Challenges in Implementing Teacher-Student Assignment Policies: Evidence From Michigan's Read by Grade Three Law

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ABSTRACT

Given the importance of teachers for students' short- and long-term success, many education policies include mandates to match targeted students with "highly effective" teachers. An example is Michigan's Read by Grade Three Law, which requires students eligible for retention to be assigned "highly effective" teachers. Using a regression discontinuity design, we study the assignments of "highly effective" teachers to students eligible for retention under the law. We find no evidence that these students were more likely to be assigned a "highly effective" teacher than their peers just above the eligibility cut-off. Approximately 15% of both retention-eligible and ineligible students just above the cut-off with a "highly effective" teacher in the same building and grade level were not assigned to a "highly effective" teacher.

INTRODUCTION

Teachers play a crucial role in shaping students' educational outcomes and are a vital input in the education process. (e.g., Chetty et al., 2011, 2014a, 2014b; Jackson, 2018; Rivkin et al., 2005; Rockoff, 2004). However, their effectiveness varies significantly (e.g., Chetty et al., 2014a), and individual teachers may exhibit different levels of success with different student groups (Aucejo et al., 2022; Dee, 2004, 2005; Fairlie et al., 2014; Gershenson et al., 2016, 2018; Holt & Gershenson, 2019; Lindsay & Hart, 2017; Master et al., 2016; Wood et al., 2022). For these reasons, many education policies that aim to improve student achievement rely on the strategic allocation of high-quality teachers to meet students' individual needs (Clotfelter et al., 2006; Figlio & Özek, 2023; Gershenson et al., 2018). However, these kinds of policies rely on assumptions about the sufficient supply of high-quality teachers and the capacity of school and district administrators to strategically allocate these teachers within and across schools.

Michigan's Read by Grade Three Law is one such policy. Like 43% of early literacy policies in place across the country, the Read by Grade Three Law aims to improve students' literacy skills by the end of third grade in part by retaining students who score at least a year behind grade level on the state's summative end-of-year third-grade ELA achievement test. Also similar to other states' early literacy policies, under the Read by Grade Three Law, schools and districts must assign retention-eligible students to high-quality teachers, defined in Michigan as a "highly effective" teacher as rated by the district's evaluation system, the teacher with the highest effectiveness rating available, or a reading specialist. This is the case whether or not they are retained in third grade or promoted to the fourth grade using one of the Law's "good cause exemptions." In addition, the school or district must provide retention-eligible students with additional literacy interventions (Michigan Public Act No. 306, 2016).[1]

In this paper, we focus on the assignment of highly effective teachers to students eligible for retention under the Read by Grade Three law and investigate the capacity of Michigan schools and districts to do so. Approximately 4.8%, or 3,461, of tested Michigan third-graders were retention eligible in 2020-21 (Strunk et al., 2022). Even though this is a relatively small number of retention-eligible students, they were not equitably distributed across Michigan schools and districts, with certain schools and districts—particularly those with greater proportions of low-income students and students of color, lower ELA test scores, and those in urban locations—enrolling disproportionate numbers of retention-eligible students (Strunk et al., 2022). Importantly, these are the same kinds of schools that tend to employ fewer "highly effective" teachers, whether defined by teacher evaluation systems, value-added measures of teacher quality, or other measures such as experience (e.g., Bonesrønning et al., 2005; Lankford et al., 2002; Rice, 2010)

Given the importance of effective teachers for student achievement, and the uneven distribution of both retention-eligible students and highly effective teachers, we ask two questions central to the successful implementation of Michigan's Read by Grade Three Law: 1) *Do Michigan schools and districts have the capacity to assign all retention-eligible students to highly effective teachers?*; and 2) *Are retention-eligible students more likely to be assigned a highly effective teacher in the following year*?

We use administrative data from the Michigan Department of Education to answer these questions. We define highly effective teachers using their ratings on local district evaluations, as the Law requires. When we examine the impact of retention eligibility in 2020-21 on student-teacher assignments in 2021-22, we find no evidence that retention-eligible students are more or less likely to have a highly effective teacher than their peers just above the eligibility threshold. The policy interpretation of this finding hinges on the baseline rate of assignment to highly effective teachers and the availability and suitability of these teachers. In particular, there may be no increased likelihood of retention-eligible students being assigned to highly effective teachers because all students around the eligibility cut-point are already assigned to highly effective teachers. By contrast, there may be no effect because there are no highly effective teachers available for these students at all in the school or their grade or because the available highly effective teachers are unsuitable in other ways (e.g., they are not general education teachers). However, approximately 60% of students just above the retention-eligibility cut-off are assigned to a highly effective teacher, suggesting that highly effective teachers are frequently available. Accordingly, we continue to find no significant effects of retention eligibility on assignment to a highly effective teacher when we restrict the sample to students in schools with at least one highly effective teacher in a student's grade in 2021-22. Moreover, the highly effective teachers in the same building and grade as unassigned retention-eligible students tend to be general education teachers, have other-retention-eligible students in their classrooms, and around a third have ELA-related endorsements.

Together, our results suggest that some Michigan schools and districts may not be implementing the highly effective teacher assignment requirement of the Read by Grade Three Law. However, schools can comply with the Law by assigning students to a reading specialist or the highest-rated teacher available. One limitation of our study is the difficulty in determining which educators qualify as literacy specialists, as Michigan's definition of literacy specialist lacks clarity. Consequently, we cannot definitively conclude that these schools and districts are failing to comply with the Law because assignment to a literacy specialist is an alternative to a highly effective teacher under the Law. An additional limitation is that we only examine the teacher assignments of one cohort of retention-eligible students because, at the time of writing, the teacher-student data linkage is only available for the 2020-21 and 2021-22 school years.

Nonetheless, our paper contributes to the existing literature on teacher assignment policies by examining capacity constraints that may impact the implementation of

laws that rely on the distribution of highly effective teachers to certain kinds of students, as well as potential challenges to the implementation of Michigan's early literacy policy, and how student-teacher assignments may change in response to student-level accountability pressure. This paper highlights the importance of examining the capacity of schools and districts to implement policies aimed at improving student achievement, especially given the uneven distribution of highly effective teachers and retention-eligible students.

The remainder of the paper proceeds with additional background on Michigan's Read by Grade Three Law and a review of the prior literature in Section 2. Section 3 describes the data and methods. We discuss our findings in Section 4. Finally, we conclude and provide implications for policy in Section 5.

BACKGROUND

Policy Background

Michigan's Read by Grade Three Law aims to improve students' literacy skills in grades K-3 through various interventions, including data-driven instruction, small group instruction, "Read at Home" plans, and the assignment of students struggling with literacy to high-quality teachers. In this section, we will describe two aspects of the Read by Grade Three Law that are important to our research questions: the threat of 3rd-grade retention and the requirement that retention-eligible 3rd-grade students must be assigned in the following school year to a highly effective teacher, the most highly qualified teacher available, or a reading specialist. We will also discuss Michigan's teacher evaluation system, which is used under the law to define a highly effective teacher.

At the end of third grade, students are eligible for retention under the Read by Grade Three law if they score more than one grade level behind on the ELA portion of Michigan's high-stakes assessment, the Michigan Student Test of Educational Progress (M-STEP). Beginning in 2020-21, students were eligible for retention if they scored 1252 scale score points or below, or approximately 1.75 standard deviations below the mean third-grade ELA M-STEP score that year. Under the Law, districts must retain students scoring below the cut score unless they qualify for a waiver, called a "good cause exemption." Regardless of whether a student is retained, the Read by Grade Three Law requires that any student *eligible* for retention based on their standardized test performance must be assigned to a highly effective teacher, the teacher with the highest effectiveness rating available, or a reading specialist. While the second and third choices on that list presumably exist to give schools without a highly effective teacher on staff additional options, this clause in the Law aims to ensure retention-eligible students receive the best support and literacy instruction possible in the following year.

In Michigan, school districts must evaluate their teachers and administrators based on several locally determined factors. State law requires that one criterion is teachers' contributions to student achievement. Other components can include absenteeism, management abilities, instructional practices, and other relevant performance characteristics (Act No. 306, 2016). Districts must rate all teachers as either Highly Effective, Effective, Minimally Effective, or Ineffective. Districts are expected to evaluate all teachers yearly unless they are highly effective three years in a row. In this case, they receive a rating every other year. Notably, effectiveness ratings were paused in 2019-20 during the COVID-19 pandemic.

Prior Literature

One of the central assumptions of the Read by Grade Three Law is that assigning retention-eligible students to highly effective teachers will help students improve their literacy skills. This assumption is supported by prior literature showing higher-quality teachers can substantially improve student achievement (e.g., Chetty et al., 2014b; Jackson, 2018). For example, Chetty et al. (2014) show that a one standard deviation increase in value-added measures of teachers' contributions to student achievement gains leads to a 0.13 SD increase in students' test scores and an estimated $39,000 increase in their lifetime earnings. Moreover, Jackson (2018) finds that teachers have important impacts beyond their students' academic skills, showing that teachers can increase noncognitive skills, including adaptability, self-restraint, and motivation. Another implicit assumption of the Read by Grade Three Law is that highly effective students are good teachers for all students. However, good teachers are not necessarily equally effective for all students. A growing literature shows that certain teachers are more effective with certain types of students (Aucejo et al., 2022; Dee, 2004, 2005; Fairlie et al., 2014; Gershenson et al., 2016, 2018; Holt & Gershenson, 2019; Lindsay & Hart, 2017; Master et al., 2016; Wood et al., 2022).

Beyond effectiveness ratings, prior research has demonstrated that teachers with content-specific knowledge may be more effective at improving student performance (e.g., Boyd et al., 2009; Cowan & Goldhaber, 2016a; Dee & Cohodes, 2008; Goldhaber & Brewer, 2000). Cowan and Goldhaber (2016), for instance, find that students of teachers with an additional literacy and language arts certificate scored slightly higher on reading assessments than students of teachers without the additional certification. Thus, in addition to being rated highly effective, research suggests that teachers might be considered more highly qualified to teach retention-eligible students if they possess one of these endorsements. In Michigan, any teacher can add content-specific endorsements to their teaching certificate by passing an exam in those content areas. Relevant endorsement areas include reading, writing, and speech, which we group under a broad "ELA-related endorsement" category for this study. We, therefore, examine the assignment of students to teachers with these relevant content endorsements to understand whether retention-eligibility affects teacher-student assignments across other dimensions of teacher effectiveness not captured by districts' ratings.

Assigning lower-performing students to more effective teachers may not be practical for two key reasons. First, identifying effective teachers is challenging a priori because the mechanisms through which teachers improve students' long-run outcomes are unclear (Staiger & Rockoff, 2010). As in many state policies, Michigan's Read by Grade Three Law assumes that teachers rated as highly effective are, in fact, higher quality. Second, teacher quality is unevenly distributed across schools. An extensive literature shows that more qualified and effective teachers tend to work in schools with higher-achieving students (e.g., Bonesrønning et al., 2005; Lankford et al., 2002; Rice, 2010). For example, Lankford et al. (2002) find that 35% of students in the lowest performing schools on the state ELA exam have teachers who failed their certification exams compared to less than 10% of students in schools where no students scored in the lowest quartile. Thus, depending on how uneven the distribution of teachers is, there may be no or too few highly effective teachers available in a grade, school, or district to teach lower-performing students.

A smaller literature examines the sorting of teachers to students within schools. For example, while new teachers tend to be less effective (Rockoff, 2004), schools are more likely to assign inexperienced teachers to lower-performing classrooms with lower-performing students (Grissom et al., 2015; Kalogrides et al., 2013; Loeb et al., 2012). This finding suggests that students who are retention eligible or at risk of academic failure may not be assigned a highly effective teacher even when one is available. However, Grissom et al. (2017) find that schools respond to accountability pressure by moving more effective teachers to students in grades that determine the accountability consequences. Figlio and Özek (2023) also find that students assigned to remedial sixth-grade classes in Florida tend to have more experienced and higher value-added teachers. Under Michigan's Read by Grade Three Law, the consequences fall on students facing 3rd-grade retention, meaning schools might move more effective teachers into K-3 classrooms. However, since students bear the consequences of the Read by Grade Three Law, the incentive to move effective teachers to lower grades may differ from situations where accountability consequences fall on schools.

This study contributes to the existing literature in three key ways. First, to our knowledge, we are the first to measure the distribution of highly effective teachers across schools and districts in Michigan and discuss the implications for the implementation of the state's early literacy policy. Second, literacy policies in many states require that students who are struggling with literacy are assigned to highly effective teachers (ExcelinEd, 2021), but to our knowledge, there have been no evaluations of whether or not this occurs. We, therefore, add to the growing literature examining the implementation of literacy policies. Third, we contribute new knowledge to the small literature examining how teacher assignments respond to *student* accountability pressure, such as student retention or remediation policies (Figlio & Özek, 2023). Therefore, we provide new insights into the assignments of teachers within schools and the responsiveness of these assignments to student

accountability pressures. These contributions provide policymakers with valuable information regarding potential challenges in implementing teacher assignment policies when teacher quality may be unevenly distributed.

DATA AND METHODS

Data

We combine several administrative education datasets from the Michigan Department of Education (MDE) and the Center for Educational Performance Information (CEPI) regarding elementary-aged students, teachers, and schools for the 2020-21 and 2021-22 school years. We use course schedule data to link students and teachers as well as separate student-level, employee-level, and school-level data. The following sections outline the construction of the analysis dataset.

Student Data

We use student administrative records of Michigan public school students in 2020-21. The data include students' school and district, their gender, race and ethnicity, and whether they qualify as economically disadvantaged, an English learner, and/or a student with a disability (i.e., have an Individualized Education Plan [IEP] or a Section 504 Plan).[2] We examine these characteristics because retention-eligibility in Michigan differentially affects these student groups (Strunk et al., 2022). Additionally, students with disabilities or English learners are often assigned to specialized teachers, potentially affecting how the Law's highly effective teacher assignment mandate is implemented for these groups.

We first restrict our attention to the 102,138 students enrolled in the third grade in 2020-21. This represents the first cohort of students subject to retention under the Read by Grade Three Law. We exclude six students who were missing demographic information. The first column of Table 1 shows statistics for all 102,132 students in this sample. Approximately half of the students are female, and over half are economically disadvantaged. Nearly two-thirds are White, approximately 20% are Black, and under 10% are Latino/a. About 10% of the students are English learners, and just over 15% have disabilities.

Next, we exclude 2,079 students who left Michigan public schools before the fall semester of 2021-22 because we cannot match these students to teachers in 2021-22.[3] After this restriction, we retain 100,053 Michigan third-grade students. The second column of Table 1 presents summary statistics for these remaining 100,053 students and shows that they are nearly identical to the full sample of third-grade students across these student characteristics.

Initially, the retention component of the Read by Grade Three Law was to go into effect in 2020-21, based on ELA M-STEP scores from the 2019-20 school year. However, given

that the assessment was canceled in 2019-20 due to the COVID-19 pandemic, Michigan began enforcing the retention component of the Read by Grade Three Law in 2021-22, based on spring 2021 ELA M-STEP scores. While the assessment was given in 2020-21, the federal Department of Education waived test participation requirements. As a result, only 72% of Michigan's third-grade students, 72,495 students in our sample, took the ELA M-STEP exam in the 2020-21 school year, compared to nearly 96% in the 2018-19 school year. If students did not take the spring 2021 ELA M-STEP, they could not be retained under the Read by Grade Three Law. Table 1, Column (3), shows summary statistics for the Michigan third-grade students who participated in the 2020-21 ELA M-STEP. The resulting sample of students has substantially more White and fewer Black students than the full third-grade sample and fewer students enrolled in urban and low-performing districts.

Next, we narrow the sample to include only students assigned to at least one teacher in the coursework data in 2021-22. This is a crucial step for our study as the coursework data connect students and teachers; without this link, we cannot examine the characteristics of a student's teacher. We remove 1,347 students (1.9%) from the sample because they were either not included in the coursework data at all or because they were not assigned to a teacher who appeared in the employee-level administrative file. Column (4), describes the remaining 71,148 students (98.1%) in our analysis sample after this restriction, showing that the students who appear in the coursework data are nearly identical to the sample of students that took the M-STEP.

Many of our analyses focus on retention-eligible students, as they are the targets of the policy. As expected, given that students are only retention-eligible if they score below 1252 on the ELA M-STEP (1.89 SD below the mean), these students are notably different from the overall population of third-graders. Column (5) shows descriptive statistics for the 3,361 students eligible for retention. Retention-eligible students are more likely to be male, Black, Latino, economically disadvantaged, and students with disabilities. These differences in sample characteristics point to underlying correlations between test scores, demographics, and program participation.

School and District Data

We construct our school-level data using a combination of school-level administrative records and aggregated student-level statistics. The school-level administrative records contain school sector information indicating whether a school is a traditional public school or a charter school (also known in Michigan as a public school academy). We construct school-level average ELA and math end-of-year assessment performance from student administrative records. We use performance from 2018-19 because this is the last year before the COVID-19 pandemic-related disruptions to testing. We normalize standardized test scores at the subject-by-grade level, then average the normalized test scores by subject at the school level. We report average test performance as z-scores or quartiles. We also average student-level records to construct school-level demographic measures, including the percentage of students who are

economically disadvantaged, who are English learners, who have disabilities (IEP or 504 plans), and who are White, Black, Latino, Asian, or other race(s).[4] These school-level characteristics are based on all students attending a school, not just the analysis sample.

Table 1, Panel B, describes the characteristics of the schools attended by students in the primary analysis sample. Students in the analysis sample attended 1,698 different schools. About 11% of students attended charter schools, as seen in Column (4). Nearly 62% of the students attended schools in suburban or town locales, relative to about 17% of students attending urban schools and 21% attending rural schools. Just over twice as many students in the sample attended a school that performed in the top 25% on the previous ELA M-STEP than in the bottom 25%, driven by the fact that charter schools tend to be smaller and lower performing. Importantly, 88% of students in the sample attended a school with at least one highly effective teacher on staff, and 73% attended a school with a highly effective teacher assigned to their grade level.

Retention-eligible students in the sample attended schools that differed slightly from the overall sample. Nearly double the proportion of retention-eligible students attended a charter school as students in the overall sample. These students were also much more likely to attend urban, lower-performing, and smaller schools. Previewing our results, retention-eligible students were also 4.4 percentage points less likely to attend a school with a highly effective teacher overall and six percentage points less likely to attend a school with a highly effective teacher assigned to their grade. Still, these students were much more likely to attend a school with a highly effective teacher than not.

Teacher Data

We derive the outcome variables from administrative personnel records for employees in Michigan public schools in 2021-22, the year after students are classified as retention eligible. We leverage the course schedule data described above to link teachers to students. The administrative data contain information regarding teachers' race, ethnicity, and gender, type of teaching certification, and their longevity at their current district (which is a good proxy for overall experience given very few teachers in Michigan change districts [Hopkins et al., 2021]), their effectiveness rating, and whether they have an ELA-related endorsement.[5] There are 9,717 teachers assigned to students in the analysis sample.

Our primary outcome of interest is an indicator that equals one if at least one of a student's 2021-22 teachers, the year after retention eligibility was determined, was rated highly effective and zero otherwise. We use teachers' effectiveness ratings from 2020-21, the year before assignment to retention-eligible students, to avoid any changes in teachers' effectiveness ratings in response to the Read by Grade Three Law.[6] We perform supplementary analyses on two other outcomes: an indicator for whether any of a student's 2021-22 teachers have an ELA-related endorsement and their 2021-22 teachers' average years of experience in their current district.

Table 1, Panel C, describes the characteristics of teachers assigned to students in the analysis sample. Approximately 72% of the teachers assigned to students in our analysis sample were rated highly effective, as seen in Column (4). Few of these students (less than 3%) were assigned to a minimally effective or an ineffective teacher, and 72% were assigned to a highly effective teacher. The percentages sum to more than 100% because students can have more than one teacher. Comparatively, as seen in Column (5), only about 64% of retention-eligible students from the sample were assigned to a highly effective teacher. Retention-eligible students were also assigned to teachers who had about 1.5 years fewer experience than the larger sample of students. Retention-eligible students were also much more likely to be assigned to a non-White teacher than the overall sample. Many of these differences in teachers' characteristics can also be attributed to the types of schools with higher proportions of retention-eligible students, as these schools are more likely to have non-White teachers, teachers with less experience, and teachers without ELA-related endorsements.

Empirical Methods

Regression Analysis

We begin by examining whether schools have the capacity to provide highly effective teachers to retention-eligible students. We estimate the following student-level linear probability model describing the probability that a student attends a school that has at least one highly effective teacher:

$$P(At\ Least\ 1\ HET_{is}) = \beta_0 + \beta_1 Eligible_i + X_i\beta_2 + S_s\beta_3 + \epsilon_i \qquad (1)$$

The outcome, $P(At\ Least\ 1\ HET_s)$, represents the probability that a student *i* attends a school s that has at least one highly effective teacher in the building in 2021-22. To determine whether retention-eligible students in 2020-21 are more or less likely to attend a school with a highly effective teacher in 2021-22, we include an indicator for retention-eligibility, $Eligible_i$. We include a vector of individual characteristics, X_i containing the racial, ethnic, and other demographic variables described above to control for correlations between these characteristics, retention-eligibility, and the availability of highly effective teachers. We also include a vector of school characteristics, S_s, including locale, entity type, prior ELA performance, and enrollment. The primary coefficient of interest is β_1, representing the relationship between retention eligibility and the probability that a student's school has a highly effective teacher, holding constant individual demographics and school-level factors.

Regression Discontinuity Design

To answer whether retention eligibility in 2020-21 affects whether students are assigned a highly effective teacher the following year, we leverage the sharp retention-eligibility cut-off in a regression discontinuity design (RDD). This empirical strategy compares the probability of assignment to a highly effective teacher for students just

above and below the retention-eligibility threshold. We implement the RDD by estimating a weighted local linear regression model:

$$P(Highly\ Effective\ Teacher_i) = \delta_0 + \delta_1 \mathbf{1}[Score_i \leq 1252] + \delta_2 f(Score_i) + e_i \qquad (2)$$

Here, $P(Highly\ Effective\ Teacher_i)$ is the probability that student *i* is assigned to a highly effective teacher in 2021-22. $\mathbf{1}[Score_i \leq 1252]$ indicates that student *i* received a score of 1252 or below on the third-grade ELA M-STEP and is retention eligible in 2020-21. We control for a flexible functional form of the ELA M-STEP score, $f(Score_i)$. In our preferred specification, $f(Score_i)$ is linear. The coefficient of interest is δ_1, which represents the local average treatment effect (LATE) of being just below the retention-eligibility threshold on the probability of assignment to a highly effective teacher. We then examine heterogeneity in the local average treatment effect by student characteristics, where we estimate the RDD model separately on different subgroups of students, then compare their LATEs.

The RDD provides valid causal estimates when comparing individuals close to the cut-off. We select the bandwidth around the test score cut-off using the mean squared error-optimal bandwidth selection procedure outlined in Calonico et al. (2020). Our preferred method allows the bandwidth to differ above and below the cut-off. The optimal bandwidth also varies by subgroup. We ensure changes in the bandwidth across subgroups do not drive our findings by selecting a single bandwidth for all our analyses. We first compute the MSE-optimal bandwidth overall and for each subgroup. We then use the average of these bandwidths rounded down to the nearest scale score. This procedure gives us a bandwidth of 13 points below and 24 points above the cut-off. As intended by the policy design, students within this bandwidth are very low performing relative to the average student. In particular, 13 scale score points below the cut-off captures more than 80% of all retention-eligible students.

Identifying Assumptions

In our study, we use a RDD to estimate the causal effect of a retention requirement on assignments to highly effective teachers. We must ensure that two key assumptions are met for our RDD estimates to be interpreted as causal. First, we assume there is continuity of expected potential outcomes around the cut-off point. In other words, in the absence of the retention requirement, we assume that the probability of assignment to a highly effective teacher would have changed smoothly across the test-score threshold. We test this assumption by examining how average individual and district characteristics change across the cut-off point. Additionally, we perform placebo analyses around other test-score cut-offs, including a 1272 ELA M-STEP scale score, which represents an achievement level above which the state recommends promotion without additional literacy support, and a 1252 Math M-STEP scale score, which has no policy relevance to teacher assignment decisions under the Law. We find no evidence of discontinuities at these points and describe the results of these robustness tests in Section 5.

Second, we assume there is no manipulation of ELA M-STEP scores around the cut-off. Direct manipulation of M-STEP scores is unlikely as students and teachers do not have a priori knowledge of what a student's test score will be, even given the number of correct or incorrect item responses. However, to ensure that this assumption holds, we examine the smoothness of the distribution of ELA M-STEP scores near the cut-off, shown in Appendix Figure A1, and find no evidence of bunching just above or below the cut-off.

An additional consideration in our setting is that the ELA M-STEP scores are discrete, which goes against the assumption of continuity-based RDD designs. However, in this case, where scores are implicitly measured with error, the extrapolation around the cut-off is natural and makes intuitive sense. Additionally, we cluster the standard errors at the scale-score level, following Lee & Card (2008).

Another issue in our setting regards differential attrition. We are concerned about attrition at two stages. First, we noted above that ELA M-STEP participation in 2020-21 was historically low due to Federal test participation waivers. Only 72% of third-grade students took the ELA M-STEP, and students who participated were not representative of all third-grade students. Since M-STEP scores are necessary for retention eligibility, this limits the generalizability of our findings. To address this, we examine how our estimates change when we adjust our estimates using inverse probability weighting in a robustness check. Second, we noted that the linkage data between students and teachers does not include all students or teachers. Therefore, just under 2% of the analysis sample are missing outcome data. If attrition from the sample correlates with retention eligibility and teacher assignments, our estimates could be biased. We test for and find no evidence of differential attrition across the retention-eligibility cut-off. We describe these robustness tests in detail in Section 5.

RESULTS

Capacity to Provide Highly Effective Teachers

We begin by examining the capacity of Michigan public schools to provide retention-eligible students with a highly effective teacher based on the mere availability of such teachers in the schools and grades in which retention-eligible students are enrolled. The last rows of Table 1 provide some early evidence to answer this question. In particular, Columns (1) through (4) show that 13% of third-grade students and 16% of retention-eligible third-grade students attend a school that does not have a highly effective teacher in the building, and 23% of retention-eligible students attend a school that does not have a highly effective teacher assigned to their grade. Clearly, this makes the assignment of a highly effective teacher quite challenging (if not impossible) in practice. Much of this unequal distribution of highly effective teachers across the state likely reflects other school and district characteristics associated with teacher

quality. For example, Lankford et al. (2002) show that more qualified teachers work in schools serving higher-performing students.

We first turn to research question one, which asks about the capacity of schools to assign retention-eligible students to highly effective teachers. We estimate Equation (1) to examine the relationship between retention-eligibility and the probability that a student's school has at least one highly effective teacher, holding constant these school and district characteristics associated with teacher quality. We present regression estimates from Equation (1) in Table 2. We first estimate a univariate regression (shown in Column (1)) in order to examine the simple relationship between retention-eligibility and the probability of a student attending a school employing a highly effective teacher. The values in each cell of Column (1) represent the coefficients from these univariate regressions. In Columns (2) and (3), we present results from multi-variable regressions that control for student demographics and then student and school characteristics to account for correlations between the characteristics of schools, the students they serve, and their teachers.

The first column of Table 2 shows that retention-eligible students are four percentage points less likely to attend a school with a highly effective teacher. Column (2) shows that retention-eligible students are still nearly two percentage points less likely to have a highly effective teacher, even when controlling for student demographics. Column (3) shows that once we control for school characteristics, retention-eligible students are still less likely to attend a school with a highly effective teacher, but this relationship is no longer significant at conventional levels.

Apart from the focus on retention-eligible students, the results presented in Table 2 confirm findings in the prior literature regarding the non-random sorting of teachers across schools. Historically marginalized students tend to attend schools that have less effectively rated teachers. While the schools that retention-eligible students attend are less likely to have a highly effective teacher, this relationship appears to be driven by other school characteristics, including student demographics, charter school status, and urbanicity.

Columns (4) through (6) of Table 2 use a stricter definition of the availability of highly effective teachers, requiring a highly effective teacher in the same school and grade as the student. Again, we see similar patterns in the availability of highly effective teachers to retention-eligible students. Retention-eligible students are less likely to attend schools with a highly effective teacher in their grade, but the correlation between other students and school characteristics and retention eligibility explains most of this difference.

Retention Eligibility and Assignment to Highly Effective Teachers

Although retention-eligible students are less likely to attend a school with a highly effective teacher, the Law still mandates the assignment of eligible students to highly effective teachers. If schools abide by this mandate and do not assign all retention-eligible students to literacy specialists, also allowed by the Law, we would expect retention eligibility to increase the probability of assignment to a highly effective teacher, given access to these teachers. We examine this by estimating the RDD described in Section 3.2.2. Figure 1 provides a graphical representation of the RDD and shows that the probability of assignment to a highly effective teacher changes smoothly across the retention-eligibility cut-off, providing no evidence that retention eligibility increases the probability that students are assigned a highly effective teacher, on average. The detailed estimates in Table 3 also indicate a null effect of retention-eligibility; retention-eligibility is associated with a 0.9 percentage point change in the probability of assignment to a highly effective teacher, which is not statistically significant at any reasonable level (p-value=0.95).

However, these average effects across all students near the test-score cut-off could be masking heterogeneity for some subgroups of students. For example, retention-eligible English learners or students with disabilities may not be affected by the mandate because they are more likely to be assigned a non-general education teacher specializing in their program. Table 3 examines heterogeneity in the effect of retention-eligibility across subgroups of students and school districts. We again find no evidence of a statistically significant and meaningful increase in the probability of assignment to a highly effective teacher across these subgroups.

We consider two other reasons that retention-eligibility could have a null effect on assignments to highly effective teachers in our research design that do not imply that districts are not implementing the highly effective teacher assignment mandate. First, since students attending schools without any highly effective teachers cannot possibly be assigned to a highly effective teacher, the presence of these students in the analysis sample would bias the treatment effect estimates toward zero. Figure 2 and Table 4 show the RDD estimates for the subset of students attending a school with at least one highly effective teacher assigned to the student's grade level. We again find no evidence of a discontinuity; the probability of assignment to a highly effective teacher appears to change smoothly across the retention-eligibility threshold even when a highly effective teacher appears available to retention-eligible students.

Second, if all students near the retention-eligibility cut-off are already assigned to a highly effective teacher, the eligibility threshold would not impact the probability of assignment to a highly effective teacher. We see this is not the case in Figures 1 and 2, as approximately 65% and 85% of students near the cut-off have a highly effective teacher, respectively, suggesting that there is variation in teacher effectiveness across

students near the cut-off even among students with a highly effective teacher in their grade. Notably, these findings show that there are roughly 350 retention-eligible students in schools with a highly effective teacher available in their grade level who are not being assigned to a highly effective teacher.

Altogether, these results provide no evidence that retention-eligible students are more likely to have a highly effective teacher than similar non-eligible students, even when a highly effective teacher is available in the student's school building and grade. In the next section, we examine why this might be the case.

Potential Mechanisms

In this section, we examine potential reasons why the Law's teacher assignment mandate appears unfulfilled. We first consider whether other factors make the apparently available highly effective teachers less suitable instructors for retention-eligible students. Second, we examine if schools are perhaps following the spirit rather than the text of the Law by assigning retention-eligible students to higher-quality teachers along other dimensions of teacher effectiveness that are not captured by districts' effectiveness ratings.

We begin by examining the characteristics of highly effective teachers who are in the same building and grade as an unassigned retention-eligible student in Table 5. We see that the majority of these highly effective teachers are general education teachers. Roughly a third have an ELA-related endorsement, a lower rate than the typical teacher serving retention-eligible students. However, they also have 13.6 years of experience, substantially more than the average teacher serving retention-eligible students (see Table 1 Column [4]). Moreover, over half of these teachers are already assigned to at least one retention-eligible student, and there are just 2.75 retention-eligible students per highly effective teacher within schools and grades with at least one retention-eligible student.

These descriptive findings suggest that many of the available highly effective teachers appear qualified to teach retention-eligible students, already teach some of these students, and each highly effective teacher is not already teaching a high number of retention-eligible students. To understand whether schools are assigning these students to other teachers because they are higher-quality teachers in dimensions of teacher effectiveness not captured by districts' effectiveness ratings, we leverage the RDD to estimate whether retention eligibility increases the probability of assignment to more experienced teachers or teachers with ELA-related endorsements.

Figures 3, Panels A and B, along with the more detailed Tables 5 and 6, show the RDD estimates of the impact of retention-eligibility on assigned teachers' experience and the probability that the assigned teacher has an ELA-related endorsement, respectively. In both cases, we see smooth changes in the outcome across the

retention-eligibility cut-off and no systematic evidence of statistically significant retention-eligibility effects.

ADDITIONAL ROBUSTNESS CHECKS

Smoothness of Other Characteristics, Placebo Cut-Offs, and Quadratic Functional Form

The RDD method assumes that potential outcomes vary smoothly across the cut-off. Although we cannot observe the potential outcomes, we can test the plausibility of this assumption by analyzing the smoothness of student and district characteristics across the cut-off. These characteristics should not be impacted by retention-eligibility near the retention-eligibility threshold. The results of RDD estimates using student characteristics and charter school status as outcomes are presented in Appendix Figure A2. These results show no clear sign of a discontinuity in these characteristics across the retention-eligibility threshold, reinforcing the continuity assumption.

To further validate the RDD, we evaluate the robustness of our results with placebo test-score cut-offs unrelated to teacher assignment mandates under the Law. A noticeable change in the probability of assignment to a highly effective teacher across the placebo cut-off would suggest that this probability is affected by policies other than the Read by Grade Three Law. Figure A3, Panel A and B, show the results of our preferred model specification using ELA M-STEP scale scores with a cut-off at 1279 scale score points and math M-STEP scores with a cut-off at 1252 points as running variables, respectively. We select the 1279 ELA M-STEP cut-off because this is the exam's cut-off between "not proficient" and "partially proficient," but there is no policy relevance to this cut-off. We chose the second cut-off at a 1252 math M-STEP score because this parallels the retention-eligibility cut-off for the ELA M-STEP but has no relevant policy requirements attached. We find no statistically significant changes in the probability of assignment to a highly effective teacher across either of these placebo cut-offs, further supporting the validity of our design.

Finally, we examine whether choosing a linear functional form for the running variable influences our estimates by re-estimating the models using a quadratic functional form. We present the results of re-estimating Table 3, which examines the heterogeneity of treatment effect by student characteristics, in Appendix Table A1. Overall, our findings are consistent across this alternative functional form.

Alternative Bandwidths

We select our preferred bandwidth following Calonico et al. (2020), selecting the average MSE-optimal bandwidth across all the student subgroups we analyze and allowing the bandwidths to differ above and below the cut-off. Our preferred bandwidth is 13 points below the cut-off and 24 points above. We test the robustness

of our estimates to other cut-offs, including +/- 12 and +/- 7 scale score points from the cut-off. We replicate the main findings in Table 3 using the +/- 12 bandwidth in Appendix Table A2 and +/- 7 in Appendix Table A3. The results are consistent across these alternative bandwidths. We continue to find no evidence of a statistically significant effect of retention-eligibility on assignment to highly effective teachers.

Differential Attrition

Our analyses can only include students who are not missing information about their ELA M-STEP scores and teacher in 2021-22. As noted above, the federal Department of Education waived test participation requirements, resulting in only 72% of Michigan's third-grade students taking the ELA M-STEP exam in the 2020-21 school year. Since students who took the M-STEP appear to be higher performing than their peers who did not, our estimates may not be generalizable to more typical school years. To assess the generalizability of our results, we re-estimate Equation (2) with weights based on the inverse probability of a student taking the M-STEP.[7] Appendix Table A4 presents estimates adjusted using these inverse probability weights, paralleling those in Table 3. These attrition-adjusted estimates closely align with the unadjusted estimates in Table 3, suggesting that our results could be generalizable to a school year with typical levels of M-STEP participation.

Students might be missing teacher data for two key reasons. First, they may have left Michigan public schools between 2020-21 and 2021-22. Second, they may be missing because the linkage between students and teachers does not include all students and teachers in the other administrative datasets. These potential sources of attrition could be concerning for our identification strategy if attrition correlates with both retention eligibility and the probability that a student is assigned a highly effective teacher. We test whether retention-eligibility affects attrition rates in Appendix Figure A4, and we find no evidence of a statistically significant relationship.

DISCUSSION AND CONCLUSION

We study the mandated assignment of highly effective teachers to students eligible for retention under Michigan's Read by Grade Three Law. The Law requires that students who score below an end-of-year assessment threshold be assigned a highly effective teacher, the teacher with the highest effectiveness rating, or a reading specialist. We show that, although retention-eligible students are less likely to attend a school with a highly effective teacher in their grade, more than 60% of retention-eligible students have access to a highly effective teacher. However, we find no evidence that retention-eligible students are more likely to be assigned to a highly effective teacher than ineligible students just above the test score cut-off.

Our results indicate that more than 350 retention-eligible students (10% of retention-eligible students) are not assigned to a highly effective teacher, even when their school

can do so. Moreover, the majority of these available highly effective teachers have general education assignments, roughly a third have an ELA-related endorsement, and over half already have a retention-eligible student in their classroom. We also examine whether schools assign these students to other teachers because they are of higher quality in ways that districts' effectiveness ratings may not capture. However, we find no evidence that retention-eligible students are more likely to have a teacher with an ELA-related endorsement or more years of experience, both rough proxies for effectiveness.

Importantly, while our findings suggest that some schools and districts are not implementing the highly effective teacher assignment mandate of the Read by Grade Three Law, we cannot definitively say that they are not complying with the Law. The Law outlines assignment to a literacy specialist as an alternative to a highly effective teacher. However, one limitation of our data is our limited ability to discern which teachers are literacy specialists. Thus, these 350 unassigned retention-eligible students may work with a literacy specialist in compliance with the Read by Grade Three Law.

These findings inform state policymakers about how their policies are implemented in practice. While the Read by Grade Three Law is clear in its teacher assignment mandate, there appears to be a disconnect between policymakers and administrators. This may also be the case for other policies that require schools and districts to change their behaviors. Our findings suggest that district- and school-level administrators may need explicit training in the specific components of Laws. In addition, it may be prudent for state policymakers to mandate clear reporting of districts' and schools' fulfillment of important aspects of policies, such as the teacher assignment component of the Read by Grade Three Law, to ensure implementation. State policymakers could also better incentivize the implementation of the teacher assignment mandate or other policy elements through well-defined consequences for inaction. Alternately, school and district administrators may have a good reason for failing to comply with the mandate, including more in-depth knowledge of teachers' individual strengths and the potential for a good match between a teacher and a retention-eligible student. Including local administrators in the design of such policies may lead policymakers to generate policies that administrators believe are in the best interest of students, schools, and districts.

ENDNOTES

[1] We use the term "highly effective" as defined by Michigan law (Act No. 306, 2016) throughout the paper, but we recognize effectiveness ratings may not fully capture the quality of a teacher. In Michigan, school districts must evaluate their teachers and administrators based on several locally determined factors. State law requires that one criterion is teachers' contributions to student achievement. Other components can include absenteeism, management abilities, instructional practices, and other relevant performance characteristics (Act No. 306, 2016).

[2] Economically disadvantaged status is defined in Michigan as students who are eligible for free- or reduced-price lunch, are in households receiving food (SNAP) or cash (TANF) assistance, are homeless, are migrant, and/or are in foster care.

[3] We examine the potential for attrition by leaving Michigan public schools in response to retention-eligibility in Section 5.3 below. Moreover, only 21 retention-eligible students are missing fall 2021-22 grade information, limiting the impact of any potential bias.

[4] Other race(s) includes American Indian, Alaskan Native, Native Hawaiian, other Pacific Islanders, and students of two or more races. We group these races and ethnicities together because of the limited number of students in each group.

[5] We say a teacher has an ELA-related endorsements if they have an endorsement for Communication Arts, Language Arts, English, Speech, Reading Specialist, or Reading (corresponding to AX, BX, BA, BD, BR, or BT Michigan teacher endorsement codes).

[6] If teachers are missing an effectiveness rating for 2020-21, we use their last available effectiveness rating. If a teacher is missing an effectiveness rating because they are a new teacher and their district has not yet rated them, we count them as not rated highly effective.

[7] We estimate the probability that a student took the M-STEP using the sample of third-grade students in Column (2) of Table 1 with full demographic and 2021-22 data and a probit model specified parallel to Equation (1) but with an indicator for taking the M-STEP as the outcome and without the retention-eligibility indicator.

REFERENCES

Aucejo, E., Coate, P., Fruehwirth, J. C., Kelly, S., & Mozenter, Z. (2022). Teacher Effectiveness and Classroom Composition: Understanding Match Effects in the Classroom*. *The Economic Journal*, ueac046. https://doi.org/10.1093/ej/ueac046

Bonesrønning, H., Falch, T., & Strøm, B. (2005). Teacher sorting, teacher quality, and student composition. *European Economic Review*, *49*(2), 457–483. https://doi.org/10.1016/S0014-2921(03)00052-7

Boyd, D. J., Grossman, P. L., Lankford, H., Loeb, S., & Wyckoff, J. (2009). Teacher Preparation and Student Achievement. *Educational Evaluation and Policy Analysis*, *31*(4), 416–440. https://doi.org/10.3102/0162373709353129

Calonico, S., Cattaneo, M. D., & Farrell, M. H. (2020). Optimal bandwidth choice for robust bias-corrected inference in regression discontinuity designs. *The Econometrics Journal*, *23*(2), 192–210. https://doi.org/10.1093/ectj/utz022

Chetty, R., Friedman, J. N., & Rockoff, J. E. (2011). *The long-term impacts of teachers: Teacher value-added and student outcomes in adulthood* (No. w17699; pp. 1–94). National Bureau of Economic Research. https://doi.org/10.3386/w17699

Chetty, R., Friedman, J. N., & Rockoff, J. E. (2014a). Measuring the impacts of teachers I: Evaluating bias in teacher value-added estimates. *American Economic Review*, *104*(9), 2593–2632.

Chetty, R., Friedman, J. N., & Rockoff, J. E. (2014b). Measuring the Impacts of Teachers II: Teacher Value-Added and Student Outcomes in Adulthood. *American Economic Review*, *104*(9), 2633–2679. https://doi.org/10.1257/aer.104.9.2633

Clotfelter, C. T., Ladd, H. F., & Vigdor, J. L. (2006). Teacher-student matching and the assessment of teacher effectiveness. *The Journal of Human Resources*, *XLI*(4), 778–820. https://doi.org/10.3368/jhr.XLI.4.778

Cowan, J., & Goldhaber, D. (2016a). National Board Certification and Teacher Effectiveness: Evidence From Washington State. *Journal of Research on Educational Effectiveness*, *9*(3), 233–258. https://doi.org/10.1080/19345747.2015.1099768

Cowan, J., & Goldhaber, D. (2016b). National Board Certification and Teacher Effectiveness: Evidence From Washington State. *Journal of Research on Educational Effectiveness*, *9*(3), 233–258. https://doi.org/10.1080/19345747.2015.1099768

Dee, T. S. (2004). Teachers, Race, and Student Achievement in a Randomized Experiment. *Review of Economics and Statistics*, *86*(1), 195–210. https://doi.org/10.1162/003465304323023750

Dee, T. S. (2005). A Teacher like Me: Does Race, Ethnicity, or Gender Matter? *The American Economic Review*, *95*(2), 158–165. JSTOR.

Dee, T. S., & Cohodes, S. R. (2008). Out-of-Field Teachers and Student Achievement: Evidence from Matched-Pairs Comparisons. *Public Finance Review*, *36*(1), 7–32. https://doi.org/10.1177/1091142106289330

ExcelinEd. (2021). *Comprehensive early literacy policy: State-by-state analysis of fundamental principles*. ExcelinEd. https://excelined.org/wp-content/uploads/2021/10/ExcelinEd_PolicyToolkit_EarlyLiteracy_StatebyStateAnalysis_2021.pdf

Fairlie, R. W., Hoffmann, F., & Oreopoulos, P. (2014). A community college instructor like me: Race and ethnicity interactions in the classroom. *American Economic Review*, *104*(8), 2567–2591. https://doi.org/10.1257/aer.104.8.2567

Figlio, D. N., & Özek, U. (2023). *The Unintended Consequences of Test-Based Remediation* (Working Paper No. 30831). National Bureau of Economic Research. https://doi.org/10.3386/w30831

Gershenson, S., Hart, C. M. D., Hyman, J., Lindsay, C., & Papageorge, N. W. (2018). *The Long-Run Impacts of Same-Race Teachers*. National Bureau of Economic Research.

Gershenson, S., Holt, S. B., & Papageorge, N. W. (2016). Who believes in me? The effect of student–teacher demographic match on teacher expectations. *Economics of Education Review*, *52*, 209–224. https://doi.org/10.1016/j.econedurev.2016.03.002

Goldhaber, D. D., & Brewer, D. J. (2000). Does Teacher Certification Matter? High School Teacher Certification Status and Student Achievement. *Educational Evaluation and Policy Analysis*, *22*(2), 129–145. https://doi.org/10.3102/01623737022002129

Grissom, J. A., Kalogrides, D., & Loeb, S. (2015). The Micropolitics of Educational Inequality: The Case of Teacher–Student Assignments. *Peabody Journal of Education*, *90*(5), 601–614. https://doi.org/10.1080/0161956X.2015.1087768

Grissom, J. A., Kalogrides, D., & Loeb, S. (2017). Strategic Staffing? How Performance Pressures Affect the Distribution of Teachers Within Schools and Resulting

Student Achievement. *American Educational Research Journal*, *54*(6), 1079–1116. https://doi.org/10.3102/0002831217716301

Holt, S. B., & Gershenson, S. (2019). The Impact of Demographic Representation on Absences and Suspensions. *Policy Studies Journal*, *47*(4), 1069–1099. https://doi.org/10.1111/psj.12229

Hopkins, B., Kilbride, T., & Strunk, K. O. (2021). Trends in Michigan's K-12 Public School Teaching Workforce. *Education Policy Innovation Collaborative*, 17.

Jackson, C. K. (2018). What Do Test Scores Miss? The Importance of Teacher Effects on Non–Test Score Outcomes. *Journal of Political Economy*, *126*(5), 2072–2107. https://doi.org/10.1086/699018

Kalogrides, D., Loeb, S., & Béteille, T. (2013). Systematic sorting: Teacher characteristics and class assignments. *Sociology of Education*, *86*(2), 103–123. https://doi.org/10.1177/0038040712456555

Lankford, H., Loeb, S., & Wyckoff, J. (2002). Teacher sorting and the plight of urban schools: A descriptive analysis. *Educational Evaluation and Policy Analysis*, *24*(1), 37–62. https://doi.org/10.3102/01623737024001037

Lee, D. S., & Card, D. (2008). Regression discontinuity inference with specification error. *Journal of Econometrics*, *142*(2), 655–674. https://doi.org/10.1016/j.jeconom.2007.05.003

Lindsay, C. A., & Hart, C. M. D. (2017). Exposure to Same-Race Teachers and Student Disciplinary Outcomes for Black Students in North Carolina. *Educational Evaluation and Policy Analysis*, *39*(3), 485–510. https://doi.org/10.3102/0162373717693109

Loeb, S., Kalogrides, D., & Béteille, T. (2012). Effective Schools: Teacher Hiring, Assignment, Development, and Retention. *Education Finance and Policy*, *7*, 269–304.

Act No. 306, 4822, State of Michigan 98th Legislature, Regular (2016).

Rice, S. M. (2010). Getting our best teachers into disadvantaged schools: Differences in the professional and personal factors attracting more effective and less effective teachers to a school. *Educational Research for Policy and Practice*, *9*(3), 177–192. https://doi.org/10.1007/s10671-010-9085-2

Rivkin, S. G., Hanushek, E. A., & Kain, J. F. (2005). Teachers, schools, and academic achievement. *Econometrica*, *73*(2), 417–458.

Rockoff, J. E. (2004). The Impact of Individual Teachers on Student Achievement: Evidence from Panel Data. *American Economic Review*, *94*(2), 247–252. https://doi.org/10.1257/0002828041302244

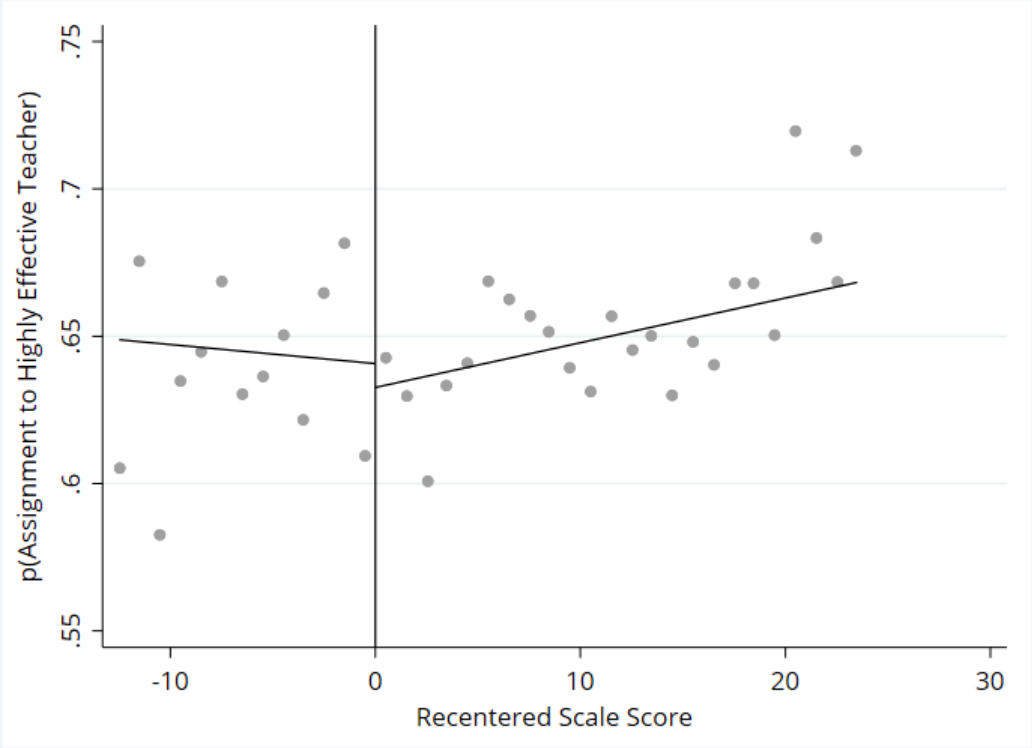
Staiger, D. O., & Rockoff, J. E. (2010). Searching for Effective Teachers with Imperfect Information. *Journal of Economic Perspectives*, *24*(3), 97–118. https://doi.org/10.1257/jep.24.3.97

Strunk, K. O., Wright, T. S., Westall, J., Zhu, Q., Kilbride, T., Cummings, A., Utter, A., & Mavrogordato, M. (2022). *Michigan's Read by Grade Three Law: Year two report*. Education Policy Innovation Collaborative. https://epicedpolicy.org/wp-content/uploads/2022/02/RBG3_Rpt_Yr2_Feb2022.pdf

Wood, W. J., Lai, I., Filosa, N. R., Imberman, S. A., Jones, N. D., & Strunk, K. O. (2022). *Are Effective Teachers for Students with Disabilities Effective Teachers for All?* National Bureau of Economic Research.

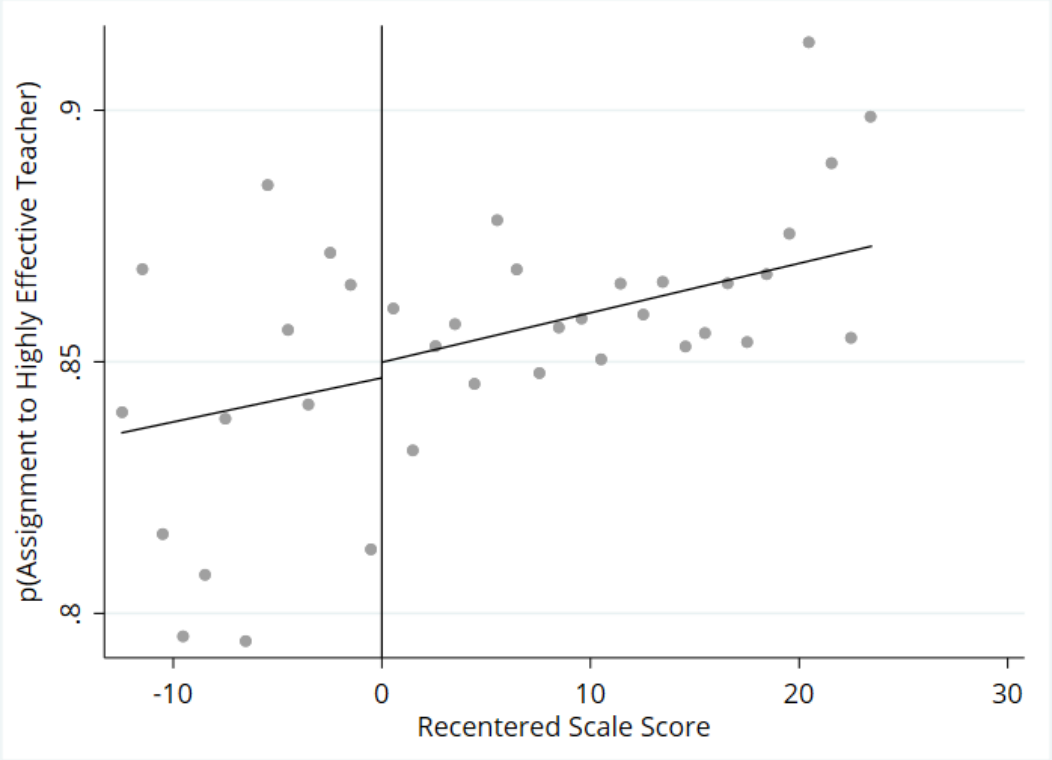
FIGURES AND TABLES

Figure 1. Retention Eligibility and Assignments to Highly Effective Teachers



Note: The y-axis represents the probability of assignment to a highly effective teacher. The vertical line indicates the retention-eligibility threshold of 1252 scale score on the third-grade 2020-21 ELA M-STEP. There is one dot for each scale score. The fit lines are from local linear regressions with triangular weights. Each panel represents a different predicted outcome.

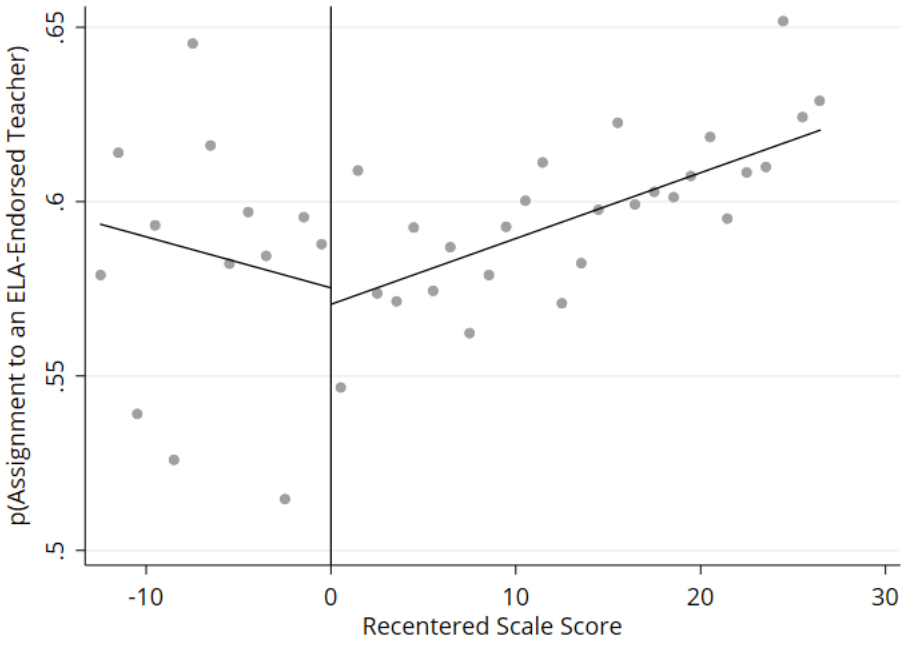
Figure 2. Retention Eligibility and Assignments to Highly Effective Teachers Conditional on At Least One Highly Effective Teacher in the Building and Grade



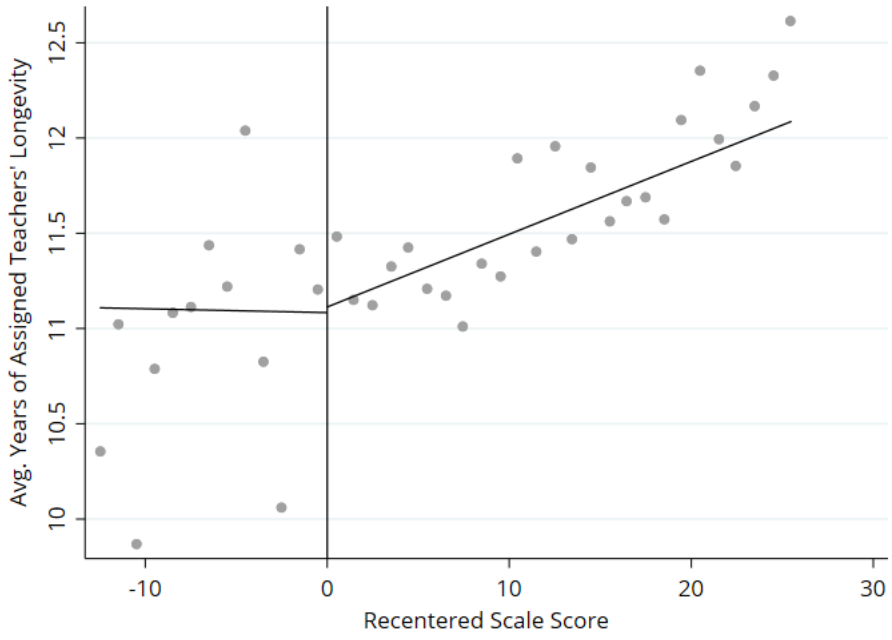
Note: The y-axis represents the probability of assignment to a highly effective teacher. The sample is restricted to students who have a highly effective teacher in their school and grade. The vertical line indicates the retention-eligibility threshold of 1252 scale score on the third-grade 2020-21 ELA M-STEP. There is one dot for each scale score. The fit lines are from local linear regressions with triangular weights.

Figure 3. Retention and Teacher Assignments: ELA-related Endorsements and Experience

Panel A: ELA-Endorsement



Panel B: Years of Experience



Note: In Panel A, the y-axis represents the probability of assignment to a teacher with an ELA-related endorsement. In Panel B, the y-axis represents years of teacher experience. The vertical line indicates the retention-eligibility threshold of 1252 scale score on the third-grade 2020-21 ELA M-STEP. There is one dot for each scale score. The fit lines are from local linear regressions with triangular weights.

Table 1. Descriptive Statistics of the Student Sample					
	(1)	(2)	(3)	(4)	(5)
	All Third-Grade Students	Have 2021-22 Data	Took ELA M-STEP in 2020-21	Analysis Sample (Has Teacher Data)	Retention Eligible
	PANEL A: STUDENT CHARACTERISTICS				
Male	51.5%	51.5%	51.1%	51.1%	57.7%
White	63.0%	63.3%	71.9%	72.0%	49.8%
Asian	3.8%	3.7%	3.4%	3.3%	1.9%
Black	18.8%	18.6%	11.4%	11.4%	31.2%
Latino	8.6%	8.6%	7.5%	7.5%	10.4%
Other race(s)	5.9%	5.9%	5.8%	5.7%	6.7%
Econ. Disad.	56.7%	56.6%	51.6%	51.6%	83.1%
English Learner	9.3%	9.2%	8.3%	8.3%	12.5%
Student w/ Disability	15.5%	15.5%	14.7%	14.7%	29.4%
	PANEL B: SCHOOL CHARACTERISTICS				
Charter	12.6%	12.4%	10.8%	10.8%	21.6%
Urban	25.4%	25.2%	16.8%	16.7%	31.1%
Suburban	56.2%	56.4%	61.6%	61.7%	50.0%
Rural	17.4%	17.4%	21.1%	21.0%	17.8%
Bottom 25% of ELA Perf.	17.4%	17.1%	10.0%	10.0%	31.2%
Top 25% of ELA Perf.	38.6%	38.7%	43.3%	43.3%	19.6%
Bottom 25% of Sch. Enrollment	8.4%	8.3%	7.6%	7.5%	11.5%
Top 25% of Sch. Enrollment	43.4%	43.5%	44.8%	44.9%	40.4%
Attends a school w/ a HE teacher	87.5%	86.7%	88.4%	88.5%	84.1%
Attends a school w/ a HE teacher in their Grade	71.5%	71.5%	72.7%	72.7%	66.7%
	PANEL C: TEACHER CHARACTERISTICS				
Has a Highly Effective Teach.	-	-	-	71.5%	64.2%
Has an Effective Teacher	-	-	-	77.5%	82.9%
Has a Min. Effective or Ineffective Teacher	-	-	-	2.8%	3.9%
Has an ELA Endorsed Teacher	-	-	-	61.8%	58.1%
Avg. Teacher Longevity in District	-	-	-	12.4	10.9
Has a Teacher w/ At Least 10 Yrs. Exp.	-	-	-	65.7%	54.8%
Has a Male Teacher	-	-	-	70.9%	71.3%
Has a Non-White Teacher	-	-	-	20.6%	34.0%
Num. Students	102,132	100,053	72,495	71,148	3,361

Note: Every column is a subset of the column before it. Each percentage indicates the percentage of the total listed in the first row. For example, 51.5% of all third-grade students in the sample are male. HE represents Highly Effective

Table 2. Capacity to Provide Highly Effective Teachers						
	(1)	(2)	(3)	(4)	(5)	(6)
	Univariate	Stud. Char.	School Char.	Univariate	Stud. Char.	School Char.
Retention Eligible	-0.040***	-0.019*	-0.011	-0.063***	-0.017	-0.005
	(0.012)	(0.009)	(0.009)	(0.015)	(0.012)	(0.011)
Male	0.000	-0.000	-0.000	-0.004	-0.004	-0.004
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Asian	-0.046*	-0.028	-0.022	0.013	0.024	0.021
	(0.023)	(0.022)	(0.023)	(0.029)	(0.030)	(0.032)
Black	-0.092***	-0.089***	-0.037+	-0.141***	-0.123***	-0.055*
	(0.023)	(0.023)	(0.021)	(0.027)	(0.028)	(0.025)
Latino	0.033***	0.039**	0.047***	-0.002	0.017	0.028
	(0.010)	(0.013)	(0.014)	(0.019)	(0.021)	(0.020)
Other race(s)	0.006	-0.006	0.006	0.004	-0.007	0.004
	(0.008)	(0.009)	(0.009)	(0.012)	(0.014)	(0.013)
Economically Disadvantaged	-0.023*	-0.007	-0.001	-0.078***	-0.054***	-0.042***
	(0.010)	(0.009)	(0.008)	(0.014)	(0.013)	(0.012)
English Learner	-0.047*	-0.057**	-0.047*	-0.066*	-0.072*	-0.059*
	(0.020)	(0.021)	(0.019)	(0.028)	(0.030)	(0.029)
Stud. w/ Disabilities	0.007	0.007+	0.004	-0.007	0.003	-0.006
	(0.005)	(0.004)	(0.004)	(0.007)	(0.006)	(0.006)
Charter	-0.140***		-0.107**	-0.225***		-0.182***
	(0.033)		(0.033)	(0.042)		(0.044)
Urban	-0.023		0.040+	-0.012		0.071*
	(0.024)		(0.024)	(0.034)		(0.034)
Rural	0.051*		0.050*	0.041		0.038
	(0.021)		(0.022)	(0.032)		(0.034)
School ELA M-STEP Performance	0.001***		0.001**	0.002***		0.002***
	(0.000)		(0.000)	(0.000)		(0.000)
School enrollment (100 students)	0.060***		0.053**	-0.005		-0.023
	(0.017)		(0.018)	(0.048)		(0.048)
Mean of Dep Var		0.888	0.888		0.727	0.727
R-Squared		0.012	0.035		0.016	0.041
Observations		71148	71148		71124	71124

*Note: The sample includes all third-grade students who took the 2020 ELA M-STEP for whom we have complete student and school data. The dependent variable is an indicator for having any highly effective teacher in the school in Columns (1) through (3) and having one in third grade in Columns (4) through (6). Heteroskedasticity-robust standard errors are in parentheses. + p<0.1 * p<0.05 ** p<0.01 *** p<0.001*

Table 3. Regression Discontinuity Estimates of Assignment to a Highly Effective Teacher				
	RD Estimate - Impact of Retention Eligibility	**Confidence Interval**	**N - Below Cut-off**	**N - Above Cut-off**
Overall	0.009	[-0.053,0.056]	2,854	16,938
Student Characteristics				
Econ Disadvantaged	0.004	[-0.069,0.068]	2,364	12,447
Not Econ Disadvantaged	0.042	[-0.056,0.090]	490	4,490
White	0.006	[-0.038,0.040]	1,463	10,118
Black	0.028	[-0.080,0.106]	862	3,713
Female	0.033	[-0.032,0.119]	1,207	7,726
Male	-0.009	[-0.086,0.024]	1,647	9,211
Student with Disabilities	-0.020	[-0.144,0.074]	833	4,259
Not Student with Disabilities	0.022	[-0.022,0.058]	2,021	12,678
English Learner	-0.005	[-0.138,0.072]	367	2,060
Not English Learner	0.012	[-0.057,0.074]	2,487	14,877
District Characteristics				
Charter School	0.036	[-0.069,0.095]	595	2,800
Traditional Public School	0.003	[-0.064,0.061]	2,259	14,138
District's Quartile for ELA in 2019				
Lowest	0.010	[-0.071,0.033]	861	3,337
Mid-Low	0.035	[-0.041,0.127]	715	4,066
Mid-High	-0.009	[-0.049,0.038]	679	4,764
High	0.014	[-0.081,0.082]	565	4,624
Rural	0.012	[-0.078,0.069]	865	3,801
Suburban and Town	-0.007	[-0.074,0.036]	1,401	7,383
Urban	0.021	[-0.053,0.081]	2,350	13,481

*Note: Regression discontinuity estimates of the impact of retention-eligibility on the probability of being assigned to a highly effective teacher. Estimates are from local linear models with triangular kernels. The running variable is students' ELA M-STEP scale score. Students are retention eligible if they score 1252 or below. Each row represents a separate model estimate on a given subpopulation. In each model the bandwidth is 13 scale score points below and 24 scale score points above the cut-off. Column (1) shows the LATE estimate of the impact of being just below the retention-eligibility threshold on the probability of assignment to a highly effective teacher. Column (2) shows robust confidence intervals. Columns (3) and (4) show the number of observations within the bandwidth below and above the cut-off. +p<0.1 *p<0.05 **p<0.01 ***p<0.001*

Table 4. Regression Discontinuity Estimates of Assignment to a Highly Effective Teacher Conditional on Having a Highly Effective Teacher in the same Building and Grade

	RD Estimate - Impact of Retention Eligibility	Confidence Interval	N - Below Cut-off	N - Above Cut-off
Overall	-0.003	[-0.055,0.043]	1,914	11,507
Student Characteristics				
Econ Disadvantaged	-0.008	[-0.069,0.052]	1,555	8,198
Not Econ Disadvantaged	0.023	[-0.052,0.060]	359	3,309
White	0.018	[-0.020,0.053]	1,007	7,203
Black	-0.036	[-0.140,0.054]	536	2,126
Female	0.019	[-0.040,0.093]	825	5,254
Male	-0.020	[-0.082,0.018]	1,089	6,253
Student with Disabilities	-0.012	[-0.079,0.047]	560	2,979
Not Student with Disabilities	0.002	[-0.048,0.047]	1,354	8,528
English Learner	-0.006	[-0.102,0.072]	226	1,252
Not English Learner	-0.002	[-0.056,0.047]	1,688	10,255
District Characteristics				
Charter School	-0.007	[-0.205,0.122]	286	1,328
Traditional Public School	-0.001	[-0.034,0.032]	1,628	10,179
District's Quartile for ELA in 2019				
Lowest	-0.061	[-0.221,0.037]	496	1,823
Mid-Low	0.070*	[0.018,0.163]	466	2,532
Mid-High	0.006	[-0.025,0.039]	509	3,651
High	-0.003	[-0.047,0.023]	426	3,414
Rural	-0.051	[-0.128,0.003]	580	2,452
Suburban and Town	-0.031	[-0.077,0.002]	950	5,017
Urban	-0.006	[-0.077,0.057]	1,565	9,031

*Note: Regression discontinuity estimates of the impact of retention-eligibility on the probability of being assigned to a highly effective teacher. The sample is restricted to students who are in a school with a highly effective teacher assigned to teach their grade. Estimates are from local linear models with triangular kernels. The running variable is students' ELA M-STEP scale score. Students are retention eligible if they score 1252 or below. Each row represents a separate model estimate on a given subpopulation. In each model the bandwidth is 13 scale score points below and 24 scale score points above the cut-off. Column (1) shows the LATE estimate of the impact of being just below the retention-eligibility threshold on the probability of assignment to a highly effective teacher. Column (2) shows robust confidence intervals. Columns (3) and (4) show the number of observations within the bandwidth below and above the cut-off. +p<0.1 *p<0.05 **p<0.01 ***p<0.001*

Table 5. Descriptive Statistics of Teachers in Schools with at Least One Retention-Eligible Student Not Assigned to a Potentially Available Highly Effective Teacher in Their Grade

	(1)
	Highly Effective Teachers
General Education Assignment	64.0%
ELA endorsed	33.1%
Average Years Worked in District	13.6
Percent with >0 retention-eligible students assigned	54.5%
Average retention-eligible students in school	3.4
Average retention-eligible students assigned	1.7
Number of teachers	369

Note: The sample is restricted to highly effective teachers in schools with at least one retention-eligible student who was not assigned to a highly effective teacher, even though a highly effective teacher was available in their grade. Each percentage indicates the percentage of the total listed in the first row. For example, 85.6% of all highly effective general education teachers in schools with at least one retention-eligible student not assigned to a highly effective teacher were are female.

Table 6. Regression Discontinuity Estimates of Assignment to an ELA-Endorsed Teacher				
	RD Estimate - Impact of Retention Eligibility	**Confidence Interval**	**N - Below Cut-off**	**N - Above Cut-off**
Overall	0.005	[-0.027,0.048]	2,877	19,538
Student Characteristics				
Econ Disadvantaged	0.000	[-0.028,0.049]	2,386	14,036
Not Econ Disadvantaged	0.036	[-0.086,0.111]	491	5,501
White	0.015	[-0.025,0.057]	1,468	11,899
Black	0.033	[-0.036,0.104]	875	4,075
Female	0.033	[-0.016,0.093]	1,215	8,994
Male	-0.016	[-0.044,0.020]	1,662	10,543
Student with Disabilities	0.008	[-0.042,0.061]	839	4,766
Not Student with Disabilities	0.005	[-0.034,0.059]	2,038	14,771
English Learner	-0.029	[-0.096,0.030]	368	2,335
Not English Learner	0.011	[-0.023,0.059]	2,509	17,202
District Characteristics				
Charter School	0.006	[-0.071,0.113]	613	3,151
Traditional Public School	0.005	[-0.028,0.041]	2,264	16,387
District's Quartile for ELA in 2019				
Lowest	0.060	[-0.003,0.176]	870	3,648
Mid-Low	0.020	[-0.031,0.102]	716	4,580
Mid-High	-0.020	[-0.077,0.024]	680	5,559
High	-0.012	[-0.080,0.006]	569	5,563
Rural	0.021	[-0.036,0.089]	876	4,270
Suburban and Town	-0.002	[-0.060,0.065]	1,419	8,437
Urban	0.007	[-0.025,0.053]	2,370	15,517

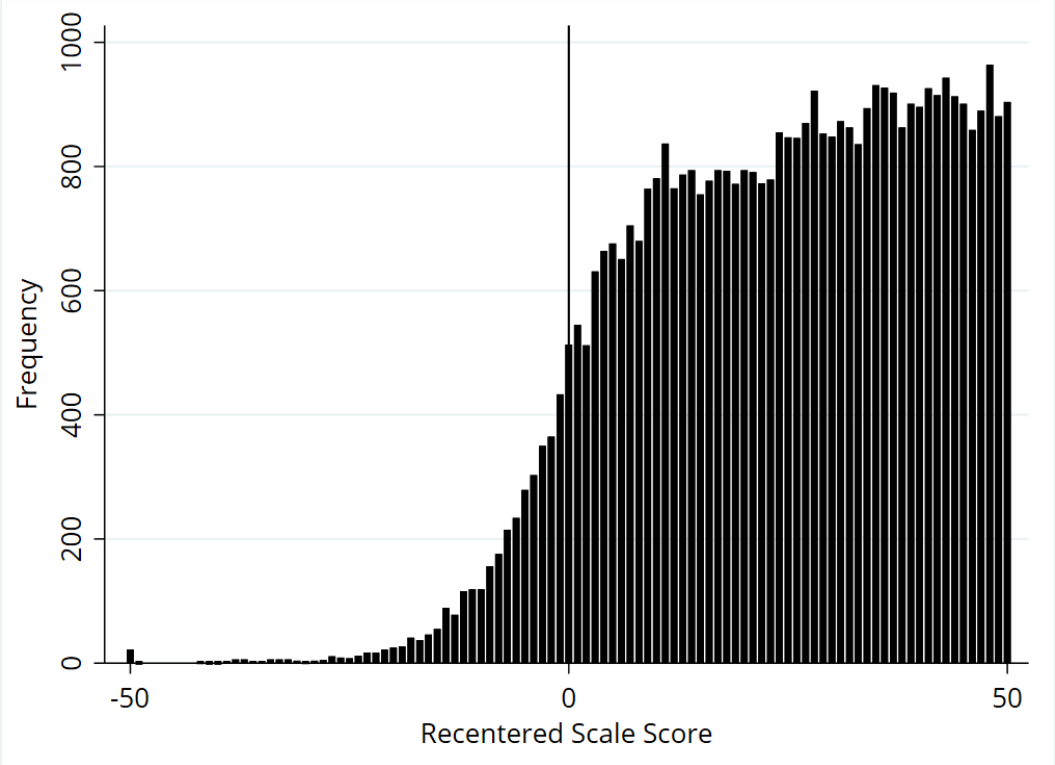
*Note: Regression discontinuity estimates of the impact of retention-eligibility on the probability of being assigned to an ELA-endorsed teacher. Estimates are from local linear models with triangular kernels. The running variable is students' ELA M-STEP scale score. Students are retention eligible if they score 1252 or below. Each row represents a separate model estimate on a given subpopulation. In each model the bandwidth is 13 scale score points below and 27 scale score points above the cut-off. Column (1) shows the LATE estimate of the impact of being just below the retention-eligibility threshold on the probability of assignment to an ELA-endorsed teacher. Column (2) shows robust confidence intervals. Columns (3) and (4) show the number of observations within the bandwidth below and above the cut-off. +p<0.1 *p<0.05 **p<0.01 ***p<0.001*

Table 7. Regression Discontinuity Estimates of Average. Years Taught in District by Assigned Teachers				
	RD Estimate - Impact of Retention Eligibility	**Confidence Interval**	**N - Below Cut-off**	**N - Above Cut-off**
Overall	-0.013	[-0.648,0.470]	2,872	18,677
Student Characteristics				
Econ Disadvantaged	0.125	[-0.526,0.603]	2,381	13,506
Not Econ Disadvantaged	-0.609	[-2.000,0.591]	491	5,170
White	0.521*	[0.025,0.835]	1,467	11,304
Black	-0.404	[-1.906,0.669]	873	3,956
Female	-0.119	[-0.901,0.491]	1,216	8,573
Male	0.064	[-0.579,0.567]	1,656	10,103
Student with Disabilities	-0.714*	[-1.509,-0.180]	840	4,594
Not Student with Disabilities	0.283	[-0.344,0.804]	2,032	14,082
English Learner	-0.987	[-2.527,0.347]	367	2,245
Not English Learner	0.136	[-0.597,0.735]	2,505	16,431
District Characteristics				
Charter School	0.079	[-0.386,0.571]	610	3,019
Traditional Public School	-0.011	[-0.583,0.287]	2,262	15,658
District's Quartile for ELA in 2019				
Lowest	-0.452	[-1.880,0.598]	871	3,545
Mid-Low	0.063	[-1.109,0.710]	716	4,404
Mid-High	1.039***	[0.644,1.884]	679	5,304
High	-0.276	[-1.209,0.291]	567	5,252
Rural	-0.078	[-1.218,0.997]	873	4,108
Suburban and Town	0.060	[-0.793,0.802]	1,415	8,068
Urban	-0.193	[-0.883,0.357]	2,366	14,856

*Note: Regression discontinuity estimates of the impact of retention-eligibility on the average years of experience of the teacher assigned to the student. Estimates are from local linear models with triangular kernels. The running variable is students' ELA M-STEP scale score. Students are retention eligible if they score 1252 or below. Each row represents a separate model estimate on a given subpopulation. In each model the bandwidth is 13 scale score points below and 26 scale score points above the cut-off. Column (1) shows the LATE estimate of the impact of being just below the retention-eligibility threshold on the average teacher tenure. Column (2) shows robust confidence intervals. Columns (3) and (4) show the number of observations within the bandwidth below and above the cut-off. +p<0.1 *p<0.05 **p<0.01 ***p<0.001*

APPENDIX

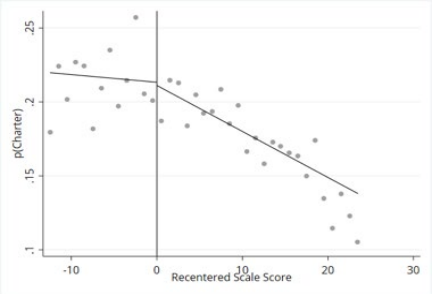
Appendix Figure A1. Distribution of Third-Grade ELA M-STEP Scores



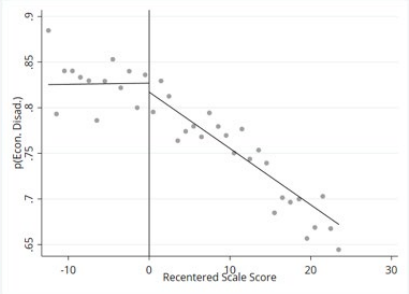
Note: The x-axis contains ELA M-STEP scale scores adjusted such that a 1253 scale score equals 0. The y-axis represents the frequency each scale score occurs in the data.

Appendix Figure A2. Smoothness of Covariates Across Retention-Eligibility Cut-Off

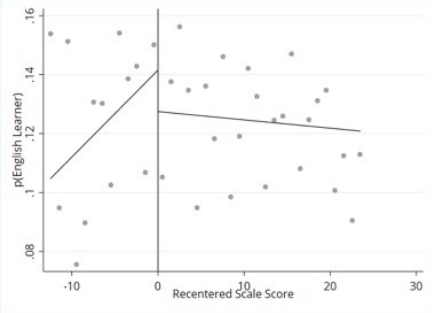
Panel A: Charter School



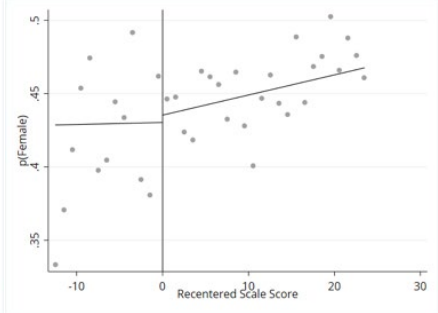
Panel B: Economically Disadvantaged



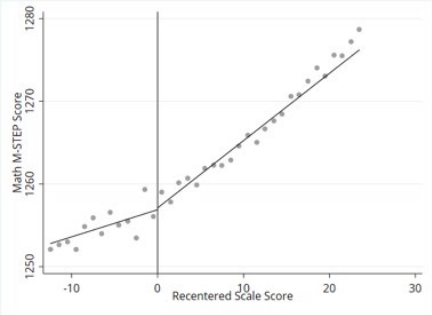
Panel C: English Learner



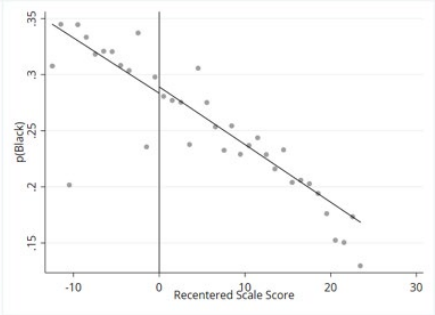
Panel D: Female



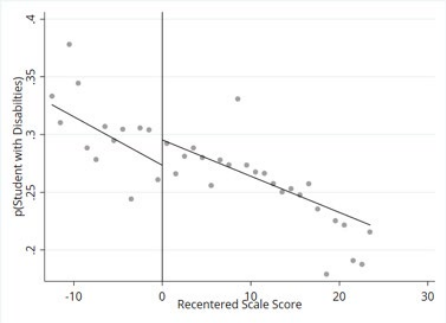
Panel E: Math M-STEP Score



Panel F: Black



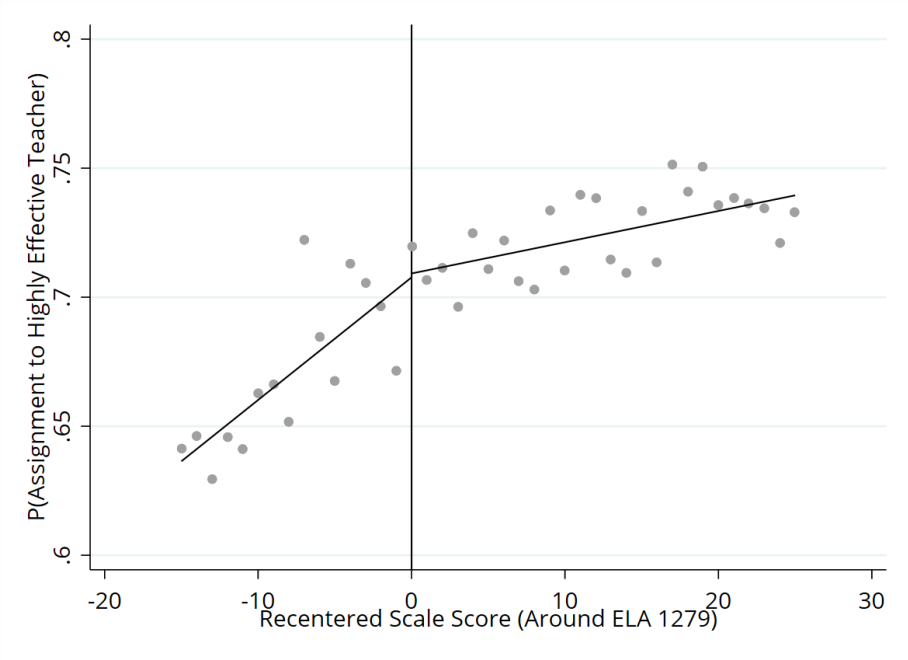
Panel G: Students With Disabilities



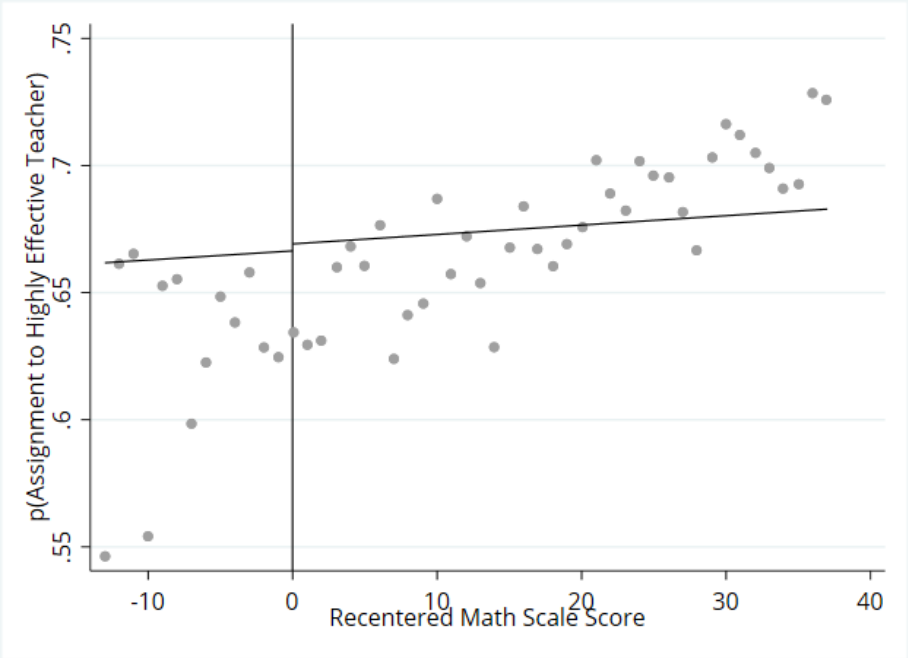
Note: The vertical line indicates the retention-eligibility threshold of 1252 scale score on the third-grade 2020-21 ELA M-STEP. There is one dot for each scale score. The fit lines are from local linear regressions with triangular weights. Each panel is estimated on a different outcome given by the panel title.

Appendix Figure A3. Regression Discontinuity Estimates With Placebo Cut-Offs

Panel A: ELA Placebo 1279 Point Cut-Off

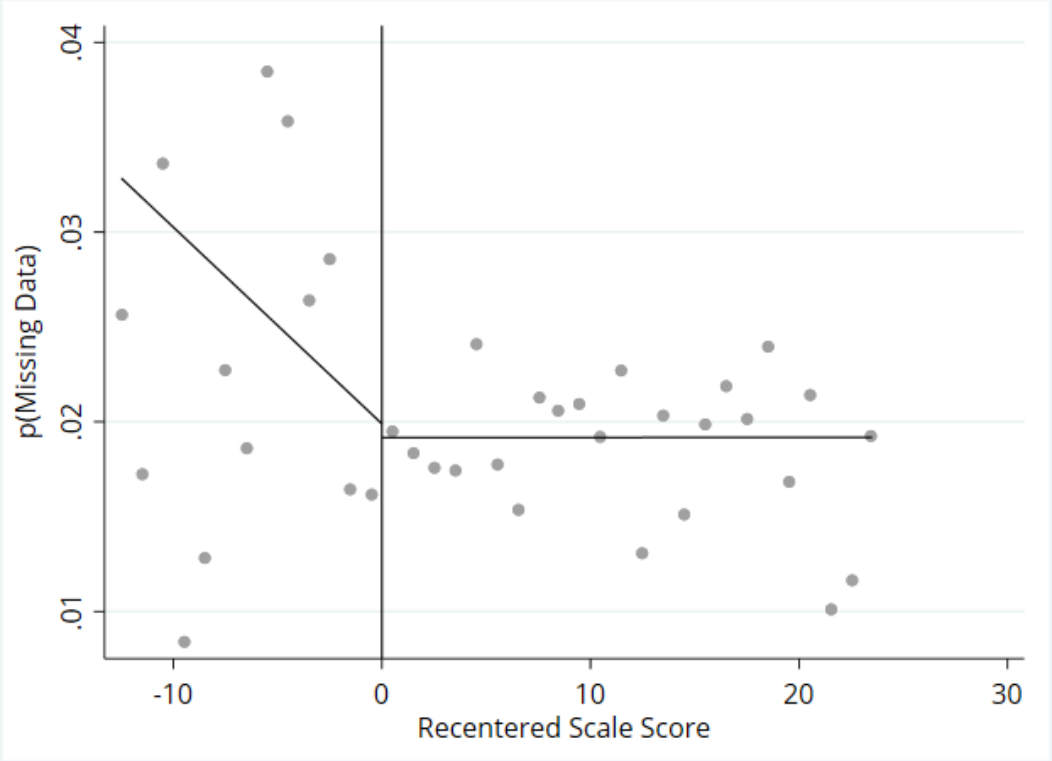


Panel B: Math Score 1252 Point Placebo Cut-Off



Note: The vertical line indicates the placebo thresholds. In Panel A, the threshold is a 1279 scale score on the third-grade ELA M-STEP. In Panel B, the threshold is a 1252 scale score on the third-grade Math M-STEP. There is one dot for each scale score. The fit lines are from local linear regressions with triangular weights.

Appendix Figure A4. Regression Discontinuity Estimates of Differential Attrition



Note: Regression discontinuity estimates of the impact of retention-eligibility on the probability of attrition from the coursework data in 2021-22. Estimates are from local linear models with triangular kernels. The running variable is students' ELA M-STEP scale score. Students are retention eligible if they score 1252 or below.

Appendix Table A1. Regression Discontinuity Estimates of Assignment to a Highly Effective Teacher (Quadratic Functional Form)				
	RD Estimate - Impact of Retention Eligibility	**Confidence Interval**	**N - Below Cut-off**	**N - Above Cut-off**
Overall	-0.012	[-0.072,0.033]	2,849	16,918
Student Characteristics				
Econ Disadvantaged	-0.013	[-0.092,0.057]	2,359	12,429
Not Econ Disadvantaged	-0.005	[-0.119,0.071]	490	4,489
White	-0.021	[-0.073,0.022]	1,462	10,113
Black	0.005	[-0.086,0.081]	858	3,702
Female	0.041	[-0.044,0.130]	1,205	7,718
Male	-0.054***	[-0.111,-0.029]	1,644	9,200
Student with Disabilities	-0.028	[-0.157,0.098]	832	4,257
Not Student with Disabilities	-0.007	[-0.053,0.019]	2,017	12,661
English Learner	-0.077	[-0.203,0.019]	367	2,056
Not English Learner	-0.001	[-0.071,0.057]	2,482	14,862
District Characteristics				
Charter School	-0.004	[-0.096,0.064]	593	2,787
Traditional Public School	-0.013	[-0.078,0.039]	2,256	14,131
District's Quartile for ELA in 2019				
Lowest	-0.031	[-0.088,-0.010]	858	3,327
Mid-Low	0.055	[-0.044,0.166]	714	4,061
Mid-High	-0.029	[-0.081,0.013]	679	4,760
High	-0.010	[-0.093,0.061]	564	4,623
Rural	-0.002	[-0.083,0.048]	864	3,793
Suburban and Town	-0.029	[-0.084,0.008]	1,399	7,372
Urban	-0.002	[-0.078,0.054]	2,346	13,464

*Note: Regression discontinuity estimates of the impact of retention-eligibility on the probability of being assigned to a highly effective teacher. Estimates are from local quadratic models with triangular kernels. The running variable is students' ELA M-STEP scale score. Students are retention eligible if they score 1252 or below. Each row represents a separate model estimate on a given subpopulation. In each model the bandwidth is 13 scale score points below and 24 scale score points above the cut-off. Column (1) shows the LATE estimate of the impact of being just below the retention-eligibility threshold on the probability of assignment to a highly effective teacher. Column (2) shows robust confidence intervals. Columns (3) and (4) show the number of observations within the bandwidth below and above the cut-off. +p<0.1 *p<0.05 **p<0.01 ***p<0.001*

Appendix Table A2. Regression Discontinuity Estimates of Assignment to a Highly Effective Teacher (+/- 12 Scale Score Point Bandwidth)				
	RD Estimate - Impact of Retention Eligibility	**Confidence Interval**	**N - Below Cut-off**	**N - Above Cut-off**
Overall	0.006	[-0.051,0.063]	2,773	7,756
Student Characteristics				
Econ Disadvantaged	-0.003	[-0.077,0.071]	2,292	6,052
Not Econ Disadvantaged	0.058	[-0.036,0.138]	481	1,704
White	-0.006	[-0.061,0.047]	1,423	4,360
Black	0.033	[-0.060,0.113]	835	1,989
Female	0.032	[-0.040,0.124]	1,181	3,423
Male	-0.013	[-0.075,0.033]	1,592	4,333
Student with Disabilities	-0.008	[-0.118,0.104]	806	2,172
Not Student with Disabilities	0.012	[-0.034,0.055]	1,967	5,584
English Learner	-0.037	[-0.200,0.071]	355	982
Not English Learner	0.014	[-0.047,0.082]	2,418	6,774
District Characteristics				
Charter School	0.024	[-0.087,0.083]	581	1,453
Traditional Public School	0.006	[-0.050,0.072]	2,192	6,303
District's Quartile for ELA in 2019				
Lowest	0.011	[-0.053,0.038]	835	1,848
Mid-Low	0.047	[-0.031,0.173]	700	1,922
Mid-High	-0.016	[-0.066,0.046]	664	2,026
High	0.015	[-0.057,0.080]	540	1,880
Rural	0.026	[-0.053,0.103]	841	1,903
Suburban and Town	-0.007	[-0.057,0.044]	1,365	3,504
Urban	0.020	[-0.053,0.090]	2,280	6,223

*Note: Regression discontinuity estimates of the impact of retention-eligibility on the probability of being assigned to a highly effective teacher. Estimates are from local linear models with triangular kernels. The running variable is students' ELA M-STEP scale score. Students are retention eligible if they score 1252 or below. Each row represents a separate model estimate on a given subpopulation. In each model the bandwidth is 12 scale score points below and 12 scale score points above the cut-off. Column (1) shows the LATE estimate of the impact of being just below the retention-eligibility threshold on the probability of assignment to a highly effective teacher. Column (2) shows robust confidence intervals. Columns (3) and (4) show the number of observations within the bandwidth below and above the cut-off. +p<0.1 *p<0.05 **p<0.01 ***p<0.001*

Appendix Table A3. Regression Discontinuity Estimates of Assignment to a Highly Effective Teacher (+/- 7 Scale Score Point Bandwidth)				
	RD Estimate - Impact of Retention Eligibility	**Confidence Interval**	**N - Below Cut-off**	**N - Above Cut-off**
Overall	-0.001	[-0.068,0.053]	2,106	4,096
Student Characteristics				
Econ Disadvantaged	-0.003	[-0.090,0.080]	1,739	3,222
Not Econ Disadvantaged	0.011	[-0.121,0.077]	367	874
White	-0.012	[-0.077,0.044]	1,095	2,226
Black	-0.004	[-0.110,0.052]	627	1,111
Female	0.039	[-0.049,0.136]	902	1,826
Male	-0.032*	[-0.095,-0.004]	1,204	2,270
Student with Disabilities	-0.015	[-0.149,0.103]	598	1,139
Not Student with Disabilities	0.005	[-0.046,0.043]	1,508	2,957
English Learner	-0.063	[-0.225,0.068]	283	510
Not English Learner	0.009	[-0.061,0.070]	1,823	3,586
District Characteristics				
Charter School	-0.025	[-0.124,0.010]	445	793
Traditional Public School	0.007	[-0.058,0.068]	1,661	3,303
District's Quartile for ELA in 2019				
Lowest	-0.015**	[-0.059,-0.008]	628	1,023
Mid-Low	0.066	[-0.045,0.197]	531	1,030
Mid-High	-0.022	[-0.074,0.025]	510	1,029
High	0.010	[-0.069,0.069]	412	969
Rural	0.007	[-0.085,0.067]	629	1,037
Suburban and Town	-0.013	[-0.077,0.039]	1,024	1,868
Urban	0.005	[-0.079,0.066]	1,735	3,301

*Note: Regression discontinuity estimates of the impact of retention-eligibility on the probability of being assigned to a highly effective teacher. Estimates are from local linear models with triangular kernels. The running variable is students' ELA M-STEP scale score. Students are retention eligible if they score 1252 or below. Each row represents a separate model estimate on a given subpopulation. In each model the bandwidth is 7 scale score points below and 7 scale score points above the cut-off. Column (1) shows the LATE estimate of the impact of being just below the retention-eligibility threshold on the probability of assignment to a highly effective teacher. Column (2) shows robust confidence intervals. Columns (3) and (4) show the number of observations within the bandwidth below and above the cut-off. +p<0.1 *p<0.05 **p<0.01 ***p<0.001*

Appendix Table A4. Inverse Probability Weighted Regression Discontinuity Estimates of Assignment to a Highly Effective Teacher (Attrition Correction)				
	RD Estimate - Impact of Retention Eligibility	**Confidence Interval**	**N - Below Cut-off**	**N - Above Cut-off**
Overall	0.007	[-0.065,0.057]	2,849	16,918
Student Characteristics				
Econ Disadvantaged	0.003	[-0.076,0.066]	2,359	12,429
Not Econ Disadvantaged	0.028	[-0.071,0.065]	490	4,489
White	-0.002	[-0.051,0.030]	1,462	10,113
Black	0.018	[-0.088,0.089]	858	3,702
Female	0.025	[-0.038,0.104]	1,205	7,718
Male	-0.006	[-0.100,0.036]	1,644	9,200
Student with Disabilities	-0.020	[-0.168,0.089]	832	4,257
Not Student with Disabilities	0.019	[-0.031,0.052]	2,017	12,661
English Learner	-0.018	[-0.148,0.053]	367	2,056
Not English Learner	0.011	[-0.071,0.078]	2,482	14,862
District Characteristics				
Charter School	0.045	[-0.064,0.107]	593	2,787
Traditional Public School	-0.003	[-0.078,0.057]	2,256	14,131
District's Quartile for ELA in 2019				
Lowest	0.014	[-0.076,0.046]	858	3,327
Mid-Low	0.023	[-0.070,0.137]	714	4,061
Mid-High	-0.024	[-0.073,0.024]	679	4,760
High	0.018	[-0.076,0.083]	564	4,623
Rural	0.013	[-0.086,0.078]	864	3,793
Suburban and Town	0.000	[-0.079,0.048]	1,399	7,372
Urban	0.014	[-0.071,0.076]	2,346	13,464

*Note: Regression discontinuity estimates of the impact of retention-eligibility on the probability of being assigned to a highly effective teacher. Estimates are weighted using the inverse probability of taking the ELA M-STEP in 2020-21. Estimates are from local linear models with triangular kernels. The running variable is students' ELA M-STEP scale score. Students are retention eligible if they score 1252 or below. Each row represents a separate model estimate on a given subpopulation. In each model the bandwidth is 13 scale score points below and 24 scale score points above the cut-off. Column (1) shows the LATE estimate of the impact of being just below the retention-eligibility threshold on the probability of assignment to a highly effective teacher. Column (2) shows robust confidence intervals. Columns (3) and (4) show the number of observations within the bandwidth below and above the cut-off. +p<0.1 *p<0.05 **p<0.01 ***p<0.001*