



Exhibit G



Performance & Funding

Raifu Durodoye Jr., PhD
Patrick McClellan
Lauren Outlaw
WestEd

Presentation to the Senate Committee on Education and the House Committee on Education, Little Rock, Arkansas September 8, 2020

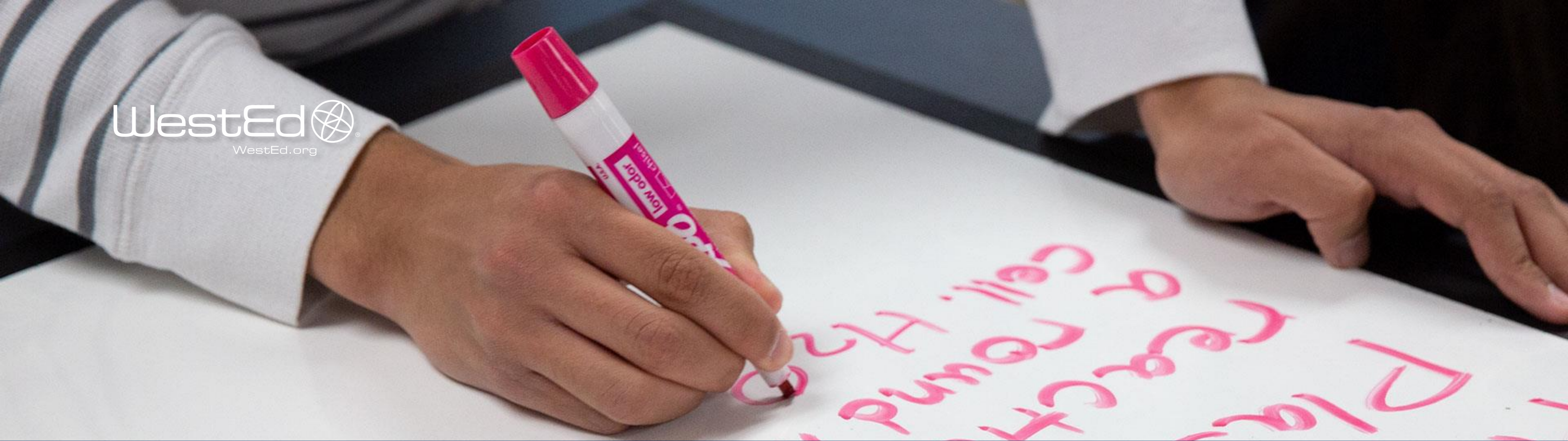


Roadmap

1. Key Findings

2. Methodology

3. Analysis Overview



Key Findings

Performance and Funding: Key Findings

- **Schools that spend more per-pupil have larger high need student populations compared to schools that spend less per-pupil.**
 - Per-pupil spending increases as the percentage of low-income, SPED, LEP, and urm students in a school increases.
- **On average, students that received higher per-pupil funding amounts in 2018 did not perform substantially better in Math or ELA compared to students that received less.**
 - There was a slight negative correlation between per-pupil spending and ACT Aspire scores in 2018.
 - In 2018, per-pupil funding did not equate to substantive gains in ELA and Math ACT Aspire scale score performance when controlling for other factors.



Data & Methodology

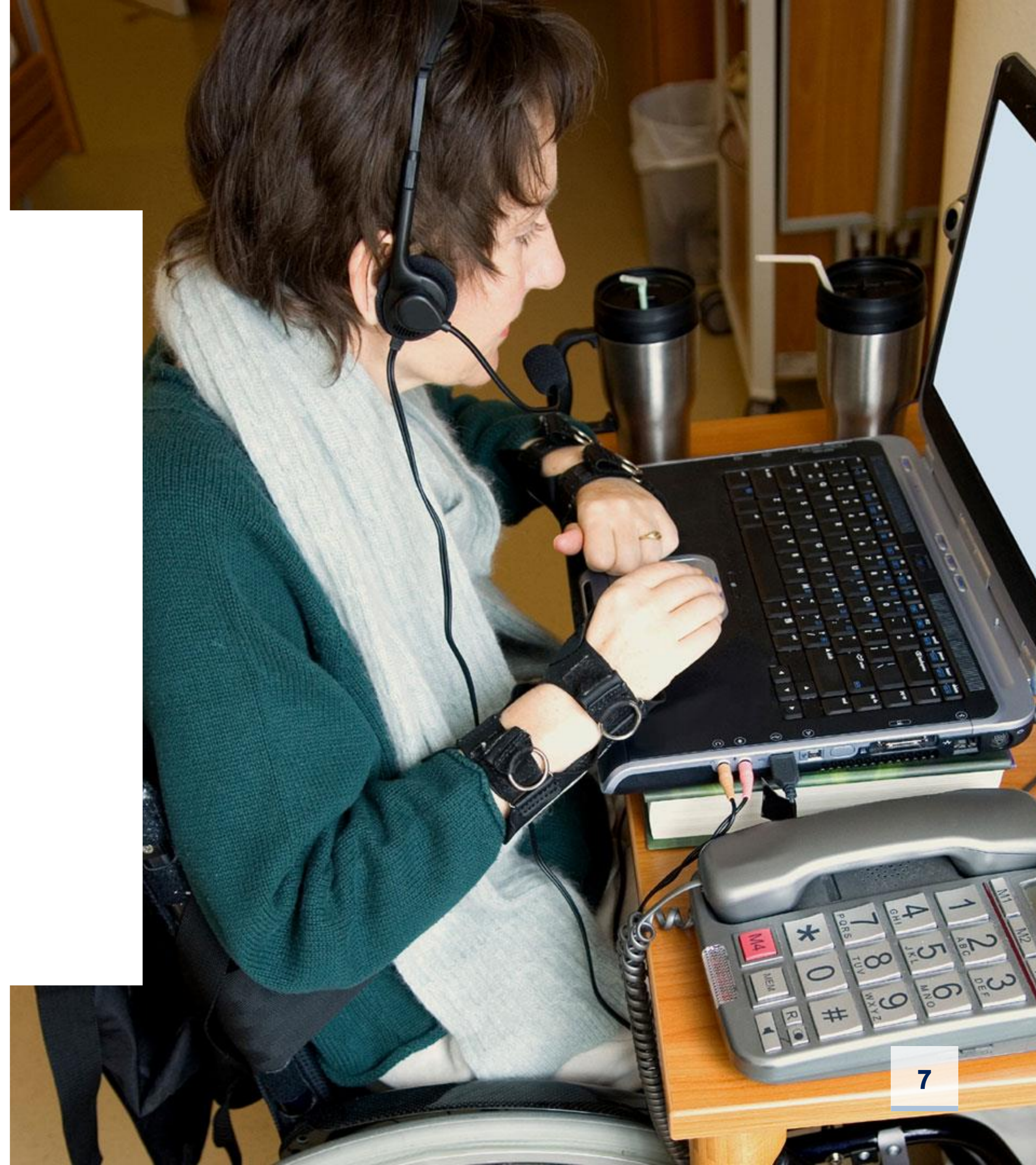
Performance and Funding: Data Sources

- **Arkansas Department of Education (ADE)**
 - Proficiency level data
 - Student demographics
 - School expenditures
- **National Center for Educational Statistics**
 - Locale and geography
- **Office of Education Policy at the University of Arkansas**
 - School VAM measures
 - Region



Performance and Funding: Methodology

- **Descriptive Analysis**
- **Regression Analyses**
 - Ordinal logistic regression
 - Least Absolute Shrinkage Operator



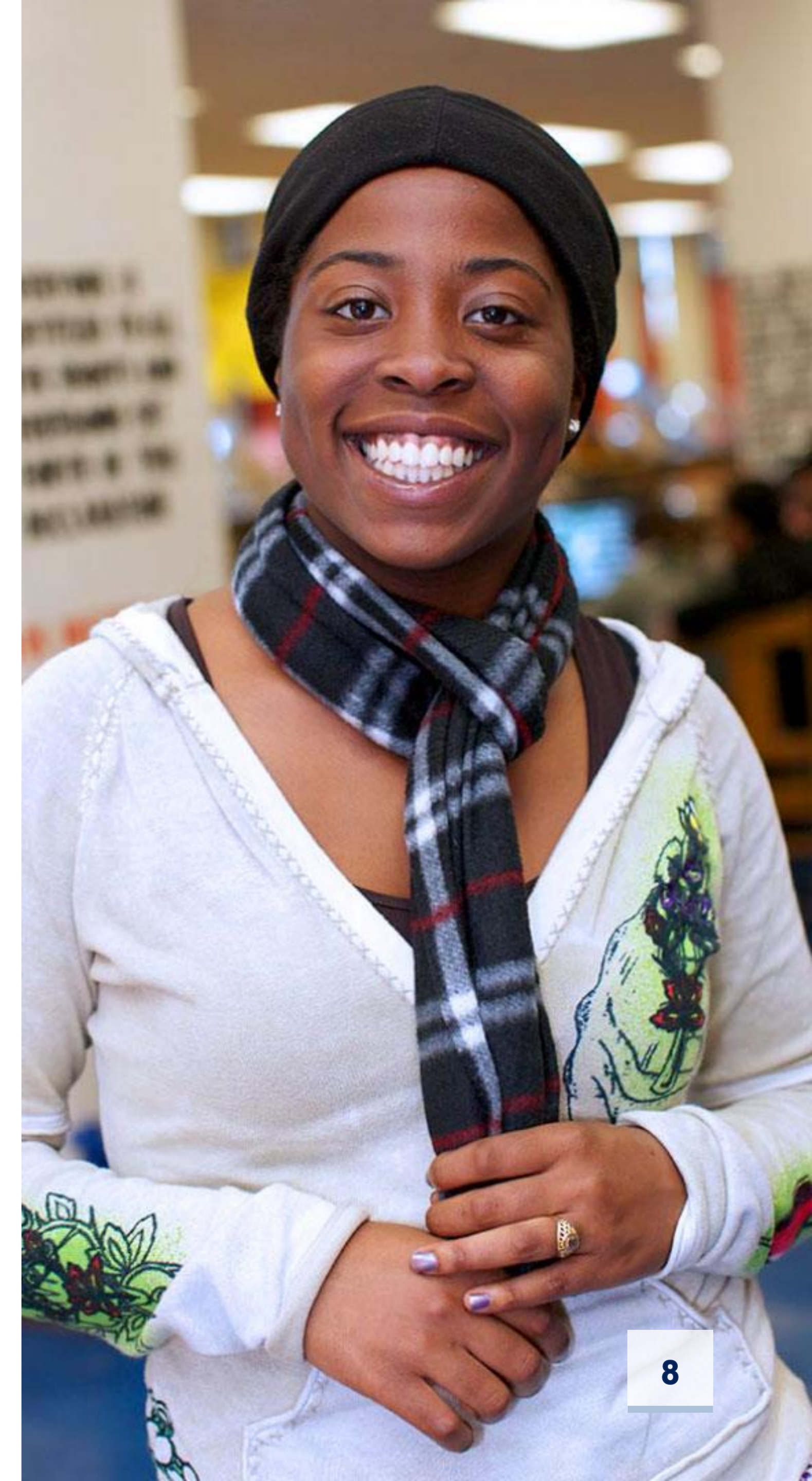
Methodology cont.

- **What is Ordinal Logistic Regression**

- A regression method appropriate when the dependent variable is ordinal.
- OLR can be used to calculate odds, or probabilities, of an outcome.
- We control for several student, school, and district characteristics using ORL.

- **What is the LASSO**

- LASSO is a form of penalized regression; It is a machine learning approach.
- The LASSO is used to identify variables, or covariates, that are most important to account for in our analysis.
- The LASSO is a more efficient way to select the proper statistical model.



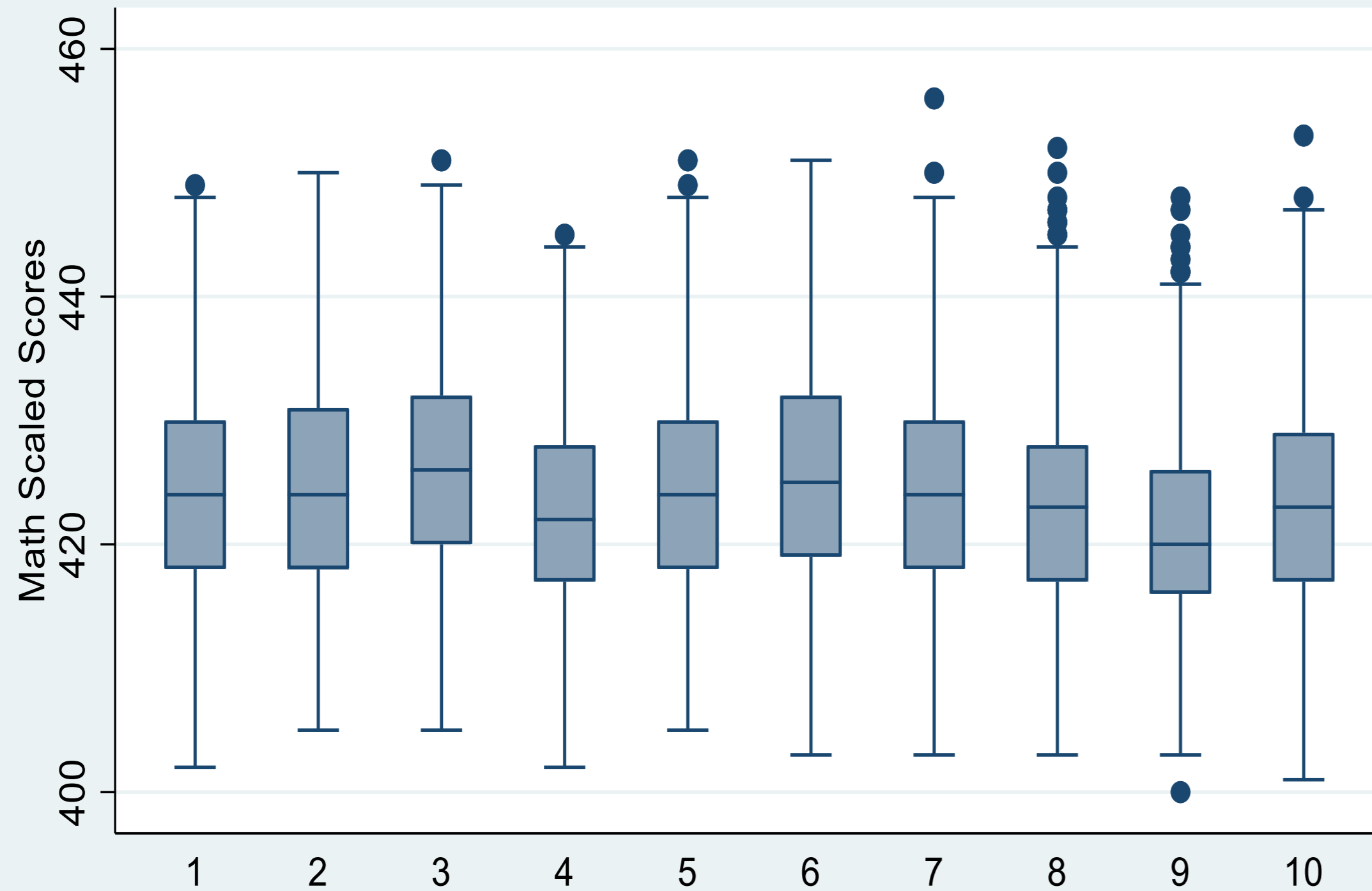
Analysis Overview

School Demographic Characteristics by Per-Pupil Funding

Decile	Per-Pupil Spending	Pct Low-Income	Pct Sped	Pct LEP	Pct URM
Decile 1	\$7,039	57.2%	11.8%	4.8%	34.8%
Decile 2	\$7,919	55.6%	12.9%	3.3%	25.5%
Decile 3	\$8,404	60.8%	12.4%	5.1%	30.9%
Decile 4	\$8,819	66.2%	13.3%	8.3%	33.2%
Decile 5	\$9,261	68.1%	12.9%	12.0%	45.6%
Decile 6	\$9,670	59.9%	13.3%	7.5%	35.2%
Decile 7	\$10,169	70.8%	14.0%	7.8%	36.1%
Decile 8	\$11,041	70.8%	13.4%	10.2%	39.5%
Decile 9	\$12,130	76.4%	13.8%	8.3%	47.0%
Decile 10	\$17,223	72.3%	14.0%	6.7%	43.9%

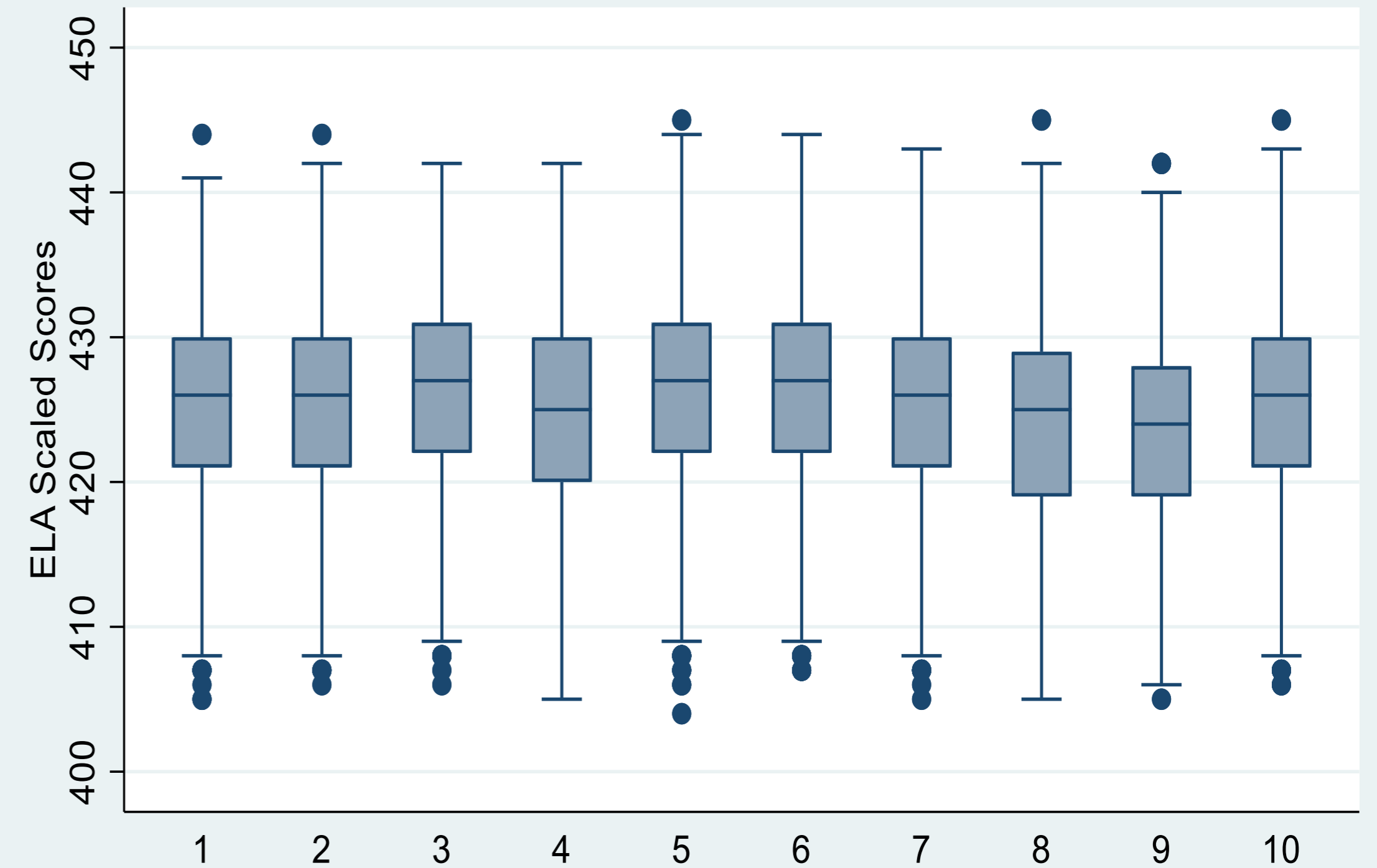
2018 8th Grade Math and ELA ACT Aspire Performance by Spending Level

8th Grade Math Scaled Scores
By Per Pupil Spending Decile



2018 ACT Aspire and school expenditure data
Box plots represent performance by funding decile

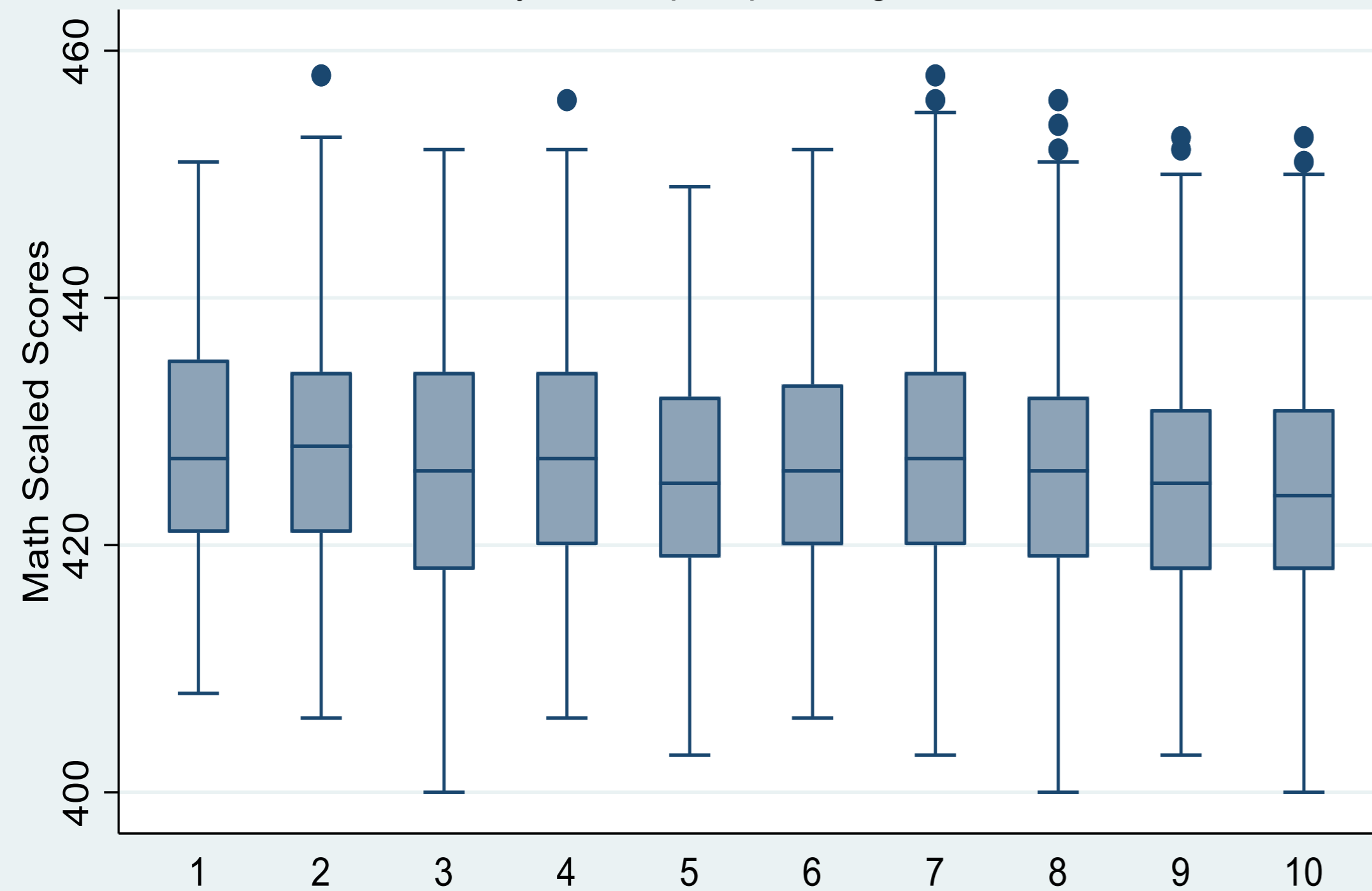
8th Grade ELA Scaled Scores
By Per Pupil Spending Decile



2018 ACT Aspire and school expenditure data
Box plots represent performance by funding decile

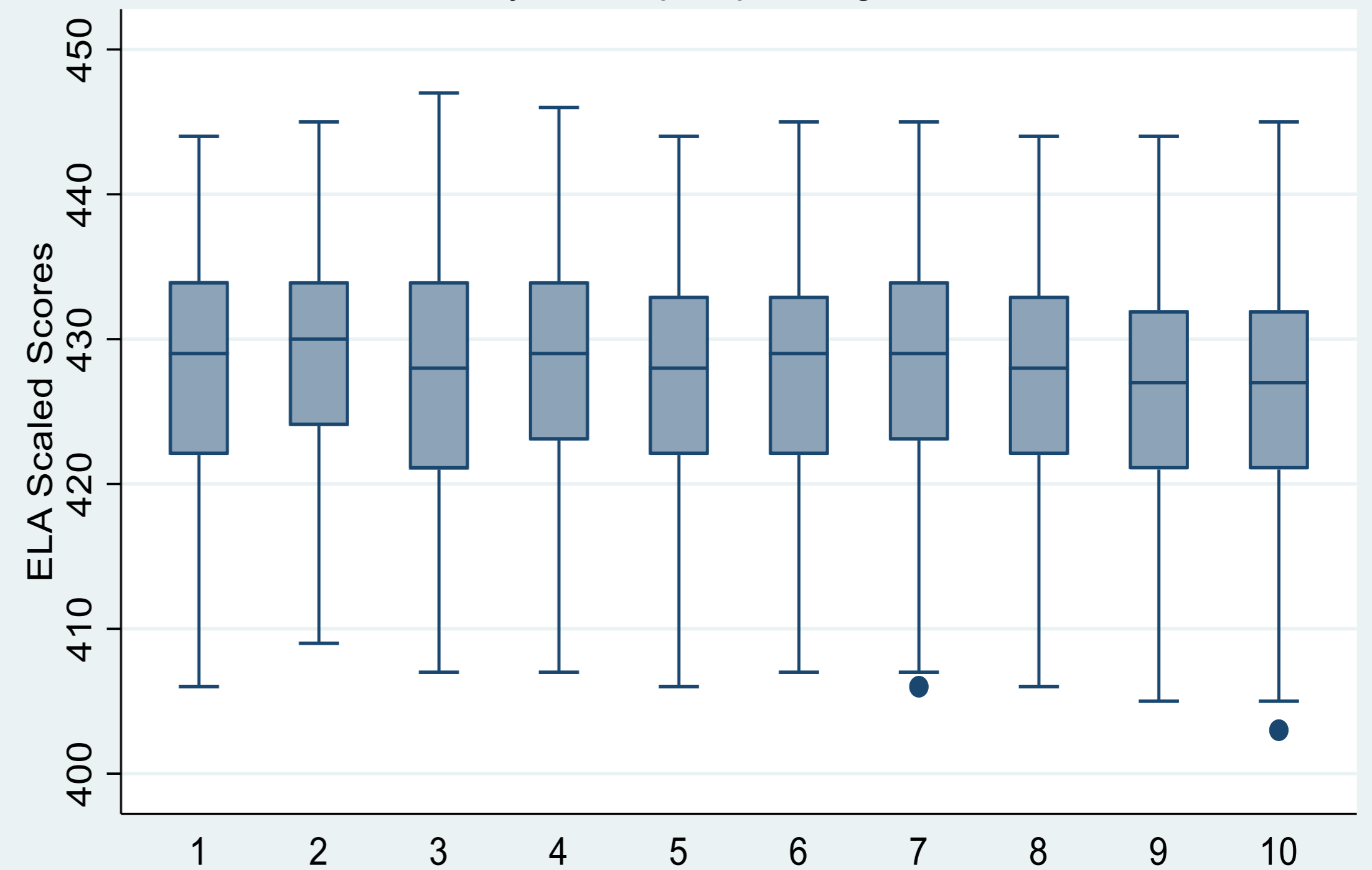
2018 10th Grade Math and ELA ACT Aspire Performance by Spending Level

10th Grade Math Scaled Scores
By Per Pupil Spending Decile



2018 ACT Aspire and school expenditure data
Box plots represent performance by funding decile

10th Grade ELA Scaled Scores
By Per Pupil Spending Decile



2018 ACT Aspire and school expenditure data
Box plots represent performance by funding decile

2018 Correlations Between Funding and Achievement in Math and ELA by Grade Level

- ACT Aspire math and ELA scaled scores have a slight negative correlation with funding.
- This is true across grade levels as the trend held for 3rd graders, 8th graders, and 10th graders.
- Without controlling for other factors, per-pupil funding does not seem to have a strong relationship with performance.

	3 rd Grade	8 th Grade	10 th Grade
Math Scores	-.057	-.038	-.08
ELA Scores	-.045	-.029	-.063

Regression Analyses

Ordinal Logistic Regression (OLR) Results

The table to the right displays OLR results.

- The results indicate the probability of being a level 4 (proficiency level) student based on different funding levels.
- For ELA, the probability of being a level 4 student remains the same if students receives \$8,250 per pupil or \$11,250 per pupil
- The same is true for math, where a student's probability of being level 4 is 5.7% irrespective of their funding level.

	Funding Amount	Probability of Being Level 4
ELA	\$8,250	10.9%
	\$11,250	
Math	\$8,250	5.5%
	\$11,250	

LASSO Findings

- **The LASSO is used to identify the most important covariates to include in a statistical model.**
- **Output from the procedure identifies the covariates deemed to be most informative.**
 - Previous year test scores
 - Student level characteristics
 - Teacher workforce characteristics
 - Grade level
- **The LASSO results aligned with results from previous analyses.**
 - Per-pupil spending did not equate to substantive gains in ACT Aspire student performance.

Summary

- **Schools with larger percentages of at-risk students, on average, expend more per-pupil funding.**
- **The results of the analysis indicate that per-pupil funding differences alone do not equate to gains in ACT Aspire performance in math or ELA.**
- **This analysis indicates that current funding levels would not close achievement and/or opportunity gaps for Arkansas students.**



Appendix A: Terms and Definitions

Descriptive Analysis: Analyses to summarize or describe data to find patterns. Descriptive analyses may entail univariate analyses that describe the distribution of variables.

Decile: A decile is a portion, or a slice of a distribution, that is formed through cut points that segment the distribution into 10 equal parts.

Interquartile Range: The interquartile range represents 50% of a distribution and encompasses observations from the 25th to the 75th percentile.

Ordinal Logistic Regression: Ordinal logistic regression is a regression technique appropriate when an outcome is categorical and reflects an underlying or natural ordering. It is an extension of logistic regression.

Students of Color: African American, Latinx, Native American, Pacific Islander, or mixed-race students.

LEP Students: Limited English Proficient. Students

Proficient: A student categorized as level 3 or level 4 on the ACT Aspire assessment.

Growth: Gain in assessment scaled score between two regularly scheduled test administrations.

Correlation Coefficients: A numerical value quantifying the statistical relationship between two variables. We report the Pearson correlation coefficient.

Fixed Effects: Regression variables that are constant across time or individuals. In this analysis we use fixed effects to control for time period and district effect.

LASSO: The Least Absolute Shrinkage Operator is a machine learning technique that utilizes penalized regression to iteratively select the most influential covariates while shrinking the unneeded covariate coefficients to zero.

Appendix B: 3rd Grade ACT Aspire Scaled Score Distribution by Spending Decile

