What Works and For Whom? Effectiveness and Efficiency of School Capital Investments Across the U.S.

Online Appendix

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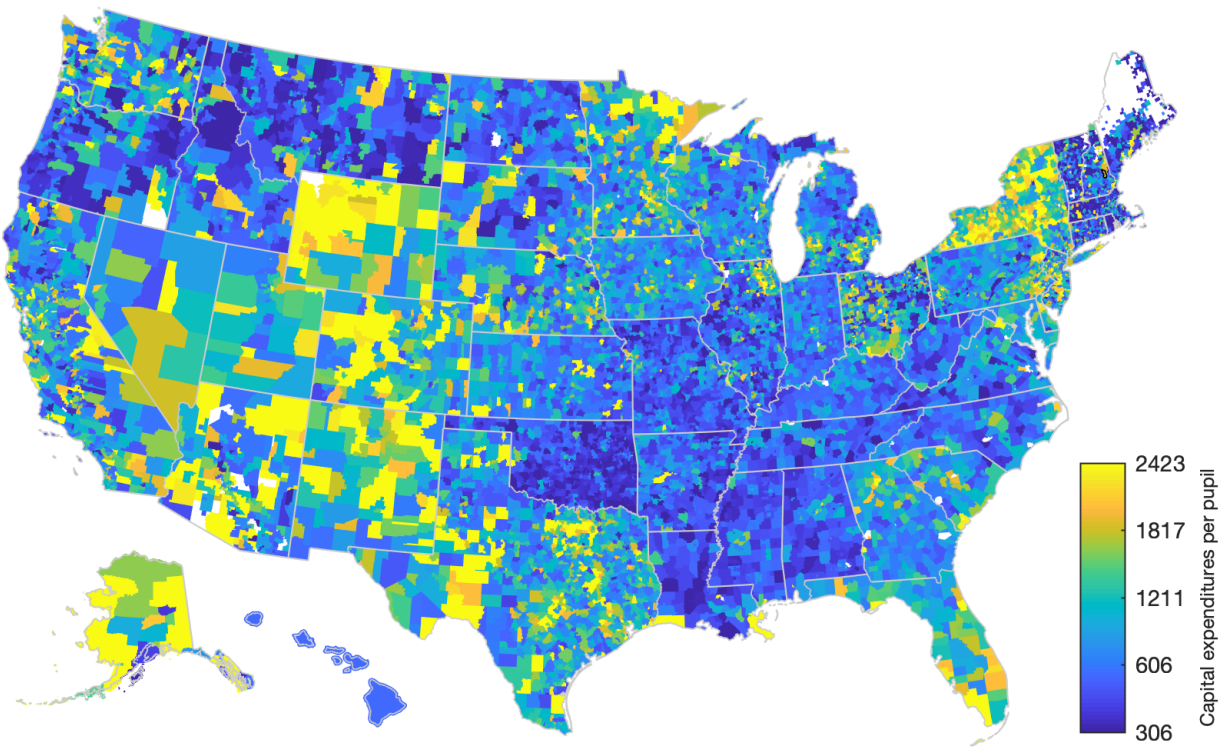
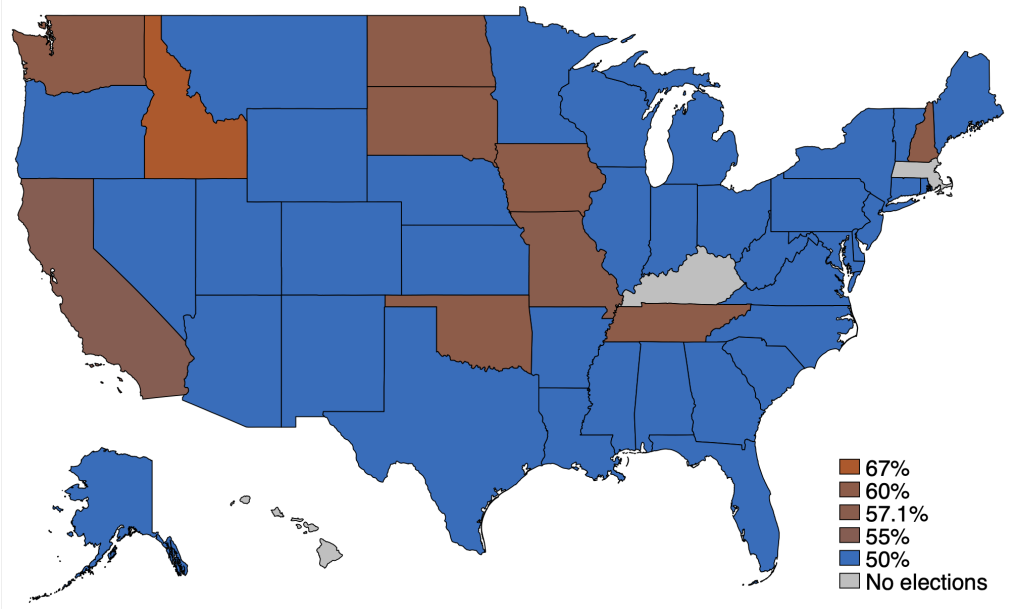
A Additional Figures and Tables

Figure A1: District-level Capital Expenditures (per-pupil, 2015-16)



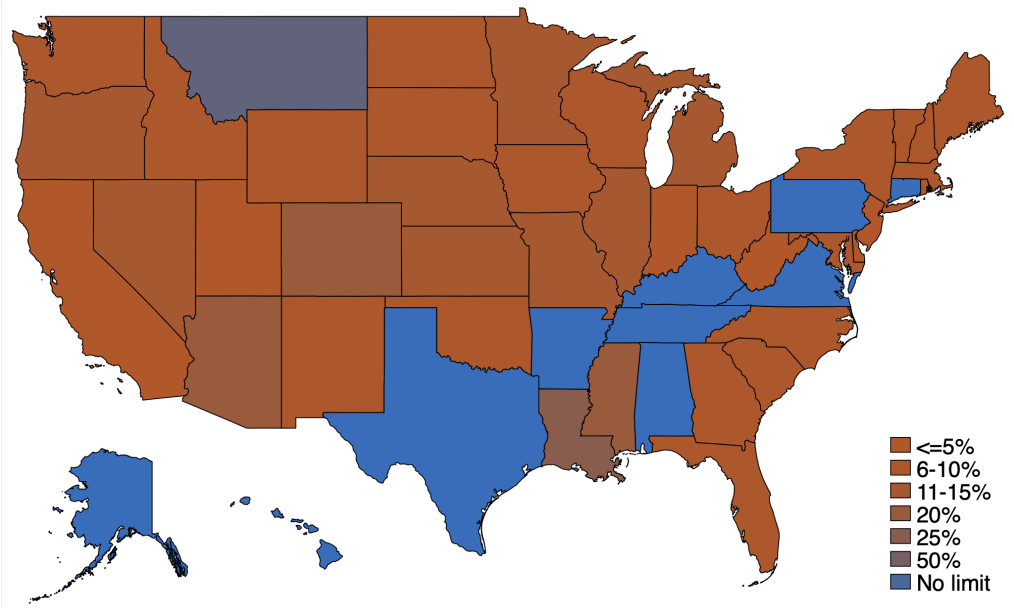
Note: Spending on school capital projects, per pupil, 2015-16. Source: National Center for Education Statistics (NCES).

Figure A2: Majority Requirements



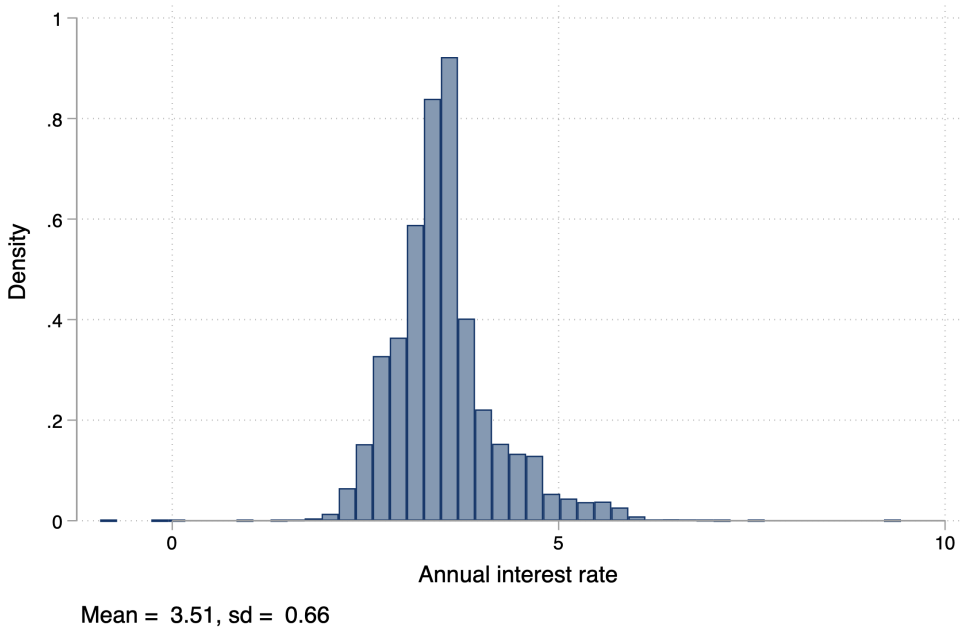
Note: Majority requirements refer to the share of favorable votes, among all people who vote, required for a bond measure to pass.

Figure A3: Debt Limits



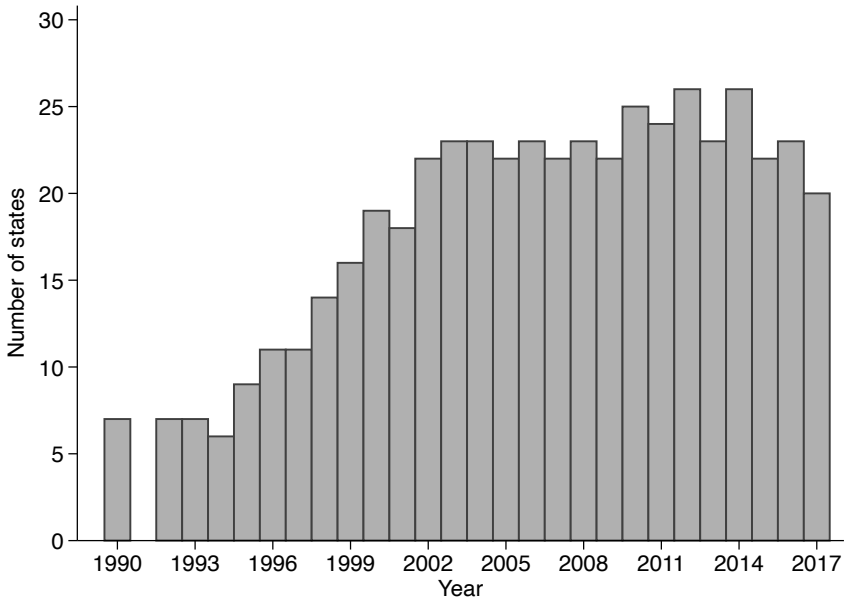
Note: Debt limits are expressed as a share of total assessed property values.

Figure A4: School District Bonds Interest Rates, 1997-2017

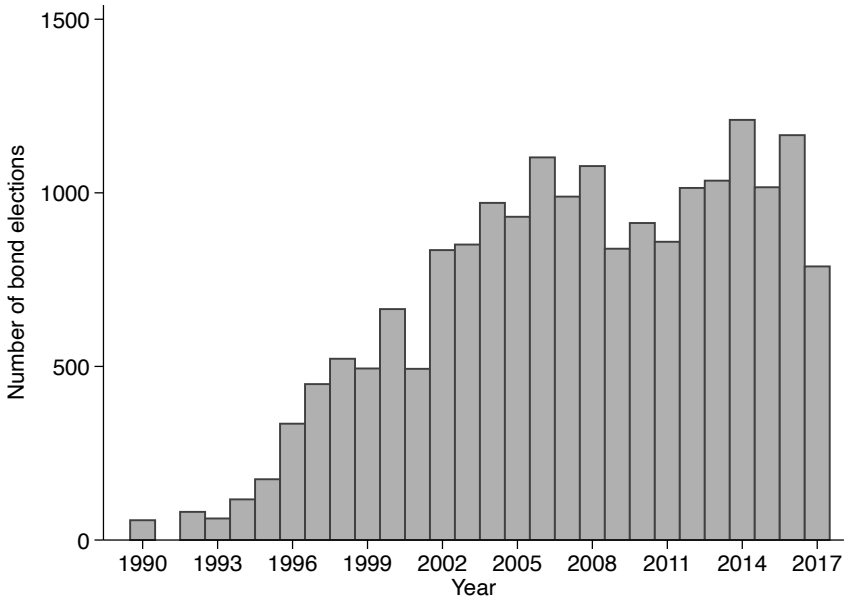


Note: Coupon rates on school district bonds for the years 1997-2017. Rates are shown net of fixed effects for the year of issuance and maturity and for bond type. Data from the Mergent Municipal Bonds Database.

Figure A5: Bond Data Coverage, by Year



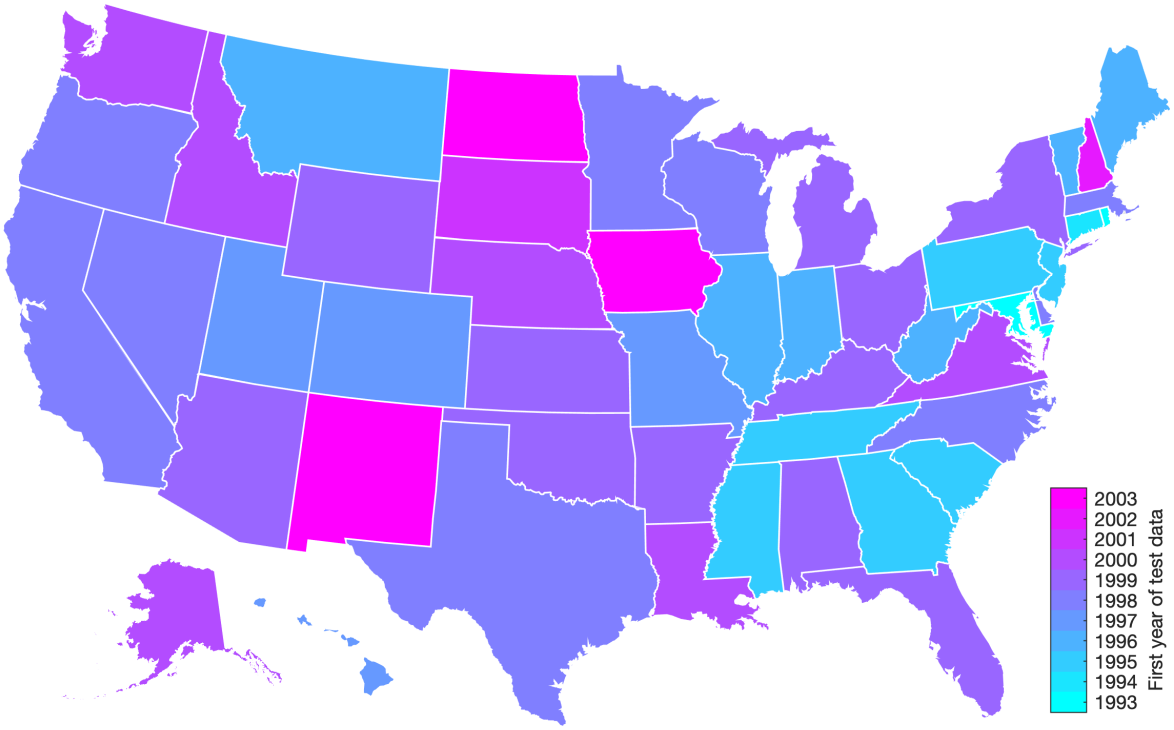
(a) Number of States with Bond Elections in a Year



(b) Number of Bond Elections

Note: Panel (a) shows the number of states with bond election information in each year. Panel (b) shows the number of bond elections in our data in each year.

Figure A6: First Year with Test Score Data, by State

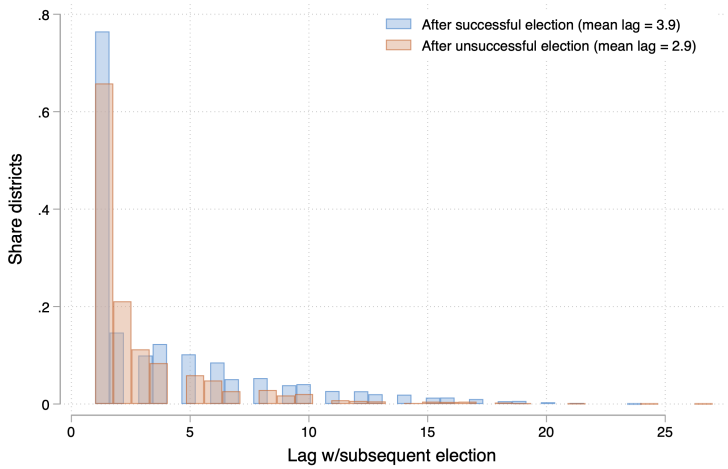


Note: First year for which we have test score data, by state

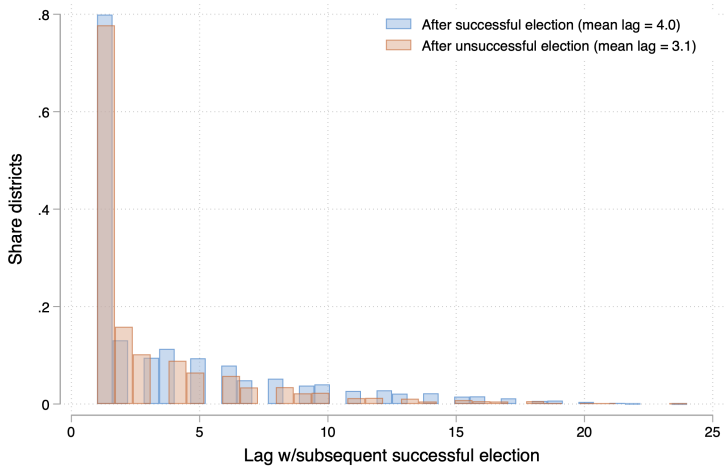
.

Figure A7: Distribution of Time Elapsed Between Subsequent Elections, by Outcome of Earlier Election

(a) Any subsequent election

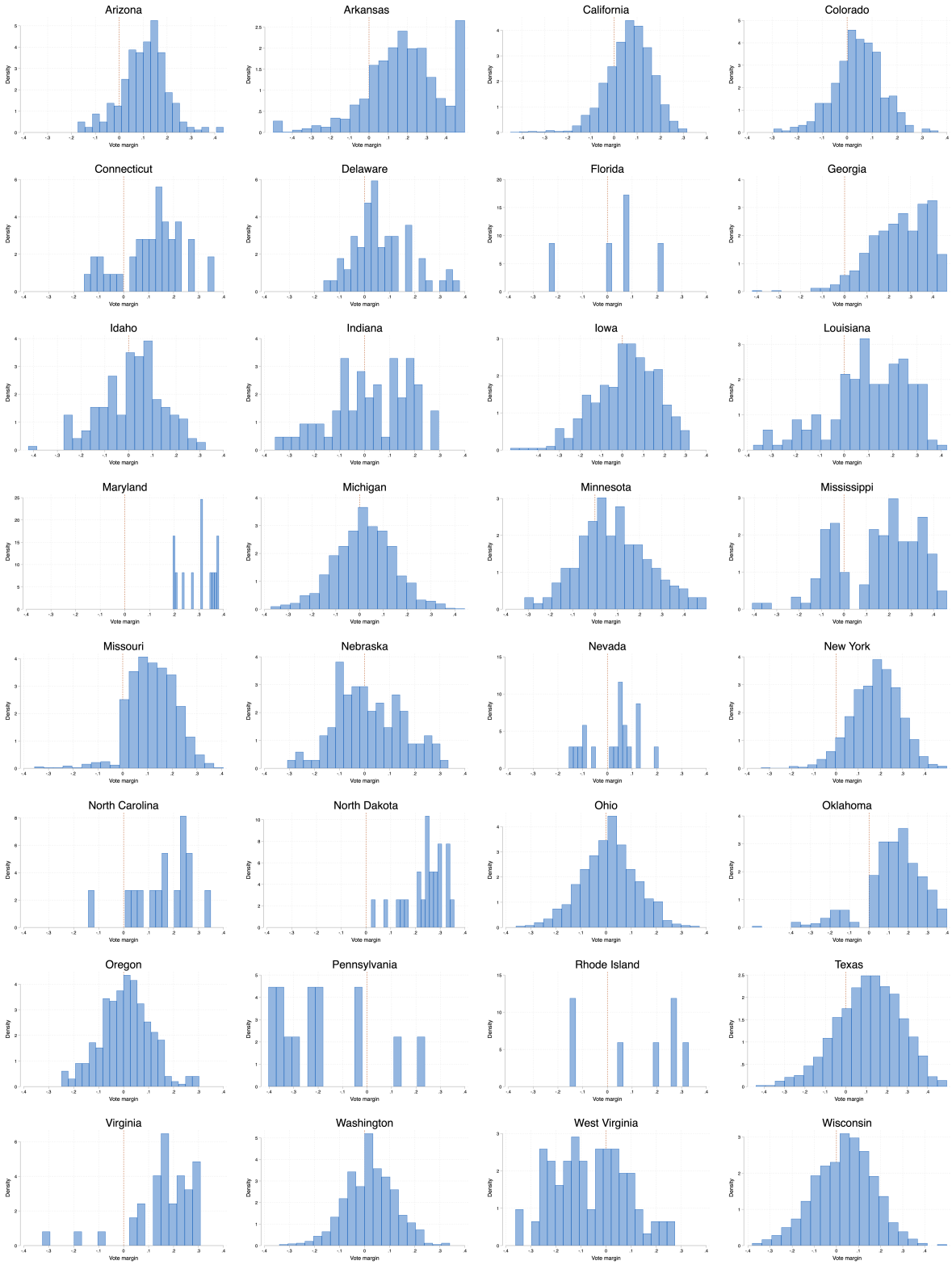


(b) Successful subsequent election



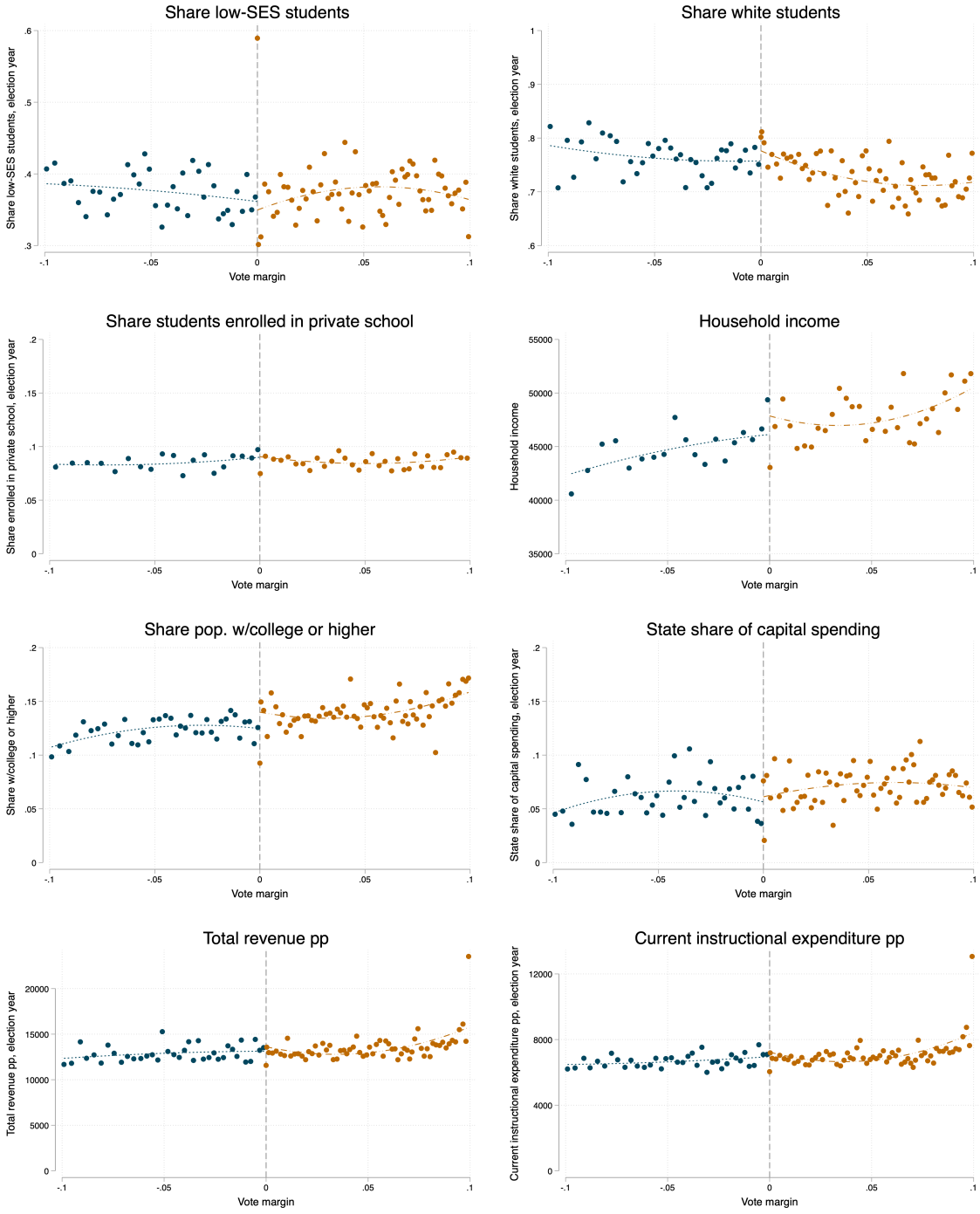
Note: Distribution of time elapsed between any two subsequent district elections, by outcome of the first election (successful or unsuccessful). Panel (a) shows the distribution all districts and elections; panel (b) focuses on successful subsequent elections.

Figure A8: Density of Vote Margin, by State



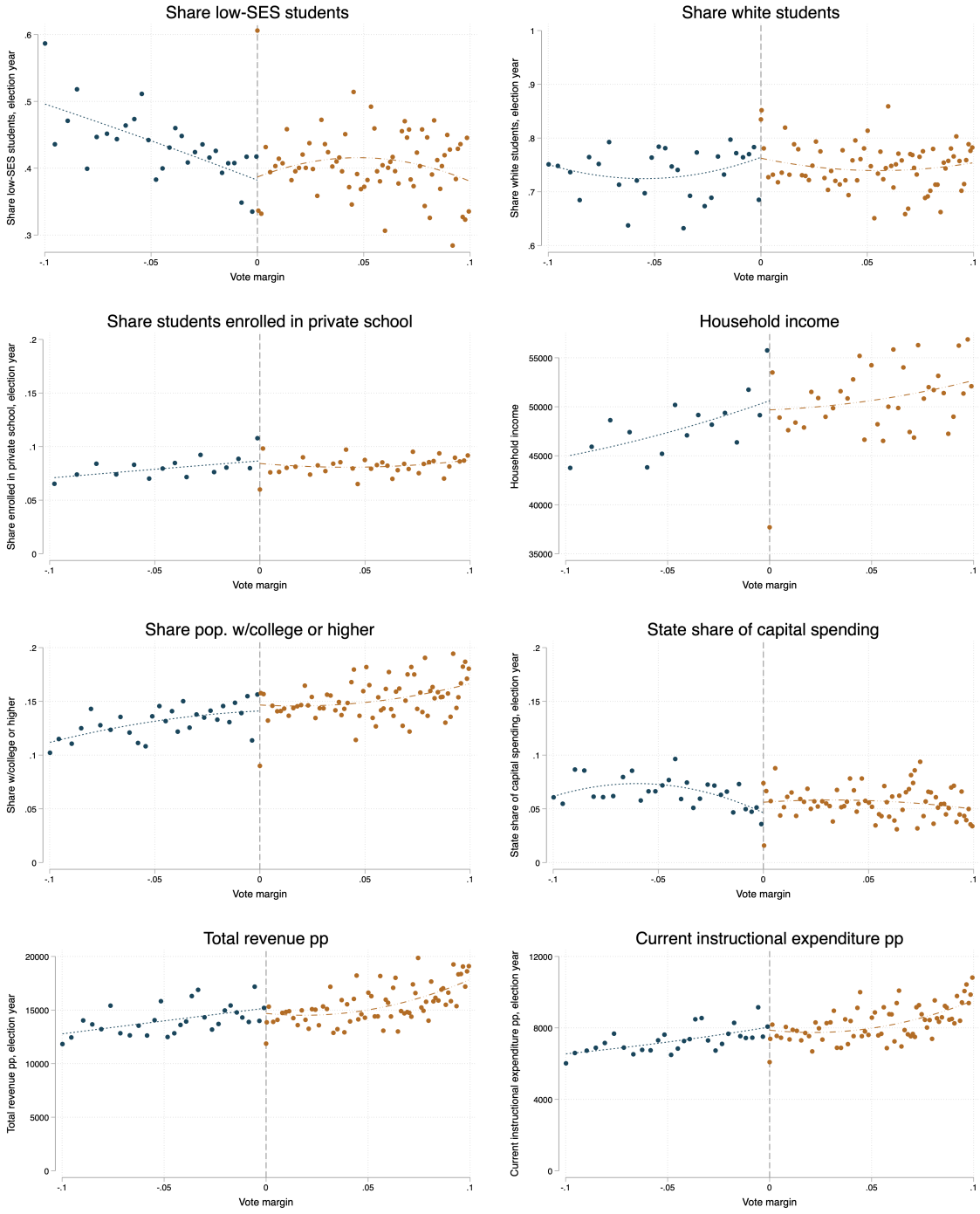
Note: Histogram of vote margins by state. The vote margin is defined as the difference between the share of votes in favor of the proposed measure and the required majority in the state.

Figure A9: Covariate Balance Around the Vote Margin Cutoff. Main Data



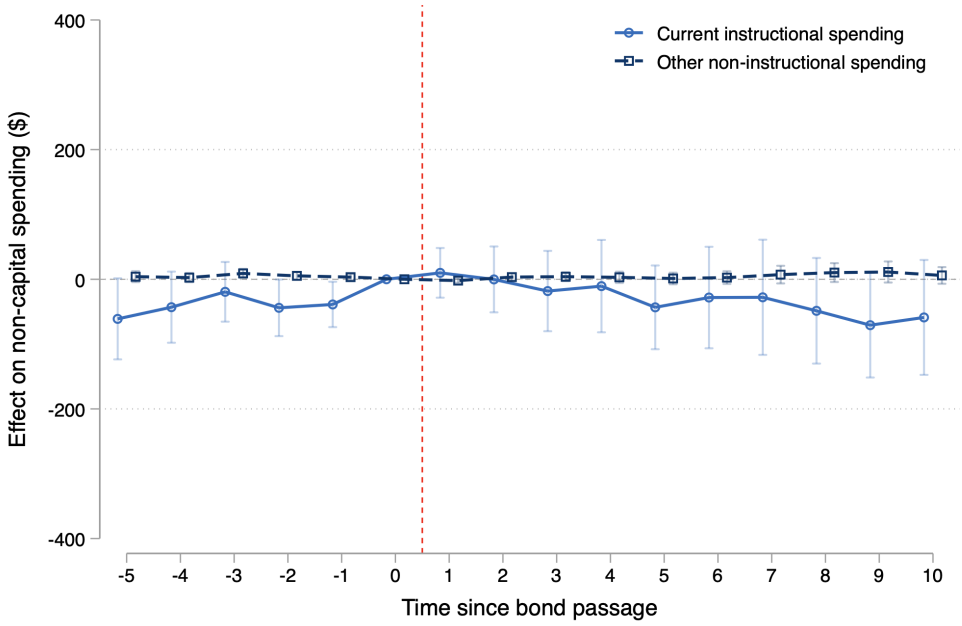
Note: Binned scatterplots of district-level covariates around the vote margin cutoff, obtained using the main data set. Positive vote margins denote successful elections. Each dot is a quantile of vote margin; the vertical axis displays the mean of each covariate in the corresponding quantile. The lines represent fitted quadratic polynomials on either side of the threshold. All variables are measured in the year of the election except for household income and the population share of people with at least a college degree, which are from the U.S. Census of Population and Housing (years 1990 and 2000) and the American Community Survey (years 2007-2012).

Figure A10: Covariate Balance Around the Vote Margin Cutoff. Stacked Data



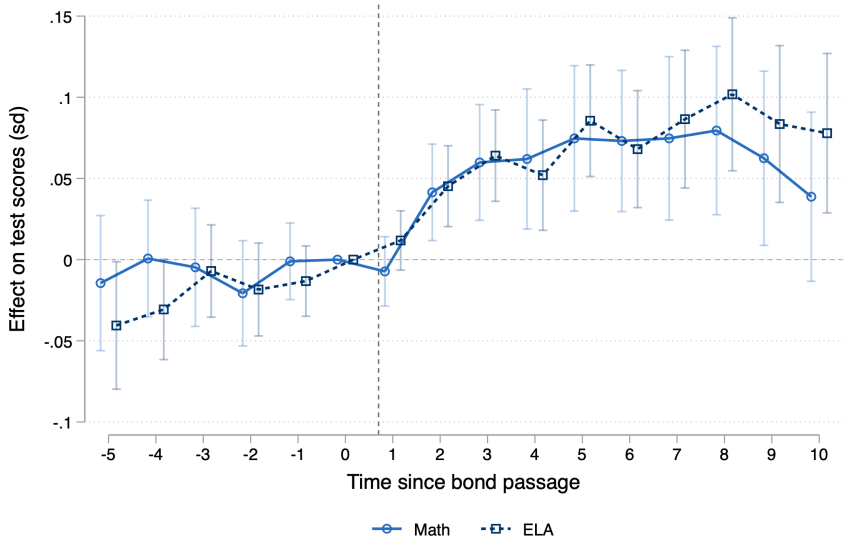
Note: Binned scatterplots of district-level covariates around the vote margin cutoff, obtained using the stacked data set used in estimation. Positive vote margins denote successful elections. Each dot is a quantile of vote margin; the vertical axis displays the mean of each covariate in the corresponding quantile. The lines represent fitted quadratic polynomials on either side of the threshold. All variables are measured in the year of the election except for household income and the population share of people with at least a college degree, which are from the U.S. Census of Population and Housing (years 1990 and 2000) and the American Community Survey (years 2007-2012).

Figure A11: Mean Effects of Bond Authorization on Current Spending



Note: Estimates and confidence intervals of the parameters β_k in equation (3), obtained using current instructional spending and other (non-instructional) spending per pupil as the dependent variables. Estimates are obtained using district-by-cohort and cohort-by-state-by-year effects; observations and weighted by district enrollment. Standard errors are clustered at the district level.

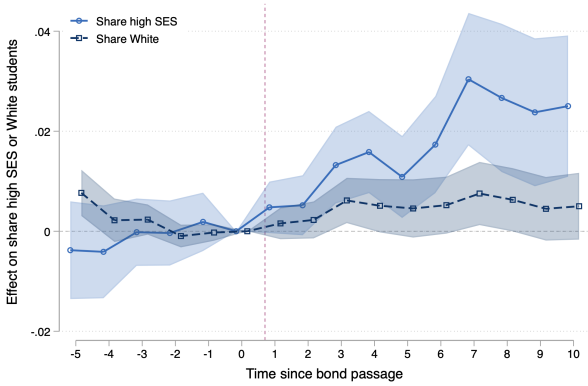
Figure A12: Average Effects of Bond Authorization on Test Scores, by Subject



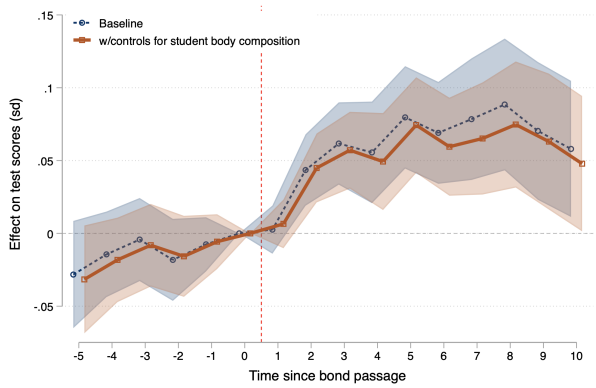
Note: Estimates and confidence intervals of the parameters β_k in equation (3), obtained using test scores (panel a) and house price index (panel b) as the dependent variable. Estimates are shown separately by subject; they are obtained pooling data across grades, controlling for district-by-cohort and cohort-by-state-by-year-by-grade effects, and weighing observations by the number of test takers. Standard errors are clustered at the district level.

Figure A13: Average Effects of Bond Authorization on Student Body Composition

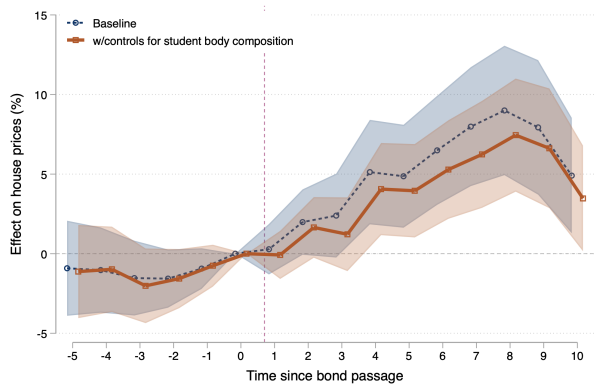
(a) Shares of high-SES and White students



(b) Test scores



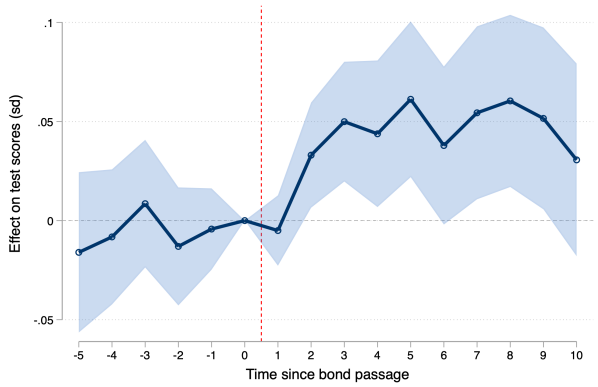
(c) House prices



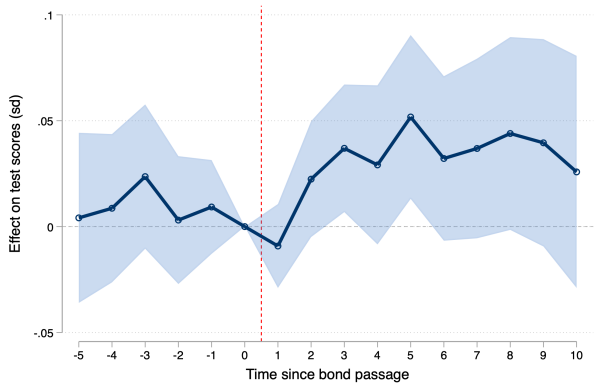
Notes: Panel (a) shows estimates and confidence intervals of the parameters β_k in equation (3), obtained using the shares of high-SES (solid line) and White students (dashed line) as the dependent variables. Panel (b) shows estimates and confidence intervals of β_k on test scores (as in panel (a) of Figure 3), obtained controlling for the share of low-SES and minority students in each district and year. Panel (c) shows estimates and confidence intervals of β_k on house prices (as in panel (b) of Figure 3), obtained controlling for the share of low-SES and minority students in each district and year. In panels (a) and (c), estimates are obtained using district-by-cohort and cohort-by-state-by-year effects and observations are weighted by district enrollment. In panel (b), estimates are obtained pooling data on multiple grades and years and using district-by-cohort and cohort-by-state-by-year-by-subject-by-grade effects, and observations and weighted by the number of test takers. Standard errors are clustered at the district level.

Figure A14: Average Effects of Bond Authorization on Test Scores and House Prices. Using Different Polynomials of The Vote Share

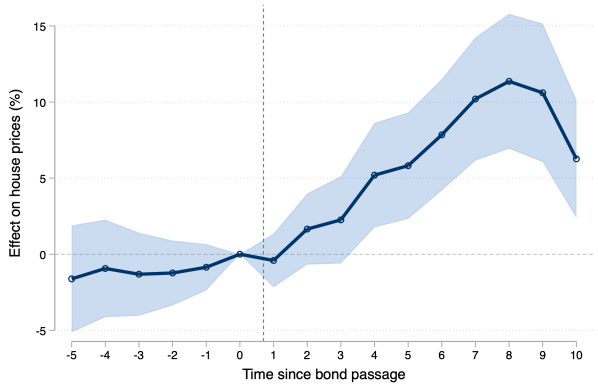
(a) Test scores, linear, slope differs



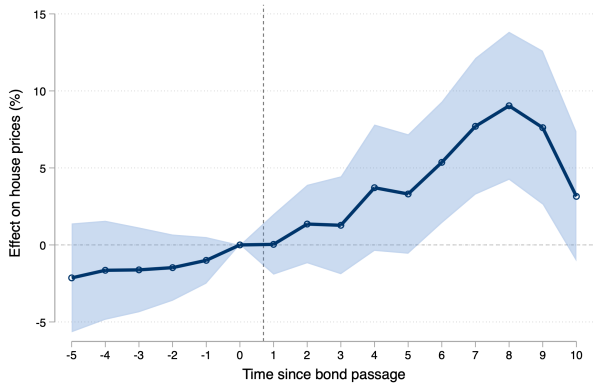
(b) Test scores, quadratic



(c) House price index, linear, slope differs

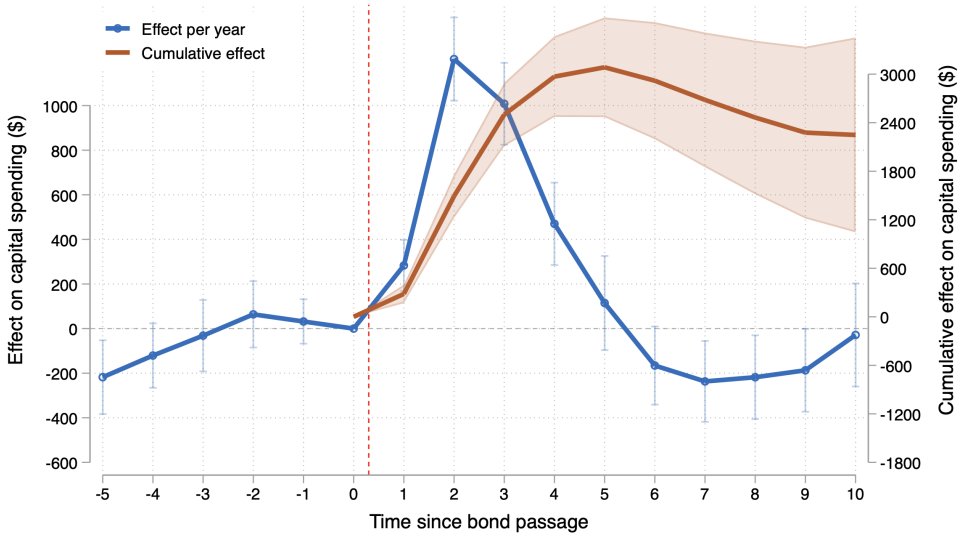


(d) House price index, quadratic



Notes: Estimates and confidence intervals of the parameters β_k in equation (3), obtained using test scores (panel a) and house price index (panel b) as the dependent variable. In panels (a) and (c), we control for a linear polynomial of the vote share variable allowing for the slope to differ on either side of the threshold. In panels (b) and (d), we control for a quadratic polynomial of the vote share variable. Test score estimates are obtained pooling data across subjects and grades, controlling for district-by-cohort and cohort-by-state-by-year-by-subject-by-grade effects, and weighing observations by the number of test takers. House price estimates are obtained using district-by-cohort and cohort-by-state-by-year effects, weighing observations by district enrollment. Standard errors are clustered at the district level.

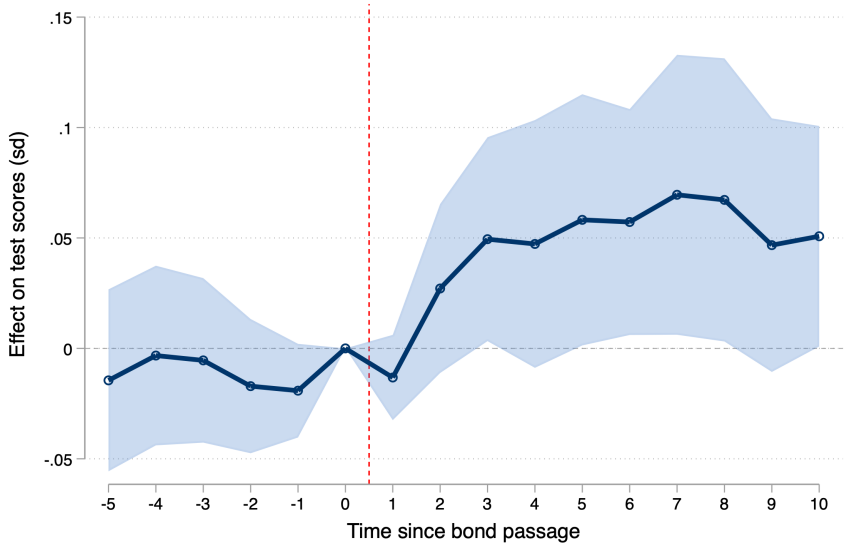
Figure A15: Average Effects of Bond Authorization on Capital Spending. Using Cellini, Ferreira, and Rothstein's (2010) Treatment-on-the-Treated Estimator



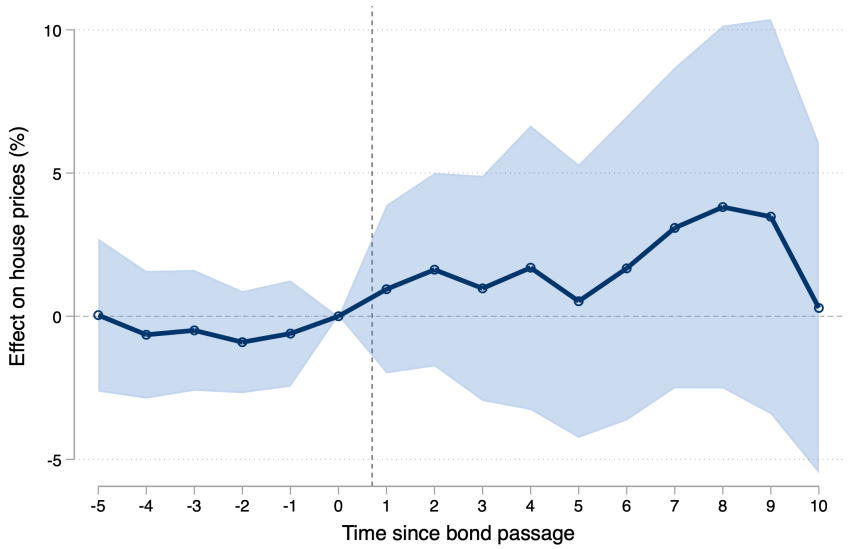
Notes: The blue line with circle markers shows estimates and confidence intervals of the parameters β_k in equation (2), obtained using capital spending per pupil as the dependent variable. The orange continuous line shows cumulative effects, calculated as the running sum of coefficients since time 0. Estimates are obtained using district and state-by-year effects; observations and weighted by by district enrollment. Standard errors are clustered at the district level.

Figure A16: Average Effects of Bond Authorization on Test Scores and House Prices. Using Cellini, Ferreira, and Rothstein's (2010) Treatment-on-the-Treated Estimator

(a) Test scores

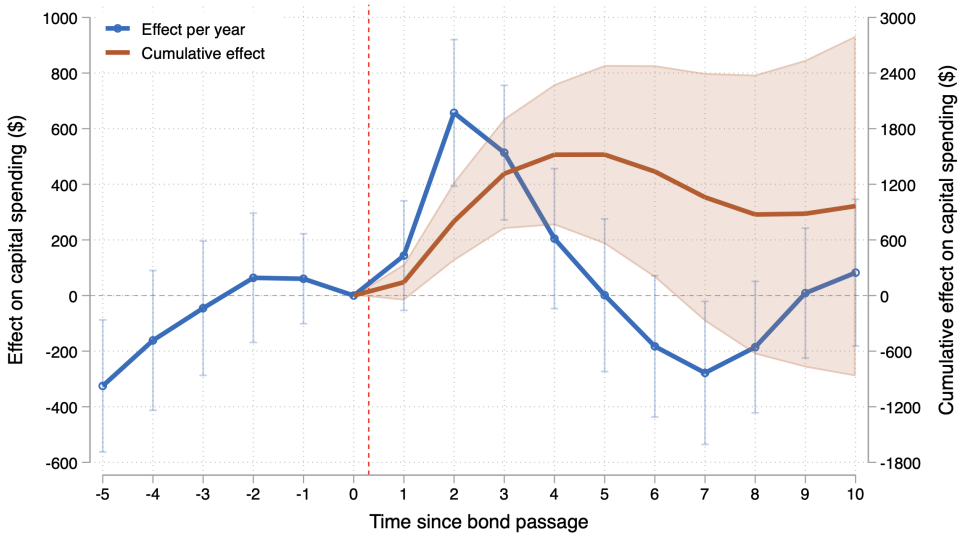


(b) House prices



Notes: Estimates and confidence intervals of the parameters β_k in equation (2), obtained using test scores (panel a) and house price index (panel b) as the dependent variables. Test score estimates are obtained pooling data across subjects and grades, controlling for district and state-by-year-by-subject-by-grade effects, and weighing observations by the number of test takers. House price estimates are obtained using district and state-by-year effects, weighing observations by district enrollment. Standard errors are clustered at the district level.

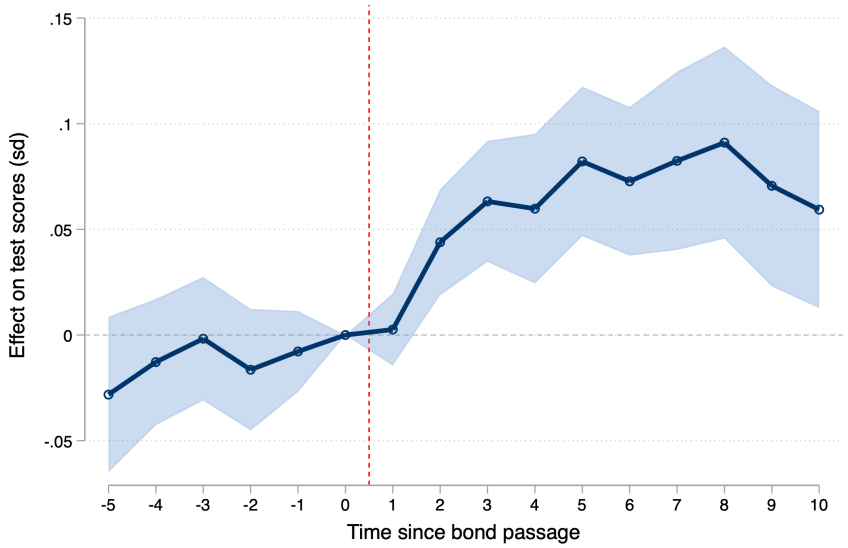
Figure A17: Average Effects of Bond Authorization on Capital Spending. Stacked Approach, Controls Never Authorize a Bond in Time Window of Analysis



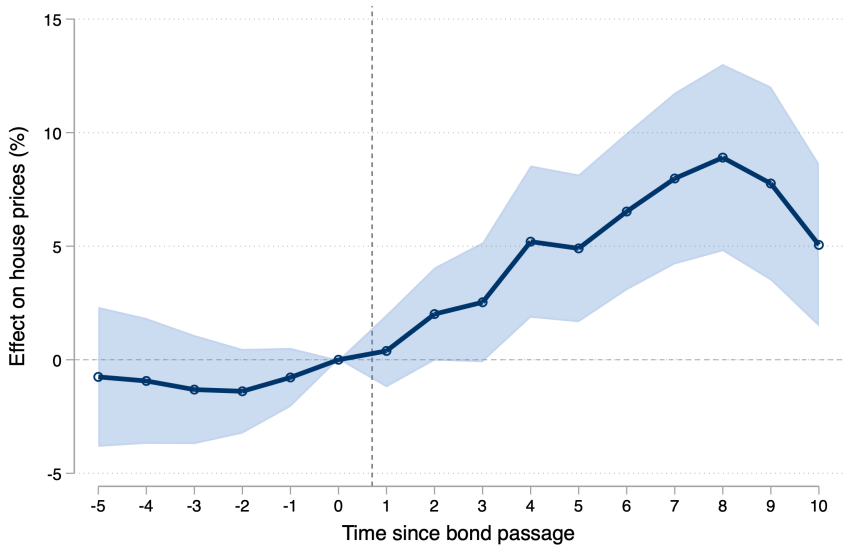
Notes: The blue line with circle markers shows estimates and confidence intervals of the parameters β_k in equation (3), obtained using capital spending per pupil as the dependent variable and using as "clean controls" only districts that never authorize any bonds in the time window of analysis. The orange continuous line shows cumulative effects, calculated as the running sum of coefficients since time 0. Estimates are obtained using district-by-cohort and cohort-by-state-by-year effects; observations and weighted by by district enrollment. Standard errors are clustered at the district level.

Figure A18: Average Effects of Bond Authorization on Test Scores and House Prices. Stacked Approach, Controls Never Authorize a Bond in Time Window of Analysis

(a) Test scores

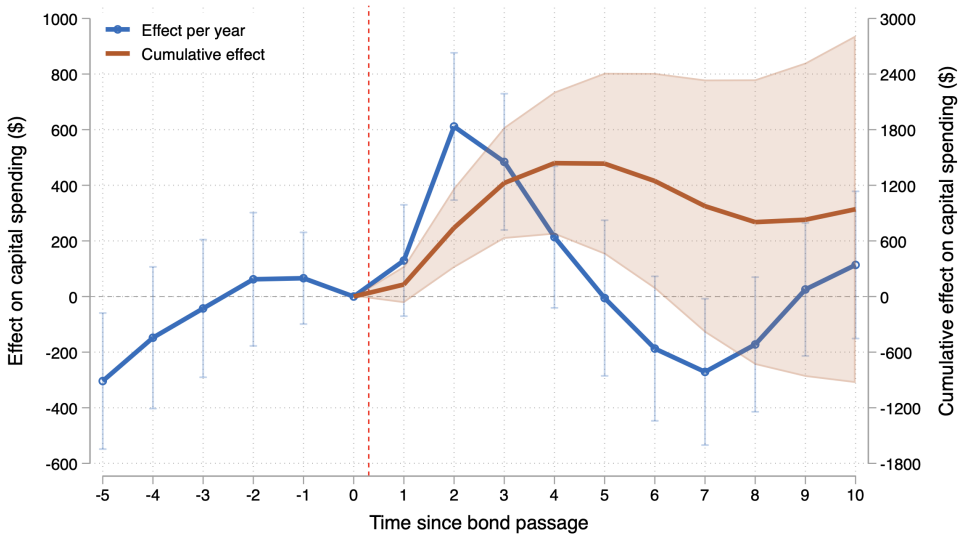


(b) House prices



Notes: Estimates and confidence intervals of the parameters β_k in equation (3), obtained using test scores (panel a) and house price index (panel b) as the dependent variable, and using as "clean controls" only districts that never authorize any bonds in the time window of analysis. Test score estimates are obtained pooling data across subjects and grades, controlling for district-by-cohort and cohort-by-state-by-year-by-subject-by-grade effects, and weighing observations by the number of test takers. House price estimates are obtained using district-by-cohort and cohort-by-state-by-year effects, weighing observations by district enrollment. Standard errors are clustered at the district level.

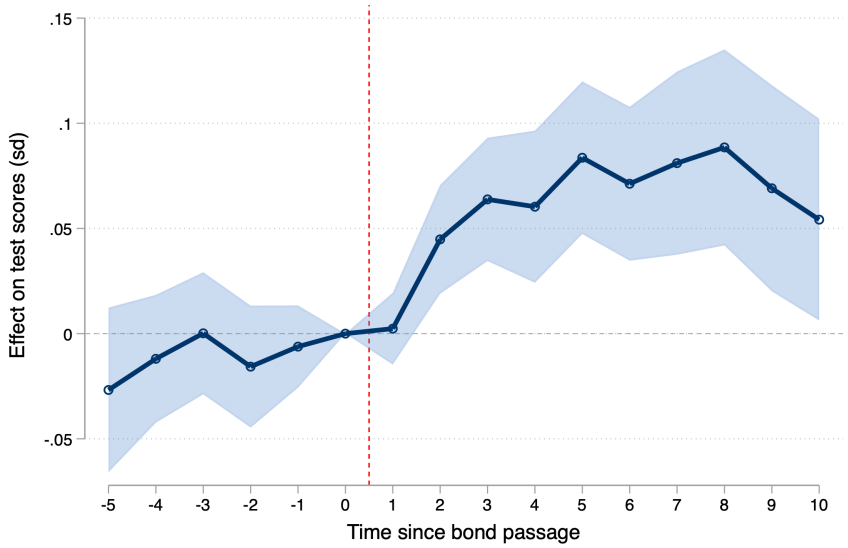
Figure A19: Average Effects of Bond Authorization on Capital Spending. Stacked Approach, Matching on Pre-Election Bond History



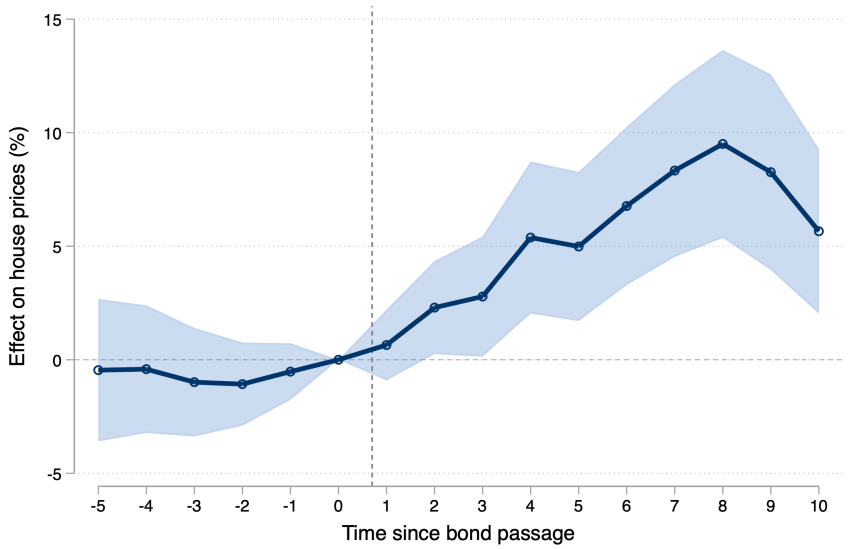
Notes: The blue line with circle markers shows estimates and confidence intervals of the parameters β_k in equation (3), obtained using capital spending per pupil as the dependent variable and using as "clean controls" only districts that share the bond history with at least one treated district in their cohort. The orange continuous line shows cumulative effects, calculated as the running sum of coefficients since time 0. Estimates are obtained using district-by-cohort and cohort-by-state-by-year effects; observations and weighted by by district enrollment. Standard errors are clustered at the district level.

Figure A20: Average Effects of Bond Authorization on Test Scores and House Prices. Stacked Approach, Matching on Pre-Election Bond History

(a) Test scores

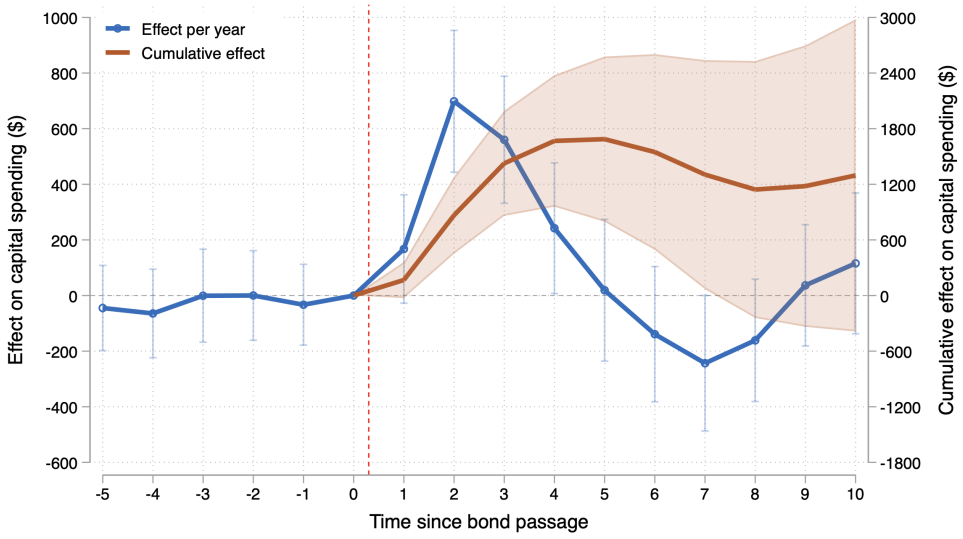


(b) House prices



Notes: Estimates and confidence intervals of the parameters β_k in equation (3), obtained using test scores (panel a) and house price index (panel b) as the dependent variable, and using as "clean controls" only districts that share the bond history with at least one treated district in their cohort. Test score estimates are obtained pooling data across subjects and grades, controlling for district-by-cohort and cohort-by-state-by-year-by-subject-by-grade effects, and weighing observations by the number of test takers. House price estimates are obtained using district-by-cohort and cohort-by-state-by-year effects, weighing observations by district enrollment. Standard errors are clustered at the district level.

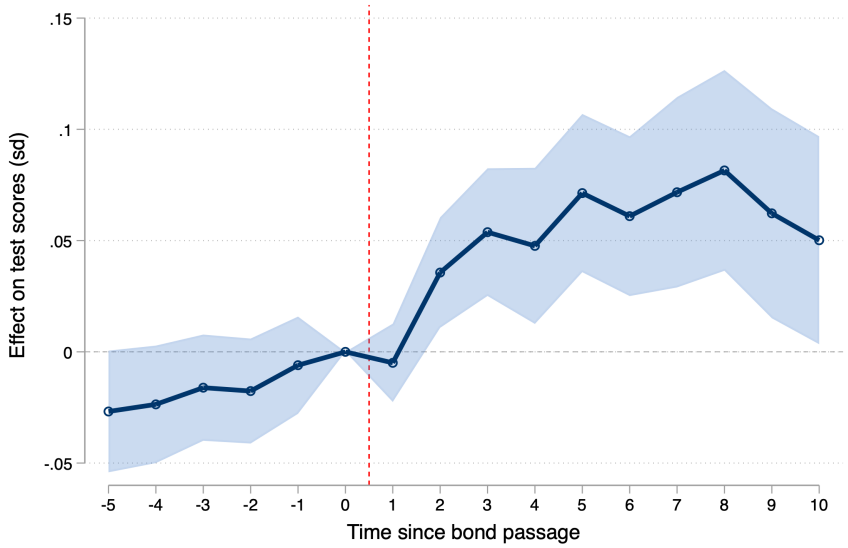
Figure A21: Average Effects of Bond Authorization on Capital Spending. Stacked Approach, Not Controlling for Future Bond History



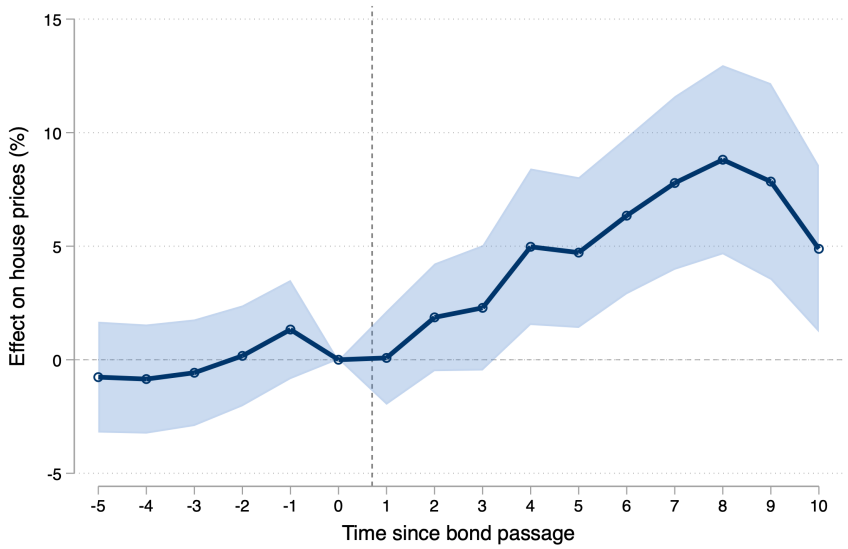
Notes: The blue line with circle markers shows estimates and confidence intervals of the parameters β_k in equation (3), obtained using capital spending per pupil as the dependent variable and not controlling for M_{jct-k} for $k < 0$. The orange continuous line shows cumulative effects, calculated as the running sum of coefficients since time 0. Estimates are obtained using district-by-cohort and cohort-by-state-by-year effects; observations and weighted by by district enrollment. Standard errors are clustered at the district level.

Figure A22: Average Effects of Bond Authorization on Test Scores and House Prices. Stacked Approach, Not Controlling for Future Bond History

(a) Test scores

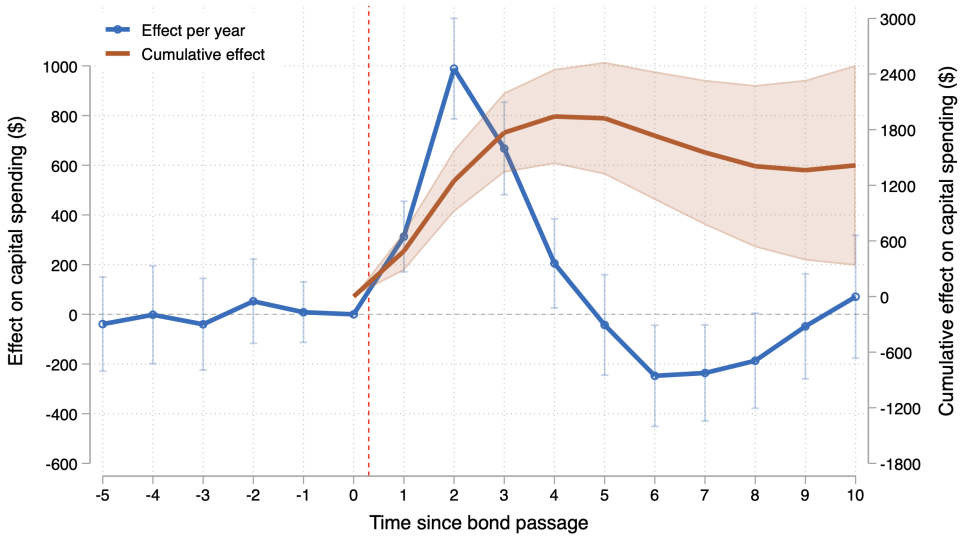


(b) House prices



Notes: Estimates and confidence intervals of the parameters β_k in equation (3), obtained using test scores (panel a) and house price index (panel b) as the dependent variable and not controlling for M_{jct-k} for $k < 0$. Test score estimates are obtained pooling data across subjects and grades, controlling for district-by-cohort and cohort-by-state-by-year-by-subject-by-grade effects, and weighing observations by the number of test takers. House price estimates are obtained using district-by-cohort and cohort-by-state-by-year effects, weighing observations by district enrollment. Standard errors are clustered at the district level.

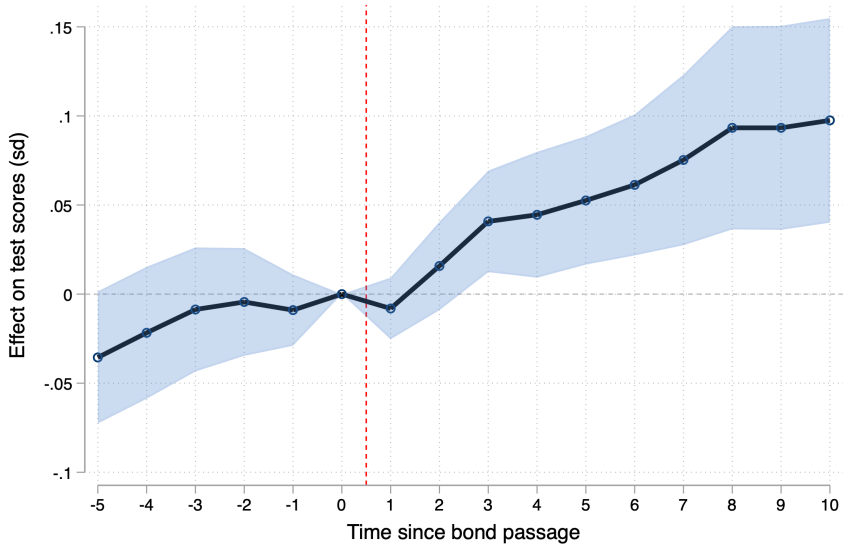
Figure A23: Average Effects of Bond Authorization on Capital Spending. Extended Two-Way-Fixed-Effects Estimator as in Wooldridge (2021)



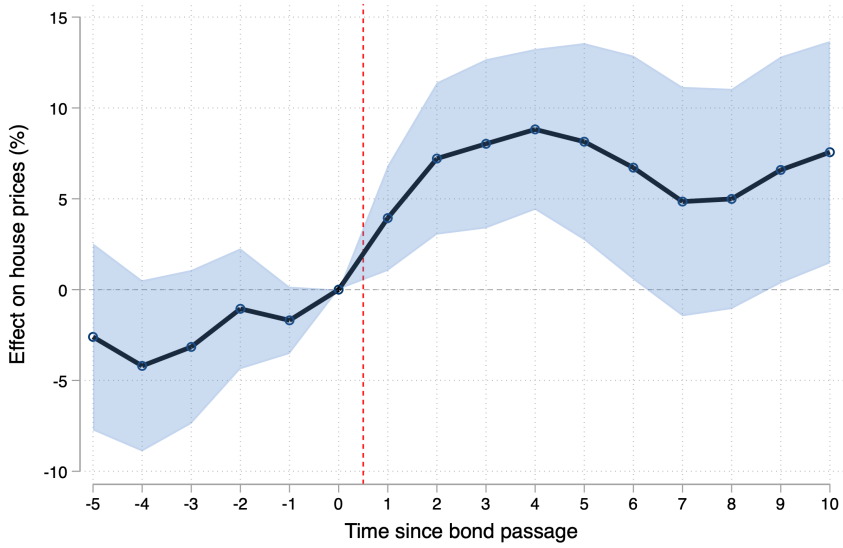
Notes: The blue line with circle markers shows estimates and confidence intervals of the parameters β_k in equation (2), obtained using capital spending per pupil as the dependent variable and allowing for the treatment effect to be heterogeneous across cohorts, as in Wooldridge (2021) (we show averages of treatment effects across cohorts). The orange continuous line shows cumulative effects, calculated as the running sum of coefficients since time 0. Estimates are obtained using district and state-by-year effects; observations and weighted by by district enrollment. Standard errors are clustered at the district level.

Figure A24: Average Effects of Bond Authorization on Test Scores and House Prices. Extended Two-Way-Fixed-Effects Estimator as in Wooldridge (2021)

(a) Test scores



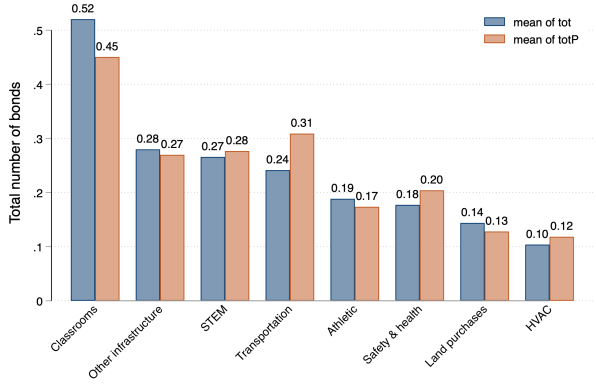
(b) House prices



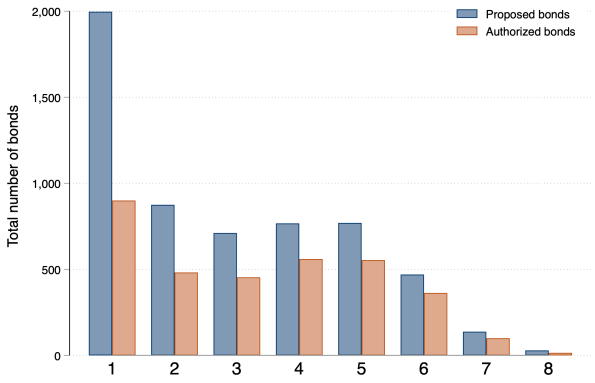
Notes: Estimates and confidence intervals of the parameters β_k in equation (2), obtained using test scores (panel (a)) and the house price index (panel (b)) as the dependent variable and allowing for the treatment effect to be heterogeneous across cohorts, as in Wooldridge (2021) (we show averages of treatment effects across cohorts). We average test scores across grades and subjects within a district-year, using the number of test score takers as weights. All estimates are obtained using district-by-cohort and cohort-by-state-by-year effects, weighing observations by district enrollment. Standard errors are clustered at the district level.

Figure A25: Share of Bonds by Category and Number of Categories

(a) Share of bonds in each category



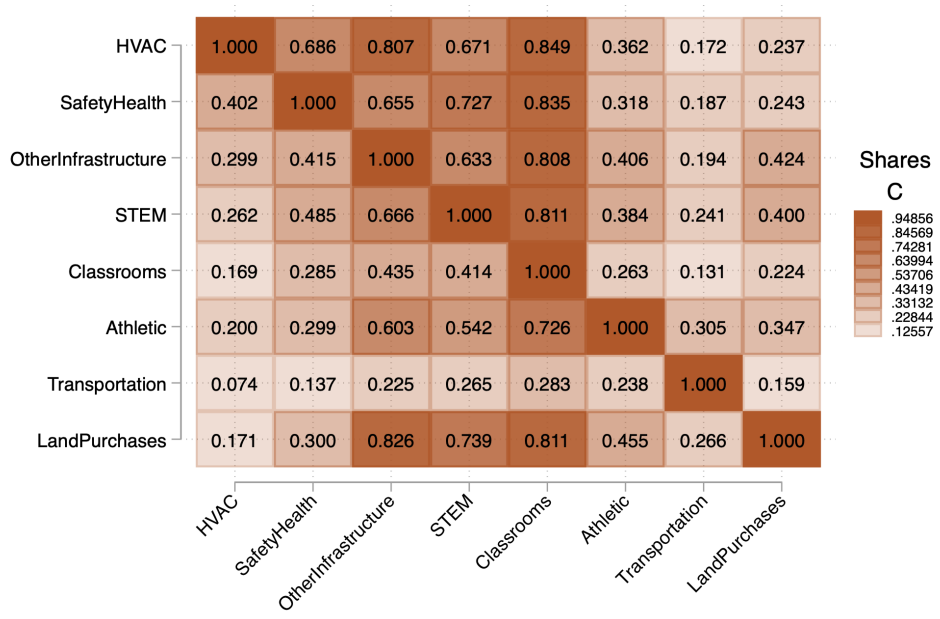
(b) Share of bonds by number of assigned categories



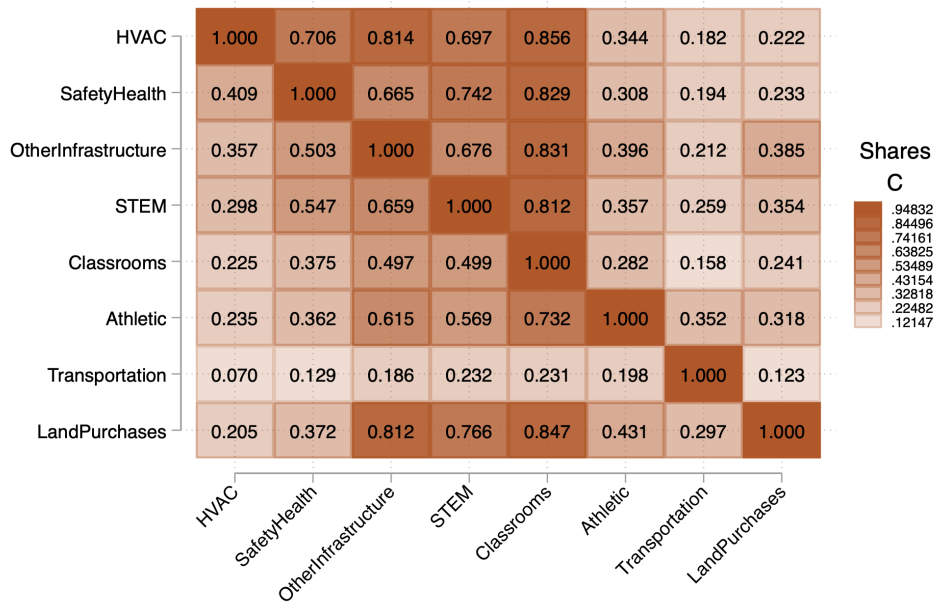
Note: Panel (a) shows the number of bonds assigned to each (non-mutually exclusive) category. Panel (b) shows the number of bonds with each number of assigned categories.

Figure A26: Bundling of Bond Categories: Shares of Bonds by Category that Also Contain Other Categories

(a) Proposed bonds

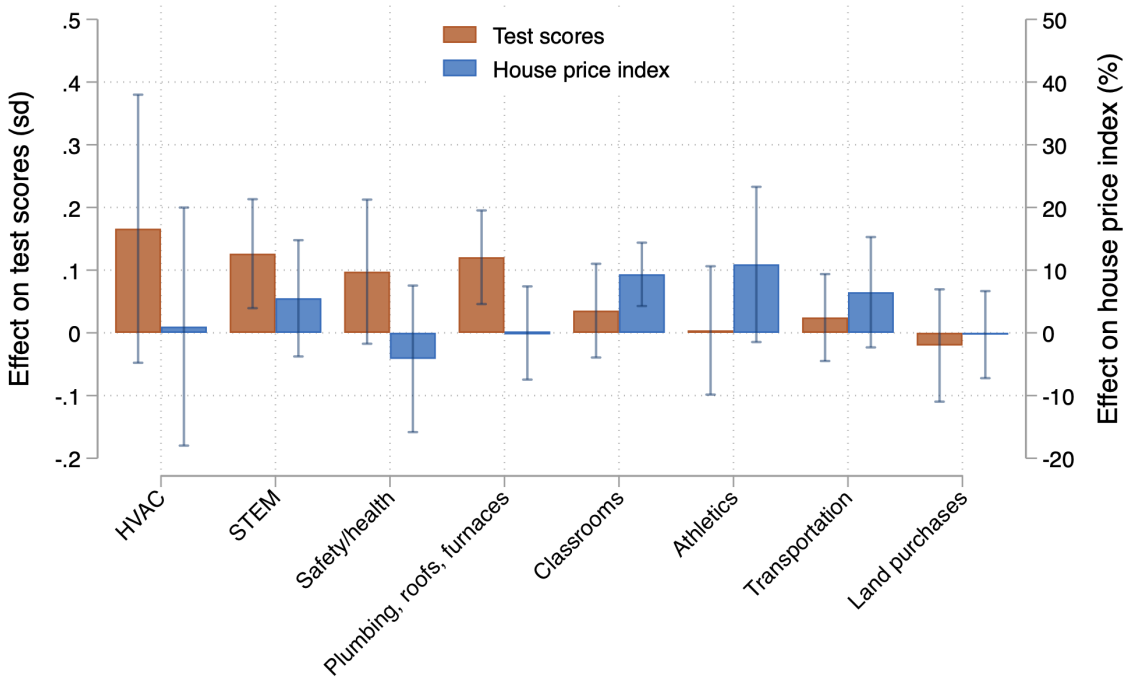


(b) Authorized bonds



Note: Each number in the matrix corresponds to the share of bonds in the category shown on the horizontal axis, who also belong to the category on the vertical axis. For example, the number 0.237 in the top-right cell of panel (a) indicates that 23.7% of all HVAC bonds also contain land purchases. Panel (a) refers to all proposed bonds; panel (b) refers to authorized bonds.

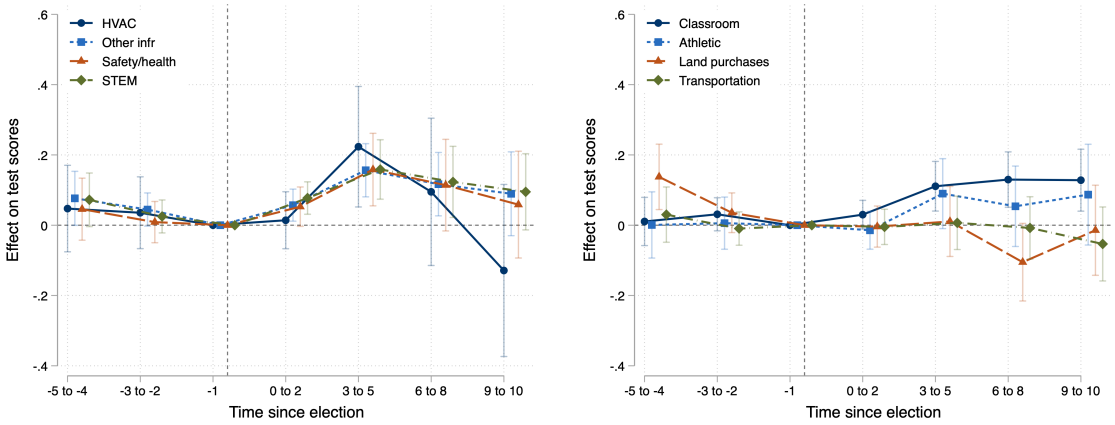
Figure A27: Effects of Passing a Bond, By Spending Category. Controlling For Other Categories



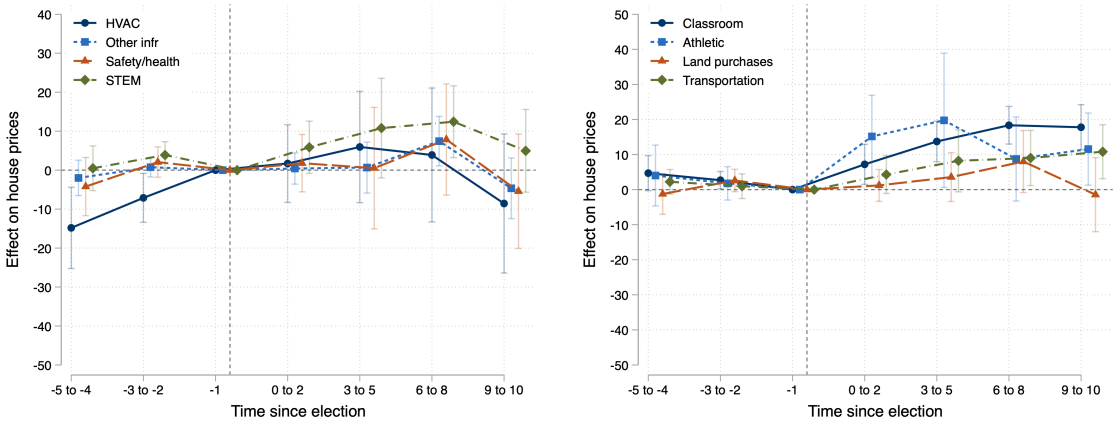
Note: Point estimates and confidence intervals of averages of the parameters $\beta_{k,p}$ in equation (6) for $k \in [3, 6]$, shown separately for each spending category p. The orange series is estimated using test scores as the dependent variable, pooled across subjects and grades, using district-by-cohort and state-by-year-by-subject-by-grade-by-cohort effects and weighing observations by the number of test takers. The blue series is estimated using the house price index as the dependent variable, using district-by-cohort and state-by-year-by-cohort effects and weighing observations by district enrollment. All specifications also control for indicators for other bond categories, interacted with state-by-year-by-cohort fixed effects. Confidence intervals are calculated using standard errors clustered at the district level.

Figure A28: Effects of Passing a Bond, By Spending Category. Dynamic Effects

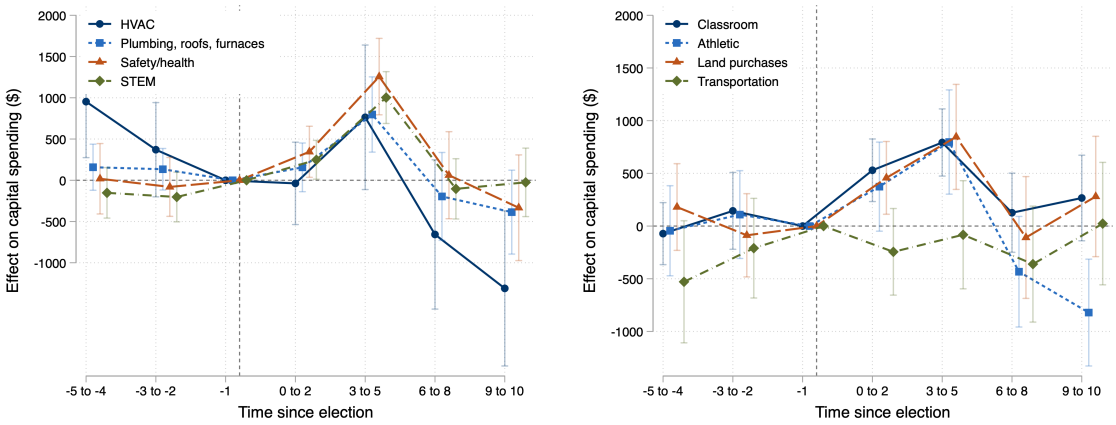
(a) Test scores



(b) House prices



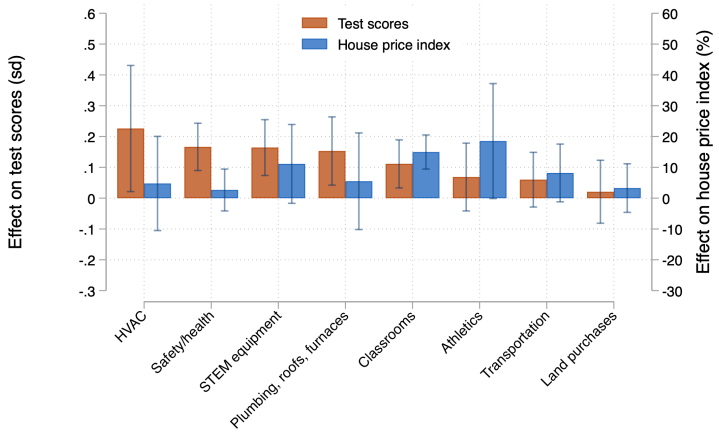
(c) Capital spending per pupil



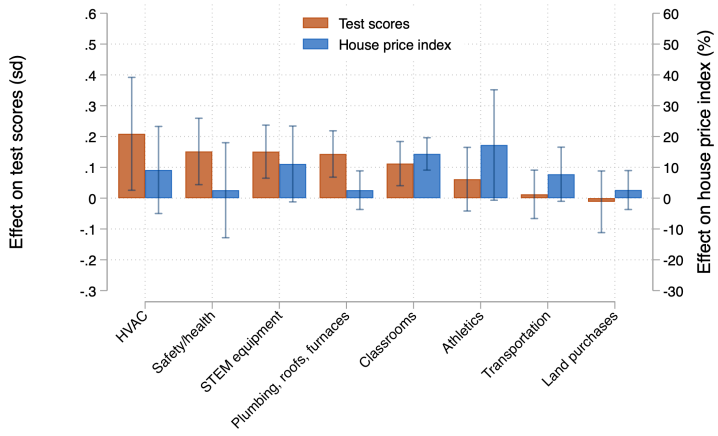
Note: Point estimates and confidence intervals of averages of the parameters $\beta_{k,p}$ in equation (6) over different time periods, shown separately for each spending category p. The dependent variables are test scores (panel (a)), the house price index (panel (b)), and capital spending per pupil (panel (c)). Test score effects are obtained pooling data across subjects and grades, using district-by-cohort and state-by-year-by-subject-by-grade-by-cohort effects and weighing observations by the number of test takers. Capital spending and house price effects are obtained using district-by-cohort and state-by-year-by-cohort effects and weighing observations by district enrollment. Confidence intervals are calculated using standard errors clustered at the district level.

Figure A29: Effects of Passing a Bond, By Spending Category. Alternative Estimation Approaches

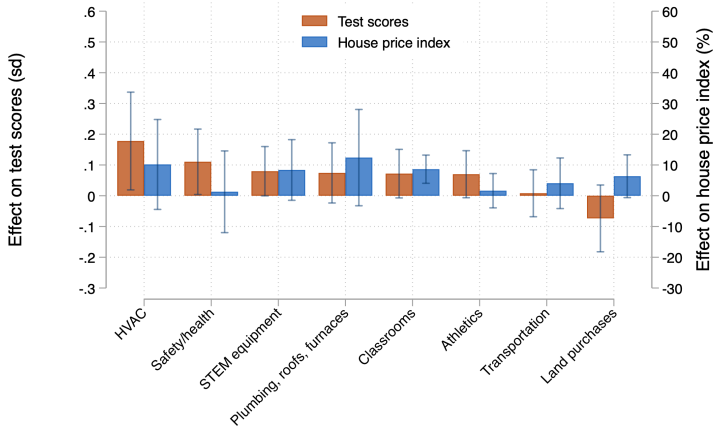
(a) Stacked DRD, matching on pre-election bond history



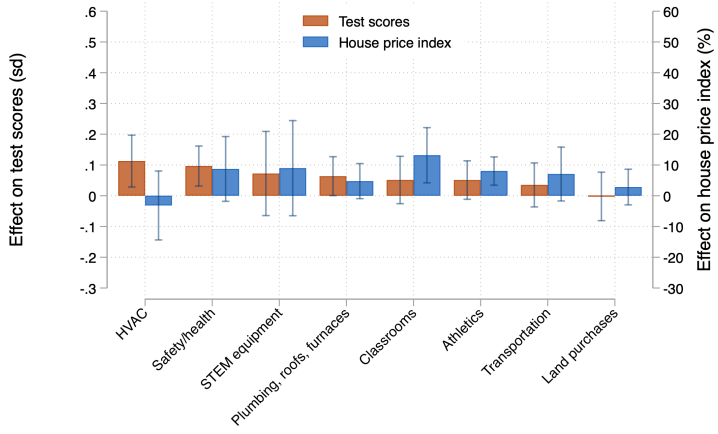
(b) Stacked DRD, controls never authorize bonds in window



(c) Stacked DRD, not controlling for future bond history



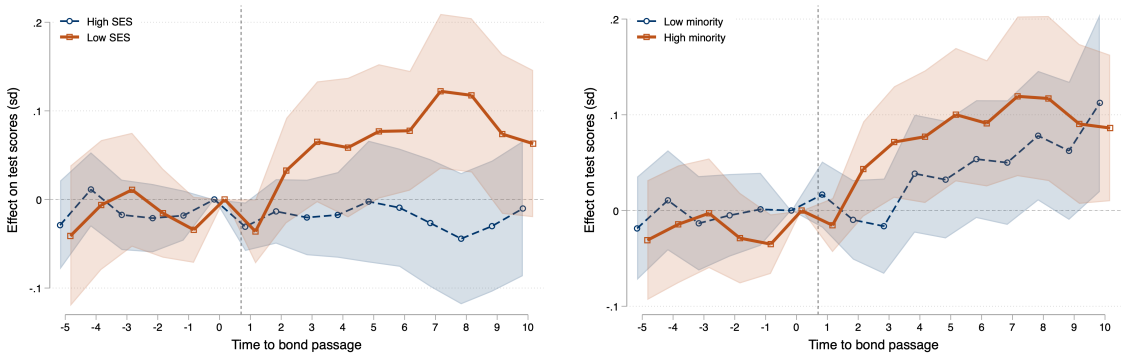
(d) Extended Two-way Fixed Effects (Wooldridge, 2021)



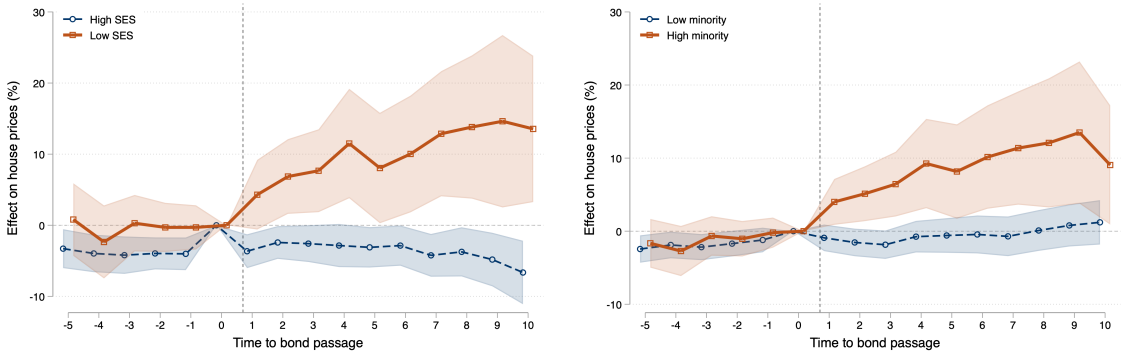
Note: Point estimates and confidence intervals of averages of the parameters $\beta_{k,p}$ in equation (6) for $k \in [3,6]$, shown separately for each spending category p. The orange series is estimated using test scores as the dependent variable, pooled across subjects and grades, using district-by-cohort and state-by-year-by-subject-by-grade-by-cohort effects and weighing observations by the number of test takers. The blue series is estimated using the house price index as the dependent variable, using district-by-cohort and state-by-year-by-cohort effects and weighing observations by district enrollment. Estimates are obtained using the different approaches described in Section 4. Confidence intervals are calculated using standard errors clustered at the district level.

Figure A30: Effects of Bond Authorization By Student Demographics. Using Cellini, Ferreira, and Rothstein's (2010) Treatment-on-the-Treated Estimator

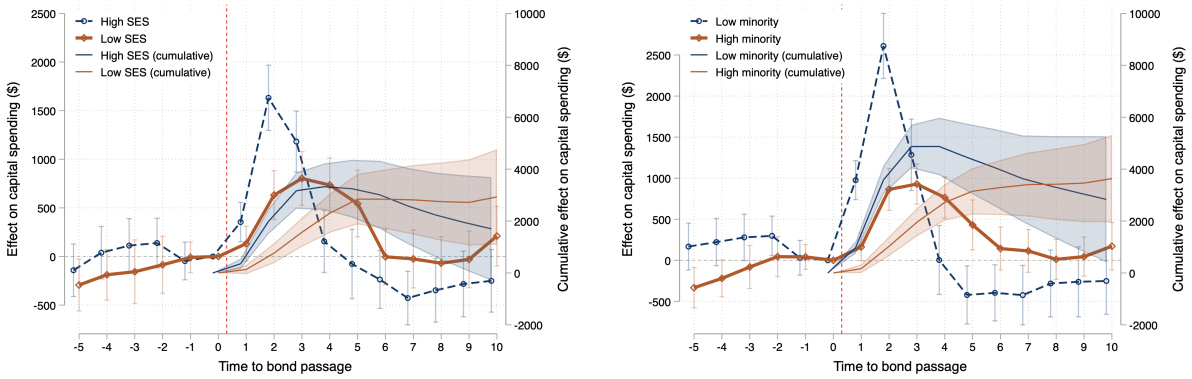
(a) Test scores



(b) House prices



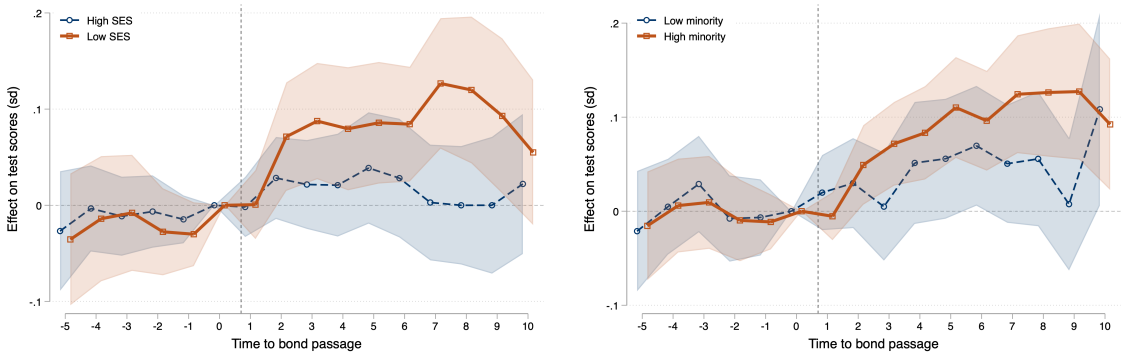
(c) Capital spending



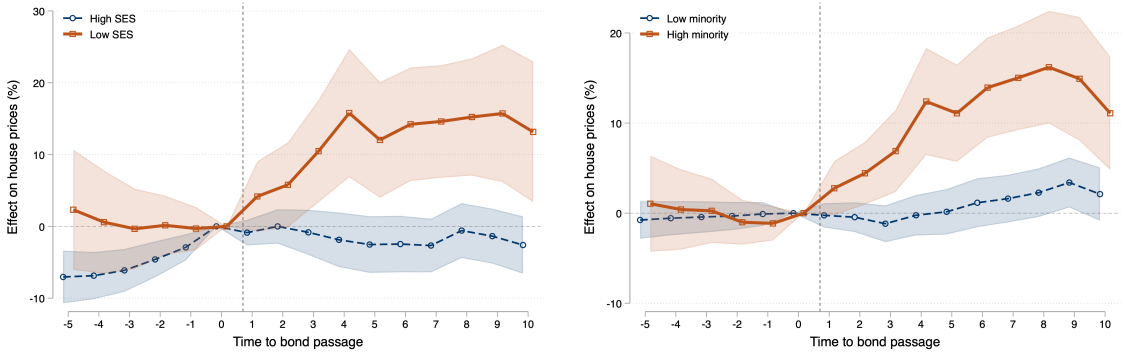
Note: Estimates and confidence intervals of the parameters β in equation (2), obtained using test scores (panel a), the house price index (panel b), and capital spending per pupil (panel c) as the dependent variable. Figures in the left panels show estimates by tercile of the share of disadvantaged students ("low-SES" denotes the top tercile and "high-SES" denotes the bottom tercile). Figures in the right panels show estimates by tercile of the share of minority students ("high-minority" denotes the top tercile and "low-minority" denotes the bottom tercile). Estimates on test scores are obtained pooling data across subjects and grades, using district- and and state-by-year-by-subject-by-grade effects and weighing observations by the number of test takers. Other estimates are obtained using state-by-year effects and weighing observations by district enrollment. Standard errors are clustered at the district level.

Figure A31: Effects of Bond Authorization By Student Demographics. Stacked Approach, Controls Never Authorize a Bond in Time Window of Analysis

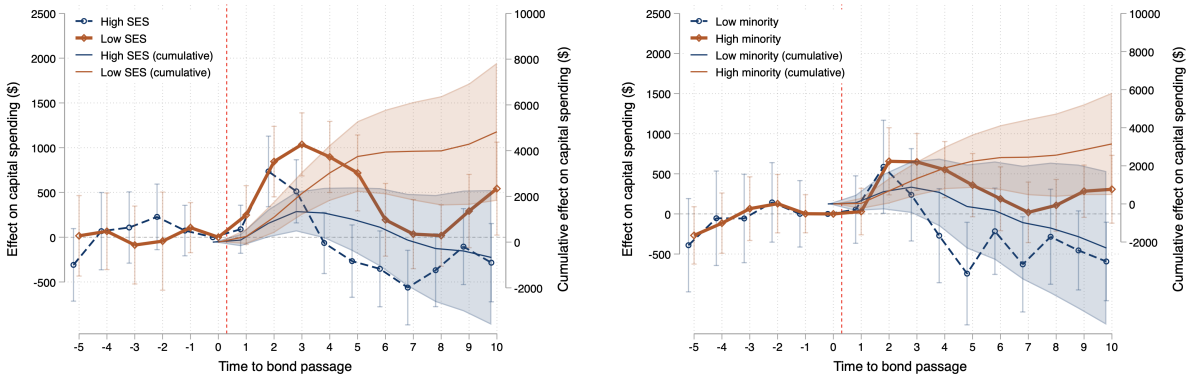
(a) Test scores



(b) House prices



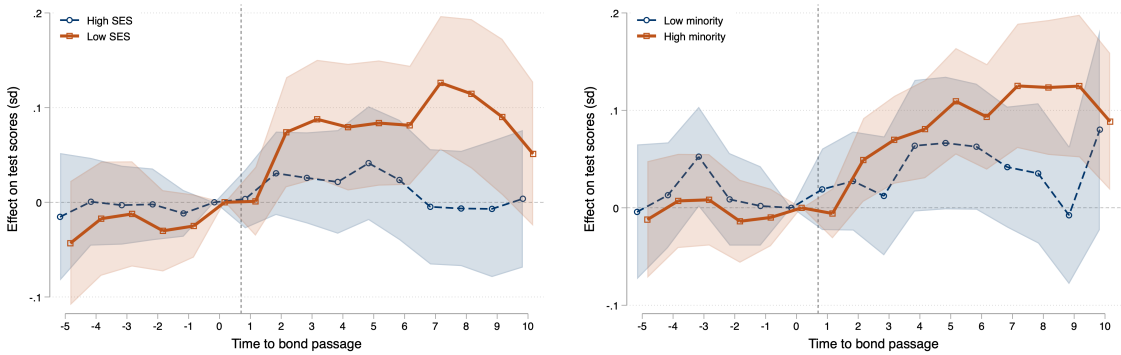
(c) Capital spending



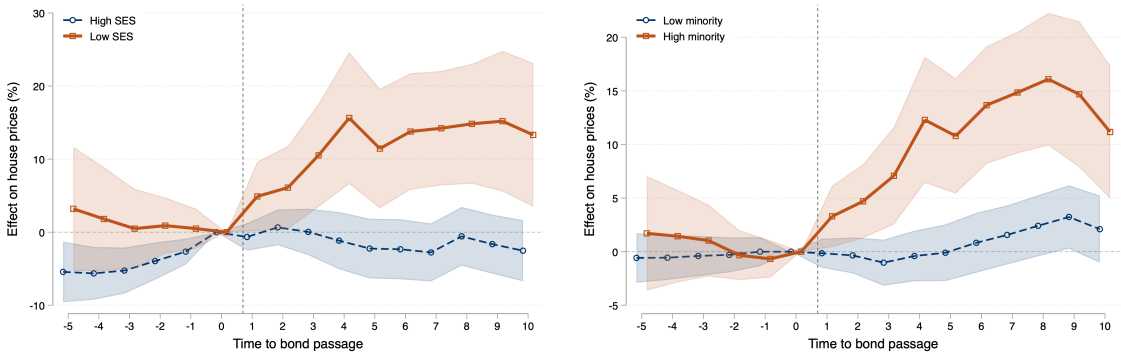
Note: Estimates and confidence intervals of the parameters β in equation (3), obtained using test scores (panel a), the house price index (panel b), and capital spending per pupil (panel c) as the dependent variable, and using as "clean controls" only districts that never authorize any bonds in the time window of analysis. Figures in the left panels show estimates by tercile of the share of disadvantaged students ("low-SES" denotes the top tercile and "high-SES" denotes the bottom tercile). Figures in the right panels show estimates by tercile of the share of minority students ("high-minority" denotes the top tercile and "low-minority" denotes the bottom tercile). Estimates on test scores are obtained pooling data across subjects and grades, using district-by-cohort and state-by-year-by-subject-by-grade-by-cohort effects and weighing observations by the number of test takers. Other estimates are obtained using district-by-cohort and state-by-year-by-cohort effects and weighing observations by district enrollment. Standard errors are clustered at the district level.

Figure A32: Effects of Bond Authorization By Student Demographics. Stacked Approach, Matching on Pre-Election Bond History

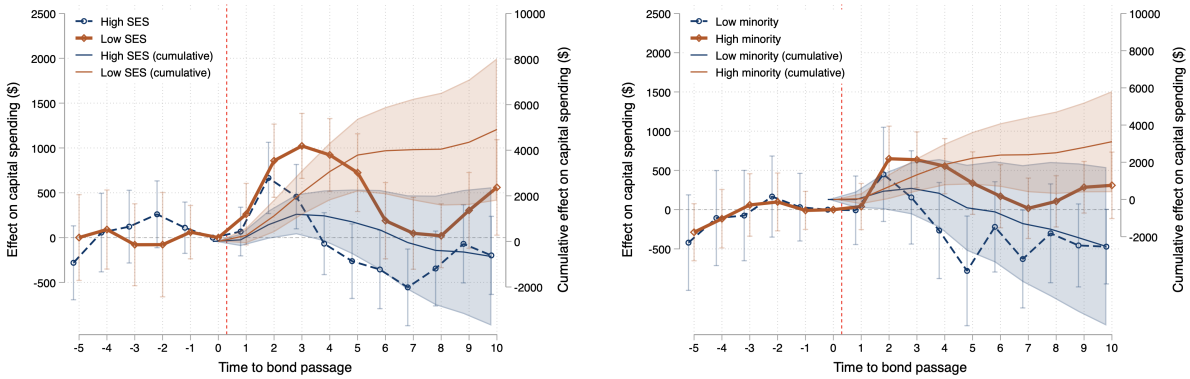
(a) Test scores



(b) House prices



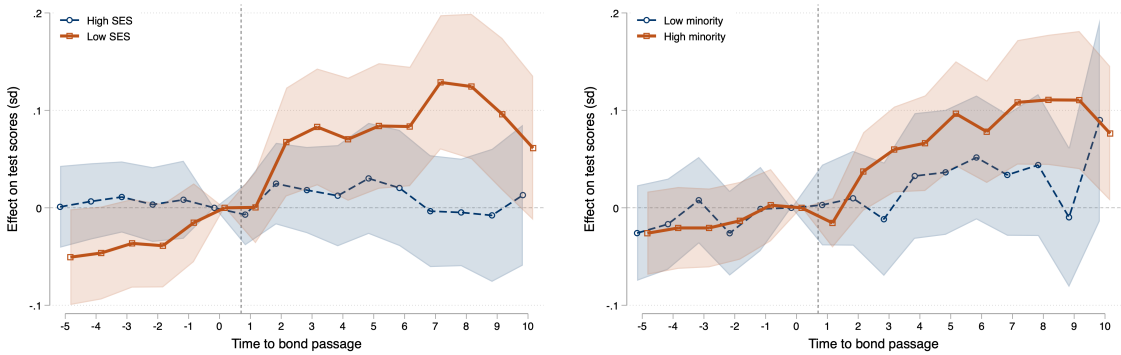
(c) Capital spending



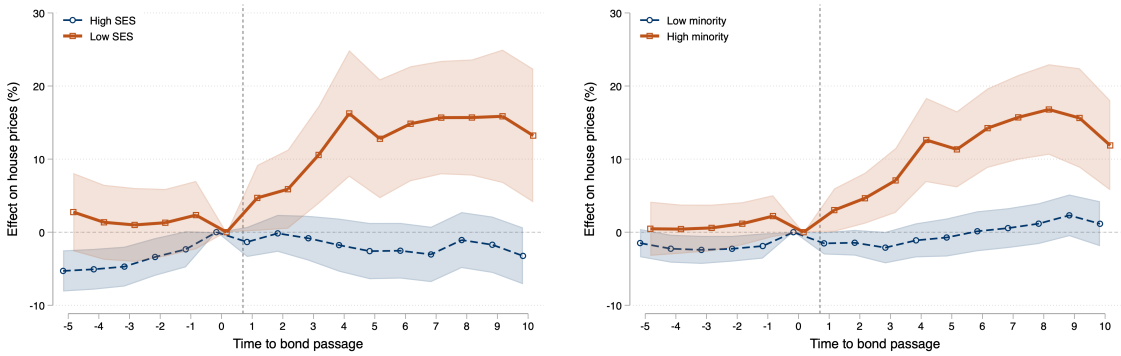
Note: Estimates and confidence intervals of the parameters β in equation (3), obtained using test scores (panel a), the house price index (panel b), and capital spending per pupil (panel c) as the dependent variable, and using as "clean controls" only districts that share the bond history with at least one treated district in their cohort. Figures in the left panels show estimates by tercile of the share of disadvantaged students ("low-SES" denotes the top tercile and "high-SES" denotes the bottom tercile). Figures in the right panels show estimates by tercile of the share of minority students ("high-minority" denotes the top tercile and "low-minority" denotes the bottom tercile). Estimates on test scores are obtained pooling data across subjects and grades, using district-by-cohort and state-by-year-by-subject-by-grade-by-cohort effects and weighing observations by the number of test takers. Other estimates are obtained using district-by-cohort and state-by-year-by-cohort effects and weighing observations by district enrollment. Standard errors are clustered at the district level.

Figure A33: Effects of Bond Authorization By Student Demographics. Stacked Approach, Not Controlling for Future Bond History

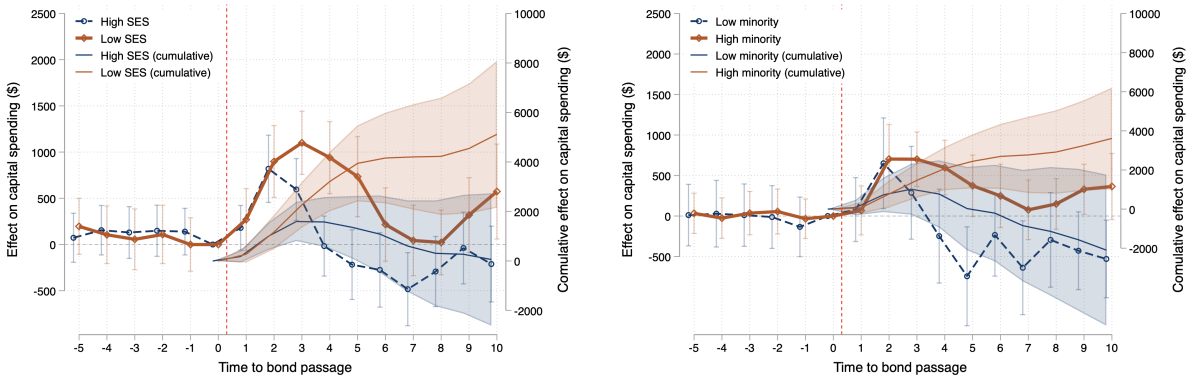
(a) Test scores



(b) House prices



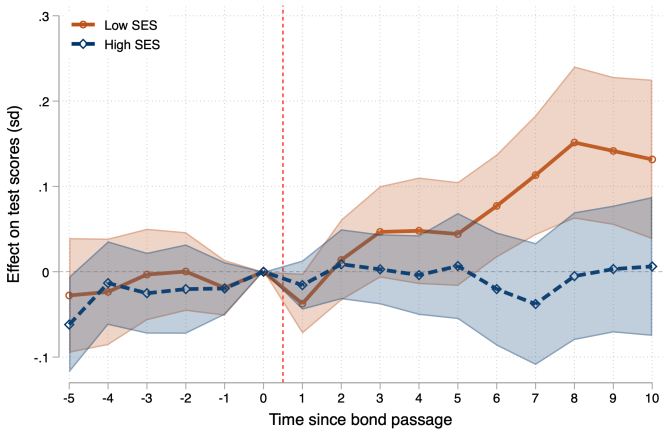
(c) Capital spending



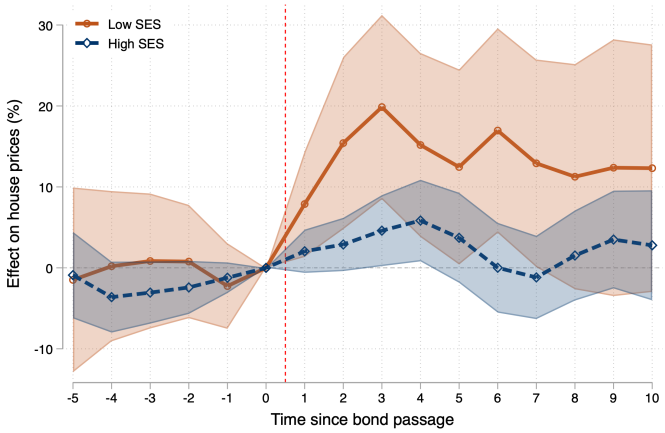
Note: Estimates and confidence intervals of the parameters β in equation (3), obtained using test scores (panel a), the house price index (panel b), and capital spending per pupil (panel c) as the dependent variable, and using as "clean controls" only districts that share the bond history with at least one treated district in their cohort. Figures in the left panels show estimates by tercile of the share of disadvantaged students ("low-SES" denotes the top tercile and "high-SES" denotes the bottom tercile). Figures in the right panels show estimates by tercile of the share of minority students ("high-minority" denotes the top tercile and "low-minority" denotes the bottom tercile). Estimates on test scores are obtained pooling data across subjects and grades, using district-by-cohort and state-by-year-by-subject-by-grade-by-cohort effects and weighing observations by the number of test takers. Other estimates are obtained using district-by-cohort and state-by-year-by-cohort effects and weighing observations by district enrollment. Standard errors are clustered at the district level.

Figure A34: Effects of Bond Authorization By Student Demographics. Extended Two-Way-Fixed-Effects Estimator as in Wooldridge (2021)

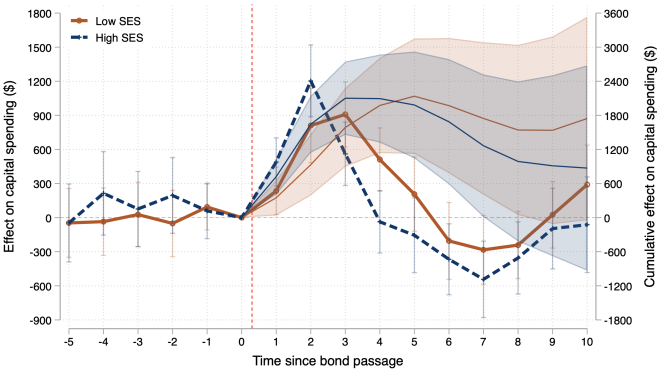
(a) Test scores



(b) House prices

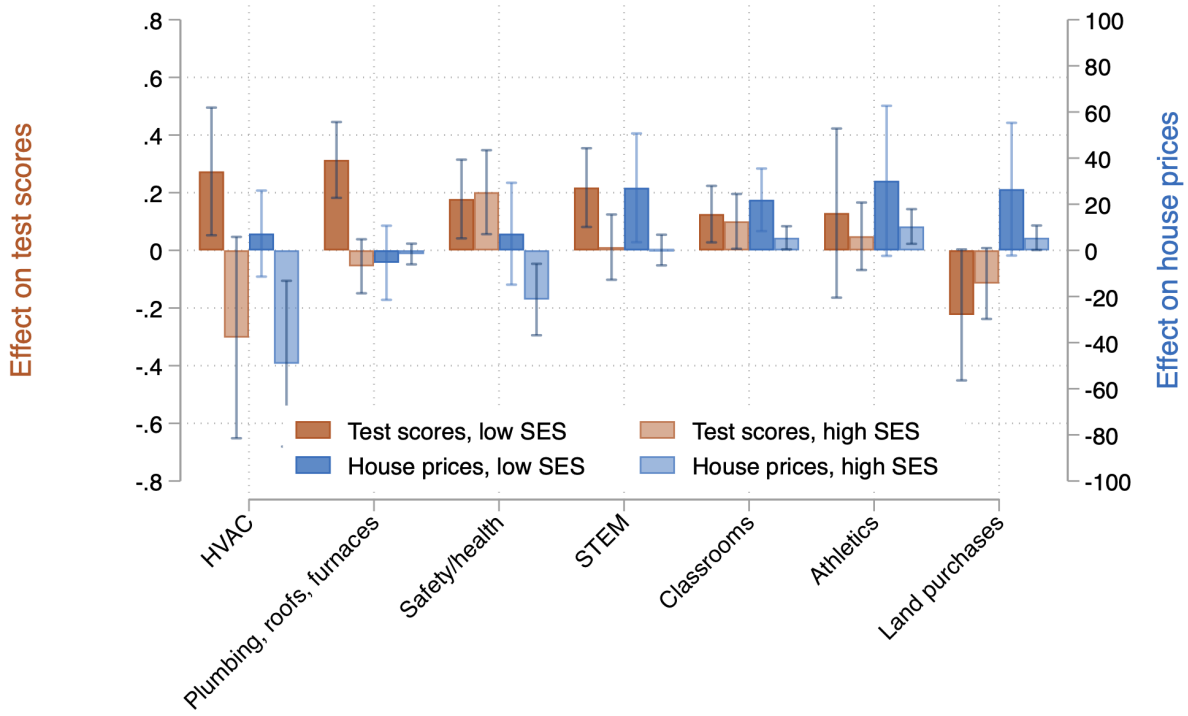


(c) Capital spending



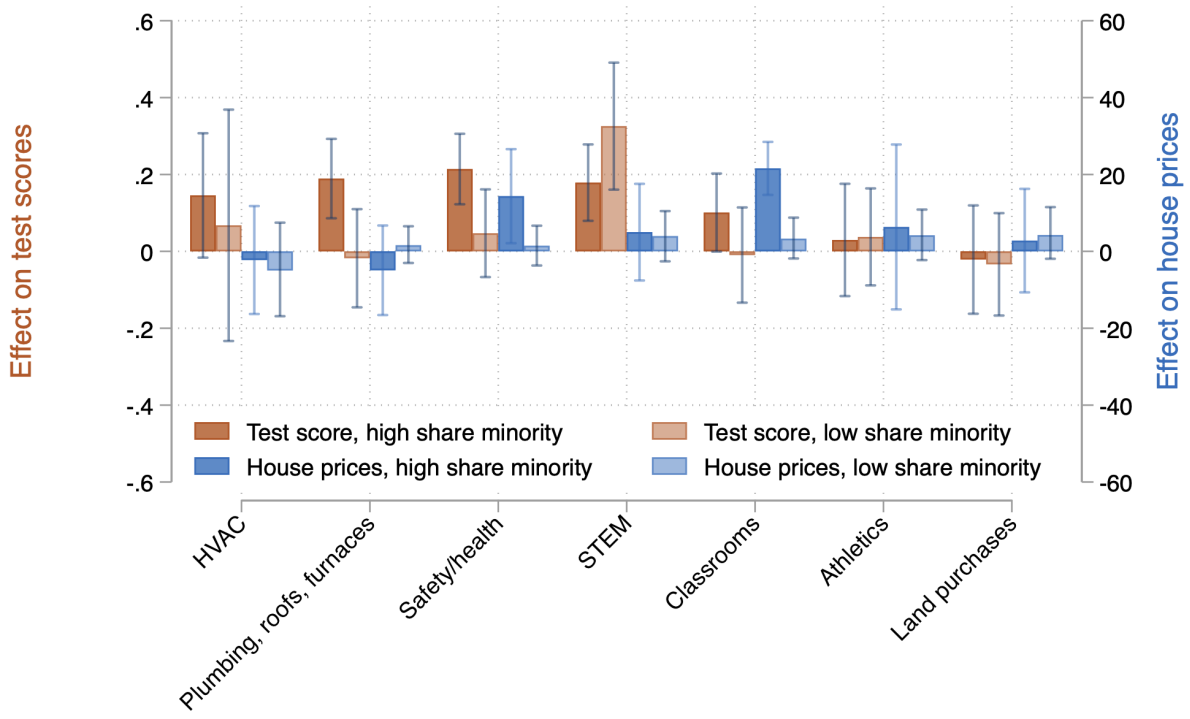
Note: Estimates and confidence intervals of the parameters β in equation (3), obtained using test scores (panel a), the house price index (panel b), and capital spending per pupil (panel c) as the dependent variable, and allowing for the treatment effect to be heterogeneous across cohorts, as in Wooldridge (2021) (we show averages of treatment effects across cohorts). Estimates are shown by tercile of the share of disadvantaged students ("low-SES" denotes the top tercile and "high-SES" denotes the bottom tercile). We average test scores across grades and subjects within a district-year, using the number of test score takers as weights. All estimates are obtained using district-by-cohort and cohort-by-state-by-year effects, weighing observations by district enrollment. Standard errors are clustered at the district level.

Figure A35: Effects of Bond Authorization By Spending Category and Share of Low-SES Students



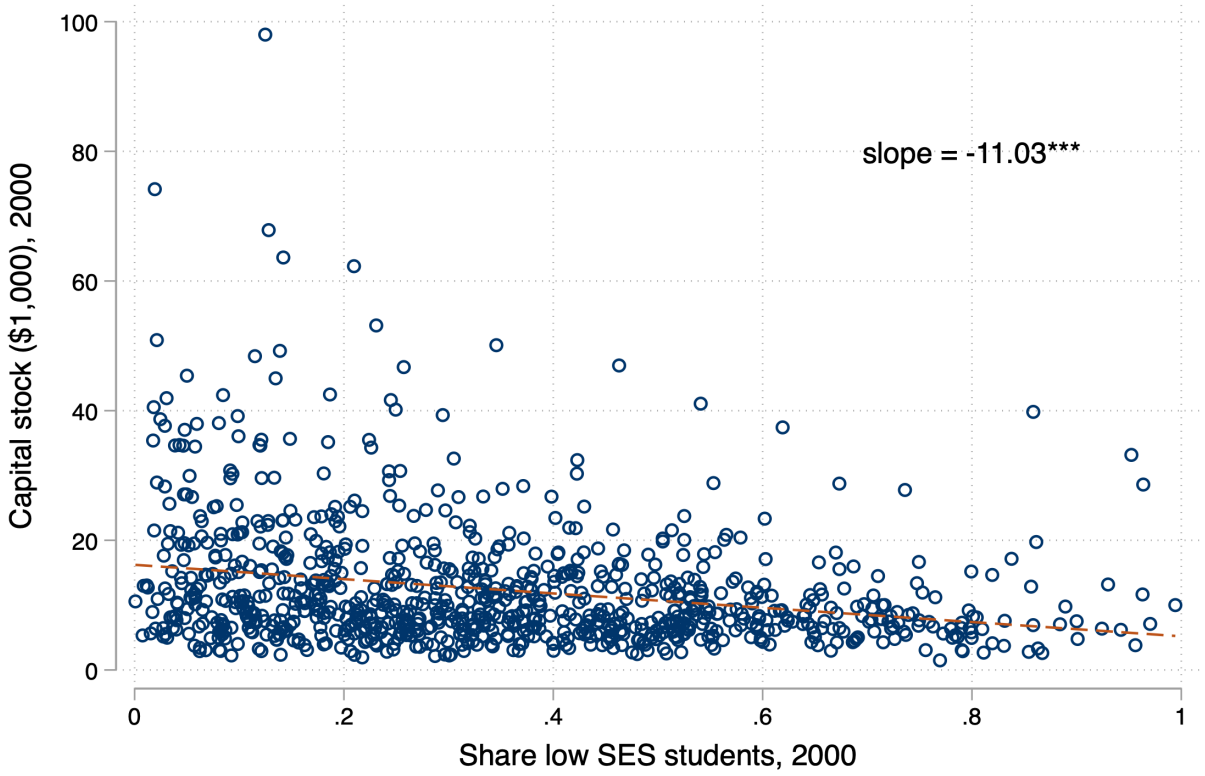
Note: Point estimates and confidence intervals of a linear combination of the parameters $\beta_{k,p}$ in equation (6) for $k \in [3, 6]$, shown separately for each spending category p and estimated separately for districts in the top tercile of the distribution of low-SES students ("low-SES", darker series) and those in the bottom tercile ("high-SES", lighter series). The orange series are estimated using test scores as the dependent variable, pooled across subjects and grades, using district-by-cohort and state-by-year-by-subject-by-grade-by-cohort effects and weighing observations by the number of test takers. The blue series are estimated using the house price index as the dependent variable, using district-by-cohort and state-by-year-by-cohort effects and weighing observations by district enrollment. Confidence intervals are calculated using standard errors clustered at the district level.

Figure A36: Effects of Bond Authorization, By Spending Category and Share of Minority Students



Note: Point estimates and confidence intervals of averages of the parameters $\beta_{k,p}$ in equation (6) for $k \in [3, 8]$, shown separately for each spending category p and estimated separately for districts in the top tercile of the distribution of the share of Black and Hispanic students ("high minority", darker series) and those in the bottom tercile ("low minority", lighter series). The orange series are estimated using test scores as the dependent variable, pooled across subjects and grades, using district-by-cohort and state-by-year-by-subject-by-grade-by-cohort effects and weighing observations by the number of test takers. The blue series are estimated using the house price index as the dependent variable, using district-by-cohort and state-by-year-by-cohort effects and weighing observations by district enrollment. Confidence intervals are calculated using standard errors clustered at the district level.

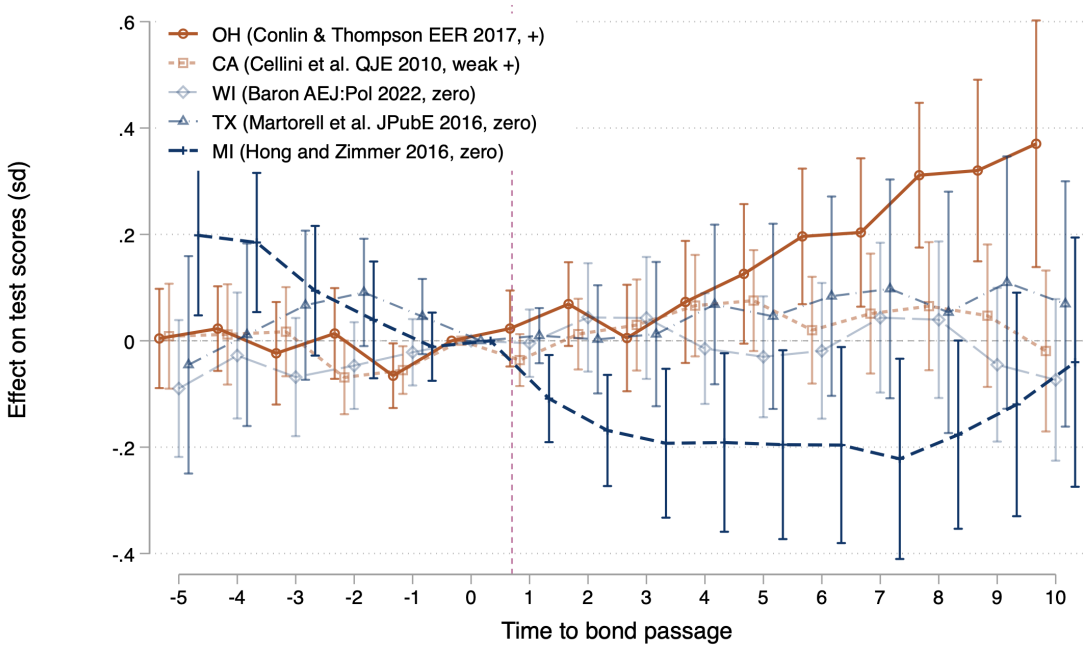
Figure A37: Capital Stock and Share of Low-SES Students: Correlation



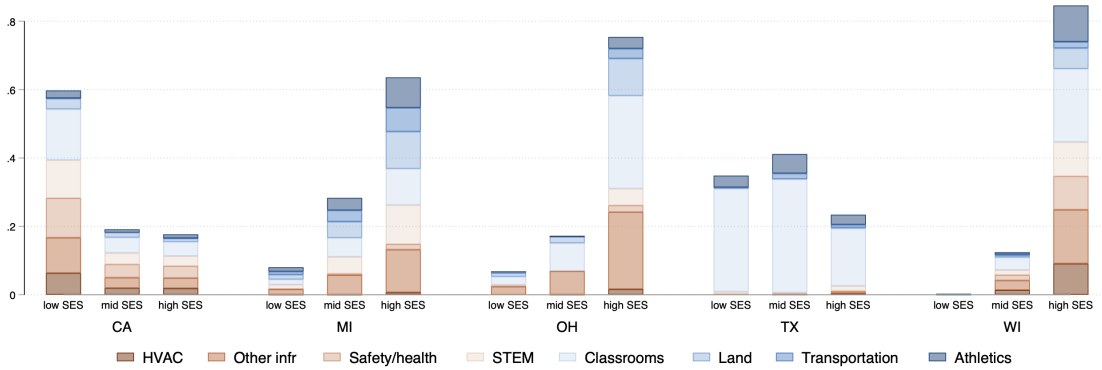
Note: Scatter plot of districts' shares of low-SES students (horizontal axis) and capital stock, calculated as each district's sum of capital spending over 30 years using a 5% depreciation rate (vertical axis). Variables are measured in the year 2000.

Figure A38: Replicating Estimates from Previous Studies

(a) Dynamic estimates, by state and study



(b) Share of bonds in each category by state and district SES



Note: Panel (a) shows estimates and confidence intervals of equation (3) obtained using data from the states and years included in each study. Panel (b) shows the share of bonds passed in each state and time period, by category and type of district. *Low SES*, *mid SES*, and *high SES* refer to districts in the first, second, and third tercile of the distribution of the share of low-SES students across the whole country.

Table A1: Close vs Non-Close Elections: District Expenditures, Bonds, and Spending Categories

	Non-close	Close (margin$= +/ - 0.1$)	Difference
Capital	1272.8	1061.3	211.6***
			(45.96)
Current	7942.3	6946.0	996.3***
			(75.71)
Spending rules			
Share w/supermajority	0.122	0.208	-0.0859***
			(0.00618)
Voting requirement	0.509	0.515	-0.00577***
			(0.000499)
Debt limit (share prop. value)	0.0866	0.0948	-0.00822***
			(0.00106)
Share approved	0.839	0.622	0.217***
			(0.00717)
Vote margin	0.157	0.0155	0.142***
			(0.00239)
Size p.p. proposed ($1,000)	6.858	8.270	-1.411***
			(0.173)
Categories, approved bonds			
Classrooms	0.387	0.571	-0.183***
			(0.0118)
Other infrastructure	0.212	0.379	-0.166***
			(0.0105)
HVAC	0.106	0.141	-0.0346***
			(0.00778)
STEM equipment	0.238	0.351	-0.113***
			(0.0107)
Safety/health	0.184	0.242	-0.0583***
			(0.00970)
Athletic facilities	0.157	0.205	-0.0478***
			(0.00912)
Transportation	0.368	0.196	0.172***
			(0.0110)
Land purchases	0.0955	0.190	-0.0942***
			(0.00799)
Demographics and outcomes			
Share low-SES	0.418	0.376	0.0419***
			(0.00386)
Share Black/Hispanic	0.226	0.215	0.0104**
			(0.00450)
ELA test scores	-0.0679	-0.0624	-0.00548
			(0.0163)
Math test scores	-0.0948	-0.0778	-0.0169
			(0.0164)
House price index ($1989 = 100$)	183.5	191.2	-7.702***
			(1.169)
Number of districts	3,446	3,085	4,683
Number of states	29	28	29

Note: Means and standard deviations of variables of interest, for close and non-close elections. Close elections are defined as those with an absolute vote margin of at most 15%.

Table A2: First Stage: Effects of Bond Authorization on School Expenditures. Stacked Approach, Matching on Pre-Election Bond History

Type of expenditure:	Capital	Current	Other non-instr services
Average effect over:	(1)	(2)	(3)
1-5 years	360***	-6	2
	(98)	(30)	(3)
6-10 years	-159	-38	5
	(116)	(46)	(7)
11-15 years	73	-109**	5
	(115)	(52)	(8)
District FE	X	X	X
Year-State FE	X	X	X
Adj. R^2	0.288	0.977	0.873
N	124,105	124,105	124,105

Note: Estimates and standard errors of linear combinations of the parameters β_k in equation (3), obtained using as "clean controls" only districts that share the bond history with at least one treated district in their cohort. The dependent variables are per pupil capital spending (column 1), current spending (column 2), and spending on non-instructional services (column 3). All columns control for district-by-cohort and cohort-by-state-by-year effects. Observations are weighted by district enrollment. Standard errors in parentheses are clustered at the district level. $*$ = 0.1; $**$ = 0.05; $***$ = 0.01.

Table A3: Effects of Bond Authorization on Student Achievement and House Prices. Stacked Approach, Matching on Pre-Election Bond History

	Test scores			HPI	Enrollment			Test	HPI
	Pooled	Math	ELA		ln(Enrollment)	White	High-SES	scores	
Average effect over:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1-4 years	0.043***	0.041**	0.045***	2.777**	0.003	0.004*	0.010***	0.041***	1.999*
	(0.014)	(0.018)	(0.014)	(1.348)	(0.005)	(0.002)	(0.003)	(0.013)	(1.177)
5-8 years	0.081***	0.078***	0.087***	7.398***	0.008	0.007*	0.023***	0.071***	5.944***
	(0.022)	(0.028)	(0.022)	(2.131)	(0.011)	(0.004)	(0.007)	(0.021)	(1.888)
9-12 years	0.069**	0.046	0.092***	5.606**	0.021	0.006	0.022***	0.061**	4.190**
	(0.028)	(0.032)	(0.029)	(2.023)	(0.014)	(0.004)	(0.007)	(0.028)	(1.912)
District FE	X	X	X	X	X	X	X	X	X
Yr-St-Gr-Subj FE	X							X	
Yr-St-Gr FE		X	X						
Year-State FE				X	X	X	X		X
Enroll. shares								X	X
Adj. R^2	0.875	0.866	0.898	0.937	0.998	0.990	0.932	0.877	0.940
N	1,071,680	519,235	552,427	83,287	124,113	123,870	120,686	1,050,935	80,453

Note: Estimates and standard errors of linear combinations of the parameters β_k in equation (3), obtained using as "clean controls" only districts that share the bond history with at least one treated district in their cohort. The dependent variables are pooled test scores (columns 1 and 8); Math and ELA test scores (columns 2 and 3, respectively); the house price index (columns 4 and 9); the natural logarithm of total enrollment (column 5); and the share of enrolled students who are white (column 6) and high-SES (column 7). All columns control for district-by-cohort and cohort-bystate-by-year effects. Columns 1 and 8 also control for cohort-by-state-by-year-by-grade-by-subject effects, and columns 2-3 control for cohort-by-state-by-year-by-grade effects. Columns 8 and 9 additionally control for the share of white and low-SES students in each district and year. Standard errors in parentheses are clustered at the district level. $*$ = 0.1; $**$ = 0.05; $***$ = 0.01.

Table A4: First Stage: Effects of Bond Authorization on School Expenditures. Stacked Approach, Controls Never Authorize a Bond in Time Window of Analysis

Type of expenditure:	Capital	Current	Other non-instr services
Average effect over:	(1)	(2)	(3)
1-5 years	380***	1	1
	(97)	(30)	(3)
6-10 years	-161	-24	4
	(114)	(45)	(7)
11-15 years	45	-94*	4
	(114)	(51)	(8)
District FE	X	X	X
Year-State FE	X	X	X
Adj. R^2	0.287	0.977	0.871
N	126,421	126,421	126,421

Note: Estimates and standard errors of linear combinations of the parameters β_k in equation (3), obtained using as "clean controls" only districts that never authorize any bonds in the time window of analysis. The dependent variables are per pupil capital spending (column 1), current spending (column 2), and spending on non-instructional services (column 3). All columns control for district-by-cohort and cohort-by-state-by-year effects. Observations are weighted by district enrollment. Standard errors in parentheses are clustered at the district level. $*$ = 0.1; $**$ = 0.05; $***$ = 0.01.

Table A5: Effects of Bond Authorization on Student Achievement and House Prices. Stacked Approach, Controls Never Authorize a Bond in Time Window of Analysis

	Test scores			HPI	Enrollment			Test	HPI
	Pooled	Math	ELA		ln(Enrollment)	White	High-SES	scores	
Average effect over:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1-4 years	0.042***	0.041**	0.045***	2.533*	0.005	0.004*	0.009**	0.041***	1.810
	(0.014)	(0.018)	(0.014)	(1.354)	(0.005)	(0.002)	(0.003)	(0.013)	(1.183)
5-8 years	0.082***	0.080***	0.088***	7.078***	0.011	0.006*	0.022***	0.071***	5.691***
	(0.022)	(0.027)	(0.021)	(2.117)	(0.010)	(0.004)	(0.007)	(0.020)	(1.873)
9-12 years	0.073**	0.051	0.096***	5.095**	0.024*	0.005	0.020***	0.064**	3.741*
	(0.028)	(0.031)	(0.028)	(2.006)	(0.014)	(0.004)	(0.007)	(0.027)	(1.893)
District FE	X	X	X	X	X	X	X	X	X
Yr-St-Gr-Subj FE	X							X	
Yr-St-Gr FE		X	X						
Year-State FE				X	X	X	X		X
Enroll. shares								X	X
Adj. R^2	0.874	0.864	0.896	0.936	0.998	0.990	0.932	0.875	0.939
N	1,091,678	529,101	562,559	84,634	126,429	126,182	122,894	1,070,120	81,765

Note: Estimates and standard errors of linear combinations of the parameters β_k in equation (3), obtained using as "clean controls" only districts that never authorize any bonds in the time window of analysis. The dependent variables are pooled test scores (columns 1 and 8); Math and ELA test scores (columns 2 and 3, respectively); the house price index (columns 4 and 9); the natural logarithm of total enrollment (column 5); and the share of enrolled students who are white (column 6) and high-SES (column 7). All columns control for district-by-cohort and cohort-bystate-by-year effects. Columns 1 and 8 also control for cohort-by-state-by-year-by-grade-by-subject effects, and columns 2-3 control for cohort-by-state-by-year-by-grade effects. Columns 8 and 9 additionally control for the share of white and low-SES students in each district and year. Standard errors in parentheses are clustered at the district level. $*$ = 0.1; $**$ = 0.05; $***$ = 0.01.

B Construction of The Dataset

B.1 Test Scores

Here, we describe the collection, compilation, and standardization of test score data across states and years. To construct our panel of test scores at the district-subject-grade-year level, we rely on multiple data sources:

1. For years 2005 and earlier, we rely on data from the National Longitudinal School Level State Assessment Score Database (NLSLSASD).[38] Test scores are at the school-grade-subject-year level, and include data from all states from 2003-2005, and a subset of states in earlier years. Most states have data from at least 1999, with the earliest state (Maryland) reporting data as early as 1993.

2. For 2006-2008, we collected data from individual states. Data were collected from state departments of education. In some states, data were publicly accessible on a state website, while other states required us to submit public data requests. Through this process we collected from 44 states and the District of Columbia; we were unable to collect data for Alabama, Alaska, Hawaii, Nebraska, North Dakota, and Oklahoma. Depending on the state, data are either at the district-subject-grade-year or the school-subject-grade-year level.

3. For 2009-2018, we rely on district-subject-grade-year test score data in math and ELA from the Stanford Education Data Archive (SEDA).[39]

We restrict only to test scores in grades 3-8; data for other grades is inconsistent across years, states, and subjects. We restrict attention only to district-level test scores. For state-years where we have school-level but not district-level scores, we take the weighted average score across schools, weighting by enrollment.[40]

For each state and year, we keep only test scores for math and English Language Arts (ELA) for the primary exam used in the state to assess educational standards. For ELA scores, we use scores from the reading, language, or literacy tests in a state. If multiple exams (e.g. reading and literacy) are available in a given year, we use only the reading exam.[41] Finally, we keep only districts with non-missing district IDs (NCES LEA IDs).

B.1.1 Standardizing Data

For the non-SEDA data, the type of test scores vary by state, subject, and year, including proficiency shares or counts, normed scale scores, percentile scores, and normal curve equivalence

[38] We thank Sean Reardon and Jesse Rothstein for sharing NLSASASD data.

[39] We use data from SEDA version 4.0.

[40] When included in the data, we weight by the number tested. If the number tested is not available, we use school enrollment from the NCES Common Core of Data as weights to construct the mean score.

[41] In some cases, there are scores for reading exams that are not the primary state standards assessment. In these instances we use scores from the language or literacy portion of the primary state standards exam.

scores. For percentile and normal curve equivalence scores, we construct a mean test score by using the inverse normal transformation. For test score data with proficiency rates or counts, we need to estimate mean scores using the distribution of students in each profiency category.

We estimate mean scores from proficiency count data using hetoeroskedastic ordered probit models (HETOP), following the approach developed by Reardon et al. (2017) and used in the SEDA data Fahle et al. (2021).[42] When only two proficiency levels are available (e.g. above/below proficient), we estimate mean scores using homoskedasitc (HOMOP) models. Where more than two proficiency levels are available, we estimate mean scores using hetoeroskedastic (HETOP) models. We exclude roughly 3% of observations where all students in a district-subject-grade-year are in a single proficiency category.

Next, we convert scores to standard deviation units and standardize scores. To construct a consistent sample across test score data sources, we restrict attention to districts that appear at least once in the SEDA data from 2009-2018. Then, for all non-SEDA test scores we convert scores to district-level standard deviations, using the mean and standard deviation within subject-grade-year and across districts.

Finally, we convert scores to a common scale across state-years using the distribution across state-years on the National Assessment for Educational Progress (NAEP). NAEP state-level scores are generally available every other year for 4th and 8th grade math and reading. Starting in 1994, we estimate state-level mean NAEP scale scores and standard devitaions by linearly interpolating or extrapolating across grades and years, using the biannually available data. Standardized disrtict level scores are then constructed by taking the product of our district-level mean scores and the NAEP state-subject-grade-year standard deviation, and then adding the mean state-subject-grade-year NAEP score. To conform with SEDA "cohort scale" scores, we standardize these mean scores relative to the average of the NAEP mean and standard deviation of the four national cohorts in 4th grade in 2009, 2011, 2013, and 2015 (Fahle et al., 2021).[43]

B.2 Bond Data

B.2.1 Classifying Bonds into Categories

We classify bonds into eight non-mutually exclusive categories using the text of each bond's ballot. Specifically, we assign a bond to a category if its ballot text contains a related word or word substring. The assignment rules are as follows:

- *Classroom*: Text contains one among "building", "Building", "classroom", "Classroom" "school fa" "School fa" AND one among"construct", "Construct", "overcrow", "Overcrow", "const.", "renov", "Renov", "repa", "Repla", "repla", "Repa", "modern", "Modern", "improv", "Improv", "upgrad", "Upgrad", "refurb", "Refurb"

[42] We estimate the HETOP models on our data using the `hetop` command in Stata.

[43] Because SEDA scores are standardized in student-level and not district-level standard deviation units like our other district-level data, we standardize the SEDA scores to the district level by first inverting the NAEP normalization and rescaling to district-level standard deviations, and then reapplying the NAEP normalization.

- *Other Infrastructures*: Text contains one among “plumbing” “Plumbing”, “sewa”, “Sewa”, “sewi”, “Sewi”, “flush”, “Flush”, “Restroom”, “restroom”, “roof”, “ROOF”, “Roof”, “furni”, “Furni”, “FURNI”, “window”, “Window”, “Door”, “door”
- *HVAC*: Text contains one among “HVAC”, “hvac”, “Hvac”, “Cool”, “cool”, “COOL”, “Heat”, “HEAT”, “heat”, “air co”, “Air co”, “air-co”, “Air-co”, “vent”, “Vent”
- *STEM*: Text contains one among “Lab”, “lab”, “career tech”, “Career tech”, “Career Tech”, “Career tech”, “Career Tech”, “vocat” ”Vocat”, “STEM”, “Comput”, “comput”, “COMPUT”
- *Safety/health*: Text contains one among “Safe”, “safe”, “SAFE”, “Security”, “security”, “surveil”, “Surveil” ”Alarm”, “alarm” ”fire”, “FIRE”, “Asbes”, “asbes”, “ASBES”
- *Athletic*: Text contains one among “thlet”, “THLET”, “gym”, “Gym”, “GYM”, “tadiu”, “TADIU”, “Sport”, “sport”, “SPORT”, “field”, “Field”
- *Transportation*: Text contains one among “bus”, “BUS”, “Bus”, “Vehicle”, “vehicle”, “VEHICLE”, “transpo”, “Transpo”, “TRANSPO”
- *Land purchases*: Text contains one among “land”, “Land”, “site”, “Site” AND one among ”acqui”, “Acqui”, “purch”, “Purch”

Table B1: Bond Data: Sources, Limitations, and Inclusion in Final Sample

State	Source	Data Issues	Satisfies RD assmps	In final dataset	Has ballot text
Alabama	N/A				
Alaska	N/A				
Arizona	Stifel, Nicolaus & Company, Inc.		X	X	
Arkansas	Stéphane Lavertu's records; Division of Elections		X	X	
California	California Elections Data Archive		X	X	X
Colorado	Dept of Education		X	X	
Connecticut	Office of Secretary of State		X	X	X
Delaware	Dept of Elections		X	X	X
Florida	TaxWatch; Dept of Education		X	X	
Georgia	Secretary of State		X	X	X
Hawaii	N/A - doesn't vote				
Idaho	Secretary of State		X	X	X
Illinois	State Board of Education	Too few bonds			X
Indiana	Secretary of State		X	X	
Iowa	Dept of Education		X	X	
Kansas	Dept of Education	Too few bonds			X
Kentucky	N/A - doesn't vote				
Louisiana	Secretary of State		X	X	
Maine	N/A				
Maryland	State Board of Elections		X	X	X
Massachusetts	Dept of Elections, Dept of Revenue		X		X
Michigan	Stéphane Lavertu's records; Association of School Boards		X	X	X
Minnesota	Dept of Education		X	X	X
Mississippi	Statewide Election Management System		X	X	
Missouri	State Auditor's Office, collected by Shiloh Dutton; Stéphane Lavertu's records				X
Montana	Secretary of State	Too few bonds			X
Nebraska	Stéphane Lavertu's records; Board of State Canvassers		X	X	X
Nevada	Secretary of State		X	X	X
New Hampshire	N/A				
New Jersey	School Boards Association	No vote share			X
New Mexico	nmbonds.com	Too few bonds			
New York	Stéphane Lavertu's records		X	X	X
North Carolina	Dept of State Treasurer	X	X	X	
North Dakota	N/A				
Ohio	Stéphane Lavertu's records		X	X	X
Oklahoma	Stéphane Lavertu's records				X
Oregon	Oregon School Board Association		X	X	
Pennsylvania	Association of School Business Officials; Stéphane Lavertu's records		X	X	
Rhode Island	Secretary of State		X	X	
South Carolina	Election Commission	Too few bonds			X
South Dakota	Secretary of State	Too few bonds			
Tennessee	Individual district offices	Too few bonds			
Texas	Stéphane Lavertu's records		X	X	X
Utah	N/A				
Virginia	Department of Elections		X	X	X
Vermont	N/A				
Washington	Office of the Superintendent				
West Virginia	Secretary of State		X	X	
Wisconsin	Adam Gamoran - University of Wisconsin		X	X	X
Wyoming	N/A				
Total			28	28	23

Note: Sources, availability, and limitations of bond election records by state.