How Political Institutions Shape Education Spending: Supermajority Requirements in U.S. School Investments

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NBER Fiscal Dynamics Conference, September 2025

Supermajority Requirements and Public Policies

Political institutions shape **public policies** Persson & Tabellini 2000, Acemoglu & Robinson 2005

- Aggregate preferences of different stakeholders
- Determine funding for public goods and ultimately economic outcomes

Supermajority requirements widely used political institution

- Constitutional changes often require 2/3 majority in many countries and U.S. states
- Many U.S. state and local governments require supermajorities for taxes & spending

But **longstanding debate** on **costs and benefits** of supermajority rules

- Impedes passage of “hasty and partial measures” Madison, Federalist No. 22
- But “contemptible compromises of the public good” Hamilton, Federalist No. 58

Supermajority Requirements in U.S. School Capital Investments

Context: **school facility investment** in the U.S.

- School districts in most states require voter approval to issue bonds
- Main source of revenue for capital expenditures
- Required majority ranges from 50% to 2/3 supermajority

Supermajority requirement may **inhibit investment** or **deter wasteful spending**

- Investments in U.S. schools improve student learning Jackson & Mackevicius 2022
- But effectiveness and efficiency of investments varies Biasi, Lafortune, & Schönholzer 2025

→ How do **supermajority requirements** affect **school investments** and **outcomes**?

2000 California Proposition: Lower 2/3 Requirement to 55%

PROPOSITION **39**

SCHOOL FACILITIES. 55% LOCAL VOTE. BONDS, TAXES. ACCOUNTABILITY REQUIREMENTS.
Initiative Constitutional Amendment and Statute.

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Arguments in Favor

This initiative helps fix classroom overcrowding and provides much needed repairs of unsafe and out-dated schools. It requires bonds to be passed by a tough 55% super-majority vote.

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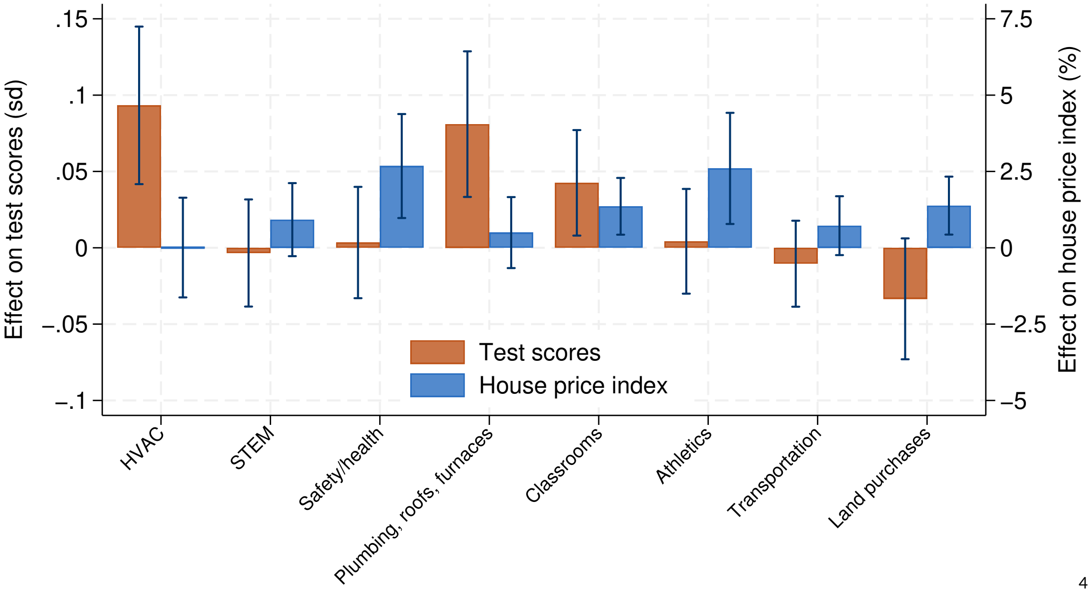
Rebuttal to Arguments in Favor

GOOD BONDS PASS NOW. Since 1996, 62% passed, with two-thirds voter approval. $13 Billion worth! Do you really want every bond, good or bad, approved?

— Jon Coupal, Chairman
Save Our Homes Committee

What Kinds of Bonds Pass Matters (Biasi et al. 2025)



Ongoing Debate in Washington and Idaho

THE SPOKESMAN-REVIEW

Spokane, Washington Est. May 19, 1883

Washington Idaho

NEWS > WA GOVERNMENT

Proposed law would lower Washington school bond election threshold to 55%

Jan. 16, 2024 | Updated Tue., Jan. 16, 2024 at 9:40 a.m.

PROPUBLICA

Education

Idaho Resolution Would Aim to Lower Voting Threshold to Pass School Bonds

Under restrictive school funding policies, Idaho districts struggle to repair and replace deteriorating buildings. If voters agree, the proposal would, in some elections, reduce the two-thirds threshold needed to pass bonds for school repairs.

This Paper: What We Do

1. Provide **new facts** on **bond elections** and **supermajorities** across eight U.S. states
   - New database of 7,511 capital bond referenda
   - Text of electoral ballot: examine spending size and composition

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3. Identify and estimate **structural parameters** of model
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4. Conduct **policy simulation** for **counterfactual majority requirements**
   - Estimate effect on equilibrium investment behavior
   - Ultimate impacts on student achievement and house prices

This Paper: What We Find

1. **Preferences of voters and districts only partially aligned**:
   - Voters prefer capacity expansion such as more classroom space
   - Districts prefer upgrades such as athletic facilities

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3. **Counterfactual downstream effects of Proposition 39**:
   - Student achievement would have grown 19% less
   - House prices would have grown similarly; suggests efficiency

Contribution to The Literature

1. **Effects of supermajority requirements** on taxes and spending Baron 1991; Dixit & al. 2000; Knight 2000; Bradbury & Johnson 2006; Heckelman & Dougherty 2010
   - Theory: how institutions affect compositional changes in public goods provision
   - Empirics: New data allows us to study these changes
2. Role of **fiscal resources in public education** Jackson et al. 2016; Lafortune et al. 2018; Jackson 2020; Biasi 2023; Cellini et al. 2010; [...] Biasi et al. 2024
   - Study how decisions over spending are made (political institutions & preferences)
3. **Institutional determinants** of cross-state/district differences in education spending Romer et al. 1992; Manwaring & Sheffrin 1997; Hoxby 1998
   - Focus on political institutions as driver of differences & understand impacts

Outline

1. Data & Background
2. Model of School Bond Process
3. Structural Estimation
4. Counterfactual Simulations

Roadmap

1. Data & Background
   a. Bond Elections: Data and Context
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New Bond Election and District Dataset

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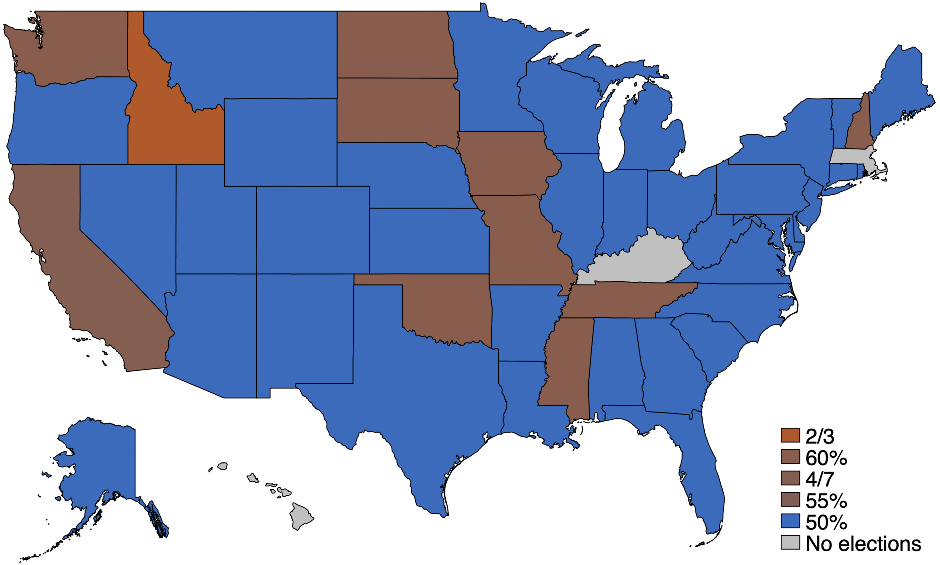
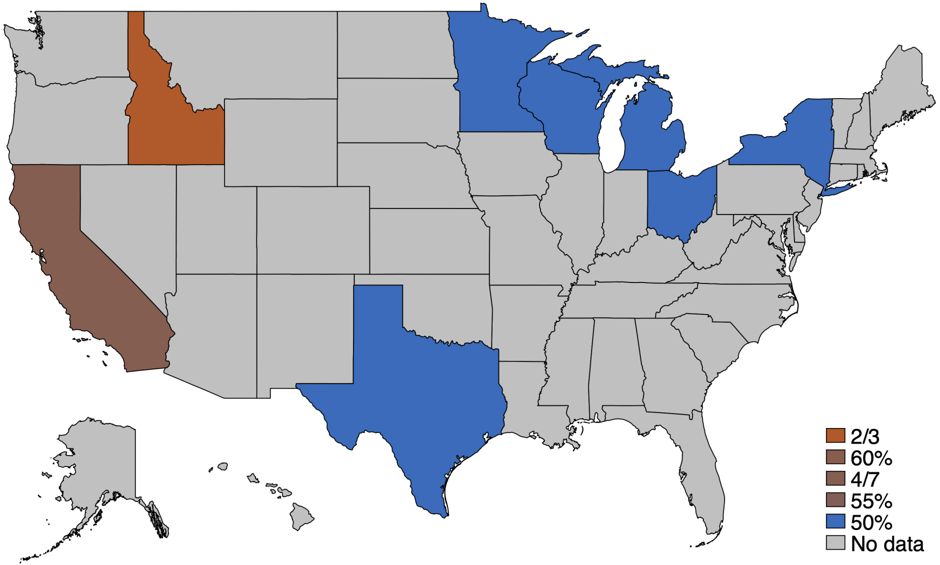
Final sample: 8 states, 2,684 districts, and 7,511 bond elections, 1995-2017

Majority Requirements for School Bonds Across States



Majority Requirements: Sample of States



Ballot Texts to Characterize Bonds

Districts describe proposed bond in **ballot text**:

- Size of bond and impact on property taxes
- Intended purpose of bond funds

Organize stated purpose of bonds into **three categories**:

1. Upgrades: athletic facilities, auditoriums, labs
2. Basic infrastructure: roofs, plumbing, HVAC, furnaces
3. Capacity expansions: classroom space & buildings, land purchases

Example of bond election

Summary Statistics

	Mean	P(10)	P(50)	P(90)
Election characteristics				
Yes share	0.596	0.414	0.603	0.769
Yes margin	0.081	-0.097	0.083	0.255
Passed	0.734	0	1	1
Bond characteristics				
Size per pupil ($ths.)	8.64	0.19	6	20.44
Basic infrastructure	0.42	0	0	1
Capacity expansion	0.377	0	0	1
Upgrade	0.368	0	0	1
District characteristics				
Annual proposal rate	0.085	0	0	0
Bonds	7310			
School districts	2664			
States	8			

Roadmap

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   a. California: What If Proposition 39 Had Never Passed?

Model Setup

School district: every period $t = 1, 2, \ldots$, consider **proposing bond** at cost $\chi > 0$

- Per-pupil bond size $x \geqslant 0$; composition $c \in \{c_1, \ldots c_K\}$; $c_k = 1$ if bond has category k
- District payoff $R_t(x, c)$

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Voters: vote on bond proposals

- Made up of unit mass of heterogeneous households indexed by i
- Indirect utility function of bond characteristics: $u_{it}(x, c) \sim F$
- Vote choice affected by other considerations $\eta_t \sim G$

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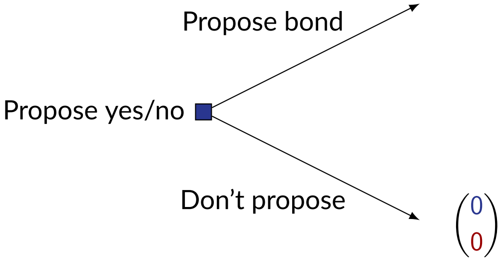
(Super-)majority requirement: $v \in [0.5, 2/3]$: determines pivotal voter

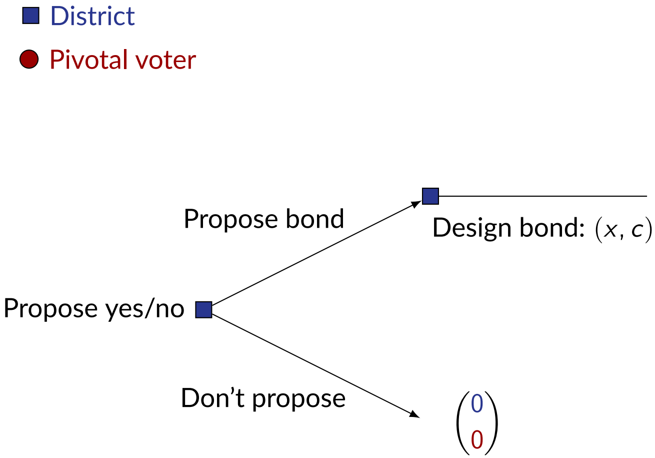
Model setup details

Stage 1: Bond Proposal

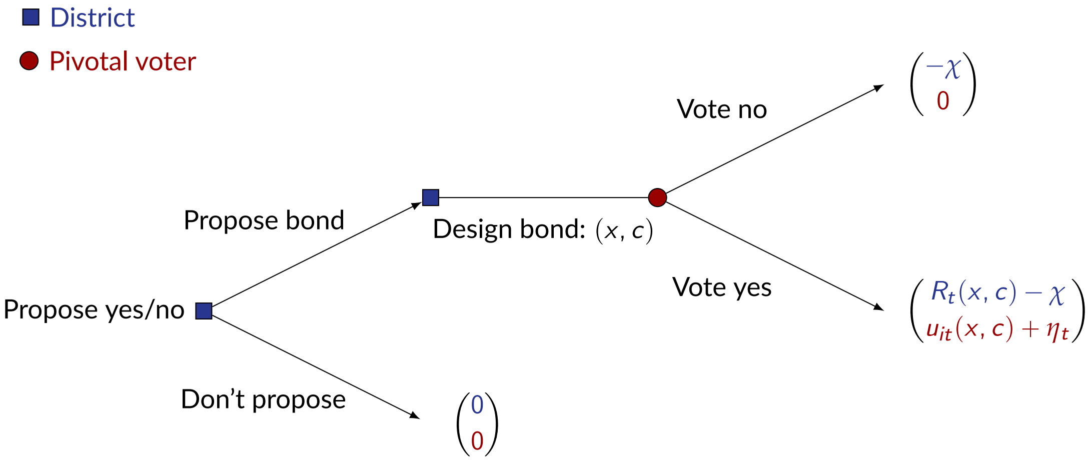
- District
- Pivotal voter



Stage 2: Bond Design



Stage 3: Voting



Model solution

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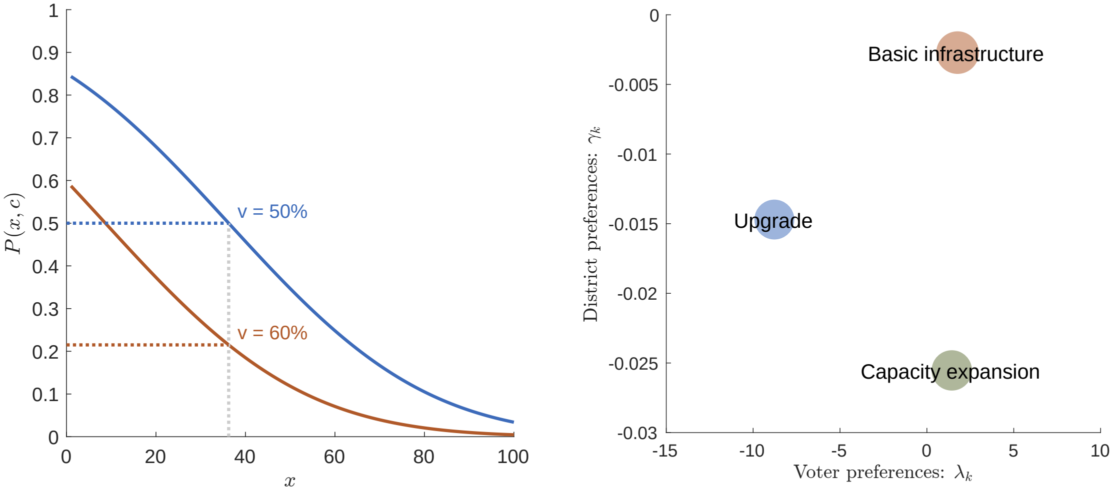
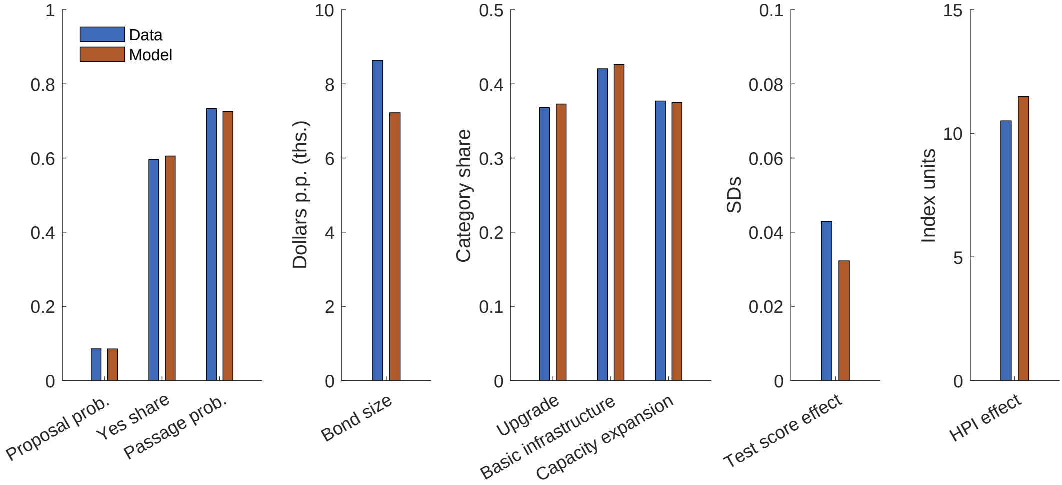
Bond Size, Supermajority, and Composition Preferences



Model Fit



Bond Effect Estimation

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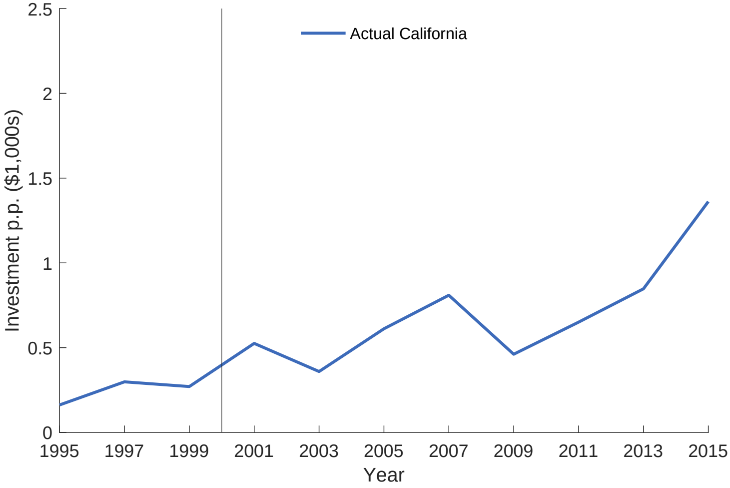
Actual and Counterfactual School Investment in California



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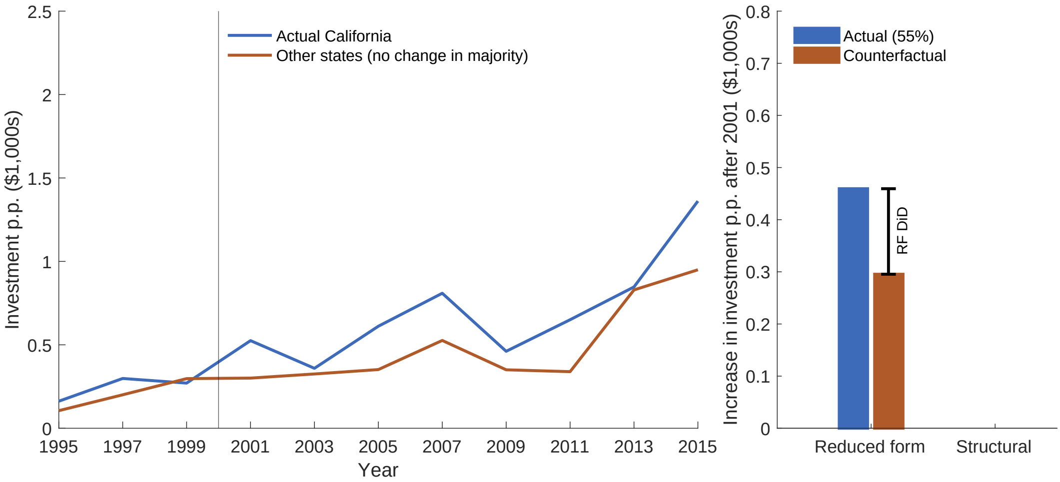

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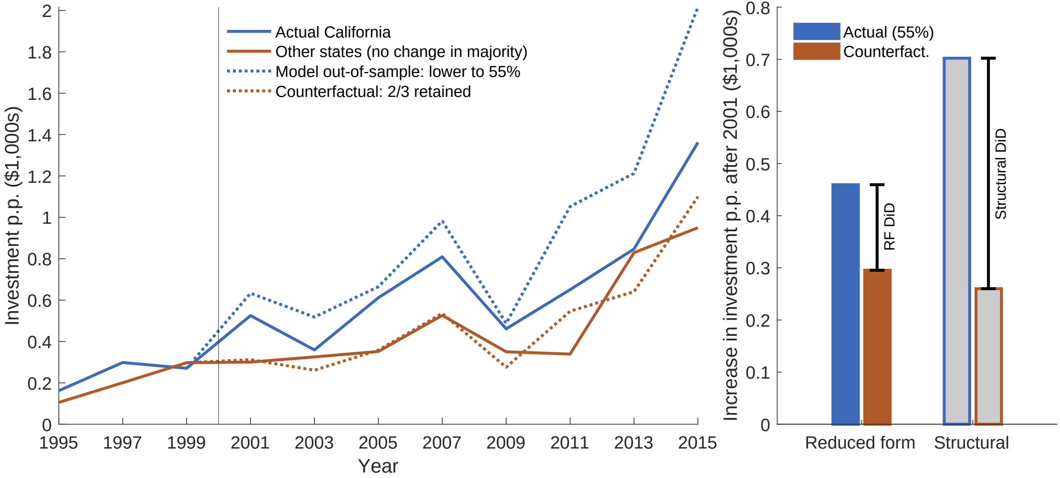
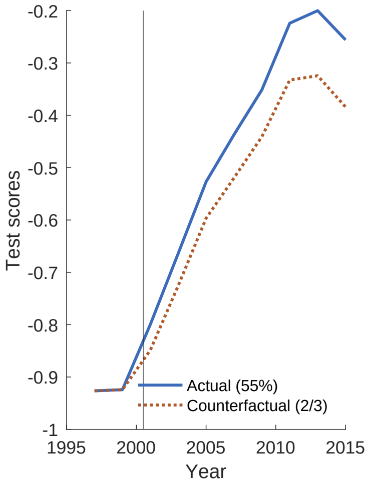
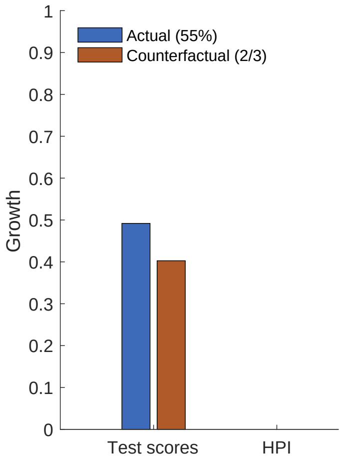


Student Achievement and House Prices





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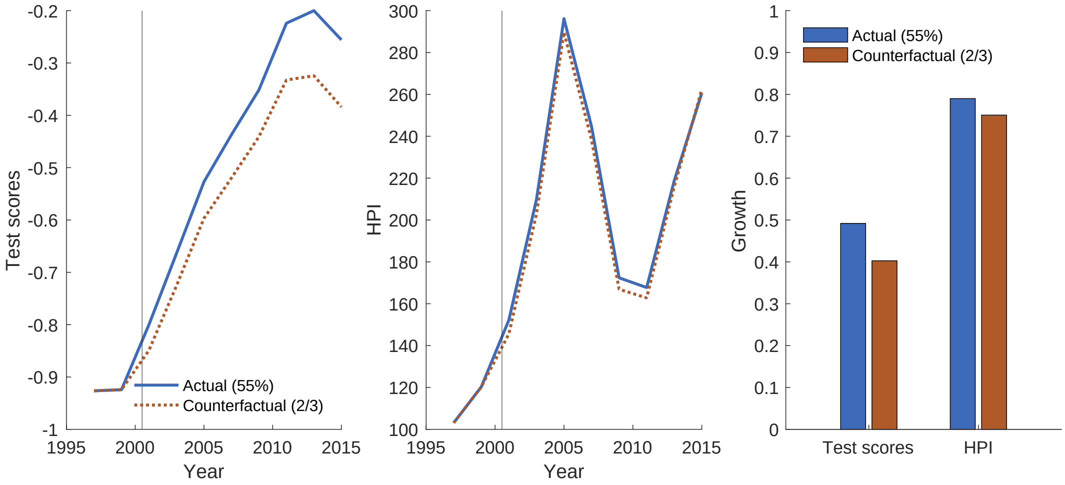

Conclusion

Supermajority requirements affect school investments in equilibrium

- Substantially larger investments with lower supermajority
- Subsequently lifts student achievement without lowering house prices

→ Institutions are policy relevant!

Ongoing work. **Next steps**:

1. Dynamic district decision-making using Bellman equation
2. Decomposing channels and distributional consequences
3. Additional counterfactuals for states of interest (Idaho, Washington)
4. Preference counterfactual: what if voters and districts were perfectly aligned?

Example of Bond Election Back

On June 7, 2022, Measure G proposed in Fremont Union High School District, CA:

> *To **upgrade classrooms, science labs, and facilities** for technology, arts, math, and career technical education; improve ventilation systems; provide essential seismic safety and accessibility upgrades; and, construct and repair sites and facilities, shall the measure **authorizing $275 million** in Fremont Union High School District bonds at legal rates, raising an estimated $18.2 million annually until approximately 2052, at **projected rates of 1.5 cents per $100 of assessed valuation**, with citizen's oversight and all funds staying local, be adopted?*
>
> *55.71% voted yes, overcoming 55% supermajority*

Passed with 55.7%; five high schools are currently modernized

Model Solution and Equilibrium: 3. Voting Stage

Define **largest acceptable bond** as

$$\tilde{x}_{it}(c) \equiv \max\left\{x : u_{it}(x, c) \geqslant 0\right\} \sim \tilde{F}(c)$$

Households **vote yes** if

$$x \leqslant \tilde{x}_{it}(c) + \eta_t$$

where $\eta_t \sim G$ is the **electoral shock**

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Election result given bond (x, c):

- The share of yes votes is $V_t(x, c) = \Pr\left(x \leqslant \tilde{x}_{it}(c) + \eta_t\right)$
- The probability of passage is $P_t(x, c) = \Pr\left(V_t(x, c) \geqslant v\right)$

Model Solution and Equilibrium: 2. Bond Design

Districts **solve**

$$(x^*, c^*) = \arg \max_{x \geqslant 0, c \in \{0,1\}^K} \underbrace{\mathbb{E}_t \left[R_t(x, c) \right]}_{P_t(x,c) R_t(x,c)}$$

Model Solution and Equilibrium: 2. Bond Design

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$$(x^*, c^*) = \arg \max_{x \geqslant 0, c \in \{0,1\}^K} \underbrace{\mathbb{E}_t \left[R_t(x, c) \right]}_{P_t(x,c) R_t(x,c)}$$

Two **optimality conditions**:

1. Bond size:

$$\underbrace{-\frac{\partial P_t(x^*, c^*)/\partial x}{P_t(x^*, c^*)}}_{\text{Marginal electoral risk}} = \underbrace{\frac{\partial R_t(x^*, c^*)/\partial x}{R_t(x^*, c^*)}}_{\text{Marginal payoff w.r.t. size}}.$$

2. Bond composition:

$$c_k^* = \mathbf{1} \left[\underbrace{\Delta_k \mathbb{E}_t \left[R_t(x^*, c^*) \right] \geqslant 0}_{\text{Positive exp. payoff by adding } k} \right] \text{ for all } k$$

Model Solution and Equilibrium: 1. Bond Proposal

Back

Districts choose **whether to propose** in each period: $D_t(x^*, c^*) \in \{0, 1\}$

Propose a bond if

$$D_t(x^*, c^*) = \mathbf{1}\left[\underbrace{\mathbb{E}_t\left[R_t(x^*, c^*)\right]}_{\text{Expected payoff}} \geqslant \underbrace{\chi}_{\text{Proposal cost}}\right]$$

Key model prediction: lower supermajority v leads to

1. Bond proposal frequency, size, and composition less favorable to voters
2. However, may still be welfare improving if political frictions severe

Proposition

Estimating Impacts of Bond passage Back

- For **dynamic, heterogeneous-robust effects**, see Biasi et al. 2024
- Goal here: **plausible fitted values** for various **bond counterfactuals**
- Approach: regress future average outcome $Y_{j,t+s}$ as follows

$$Y_{j,t+s} = \underbrace{\mu_j + \delta_t}_{\text{State \& year FE}} + \underbrace{\phi Y_{j,t}}_{\text{Baseline}} + \underbrace{\tau P_{j,t}}_{\text{Pass}} + \underbrace{\omega M_{j,t}}_{\text{Margin}}$$

$$+ \underbrace{\left(\tau_{x,0} + P_{j,t}\tau_{x,1}\right) x_{j,t}}_{\text{Size effect}} + \underbrace{\left(\tau_{c,0} + P_{j,t}\tau_{c,1}\right)' c_{j,t}}_{\text{Composition effect}}$$

$$+ w'_{j,t}\left[\underbrace{\pi_0 + P_{j,t}\pi_1}_{\text{District char.}} + \underbrace{\left(\pi_{x,0} + P_{j,t}\pi_{x,1}\right) x_{j,t}}_{\text{Size interactions}} + \underbrace{\left(\pi_{c,0} + P_{j,t}\pi_{c,1}\right) c'_{j,t}}_{\text{Composition interactions}}\right] + \epsilon_{j,t}$$

Model Details Back

Payoff function $R_t(x, c)$:

- Monotonically increasing and concave in x: $\partial R_t(x, c)/\partial x > 0$
- Single-crossing condition w.r.t. to c and c': $R_t(x, c) > R_t(x, c') \Rightarrow R_t(x', c) > R_t(x', c')$

Household utility function $u_{it}(x, c)$:

- Strictly concave in x with bounded maximum: $\partial^2 u_{it}(x, c)/\partial x^2 < 0$
- Single-crossing condition: $u_{it}(x, c) > u_{it}(x, c') \Rightarrow u_{it}(x', c) > u_{it}(x', c')$

Model Predictions Back

Let $Y \equiv \sum_t D_t(x^*, c^*) P_t(x^*, c^*) \sum_i u_{it}(x^*, c^*)$ be **welfare effect** of bonds

Proposition

Lowering the supermajority threshold v leads to

- Larger bond proposals: x^* is higher
- Shifted composition: c^* is more in line with district preferences
- More bonds pass: $D_t(x^*, c^*)$ and $P_t(x^*, c^*)$ increase
- Ambiguous expected efficiency: Y may rise or fall

Intuition for welfare prediction: Two competing forces:

1. $Y \downarrow$: Less favorable bonds due to size, composition, and frequency
2. $Y \uparrow$: Bonds may still be too few/small due to political frictions (v, η_t, χ)

Model limitations & extensions

Model Limitations & Possible Extensions Back

1. **No dynamics**: Districts are myopic
   - No **strategic delaying** of bond proposal/design to account for the future
   - With dynamics, **model predictions are similar** but estimation is harder
   - We account for bond history (included as state variable)
   - Can incorporate dynamics by **controlling for future w_t** under various scenarios

2. **No turnout**: All residents vote
   - Selection into turnout may be related to election timing Anzia, 2022
   - Modeling turnout as a voter decision requires "group rule" for it to matter
   - Two feasible solutions:
     1. Allow parameter values to vary depending on election year (even vs odd)
     2. Estimate joint distribution of turnout and $\tilde{x}_t(c)$

subsectiona. Voting Stage

Voting Stage: Parametrization

Recall **share of yes votes** is $V_t(x, c) = \Pr(x \leqslant \tilde{x}_{it}(c) + \eta_t)$

- Assume distribution of $\tilde{x}_{it}(c)$ depends flexibly on c and district characteristics w_t:

$$\tilde{x}_{it}(c) \sim \mathcal{N}\left(\underbrace{\lambda_{0,t} + \sum_{k=1}^{K} c_k \lambda_k}_{\text{Mean of largest acceptable bond}}, \underbrace{\sigma_x^2}_{\text{Variance}} \right)$$

  with $\lambda_k = \lambda_k(w_t)$, $\sigma_x = \sigma_x(w_t)$, etc.

- Electoral shock also depends on w_t:

$$\eta_t \sim \mathcal{N}\left(0, \sigma_\eta^2(w_t)\right)$$

  i.i.d. and independent from $\tilde{x}_{it}(c)$

Voting Stage: Identification

$$\theta = \left\{ \underbrace{\lambda_{0,t}, \lambda_1, \ldots, \lambda_K, \sigma_x, \sigma_\eta}_{\text{Voting parameters}} \right\}$$

Identification: Under independence of $\tilde{x}_{it}(c)$ and η_t, we have

$$\Phi^{-1}\left(V_t(x,c)\right) = \tilde{\lambda}_{0,t} + \sum_{k=1}^{K} c_k \tilde{\lambda}_k - \frac{x}{\sigma_x} + \tilde{\eta}_t, \quad \text{with } \tilde{\lambda}_k = \frac{\lambda_k}{\sigma_x}, \text{ etc.}$$

Intuition: the (transformed) yes share depends on bond characteristics, and hence

- σ_x identified from sensitivity of voter support to bond size
- λ_k from premium/penalty of including category k, scaled by σ_x
- σ_η from variation η_t unexplained by bond characteristics

Voting Stage: Reduced Form to Structural

	Share of yes votes: $V_t(x, c)$					$\Phi^{-1}(V_t(x, c))$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Bond size: $-1/\sigma_x$	-0.003***	-0.003***	-0.003***	-0.004***	-0.004***	-0.009***	-0.010***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Upgrades: λ_1/σ_x					-0.026***	-0.073***	-0.070***
					(0.006)	(0.016)	(0.016)
Basic infrastructure: λ_2/σ_x					0.003	0.004	0.007
					(0.006)	(0.018)	(0.017)
Expansion: λ_3/σ_x					-0.006	-0.014	-0.013
					(0.008)	(0.022)	(0.022)
State & year FE	X	X					
District FE			X	X	X	X	X
State-by-year FE			X	X	X	X	X
Controls		X		X	X		X
Adj R^2	0.28	0.30	0.52	0.52	0.52	0.52	0.52
N Districts	2,664	2,664	1,730	1,730	1,730	1,730	1,730
N Bond elections	7,310	7,310	6,376	6,376	6,376	6,376	6,376

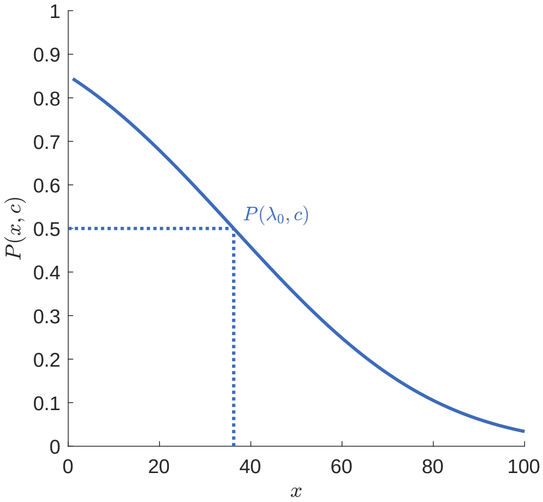
Note: Standard errors in parentheses are clustered at the district level. * = 0.1; ** = 0.05; *** = 0.01.

Voting Stage: Estimation Results

	Mean	P(10)	P(50)	P(90)
Size preferences				
λ_0	36.3	10.7	34.9	62.5
σ_x	101.3	73.7	88.5	151.1
σ_η	32.5	23.7	28.4	48.5
Composition preferences				
λ_1	-8.8	-16.1	-6.6	-4.5
λ_2	1.8	0.2	1.1	4.4
λ_3	1.4	-1.9	0	6.2

Passage probability:

$$P(x, c) = \Phi\left(\frac{\lambda_0 + \sum_k \lambda_k c_k - x - \sigma_x \Phi^{-1}(v)}{\sigma_\eta}\right)$$



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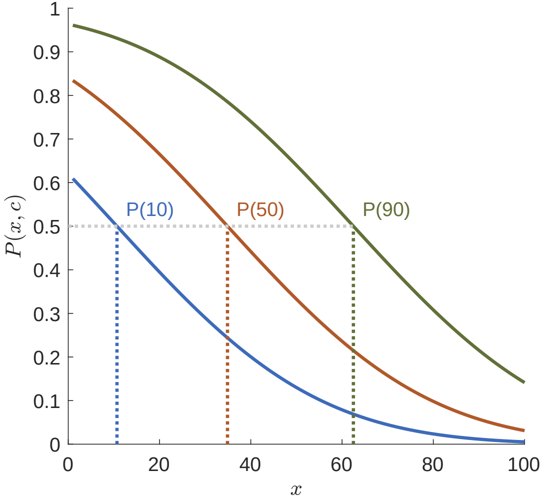

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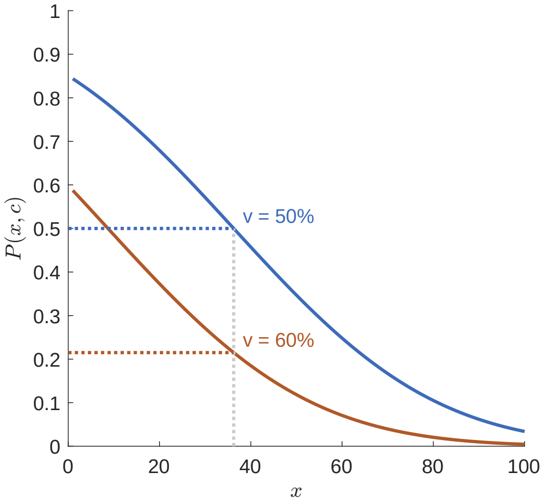

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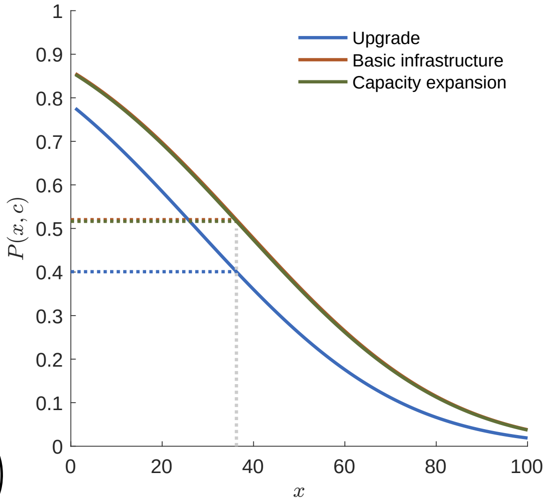


Bond Design: Parametrization

Recall **district objective function** is $\mathbb{E}_t[R_t(x,c)] = P_t(x,c)R_t(x,c)$

- $P_t(x,c) = \Pr(V_t(x,c) \geqslant v)$ pinned down by assumptions in voting stage

Need to add assumptions about **district payoff function** $R_t(x,c)$:

$$R_t(x,c) = x^{\beta_t} \exp\left(\sum_{k=1}^{K} c_k \gamma_{k,t}\right)$$

- Assume return to size fluctuates over time: $\beta_t = \beta + \varepsilon_t$ with $\varepsilon_t \sim \mathcal{N}(0, \sigma_\varepsilon^2)$
- Return to categories also fluctuates: $\gamma_{k,t} = \gamma_k + \xi_{k,t}$ with $\xi_{k,t} \sim \mathcal{N}(0, \sigma_{\xi_k}^2)$ for each k

Bond Design: Identification

$$\theta = \left\{ \underbrace{\lambda_{0,t}, \lambda_1, \ldots, \lambda_K, \sigma_x, \sigma_\eta}_{\text{Voting parameters}}, \underbrace{\beta, \gamma_1, \ldots, \gamma_K, \sigma_\varepsilon, \sigma_{\xi_1}, \ldots, \sigma_{\xi_K}}_{\text{Bond design parameters}} \right\}$$

Identification: Under indep. of η_t, ε_t, and $\xi_{k,t}$, can write **optimality conditions** as:

$$\beta = \underbrace{\mathbb{E}\left[\frac{xP_t'(x,c)}{P_t(x,c)}\right]}_{\text{Expected marginal payoff}}$$

$$\gamma_k = \underbrace{\sigma_{\xi_k}\Phi^{-1}\left(\Pr\left(c_k = 1 | x, c\right)\right)}_{\text{Transformed choice probability}} - \underbrace{\mathbb{E}\left[\Delta_k \log P_t(x,c)\right]}_{\text{Log-odds ratio of winning with } k}$$

Intuition: Conditional on voter preferences ...

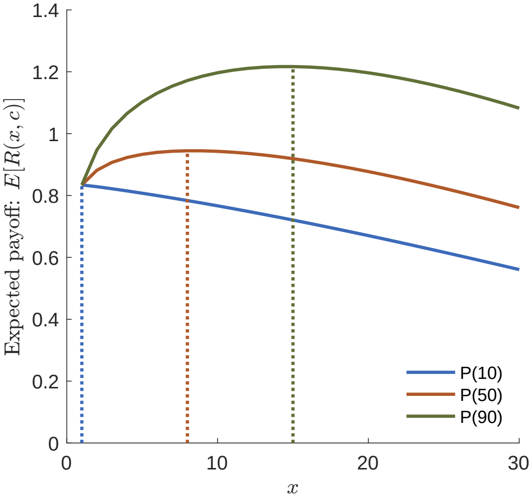
- β identified from proposed bond size
- γ_k from proposed categories

Bond Design: Estimation Results

	Mean	P(10)	P(50)	P(90)
Size preferences				
β	0.101	0.003	0.092	0.196
Composition preferences				
γ_1	-0.015	-0.075	-0.033	0.069
γ_2	-0.003	-0.029	-0.004	0.031
γ_3	-0.026	-0.141	-0.01	0.03

Expected district payoff function:

$$\mathbb{E}[R(x,c)] = P(x,c)x^{\beta} \exp\left(\sum_{k=1}^{K} c_k \gamma_k\right)$$



Bond Design: Estimation Results

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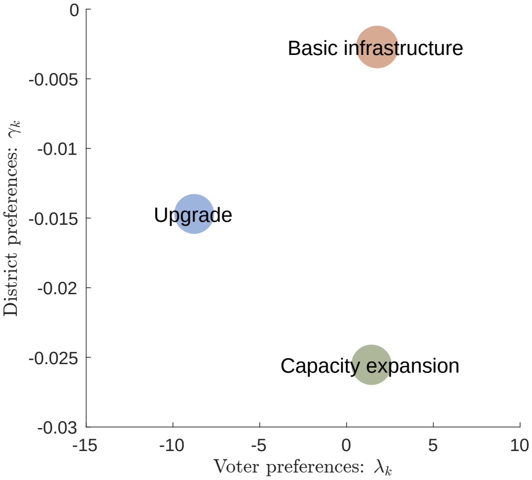

Category proposal probability:

$$\Pr\left(c_k = 1 | x, c\right) = \Phi\left(\frac{\gamma_k + \Delta_k \log P(x, c)}{\sigma_{\xi_k}}\right)$$

Bond Proposal: Parametrization

Recall **districts propose bond** if $\mathbb{E}_t\left[R_t(x^*, c^*)\right] \geqslant \chi$

- Under voting and design stage assumptions, can show that

$$\log \mathbb{E}_t R_t(x^*, c^*) \sim \mathcal{N}\left(\rho_t, \sigma_\rho\right)$$

with

$$\rho_t = \underbrace{\log P_t(x^*, c^*)}_{\text{Voting parameters}} + \underbrace{\beta \log x^* + \sum_{k=1}^{K} c_k^* \gamma_k}_{\text{Design parameters}}$$

$$\sigma_\rho^2 = \sigma_\varepsilon^2 \left(\log x^*\right)^2 + \sum_{k=1}^{K} c_k^* \sigma_{\xi_k}^2 .$$

- That is, no additional assumptions necessary

Bond Proposal: Identification

$$\theta = \left\{ \underbrace{\lambda_{0,t}, \lambda_1, \ldots, \lambda_K, \sigma_x, \sigma_\eta}_{\text{Voting parameters}}, \underbrace{\beta, \gamma_1, \ldots, \gamma_K, \sigma_\varepsilon, \sigma_{\xi_1}, \ldots, \sigma_{\xi_K}}_{\text{Bond design parameters}}, \underbrace{\chi, \rho_t, \sigma_\rho}_{\text{Proposal}} \right\}$$

Identification: under earlier independence assumptions, we have

$$\log \chi = \underbrace{\mathbb{E}\left[\rho_t\right]}_{\text{Exp. log payoff}} - \underbrace{\sigma_\rho \Phi^{-1}\left(\Pr\left(D_t = 1 | x, c\right)\right)}_{\text{Transformed proposal probability}}$$

Intuition: Conditional on voter and district preferences ...

- χ identified from proposal frequency
- **Challenge**: need to observe ρ_t also when $D_t = 0$ (no proposal)
- **Solution**: given λ_k, γ_k, etc, use optimality conditions from design stage again!

Bond Proposal: Estimation

	Mean	P(10)	P(50)	P(90)
ρ	-0.085	-0.344	-0.053	0.12
σ_ρ	1.838	1.429	1.865	2.188
$\log(\chi)$	2.649	1.758	2.744	3.539

Proposal probability:

$$\Pr(D_t = 1 | x^*, c^*) = \Phi\left(\frac{\rho - \log(\chi)}{\sigma_\rho}\right)$$