Teacher Effectiveness, Mobility, and Attrition in Florida*

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Although the impacts of per pupil spending, class size, and other school inputs on student achievement continue to be debated, there is a strong consensus that teacher quality is hugely important and varies widely, even within schools.[1] Hiring and retaining more-effective teachers thus has enormous potential for raising overall levels of student achievement and reducing achievement gaps along lines of race and class. Indeed, it is no stretch to conclude, as Robert Gordon and colleagues put it, that "without the right people standing in front of the classroom, school reform is a futile exercise."[2] It is hardly surprising, then, that recent years have seen a surge in interest among researchers and policymakers in measures intended to improve the quality of the teaching workforce.[3]

Among the most controversial strategies now under consideration is the introduction of performance pay plans that would tie teachers' compensation directly to their students' academic progress. Arguments for performance pay in K–12 education typically emphasize the incentives they would create for current educators to make pedagogical or organizational changes to foster student learning. An equally important rationale for such policies, however, could be the recruitment and retention of teachers who are already effective in the classroom. Existing teacher compensation systems, which reward teachers based primarily on seniority and degree completion, offer no special inducement for more-effective teachers to enter or remain in the profession. In fact, to the extent that good teachers have superior earnings opportunities in other fields, the current system of compensation can create a disincentive for them to continue teaching. As a result, there is widespread concern that the best teachers are leaving the schools where they are most needed for more affluent schools or more lucrative occupations.

There is a substantial literature on the correlates of teacher retention but far less research on the link between retention and effectiveness. Indeed, to our knowledge, only three studies

have examined the relationship between mobility and attrition patterns and teacher quality using direct measures of teachers' classroom effectiveness.[4] Each finds that teacher effectiveness is in fact positively associated with retention in either specific schools or the profession—a finding that might be interpreted as discrediting the concern that public schools are losing their best teachers. However, this interpretation ignores the possibility that the optimal pattern may be high attrition rates among the least effective teachers and low attrition rates among the most effective teachers. While it is sensible to measure overall differences in attrition and mobility rates by effectiveness, it is also important to consider the absolute attrition rates for different groups of teachers and whether they could (and should) be higher or lower.

This chapter, which presents a descriptive analysis of the early career paths of new elementary school teachers in the state of Florida from 2001–02 to 2005–06, extends this emerging line of research in several ways. Specifically, we address three questions:

—How do patterns of mobility across schools and attrition from the profession differ for new fourth- and fifth-grade teachers in Florida who are more and less effective, as measured by their students' academic progress on state tests?

—Do these patterns differ for schools serving more advantaged students and for schools with high-performing students?

—For teachers switching schools, how did their schools and salaries change when they moved?

Although we do not find evidence that Florida elementary schools are disproportionately losing their most effective early-career teachers, our data nonetheless suggest that schools have considerable room to raise student achievement and close achievement gaps through targeted policies aimed at retaining only their most effective performers. A clear majority of the state's most effective teachers leave their initial schools only four years into their careers, and these

same teachers are no less likely than the least effective to leave the state's public schools system altogether. We also find that some schools—namely, those with the highest-performing students—already do a far better job than most of retaining their most effective teachers and dismissing the least effective.

Teacher Policy and Mobility in Florida

In recent years, the combination of population growth and class-size reduction policies has dramatically increased the demand for teachers in Florida. The school-age population in the state increased by 6 percent (from 2,708,000 to 2,869,000) between 2000 and 2005, while the national school-age population grew by only 0.02 percent.[5] Perhaps more important, in November 2002 voters approved an amendment to the Florida constitution establishing maximum class sizes of eighteen students in grades K–3, twenty-two students in grades 4–8, and twenty-five students in high school, to be attained by the 2010–11 school year. Implementing legislation passed in 2003 mandated a reduction of two students a year in district average class sizes from 2003–04 until 2005–06; a two-student reduction in school average class size during the 2006–07 and 2007–08 school years; and a two-student reduction in individual classroom averages in 2008–09 until goals are reached before or during the 2010–11 school year. As a consequence, average class sizes statewide decreased by 6.12 students in grades K–3 and 4.75 students in grades 4–8 between the 2003–04 and 2006–07 school years.

In response to the hiring pressures stemming from these developments, the state legislature established two innovative programs that provide alternative routes into teaching: educator preparation institutes at community colleges and district-based alternative certification programs. The state's department of education also invested considerable resources in recruiting

out-of-state teachers and proposed legislation that would encourage former military personnel and military spouses to enter the classroom. However, there remains an urgent need to increase the supply of teachers entering Florida's classrooms that presumably also creates strong incentives for schools and districts to retain their current teachers.

While the Florida legislature has, since 2006, passed two landmark laws mandating that each of its sixty-seven school districts adopt plans that would make teachers eligible for bonuses based on their students' academic progress, the use of performance pay in Florida during the time period we examine was limited, especially for elementary school teachers.[6] The most important exception is the School Recognition Program, which since 2002 has offered awards of $100 per full-time-equivalent student to each school that improves its grade on the state's accountability system or maintains its ranking in the highest category. Although most recognized schools distribute the bulk of these funds to their employees, they typically do so relatively evenly among teachers and staff. As a result, the one-year bonuses for classroom teachers typically amount to less than $1,000 per teacher.[7] The state also offers bonuses to teachers who have attained certification from the National Board for Professional Teaching Standards and for teachers whose students pass advanced placement exams, but these programs are generally not relevant for early-career teachers in the elementary grades. Finally, the use of bonuses to recruit and retain teachers in hard-to-staff schools and subjects is not widespread in the state. There is little reason, then, to think that Florida's tentative early steps toward differentiated compensation for teachers had a measurable impact on the attrition and mobility patterns documented below.

The database we draw upon in this chapter enables us to track all 11,076 fourth- and fifth-grade regular classroom teachers in the 2001–02 through 2005–06 academic years, the most recent for which data are available. Eighty-two percent of teachers in these grades remained in

the same school after one year, but this figure dropped to around 50 percent by the fifth year. Most of the movement of teachers across schools in Florida occurs within districts rather than between districts. By the 2002–03 academic year, 7 percent of teachers were employed by another school within the same district in which they had taught the previous year, while only 1 percent had moved to another district. By 2005–06, these figures had increased to 18 and 4 percent, respectively. But teachers who leave the Florida public schools altogether consistently outnumber the combined share of teachers who switch schools either within or between districts. The share of 2001–02 teachers no longer employed in any public school in Florida rose from 10 percent in 2002–03 to 27 percent in 2005–06. Interestingly, the one-year mobility and attrition rates we observe in Florida in 2003–04 are remarkably close to the national average for elementary school teachers that same year: by the 2004–05 school year, 83 percent of all teachers remained in the same school, 9 percent had moved to a different school, and 8 percent had left the profession.[8]

Figures 11-1 provides an overview of mobility and attrition among the 2,313 fourth- and fifth-grade teachers who entered the profession from 2001–02 to 2004–05, the group that is the focus of our analysis. Rather than organize the data by chronological year, we instead track each teacher's movements relative to his or her first year of teaching. Because we can follow teachers only through 2005–06, we observe the cohorts of teachers entering after 2001–02 for fewer than five years. The size of the samples on which each data point is based therefore grows smaller with each successive year. The figure confirms that this group of new teachers is much more mobile than the full sample of teachers in the same grades, much as one would expect of any worker early in his or her career. Only 66 percent of new teachers remained in the same school for a second year, and by the fifth year more have left the profession than remain at the same

school. As with the full group of teachers described above, most of the movement of new teachers among schools occurs within districts rather than between districts.

Of course, when a new teacher switches schools but does not exit the profession, one school's loss is another school's gain. From a system-wide standpoint, the movement of teachers across schools could have a negligible impact on student achievement if it does not interfere with staff cohesion and if a year of experience in a school will prepare the teacher for a different school just as well as a year of experience in the new school would have. Teacher mobility could even be beneficial for student achievement if teachers sorted themselves into school environments in which they are more effective. Of course, another plausible equilibrium is one in which the best teachers drift toward the schools with the best salaries and most-favorable working conditions (for example, good neighborhood, students from affluent families, and so forth) where they instruct the students who arguably need them the least. One might expect this to occur if salary differences are small across schools (so only compensating differentials affect job choice) or if schools with wealthier families are able to offer higher salaries to attract high-quality teachers. In Florida, school districts (which are coterminous with counties) are very large, so the former hypothesis is likely more relevant than the latter.

Figure 11-2 offers some basic evidence as to how the mobility of new fourth- and fifth-grade teachers varies according to the racial distribution of their schools' student bodies. There are substantial differences in the rate at which new teachers remain in their initial schools, and teachers in schools serving less than one-third minority students are more likely to stay in their schools than teachers in high-minority schools. A virtually identical pattern emerges when we group schools according to the share of students eligible for the free or reduced-price lunch program, a standard indicator of poverty. This constitutes suggestive evidence, based on the link

between teacher experience and effectiveness, that teacher attrition may have a larger negative impact at schools that serve primarily disadvantaged students. It could, however, be that the difficult working conditions of urban schools more efficiently weed out ineffective teachers and thus that higher teacher attrition at these schools is actually beneficial for student achievement. In short, to truly understand the implications of teacher mobility for student achievement, it is essential to examine the relationship between mobility and effectiveness.

Analytic Strategy and Data

Most research on teacher quality has used observed teacher characteristics (for example, experience, graduate degrees, college selectivity, or certification test scores) as proxies for unobserved ability. Recent findings, however, cast considerable doubt on the relationship between these indicators and classroom effectiveness.[9] We use the terms *effectiveness* and *quality* interchangeably in this chapter to refer only to the effect that a teacher has on his or her students' test scores. Of course, teacher quality has other dimensions, most of which are difficult to measure and all of which are outside the scope of our analysis. The value of the findings presented below hinges on the assumption that the test instruments used are, on average, a reasonable measure of students' overall academic development.

Measuring Teacher Effectiveness

We begin our analysis of the relationship between teacher effectiveness and mobility by computing a value added measure of effectiveness for each teacher. Specifically, we regress students' math and reading test scores separately on their prior-year test scores (including squared and cubed terms of the prior-year scores in order to allow for nonlinearities in the relationship between prior and current achievement); vectors of student, classroom, and school

characteristics; dummy variables for teacher experience; and grade-by-year fixed effects.[10] Our student-level control variables (in addition to prior-year test scores) are the number of days absent the previous year and dummy variables for race, gender, limited English proficiency status, special education status, migrant status, whether the student was in a different school the previous year, and free or reduced-price lunch eligibility. Classroom- and school-level control variables include all of the student-level characteristics aggregated to the appropriate level. In addition, they include class size and the percentage of students in the classroom and school who were repeating a grade. The model, then, is

$$A_{it} = \omega A_{i,t-1} + \beta X_{it} + \gamma C_{it} + \phi S_{it} + \delta W_{it} + \pi_{it} + \varepsilon_{it},$$

where A_{it} is the test score of student i in year t (standardized by grade and year to have a mean of zero and standard deviation of one); $A_{i,t-1}$ is the student's prior-year test scores in both subjects (and their squared and cubed terms); X, C, and S are student-, classroom-, and school-level characteristics; W is a vector of teacher experience dummy variables; π is a vector of grade-by-year fixed effects, and ε is a standard zero-mean error term. We estimate this equation separately by subject (reading and math) and average the residuals by teacher and year to construct a single value added measure of teacher effectiveness.[11]

Although they are now widely used by researchers, the reliability of this kind of value added model of teacher effectiveness using nonexperimental data continues to be debated.[12] The key potential confounding factor is the nonrandom matching of students and teachers both across and within schools. For example, families choose where to live based in part on the quality of local schools, and they pay a premium for better schools through higher house prices and property taxes. At the within-school level, motivated parents could pressure the school to assign their children to teachers they perceive as better, senior teachers may be rewarded with classes

that have fewer students with behavior problems, or administrators may simply try to match students with the most appropriate teacher. Any of these potential sources of nonrandom sorting would bias our estimates of teacher quality if there are unobserved differences across students that cannot be controlled for using the variables described above.[13]

Fortunately, a recent validation study confirms that value-added estimates of teacher effectiveness are highly correlated with estimates based on experimental data in which teachers and students are randomly paired, providing strong evidence that they are in fact reliable.[14] Moreover, it is unclear whether and in what direction any nonrandom matching would bias our analyses. The nonrandom matching of students and teachers based on unobserved characteristics should increase measurement error in our teacher effectiveness ratings, thereby attenuating differences in mobility patterns between teachers in different segments of the effectiveness distribution. It is not obvious a priori, however, whether the additional error would be systematically related to teacher mobility. In short, while our analysis is not based on experimental estimates of teacher effectiveness, there is little reason to expect that this is an important limitation in this context.

The Florida Database

The information with which we implement this approach comes from the K–20 Education Data Warehouse assembled by the Florida Department of Education. Our data extract contains observations on every student in Florida who took the state assessment tests from 1998–99 to 2005–06, and each student in the database is linked to his or her teacher (or teachers) for 2001–02 through 2005–06.[15] The data include test score results from the Florida Comprehensive Assessment Test (FCAT), the state accountability system's "high-stakes" test, and the Stanford Achievement Test, a nationally norm-referenced test that is administered to students at the same

time as the FCAT but is not used for accountability purposes. Beginning in 2000–01, students in grades 3 through 10 were tested every year in math and reading. Thus annual gain scores can be calculated for virtually all students in grades 4 through 10 beginning in 2001–02. The data also contain information on the demographic and educational characteristics of the students, including gender, race, free or reduced-price lunch eligibility, limited English proficiency status, special education status, days in attendance, and age.

Our teacher data files contain detailed information on individual teachers, including demographic information, experience, and compensation. We use the employment data (the course enrollment file that matches students and teachers) to track where teachers are employed each year and to link them to their students. We use the experience data to identify the cohorts of fourth- and fifth-grade teachers that entered the teaching profession from 2001–02 and 2004–05.[16] The teacher experience variable we construct is made up of all years the teacher has spent in the profession, including both public and nonpublic schools in both Florida and other states.

The measure of teacher effectiveness used in the analysis presented below is based on FCAT math and reading test scores only. Because the FCAT is the test for which schools are held accountable, schools should have a particularly strong incentive to retain those teachers who are effective in raising student achievement on that test. The choice of which test to use, however, makes little difference to our results. The effectiveness of teachers as measured by their students' FCAT performance is modestly correlated with their effectiveness as measured by the Stanford Achievement Test ($r = 0.64$), and the attrition and mobility patterns documented below are similar regardless of which test we use to gauge effectiveness.

Students who repeated or skipped a grade are excluded from our analysis because their prior-year test scores are not directly comparable to those of their classmates.[17] We limit our

analysis to fourth- and fifth-grade students and their teachers, as these students typically have only one teacher for primary math and reading (their regular classroom teacher). Students who had more than one classroom teacher or are in a classroom of fewer than ten or more than fifty students are dropped from this analysis.[18] The data on which this analysis is based span from 2001–02, the first year for which we can calculate gain scores for fourth- and fifth-graders in both reading and math, to 2005–06, the most recent year for which data are currently available.

Results

The estimates based on our value-added model of teacher effectiveness are consistent with previous findings on both returns to experience and variation in teacher effectiveness. In math, the students of first- and second-year teachers have test scores about 4 and 1 percent of a standard deviation lower, respectively, than students of the most experienced teachers (those with more than twenty years of experience). Teachers between the third and twentieth year of experience are all about as effective as teachers with more than twenty years of experience. In reading, the test scores of students of first- and second-year teachers are about 5 and 4 percent of a standard deviation lower, respectively, than the most experienced teachers. Students of teachers in their third through tenth years of teaching also score about 2 to 3 percent of a standard deviation lower in reading than do those of the most experienced teachers.

The standard deviation of our teacher effectiveness measures, once adjusted for sampling error, is also similar to that found in previous work. After using the correlation of individual teacher's ratings across years to separate the persistent and nonpersistent components of our teacher effectiveness measure, we estimate a standard deviation of the persistent component of 0.11 in math and 0.05 in reading.[19] In other words, the effectiveness of fourth- and fifth-grade

teachers in the state of Florida as measured by their students' academic progress varies enormously, as has been the case in every context in which this question has been examined.

Mobility and Attrition by Effectiveness Tercile

We use the results of the same model to divide all teachers in Florida who were in charge of a fourth- or fifth-grade classroom from 2001–02 to 2005–06 into thirds based on their average effectiveness score in both math and reading during the time they were employed at the school in which they taught during their first year.[20] The differences in the average effectiveness of teachers in each of these terciles are substantial. Students assigned to a teacher in the lowest third could expect to make gains of 0.20 standard deviations less on the math FCAT than had they been assigned to a teacher in the middle third; students assigned to a teacher in the top third could expect to make gains that were 0.20 standard deviations greater. On the reading FCAT, the expected gains for students of bottom-third and top-third teachers would be –0.09 and 0.09 standard deviations, respectively.[21]

We then focus on the 2,313 of these teachers who entered the profession from 2001–02 to 2004–05. These teachers are somewhat clustered in the bottom of the effectiveness distribution, with just over 40 percent falling in the bottom third, 28 percent in the middle third, and 31 percent in the top third. The concentration of new teachers among the least effective could reflect either a cohort effect (that is, teachers entering the Florida school system are less effective than previous entrants) or imperfections in our adjustment for the effects of experience.[22] Fortunately, neither possibility is a problem for our analysis of early-career mobility and attrition across the three groups.

Figures 11-3 and 11-4 track the mobility of new teachers separately within each of these terciles. Mobility behavior is described by two binary variables: whether the teacher was still in

the same school (figure 11-3) and whether the teacher was still in the profession (figure 11-4). It is important to keep in mind that our data do not allow us to distinguish between voluntary and involuntary movement among teachers—that is, between involuntary transfers and dismissals and voluntary decisions to seek out a new school or leave the teaching profession. Conventional wisdom, however, would suggest that most mobility and attrition is voluntary, even among new teachers, and the patterns we observe generally provide no strong reason to think otherwise.

Contrary to common preconceptions (but consistent with previous research), we find that the most effective teachers are actually more likely to remain in their original schools than are teachers in the bottom third of the effectiveness distribution. The differences are especially pronounced in the first three years. By the second year of teaching, only 59 percent of bottom-third teachers remain in their original schools, as compared with roughly 70 percent of both middle- and top-third teachers. These differences in retention rates narrow somewhat over time but remain evident by year five (although the difference in retention rates for the middle- and bottom-third teachers is only statistically significant at the 85 percent level).

At the same time, figure 11-3 also suggests that schools would be well served by doing more to retain their most effective teachers—as only 30 percent remain in their original school by year five—and by dismissing more of the worst teachers before they are granted tenure, which in Florida generally occurs between the third and fourth years of teaching. The fact that there is no sharp drop in retention rates at this point, either overall or for the least effective teachers, suggests that schools are not using the tenure decision process to weed out probationary teachers who have been ineffective in the classroom. The markedly higher mobility rates of bottom-third teachers in the first three years, however, could indicate that schools are counseling out their worst performers.

Figure 11-4, which examines the rate at which teachers remain in any public school in Florida, paints a somewhat different picture. While teachers in the bottom third of the distribution are still less likely to remain in the profession through the second year of teaching, the differences across terciles are small and disappear altogether by year four. By year five, only 61 percent of the top-third teachers remain in Florida schools, again suggesting the potential value of targeted policies to increase retention for this group. The clear difference between the school-level and statewide retention patterns suggests that the least effective teachers, though they are more likely to leave their initial schools, are often successful in gaining employment elsewhere in the Florida public school system.

School Characteristics and Mobility by Effectiveness Tercile

Of course, it is possible that the relationship between teacher mobility and teacher effectiveness varies according to the characteristics of the school. For example, it may be the case that schools serving disadvantaged students lose their most effective teachers to schools with more desirable teaching environments and are left with only their worst performers. Figure 11-5 explores this issue by tracking the mobility of new teachers out of schools with large (more than two-thirds) shares of minority students. As above, we find that overall levels of attrition are substantially higher in high-minority schools than in schools statewide (compare figure 11-3). The relative attrition rates of the most and least effective teachers, however, are quite similar to the patterns elsewhere. Specifically, teachers in the bottom third of the distribution are roughly 10 percentage points more likely than those in the middle or top third to leave their original schools in the first two years of teaching . These schools do appear to suffer from a sharp drop-off in retention rates among the most effective teachers in year five, but this result should be interpreted cautiously because it is based on data from only a single cohort of new teachers. The

patterns for high-poverty schools (not shown) essentially parallel those for high-minority schools, with the exception of the year-five decline in retention among the most effective teachers.

Figure 11-6 looks separately at teacher mobility in the 273 elementary schools with at least one teacher in our sample in which more than two-thirds of students score at proficient levels in both math and reading on the FCAT. Interestingly, at these relatively high-performing schools, the retention rates of the most and least effective teachers appear to diverge sharply, especially in years four and five. By year four, only 27 percent of the least effective teachers remain in their initial school, as compared with more than 45 percent of the most effective teachers. By year five, fewer than 10 percent of the bottom-third teachers remain in their school. This pattern, which contrasts sharply from what is observed for the state's schools as a whole, suggests that the most successful schools in the state do a better job of selectively retaining their strongest teachers. And although we still cannot distinguish between teacher dismissals and voluntary departures, the extremely small share of ineffective teachers remaining in schools that we would expect to have more desirable teaching environments suggests that they are also more aggressive in weeding out poorly performing teachers early in their careers. Both of these factors may play a role in these schools' overall success.

Characteristics of New and Old Schools for Switchers

The results presented thus far confirm that fourth- and fifth-grade teachers in Florida are highly mobile in the early years of their careers and that much of that mobility appears to be voluntary. Some insight can be gained into the factors influencing the movement of teachers among schools and districts and its consequences for students by comparing the characteristics of teachers' original schools before and after each move. It is important to keep in mind that this

analysis is purely descriptive. We have no basis for drawing strong causal inferences about the effects of particular school characteristics on teacher mobility. Nonetheless, the patterns we observe are consistent with the notion that school working conditions, as reflected in the demographic and educational characteristics of their student bodies, play a major role in teachers' decisions about where to teach.

Table 11-1 compares the characteristics of the old and new schools of teachers who left their initial school but continued to teach in the state of Florida. It provides clear evidence that teachers who switch schools tend to move into higher-performing schools with more advantaged student bodies. Among those who remained in the same district, teachers who changed schools experienced on average a 22 percent decline in the share of students who were black and a 13 percent decline in the share eligible for the free or reduced-price lunch program. The new schools also had larger shares of students who were proficient on the FCAT in math and reading and received better overall scores on the state's highly visible school grading system, half of which is based on students' annual gains in achievement.

These changes in school characteristics were even more pronounced for teachers moving between districts. These teachers experienced a 31 percent decline in the share of black students, a 21 percent decline in the share of students eligible for the free lunch program, and increases of 22 percent and 16 percent, respectively, in the percentage of students proficient in math and reading. District switchers also saw a jump in their annual base salaries of 24 percent, or more than $6,400. The average salary increase of $4,000 experienced by within-district movers, who typically remained on the same salary schedule, provide a rough benchmark for evaluating this jump and suggest that district switchers do tend to choose systems with higher overall salary levels.

Table 11-2 looks separately at the changes experienced by switchers within each of the three effectiveness levels, combining the data from both within- and between-district switchers for all characteristics except base salary because of the relatively small number of between-district moves in each group. These data confirm that the tendency of teachers to move to schools with less disadvantaged student bodies is not unique to teachers in the top or middle thirds of the effectiveness distribution. If anything, teachers in the bottom third experience larger declines in the share of students who are black and larger increases in student academic performance as they move between schools. This may reflect the fact that these teachers tend to start out in schools that have somewhat more disadvantaged and lower-performing student bodies, a reminder that it is important to pay attention to the initial distribution of teachers as well as to their mobility.

In sum, it is clear that effective and ineffective teachers alike tend to migrate in the early years of their career toward higher-performing schools with more-advantaged student bodies. This pattern suggests that schools that attract experienced applicants may not do a very good job of selecting only those teachers with a successful track record in the classroom, at least as measured by the academic progress of the students under their care.

Implications for Policy

The United States currently faces the daunting challenge of hiring large numbers of new teachers while simultaneously improving the quality of its teaching workforce. These pressures are particularly acute in Florida because of the state's commitment to dramatic reductions in class size by the end of this decade. The difficulty of predicting the effectiveness of teachers based on what is known about them before they enter the profession—the kind of information

included on their resumes—means that retaining those teachers who have demonstrated their effectiveness in the classroom is essential to accomplishing the task.

How are schools faring in this regard? Is the teacher labor market glass half empty or half full? The answers to these questions will depend in part on prior expectations. If we suspect that the nation's most effective teachers are fleeing the classroom in droves, then even a finding that leavers are little different than those who stay may be seen as reassuring, however odd such a pattern would appear in other sectors of the economy.

At least in the case of Florida, our results also suggest that the answer will depend on the level at which one conducts the analysis. When we compare the mobility rates of the most and least effective teachers at specific schools, we find that the least effective are actually somewhat more likely to leave in the first years of their careers. And schools with high-performing students are able to retain a bare majority of their most effective teachers while dismissing all but a handful of their worst performers. Comparing the average effectiveness of those who have stayed in their school and those who have moved on by year four confirms that those who stay do tend to be modestly more effective than those who leave—by about 4 percent of a standard deviation. Looking at the state public school system as whole, however, the pattern is less encouraging. There is essentially no difference whatsoever in the effectiveness of those who remain in Florida public schools and those who leave. The disparity between mobility and attrition patterns in the state is consistent with the notion that many public schools engage in a "dance of the lemons," in which poorly performing teachers are passed from one school to another rather than being dismissed.

Perhaps surprisingly, we find little evidence that schools serving disadvantaged students are particularly likely to lose their best teachers. Rather, the tendency of teachers to drift to

schools with more favorable student characteristics is evident among both low and high performers. It is important to emphasize that this does not imply that schools serving more disadvantaged students are not adversely affected by current mobility patterns among new teachers. Indeed, given the value of classroom experience, the higher overall attrition rates at these schools should be a matter of considerable concern. But policies aimed at increasing retention in schools that serve disadvantaged students will be far more beneficial for students if they aim at retaining their most effective teachers, not just at lower turnover rates.

Discussions of differentiated compensation policies in education often treat financial incentives for performance and for teaching in hard-to-staff schools as separate issues. Proposed performance pay schemes, including those recently enacted in Florida, would make all teachers eligible for bonuses based on their students' academic progress. Separate bonuses would be available for all qualified teachers accepting assignments in hard-to-staff schools. While much more research is needed on the extent to which teachers respond to the incentives created by such policies, combining the two approaches—for example, by offering larger performance incentives in hard-to-staff schools—may represent a promising approach to improving both overall teacher quality and the allocation of the most effective teachers across schools.

Notes

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4. Hanushek and others, "The Market for Teacher Quality"; John M. Krieg, "Teacher Quality and Attrition," *Economics of Education Review* 25**,** 1 (2004): 13–27; and Dan Goldhaber, Betheny Gross, and Daniel Player, "Are Public Schools Really Losing Their Best? Assessing the Career Transitions of Teachers and Their Implications for the Quality of the Teacher Workforce," Working Paper 12 (Washington, D.C.: Urban Institute, October 2007).
5. U.S. Department of Education, *Digest of Education Statistics 2007* (U.S. Government Printing Office, 2007).
6. Eric A. Hanushek, "Teacher Compensation," in *Reforming Education in Florida*, edited by Paul E. Peterson (Stanford, Calif.: Hoover Institution Press, 2006), pp. 149–63; Richard Buddin and others, "Merit Pay for Florida Teachers: Design and Implementation Issues," Working Paper WR-508-FEA (Santa Monica, Calif.: Rand Corporation, August 2007).
7. Our data on teacher compensation indicate that the median award for all Florida teachers receiving bonuses through the School Recognition Program is $920.
8. U.S. Department of Education, *Digest of Education Statistics 2007*.
9. For a recent review of this evidence, see Charles Clotfelter, Helen Ladd, and Jacob Vigdor, "Teacher-Student Matching and the Assessment of Teacher Effectiveness," Working Paper 11936 (Cambridge, Mass.: National Bureau of Economic Research, January 2006).
10. We control for teacher experience using a dummy variable for each of the first twenty years of experience, so the omitted category includes all teachers with more than twenty years of experience.
11. This estimation approach is similar to the one used in Thomas J. Kane, Jonah E. Rockoff, and Douglas O. Staiger, "What Does Certification Tell Us about Teacher Effectiveness? Evidence from New York City," Working Paper 12155 (Cambridge, Mass.: National Bureau of Economic Research, April 2006). As a robustness check, we estimated teacher effects using models in which the dependent variable is a gain score standardized by decile of prior achievement, as in Hanushek and others, "The Market for Teacher Quality." The results, which are qualitatively similar to those reported here, are available upon request.
12. See, for example, Jesse Rothstein, "Teacher Quality in Educational Production: Tracking, Decay, and Student Achievement," Princeton University, May 2008.
13. One way to eliminate bias from nonrandom matching between schools is to focus on differences in teacher quality within schools through the inclusion of school fixed effects. We do not include school fixed effects in our preferred specification in order to allow for comparisons of teachers across schools. However, all of the results presented below are qualitatively similar to those found when we estimate teacher effectiveness conditional on school fixed effects.
14. Thomas J. Kane and Douglas O. Staiger, "Are Teacher-Level Value-Added Estimates Biased? An Experimental Validation of Non-Experimental Estimates," Harvard University, March 17, 2008.
15. We match students to their teachers using course records that clearly identify fourth- and fifth-grade classrooms. We also performed additional analyses that included teachers that appeared to be regular classroom teachers (e.g., because they taught students both English and math, and those students weren't listed in a clearly identified fourth- or fifth-grade classroom) but were not as clearly identified as such. The results of those analyses are qualitatively similar to those reported here.
16. Because the experience database does not reliably distinguish teachers with no experience and those with missing experience data, we define the cohort of new teachers in a given year as those who have missing or no experience that year and were not employed by a Florida public school in the previous year.
17. The number of students who skipped a grade is trivial, while the number who repeated a grade is substantial. The repeaters are included in the calculation of classroom- and school-level peer variables. We also calculate, and include in all regressions, variables indicating the percentage of students in each classroom and school who were repeating a grade.
18. A large and increasing number of elementary school students in Florida appear to have more than one regular classroom teacher, perhaps owing to an increase in the practice of team teaching. In future work we hope to develop effectiveness measures for this group.
19. We follow the variance decomposition method described in Kane, Rockoff, and Stagier, "What Does Certification Tell Us about Teacher Effectiveness?" They report standard deviations of teacher effectiveness of 0.13 in math and 0.10 in reading, using data from elementary schools in New York City.

20. In other words, any time spent at a school other than the one where a teacher worked in his or her first year of teaching does not contribute to their effectiveness measure. We take this approach because of our interest in whether schools are retaining teachers based on their observed performance in their initial school.
21. These calculations are based on the standard deviation of the persistent component of the teacher effectiveness measure calculated separately for math and reading, and thus the differences in expected student achievement in each subject are calculated by teacher effectiveness (tercile) in that subject. As stated earlier, the effectiveness terciles used in the rest of this analysis are based on the average of the effectiveness measures across the two subjects.
22. We find some suggestive evidence in support of the former possibility, as the effectiveness ratings of teachers who entered in 2003–04 and 2004–05, when the state's mandate regarding class-size reduction increased the number of new teachers hired in these grades, are especially low.

Figure 11-1. Status of New Teachers Over Time, Florida Public Schools, 2001-06

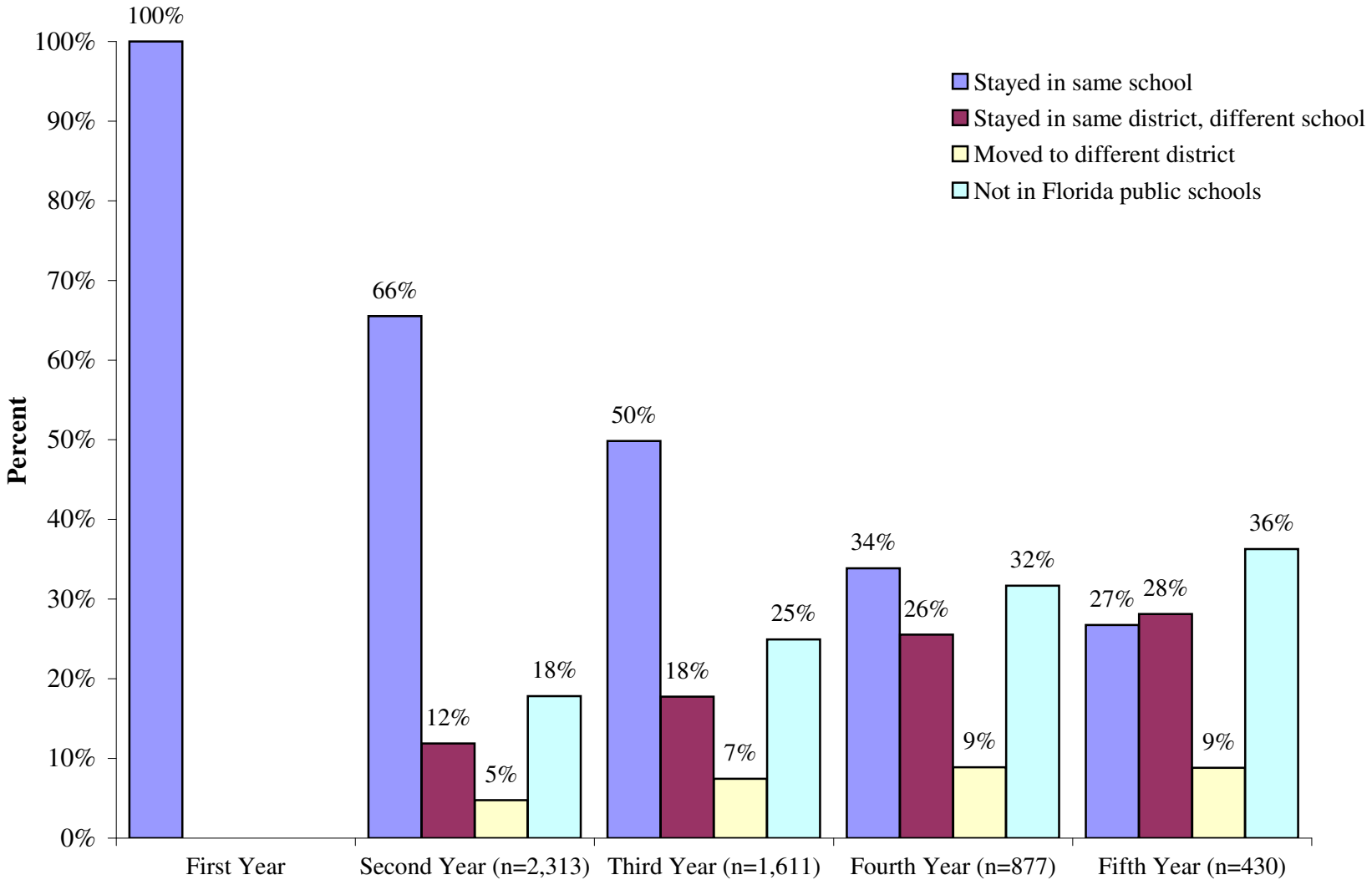

Figure 11-2. Retention of New Fourth- and Fifth-Grade Teachers, by School Racial Makeup, Florida Public Schools, 2001-06

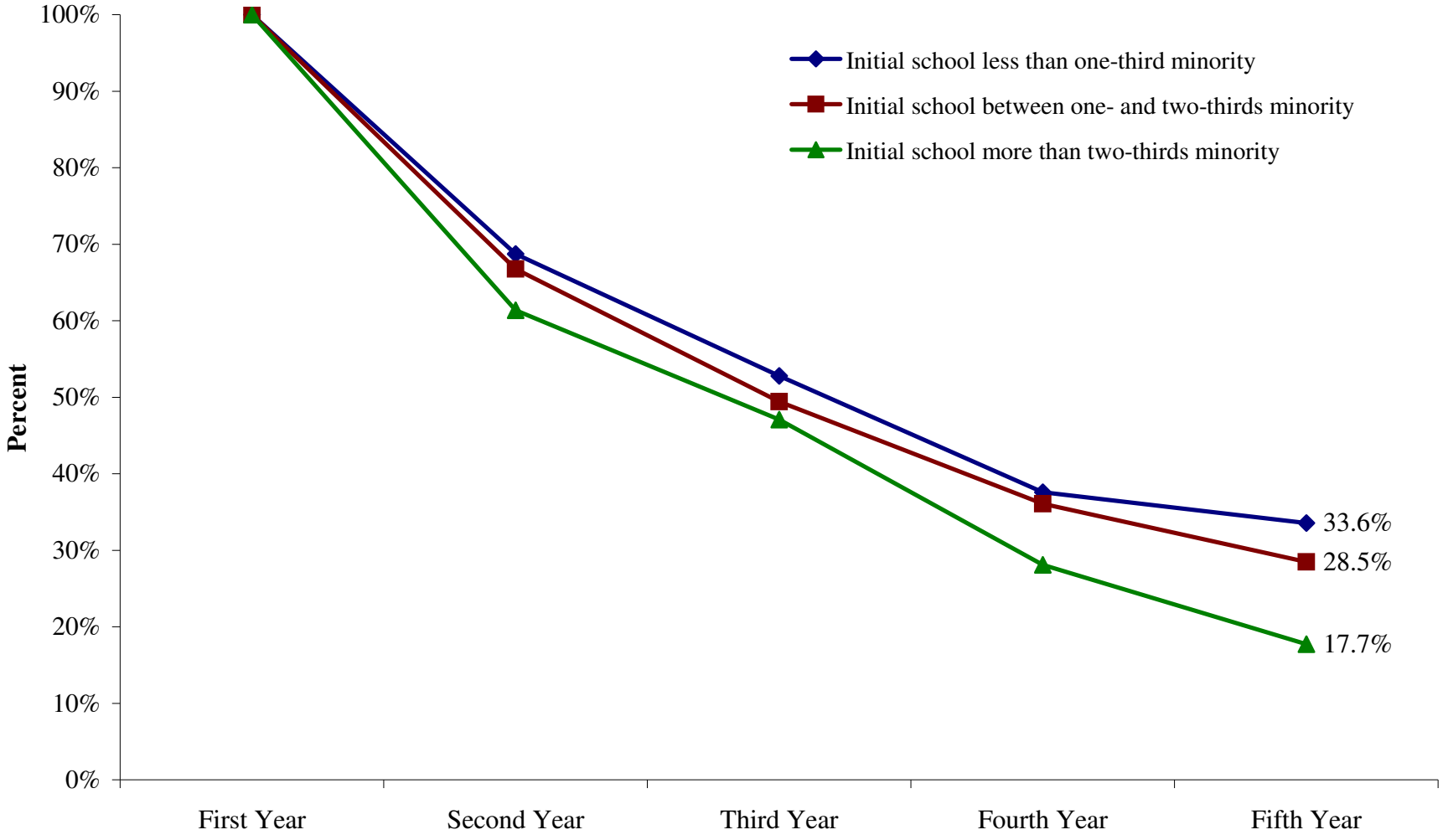

Figure 11-3. New Teacher Retention in Same School, by Teacher Effectiveness, Florida Public Schools, 2001-06

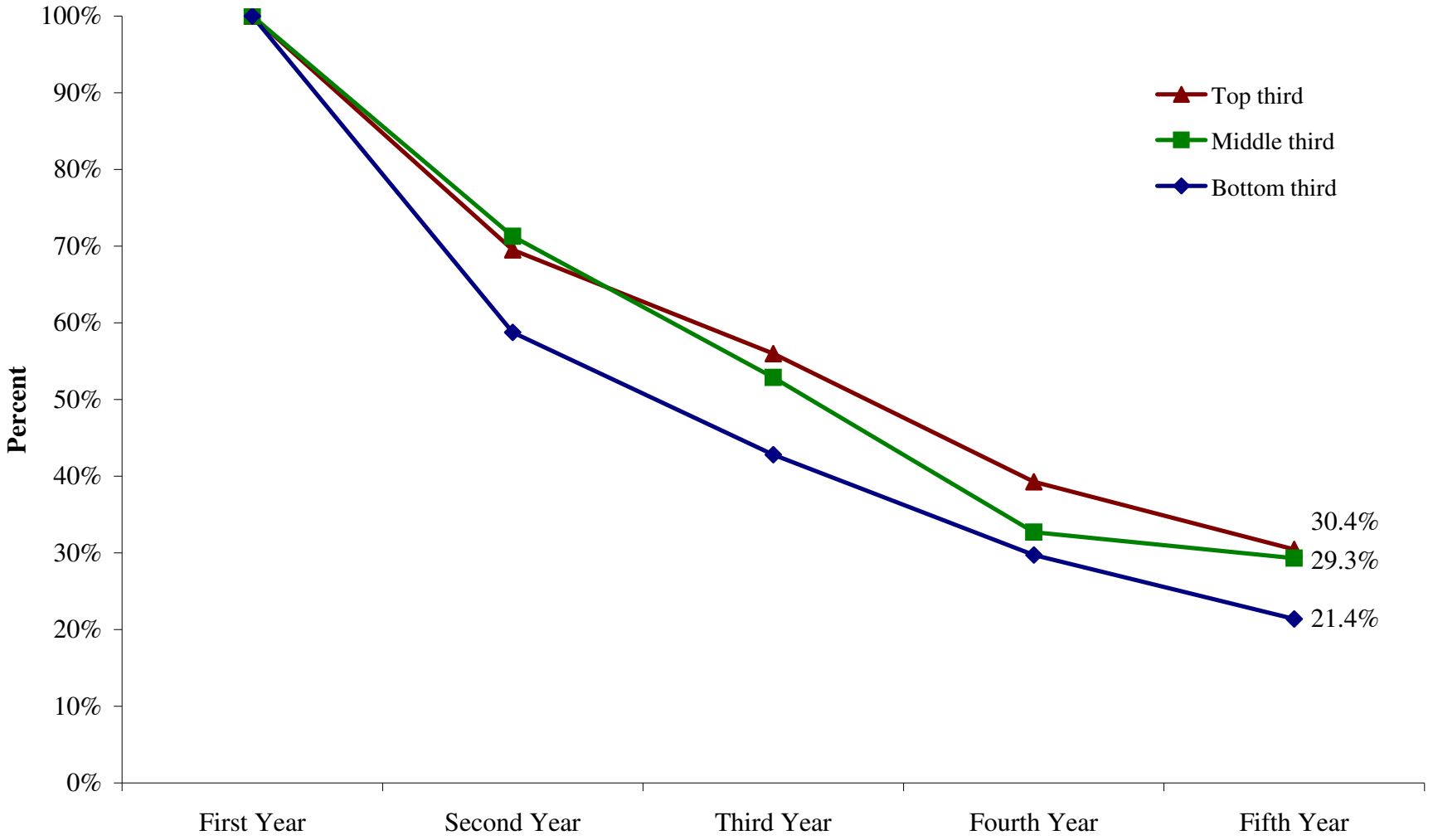

Figure 11-4. New Teacher Retention in Profession in State, by Teacher Effectiveness, Florida Public Schools, 2001-06

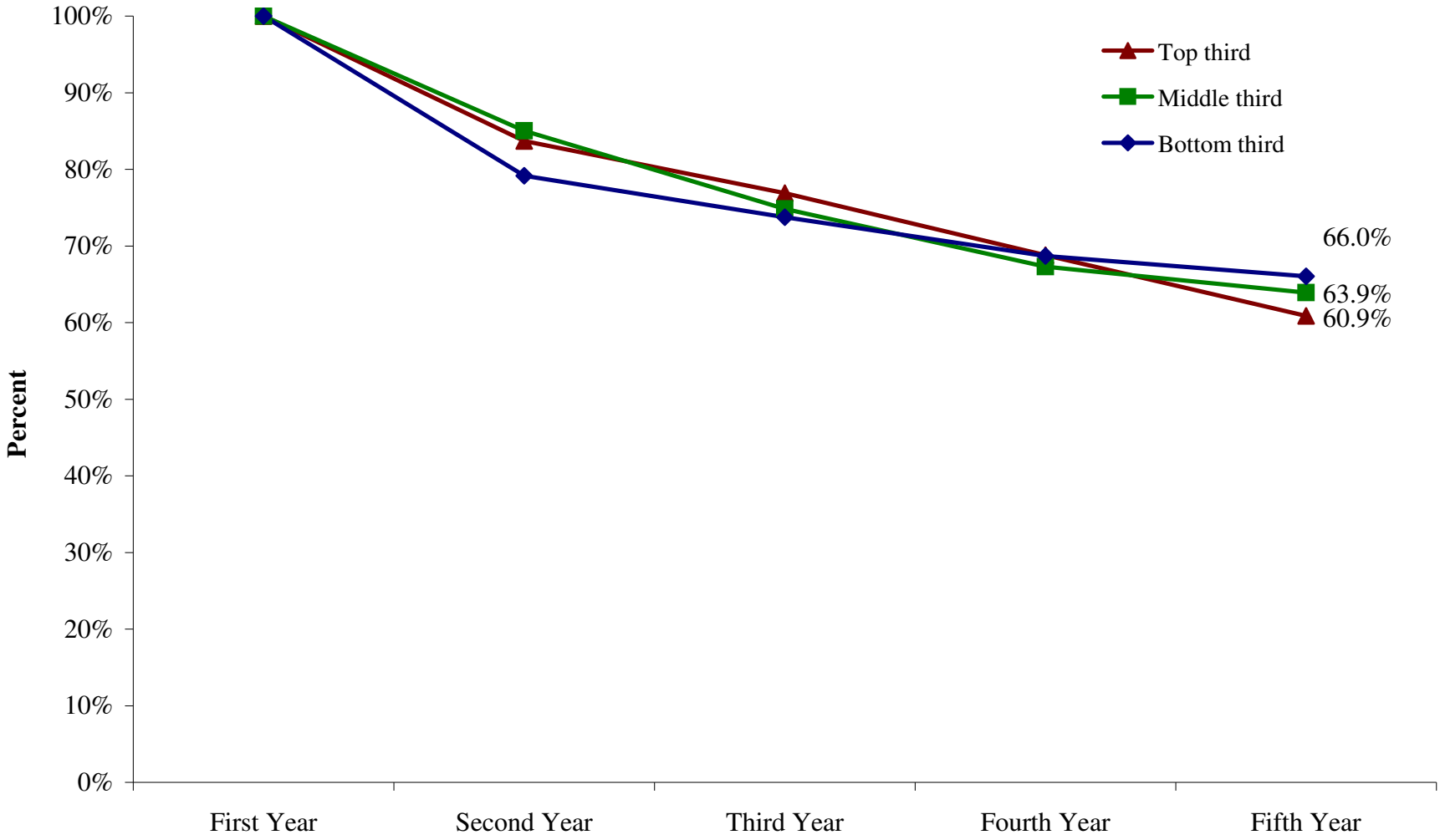

Figure 11-5. New Teacher Retention in Same School, by Teacher Effectiveness, High-Minority Schools, Florida Public Schools, 2001-06

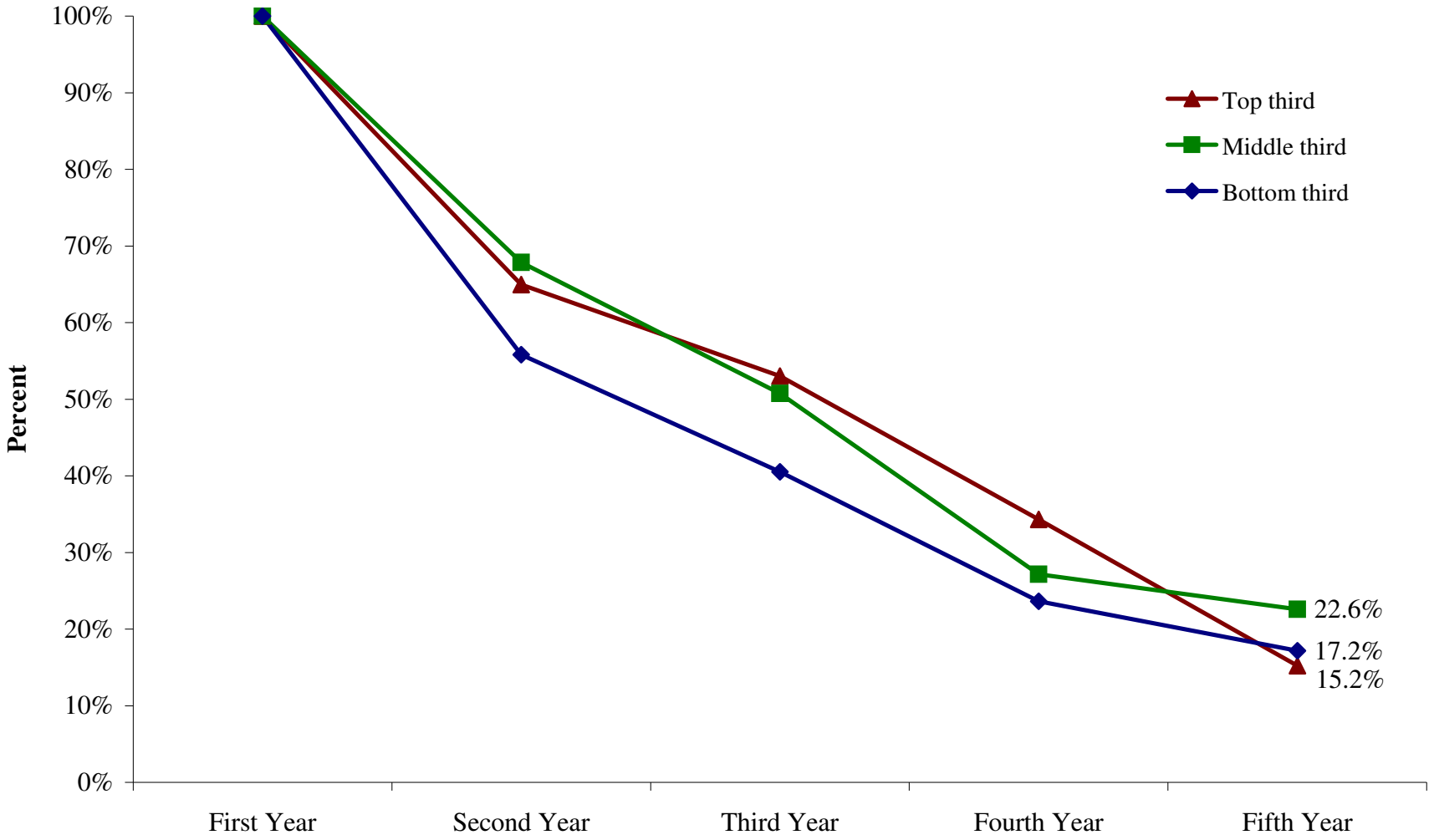

Figure 11-6. Teacher Retention in Same School, by Teacher Effectiveness, High-Scoring Schools, Florida Public Schools, 2001-06

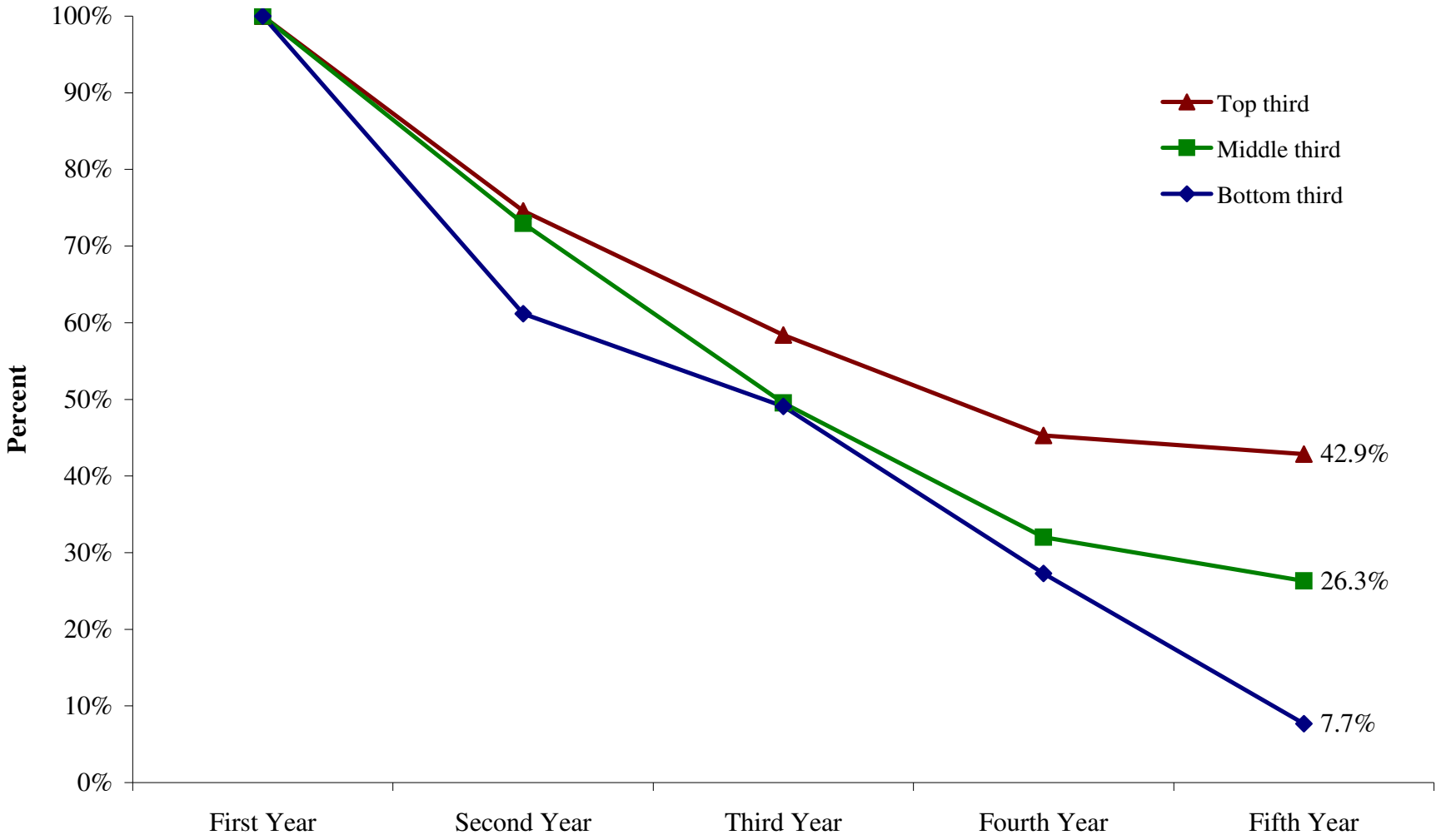

Table 11-1. Characteristics of Old and New Schools

	Same District (N=494)				
	Old	**New**	**Δ**	**%Δ**	**Sig**
Percent Black	32.7%	25.6%	-7.1%	-21.8%	**
Percent Hispanic	23.5%	25.7%	2.2%	9.3%	*
Percent Eligible for Free Lunch	61.3%	53.3%	-7.9%	-12.9%	**
Percent Special Ed	17.2%	16.2%	-1.0%	-5.6%	*
Percent Proficient in Math	50.9%	58.7%	7.7%	15.2%	**
Percent Proficient in Reading	55.8%	61.8%	6.0%	10.7%	**
School Grade	2.83	3.07	0.24	8.5%	**
Base Salary	$27,418	$31,396	$3,978	14.5%	**

	Different District (N=189)				
	Old	**New**	**Δ**	**%Δ**	**Sig**
Percent Black	35.4%	24.5%	-10.9%	-30.8%	**
Percent Hispanic	17.4%	14.7%	-2.7%	-15.4%	
Percent Eligible for Free Lunch	61.6%	49.0%	-12.6%	-20.5%	**
Percent Special Ed	18.5%	16.4%	-2.1%	-11.6%	**
Percent Proficient in Math	50.6%	61.8%	11.1%	22.0%	**
Percent Proficient in Reading	56.2%	65.2%	9.0%	15.9%	**
School Grade	2.81	3.21	0.40	14.2%	**
Base Salary	$26,403	$32,857	$6,454	24.4%	**

Note: Statistical significance of the difference between old and new schools at the 5 percent level is indicated by * and at the 1 percent level by **.

Source: Authors' calculations from Florida's K-20 Education Data Warehouse.

Table 11-2. Characteristics of Old and New Schools, by Teacher Effectiveness in Old School

	Bottom Third (N=316)				
	Old	**New**	**Δ**	**%Δ**	**Sig**
Percent Black	38.7%	27.2%	-11.5%	-29.7%	**
Percent Hispanic	21.1%	22.1%	1.0%	4.5%	
Percent Eligible for Free Lunch	64.0%	54.6%	-9.4%	-14.7%	**
Percent Special Ed	17.7%	16.7%	-1.0%	-5.6%	
Percent Proficient in Math	46.4%	57.3%	10.9%	23.4%	**
Percent Proficient in Reading	52.0%	60.7%	8.7%	16.8%	**
School Grade	2.48	2.97	0.49	19.7%	**
Base Salary (w/n district; n=230)	$26,895	$31,039	$4,144	15.4%	**
Base Salary (b/n district; n=89)	$25,698	$33,060	$7,362	28.6%	**

	Middle Third (N=191)				
	Old	**New**	**Δ**	**%Δ**	**Sig**
Percent Black	27.2%	25.2%	-2.0%	-7.4%	
Percent Hispanic	22.5%	22.3%	-0.2%	-1.0%	
Percent Eligible for Free Lunch	58.4%	52.3%	-6.1%	-10.5%	**
Percent Special Ed	18.2%	16.0%	-2.1%	-11.7%	**
Percent Proficient in Math	54.9%	60.5%	5.6%	10.2%	**
Percent Proficient in Reading	59.7%	64.1%	4.3%	7.2%	**
School Grade	3.09	3.21	0.13	4.2%	
Base Salary (w/n district; n=132)	$28,468	$33,191	$4,723	16.6%	**
Base Salary (b/n district; n=59)	$25,822	$33,229	$7,406	28.7%	**

	Top Third (N=176)				
	Old	**New**	**Δ**	**%Δ**	**Sig**
Percent Black	30.9%	22.0%	-8.9%	-28.8%	**
Percent Hispanic	22.4%	24.1%	1.8%	7.9%	
Percent Eligible for Free Lunch	59.8%	47.6%	-12.2%	-20.3%	**
Percent Special Ed	16.6%	15.7%	-0.9%	-5.4%	
Percent Proficient in Math	54.5%	62.6%	8.1%	14.8%	**
Percent Proficient in Reading	58.9%	64.9%	6.1%	10.3%	**
School Grade	3.13	3.26	0.13	4.0%	
Base Salary (w/n district; n=132)	$27,256	$30,196	$2,940	10.8%	
Base Salary (b/n district; n=44)	$28,538	$31,961	$3,423	12.0%	

Notes: Within- and between-district switches pooled for all characteristics except for base salary. Statistical significance of the difference between old and new schools at the 5 percent level is indicated by * and at the 1 percent level by **.

Source: Authors' calculations from Florida's K-20 Education Data Warehouse.