Accreditation	Weak	No			1
Oregon	3,5,8,10	School performance ratings	Write school improvement plans	Weak to moderate	Yes	10	1991	2.5
Pennsylvania	5,6,8,9,11	High schools have ratings	Money for HS improvement	Weak	No			1
Rhode Island	3,4,7,8,10	Yearly progress on test results	Reconstitution	Weak implementation	No			1
South Carolina	3-8, 10	District only	District defined as impaired	Moderate	Yes	10	1990	3
South Dakota	2,4,5,8,9,11	Test reports	None	None	No			1
Tennessee	3-8, 9	Test reports	Accreditation	Weak	Yes	9		1.5
Texas	3-8,10	Report cards	School ratings, interventions	Strong	Yes	10	1991	5

Utah	3,5,8,11	None	Accreditation	Weak	No	10	2007	1
Vermont	2,4,8,10	School reports	Identify schools for assistance	Weak	No			1
Virginia	3,4,5,6,8,9	Report tests, other data	Standards of Accreditation	Weak to moderate	No			2
Washington	2-10	School reports	Accreditation	Weak	No	10	2008	1
West Virginia	3-8	Performance audits	Intervention	Strong	No			3.5
Wisconsin	3,4,8,10	Continuous Progress Indicator	Ratings of schools	Weak to moderate	No	11	2004	2
Wyoming	4,8,11	Only district	Accreditation	Weak	No		2001	1

*Alternative specification of index, as per Margaret Goertz, in parentheses.

** Table borrowed from Carnoy and Loeb (2002), with permission from the authors.