Florida FCAT and Algebra I EOC 2013-14 Results

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Presentation Overview

- Summarize 2013-14 FCAT and Algebra I EOC value-added model
- Are the input data accurate and sensible?
  - Examine the descriptive statistics
- Does the model behave as expected?
  - Examine R-squared to determine model fit
  - Examine the variance components
  - Precision and distribution of the value-added scores
- Do the results suggest relationships between value-added scores and classroom characteristics?
  - Impact data based on correlations between value-added scores and class characteristics

Model Background

Florida's Value-Added Models

- After exploring eight different types of value-added models, the SGIC recommended a model from the class of *covariate adjustment models*
- These models begin by establishing an expected growth for each student, which is based on growth of similar students in the same grade during the same year
- To isolate the impact of the teacher on student learning, the model developed by the SGIC and approved by the Education Commissioner accounts for the characteristics of the student and the classroom

Students Included in the Models

- Models estimated separately by grade and subject (reading 4-10, math 4-8, algebra 8-9)
- Students are included in the FCAT model if they have a 2012-13 FCAT score in the same subject
  - Grade of 2012-13 score cannot be higher than 2013-14 grade
- SGIC and Commissioner approved grade 9 EOC model; use of grade 8 EOC results optional
- Students are included in EOC model if they have at least one prior math score available:
  - Grade 9 students must have a grade 8 FCAT 2.0 math score
  - Grade 8 students must have a grade 7 FCAT 2.0 math score

Model Covariates and Value-Added

- The goal of a value-added model is to isolate the contributions of current teachers and schools to student learning by using model covariates to control for factors that are not attributable to current teachers and schools
- If model covariates do not successfully control for these factors, value-added scores might reflect not only teacher and school contributions to student learning, but also factors that should not be attributed to teachers and schools
- Evidence presented below suggests the FCAT and grade 9 Algebra I EOC models successfully isolate the contributions of current teachers and schools to student learning

Model Covariates

- FCAT and Algebra I EOC models have student-level and classroom-level covariates
- Ideally, predictor variables should have the following properties:
  - A high statistical correlation with the outcome
  - A high curricular relationship with the outcome (Math 4 -> Math 5)
  - A correlation with factors that contribute to student learning but are not in the control of teachers and schools
  - A high correlation with the unobservable processes by which students are sorted into schools and classes

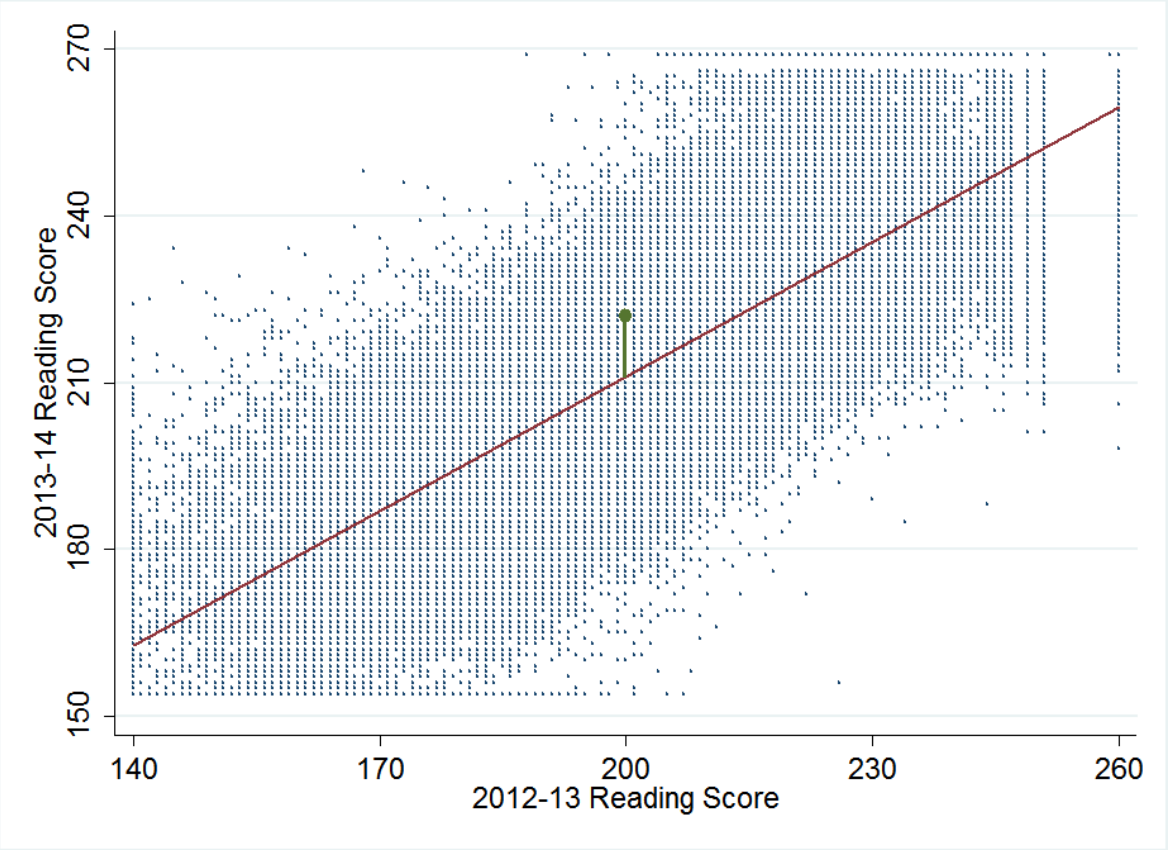
FCAT Model Covariates

- Up to two prior test scores
- Fourteen students with disabilities (SWD) status indicators
- Gifted status
- Four English Language Learner (ELL) status indicators (time as ELL)
- Attendance (percent of days present)
- Mobility (number of transitions)
- Difference from modal age in grade
- Indicators (up to 5) for number of subject-relevant courses
- Class size
- Similarity of prior test scores among students in the class

Algebra I EOC Model Covariates

- Up to two prior FCAT 2.0 math scores
- Variable indicating student was enrolled in 2 or more relevant courses
- English Language Learner (ELL) status (time as ELL)
- Students with Disabilities (SWD) status
- Gifted status
- Difference from modal age in grade
- Mobility (number of transitions)
- Attendance
- Class size
- Similarity of prior test scores among students in the class
- **Percent gifted in class (not in FCAT models)**
- **Percent at modal grade (not in FCAT models)**
- **Mean prior test score in class (not in FCAT models)**

Understanding Value-Added



Understanding Value-Added

- Florida's value-added models estimate the contributions of each of the following to students' 2013-14 test scores:
  - Observable student- and classroom-level characteristics
    - Prior test scores
    - ELL status
    - SWD status
    - Class size
    - Etc.
  - Teacher component
  - School Component

Teacher and School Components

- The model recognizes that there is an independent factor related to the school that impacts student learning: a school component
- The school component may represent the impact of the school's leadership, the culture of the school, the environment of the school, and other school-level factors on student learning
- Teachers contribute to the overall school component, but there are other factors embedded in the component that are outside the teacher's direct control

Teacher and School Components

- FCAT and EOC models include a school component and a teacher component
- FCAT: one-half of the school component is added to the teacher component to create the final teacher value-added (VAM) score
- EOC: school component is *not* added to the teacher component to create the teacher's final Algebra I EOC VAM score
  - More than a third of schools have only one or two Algebra I teachers teaching grade 9 students
  - More than half of schools have only one or two Algebra I teachers teaching grade 8 students

Value-Added Results

- A teacher's value-added score reflects the average amount of learning growth of the teacher's students above or below the expected growth of similar students in the state, using covariates accounted for in the model
  - A score of zero indicates that students performed no better or worse than expected, based on factors controlled for in the model
  - A positive score indicates that students performed better than expected
  - A negative score indicates that students performed worse than expected

Value-Added Results

- The value-added score is an estimate of a teacher's impact on student learning
- Because the score is an estimate, it contains some uncertainty
- The standard error is a statistical term that describes that uncertainty
- Using a standard error to construct a confidence interval around a score (like +/- 3 points in an opinion poll) is a good statistical practice that can increase the accuracy of classification decisions

Value-Added Results Reported

- FCAT model produces results for teachers of grades 4-10 reading and 4-8 mathematics
- Algebra I EOC model produces results for teachers of grades 8 and 9
  - Algebra I teachers are not linked to students who take math FCAT
  - Grade 8 and 9 math teachers are not linked to students who take Algebra I EOC
- FCAT results for teachers are reported as one, two, and three-year averages
- Algebra I EOC results are reported as single-year scores

Aggregation

- Teachers with multiple years of VAM scores have an aggregated VAM score
- Aggregated scores are an average of single-year scores, which are weighted by the number of students linked to the teacher that year
- Aggregating over time is a way to improve the reliability of the VAM score
- New teachers have only a single year VAM score; these scores will typically be less reliable than those based on multiple years of data

Input Data

Number of Students

	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10
Reading 1213	173,403	176,016	178,718	177,691	178,601	169,253	166,899
Reading 1314	175,797	176,779	175.521	180,093	180,043	175,486	171,798
Math 1213	173,093	175,353	178,539	172,262	154,409		
Math 1314	175,673	176,485	173,924	163,468	114,700		
Algebra 1213					53,673	99,717	
Algebra 1314					59,167	98,848	

Number of Teachers

	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10
Reading 1213	11,757	11,114	6,609	6,576	6,133	5,606	6,137
Reading 1314	11,745	10,991	6,463	6,467	6,179	5,546	6,238
Math 1213	10,512	9,715	4,814	5,067	4,528		
Math 1314	10,659	9,693	4,698	4,642	4,196		
Algebra 1213					1,517	2,741	
Algebra 1314					1,642	2,744	

Number of Schools

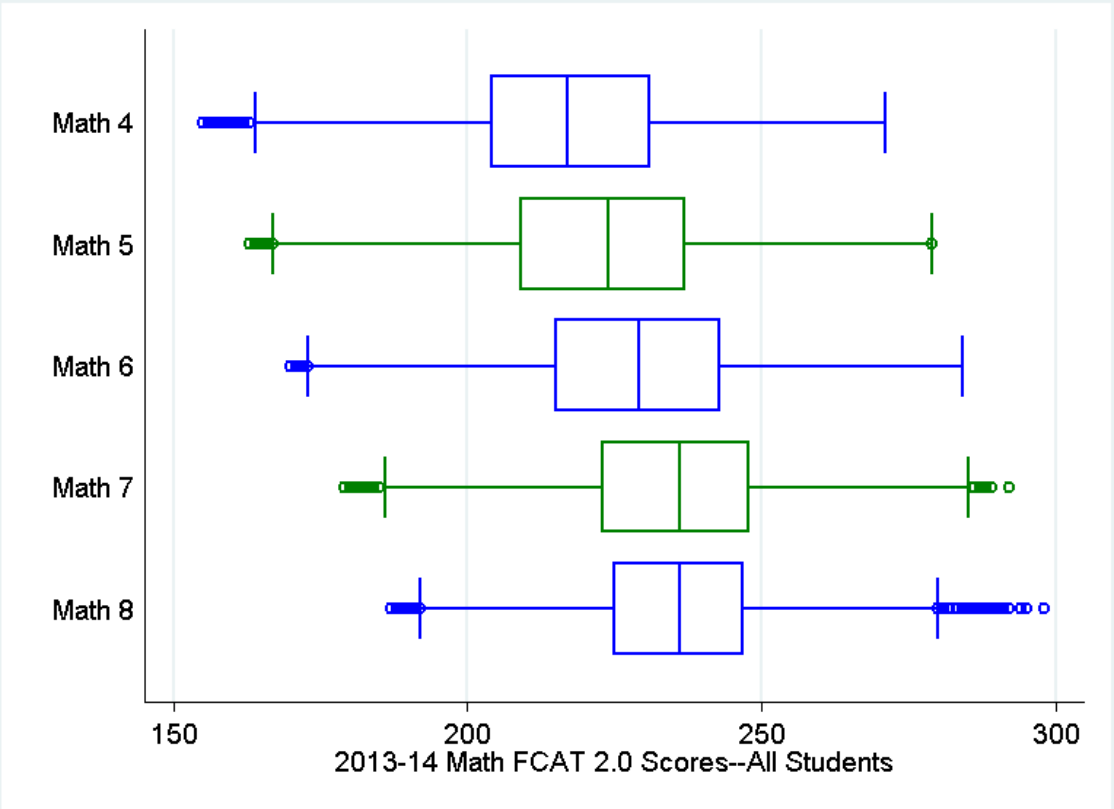
	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10
Reading 1213	2,139	2,147	1,112	1,054	1,068	821	805
Reading 1314	2,129	2,135	1,131	1,075	1,096	809	799
Math 1213	2,136	2,144	1,112	1,055	1,072		
Math 1314	2,126	2,143	1,132	1,078	1,089		
Algebra 1213					817	691	
Algebra 1314					867	701	

Average Growth by Subject and Grade

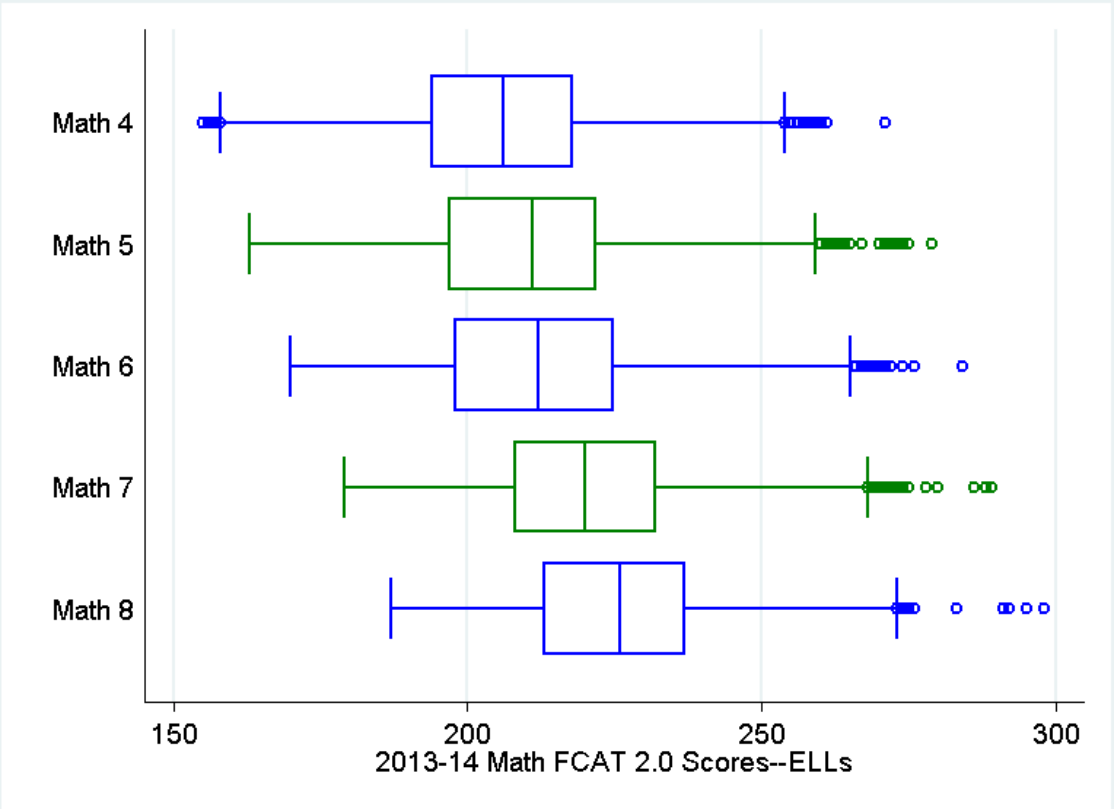
	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10
Reading 2013 to 2014	10.5	8.8	7.1	5.6	6.9	2.9	5.1
Reading 2012 to 2013	9.8	7.4	4.8	6.6	6.2	2.9	5.0
Math 2013 to 2014	13.7	5.9	6.3	10.3	7.8		
Math 2012 to 2013	12.6	6.1	4.6	9.2	6.9		

Differences in average growth between 2012-13 score and 2013-14 score are one reason models are run separately by grade and subject.

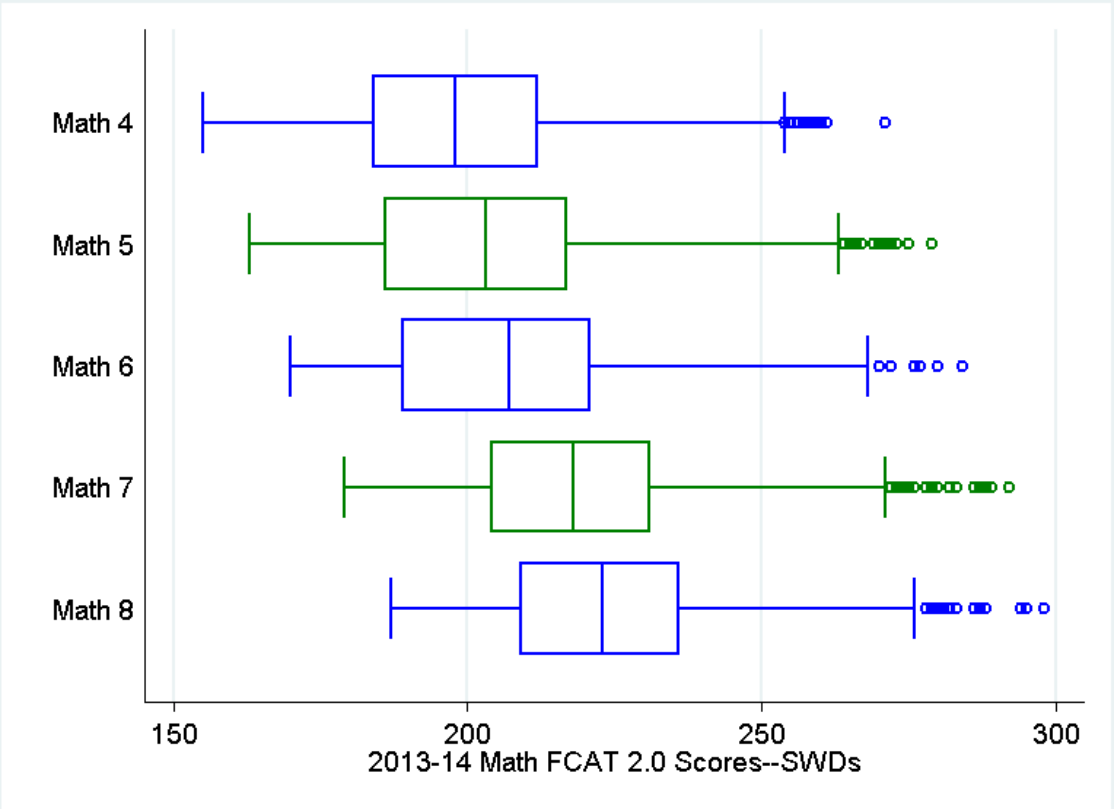
Distribution of 2013-14 FCAT 2.0 Math Scores by Grade—All Students



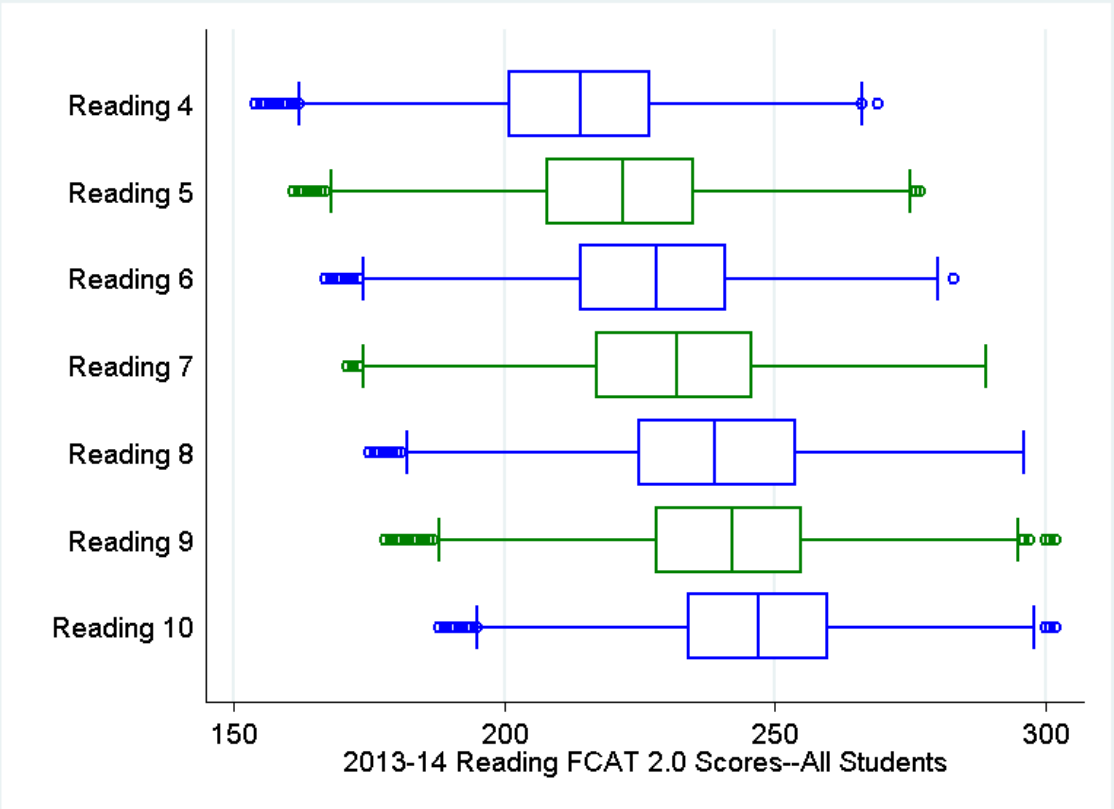
Distribution of 2013-14 FCAT 2.0 Math Scores by Grade—ELLs



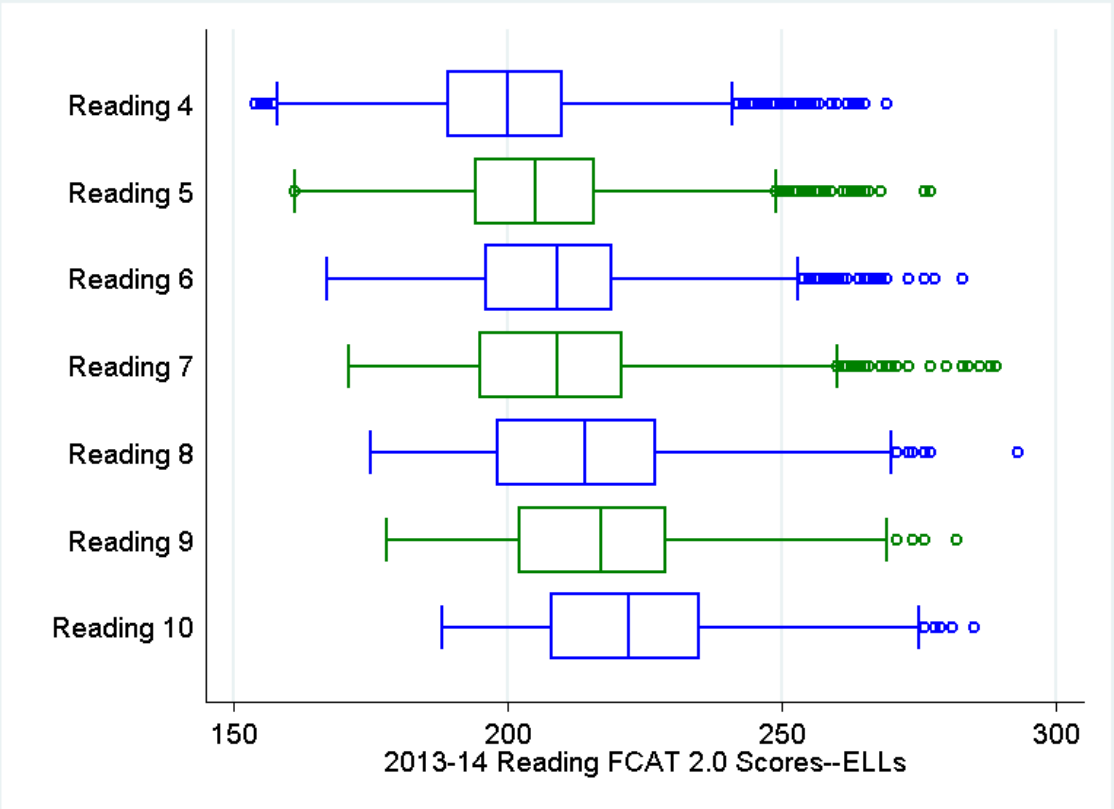
Distribution of 2013-14 FCAT 2.0 Math Scores by Grade—SWDs



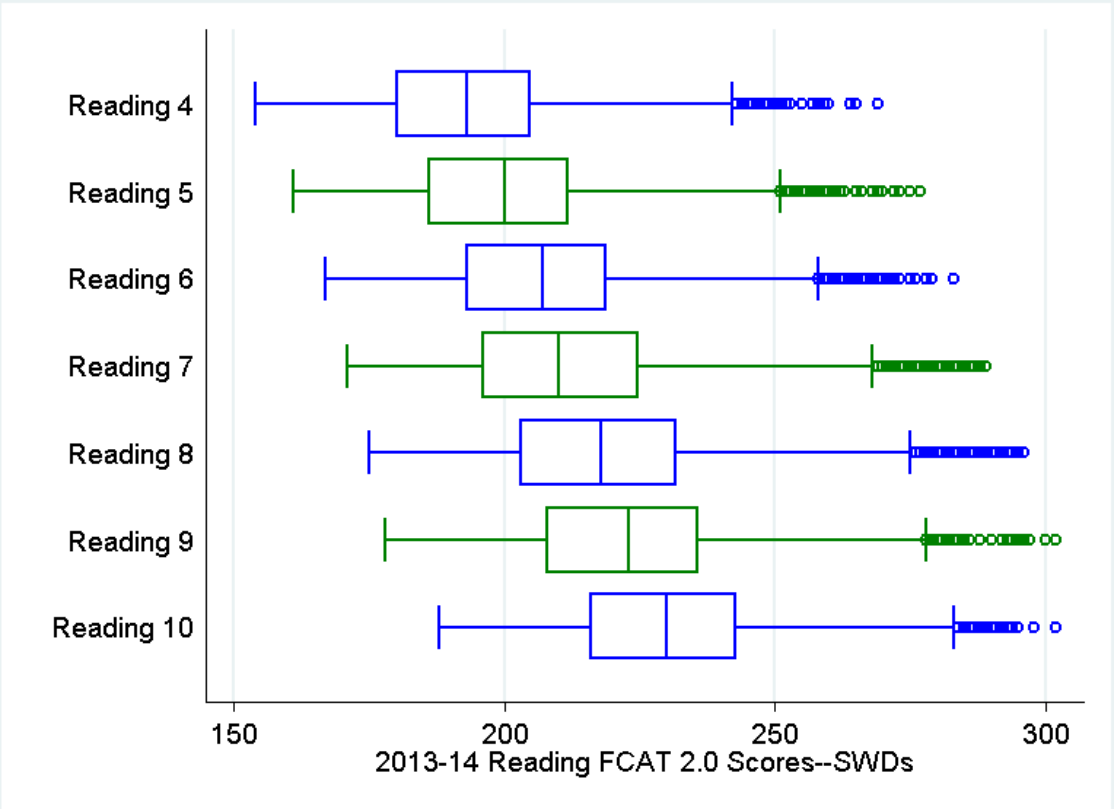
Distribution of 2013-14 FCAT 2.0 Reading Scores by Grade—All Students



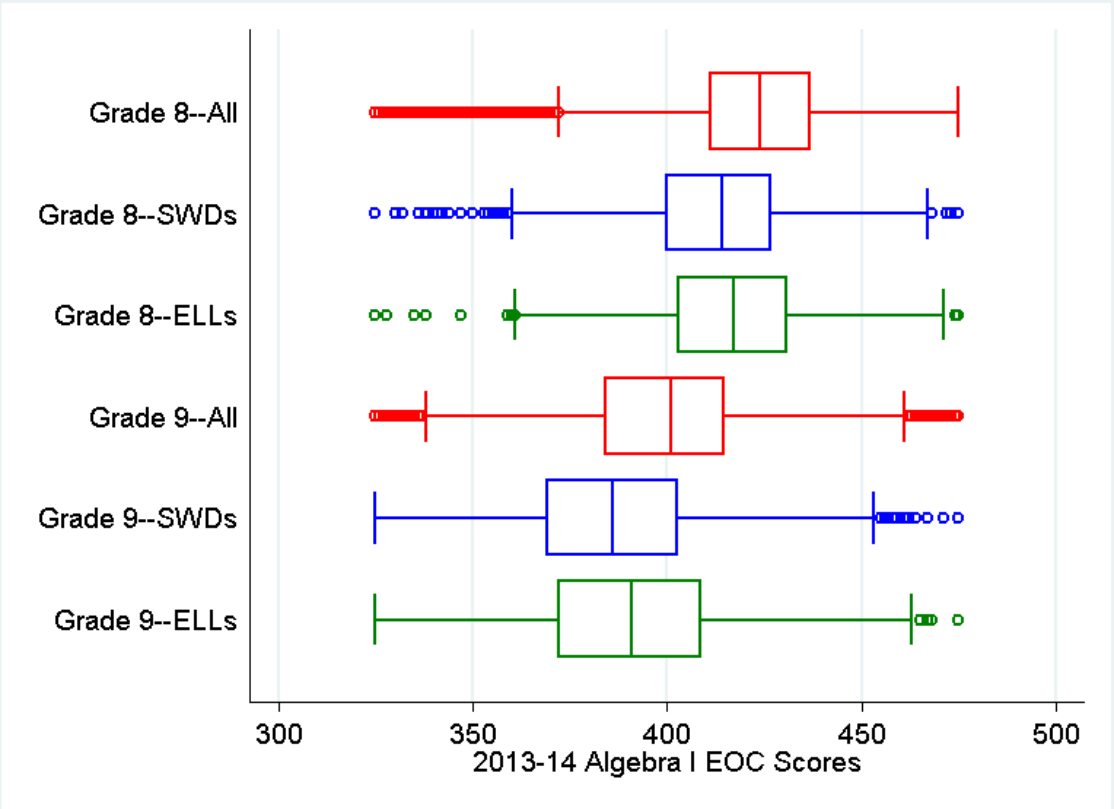
Distribution of 2013-14 FCAT 2.0 Reading Scores by Grade—ELLs



Distribution of 2013-14 FCAT 2.0 Reading Scores by Grade—SWDs



Distribution of 2013-14 Algebra I EOC Scores by Grade and Subgroup

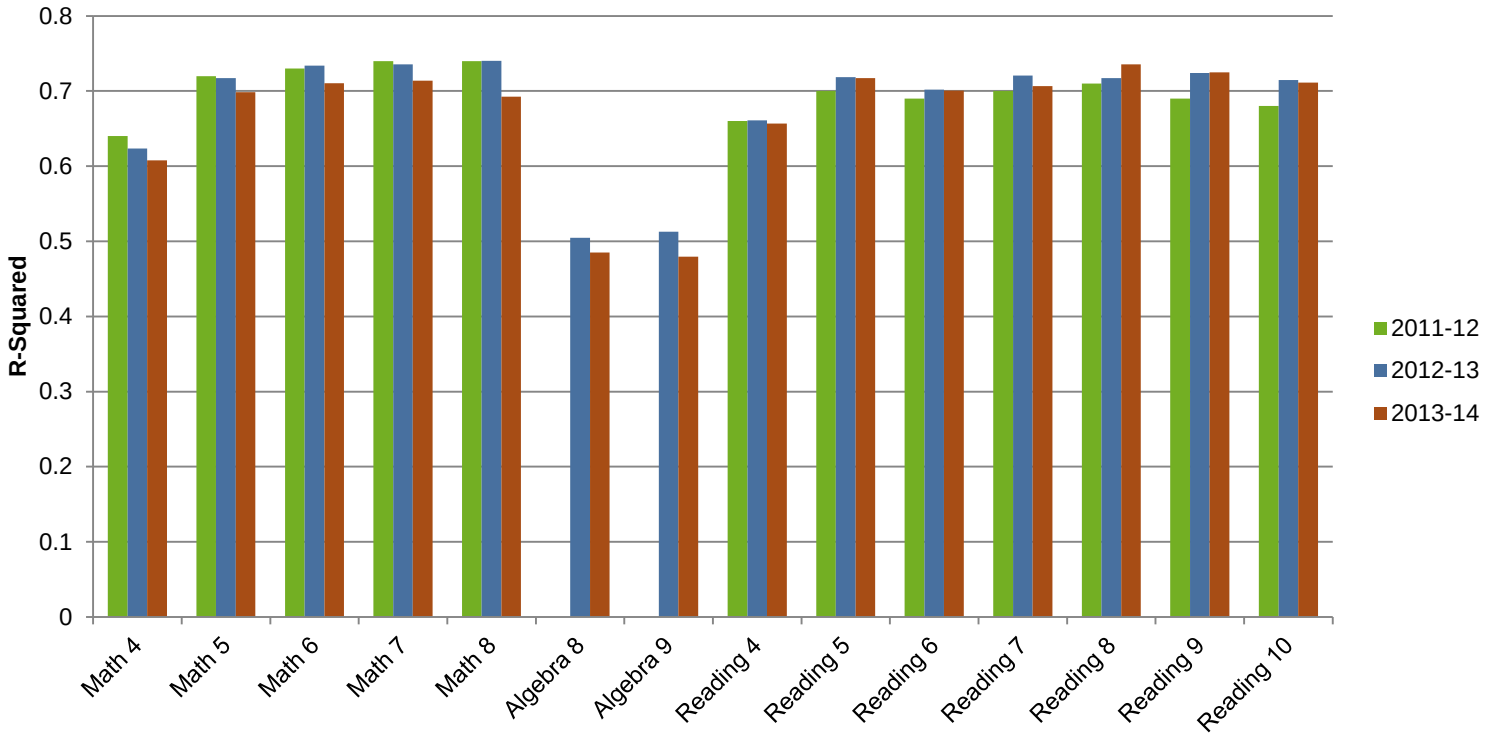


Shares of Students with Scores at the "Ceiling"

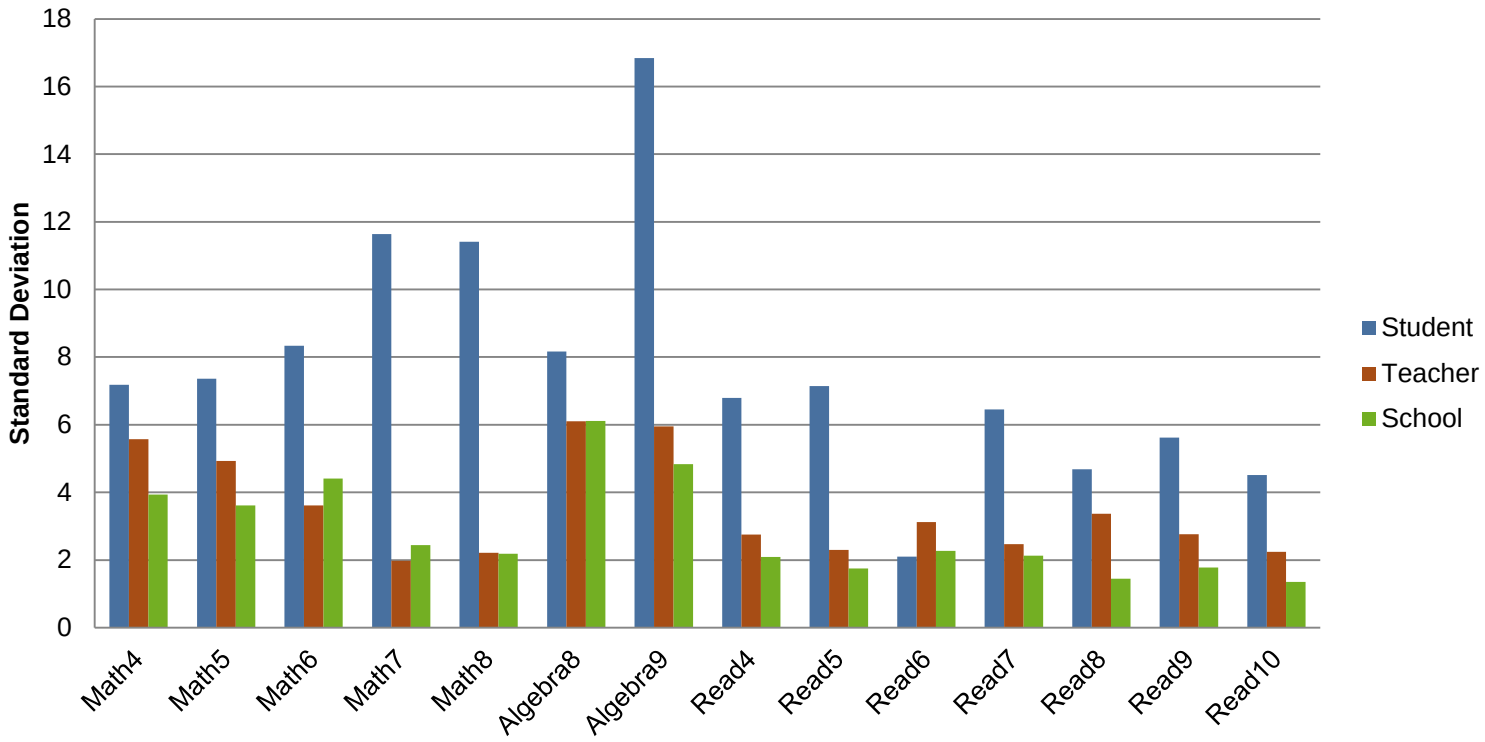
	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10
At HOSS Reading	1.0%	1.1%	1.0%	1.1%	1.3%	0.6%	1.0%
At HOSS Math	2.5%	0.5%	0.6%	0.3%	0.4%		
At HOSS Algebra					1.4%	0.0%	

Model Results

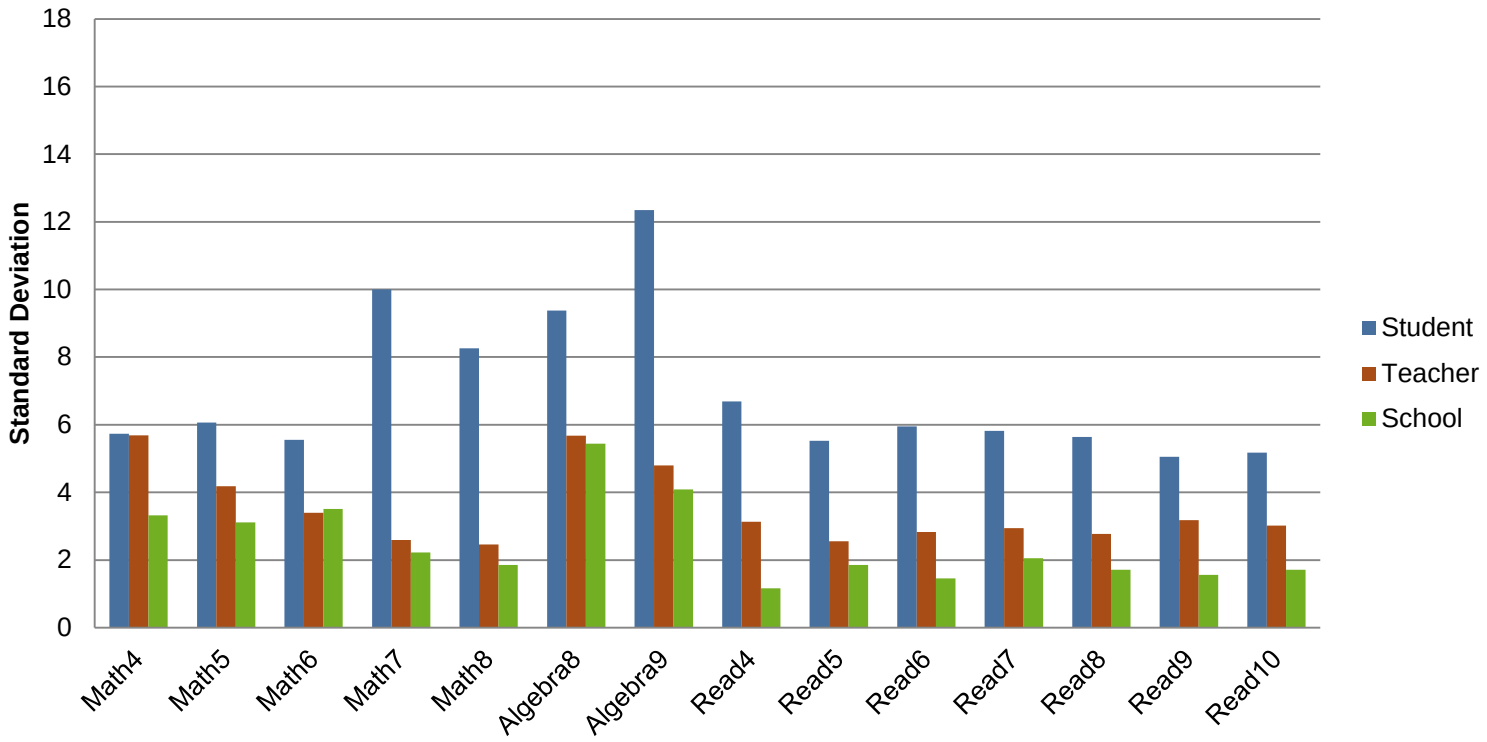
R-Squared Measures How Well Model Fits the Data



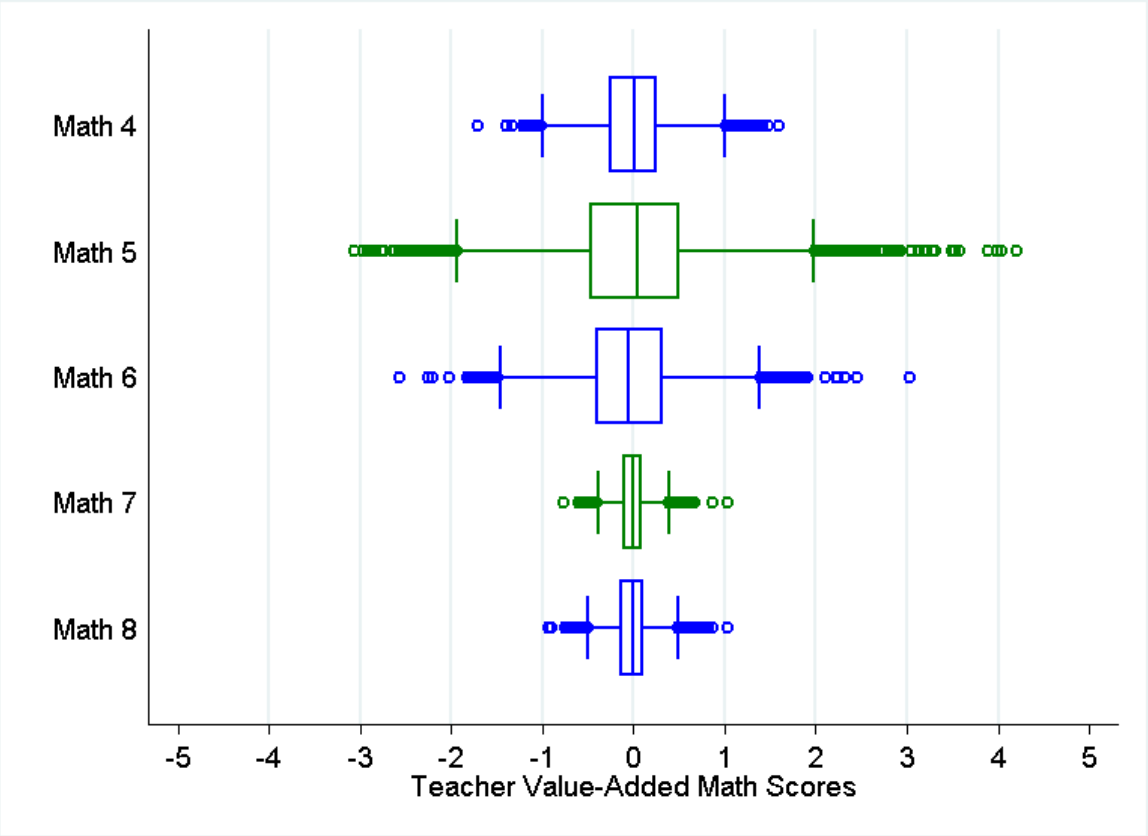
2013-14 Model Variance Components



2012-13 Model Variance Components



2014 Distribution of Teachers Math VAM Scores by Grade



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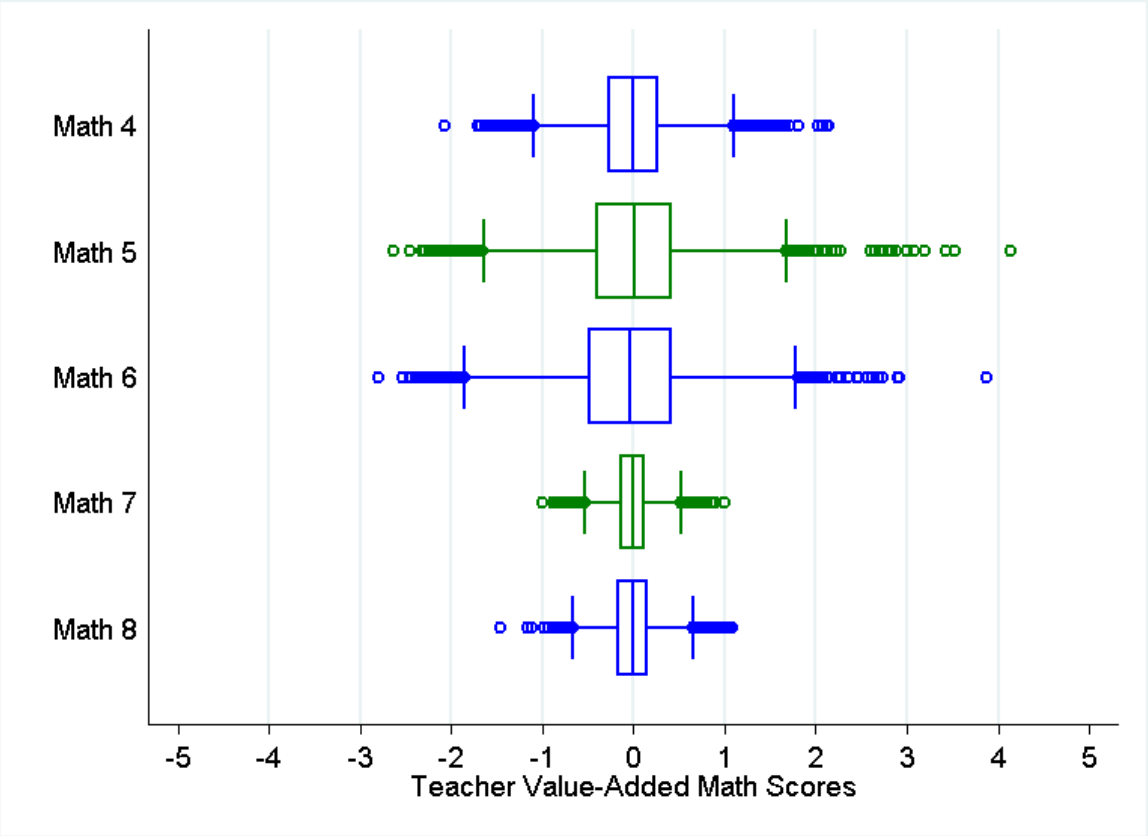
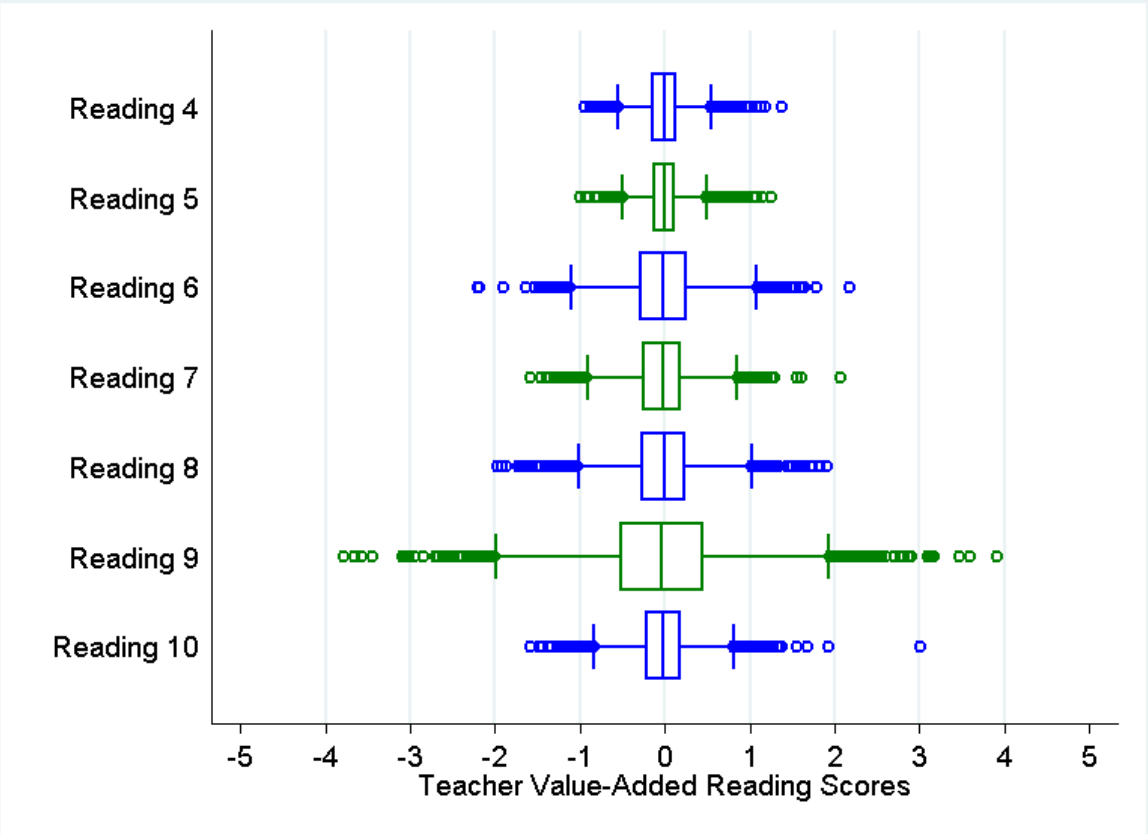
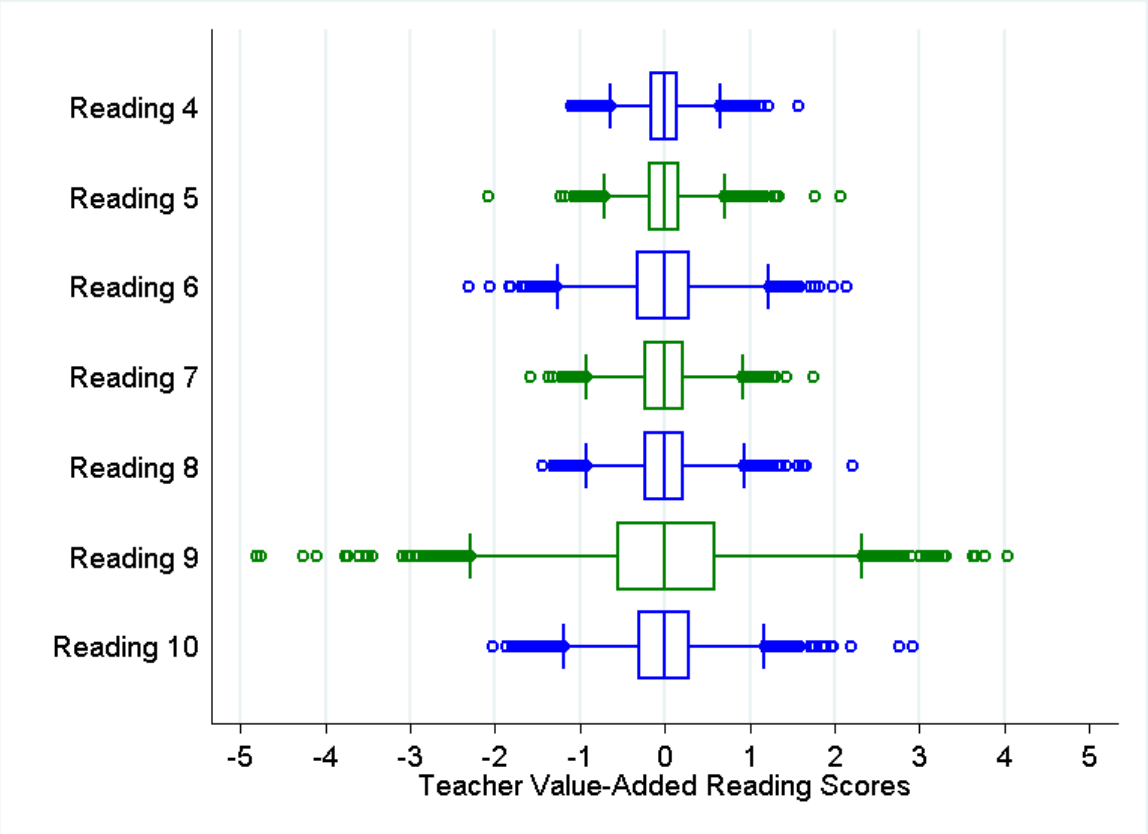


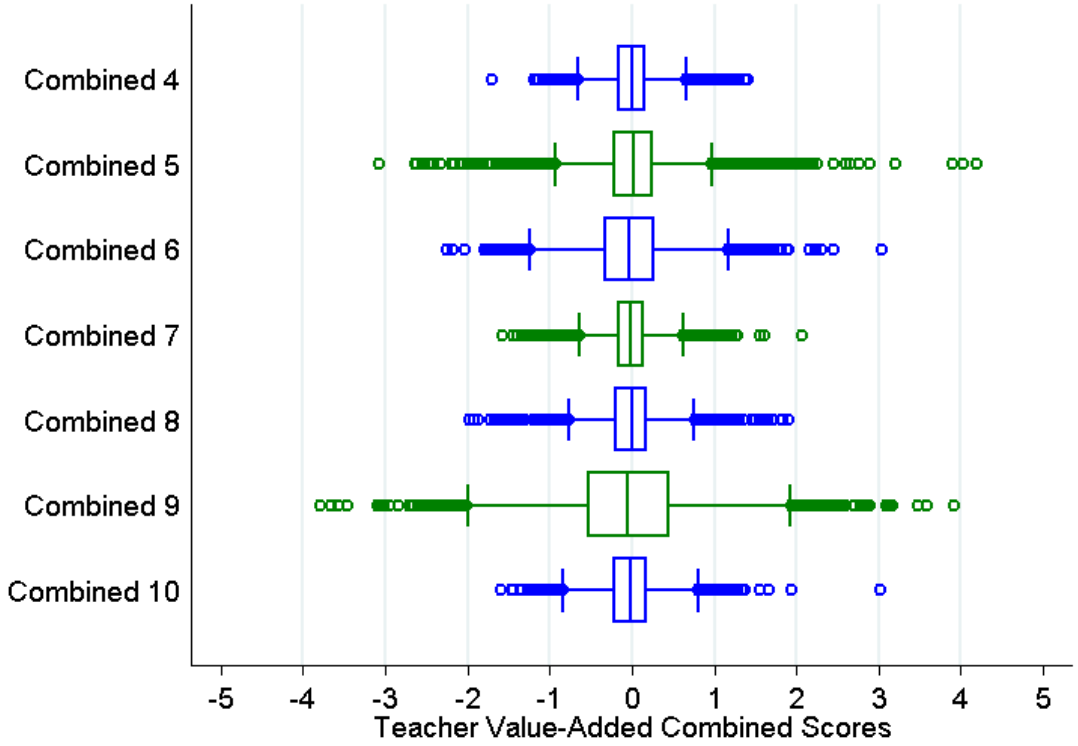
2014 Distribution of Teachers Reading VAM Scores by Grade



2013 Distribution of Teachers Reading VAM Scores by Grade



2014 Distribution of Teachers Combined VAM Scores by Grade



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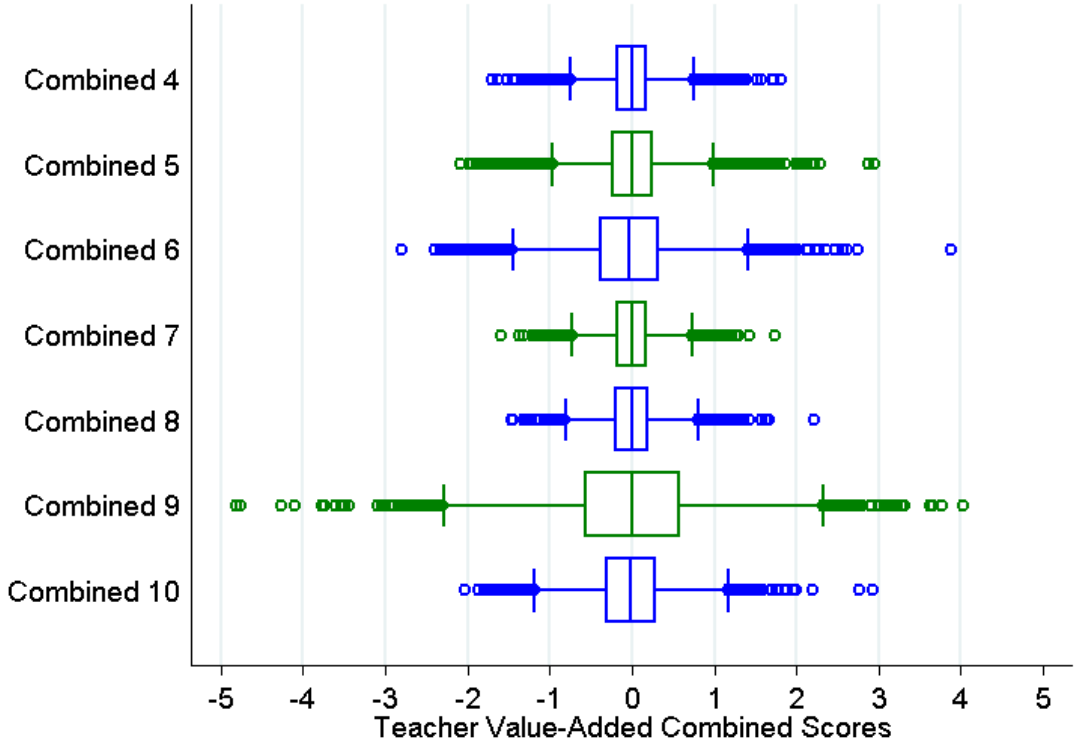
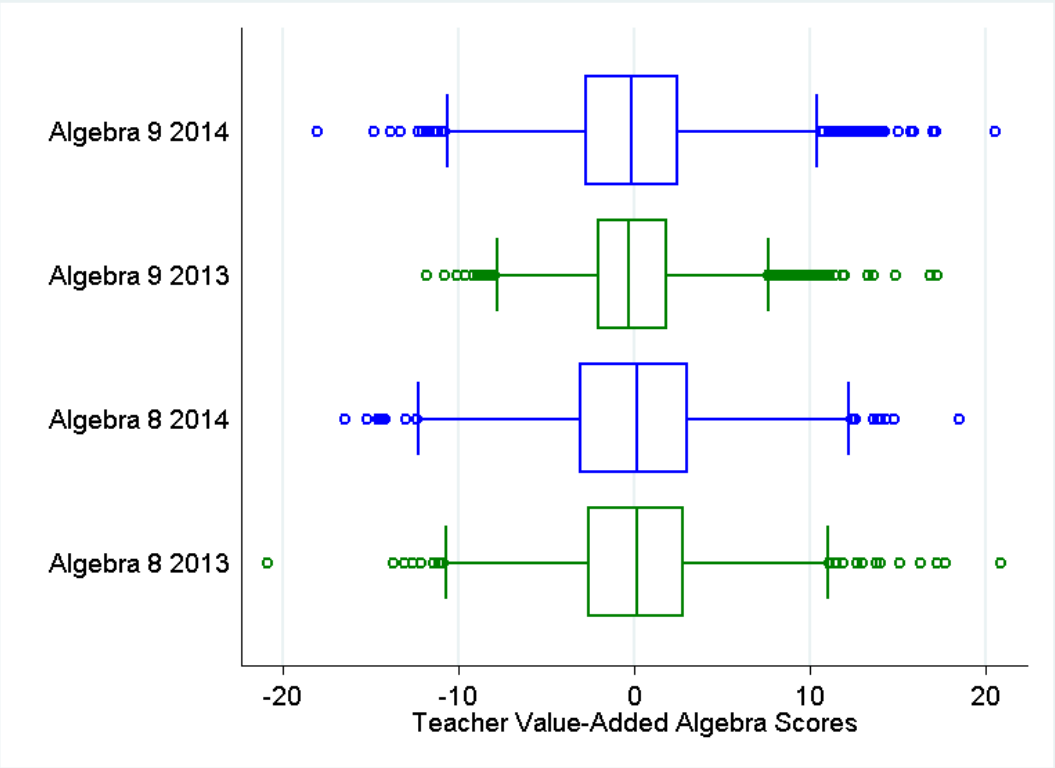
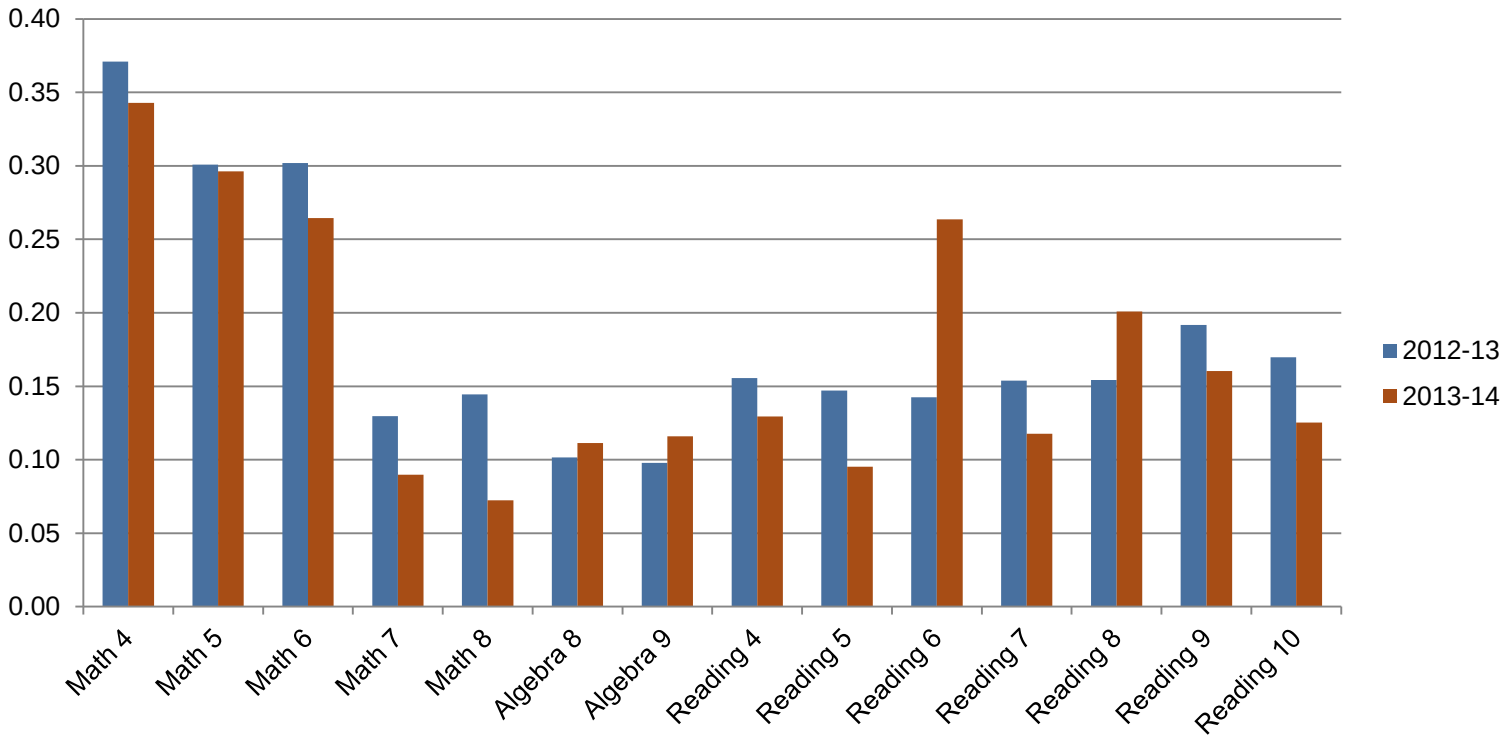


Note: Combined 9 and Combined 10 Include Only Reading Teachers

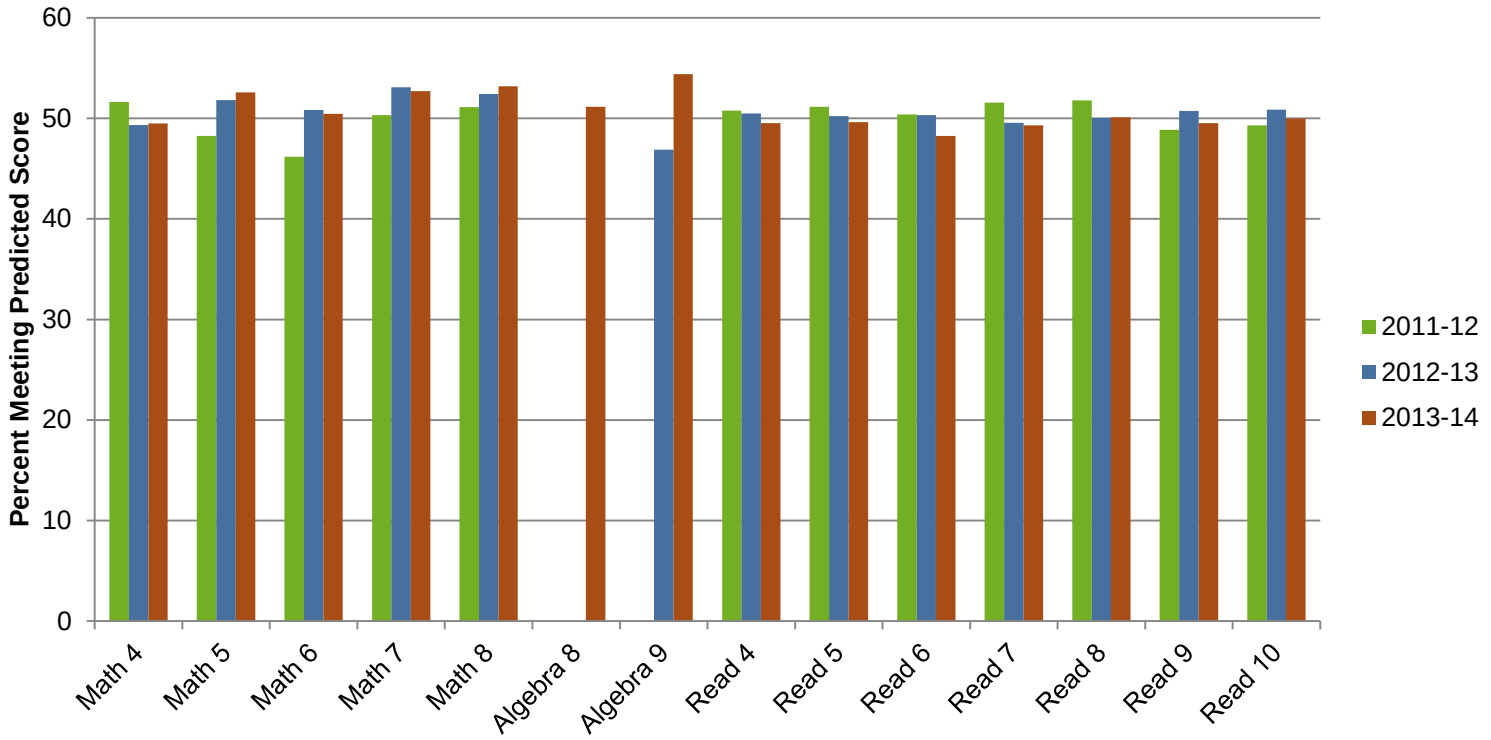
Distribution of Teacher Algebra I EOC VAM Scores



Share of Teachers Significantly Different Than Average (p = 0.05)



Share of Students Scoring at or Above Predicted Score



Note: In 2013-14 only, students scoring at the highest attainable scale score are included in set of students scoring at or above their predicted scores

Model Impact Results

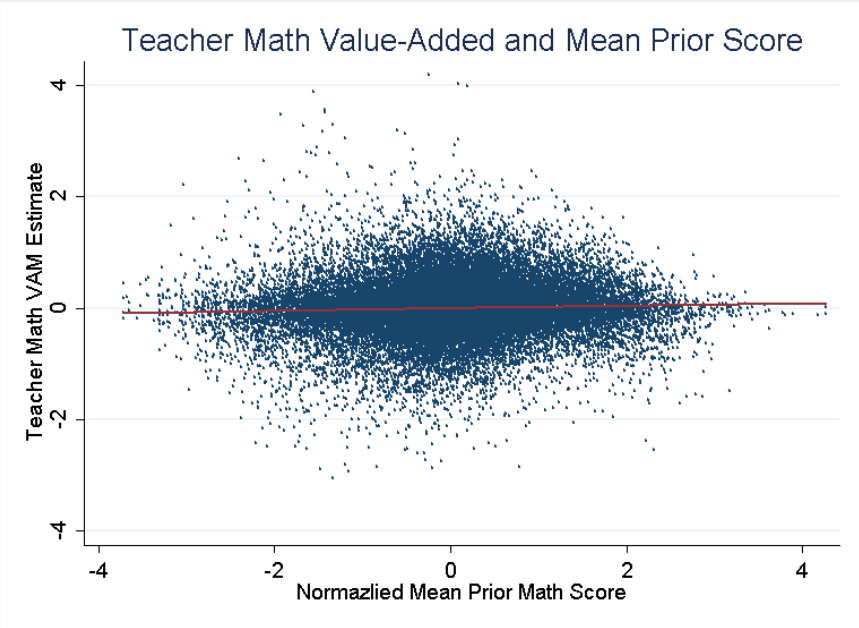
Impact Data Results

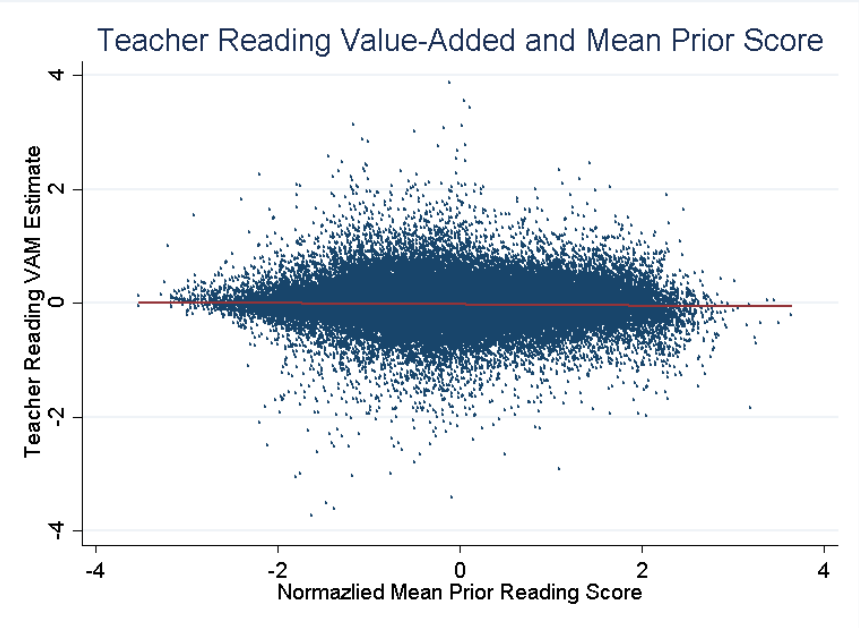
- Impact data show the relationship of the teacher score to various classroom characteristics
- There are several ways to interpret a non-zero relationship, including the following:
  - The model does not fully account for non-random assignment of students to teachers
  - Classroom characteristics affect the rate of student learning
  - There are real differences in teacher effectiveness, which are correlated with classroom characteristics

Observed Correlations with Teacher VAM Scores

	Mean Prior	%ED	%SWD	%ELL	%Non-White	% at HOSS
Math 2014	0.05	-0.07	-0.04	-0.01	-0.07	0.18
Math 2013	0.01	-0.08	-0.04	-0.01	-0.08	
Reading 2014	-0.03	-0.05	0.00	0.01	-0.04	0.09
Reading 2013	0.01	-0.09	-0.01	-0.01	-0.02	
Algebra 9 2014	0.07	-0.02	-0.09	0.06	0.03	0.15
Algebra 9 2013	0.06	-0.04	-0.03	0.04	0.00	
Algebra 8 2014	0.17	-0.09	-0.05	0.01	-0.02	0.31

Teacher VAM Score and Mean Prior Student Score





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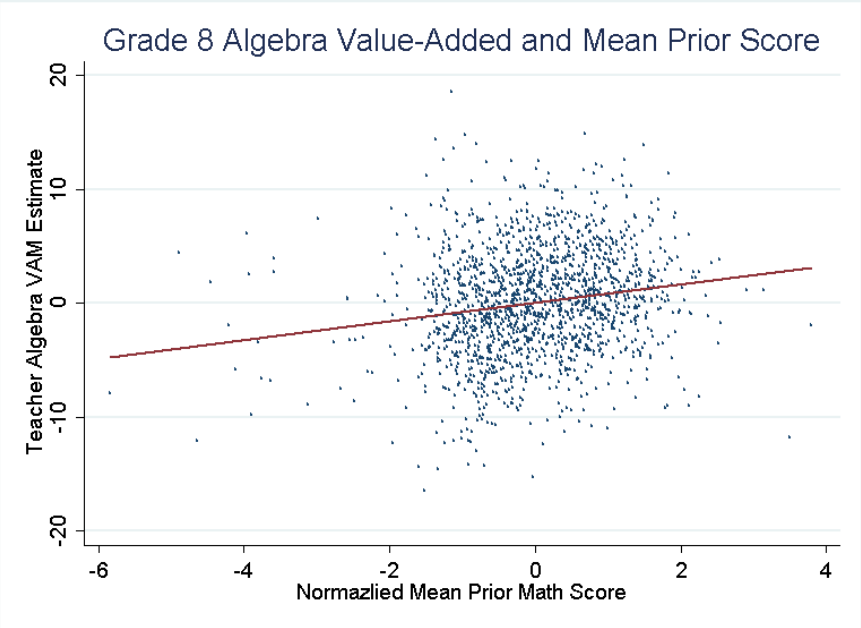
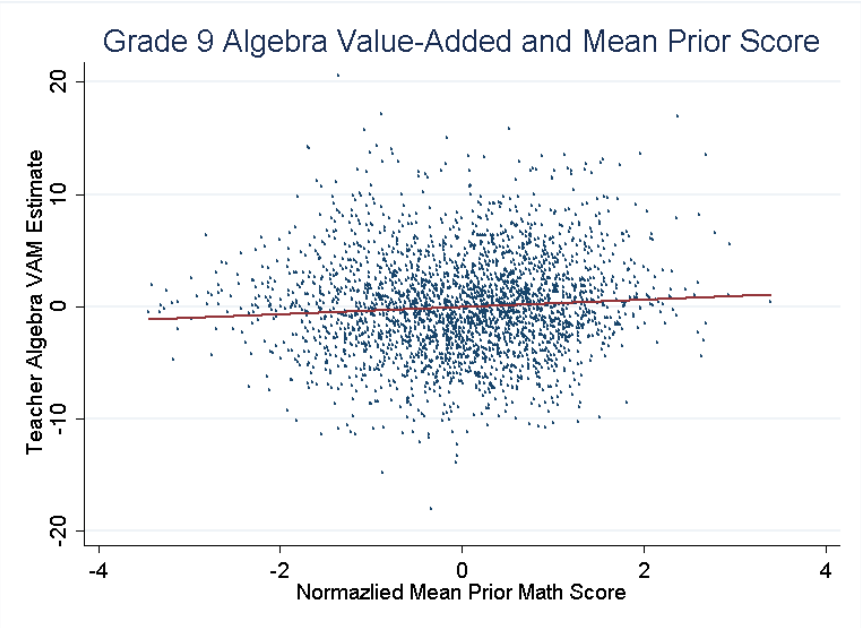
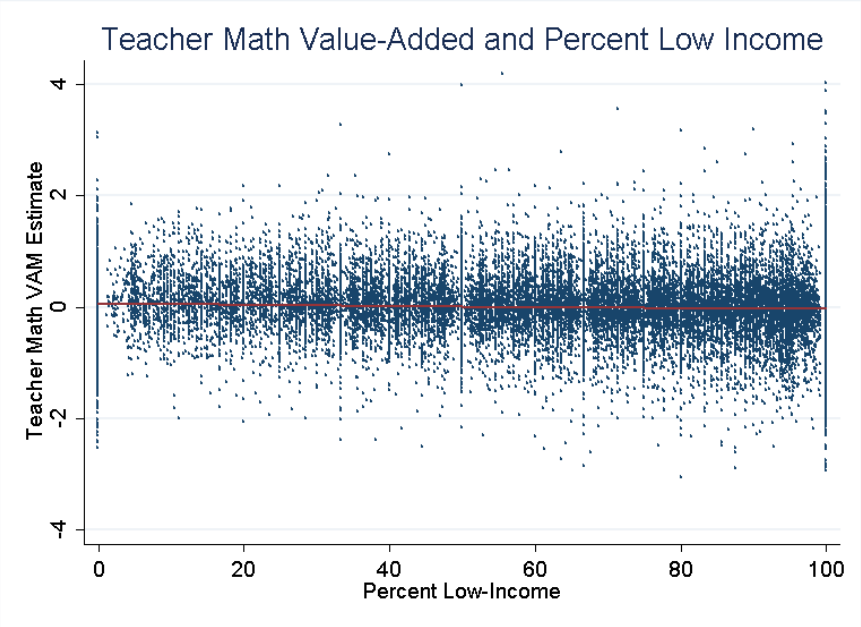
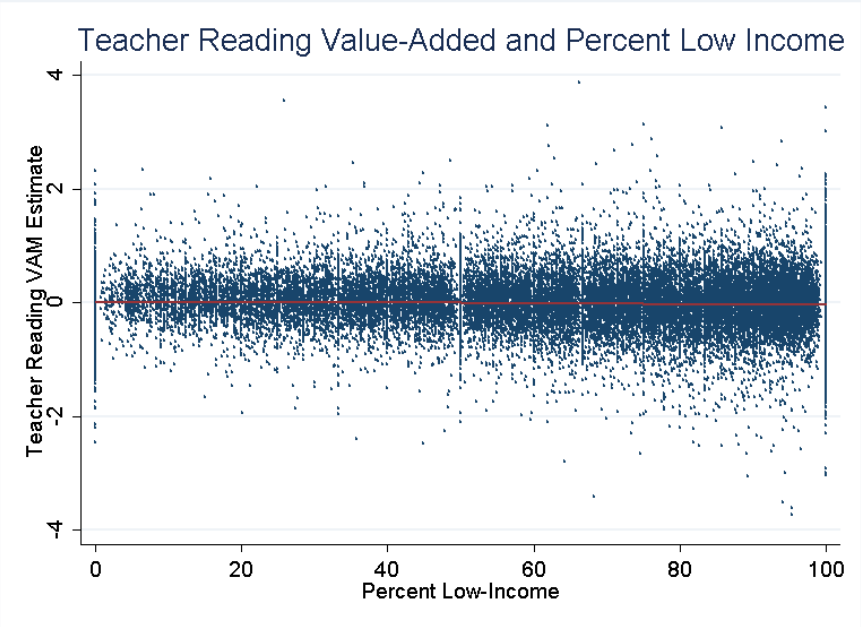




Teacher VAM Score and Share of Students Who Are Low-Income





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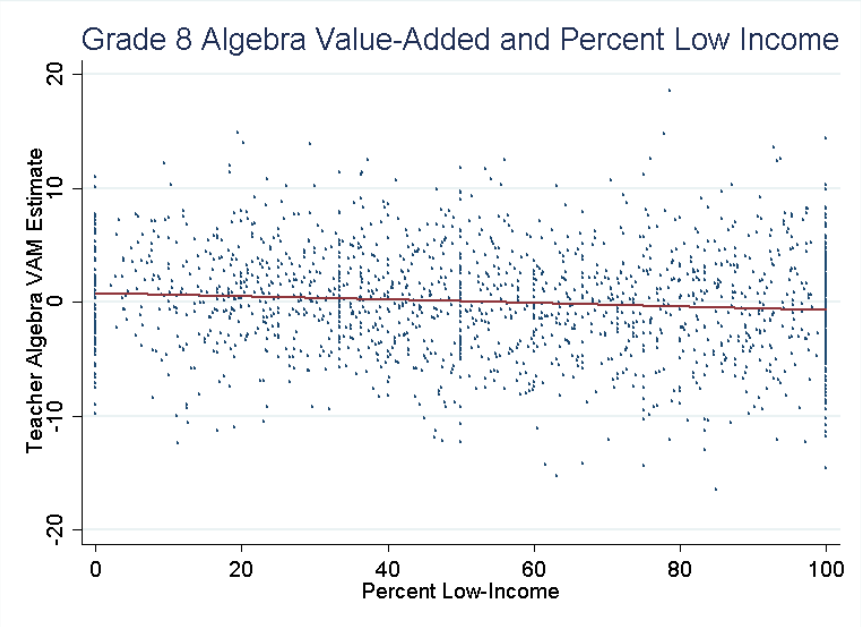
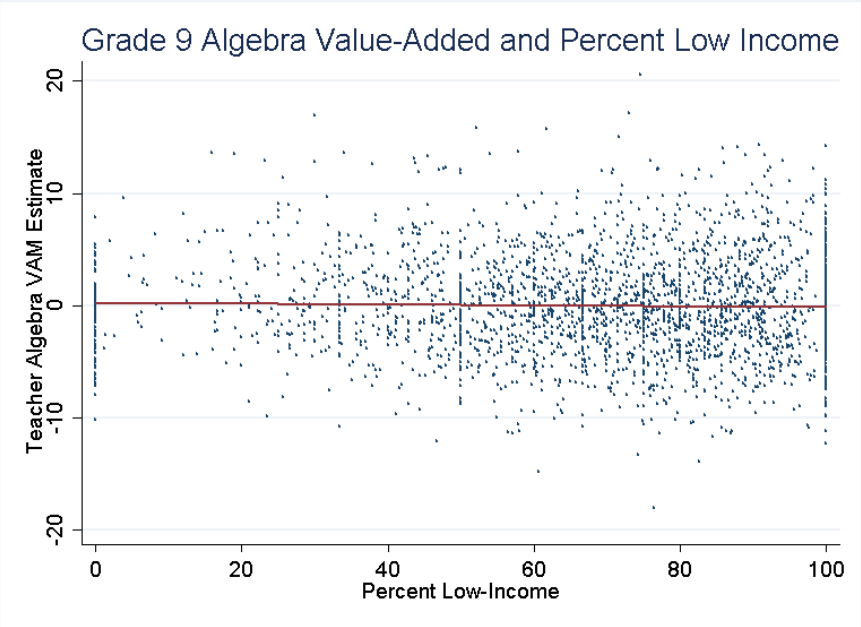
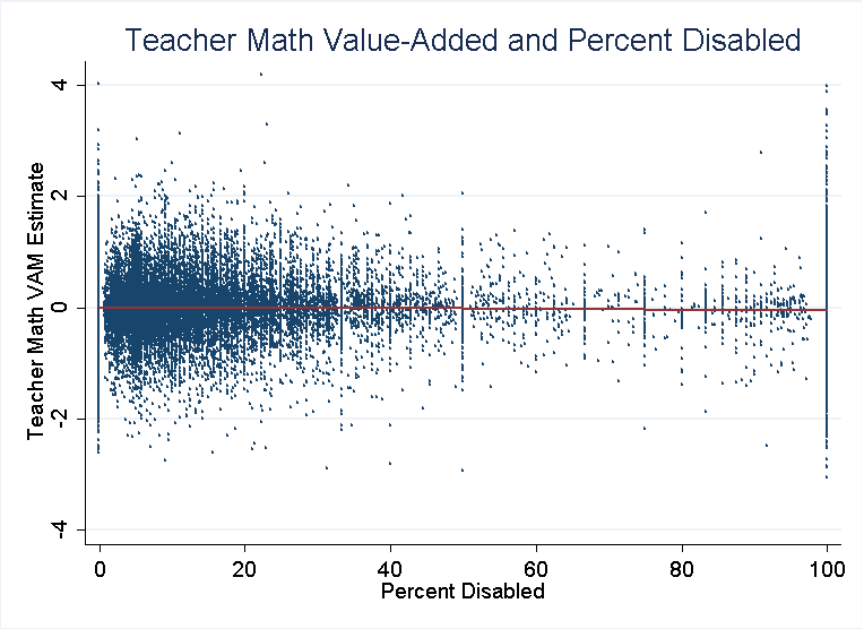
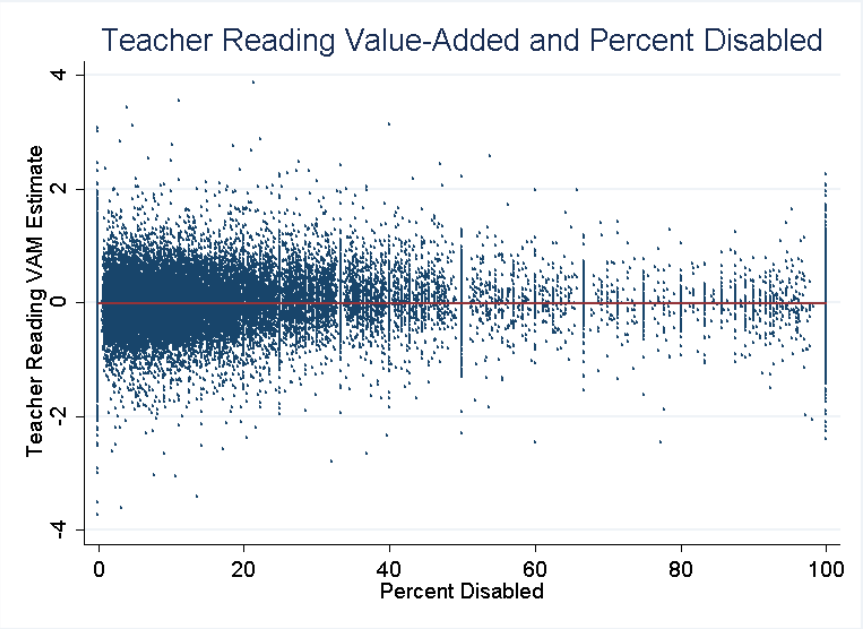


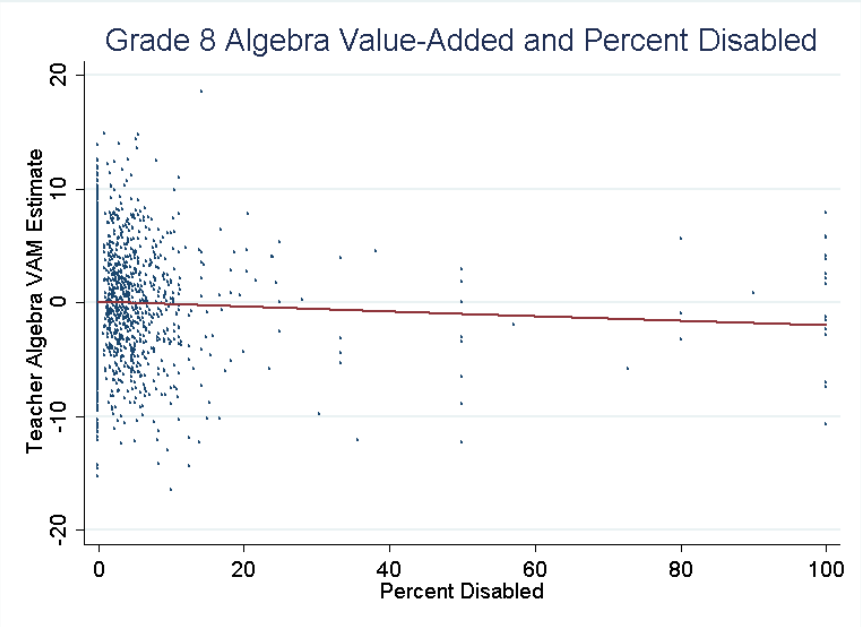


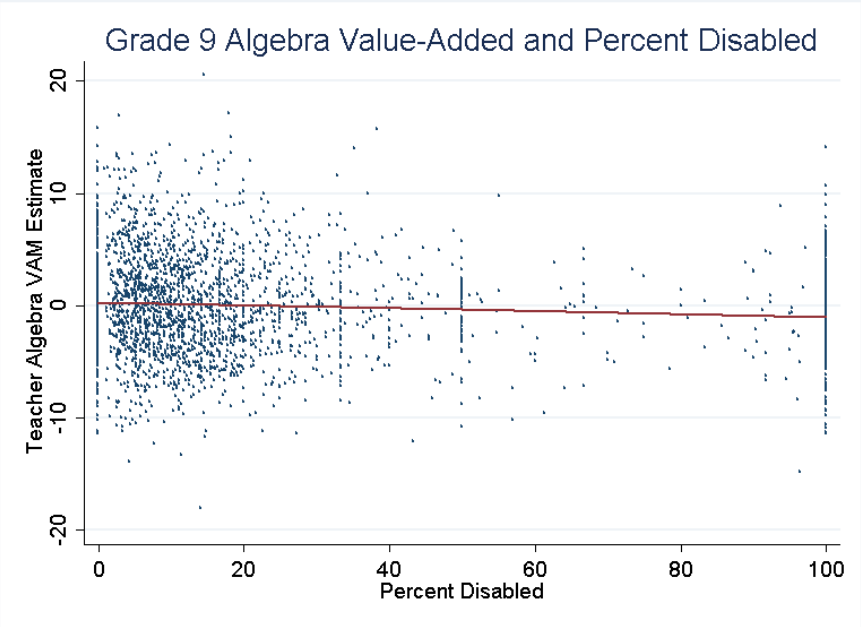
Teacher VAM Score and Share of Students Who Are Disabled



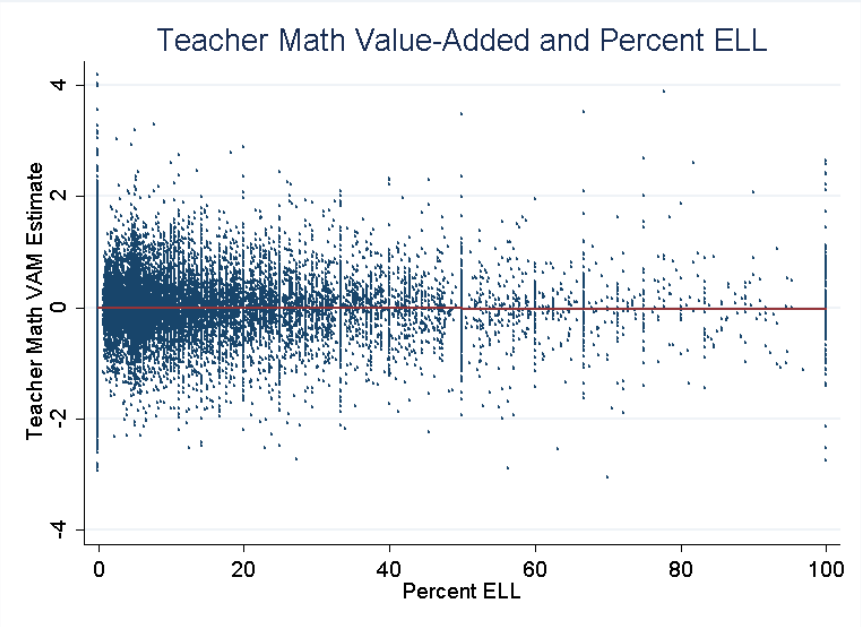


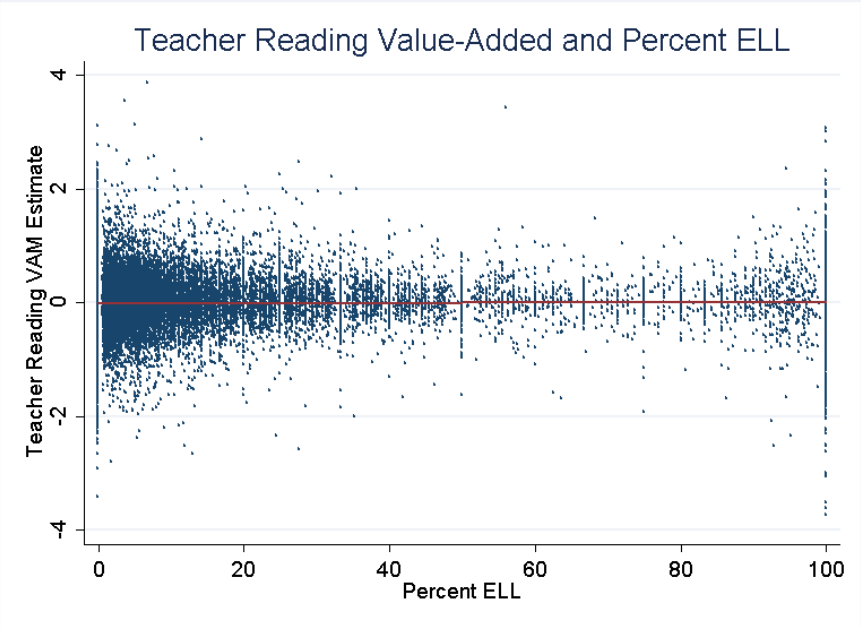
Teacher VAM Score and Share of Students Who Are Disabled



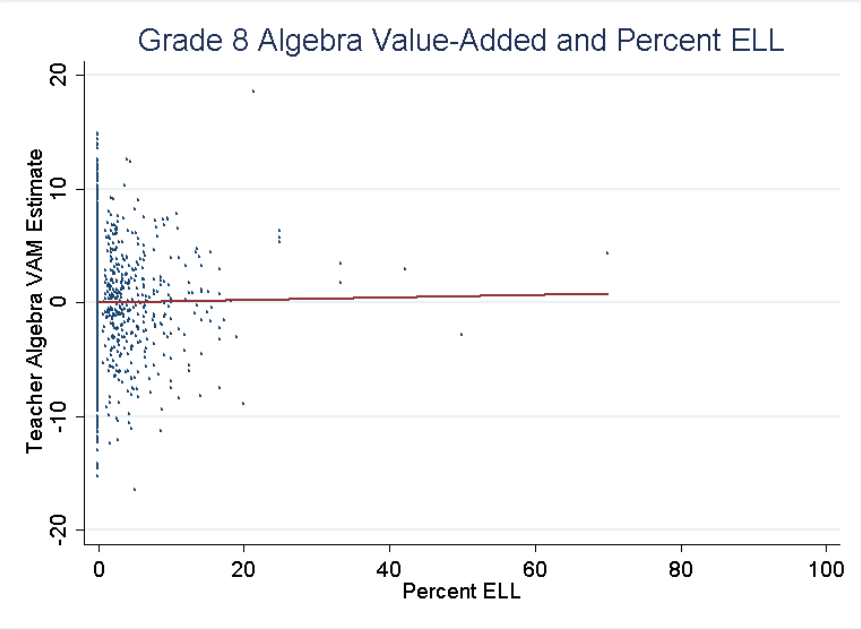


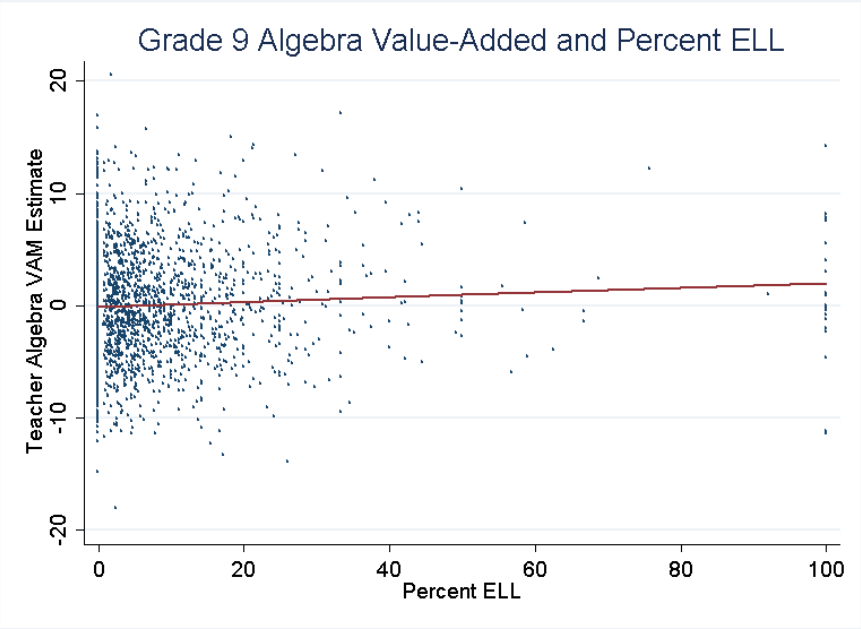
Teacher VAM Score and Share of Students Who Are English Learners



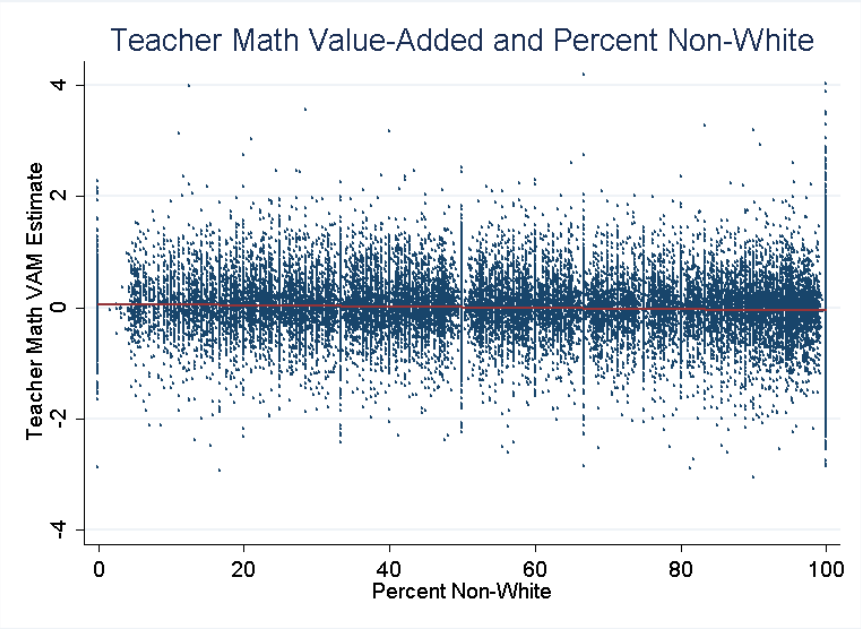


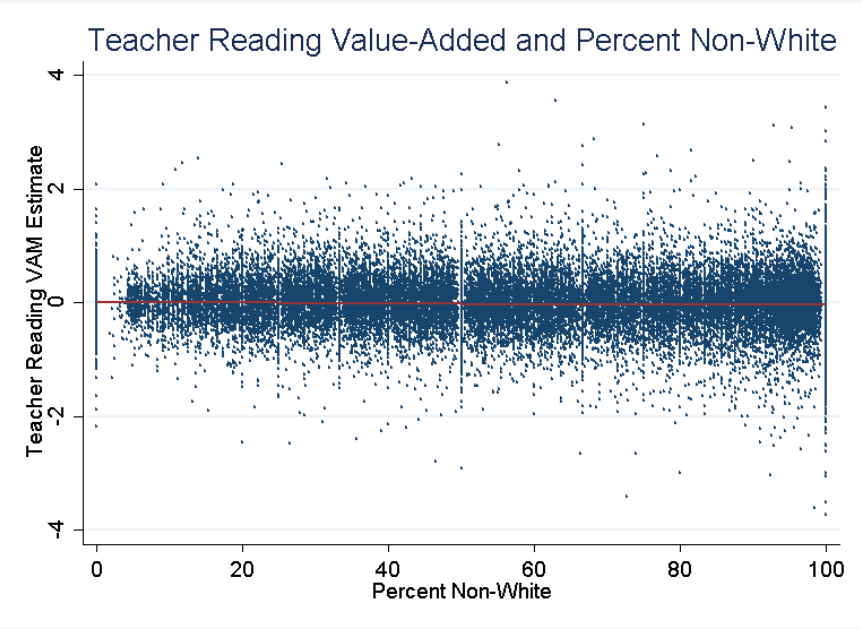
Teacher VAM Score and Share of Students Who Are English Learners



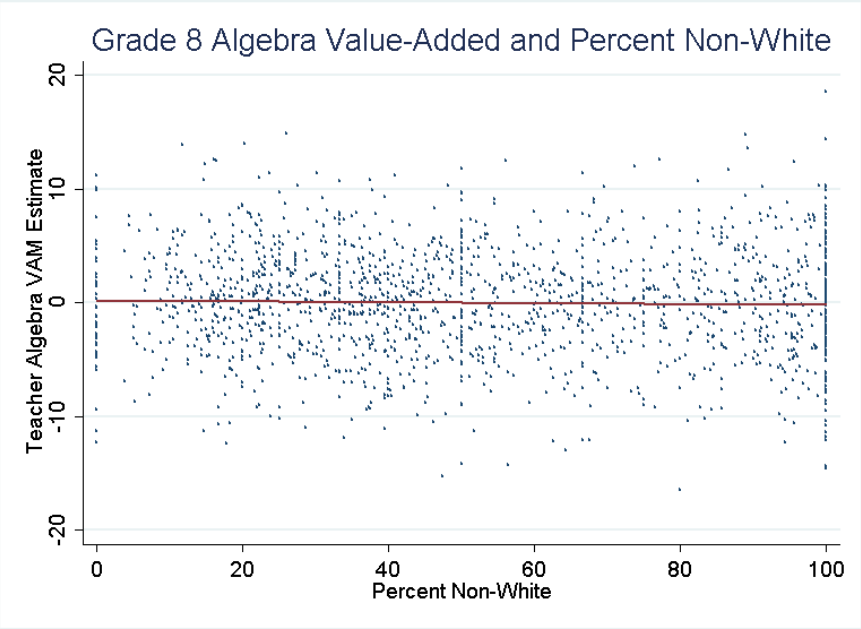


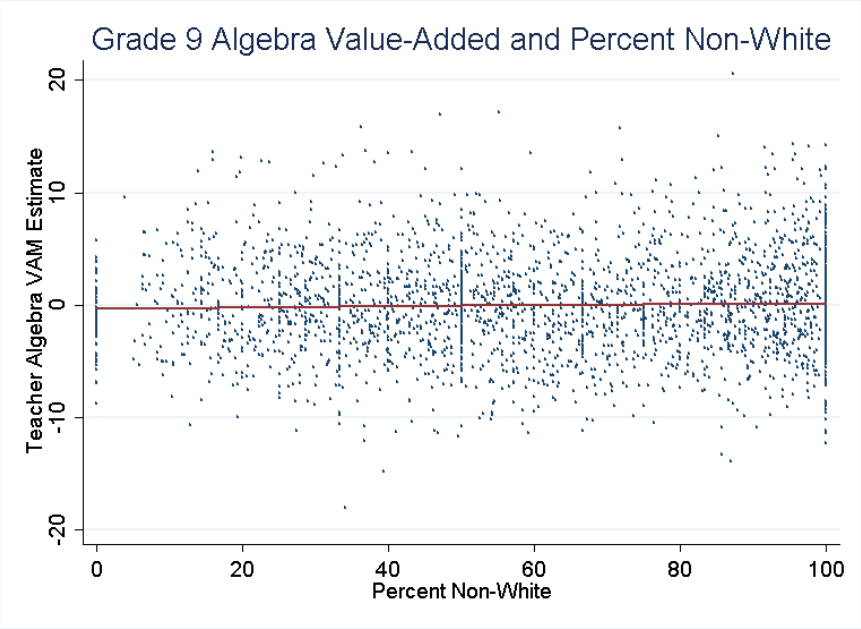
Teacher VAM Score and Share of Students Who Are Non-White



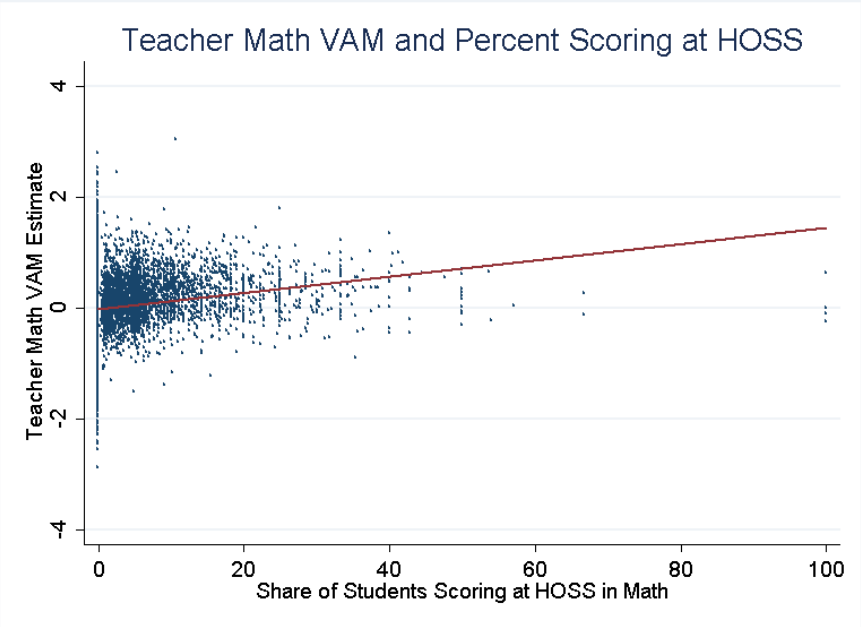


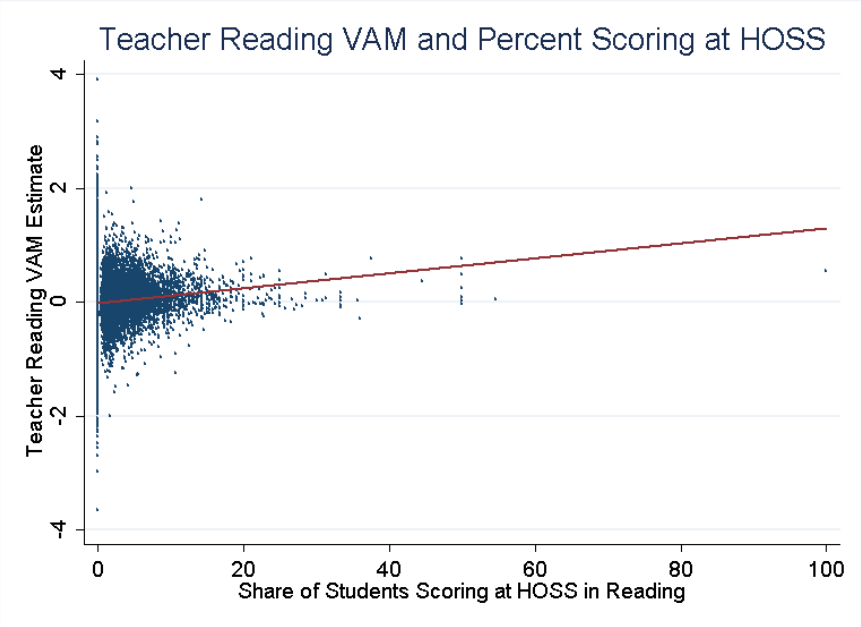
Teacher VAM Score and Share of Students Who Are Non-White



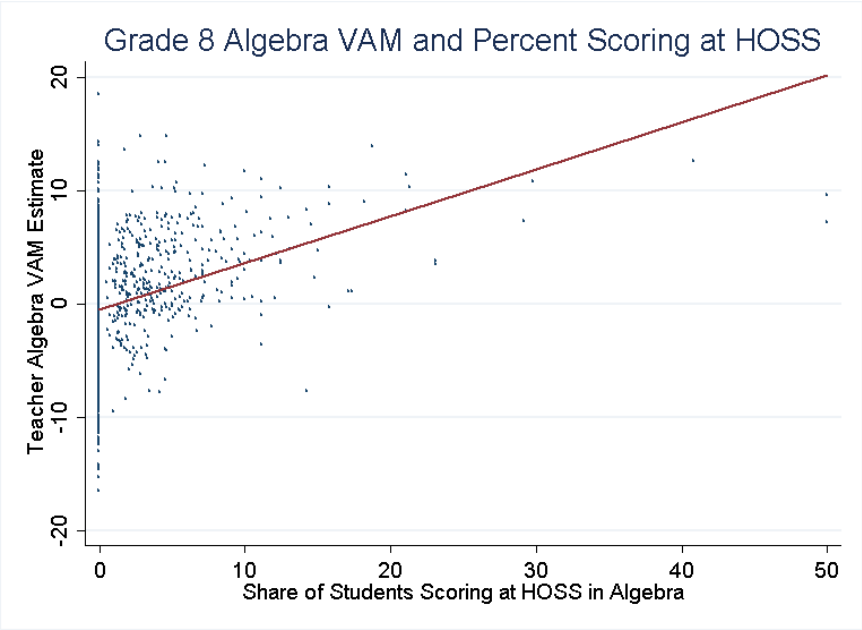


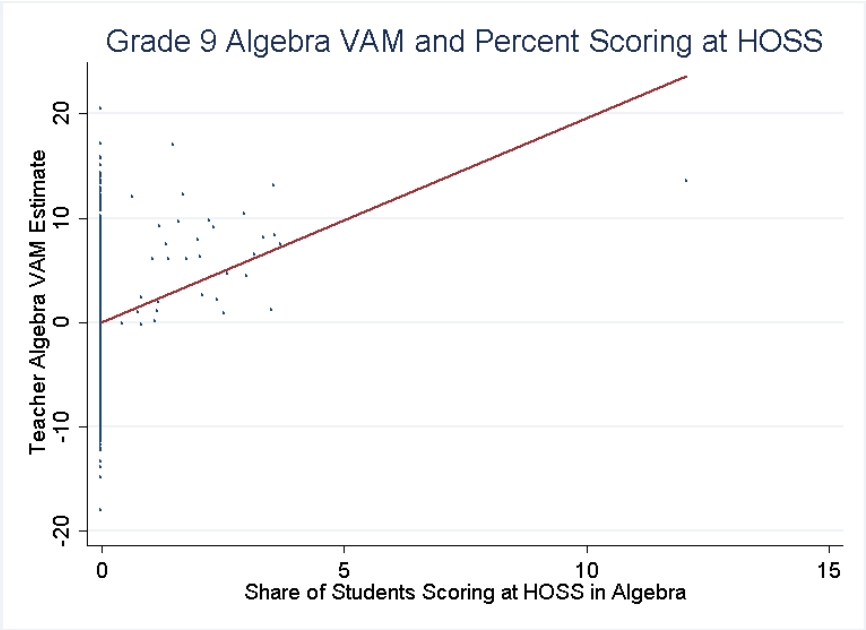
Teacher VAM Score and Share of Students Scoring at HOSS





Teacher VAM Score and Share of Students Scoring at HOSS





Summary

- 2013-14 and 2012-13 FCAT and EOC model results are similar.
- Shares of teachers significantly different than average in 2013-14 similar to shares in 2012-13, with exception of Reading 6.
- In both years, shares of teachers significantly different than average are higher in Math 4-6

Summary

- Impact data demonstrate no systematic relationship between teacher VAM scores and student demographics.
  - As was the case in prior years, grade 8 Algebra is an exception.
- Pattern of variance components in middle school grades, particularly grade 6, is different than pattern in other grades, but similar to pattern of middle school grades in prior years and in other VAM projects.

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Fixed Effects Example: Grade 6 Math 2013-14 (1 of 2)

Effect Name	Effect	Standard Error	p-Value
Constant Term	-18.511	2.795	0.000
Achievement: Prior Year	0.854	0.005	0.000
Achievement: Two Years Prior	0.152	0.005	0.000
Missing value indicator for 2011-12 score	33.631	0.973	0.000
Language Impaired	0.200	0.159	0.208
Deaf or Hard of Hearing	-0.195	0.652	0.765
Visually Impaired	2.315	1.029	0.024
Emotional/Behavioral Disability	-3.113	0.349	0.000
Specific Learning Disability	-2.333	0.119	0.000
. . .			
Enrolled in 2 or more Courses	4.244	0.142	0.000
Enrolled in 3 or more Courses	-0.496	0.72	0.491
Enrolled in 4 or more Courses	-39.453	9.156	0.000

Fixed Effects Example: Grade 6 Math 2013-14 (2 of 2)

Effect Name	Effect	Standard Error	p-Value
Heterogeneity of Class 1 Prior Year Test Scores	-0.019	0.005	0.000
. . .			
Number of Students in Class 1	-0.014	0.006	0.030
. . .			
Difference from Modal Age	-1.536	0.055	0.000
Mobility: Number of School Transfers	-0.615	0.121	0.000
Percent days attended	18.925	0.582	0.000
Gifted Student Indicator	0.081	0.106	0.444
In ELL for less than 2 years	2.038	0.265	0.000
In ELL between 2-4 years	1.535	0.220	0.000
In ELL between 4-6 years	-0.943	0.298	0.002
In ELL greater than 6 years	-1.392	0.15	0.000