Center for Education Policy Research
HARVARD UNIVERSITY

WAKE COUNTY PUBLIC SCHOOL SYSTEM

STRATEGIC DATA PROJECT

Wake County Public School System Human Capital Diagnostic

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Data, Research and Accountability

** Special thanks to former WCPSS employee Dr. Darryl Hill for his contributions to this work.*

Student Achievement Committee | June 5, 2017

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HUMAN CAPITAL DIAGNOSTIC PATHWAY				
				
RECRUITMENT	PLACEMENT	DEVELOPMENT	EVALUATION	RETENTION/ TURNOVER

HUMAN CAPITAL
To identify, recruit, develop and retain highly effective talent

Human Capital Transition HUMAN CAPITAL DIAGNOSTIC PATHWAY

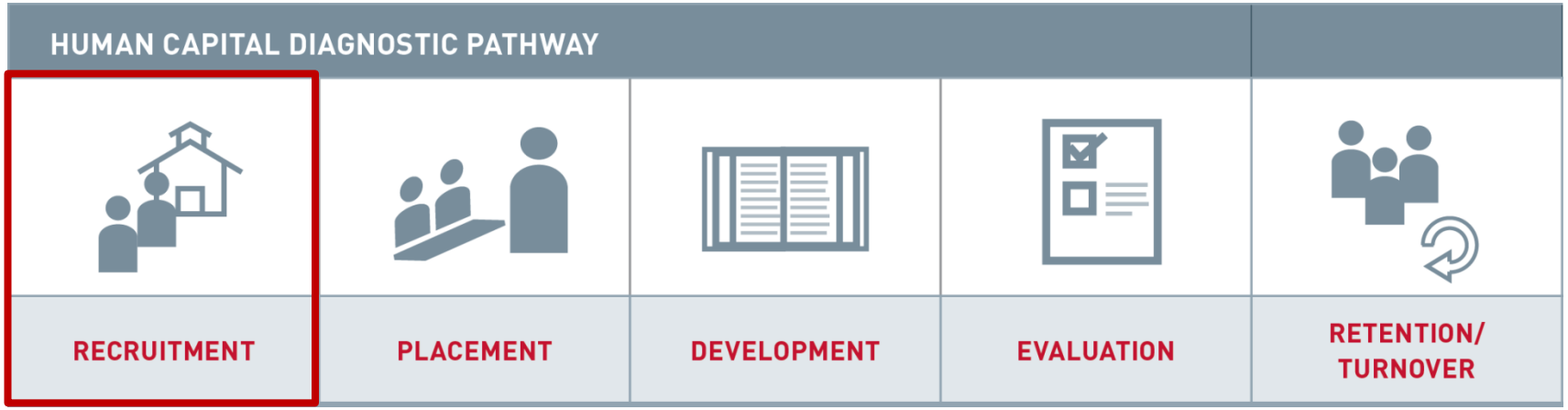
Transition WCPSS into an organization which embodies the attributes of communication, collaboration, creativity and critical thinking to ensure that all employees have a significant impact on learning and teaching

Talent Acquisition RECRUITMENT PLACEMENT DEVELOPMENT EVALAUTION

Attract and employ top talent throughout the organization in order to maintain a highly effective workforce that significantly impacts learning and teaching

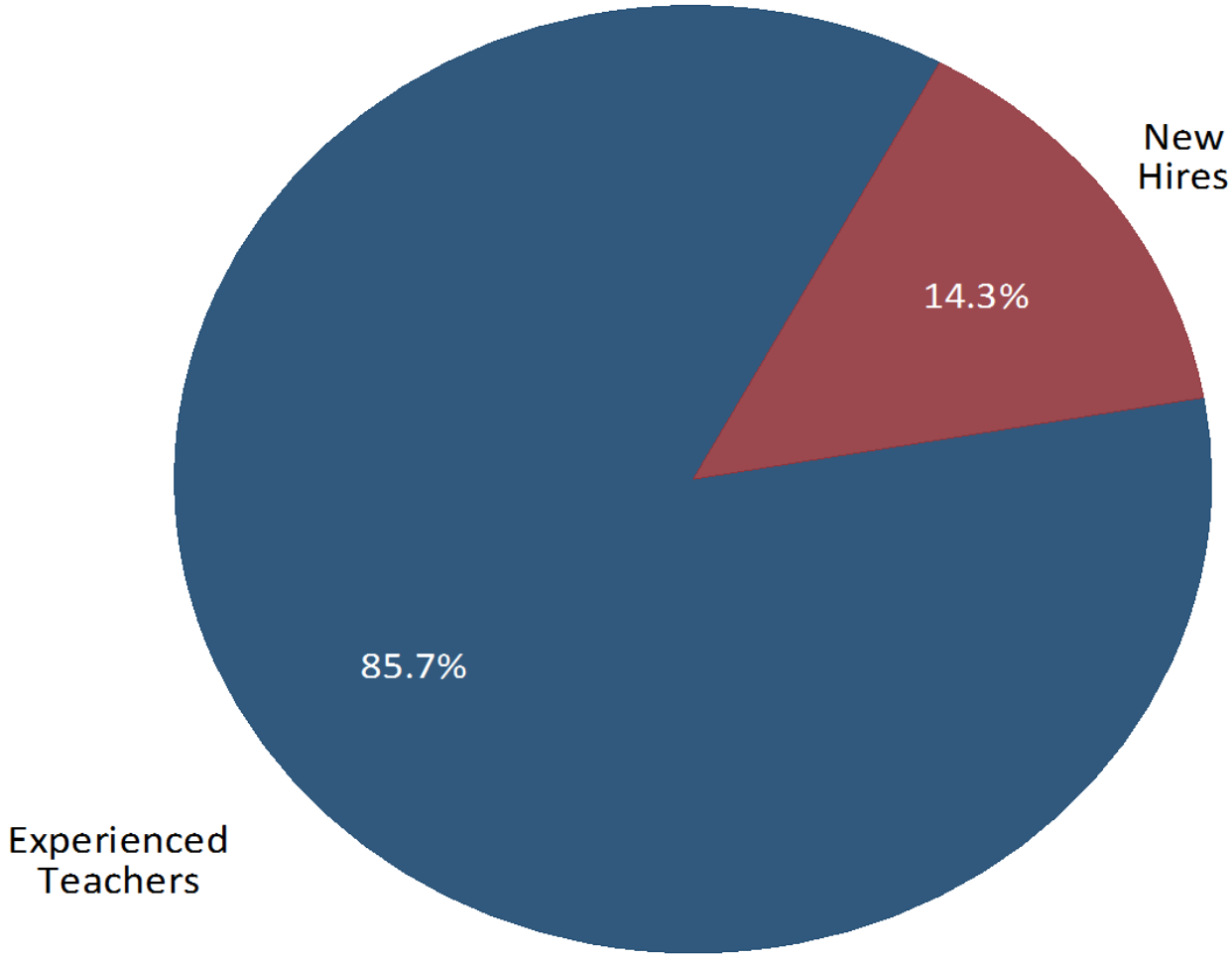
Talent Management PLACEMENT DEVELOPMENT EVALAUTION RETENTION

Develop career pathways that support personnel at all levels of the organization to enhance and build the skills necessary for professional growth, leadership or career advancement



RECRUITMENT

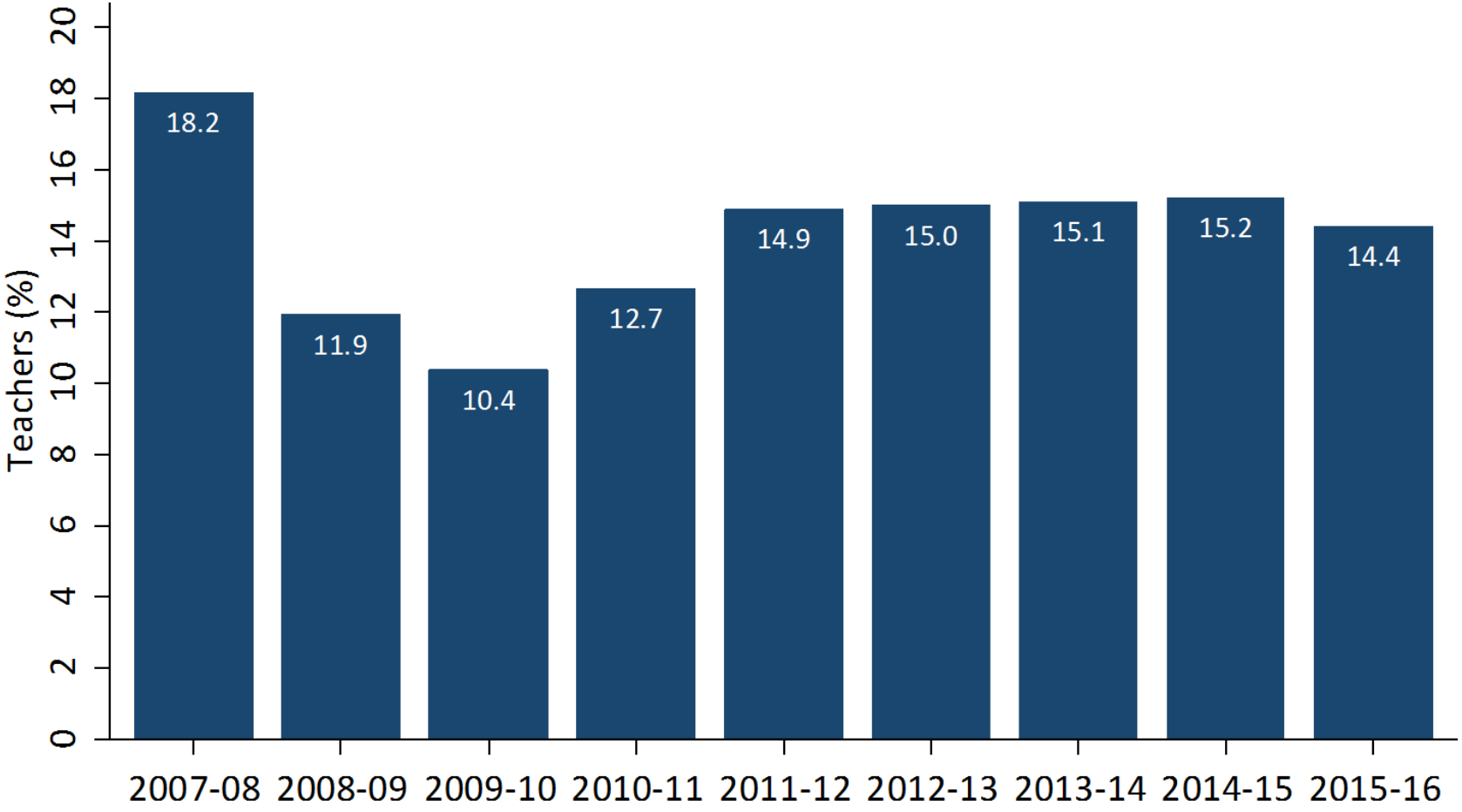
Share of Teachers Who Are New Hires



Notes: Sample includes teachers with teacher job codes in comprehensive, vocational, and magnet schools in the 2007-08 through 2015-16 school years, with 87,200 teacher-years and 18,895 unique teachers. All data are from Wake County Public School System's records.

Share of Teachers Who Are New Hires

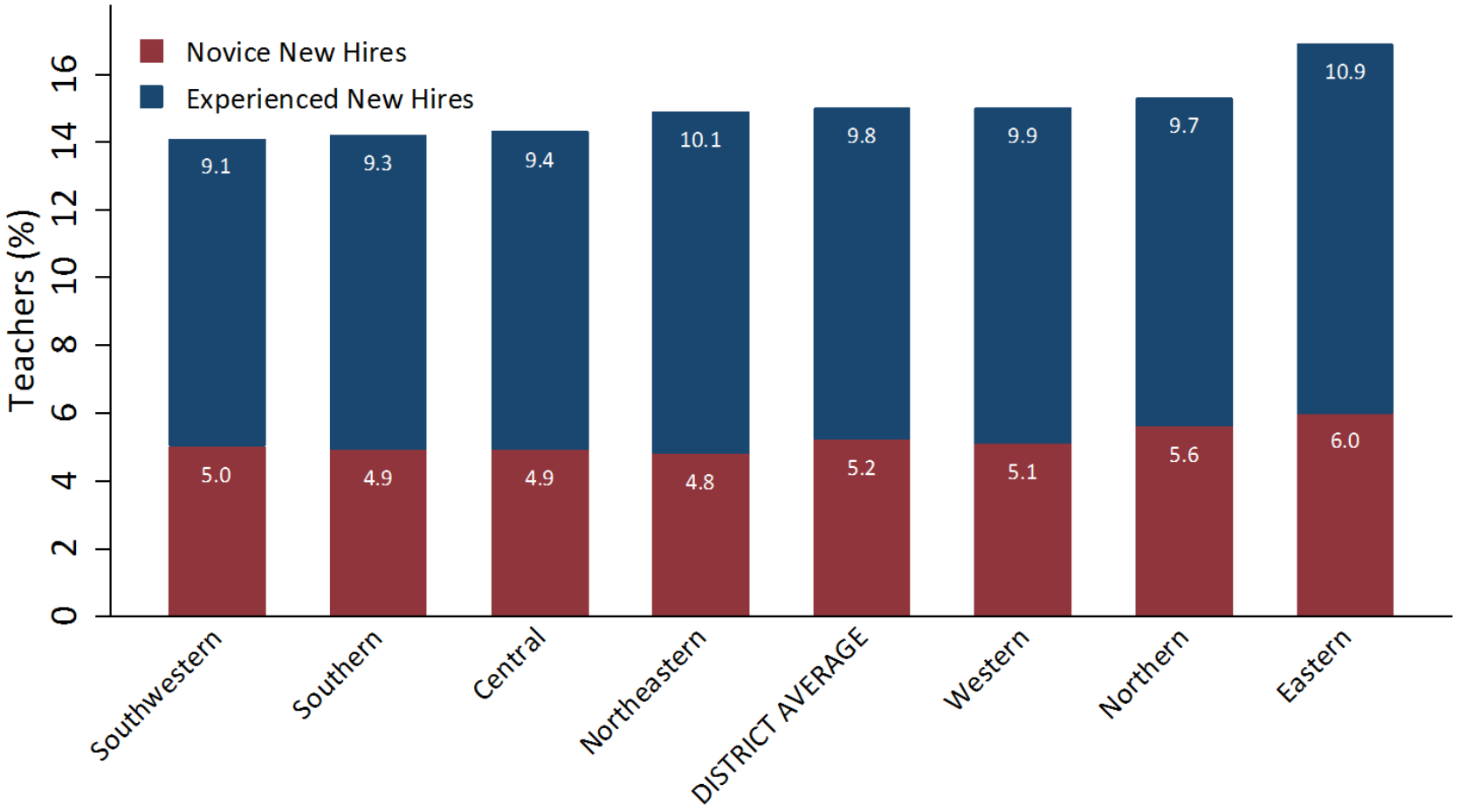
by School Year



Notes: Sample includes teachers with teacher job codes at comprehensive, vocational, and magnet schools in the 2007-08 through 2015-16 school years, with 84,910 teacher years and 18,547 unique teachers. All data are from Wake County Public School System's administrative records.

Share of Teachers Who Are New Hires

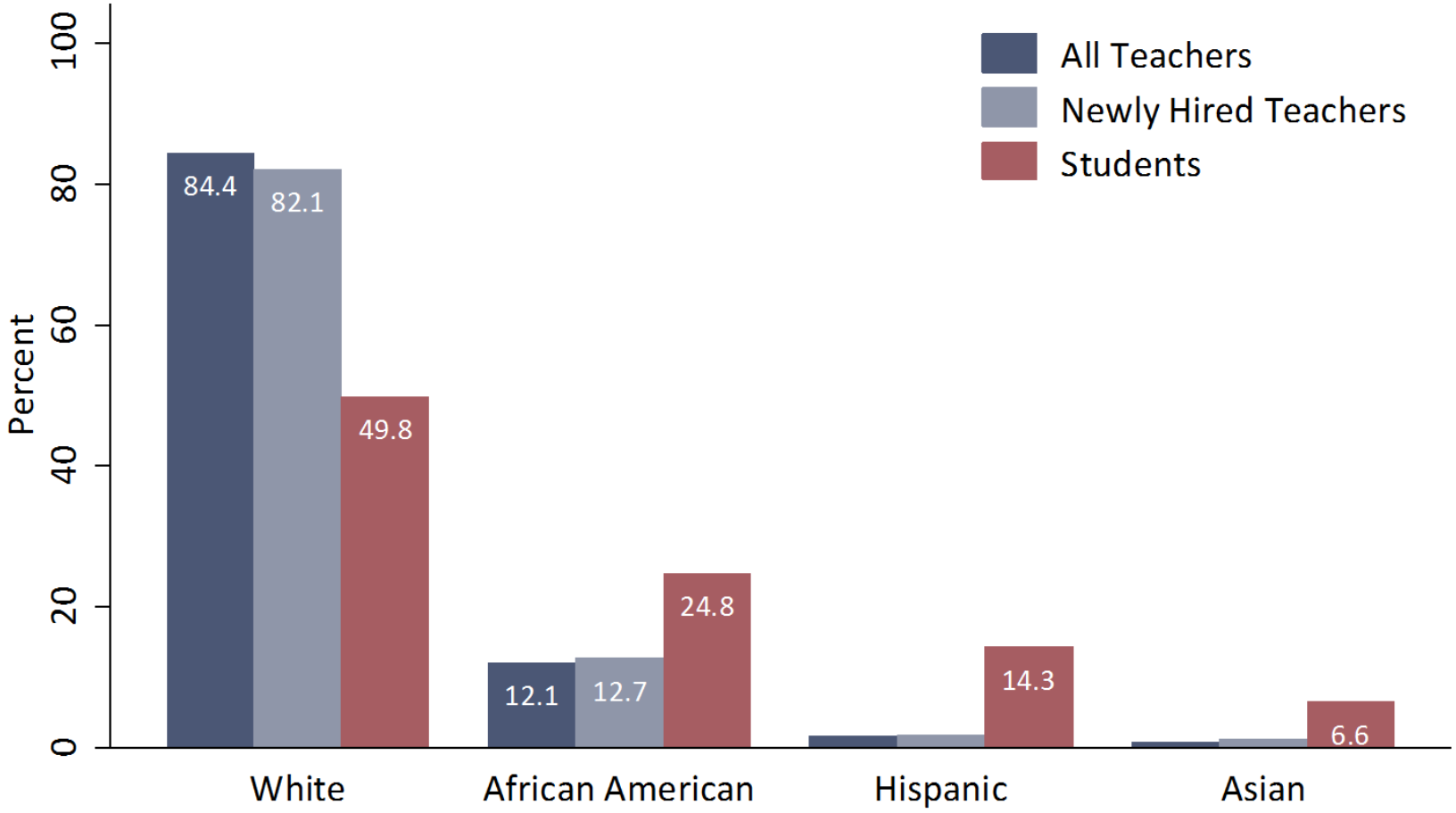
by Region



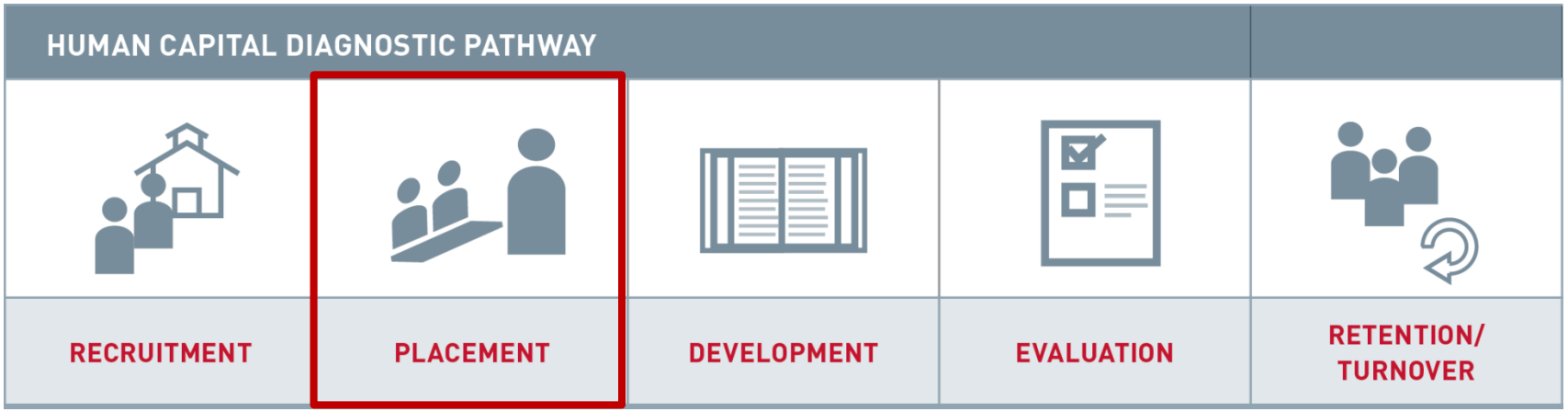
Notes: Sample includes comprehensive, vocational, and magnet school teachers with teacher job codes in the the 2007-08 through 2015-16 school years, with 87,200 teacher years and 18,895 unique teachers. All data are from Wake County Public School System's records.

Share of Teachers and Students

by Race



Notes: Sample includes teachers with teacher job codes and students at comprehensive, vocational, and magnet schools in the 2007-08 through 2015-16 school years, with 87,200 teacher years and 18,895 unique teachers, 1316672 student years and 298,727 unique students. All data are from Wake County Public School System's records.


HUMAN CAPITAL DIAGNOSTIC PATHWAY
RECRUITMENT
PLACEMENT
DEVELOPMENT
EVALUATION
RETENTION/
TURNOVER

PLACEMENT

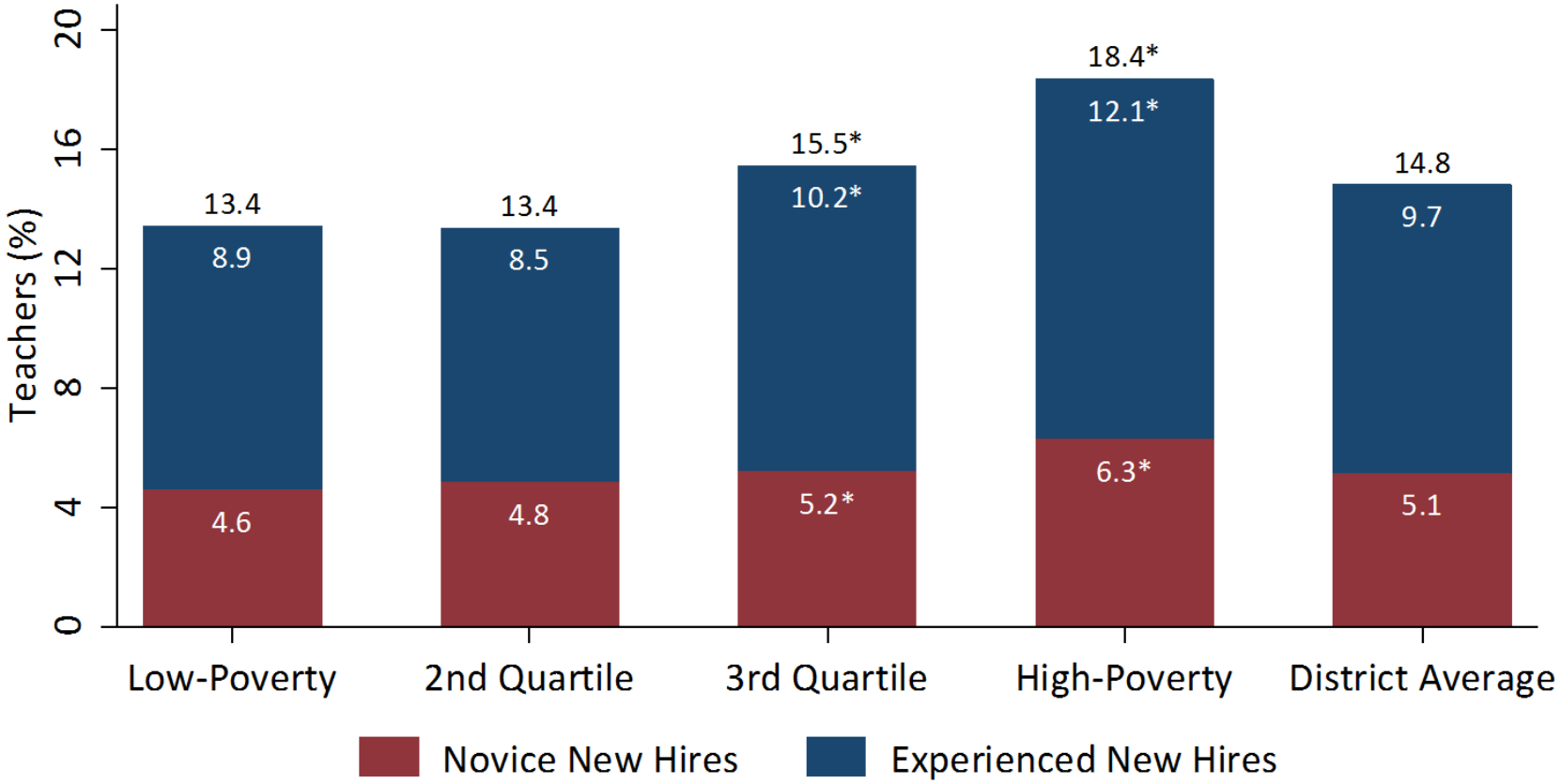
Placement

- **Method**
  - Regression of students' prior-year test scores on indicators for range of teacher experience
  - Across schools (with grade-by-year fixed effects) and within schools (with school-by-grade-by-year fixed effects)

- **Sample**
  - Students in elementary (4-5) and middle (6-8) grades with prior-year subject test scores
  - 2007-08 through 2015-16 school years (reliable experience information for these years)

Share of Teachers Who Are New Hires

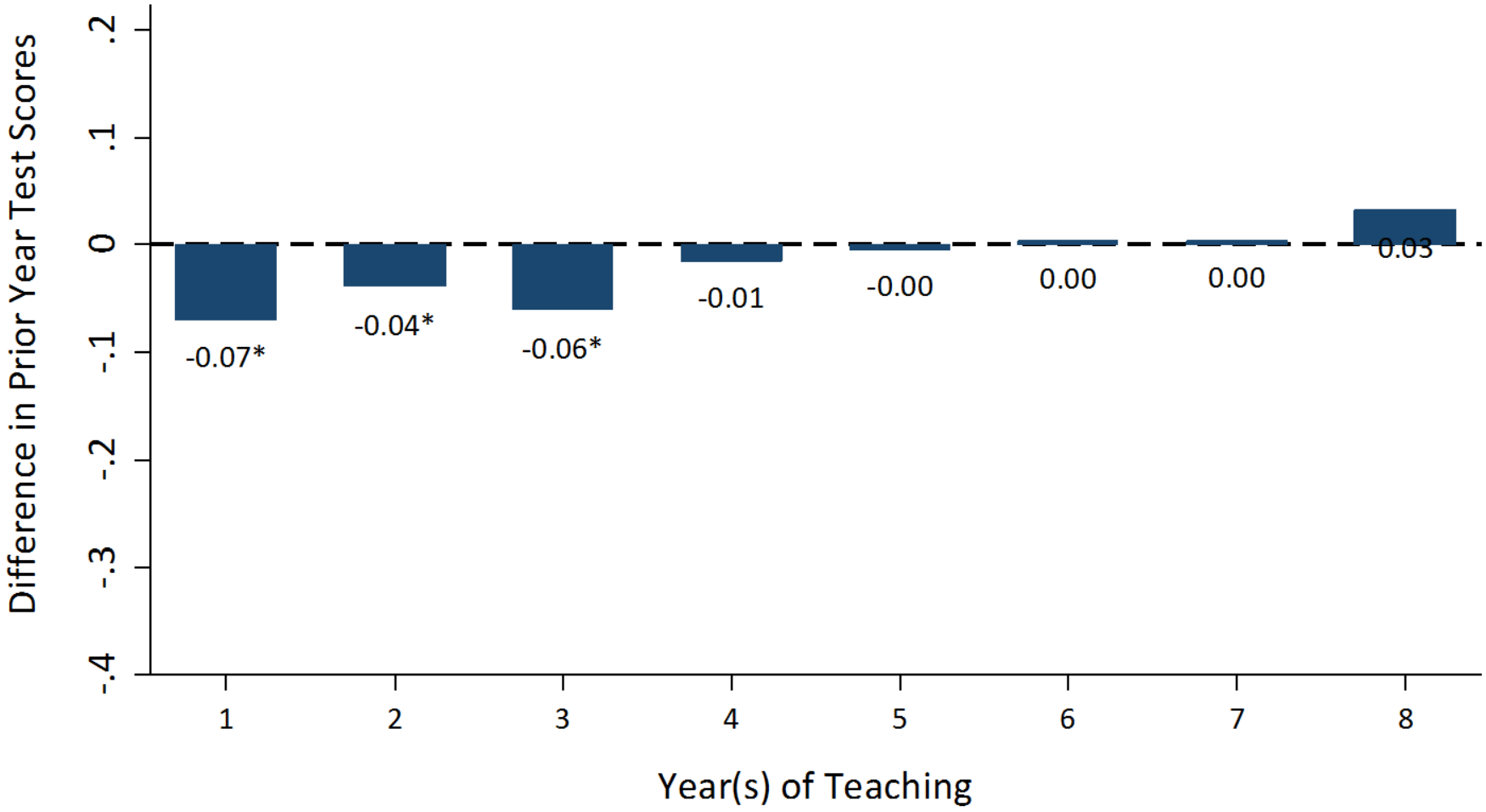
by School FRPL Quartile



*Quartile's value is significantly different from the lowest FRPL category, at the 95 percent confidence level.
Note. Sample includes teachers with teacher job codes in comprehensive, vocational, and magnet schools, with 84,003 teacher years and 18,364 unique teachers in the 2007-08 to 2015-16 school years. School free and reduced price lunch quartiles are are calculated using pooled sample data from the 2007-08 to 2015-16 school years. The quartiles of school FRPL are as follows: Bottom: 5.66-24.46; Second: 24.70-33.92; Third: 34.24-46.12; Top: 46.79-80.99. All data are from Wake County Public School System administrative records.

Difference in Average Prior ELA Performance of Students Assigned to Early-Career Teachers Compared to Teachers with 9 or More Years of Teaching

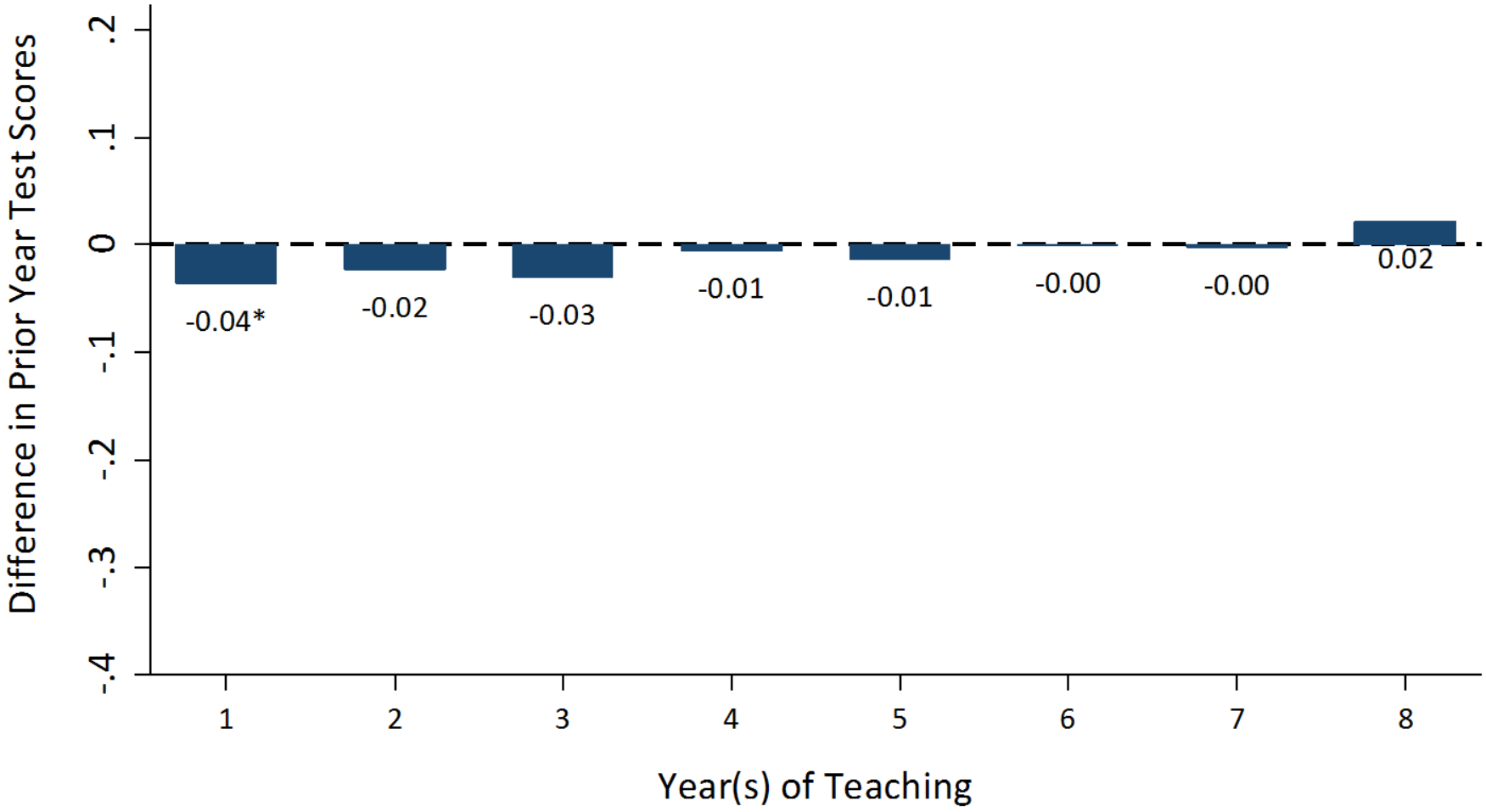
Elementary and Middle Schools, Overall



*Significantly different from zero, at the 95 percent confidence level.

Difference in Average Prior ELA Performance of Students Assigned to Early-Career Teachers Compared to Teachers with 9 or More Years of Teaching

Within Elementary and Middle Schools



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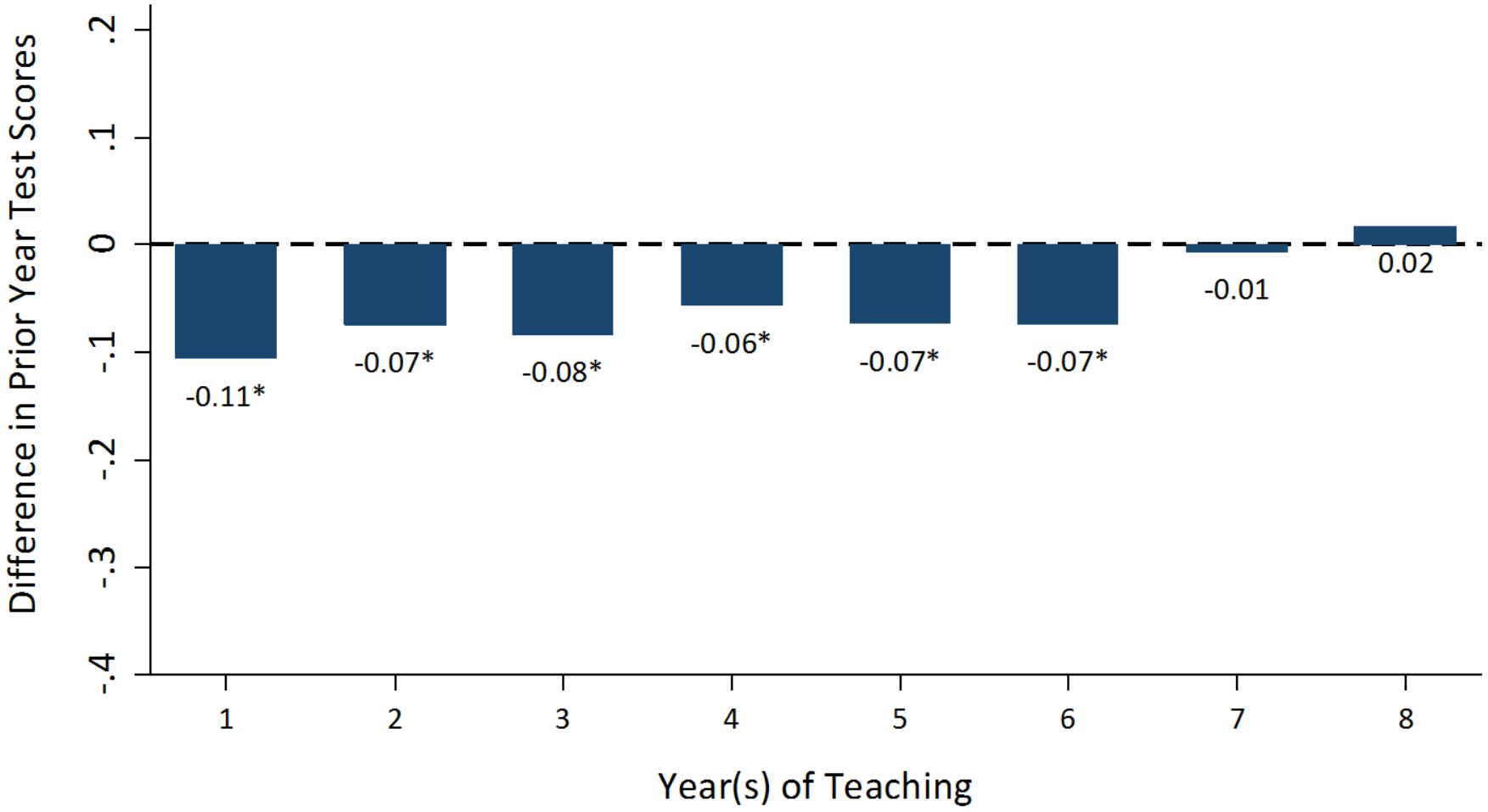
Difference in Average Prior Math Performance of Students Assigned to Early-Career Teachers Compared to Teachers with 9 or More Years of Teaching

Elementary and Middle Schools, Overall



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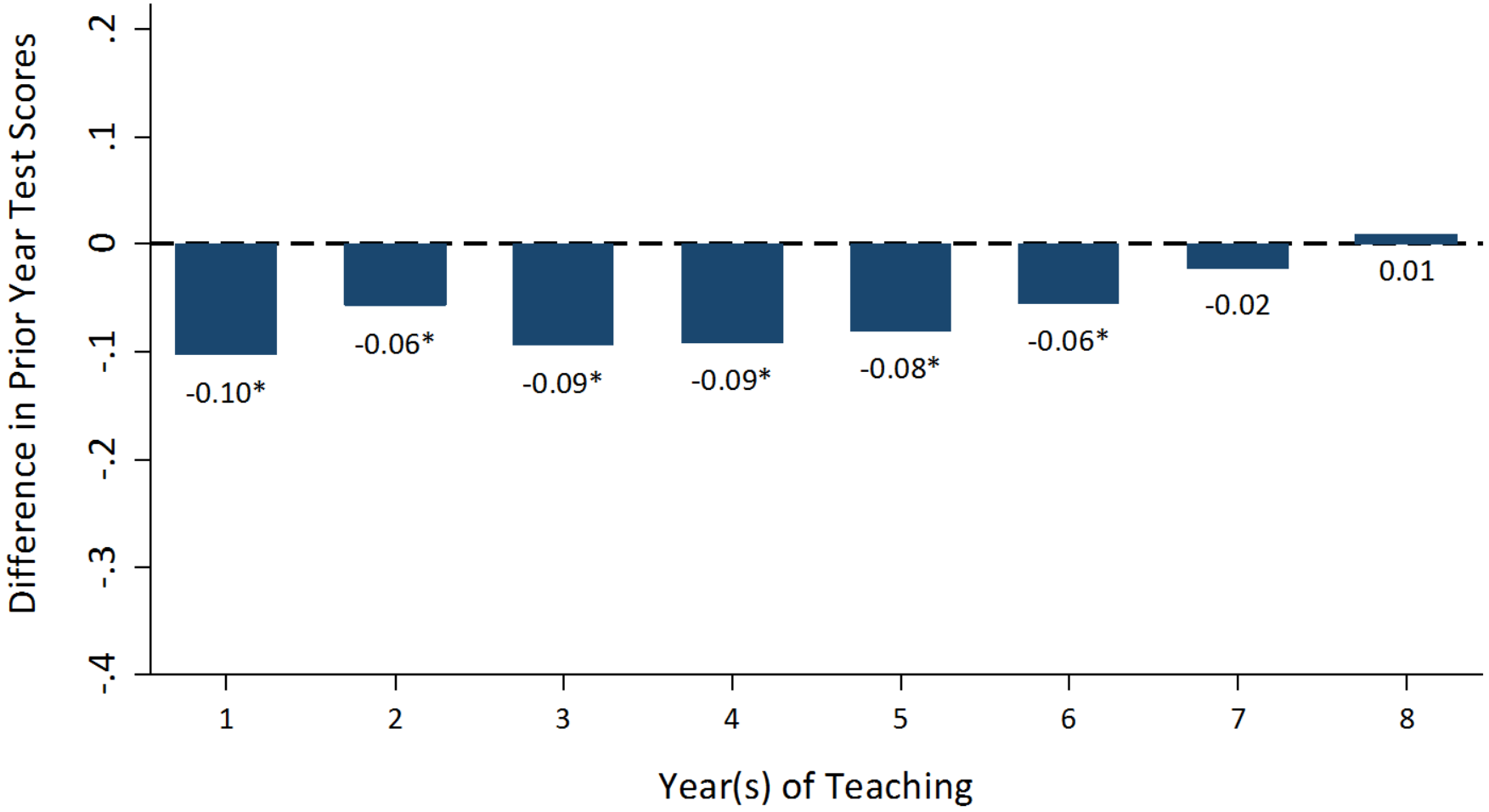
Difference in Average Prior Math Performance of Students Assigned to Early-Career Teachers Compared to Teachers with 9 or More Years of Teaching

Within Elementary and Middle Schools



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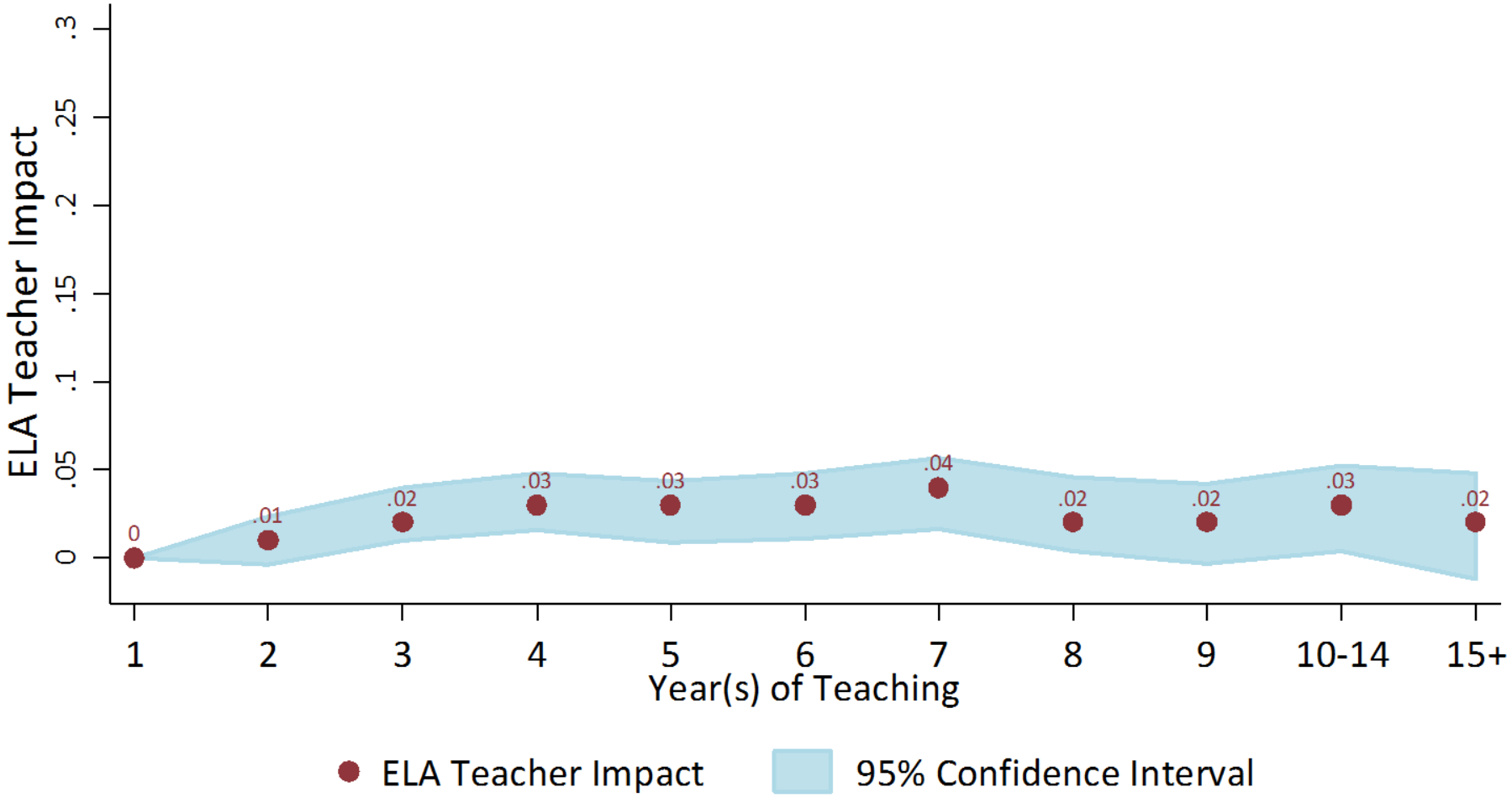
DEVELOPMENT

Comparing Effect Sizes

Comparable	Size
National Black-White achievement gap	1 standard deviation
Gap between FRPL and non-FRPL 8th grade math NAEP scores in 2002	0.8 standard deviations
One year of student growth in math on six nationally normed tests	0.4 standard deviations
Impact of drastic class-size reduction in Tennessee (from 25 to 15 students)	0.2 standard deviations
Impact of Success for All reading intervention	0.2 standard deviations

ELA Teacher Impact Compared to First Year of Teaching

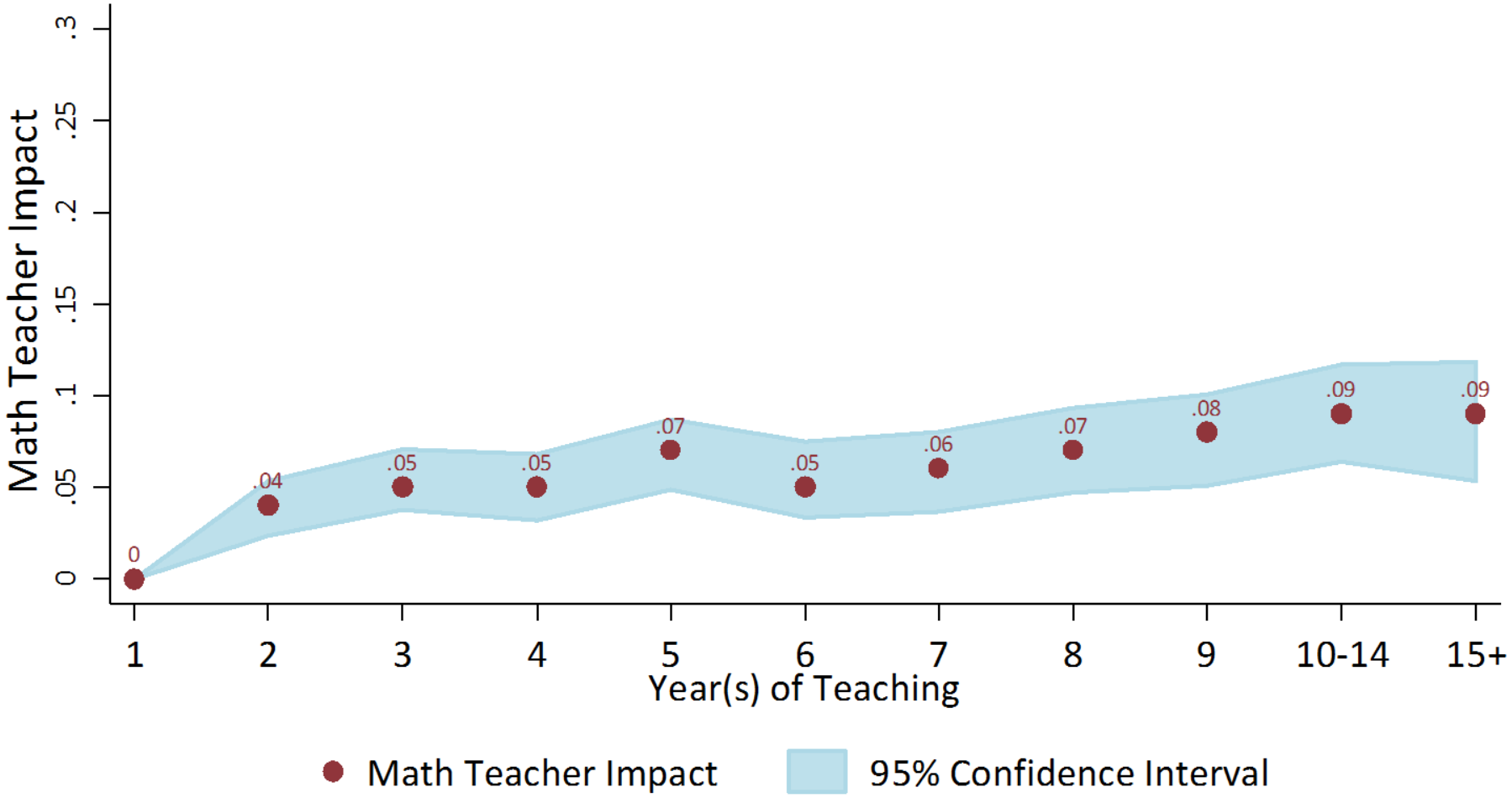
Elementary and Middle Schools



Note. Sample includes comprehensive and magnet school teachers in the 2007-08 through 2015-16 school years with teacher job codes and teacher impact estimates who are linked to 4th through 8th grade students, with 9,181 teacher years and 2,999 unique teachers. Teacher impacts on student test scores are average within-teacher gains compared to novice teachers. All data are from Wake County Public School records.

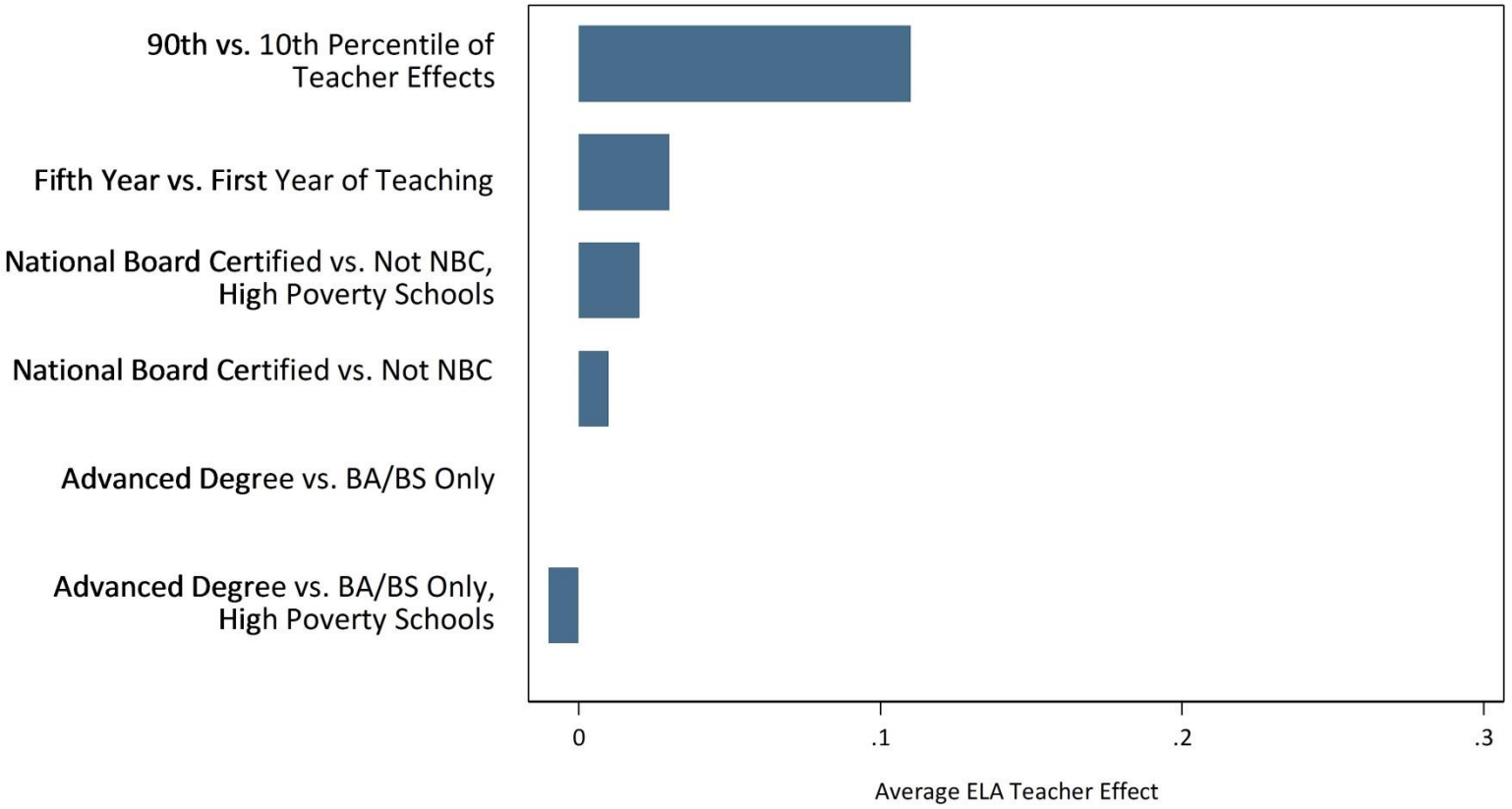
Math Teacher Impact Compared to First Year of Teaching

Elementary and Middle Schools

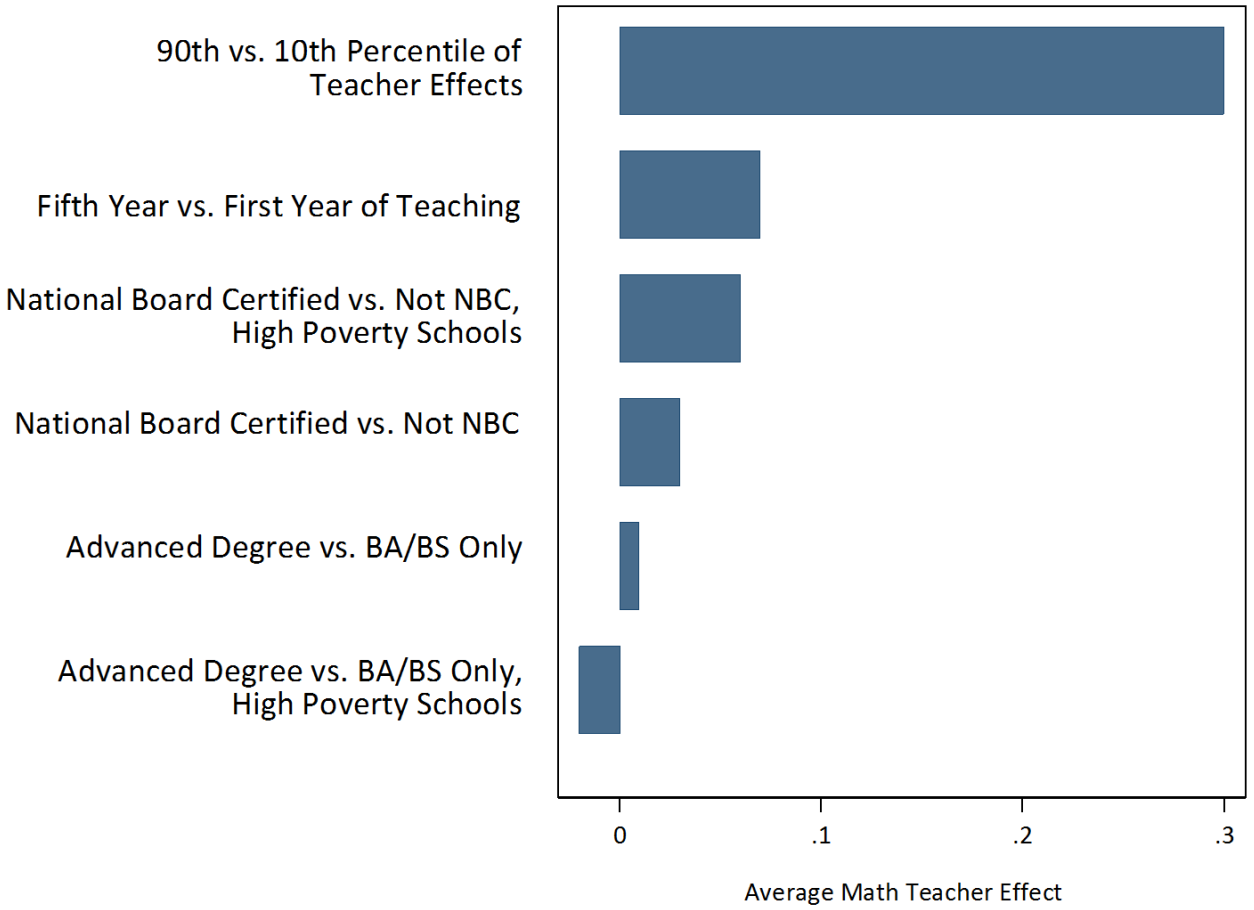


Note. Sample includes comprehensive and magnet school teachers in the 2007-08 through 2015-16 school years with teacher job codes and teacher impact estimates who are linked to 4th through 8th grade students, with 9,366 teacher years and 2,988 unique teachers. Teacher impacts on student test scores are average within-teacher gains compared to novice teachers. All data are from Wake County Public School records.

ELA Teacher Impacts of Teachers with National Board Certification or Advanced Degree

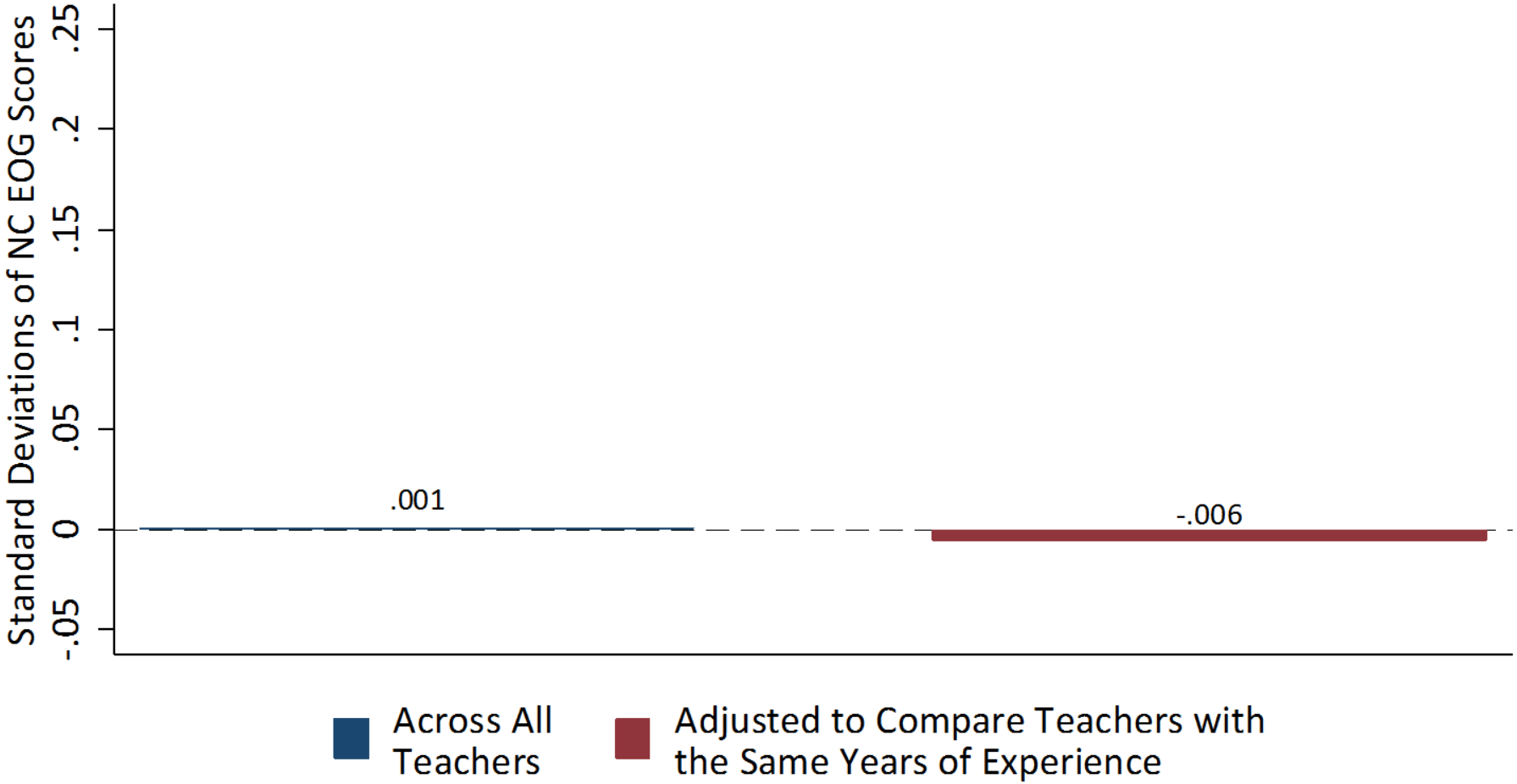


Math Teacher Impacts of Teachers with National Board Certification or Advanced Degree



Differences in English/Language Arts Teacher Impact

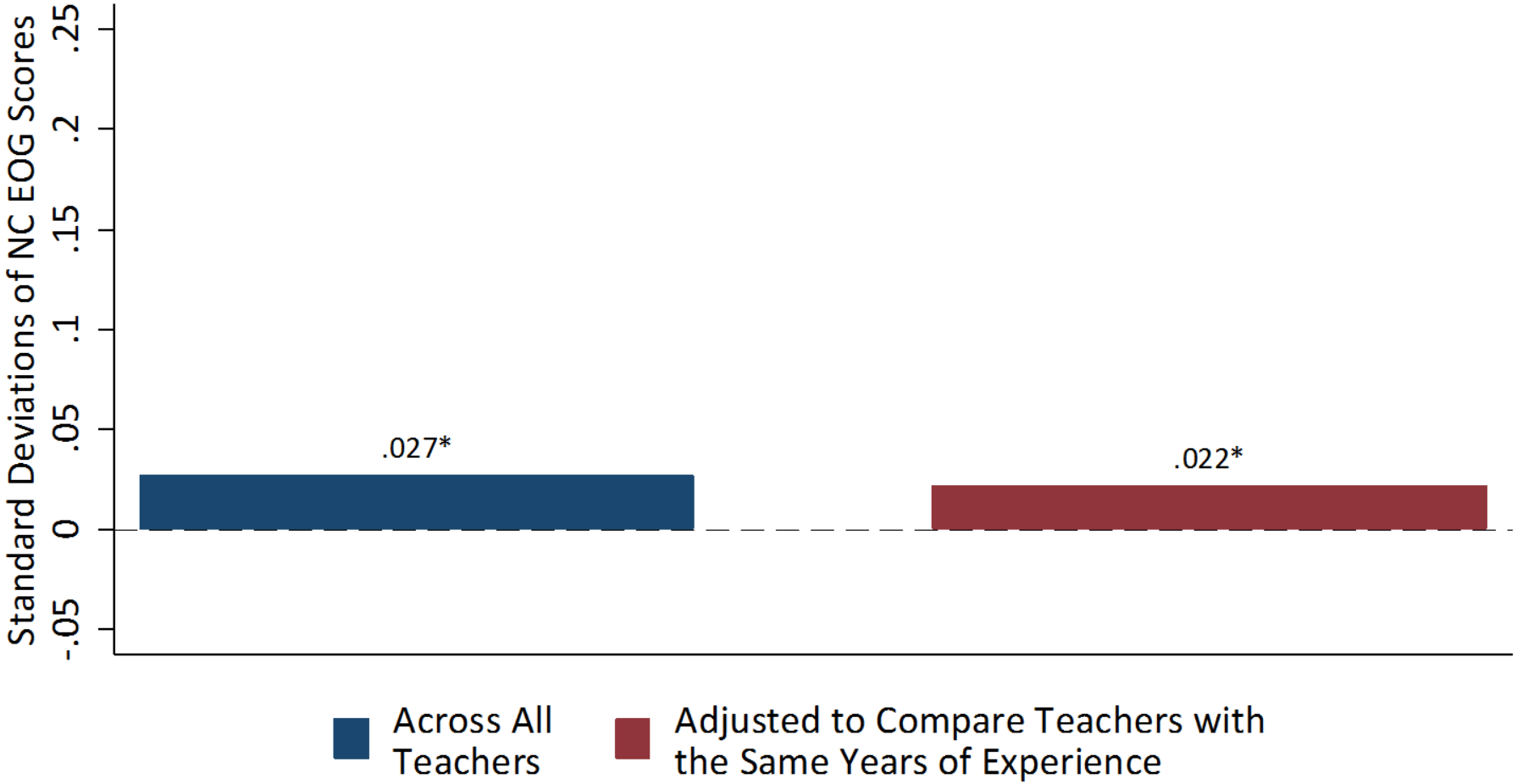
for Teachers with Advanced Degrees and National Board Certification



Notes: Sample includes teachers with teacher job codes and teacher effects estimates who are linked to students in schools in the 2007-08 to 2015-16 school years, with 9181 teacher years and 2999 unique teachers. Teachers are included for whom National Board Certification can be observed. All data are from Wake County Public Schools administrative records.

Differences in Math Teacher Impact

for Teachers with Advanced Degrees and National Board Certification



Notes: Sample includes teachers with teacher job codes and teacher effects estimates who are linked to students in schools in the 2007-08 to 2015-16 school years, with 9366 teacher years and 2988 unique teachers. Teachers are included for whom National Board Certification can be observed. All data are from Wake County Public Schools administrative records.


HUMAN CAPITAL DIAGNOSTIC PATHWAY
RECRUITMENT
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DEVELOPMENT
EVALUATION
RETENTION/ TURNOVER

EVALUATION

SDP Teacher Effectiveness Estimation Conceptual Overview

What is Value-Added?

Value-added modeling (VAM) is one quantitative method used to estimate a teacher's influence on raising student achievement from one year to the next.

How Does it Work?

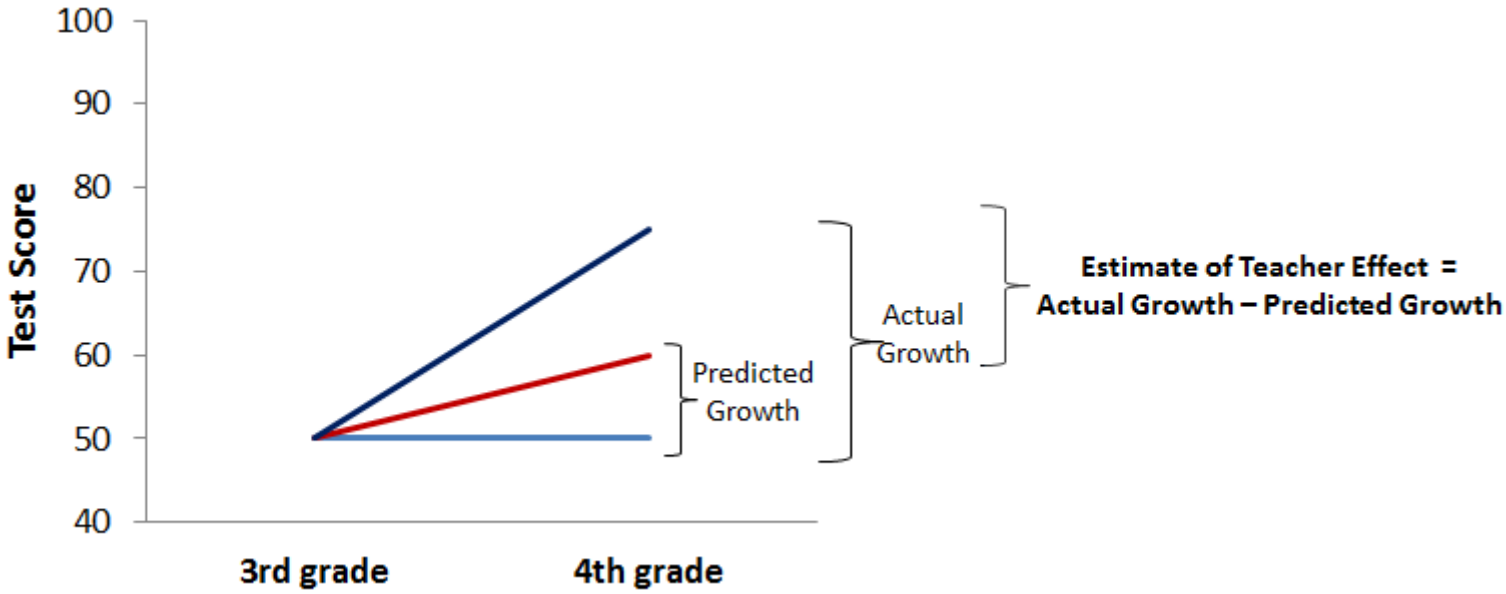
We measure student achievement growth and isolate the portion of growth attributable to a student's primary teacher (as opposed to other factors such as parents, supplemental resources, and students' peers).

Conceptual Steps to Calculating Value-Added

Step 1: Calculate actual test score growth for a teacher's students.

Step 2: Predict how much growth is expected of each student, taking into account factors beyond the teacher's control (i.e. student's prior achievement and demographic characteristics).

Step 3: Calculate the difference between actual and predicted growth for each student. This difference is a teacher's estimated contribution to raising each student's achievement. The average difference across a teacher's students is our



Variables Included in SDP's Diagnostic Model

- **Student Prior Achievement**
  - Prior year math and reading scores
- **Student Demographics and Program Participation**
  - Gender, race/ethnicity, English Language Learner status, middle school math and ELA supplemental/enrichment classes, special education designation, retained-in-grade indicator, free and reduced lunch indicators, new-to-school indicator
- **Class-Level ("Peer") Effects**
  - Percentages / means of all student demographic and program variables
  - Average math and reading prior year scores of students in the same class
- **Within-School Year and Grade-Level ("Cohort") Effects**
  - Same variables as peer effects, but for school and grade-level

Students & Teachers Included in Teacher Effect Estimates

Which Teachers are Included?

- Must be linked to 4th through 8th grade students with at least 5 students per class
- Teaching a core course in math or English/Language Arts (e.g. no supplemental or special education courses) at a regular school
- In at least one of the school years from 2007-08 to 2015-16

Which Students are Included?

- Must have a state standardized test score in either Math or English/Language Arts in the current school year and a state standardized test score in either Math or English/Language Arts in the prior school year
- Must not have more than one teacher for a core class

Limitations of Value-Added Measures of Teacher Effectiveness

- **Based only on student performance on standardized tests**
  - Effective teachers do more than raise student test scores
  - Validity depends on the quality of the standardized test and its alignment with standards
- **Many students may have more than one math or ELA teacher**
- **Demonstrate effectiveness relative to other district teachers, not against an absolute standard**
  - Even if WCPSS had the most effective teachers in the country, some would be categorized as "least effective"
- **Differences in group averages require careful interpretation**
- **May be influenced by unobserved differences in student characteristics across classrooms and schools, or by instruction received outside of the classroom**

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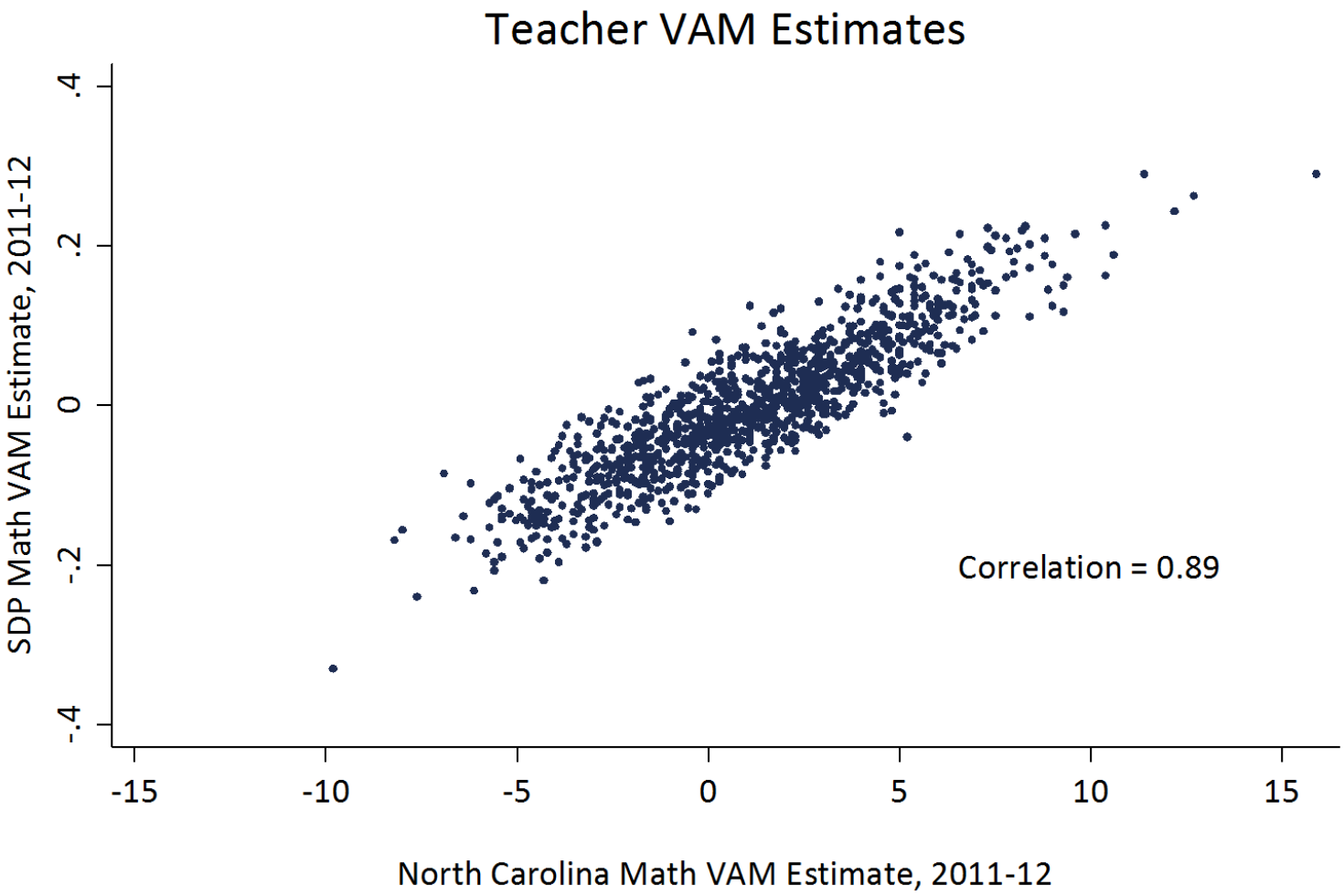
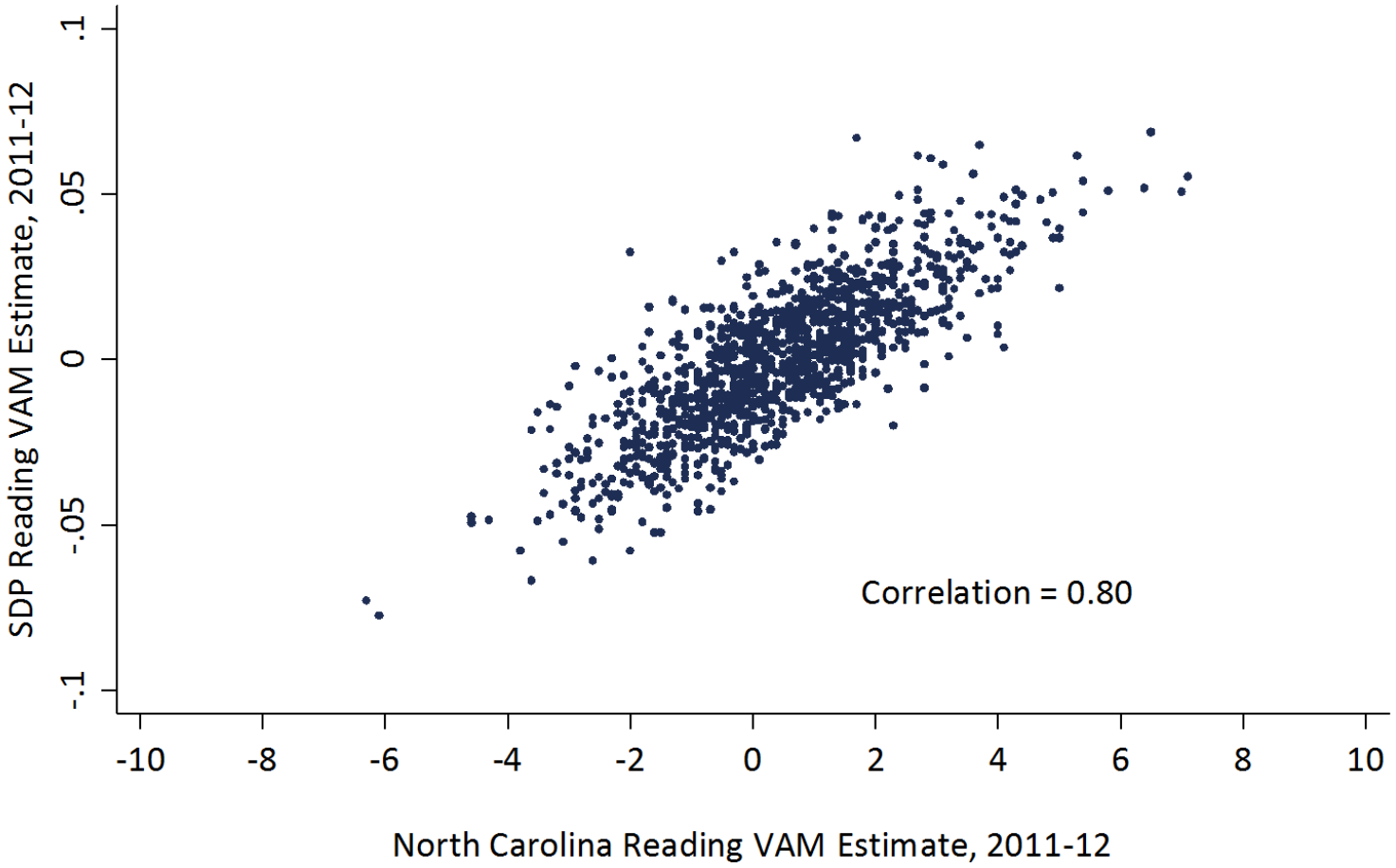


Notes: Sample includes 1,034 teachers in 2011-12 with one NC Math VAM estimate and a SDP Math VAM estimate.
All data are from Wake County Public Schools records.

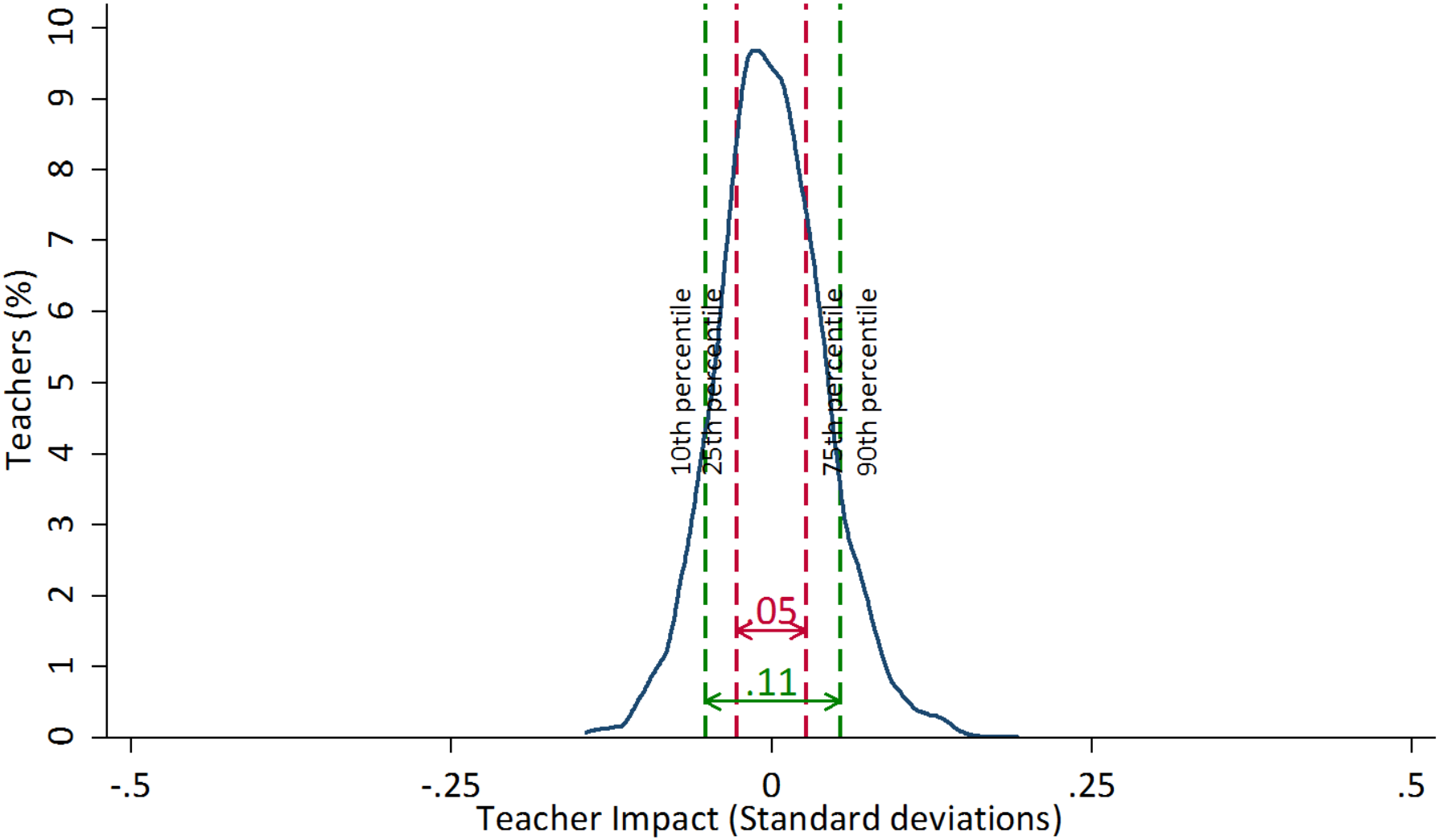
Teacher VAM Estimates



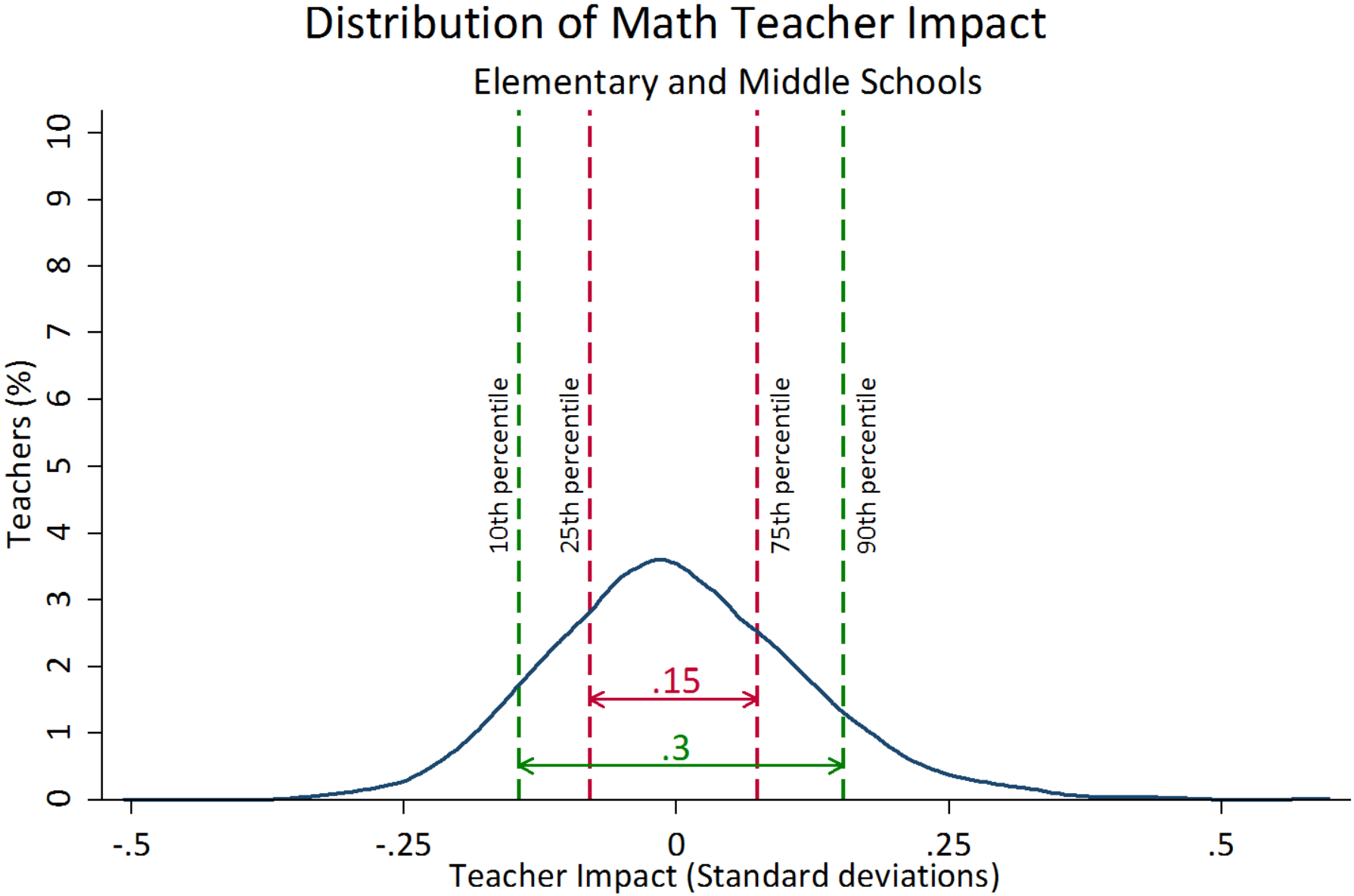
Notes: Sample includes 1,192 teachers in 2011-12 with one NC Math VAM estimate and a SDP Math VAM estimate.
All data are from Wake County Public Schools records.

Distribution of English/Language Arts Teacher Impact

Elementary and Middle Schools



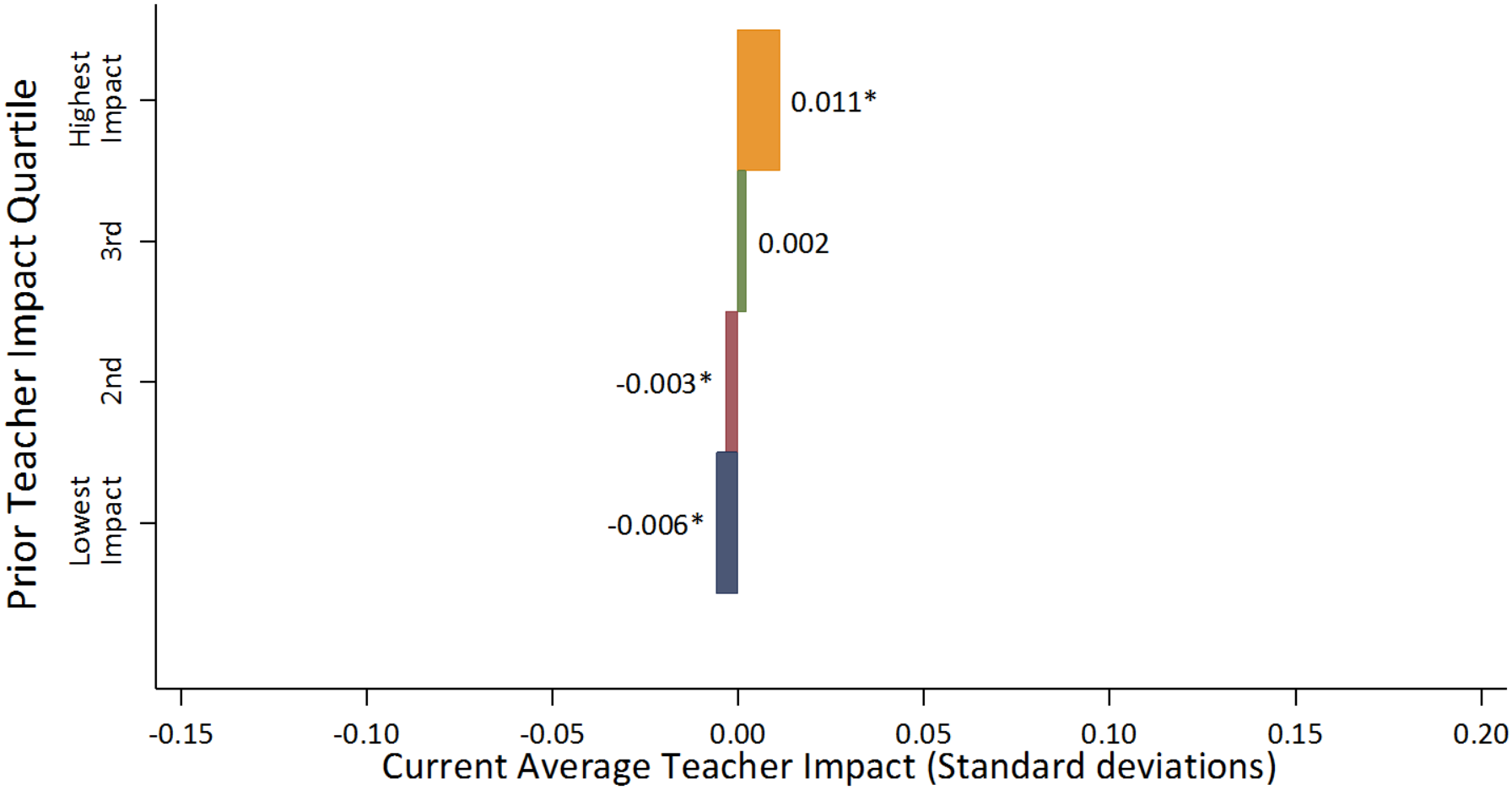
Note. Sample includes 2995 comprehensive and magnet school teachers with teacher job codes and math students in grades 4 through 8 in school years 2007-08 to 2015-16. All data are from Wake County Public Schools records.



Note. Sample includes 2,986 comprehensive and magnet school teachers with teacher job codes and math students in grades 4 through 8 in school years 2007-08 to 2015-16. All data are from Wake County Public Schools records.

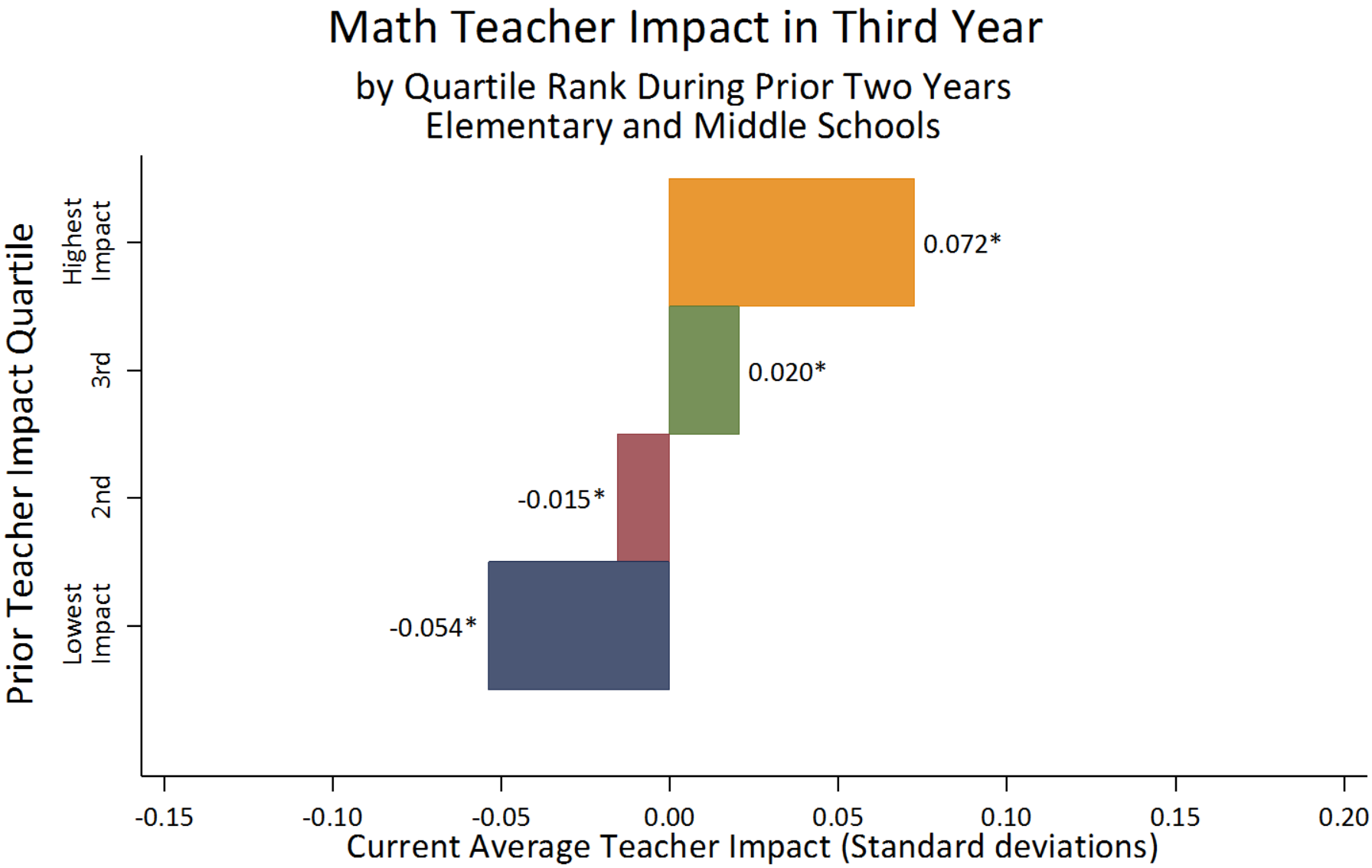
ELA Teacher Impact in Third Year

by Quartile Rank During Prior Two Years
Elementary and Middle Schools



*Significantly different from zero at the 95 percent confidence level.

Note. Sample includes comprehensive and magnet school math teachers with teacher job codes and students in grades 4 through 8 with prior year test scores in the 2007-08 through 2015-16 school years, with 1239 teachers. All data are from Wake County Public Schools records.

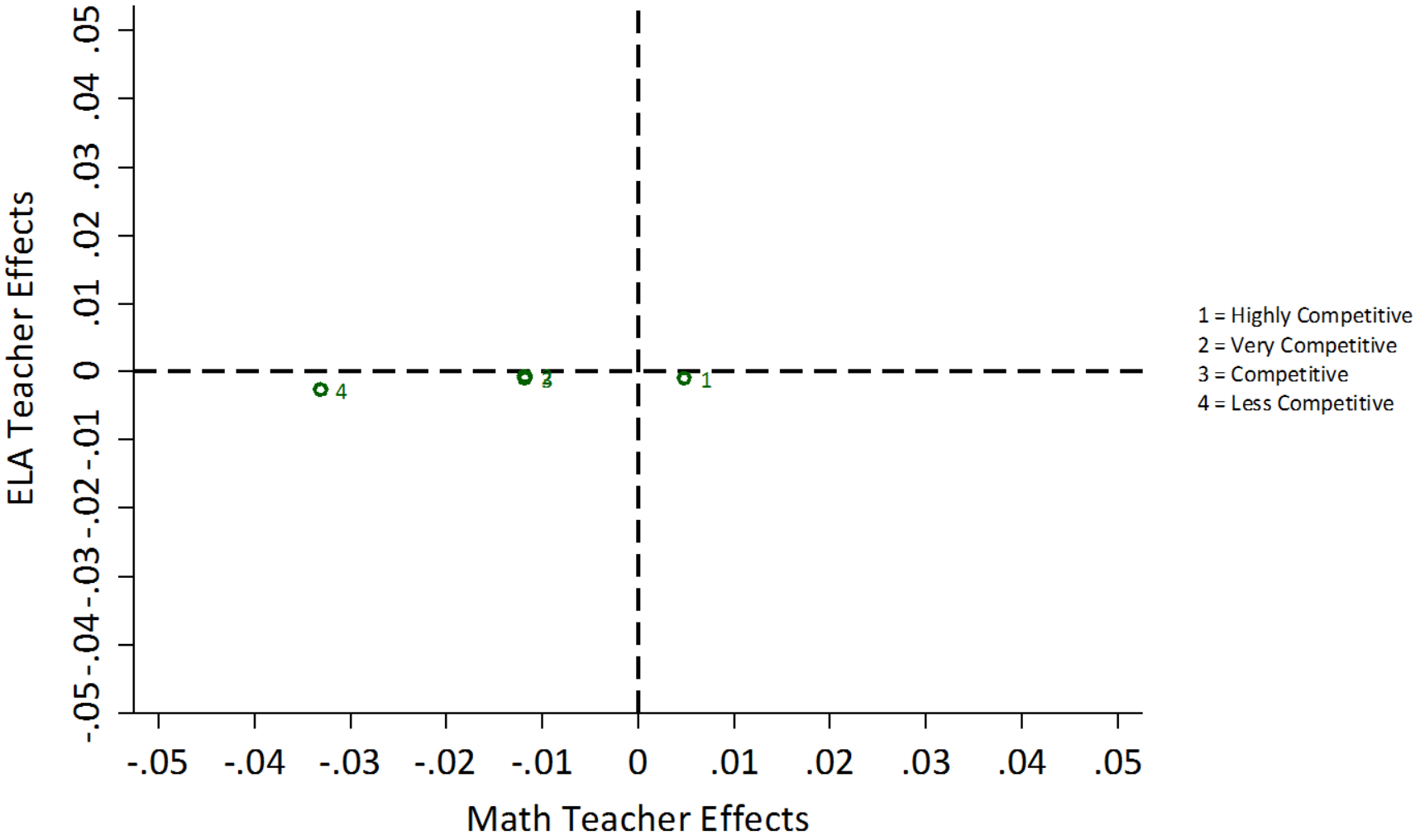


*Significantly different from zero at the 95 percent confidence level.

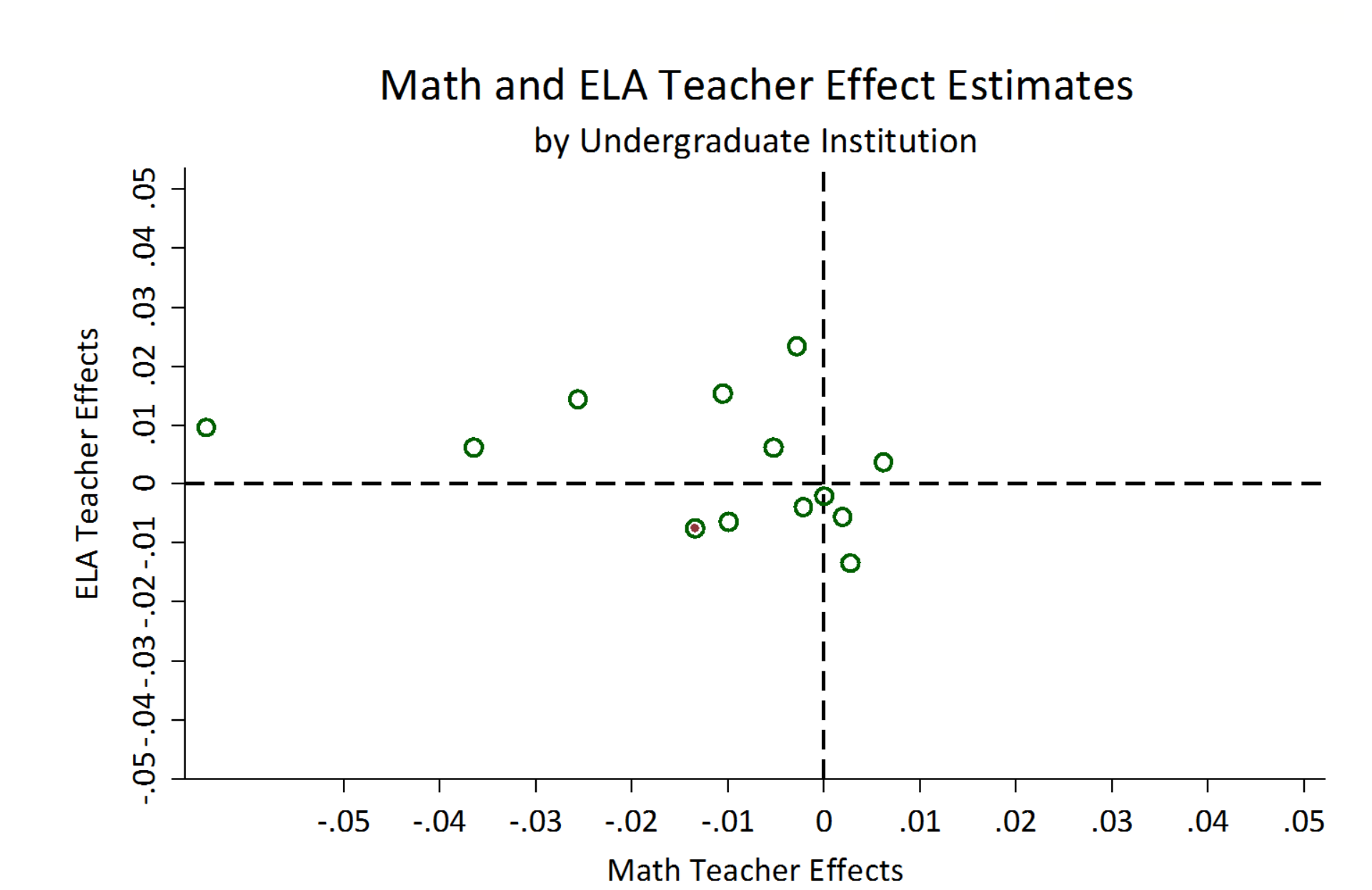
Note. Sample includes comprehensive and magnet school math teachers with teacher job codes and students in grades 4 through 8 with prior year test scores in the 2007-08 through 2015-16 school years, with 1257 teachers. All data are from Wake County Public Schools records.

Math and ELA Teacher Effect Estimates

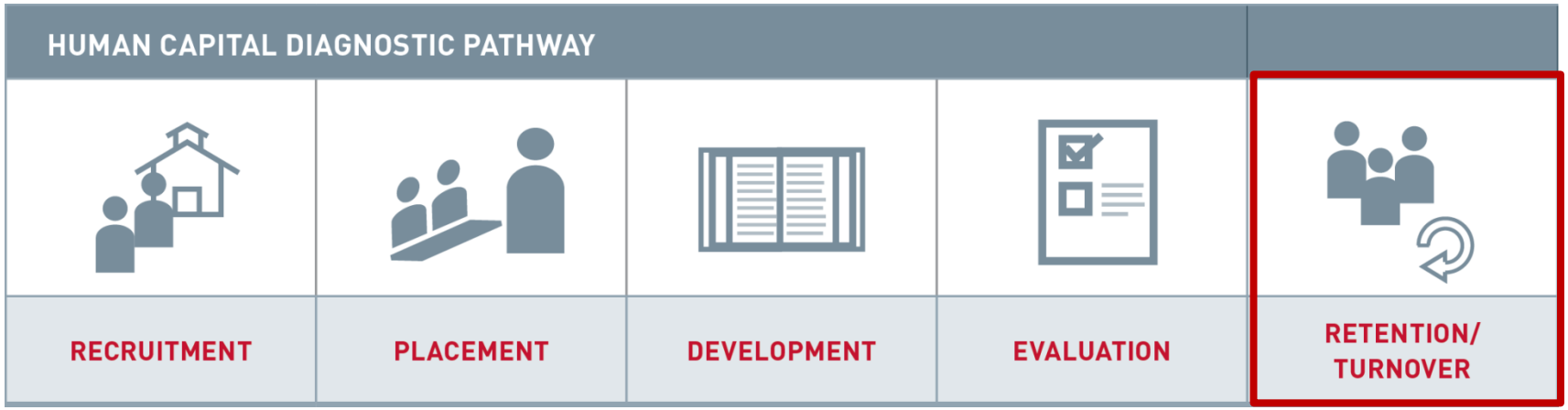
by Barron's Category



Notes: Sample includes teachers with teacher job codes at comprehensive, vocational, and magnet schools in the 2007-08 through 2015-16 school years, with 2,449 unique math teachers and 2,479 unique ELA teachers.
All data are from Wake County Public Schools administrative records.

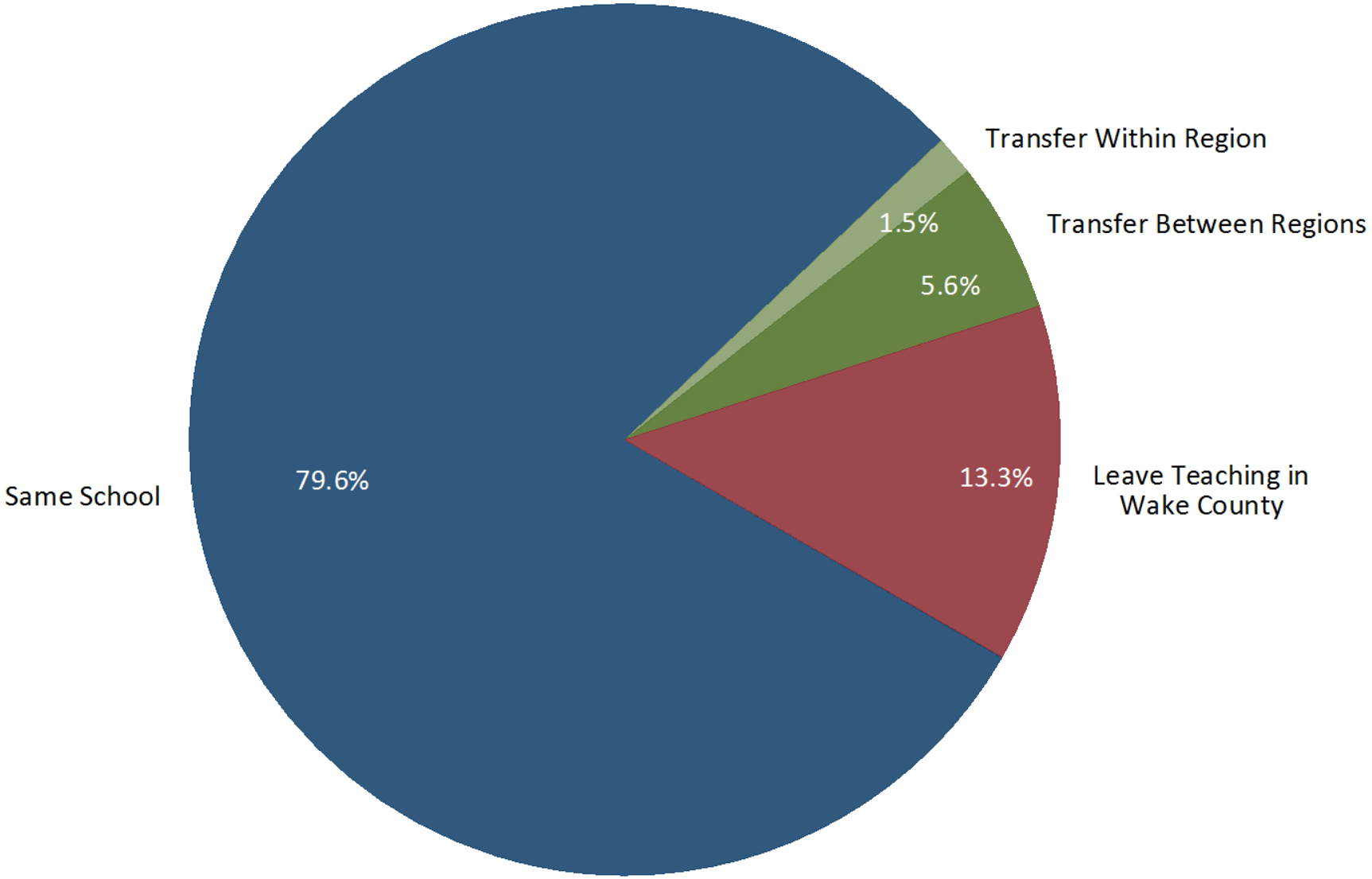


Notes: Sample includes teachers with teacher job codes at comprehensive, vocational, and magnet schools in the 2007-08 through 2015-16 school years, with 2,507 unique math teachers and 2,535 unique ELA teachers.
All data are from Wake County Public Schools administrative records.



RETENTION/TURNOVER

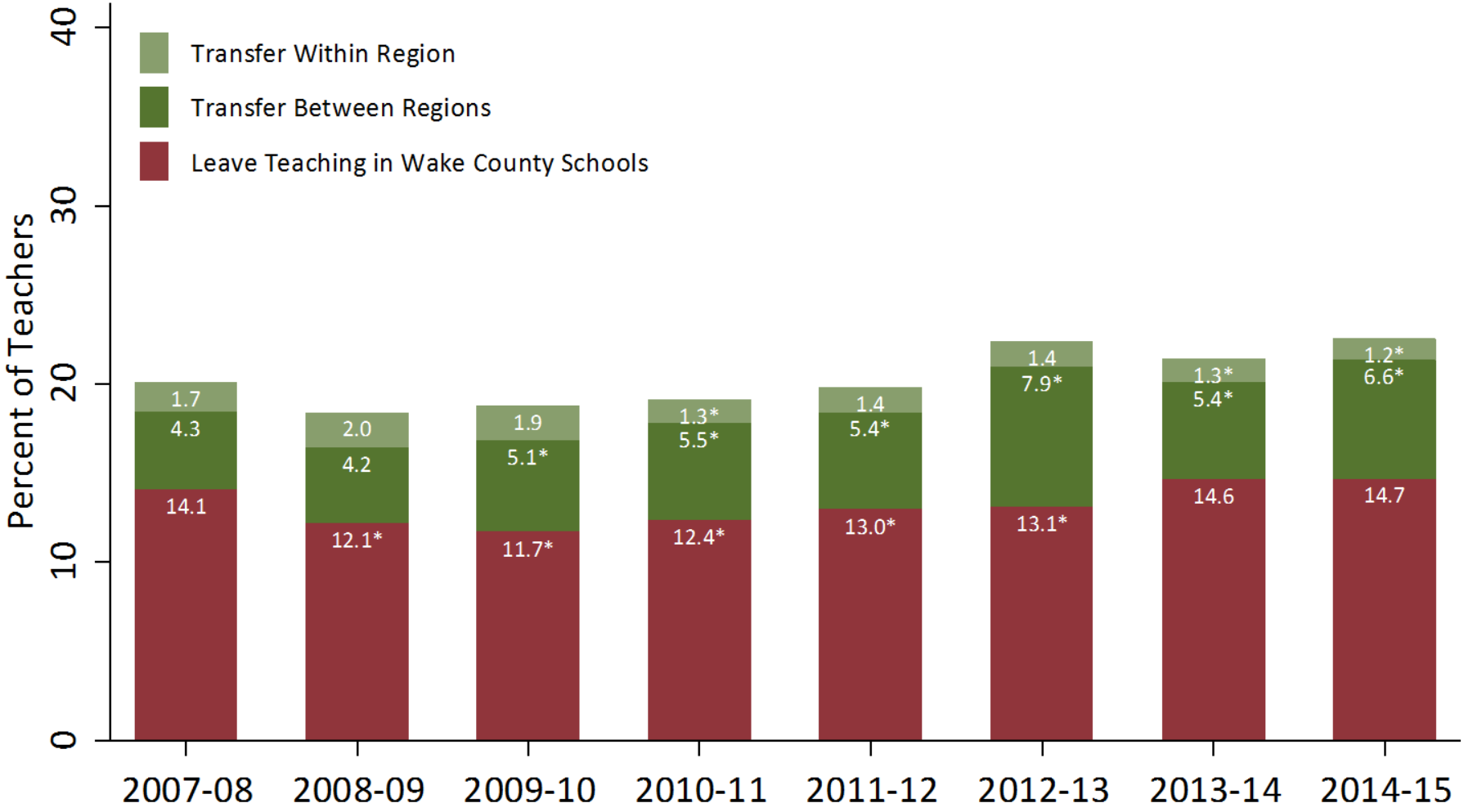
Average Teacher Retention



Notes: Sample includes teachers with teacher job codes in comprehensive, vocational, and magnet schools, with 77,027 teacher years and 17,615 unique teachers in the 2007-08 to 2014-15 school years. Retention analysis are based on one-year retention rates.
All data are from Wake County Public School System's records.

Average Teacher Turnover

by School Year



*Significantly different from 2007-08 value, at the 95 percent confidence level.
Notes: Sample includes teachers with teacher job codes in comprehensive, vocational, and magnet schools, with 77,027 teacher years and 17,615 unique teachers in the 2007-08 to 2014-15 school years. Retention analysis is based on one-year retention rates.
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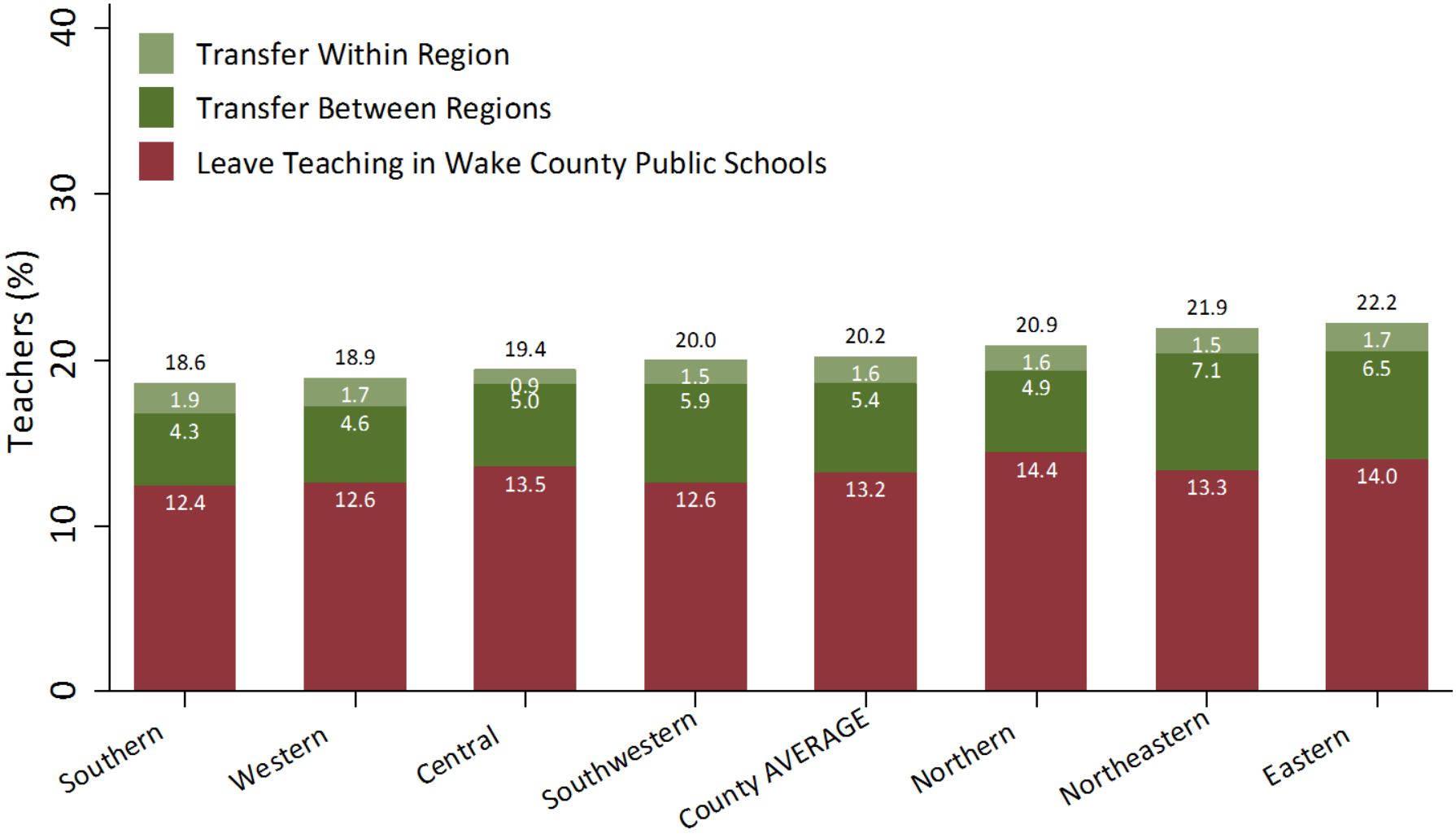
Average Teacher Turnover

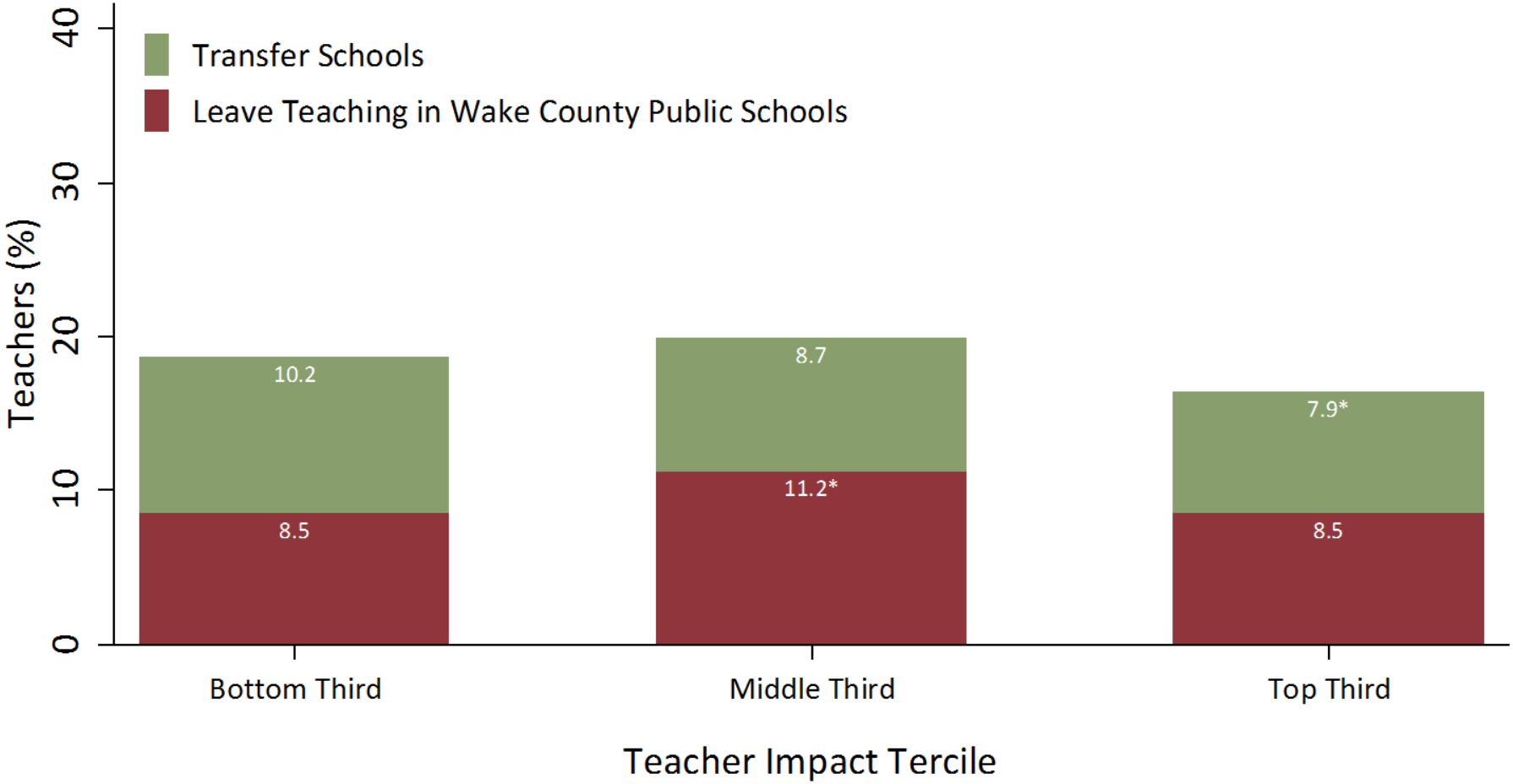
by School Region



Notes: Sample includes comprehensive, vocational and magnet school teachers with teacher job codes in the 2007-08 through 2014-15 school years, with 74,607 teacher years and 17,192 unique teachers in Wake County. All data are from Wake County Public Schools records.

Average Turnover for Experienced Elementary ELA Teachers

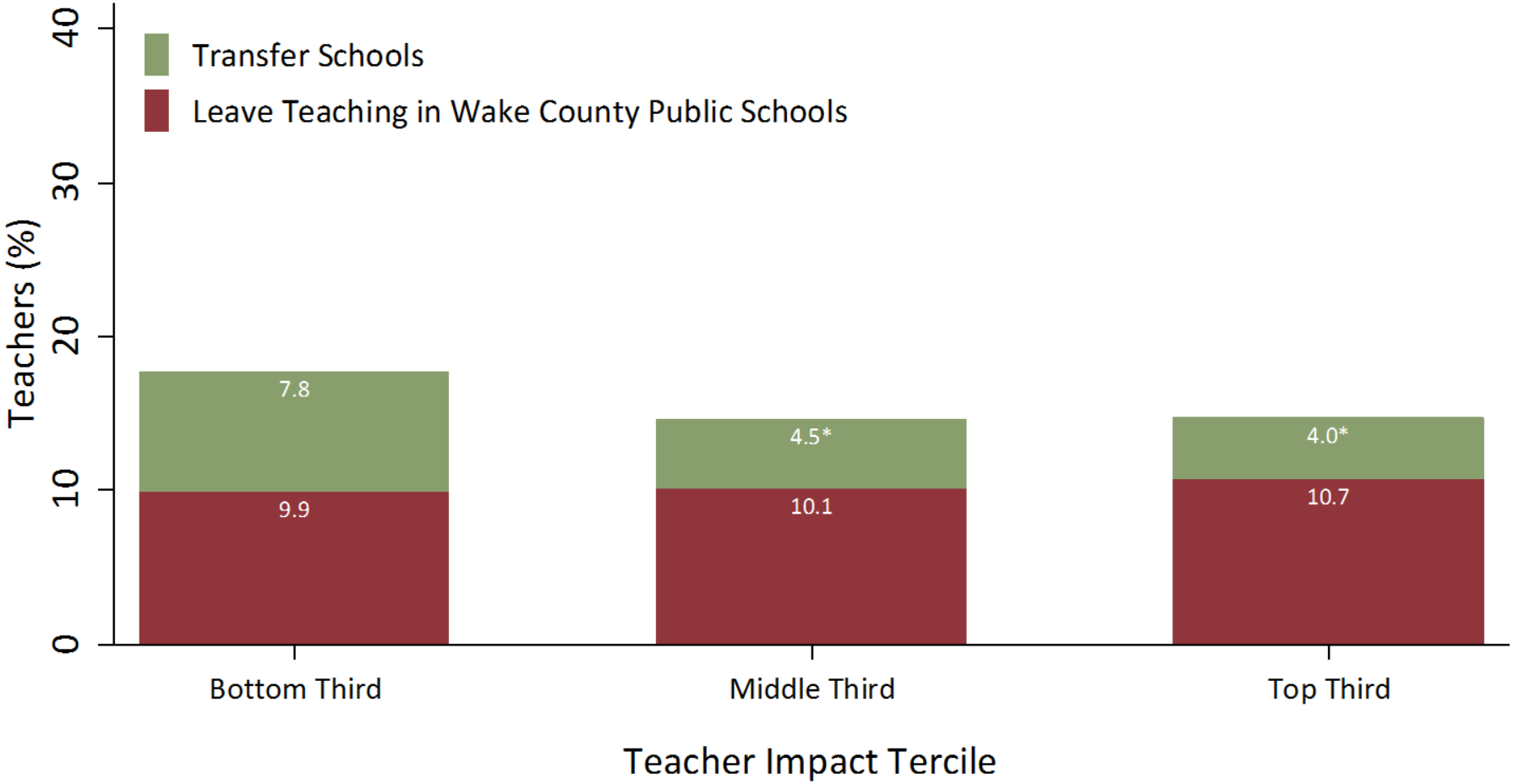
by Teacher Impact on Student Achievement



*Significantly different from bottom tercile value, at the 95 percent confidence level.
Notes: Sample includes ELA teachers with teacher impact estimates, teacher job codes, and at least three years of teaching experience who are linked to 4th and 5th grade ELA students in comprehensive and magnet schools, with 4380 teacher years and 1552 unique teachers in the 2007-08 to 2014-15 school years. Retention analysis is based on one-year retention rates. Teacher impact terciles are calculated using two years of teacher and student data, unless only one year is available. All data are from Wake County Public School records.

Average Turnover for Experienced Middle School ELA Teachers

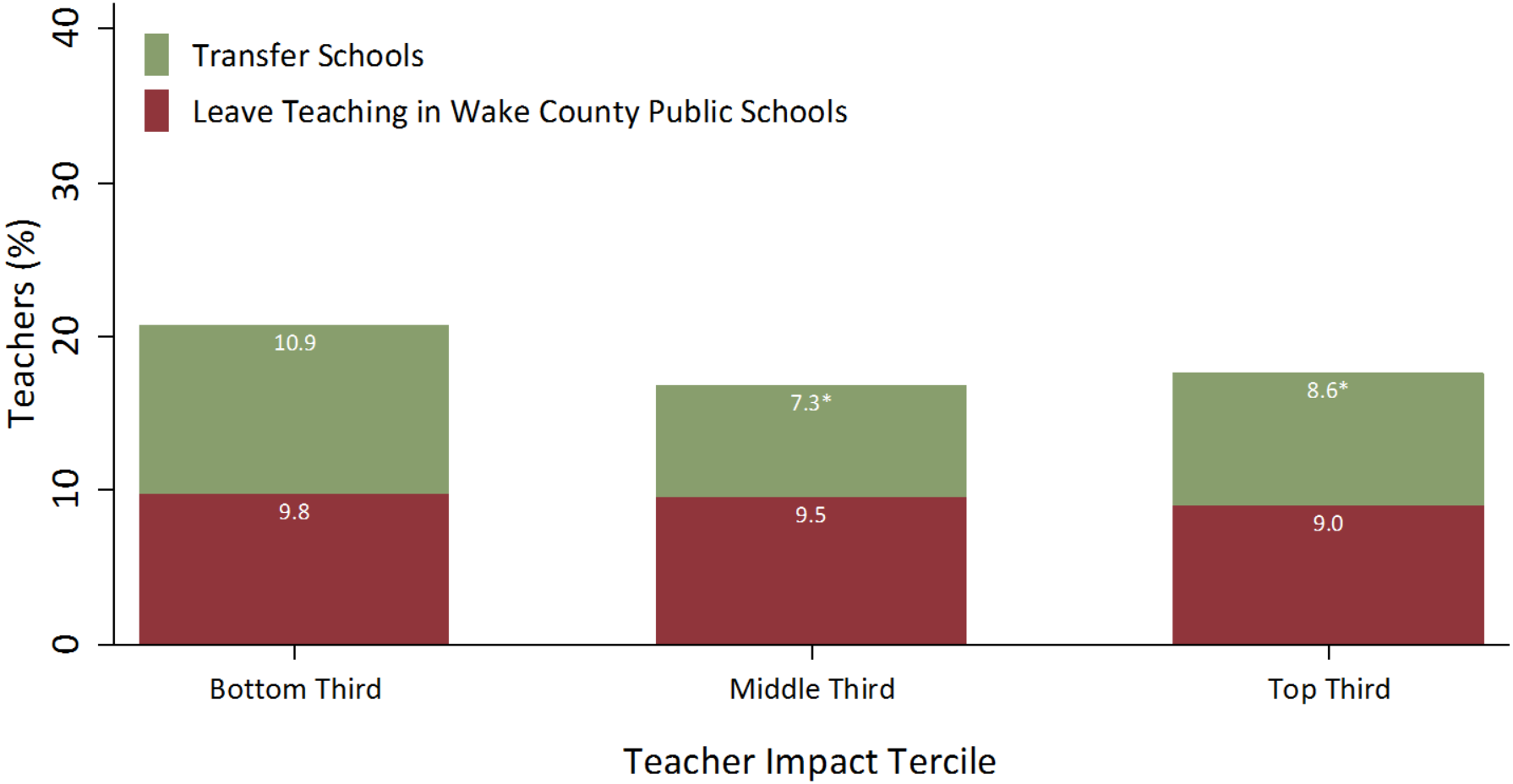
by Teacher Impact on Student Achievement



*Significantly different from bottom tercile value, at the 95 percent confidence level.
Notes: Sample includes ELA teachers with teacher impact estimates, teacher job codes, and at least three years of teaching experience who are linked to 6th-8th grade ELA students in comprehensive, magnet and vocational schools, with 1659 teacher years and 570 unique teachers in the 2007-08 to 2014-15 school years. Retention analysis is based on one-year retention rates. Teacher impact terciles are calculated using two years of teacher and student data, unless only one year is available. All data are from Wake County Public School records.

Average Turnover for Experienced Elementary Math Teachers

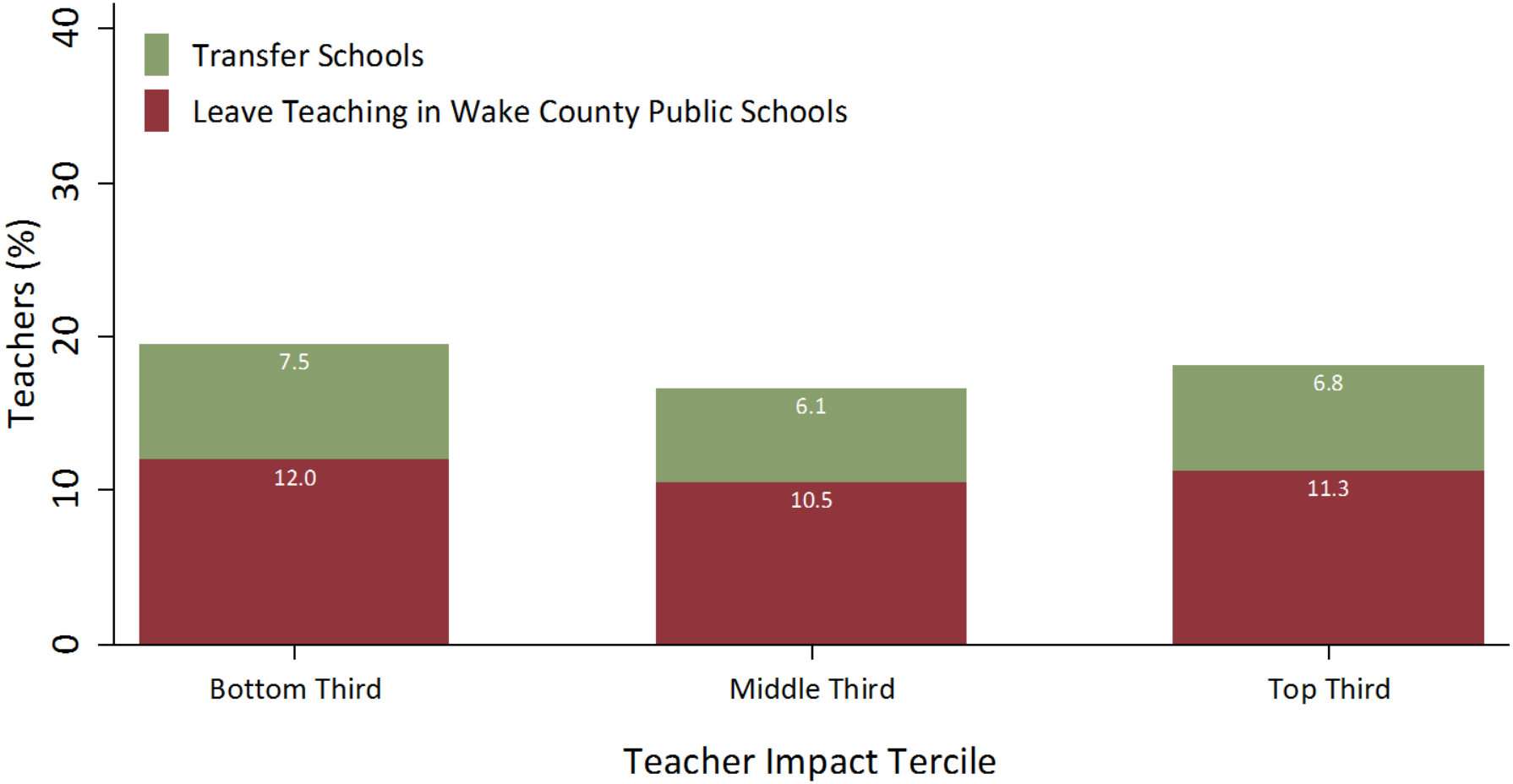
by Teacher Impact on Student Achievement



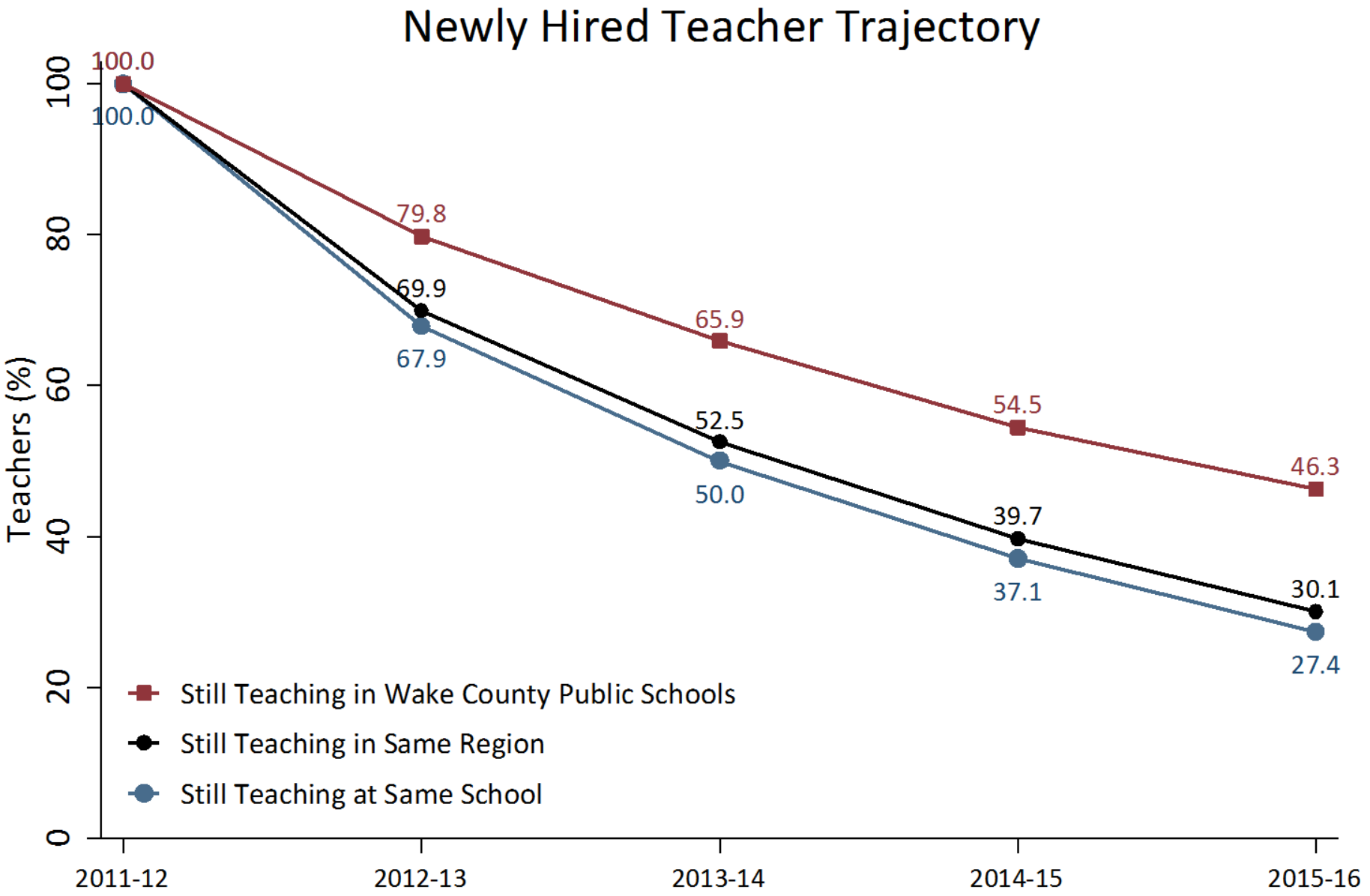
*Significantly different from bottom tercile value, at the 95 percent confidence level.
Notes: Sample includes Math teachers with teacher impact estimates, teacher job codes, and at least three years of teaching experience who are linked to 4th and 5th grade Math students in comprehensive and magnet schools, with 4451 teacher years and 1561 unique teachers in the 2007-08 to 2014-15 school years. Retention analysis is based on one-year retention rates. Teacher impact terciles are calculated using two years of teacher and student data, unless only one year is available. All data are from Wake County Public School records.

Average Turnover for Experienced Middle School Math Teachers

by Teacher Impact on Student Achievement



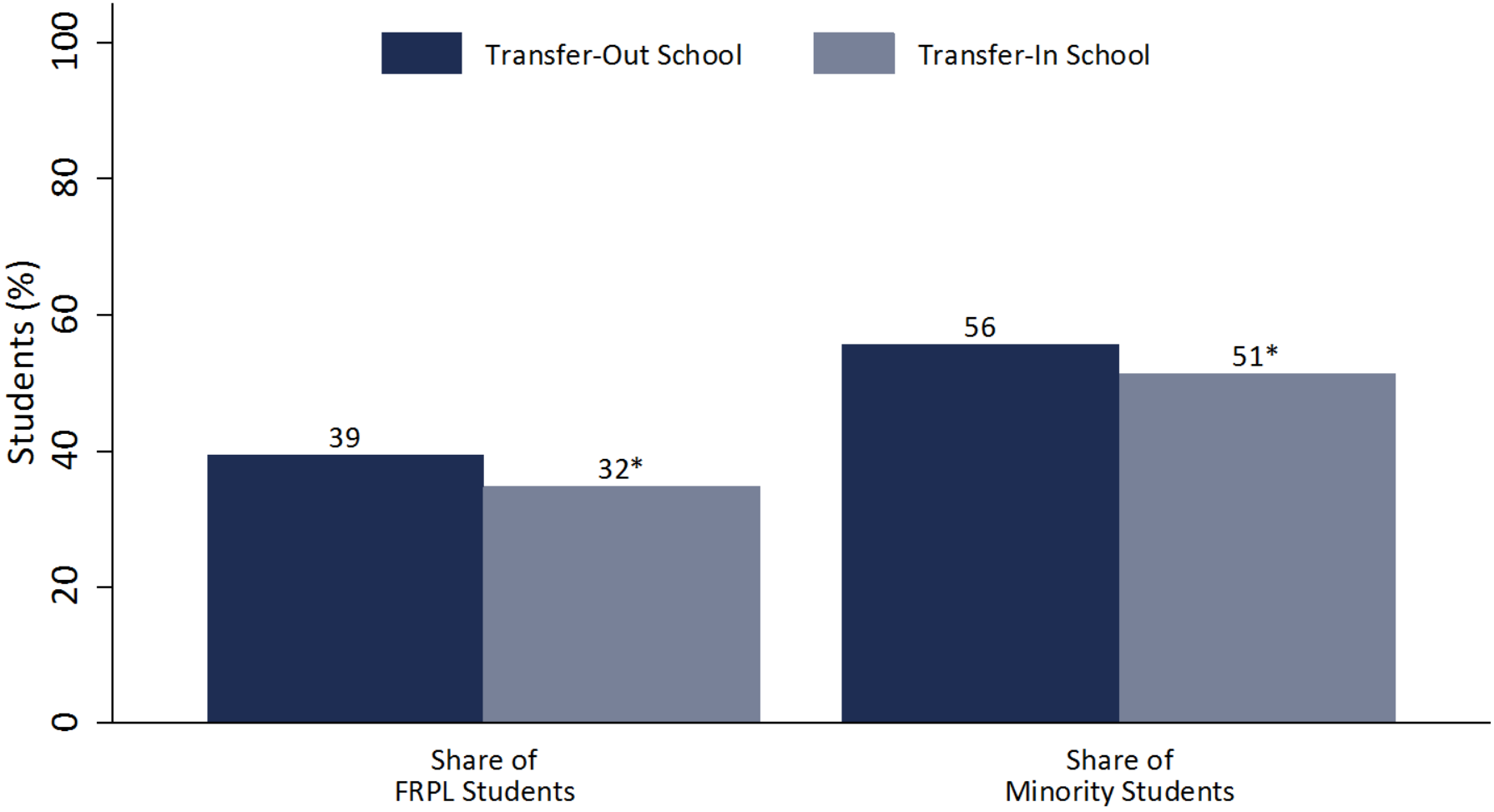
*Significantly different from bottom tercile value, at the 95 percent confidence level.
Notes: Sample includes Math teachers with teacher impact estimates, teacher job codes, and at least three years of teaching experience who are linked to 6th-8th grade Math students in comprehensive, magnet and vocational schools, with 1719 teacher years and 579 unique teachers in the 2007-08 to 2014-15 school years. Retention analysis is based on one-year retention rates. Teacher impact terciles are calculated using two years of teacher and student data, unless only one year is available. All data are from Wake County Public School records.



Notes: Sample includes 1,388 comprehensive, vocational, and magnet school teachers with teacher job codes in the 2011-12 school year.
All data are from Wake County Public Schools records.

Characteristics of Transfer-Out and Transfer-In Schools

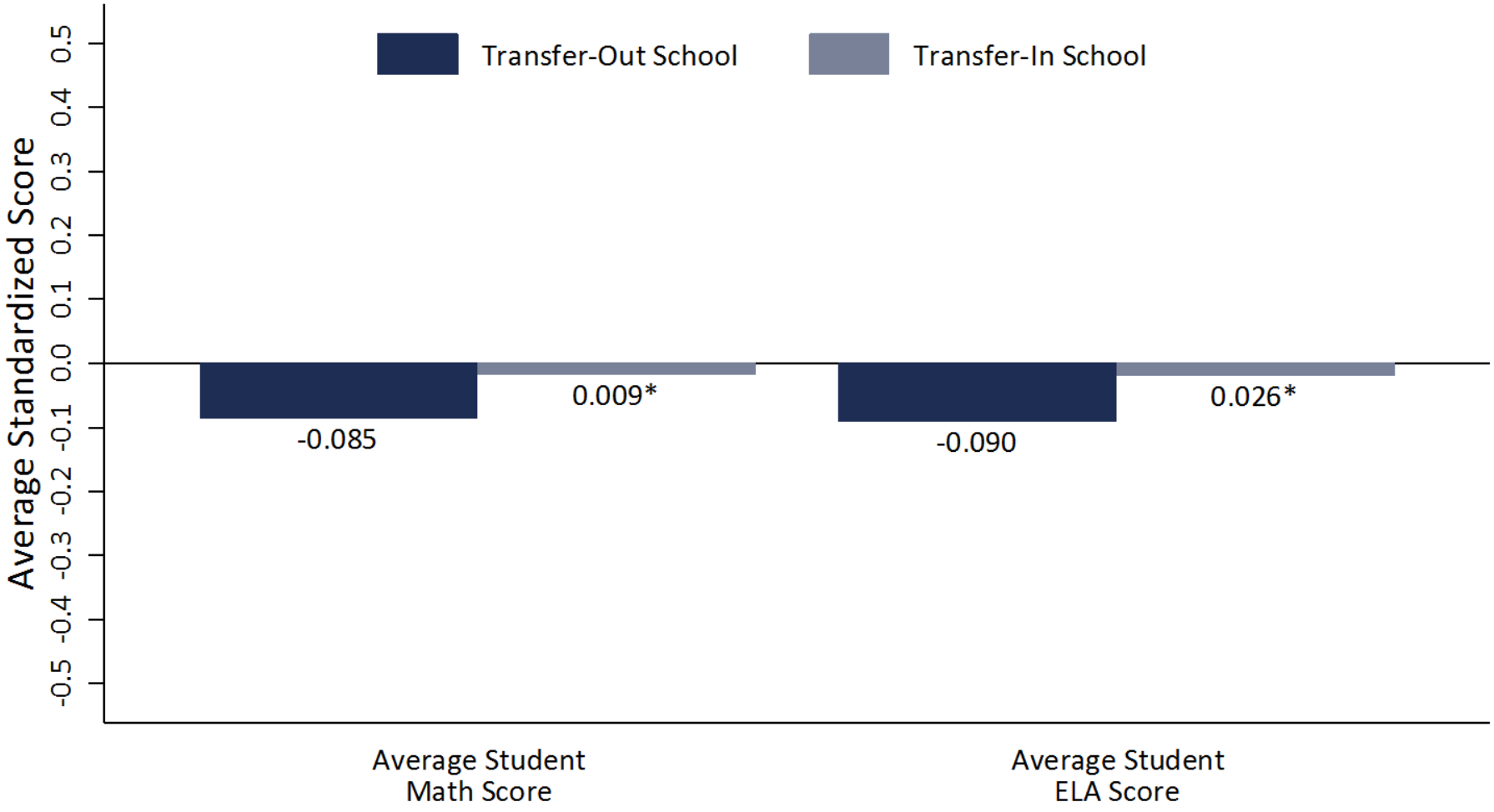
All Classroom Teachers



*Significantly different from Transfer-Out School value, at the 95 percent confidence level.
Notes: Sample includes teachers with teacher job codes in comprehensive, vocational, charter, and magnet schools, with 4,427 teacher years and 3,602 unique teachers in the 2009-10 through 2015-16 school years.
All data are from Wake County Public Schools administrative records.

Characteristics of Transfer-Out and Transfer-In Schools

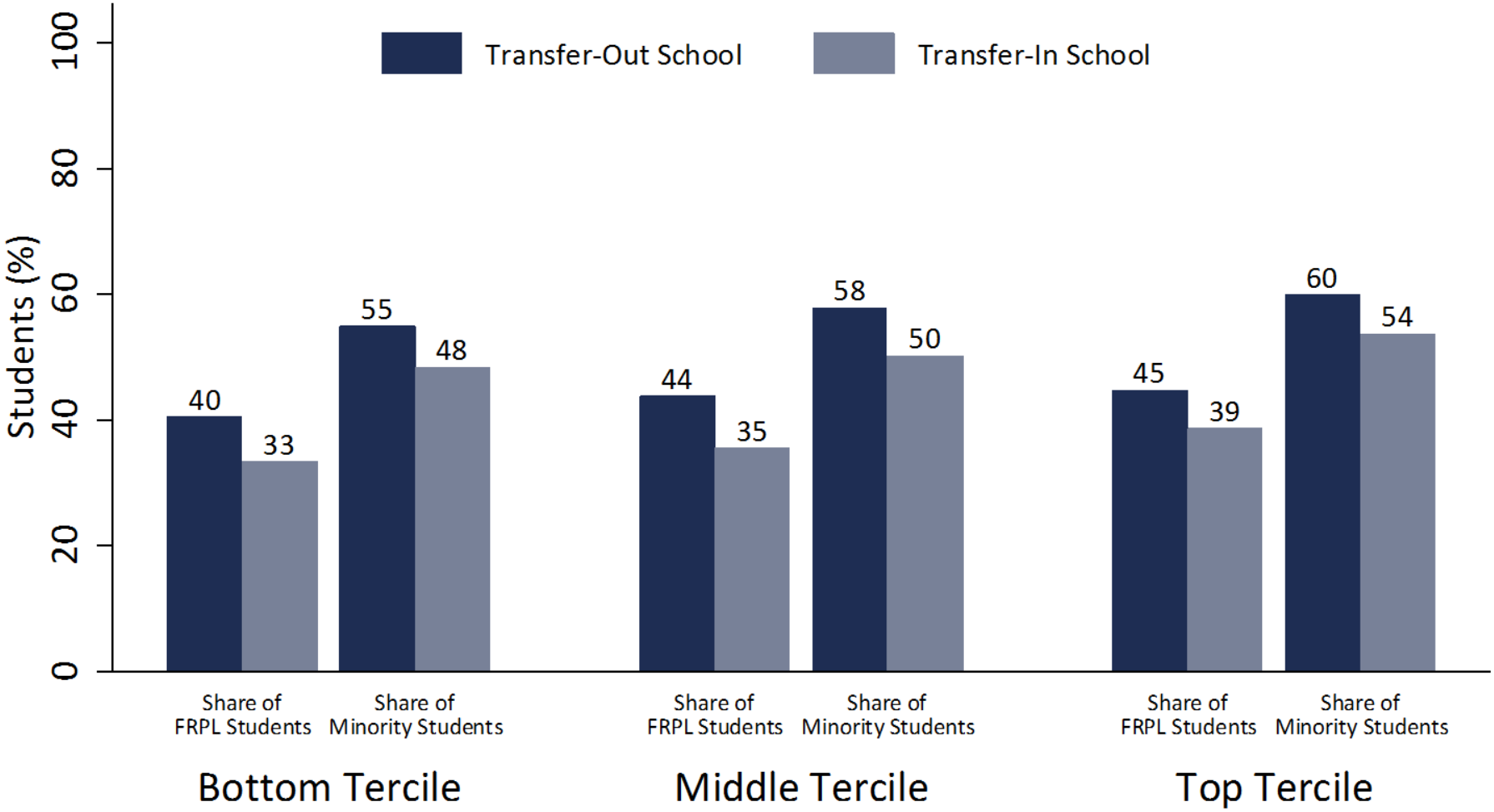
All Classroom Teachers



*Significantly different from Transfer-Out School value, at the 95 percent confidence level.
Notes: Sample includes teachers with teacher job codes in comprehensive, vocational, charter, and magnet schools, with 3,486 teacher years and 2,843 unique teachers in the 2009-10 through 2015-16 school years.
All data are from Wake County Public Schools administrative records.

Characteristics of Transfer-Out and Transfer-In Schools

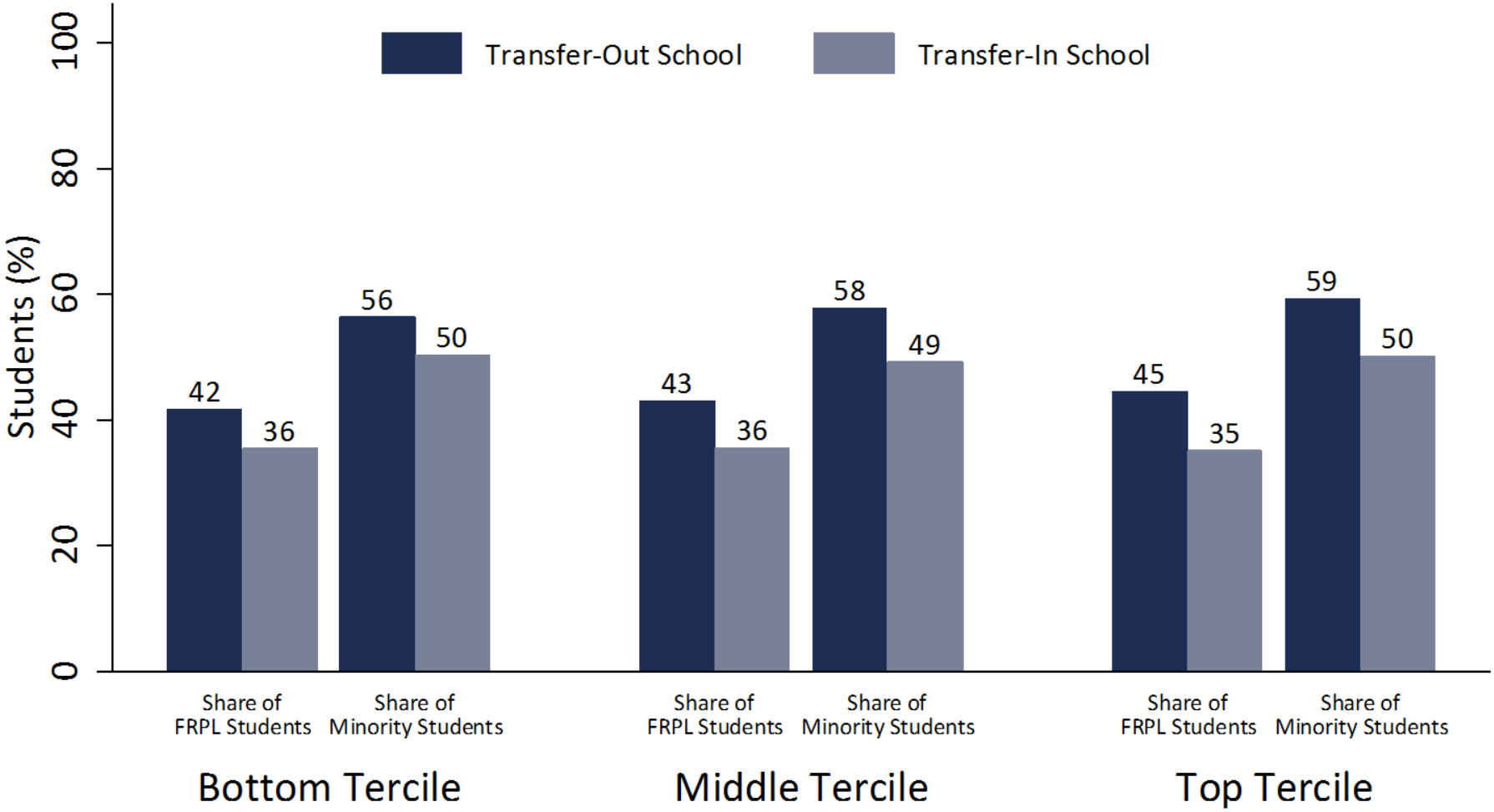
ELA Teachers by Effectiveness Tercile



*Significantly different from Transfer-Out School value, at the 95 percent confidence level.
Notes: Sample includes teachers with teacher job codes in comprehensive, vocational, charter, and magnet schools, with 330 teacher years and 302 unique teachers in the 2009-10 through 2015-16 school years.
All data are from Wake County Public Schools administrative records.

Characteristics of Transfer-Out and Transfer-In Schools

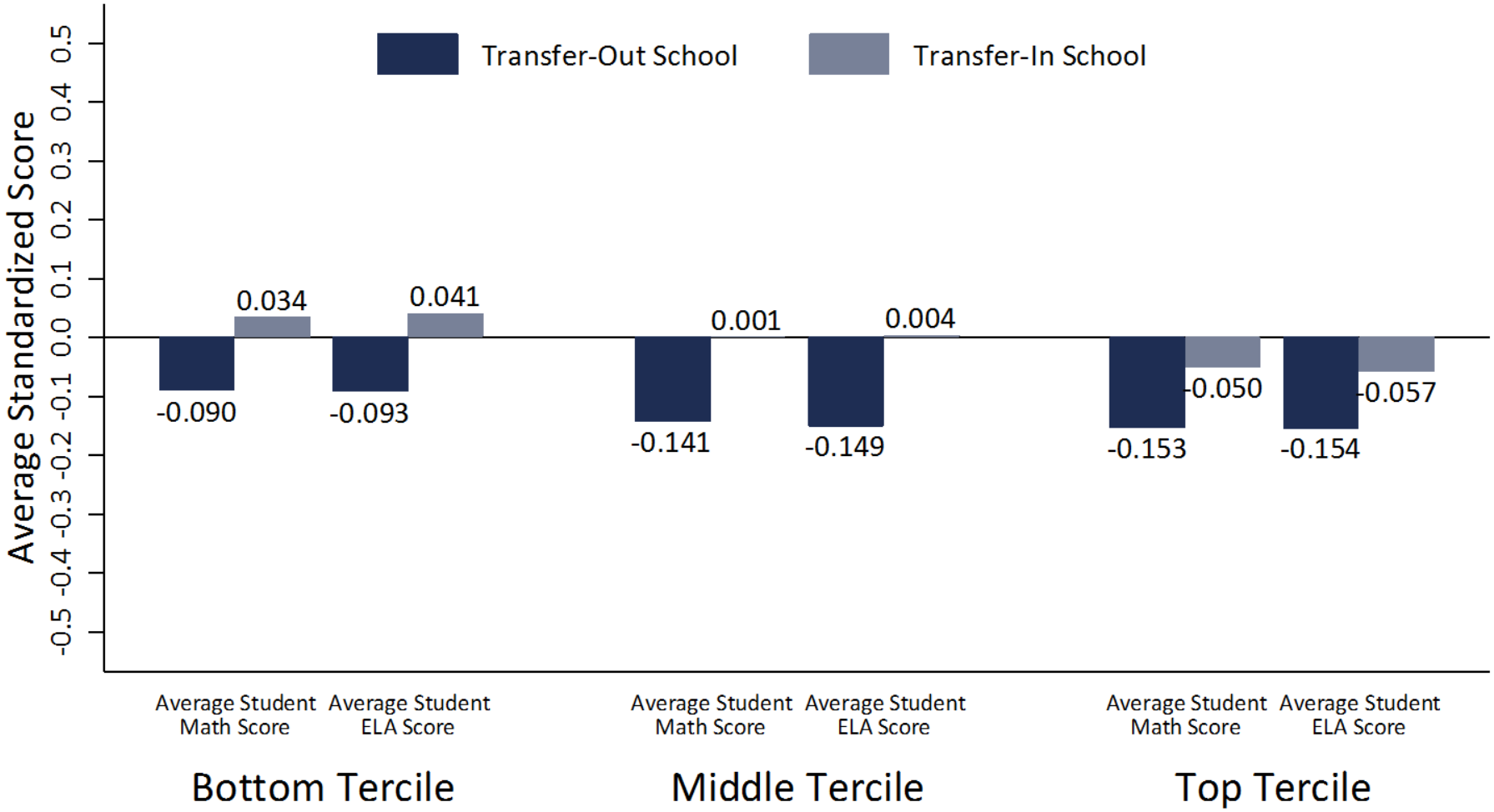
Math Teachers by Effectiveness Tercile



*Significantly different from Transfer-Out School value, at the 95 percent confidence level.
Notes: Sample includes teachers with teacher job codes in comprehensive, vocational, charter, and magnet schools, with 359 teacher years and 328 unique teachers in the 2009-10 through 2015-16 school years.
All data are from Wake County Public Schools administrative records.

Characteristics of Transfer-Out and Transfer-In Schools

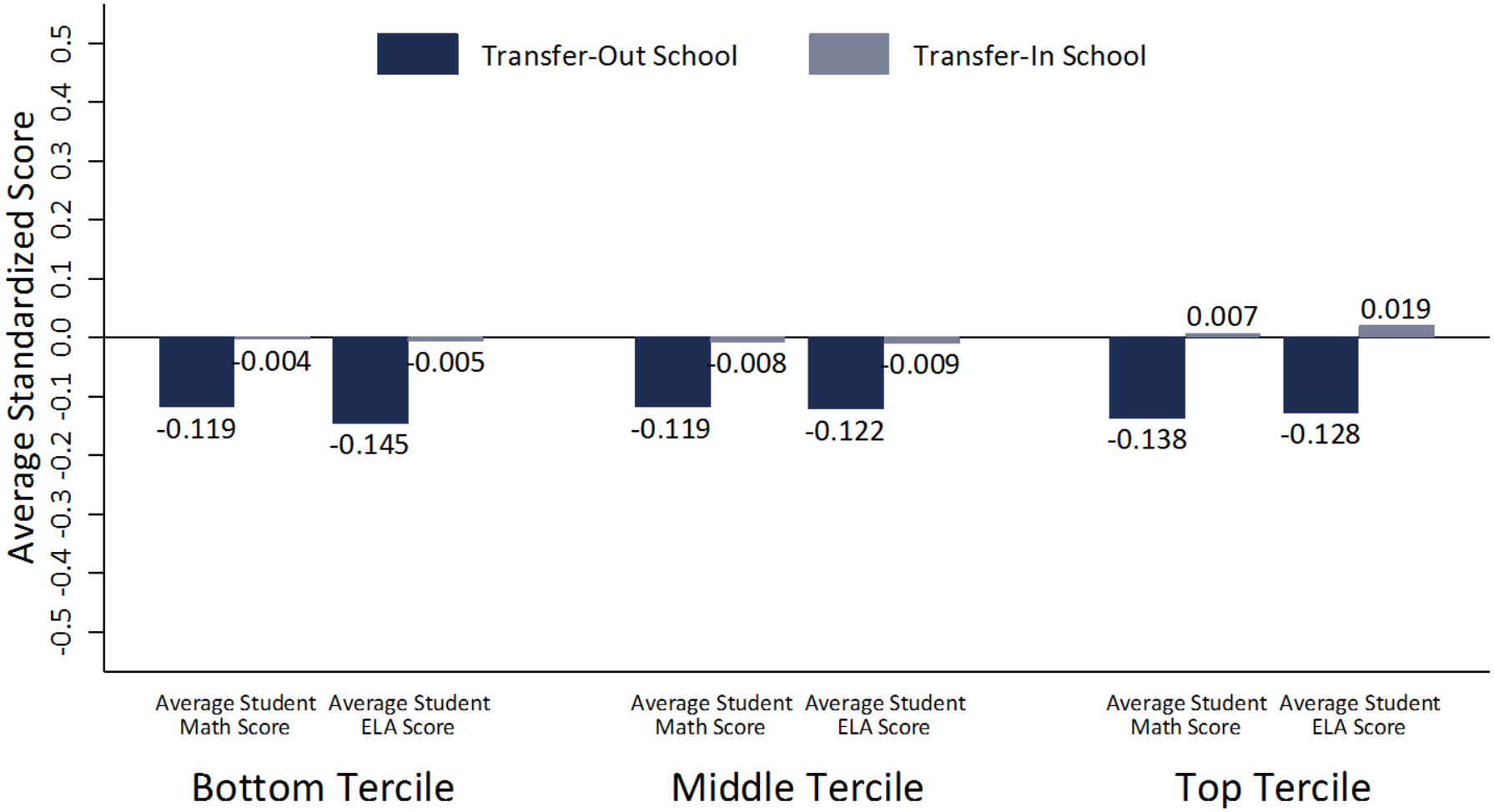
ELA Teachers by Effectiveness Tercile



*Significantly different from Transfer-Out School value, at the 95 percent confidence level.
Notes: Sample includes teachers with teacher job codes in comprehensive, vocational, charter, and magnet schools, with 327 teacher years and 299 unique teachers in the 2009-10 through 2015-16 school years.
All data are from Wake County Public Schools administrative records.

Characteristics of Transfer-Out and Transfer-In Schools

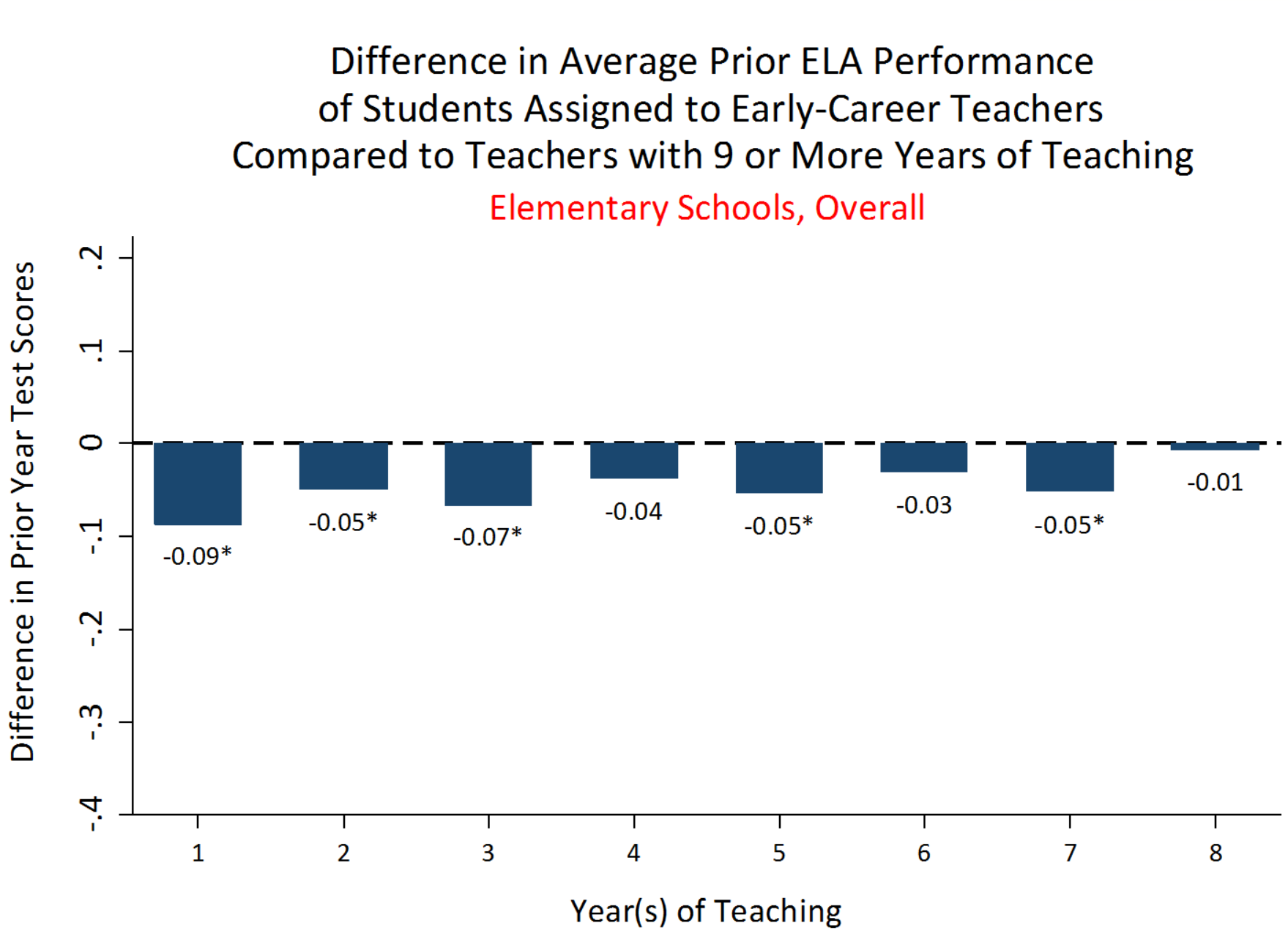
Math Teachers by Effectiveness Tercile



*Significantly different from Transfer-Out School value, at the 95 percent confidence level.
Notes: Sample includes teachers with teacher job codes in comprehensive, vocational, charter, and magnet schools, with 357 teacher years and 327 unique teachers in the 2009-10 through 2015-16 school years.
All data are from Wake County Public Schools administrative records.

HUMAN CAPITAL DIAGNOSTIC PATHWAY				
				
RECRUITMENT	PLACEMENT	DEVELOPMENT	EVALUATION	RETENTION/ TURNOVER

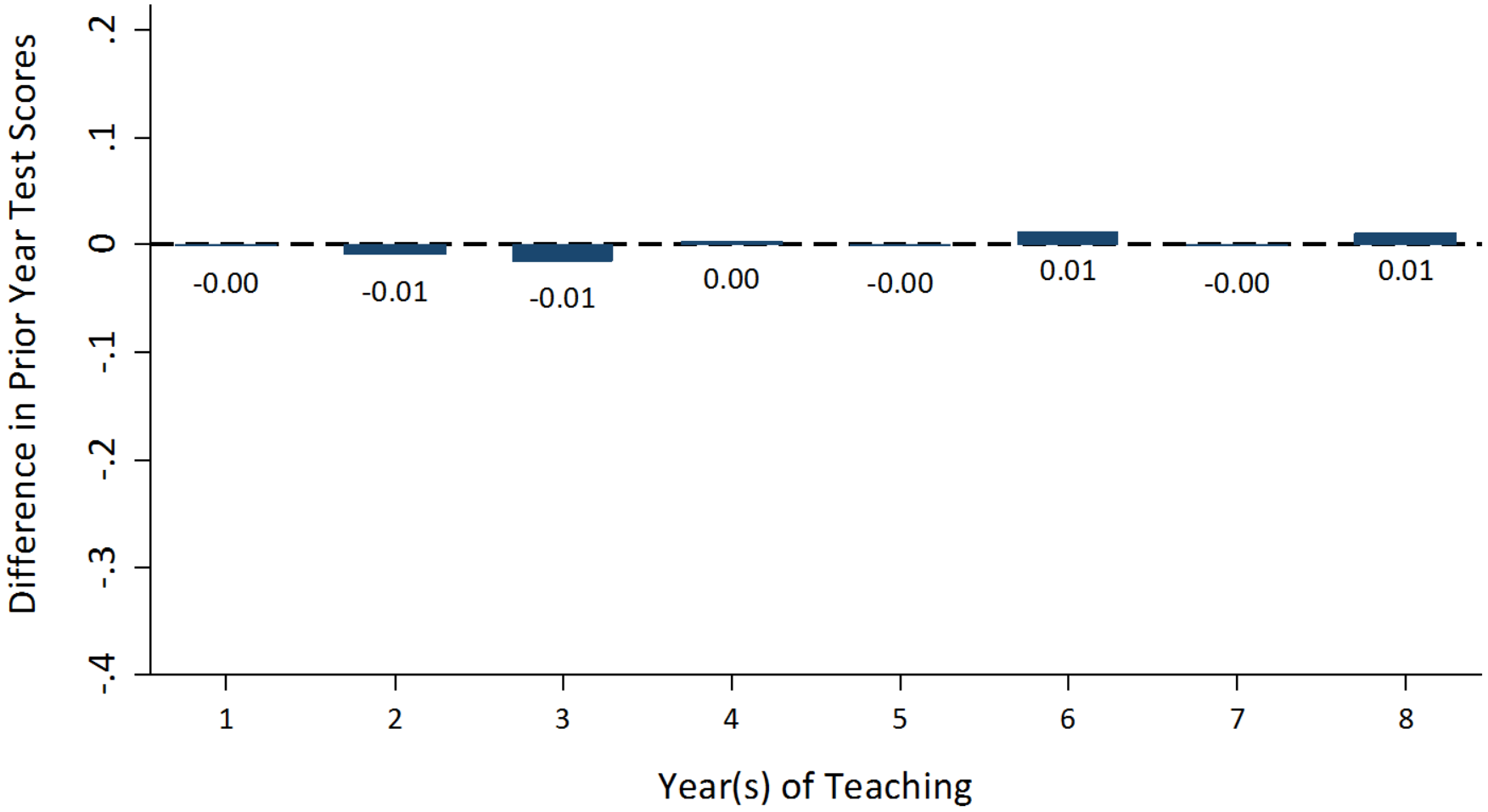
APPENDIX



*Significantly different from zero, at the 95 percent confidence level.

Difference in Average Prior ELA Performance of Students Assigned to Early-Career Teachers Compared to Teachers with 9 or More Years of Teaching

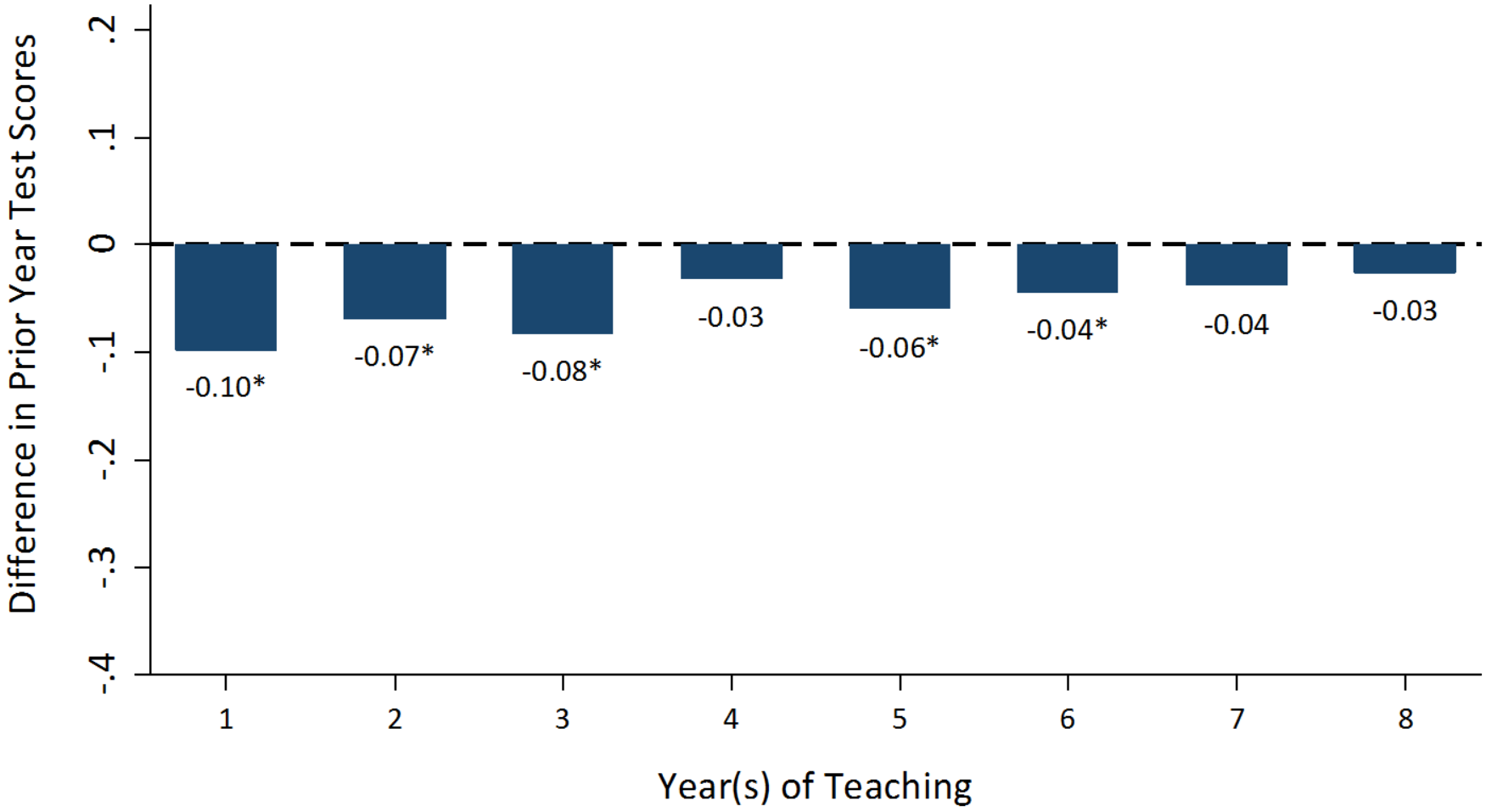
Within Elementary Schools



*Significantly different from zero, at the 95 percent confidence level.

Difference in Average Prior Math Performance of Students Assigned to Early-Career Teachers Compared to Teachers with 9 or More Years of Teaching

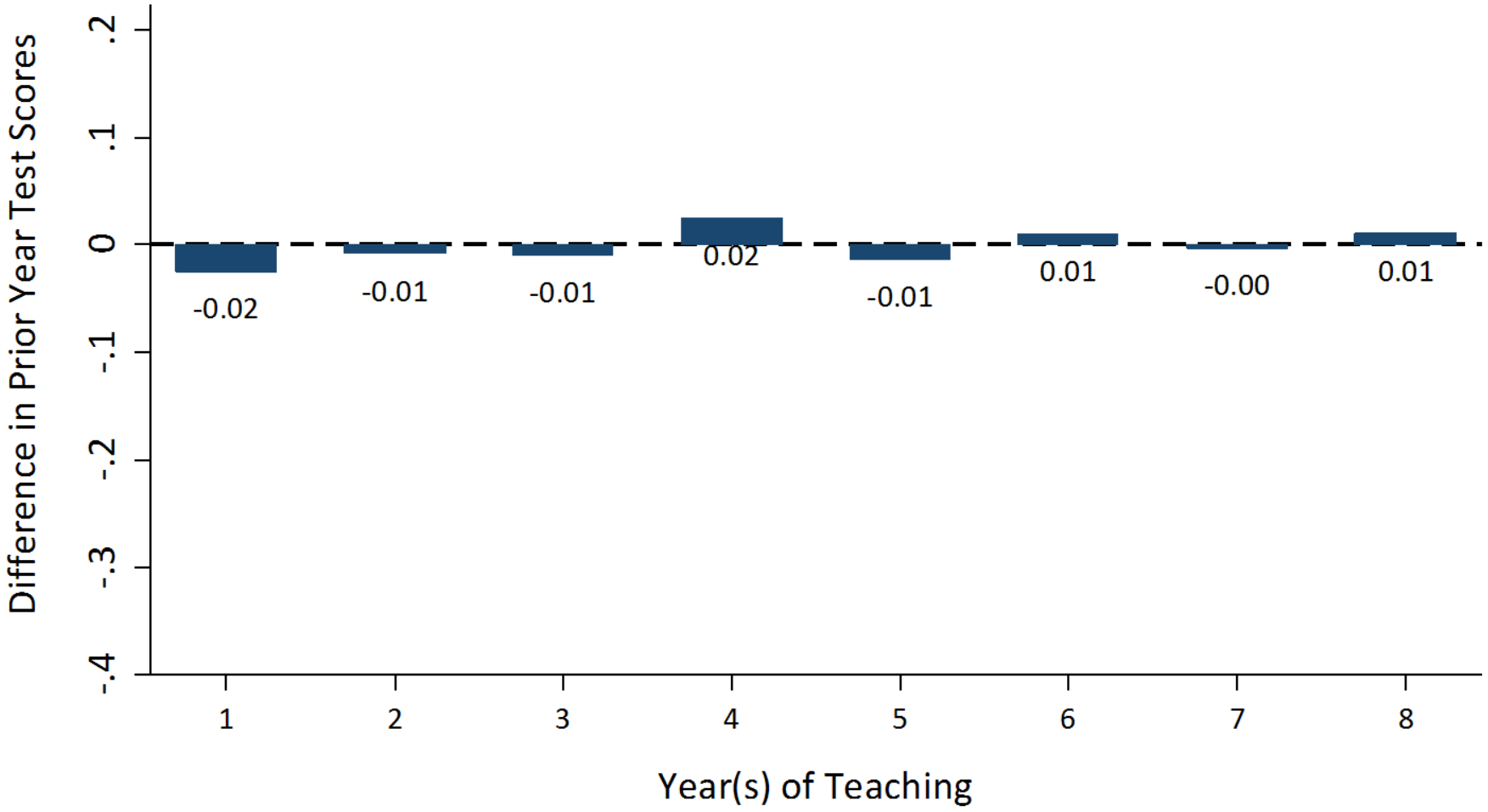
Elementary Schools, Overall



*Significantly different from zero, at the 95 percent confidence level.

Difference in Average Prior Math Performance of Students Assigned to Early-Career Teachers Compared to Teachers with 9 or More Years of Teaching

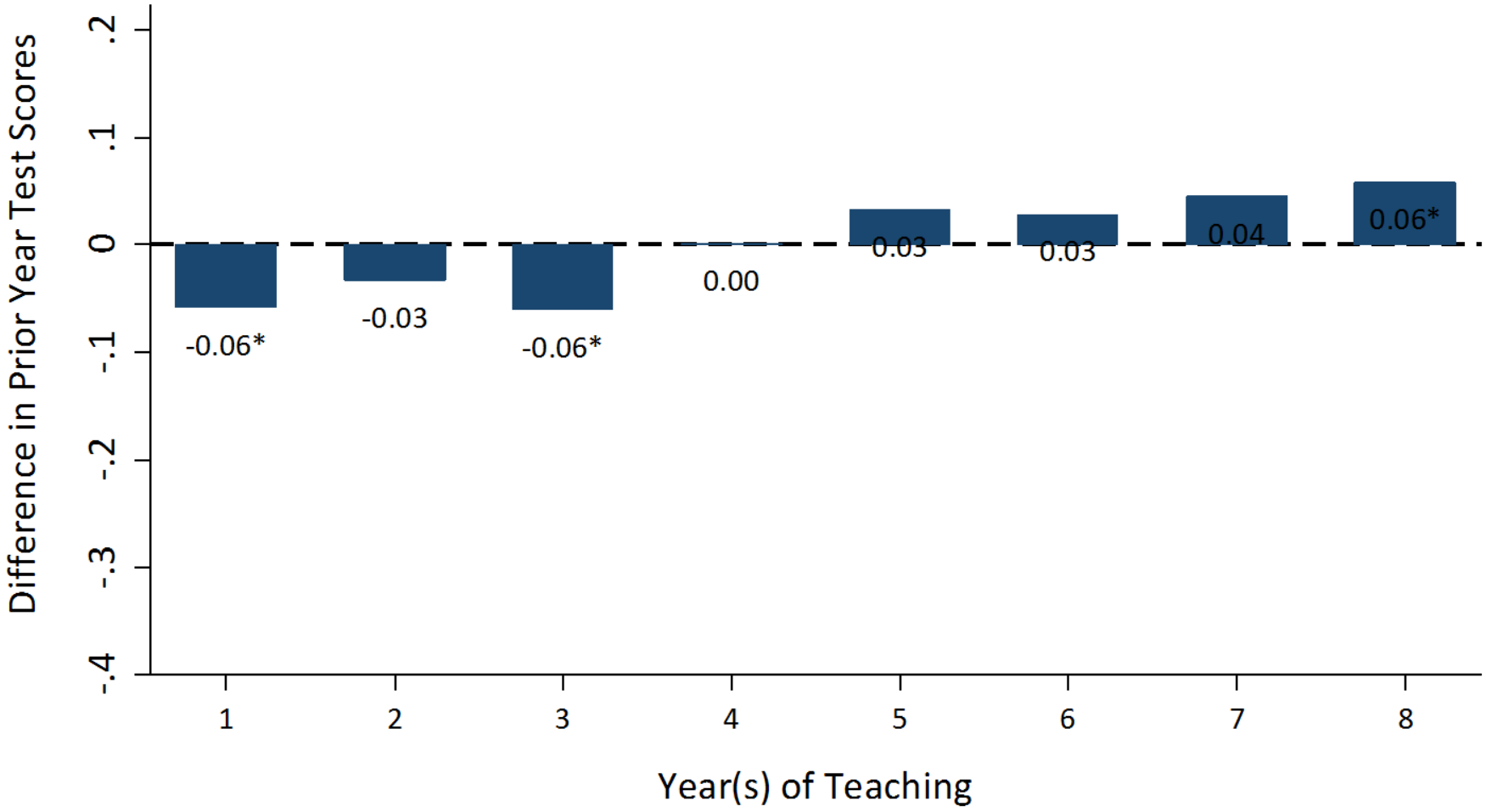
Within Elementary Schools



*Significantly different from zero, at the 95 percent confidence level.

Difference in Average Prior ELA Performance of Students Assigned to Early-Career Teachers Compared to Teachers with 9 or More Years of Teaching

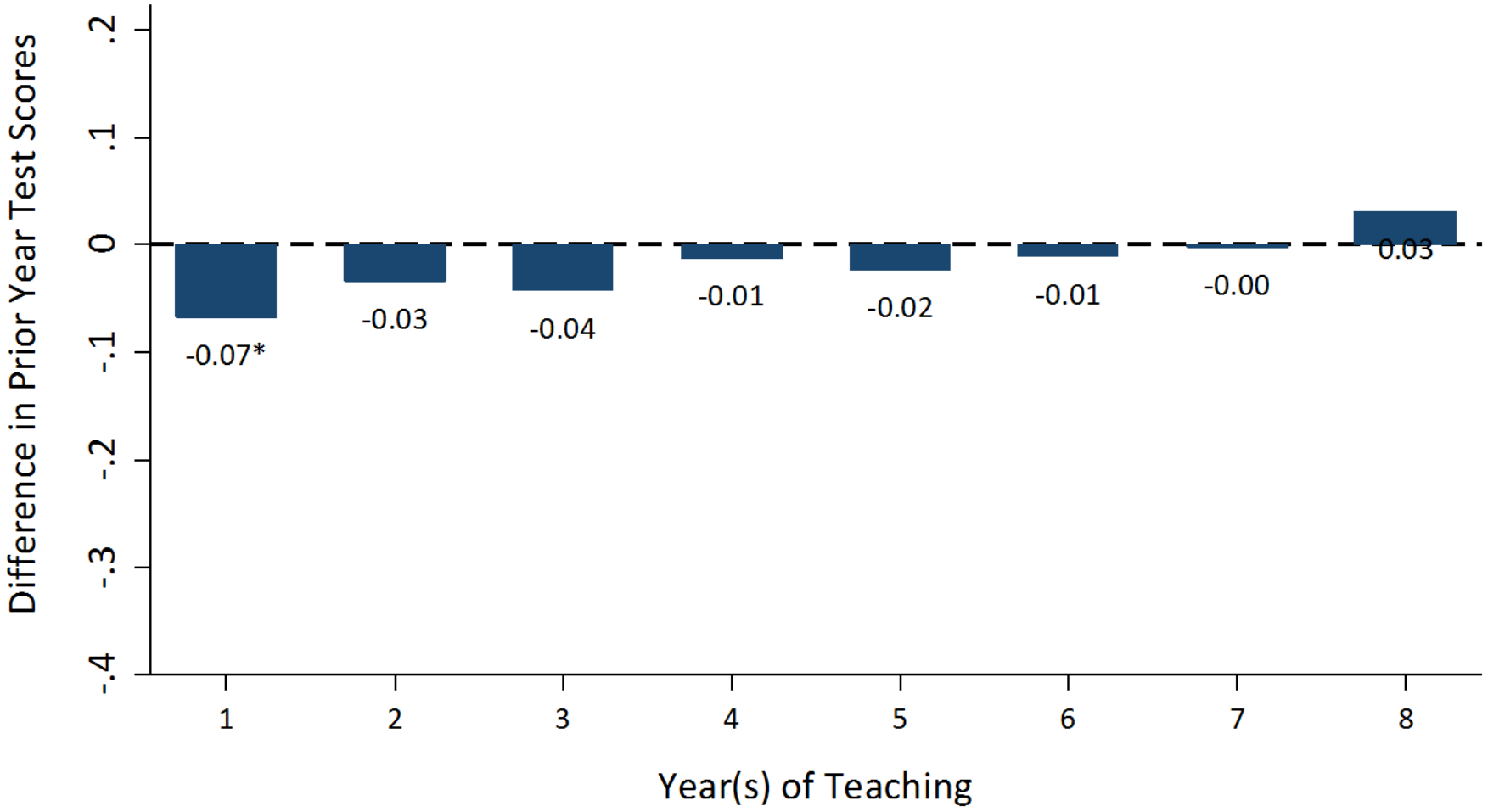
Middle Schools, Overall



*Significantly different from zero, at the 95 percent confidence level.

Difference in Average Prior ELA Performance of Students Assigned to Early-Career Teachers Compared to Teachers with 9 or More Years of Teaching

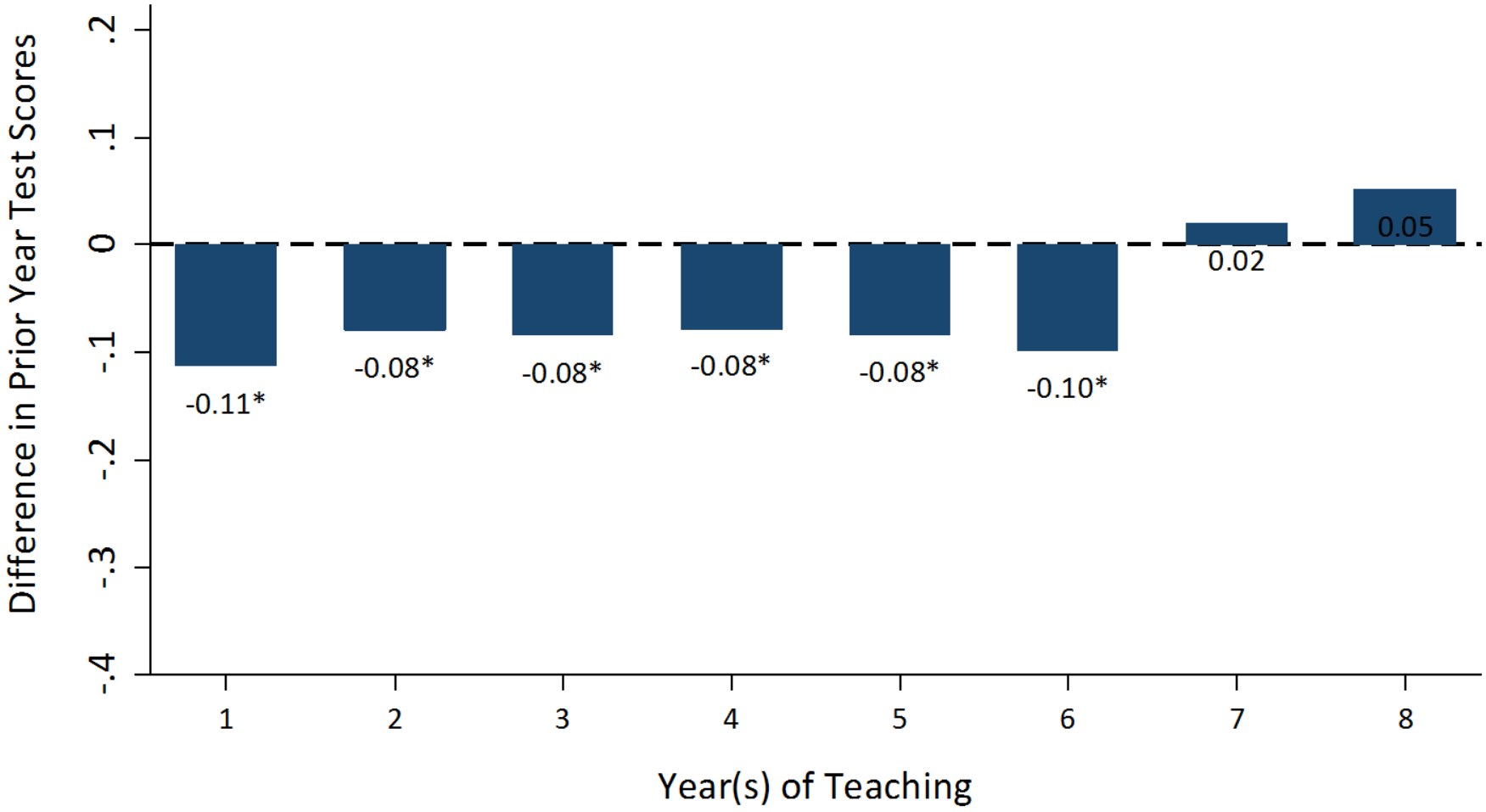
Within Middle Schools



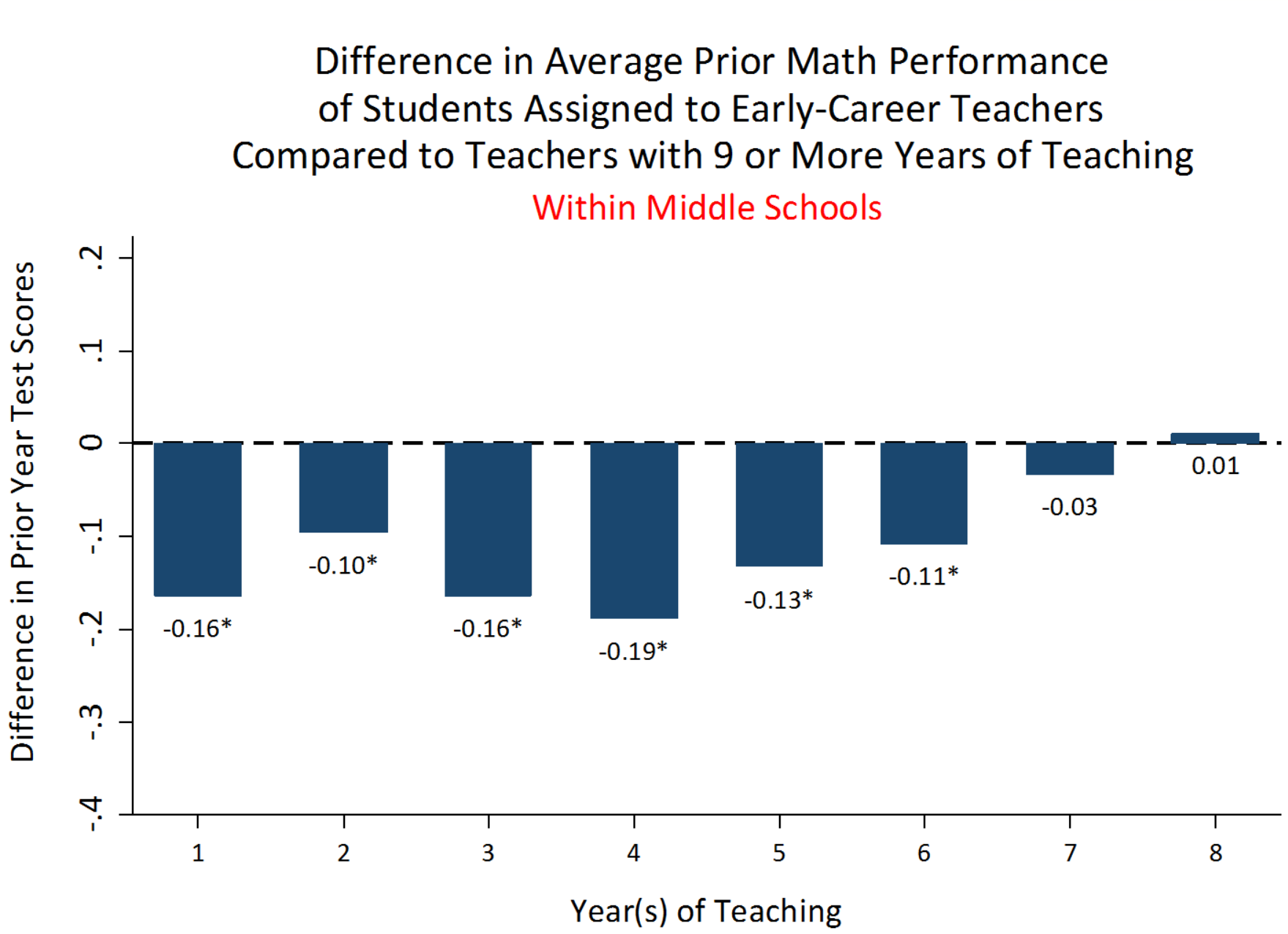
*Significantly different from zero, at the 95 percent confidence level.

Difference in Average Prior Math Performance of Students Assigned to Early-Career Teachers Compared to Teachers with 9 or More Years of Teaching

Middle Schools, Overall



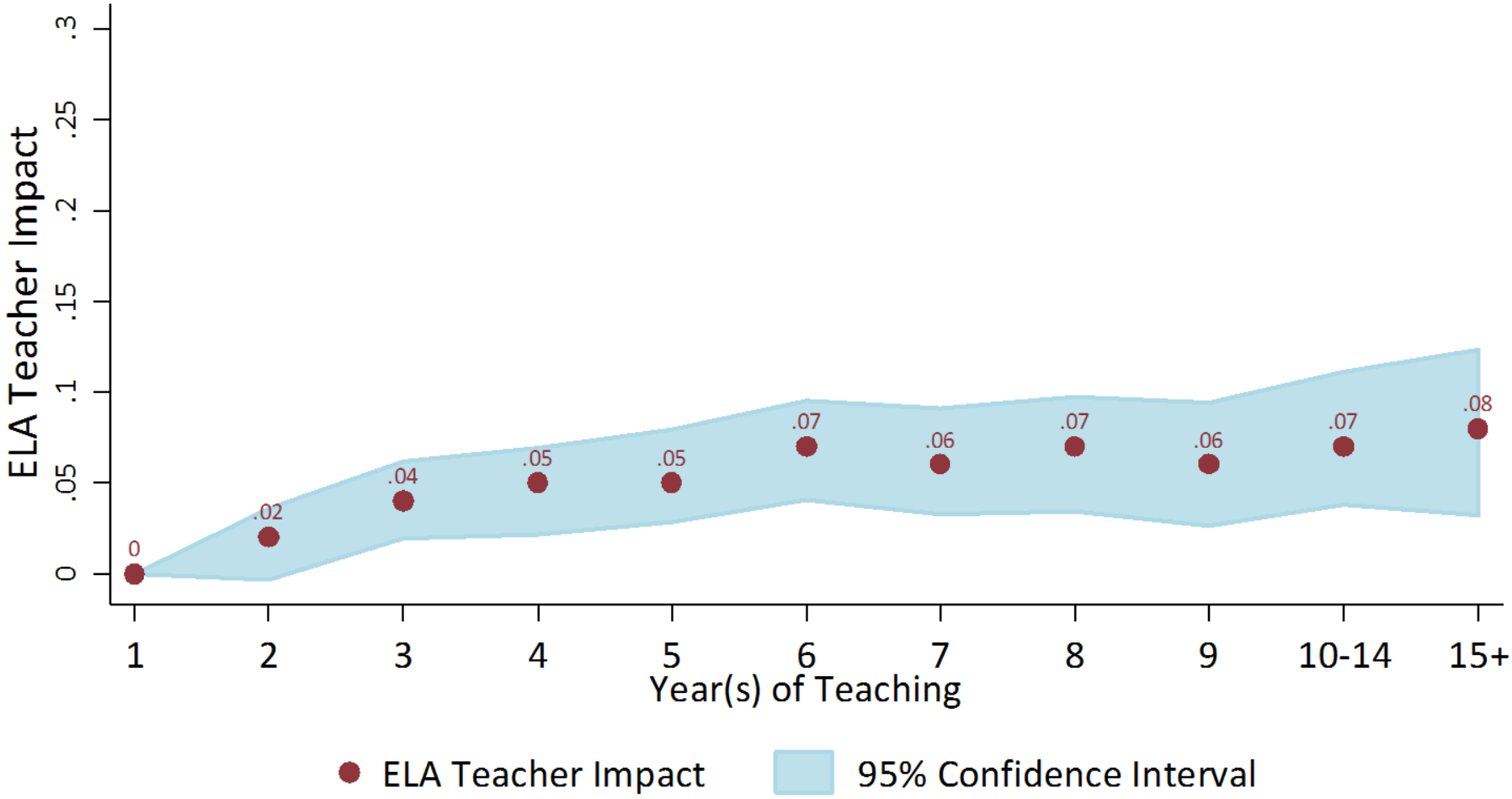
*Significantly different from zero, at the 95 percent confidence level.



*Significantly different from zero, at the 95 percent confidence level.

ELA Teacher Impact Compared to First Year of Teaching

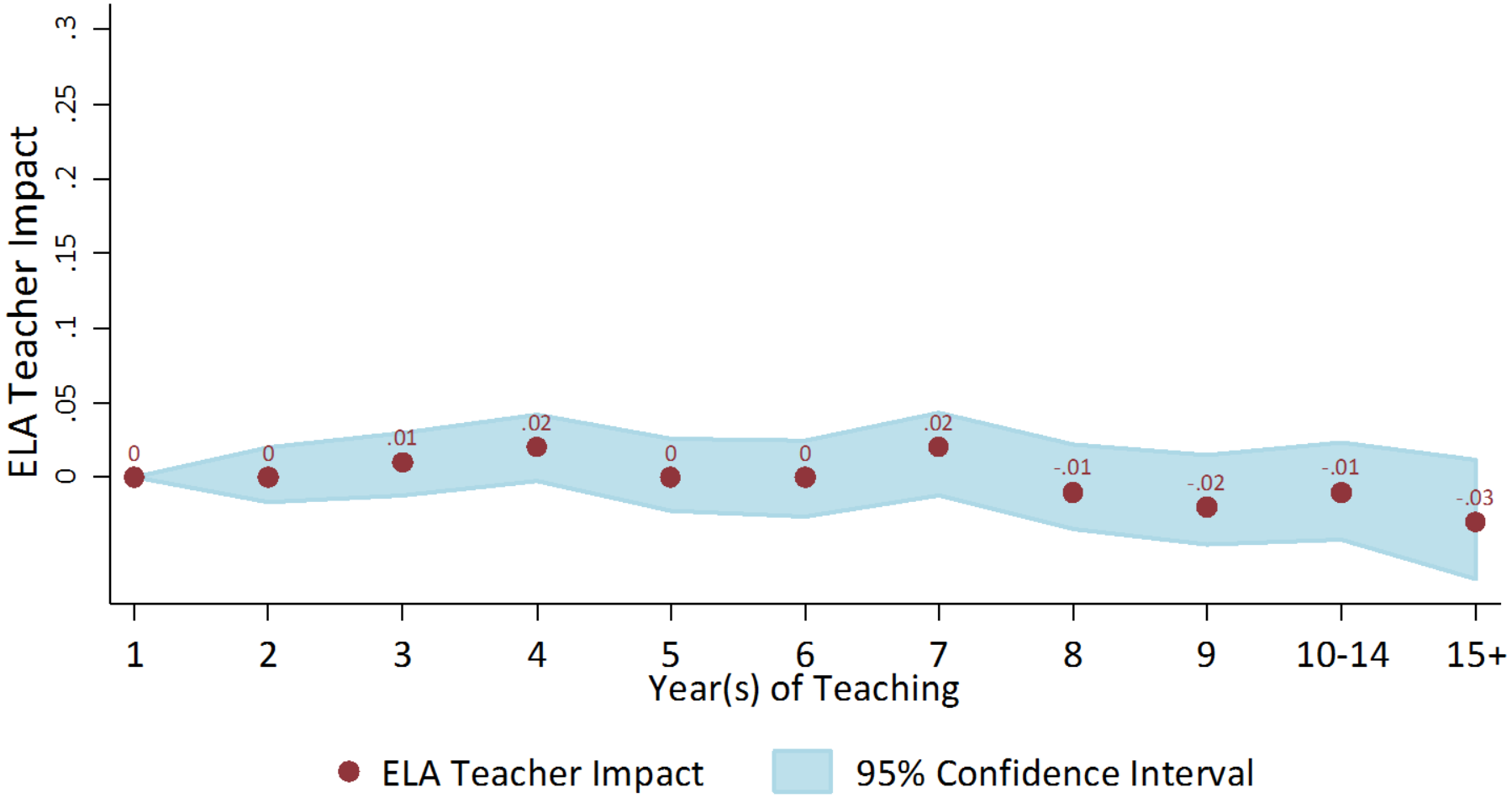
Elementary Schools



Note. Sample includes comprehensive and magnet school teachers in the 2007-08 through 2015-16 school years with teacher job codes and teacher impact estimates who are linked to 4 and 5 grade students, with 6,627 teacher years and 2,230 unique teachers. Teacher impacts on student test scores are average within-teacher gains compared to novice teachers. All data are from Wake County Public School records.

ELA Teacher Impact Compared to First Year of Teaching

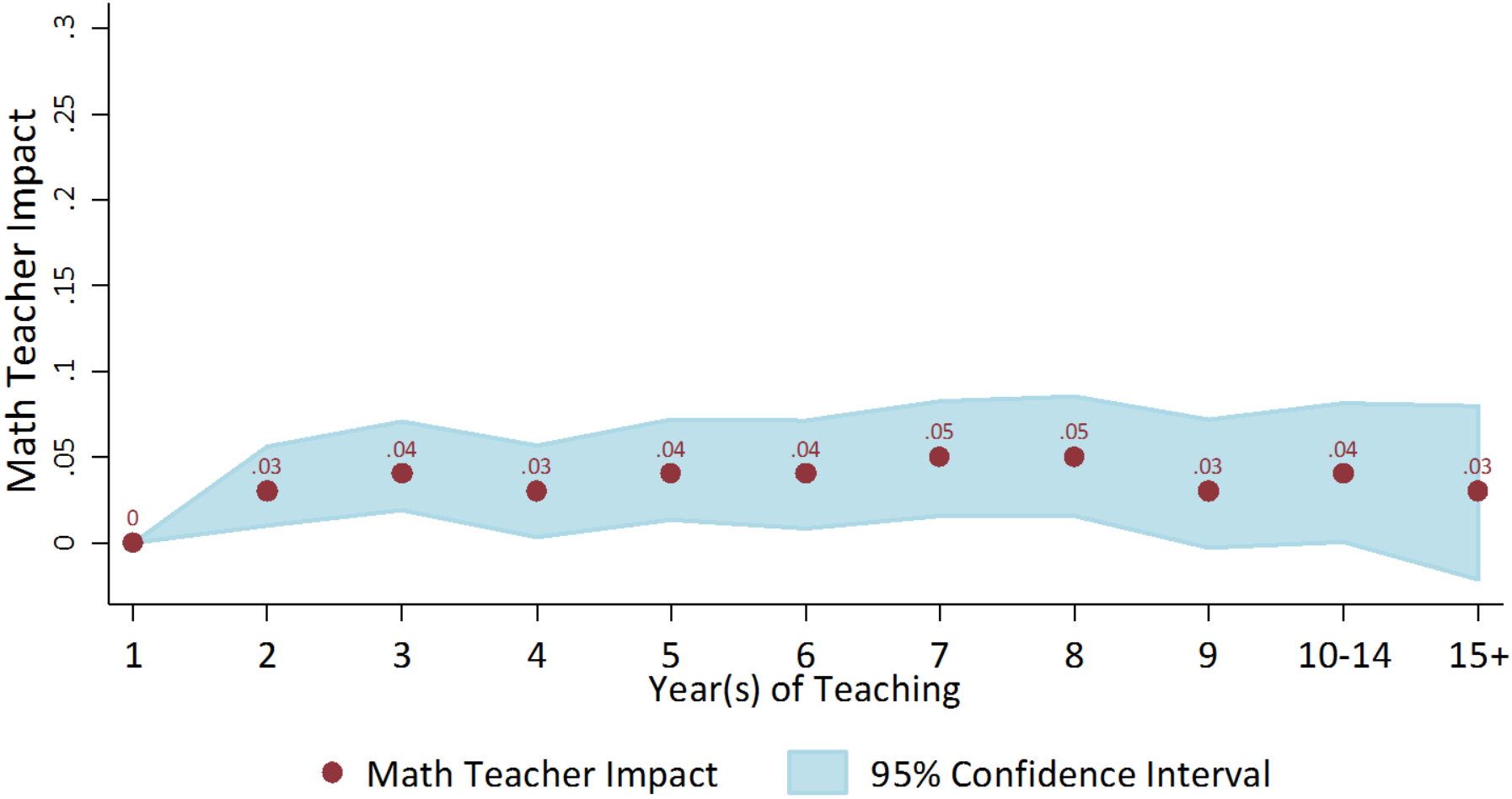
Middle Schools



Note. Sample includes comprehensive and magnet school teachers in the 2007-08 through 2015-16 school years with teacher job codes and teacher impact estimates who are linked to 6 through 8 grade students, with 2,555 teacher years and 801 unique teachers. Teacher impacts on student test scores are average within-teacher gains compared to novice teachers. All data are from Wake County Public School records.

Math Teacher Impact Compared to First Year of Teaching

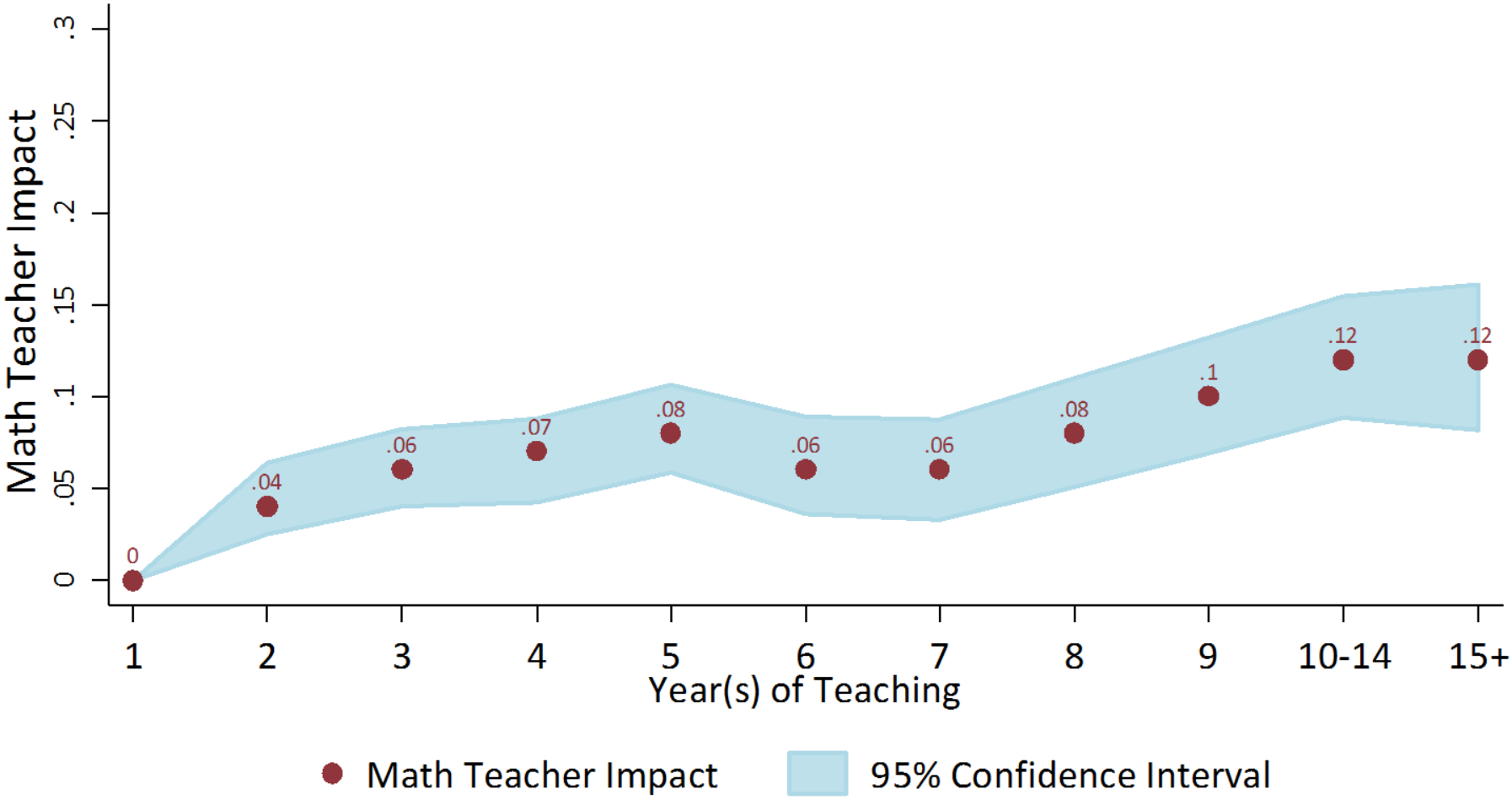
Elementary Schools



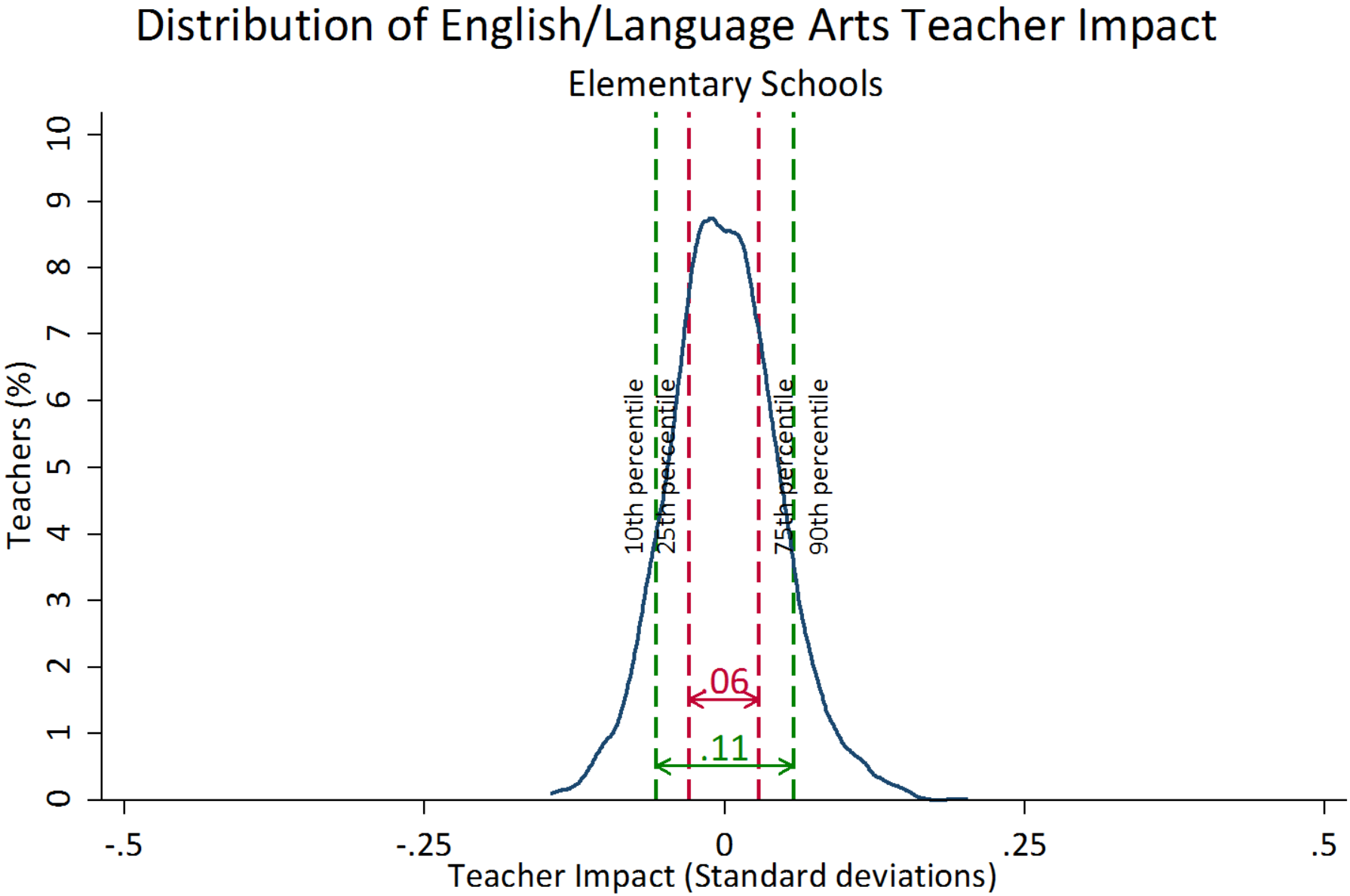
Note. Sample includes comprehensive and magnet school teachers in the 2007-08 through 2015-16 school years with teacher job codes and teacher impact estimates who are linked to 4 and 5 grade students, with 6,744 teacher years and 2,235 unique teachers. Teacher impacts on student test scores are average within-teacher gains compared to novice teachers. All data are from Wake County Public School records.

Math Teacher Impact Compared to First Year of Teaching

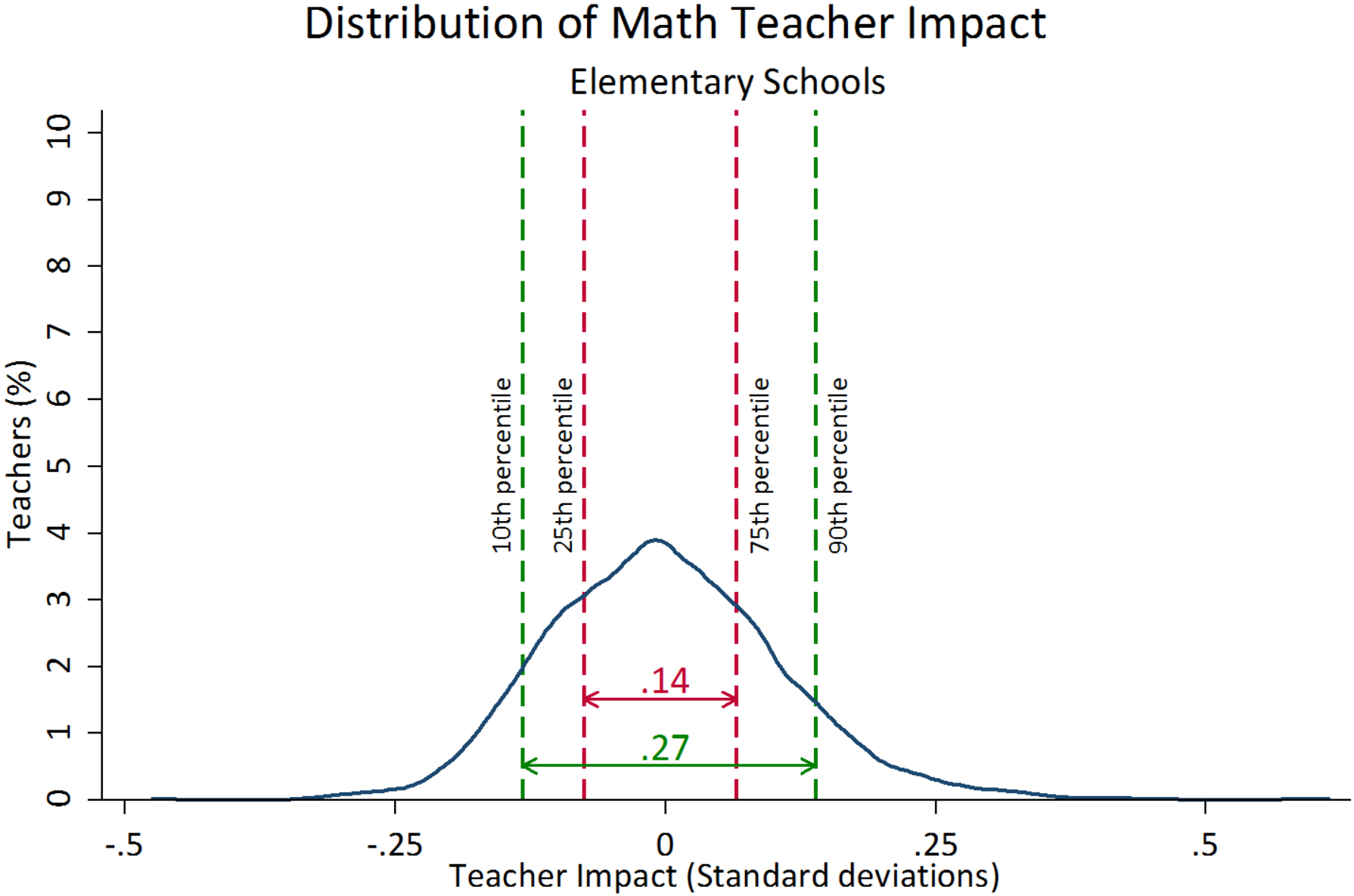
Middle Schools



Note. Sample includes comprehensive and magnet school teachers in the 2007-08 through 2015-16 school years with teacher job codes and teacher impact estimates who are linked to 6 through 8 grade students, with 2,648 teacher years and 808 unique teachers. Teacher impacts on student test scores are average within-teacher gains compared to novice teachers. All data are from Wake County Public School records.

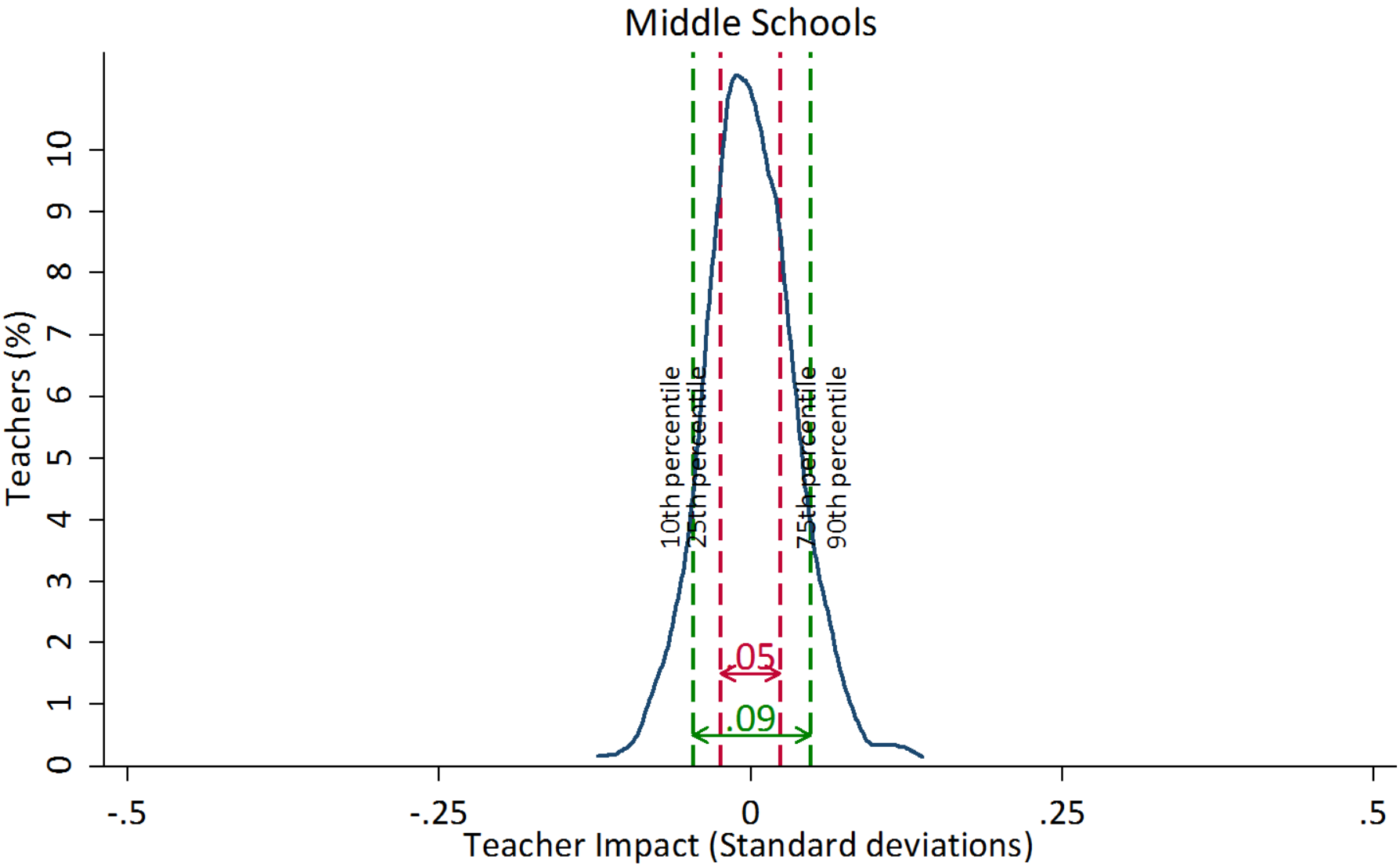


Note. Sample includes 2230 comprehensive and magnet school teachers with teacher job codes and math students in grades 4 through 8 in school years 2007-08 to 2015-16. All data are from Wake County Public Schools records.

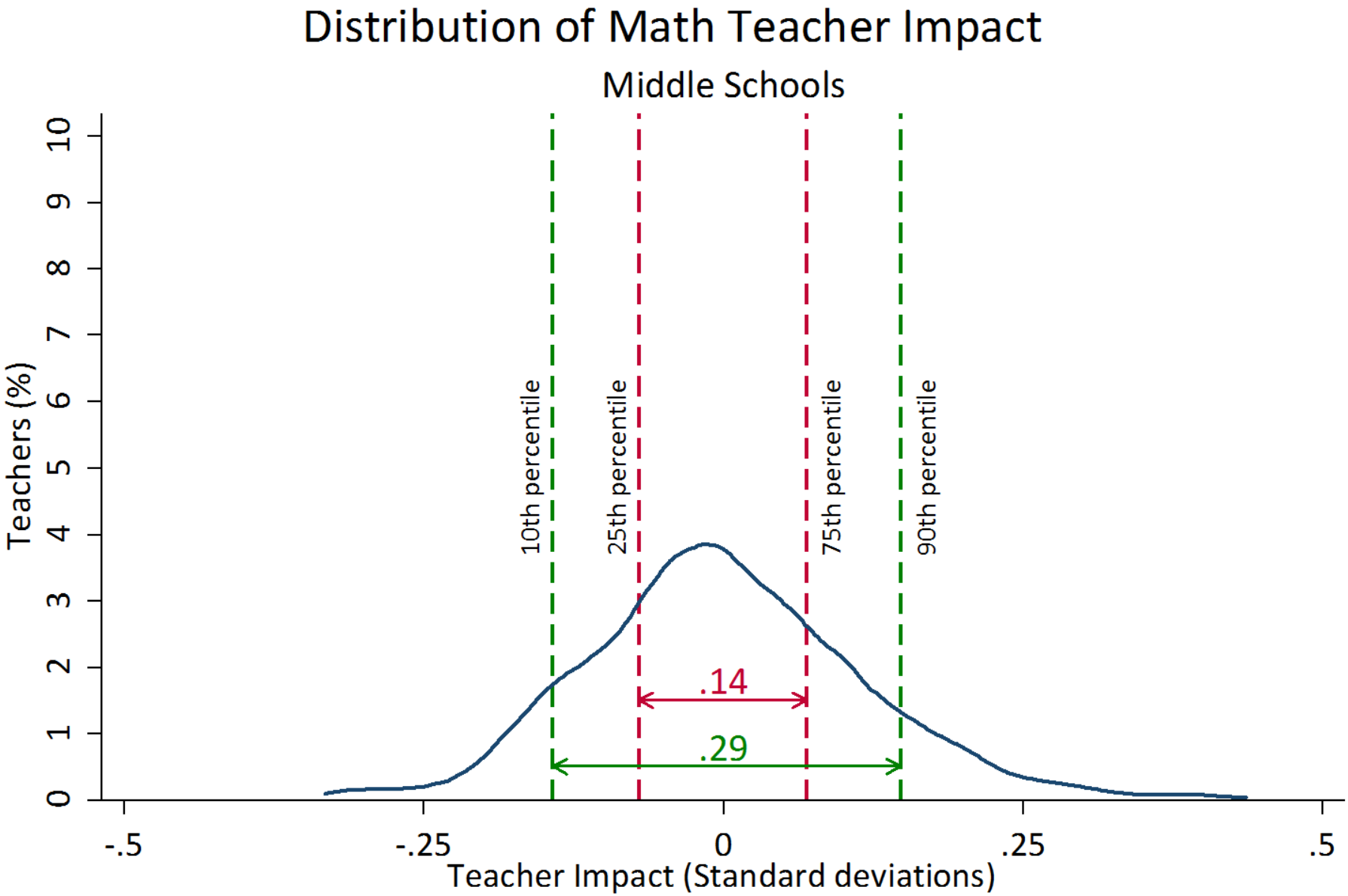


Note. Sample includes 2,235 comprehensive and magnet school teachers with teacher job codes and math students in grades 4 through 8 in school years 2007-08 to 2015-16. All data are from Wake County Public Schools records.

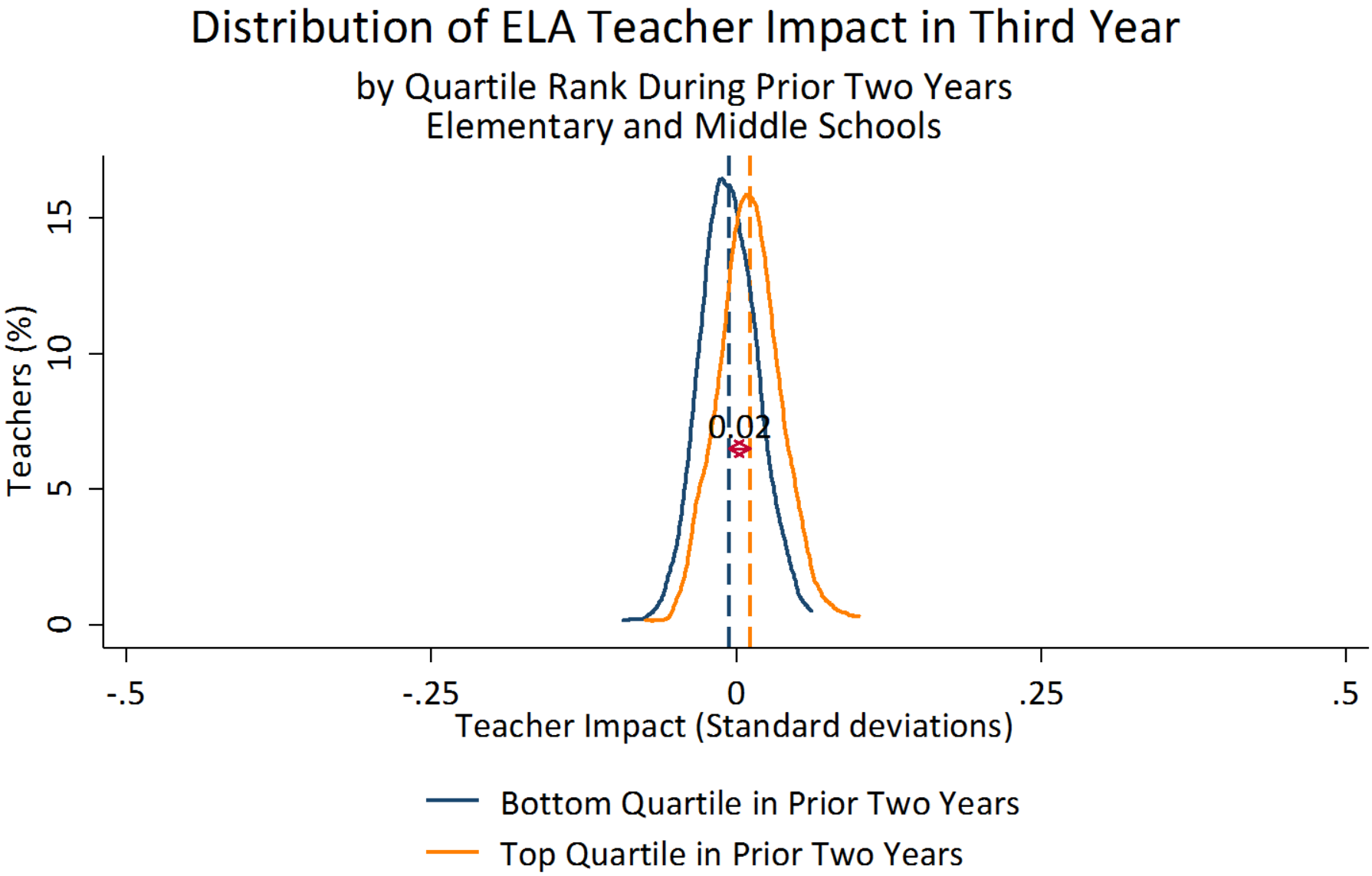
Distribution of English/Language Arts Teacher Impact



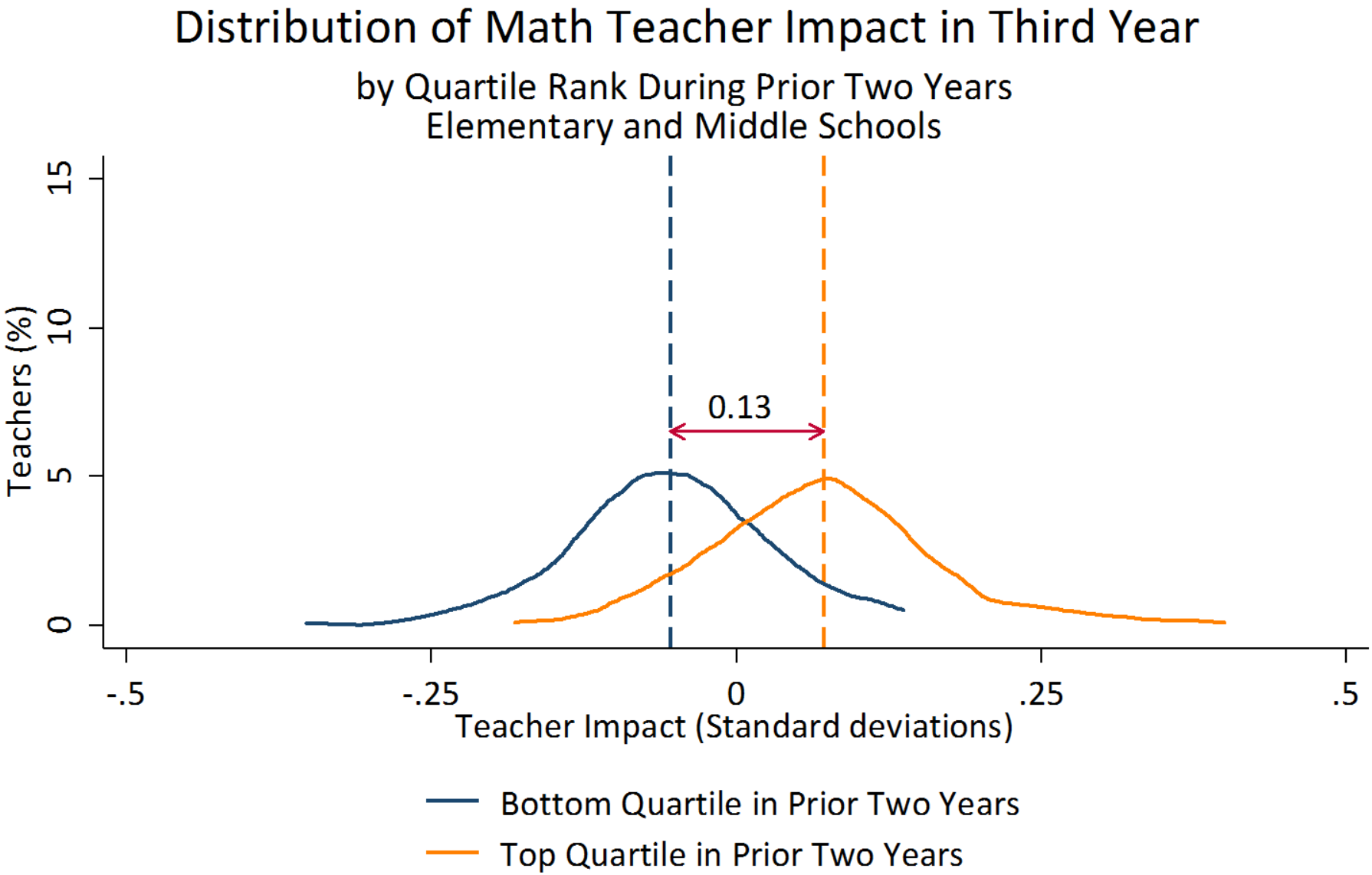
Note. Sample includes 797 comprehensive and magnet school teachers with teacher job codes and math students in grades 4 through 8 in school years 2007-08 to 2015-16. All data are from Wake County Public Schools records.



Note. Sample includes 806 comprehensive and magnet school teachers with teacher job codes and math students in grades 4 through 8 in school years 2007-08 to 2015-16. All data are from Wake County Public Schools records.



Notes. Sample includes comprehensive and magnet school math teachers with teacher job codes and students in grades 4 through 8 with prior year test scores in the 2007-08 through 2015-16 school years, with 1239 teachers. All data are from Wake County Public Schools records.



Notes. Sample includes comprehensive and magnet school math teachers with teacher job codes and students in grades 4 through 8 with prior year test scores in the 2007-08 through 2015-16 school years, with 1257 teachers. All data are from Wake County Public Schools records.