Property Tax Protection and Municipal Bond Valuation

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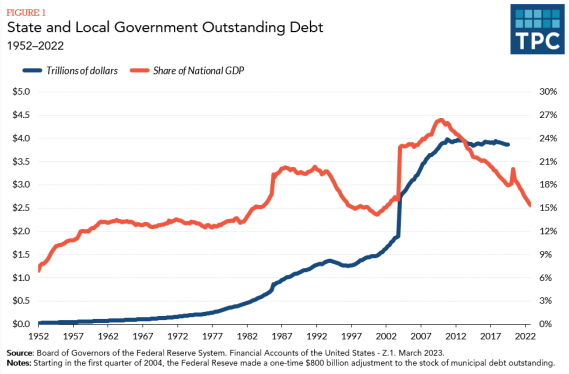
Why do municipal bonds matter?



- The $4 trillion municipal bond market supports vital infrastructure
  - Public school districts, water systems, and utilities . . .

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  2. Some states restrict increases in property taxes beyond an upper-limit (Avenancio-León and Howard, 2022a)

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  2. Some states restrict increases in property taxes beyond an upper-limit (Avenancio-León and Howard, 2022a)
- These constraints limit ability of local gvts to raise funding and invest in public projects
  - Expose local gvts to commitment problems to muni bondholders

Research Question

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  - Statewide regulations **limit declines** in property tax revenue of local gvts
  - Downside protection on own-source revenue of local gvts
  - Municipal credit risk ↑ in downturns; Downside protection is valuable

Hypothesis on Local Borrowing Costs

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  - Encourages wasteful spending; Debt $=$ Tax $-$ Spending $\Rightarrow$ Bond yields $\uparrow$

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- **Hypothesis #3:** Revenue protection has limited effects if:
  - Property tax revenue protection is not a first-order determinant
  - Recalibration in credit ratings (Adelino et al., 2017; Cornaggia et al., 2018), climate risk (Goldsmith-Pinkham et al., 2023; Painter, 2020), market fragmentation (Babina et al., 2021), liquidity risk (Trzcinka, 1982) ...

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- **My paper:** I find that revenue protection **decreases** local borrowing costs

Setting

- States impose **floors** that limit declines in property tax revenue of school districts, but not of counties
  - Policy goal: guarantee financial resources for schools and teachers
  - 15 states independently enacted floor regulations between 2000-2021

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- School district is a **setting** to study local borrowing costs because:
  1. States impose floors on school districts, but not counties
     - Schools and counties levy property taxes, spend, and issue bonds separately
  2. Much of school district funding comes from local property taxes
  3. Test whether revenue protection leads to wasteful vs efficient spending
     - If protection improves student participation, efficient spending rather than moral hazard

Human Capital Investment

- Student participation and instruction compensation:
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- Student participation and instruction compensation:
  - Outcome variables to test whether revenue protection is efficient or wasteful
- Prior work shows mixed results on school finance reforms via state transfers
  1. Wasteful spending on unneeded facilities (Zhao, 2023)
  2. Efficient spending; Better test scores in long run (Lafortune et al., 2018)
  3. Spend on needed facilities, but no real effects on student test scores (Cellini et al., 2010)
- **Missing piece**: role of **floor** (i.e., own-source revenue protection) in **local borrowing costs** and student participation
- **My study**: **Borrowing channel** through which **floor** improves student participation (i.e. dropout) and teaching environment

Findings

(1) School districts in floor states face lower borrowing costs

- compared to school districts in non-floor states and to counties
  1. Bond yield spreads $\downarrow$ by 13 basis points (i.e., 9% compared to avg 143 bps)
  2. Bond issuance $\uparrow$ by 4% (i.e., \$900K for each school district)
  3. Property tax level cannot decline; Property tax volatility $\downarrow$ by 9%

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  3. Property tax level cannot decline; Property tax volatility ↓ by 9%

(2) Floor improves educational outcomes rather than spending wastefully:

- School districts in floor states relative to school districts in non-floor states:
  1. Student dropout rates ↓ by 0.4 pp (8.6% relative to mean) over long run
  2. Average class size ↓ by 4% relative to mean ⇒ Student engagement ↑
  3. Instruction compensation per student ↑ by 3%

Costs of Floor

- Benefits of school districts come at the expense of counties
  - School districts and counties draw on a shared local property tax base
  - When local property tax revenue declines, floor protects school districts
  - Floor does not protect counties $\Rightarrow$ Share of the decline is borne by counties
  - Deteriorating borrowing conditions of counties

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  - Floor does not protect counties $\Rightarrow$ Share of the decline is borne by counties
  - Deteriorating borrowing conditions of counties
- Counties in floor states face compared to counties in non-floor states
  1. County property tax revenue $\downarrow$ by 4%
  2. County bond yield spreads $\uparrow$ by 5 bps
  3. County bond issuance $\downarrow$ by 3%

Contribution

(1) **Municipal bond literature** (Adelino et al., 2017; Babina et al., 2021; Cornaggia et al., 2017, 2024; Dougal et al., 2024; Gao et al., 2019; Garrett et al., 2023; Goldsmith-Pinkham et al., 2023; Gustafson et al., 2023; Huang et al., 2026; Li, 2025; Moussawi, 2024; Schwert, 2017, . . .)

- Property taxes are understudied in municipal bond studies
- I show downside protection on property tax revenue is a first-order determinant

- **Non-fiscal determinant for education** (Cornaggia et al., 2026; Dougal et al., 2019, . . .)
  - I show fiscal determinant of school borrowing costs and effects on real educational outcomes

(2) **Public Policy lit: Real effects of school finance reforms on public school education** (Cellini et al., 2010; Lee, 2025; Yang, 2024, . . .)

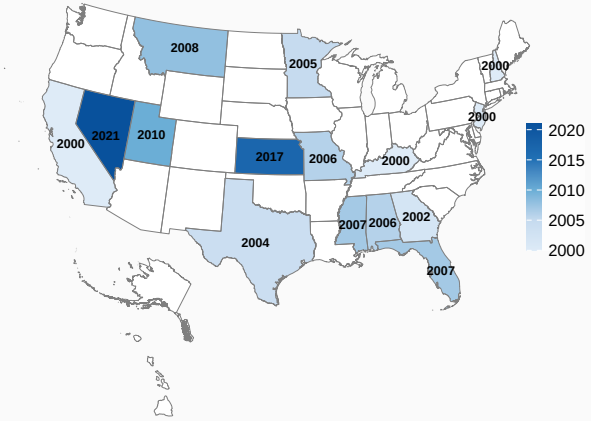
- I show borrowing channel; Exploit statewide regulations on own-source revenue, not state transfers; County borrowing costs

(3) **Property tax collections** (Avenancio-León and Howard, 2022b; Berry, 2021; Cohen and Chen, 2024; Hou et al., 2023, . . .)

- I study municipal bonds, not reasons for gaps between assessed and market values

State Adoption of Floor

- 15 states enacted floors between 2000 and 2021
- Statewide regulations **limit declines** in property tax revenue of **school districts**, but not of counties, relative to the prior year



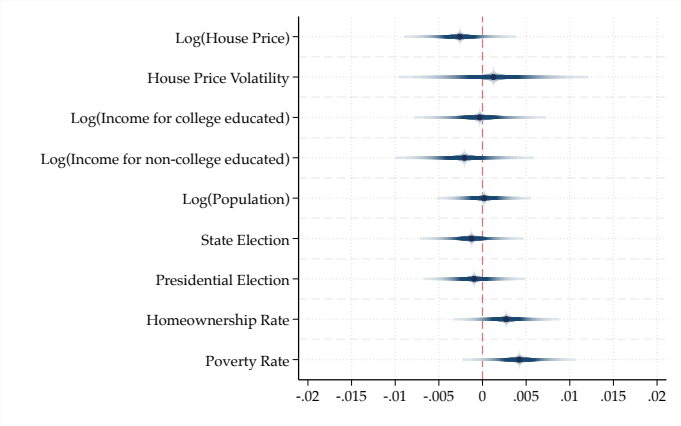
Policy

Policy objective: ensure minimum own-source revenue for public education
Requirement: Establish a minimum threshold school districts must levy
Enactment: voter referendum (e.g., Nevada), legislative action (e.g., Minnesota), or state court mandate (e.g., Texas)

Examples
Georgia (QBE Act): School districts cannot decrease local property tax revenue more than 0.5% relative to the prior year
Kentucky (SEEK): School districts cannot decrease local property tax revenue more than 0.3% to participate in state funding
Nevada (NRS 361.4722): Limits declines in assessed values to no more than 2% and tax rates to 7.5 mills (0.75%) vs. the prior year

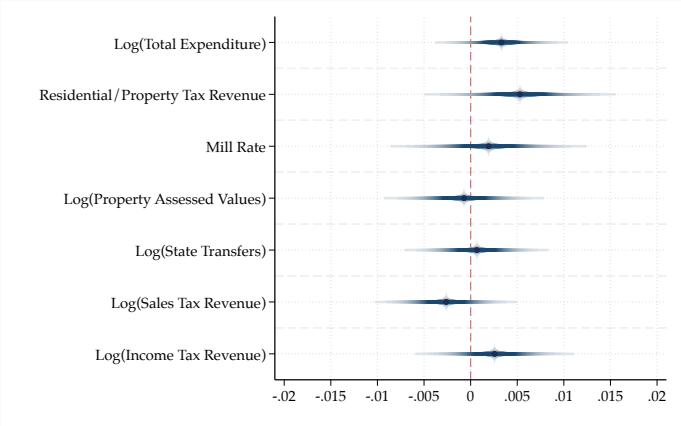
Bivariate Regressions

- Bivariate regression of floor enactment on state characteristics
  - Horizontal bandwidth is 95% confidence interval; Statistically insignificant
- State characteristics do not predict the floor enactment



Bivariate Regressions

- Bivariate regression of floor enactment on state characteristic
  - 95% confidence interval as bandwidth; Statistically insignificant
- **State tax and spending** do not predict the floor enactment



Data Sources

- 2,279 counties and 3,606 school districts in 50 states from 2000 - 2022
- 41,234 general obligation bonds and 68,001 school district bonds

  Sample | No Obs

  - **Municipal bond**: Transaction-level yield, date, price, maturity, coupon from Municipal Securities Rulemaking Board (MSRB) and issuer name from Bloomberg.
  - **Legal sources**: State statutes, administrative codes, and amendments
  - **Property tax**: Counties, and school districts from the Pierson et al. (2015)'s data on the Census Bureau
  - **Education Outcomes**: School district-level data from the National Center for Education Statistics (NCES) on student dropout rate and instruction compensation

Staggered Triple-Difference Approach

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$$y = \beta\,(\text{Floor}_{st} \times \text{School}_i) + \pi_1 \text{Floor}_{st} + \pi_2 C_{it} + \pi_3 Z_{bit} + \mu_i + \delta_t + \varepsilon_{st} \tag{1}$$

- Muni bond b, Issuer i, Year t, State s; There are **two types of issuers** i, school district and county
- $\text{Floor}_{st} = 1$ if state s restricts declines in property tax in year t, and 0 otherwise
- $\text{School}_i = 1$ if issuer i is a school district, and 0 if it is county
- Issuer control (C_{it}), i.e., local income and GDP; Bond control (Z_{bit}), e.g., maturity, credit rating; Issuer FE μ_i, Year FE δ_t Controls

Effect of Floor on Bonds

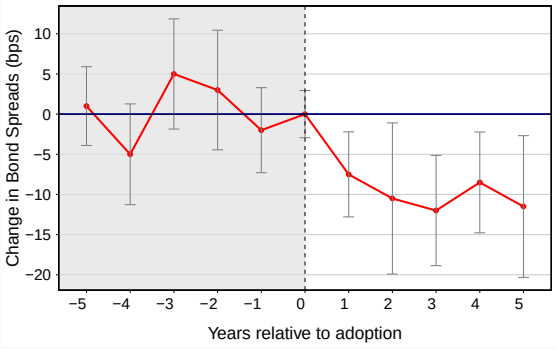
- School districts in floor states face **lower** borrowing costs compared to school districts in non-floor states and counties
  1. Lower bond yield spreads by 13 bps (9% compared to average 143 bps)
  2. Higher bond issuance by 4% (i.e., $900,000 for each school district)

	(1)	(2)	(3)	(4)
	Municipal Bond Yield Spreads		**log(Municipal Bond Issuance)**	
	Coefficient	t-stat	Coefficient	t-stat
$\beta(\text{Floor}_{st} \times \text{School}_i)$	-0.130**	(-2.456)	0.038***	(2.556)
π_1 (Floor_{st})	-0.014	(-1.510)	0.045*	(1.810)
Issuer FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Bond Controls	Y	Y	Y	Y
Issuer Controls	Y	Y	Y	Y
N	1,231,150		1,231,150	
Adj. R^2	0.255		0.341	
Dep. Var. Mean	1.43%		16.92	
Mean ($)			$22,439,482	

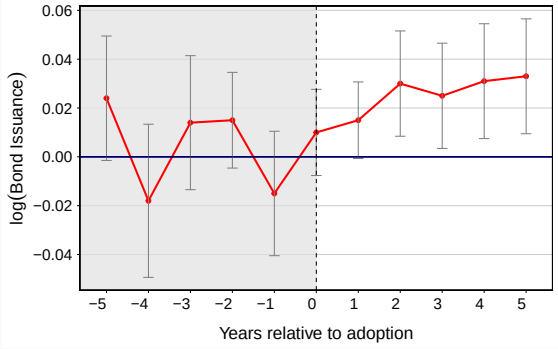
Effect of Floor on Bonds

School District Bonds Compared to County Bonds

(a) Yield Spread



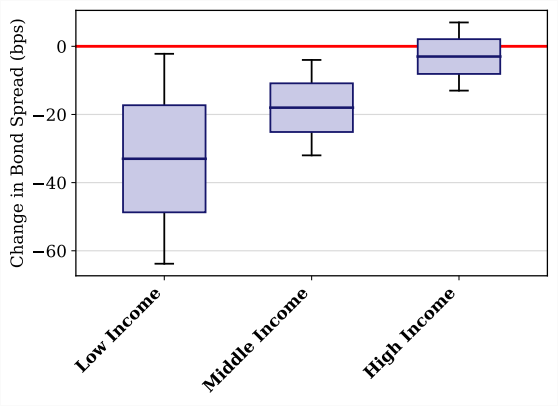
(b) Issuance



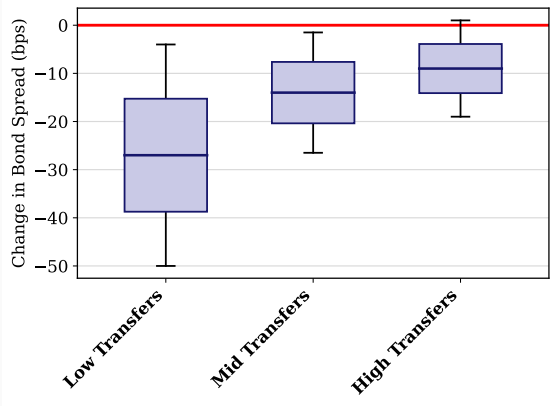
- **Parallel trend**: no meaningful difference in treated and control bonds prior to treatment

Effect of Floor on Bonds: Heterogeneity

(a) School District Income



(b) State Transfers



- Borrowing costs decline more in school districts that need protection
  - School districts with low income and low state transfers

Effect of Floor on Student Participation

- School districts in floor states vs school districts in non-floor states
- Student participation improves in floor states:
  - Student dropout rates decrease by 0.38 pp (8.6% relative to mean 4.4%)
  - Student-teacher ratio (class size) decrease by 4% relative to mean

	(1)	(2)	(3)
	Student Dropout Rate (%)	**Student Completion Rate (%)**	**Student-Teacher Ratio**
β (Floor$_{st}$)	-0.380^{***}	0.424^{**}	-1.001^{*}
t-stat	(-2.527)	(2.111)	(-1.888)
Issuer FE	Y	Y	Y
Year FE	Y	Y	Y
N	69,840	69,840	69,840
Adj. R^2	0.228	0.187	0.166
Dep. Var. Mean	4.4%	92.1%	25.4

Effect of Floor on Student Dropout by Heterogeneity

- Dropout rates decline by more in school districts that need protection:
  1. School districts with low income: Twice the reduction in dropout
  2. School districts with low state transfers: 30% larger reduction in dropout

	Student Dropout Rate					
	School District Income			State Transfers		
	Low (L)	High (H)	L−H	Low (L)	High (H)	L−H
β (Floor$_{st}$)	-0.420**	-0.220**	-0.200**	-0.401**	-0.305***	-0.096***
t-stat	(-2.149)	(-2.222)	(-2.001)	(-2.198)	(-2.511)	(-2.578)
Issuer FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
N	33,920	33,920	33,920	34,538	34,538	34,538
Adj. R^2	0.198	0.201	0.167	0.232	0.229	0.189

Effect of Floor on Class Size by Heterogeneity

- Student-Teacher ratio declines by more in districts that need protection:
  1. School districts with low income
  2. School districts with low state transfers

	Student-Teacher Ratio					
	School District Income			State Transfers		
	Low (L)	High (H)	L−H	Low (L)	High (H)	L−H
β (Floor$_{st}$)	-2.000**	-0.545*	-1.455*	-1.110**	-1.000*	-0.110
t-stat	(-2.333)	(-1.890)	(-1.913)	(-2.189)	(-1.720)	(-1.455)
Issuer FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
N	33,920	33,920	33,920	34,538	34,538	34,538
Adj. R^2	0.153	0.156	0.188	0.201	0.202	0.200

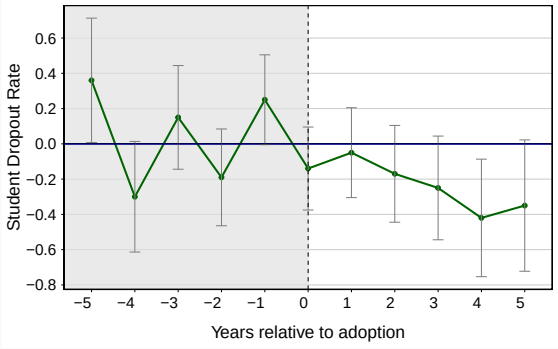
Effect of Floor on Instruction Outcomes

- Instruction compensation improves in floor than non-floor states:
  - Instruction salaries per student (pp) ↑ by 3%
  - Employee benefits per student (pp) ↑ by 4%

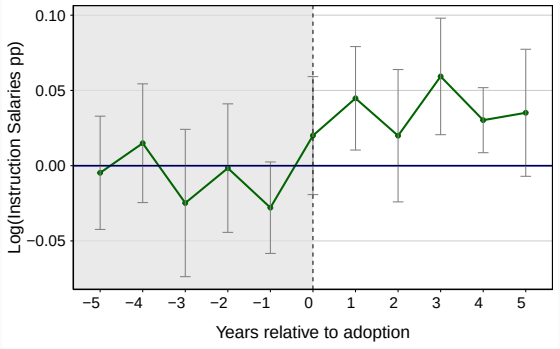
	(1)	(2)	(3)	(4)
	log(**Total Salaries** *pp*)	log(**Instruction Salaries** *pp*)	log(**Employee Benefits** *pp*)	log(**No. of Teachers**)
β (Floor$_{st}$)	0.016**	0.029**	0.037***	0.017**
t-stat	(2.377)	(2.221)	(2.764)	(2.210)
Issuer FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
N	69,840	69,840	69,840	69,840
Adj. R^2	0.423	0.458	0.384	
Dep. Var. Mean	8.676	8.290	7.732	5.92
Mean	$5,861	$3,985	$2,280	371

Effect of Floor on Students and Teachers

(a) Student Dropout Rate



(b) Instruction Salaries

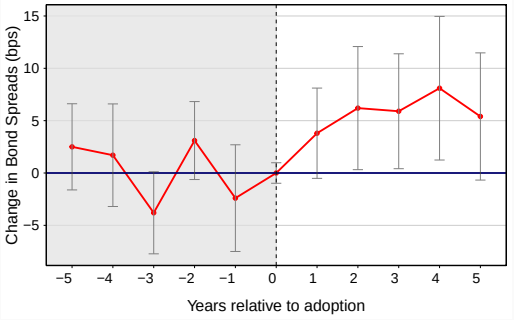


- Lower borrowing costs lead to efficient spending and improved learning environment

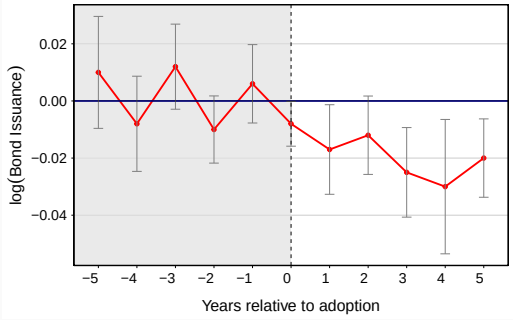
Costs of Floor

- Benefits for school districts come at the expense of counties
- County Borrowing Costs ↑
  1. County bond yield spreads ↑ by 5 bps in floor than non-floor states
  2. County bond issuance ↓ by 2.5% in floor than non-floor states

(a) Yield Spread



(b) Issuance



Conclusion

- Property tax is first order in pricing municipal bonds
- Floor provides downside protection on school district revenue
  - Lowers borrowing costs and increase bond issuance
  - Improves the private return to human capital and skill investment

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