Federal Tax Policy and Capitalization of Local Public Goods

Urban Economics and Public Finance Conference
Lincoln Institute of Land Policy

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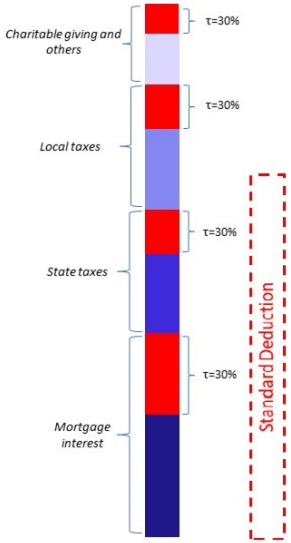
Introduction & Motivation

- Quantifying the change in land prices to a change in a local economic factor is essential because it allows for estimating the value residents place in non-market amenities and in turn for evaluating public policies (Black, 1999; Rossi-Hansberg et al., 2010; Brueckner and Singh, 2020; Albouy et al., 2020).
- Although these capitalization effects are **local**, we provide evidence that **national** tax policies may amplify them and thus change prior conclusions.
- To do so, we exploit an implicit fiscal transfer from the US federal to local governments $\rightarrow$ the deductbility of state and local taxes (SALT) from federal taxable income.

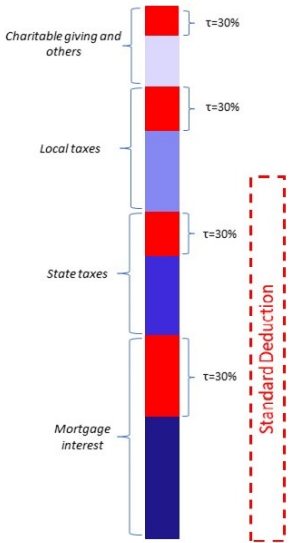
Introduction & Motivation: Federal Tax Policy



Taxpayer compares allowed itemized expenses to the standard deduction.

Then selects method that provides largest tax relief.

Introduction & Motivation: Federal Tax Policy



Itemization decreases the effective cost of deductible expenses and thus increases quantity demanded. Most common federal tax deductions:

1. Mortgage interest: e.g. Sommer & Sullivan (2018)
2. Charitable givings: e.g. Almunia et. al (2020)

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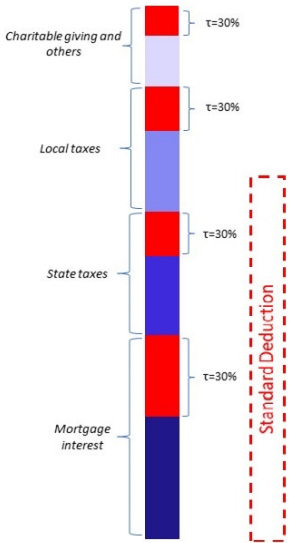

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3. State and local public goods (LPG) are subsidized too
   - In 2017, taxpayers deducted $616.6 billion of SALT - map
   - corresponding to a federal expenditure of $96.3 billion

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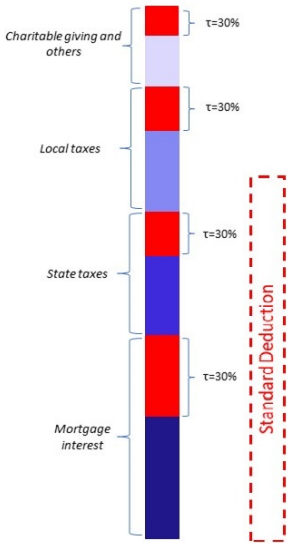

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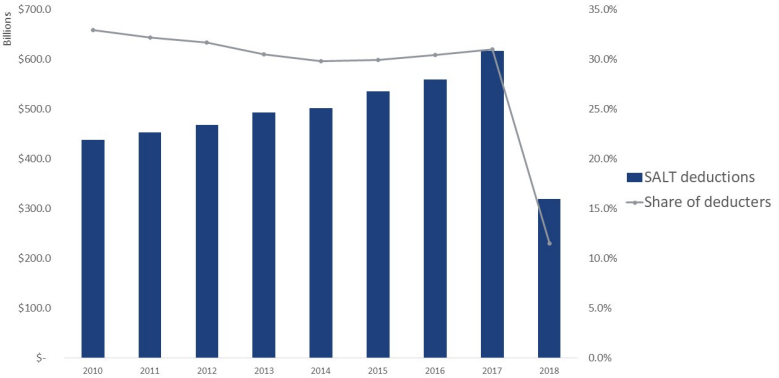
   - corresponding to a federal expenditure of $96.3 billion

Research questions:

- How does itemization of SALT on federal taxes alter the capitalization of local public goods?
- What is the impact on household sorting by income?

Motivating Evidence

- Ambrose and Valentin (*REStat* 2024) provide causal evidence of a positive relation between the demand for local public goods (using voting as a proxy) and the share of residents deducting local taxes.



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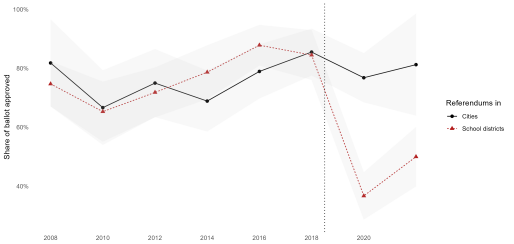
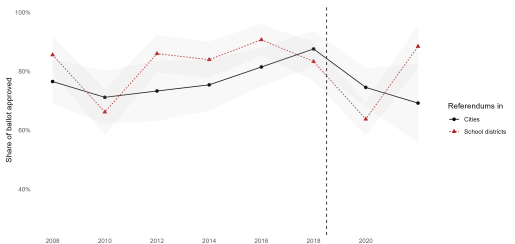


Areas with high shock to SALT deduction



Areas with low shock to SALT deduction

Source: Ambrose & Valentin, "Federal Tax Deductions and the Demand for Local Public Goods", *Review of Economics and Statistics*, (2024 Forthcoming)

In this paper...

1. We build a model of capitalization of LPG in house values with property tax deductibility.
   - Prediction: Property tax deduction amplifies capitalization of public spending in areas where residents take advantage of deduction.

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1. We build a model of capitalization of LPG in house values with property tax deductibility.
   - Prediction: Property tax deduction amplifies capitalization of public spending in areas where residents take advantage of deduction.
2. We test the model using school district spending:
   - Cross-sectional analysis $\rightarrow$ traditional capitalization model fails to capture heterogeneity created by the deductibility of SALT.
   - Panel data exploiting time-varying changes in the use of SALT $\rightarrow$ capitalized value of school test scores varies with SALT deductibility.
   - Exploit border discontinuity and changes in SALT $\rightarrow$ capitalization amplified by SALT deductibility

Contributions to the literature

- The capitalization of public goods and property taxes into house value well known:
  - *Tiebout, 1956; Oates, 1969; Brueckner 1979, 1982, 1983; ... Koster & Pinchbeck, 2022*

  → We introduce property tax deductibility into classical model

- The literature reports mixed findings on whether public goods are provided efficiently.
  - *Brueckner 1979, 1982, 1983; Barrow and Rouse (2004); Cellini et al (2010); Heintzelman (2010); Lang (2018); Bayer et al. (2020)*

  → By accounting for the deductibility of local taxes, we provide a mechanism to reconcile these results.

Contribution to the literature

- We contribute to the literature examining the consequences of the SALT deductions.
  - *Feldstein and Metcalf (1987); Metcalf (2011); Holtz-Eakin and Rosen (1990); Albouy (2009); Ambrose and Valentin (2024)*

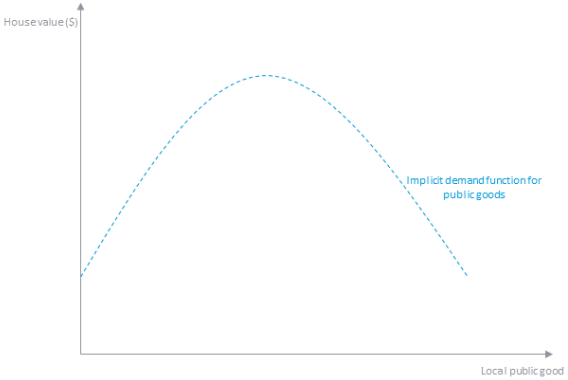
  → We show that residents value these fiscal benefits through higher capitalization.

- The equity of the property tax system
  - *Oates & Fischel, 2016; Avenancio-León & Howard, 2019; ... McMillen & Singh, 2020*

  → Wealthier communities, which benefit more from the SALT subsidy, have greater house prices than they would absent such subsidy.

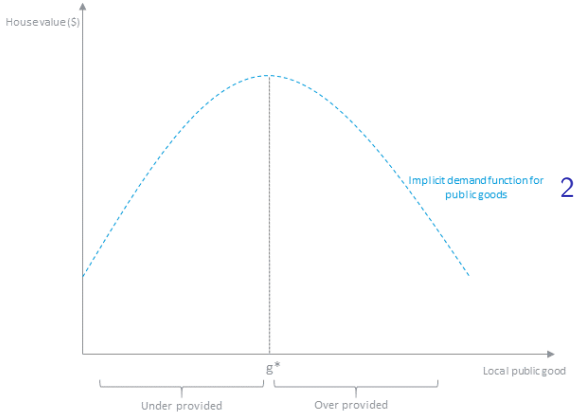
  → Raises incentive for households to sort based on income – creating more stratified communities.

Public goods, property taxes, and house value



1. Assumptions:
   - Households are mobile
   - Fixed stock of houses
   - Local public goods financed by property taxes

Public goods, property taxes, and house value



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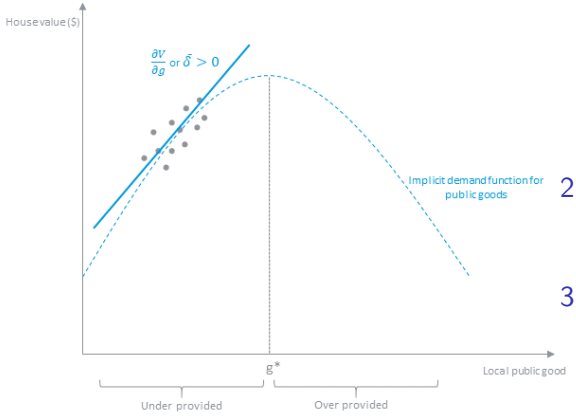

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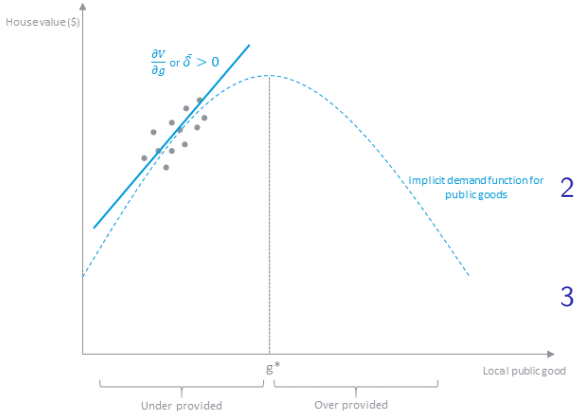

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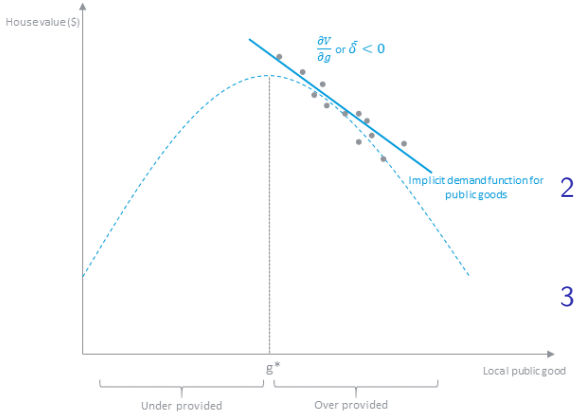
Public goods, property taxes, and house value



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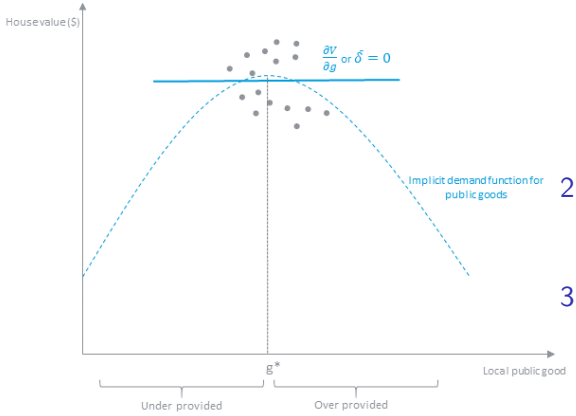
Public goods, property taxes, and house value



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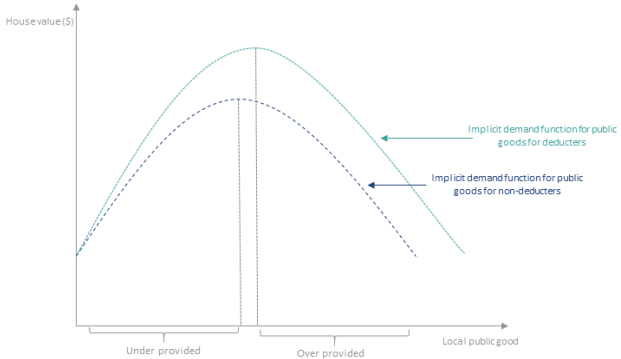
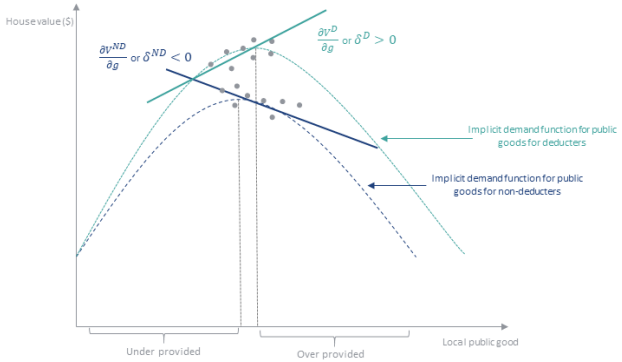
   - maximizes housing value
3. The capitalization of public goods:
   - Positive if underprovision
   - Negative if overprovided
   - Zero if efficiently provisioned

Local public goods capitalization with property tax deductibility



Introducing deductibility lowers the effective cost of providing public goods:

Local public goods capitalization with property tax deductibility



Introducing deductibility lowers the effective cost of providing public goods:

- Capitalization of LPG increases with the share of deducters ($\delta^{D} > \delta^{ND}$) - Details

Empirical Framework & Identification

- Identification relies on variations in housing values, public goods, and the share of property tax deducters.
  - We rely on a preponderance of evidence using a variety of cross-sectional and temporal methods that leverage data variations to support our conclusions.
- Because the theoretical predictions are derived in a comparative statics framework, our main test relies on cross-sectional regression analysis.
  - Advantage: Alleviates sorting issues that can emerge in time-series, endogenous jurisdiction formation, and variation in discount rates

Empirical framework

$$log(P_j) = \alpha_{m(j)} + \delta^{ND} Exp_j + \delta^{D}(Exp_j \times DedShare_j) + \phi DedShare_j + X_j'\beta + \epsilon_j$$

- $log(P_j)$: House price index from Zillow at school district level (2017)
- $\alpha_{m(j)}$: CBSA fixed effects
- Exp_j: School district adjusted spending per pupil
- $DedShare_j$: Share of households deducting property taxes in school district j
- X: School district level controls (income, education, demographics, test score ...)

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Main hypothesis: $\delta^D > 0$ and $\delta^{ND} < 0$

Data - School district

1. House value
   - Zillow Zipcode Single-family Home House price pre-TCJA

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2. Public school spending
   - Annual Survey of School System Finances
   - Spatially deflated to compare spending across the nation

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1. House value
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2. Public school spending
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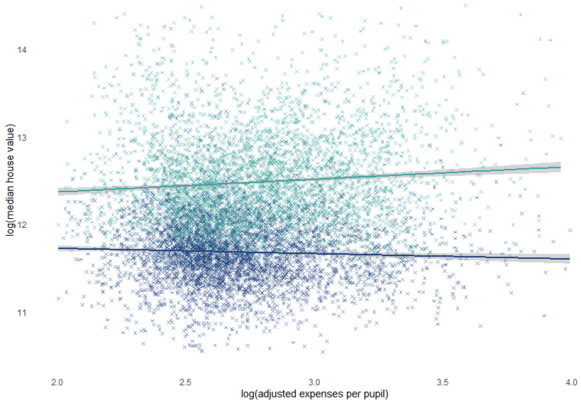
   - Spatially deflated to compare spending across the nation
3. Share of households deducting property taxes from IRS

$$DedShare_j = \frac{\#\text{ of tax returns with prop deduction}_j}{\#\text{ of tax returns}_j}$$

Main data

1) Zillow Zipcode Single-family Home House price



2) Annual Survey of School System Finances

3) IRS: share of households deducting property taxes

The demand for public goods increases with deductibility benefits

	Dependent variable:log(median house value)
	(1a)
Expenses per pupil (standardized) - $\hat{\delta}$	0.011
	(0.010)
Expenses per pupil (standardized) - δ^{ND}	
Expenses per pupil x DedShare - δ^{D}	
Demographics	X
Income Decile FE	X
Spatial FE	CBSA
Observations	8,890
Adjusted R^2	0.91

The demand for public goods increases with deductibility benefits

	Dependent variable:log(median house value)	
	(1a)	(1b)
Expenses per pupil (standardized) - $\hat{\delta}$	0.011	
	(0.010)	
Expenses per pupil (standardized) - δ^{ND}		−0.027**
		(0.010)
Expenses per pupil x DedShare - δ^{D}		0.147***
		(0.032)
Demographics	X	X
Income Decile FE	X	X
Spatial FE	CBSA	CBSA
Observations	8,890	8,890
Adjusted R^2	0.91	0.91

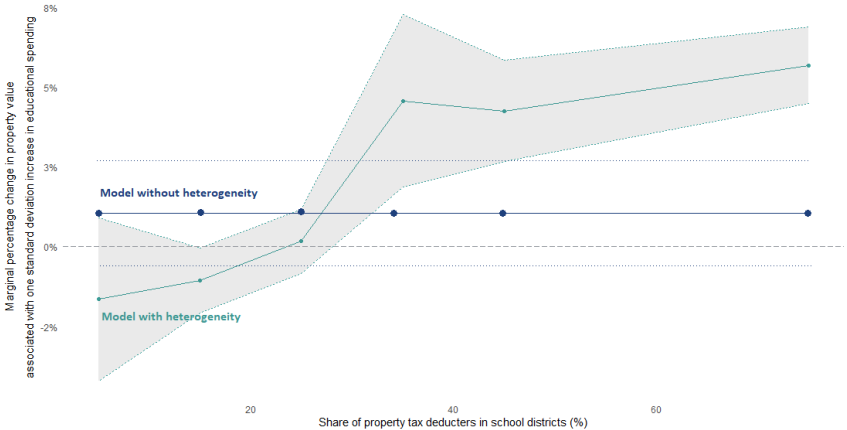
The demand for public goods increases with deductibility benefits

	Dependent variable:log(median house value)		
	(1a)	(1b)	(2b)
Expenses per pupil (standardized) - $\hat{\delta}$	0.011		
	(0.010)		
Expenses per pupil (standardized) - δ^{ND}		−0.027**	−0.024**
		(0.010)	(0.011)
Expenses per pupil x DedShare - δ^{D}		0.147***	0.113***
		(0.032)	(0.039)
Demographics	X	X	X
Income Decile FE	X	X	X
Spatial FE	CBSA	CBSA	+ State
Observations	8,890	8,890	8,890
Adjusted R^2	0.91	0.91	0.92

The demand for public goods increases with deductibility benefits

	Dependent variable:log(median house value)			
	(1a)	(1b)	(2b)	(3b)
Expenses per pupil (standardized) - $\hat{\delta}$	0.011			
	(0.010)			
Expenses per pupil (standardized) - δ^{ND}		−0.027**	−0.024**	−0.021*
		(0.010)	(0.011)	(0.013)
Expenses per pupil x DedShare - δ^{D}		0.147***	0.113***	0.134***
		(0.032)	(0.039)	(0.039)
Demographics	X	X	X	X
Income Decile FE	X	X	X	X
Spatial FE	CBSA	CBSA	+ State	County
Observations	8,890	8,890	8,890	8,890
Adjusted R^2	0.91	0.91	0.92	0.93

Introducing federal deductions creates heterogeneity



Takeaway: LPG under-provided where residents benefit from the federal tax subsidy but over-provided for school districts with few residents who deduct property taxes.

Robustness checks and external validity

1. Non-linear (log-log) specification - Results
2. Alternate proxy for tax deductibility benefits ($DedShare \times T$) Results
3. Different types of educational expenses - Results
4. External validity: Police funding at the county level - Results

Approach 1: A panel data approach

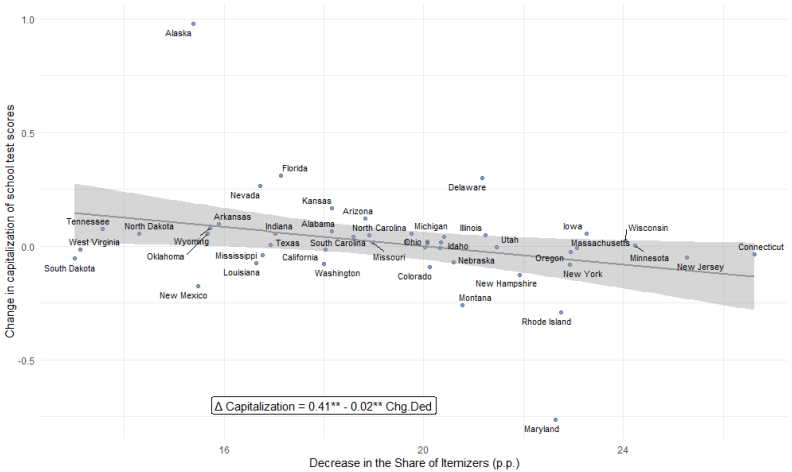
For each state:

1. compute the change in capitalization between 2017 (pre) and 2020 (post)
2. compute the decrease in the share of SALT deducters

Hypothesis: Larger decrease in the share of deducters » decrease in capitalization

- Advantage: Exploits exogenous shock associated with TCJA.
- Disadvantage: potential subjectivity bias in choice of aggregation level, and confounding factors of TCJA

Approach 1: A panel data approach - Placebo



Signification relation: as share of deductors declines, capitalization of school quality declines.

Approach 2: A difference-in-border-discontinuity approach

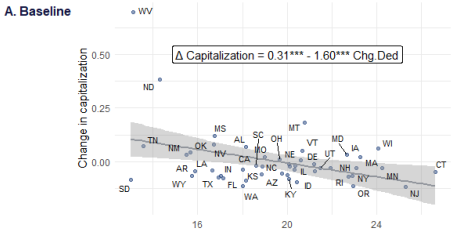
Exploit differences along school district borders in each state:

1. compute the **change in capitalization** between 2017 (pre) and 2019 (post)
   - using house-level transactions ($\approx$ 8 million);
   - keeping houses located within 1 mile of a school district border;
   - including border fixed effects (Black, 1999);
   - and demographic variables (Bayer et al., 2007).

2. compute the decrease in the share of SALT deducters

Hypothesis: Larger decrease in the share of deducters » decrease in capitalization

Approach 2: A difference-in-border-discontinuity approach - Placebo



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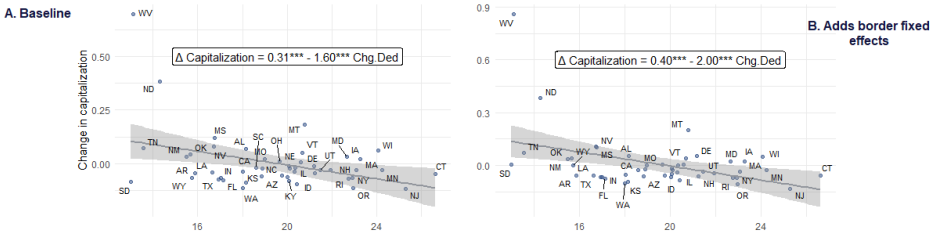

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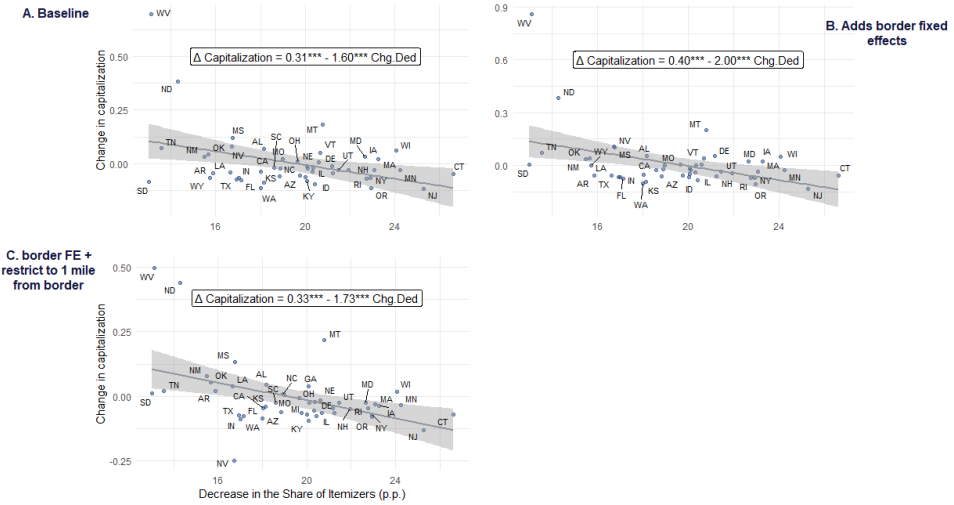

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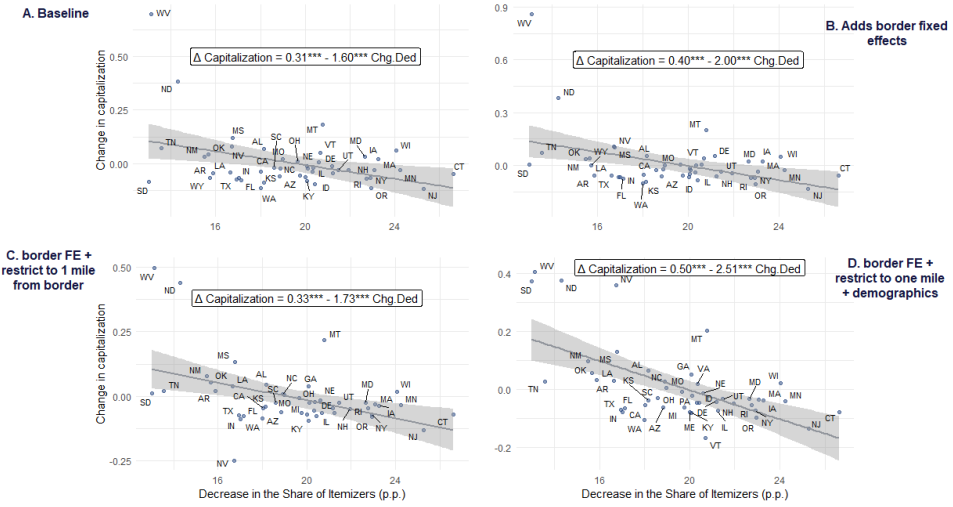


Potential channels to magnify or mitigate effect

1. School districts reliance on local taxation and capitalization
   - Separate districts based on the share of revenue coming from property taxation - Results
2. Federal marginal tax rates
   - Separate districts based on the residents' mean federal tax rate on income - Results
3. Does private schools enrollment reduce capitalization?
   - Separate school districts based on enrollment in public schools - Results
4. Does land supply elasticity mitigate capitalization?
   - Separate school districts based on share of land available for development - Results
5. Commercial properties taxation and capitalization
   - Separate districts based on the share of developed land being highly developed - Results
6. States that reformed their school systems
   - Separate school districts based on whether the states passed a equalization reform - Results

Conclusions

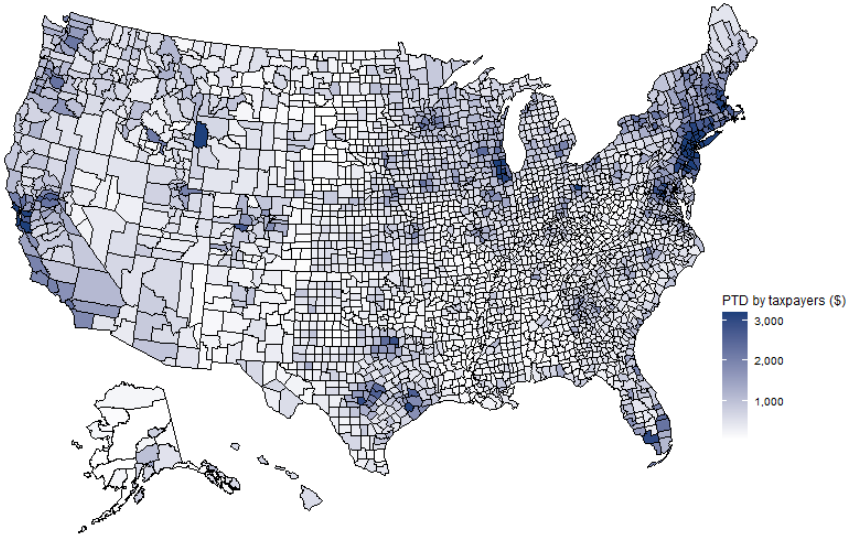
- We derive a theoretical model establishing a causal connection between the capitalization of local public goods and the deduction of property taxes.
- We confirm the predictions using cross-sectional variation in tax deductions and educational spending, and temporal variation emerging from the TCJA.
  - Absent the SALT dedutibility, residents would likely demand lower levels of local public spending.
- Implications for household income sorting:
  - SALT deduction increase with income $\rightarrow$ accentuates income sorting.
  - TCJA reduced incentives for income sorting for majority of taxpayers.
  - Our paper informs the debate surrounding 2025 sun-setting of TCJA.

THANK YOU!

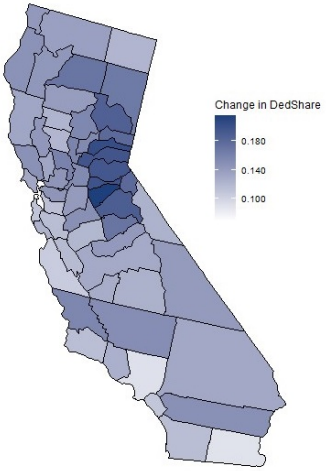
Appendix

- Motivating evidence
- theory additional
- Main results additional
- Mechanism results

Property Tax Deductions per Taxpayer by US Counties in 2017 - Back



Change in share of SALT deducters in California - pre/post TCJA - Back



Placebo test - testing for potential pre-trends - Return

	Dependent variable: Winning Margin									
Post =	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Post x $ChangeDed$	−25.41	−21.25	−19.20	−26.24	−19.41	−12.79	−14.31	−16.91	13.61	8.57
	(35.38)	(30.88)	(21.35)	(18.22)	(16.14)	(16.53)	(19.55)	(19.57)	(27.98)	(29.14)
School district FE	X	X	X	X	X	X	X	X	X	X
Election FE	X	X	X	X	X	X	X	X	X	X
Additional control	X	X	X	X	X	X	X	X	X	X
Tight election results	X	X	X	X	X	X	X	X	X	X
Observations	1,243	1,243	1,243	1,243	1,243	1,243	1,243	1,243	1,243	1,243
R^2	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Adjusted R^2	0.43	0.43	0.43	0.44	0.43	0.43	0.43	0.43	0.43	0.43

Has the TCJA triggered a change in local referendums? - Return

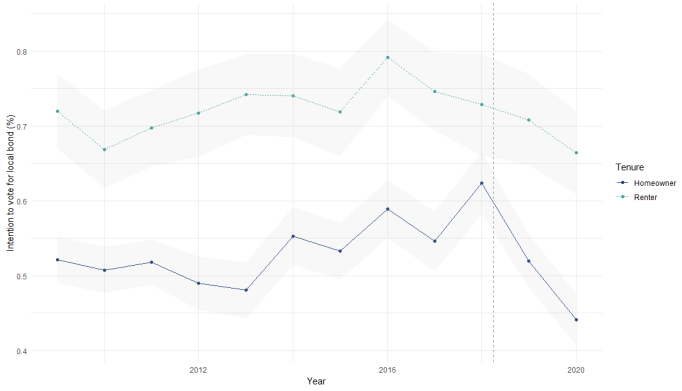
	Dependent variable:				
	Referendum on ballot	Number of referendums	Bond amount per house ($)	Parcel levy amount ($000's)	Voters' Turnout
	Logit	*Poisson*		*OLS*	
	(1)	(2)	(3)	(4)	(5)
Post x $ChangeDed$	1.37	0.506	−0.05*	−6.09	0.38
	(6.36)	(1.861)	(0.03)	(8.98)	(0.29)
School district FE	X	X	X	X	X
Time FE	Year	Year	Election	Election	Election
Observations	12,779	12,779	1,158	296	1,524
Log Likelihood	-656.96	−3,554.323			
R^2			0.85	0.69	0.79
Adjusted R^2			0.66	0.32	0.63

Extensive (loss of deductibility status) or intensive (SALT cap) margin

Return

	Winning Margin (%)			
	(1)	(2)	(3)	(4)
Post x $ChangeDed$	−41.36*	−61.23	−44.62**	−55.49**
	(22.65)	(55.25)	(22.38)	(26.67)
.. x SALT change per house	−0.46*			
	(0.27)			
.. x Change in SALT		13.21		
		(69.28)		
.. x Wasted SALT per house			−0.56	
			(0.40)	
.. x Share of SALT wasted				7.67
				(30.73)
Controls	X	X	X	X
School district FE	X	X	X	X
Election FE	X	X	X	X
Tight election results	X	X	X	X
Observations	1,476	1,476	1,476	1,476
R^2	0.71	0.71	0.71	0.71

Annual survey of Californian willingness to approve school bonds - Return



Surveyed Californian indicated reluctance to accept local ballot since 2019

Appendix

- Motivating evidence
- theory additional
- Main results additional
- Mechanism results

Cross-sectional testable hypotheses - Return

$$\underbrace{V(g_j, DedShare_j, \mathcal{H}_j)}_{\text{Tax Base}} \approx \frac{1}{\theta}\Bigg[\underbrace{\sum_{i=1}^{n} R(g, h_i)}_{\text{Rent}} - \underbrace{C(g)}_{\substack{\text{Cost of} \\ \text{Public Goods}}} + \underbrace{DedShare \cdot C(g) \cdot \text{mtr}}_{\substack{\text{Federal Deduction} \\ \text{Tax Shield}}}\Bigg]$$

Cross-sectional testable hypotheses - Return

$$V(g_j, DedShare_j, \mathcal{H}_j) \approx \frac{1}{\theta}\left[\sum_{i=1}^{n} R(g, h_i) - C(g) + DedShare \cdot C(g) \cdot \mathsf{mtr}\right]$$

Cross-sectional testable hypotheses - Return

$$V(g_j, DedShare_j, \mathcal{H}_j) \approx \frac{1}{\theta}\left[\sum_{i=1}^{n} R(g, h_i) - C(g) + DedShare \cdot C(g) \cdot \text{mtr}\right]$$

$$\frac{\partial V}{\partial DedShare} = \phi > 0 \tag{1}$$

$$\frac{\partial V}{\partial g} = \delta^{ND} \begin{cases} > 0 & \text{if g is under-provided} \\ = 0 & \text{if g is efficiently provided} \\ < 0 & \text{if g is over-provided} \end{cases} \tag{2}$$

$$\frac{\partial^2 V}{\partial g \, \partial DedShare} = \delta^{D} > 0 \tag{3}$$

The capitalization rate increases with the share of deducters.

Appendix

- Motivating evidence
- theory additional
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Different types of educational expenses - Return

	Dependent variable: log(house value)							
	No test score	Instruction	Support	Others	Non-school	Cap. Exp.	Employees	Non-deflated
	(1b)	(2b)	(3b)	(4b)	(5b)	(6b)	(7b)	(8b)
Public good (standardized) - δ^{ND}	−0.028***	0.008	−0.027**	−0.080***	−0.005	−0.024***	−0.030***	0.001
	(0.011)	(0.024)	(0.011)	(0.016)	(0.007)	(0.007)	(0.010)	(0.016)
Public good x DedShare - δ^{D}	0.147***	0.066	0.094***	0.261***	0.077**	0.105***	0.094**	0.074**
	(0.032)	(0.028)	(0.042)	(0.032)	(0.034)	(0.028)	(0.042)	(0.032)
Demographics	X	X	X	X	X	X	X	X
CBSA FE	X	X	X	X	X	X	X	X
Income Decile FE	X	X	X	X	X	X	X	X
Observations	8,890	8,890	8,890	8,890	8,890	8,102	8,890	8,890
Adjusted R^2	0.914	0.914	0.914	0.916	0.914	0.914	0.912	0.914

External validity - Police funding at county level - Return

	Dependent variable: log(house value)					
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Share of deducters (ϕ)	2.795***	2.777***	1.817***	1.861***	2.116***	2.165***
	(0.361)	(0.352)	(0.370)	(0.170)	(0.297)	(0.294)
Expenses per resident ($\bar{\delta}$)	−0.024*		−0.025		−0.030**	
	(0.014)		(0.019)		(0.013)	
Expenses per resident (δ^{ND})		−0.099***		−0.055***		−0.058**
		(0.023)		(0.018)		(0.026)
Expenses per resident x DedShare (δ^{D})		0.370***		0.140*		0.131
		(0.106)		(0.074)		(0.094)
Demographics	X	X	X	X	X	X
Income Decile FE	X	X	X	X	X	X
Spatial FE	State	State	CBSA	CBSA	Both	Both
Observations	1,758	1,758	1,758	1,758	1,758	1,758
R^2	0.876	0.878	0.961	0.961	0.966	0.966
Adjusted R^2	0.872	0.874	0.918	0.918	0.925	0.926

Robustness – log expenses per pupil - Return

Capitalization of local public goods with local tax deductions - log-log form

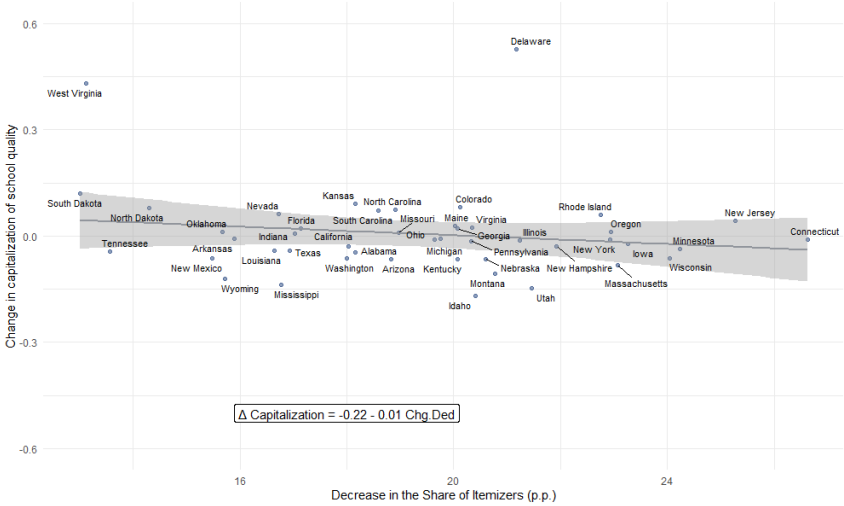
	Dependent variable: log(house value)					
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Share of property deducters (ϕ)	0.645*	−0.368	0.657**	−0.057	0.650**	−0.296
	(0.361)	(0.544)	(0.327)	(0.509)	(0.292)	(0.525)
log[Expenses per pupil] (δ)	0.013		−0.006		0.030*	
	(0.024)		(0.016)		(0.016)	
log[Expenses per pupil] (δ^{ND})		−0.077**		−0.068		−0.053
		(0.039)		(0.045)		(0.049)
log[Expenses per pupil] x DedShare (δ^{D})		0.349***		0.244		0.325*
		(0.121)		(0.190)		(0.181)
Demographics	X	X	X	X	X	X
Spatial fixed effects	CBSA	CBSA	+ State	+ State	County	County
Observations	8,890	8,890	8,890	8,890	8,890	8,890
R^2	0.923	0.923	0.927	0.927	0.945	0.946
Adjusted R^2	0.914	0.914	0.918	0.918	0.931	0.932

Robustness – $DedShare \times T$ - Return

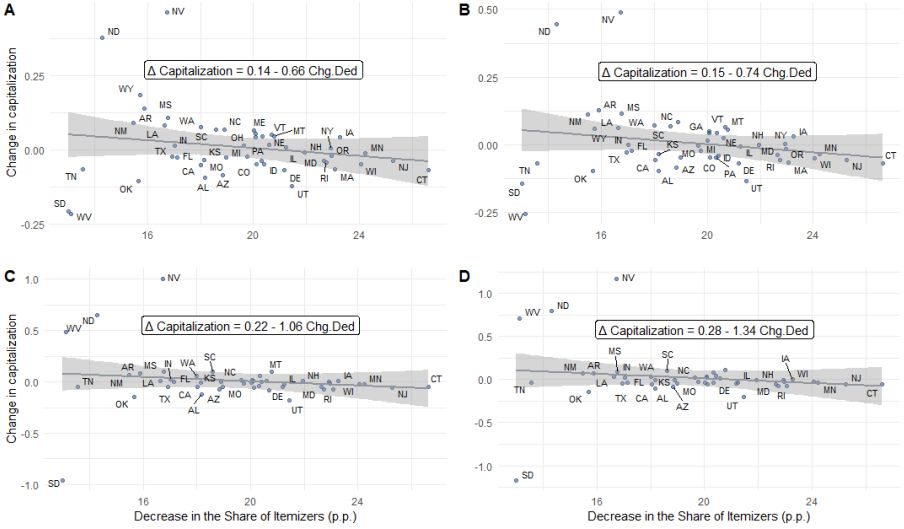
Capitalization of local public goods with local tax deductions - Alternative variable to capture local tax subsidy

	Dependent variable: log(house value)					
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Tax deduction Subsidy (ϕ)	4.096***	3.579**	3.874***	3.406***	3.794***	3.329***
	(1.221)	(1.451)	(1.096)	(1.238)	(1.159)	(1.200)
Expenses per pupil ($\bar{\delta}$)	0.010		0.004		0.012*	
	(0.010)		(0.005)		(0.007)	
Expenses per pupil (δ^{ND})		−0.028***		−0.026***		−0.019**
		(0.008)		(0.007)		(0.009)
Expenses per pupil x TaxDedSub (δ^{D})		0.778***		0.630***		0.637***
		(0.146)		(0.117)		(0.131)
Demographics	X	X	X	X	X	X
Spatial fixed effects	CBSA	CBSA	+ State	+ State	County	County
Observations	8,890	8,890	8,890	8,890	8,890	8,890
R^2	0.923	0.924	0.927	0.928	0.946	0.946
Adjusted R^2	0.914	0.915	0.918	0.919	0.932	0.933

Using 2015 and 2017 as placebo years - Return



Using 2015 and 2017 as placebo years - Return



Appendix

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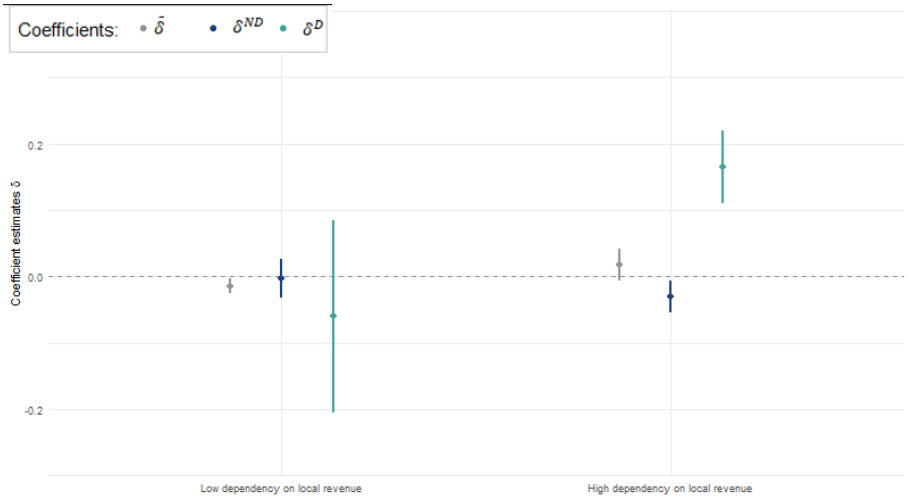
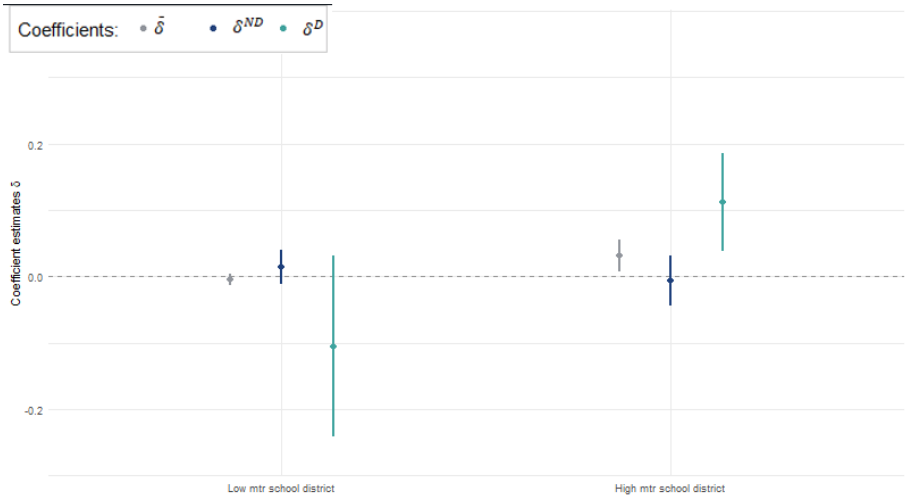
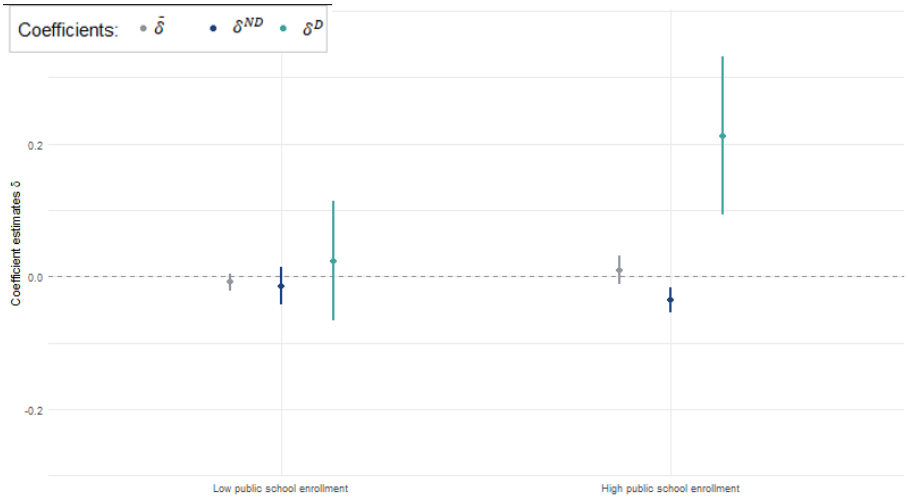
School districts dependency on local taxation - Return



Larger capitalization in school districts with high federal tax rates - Return



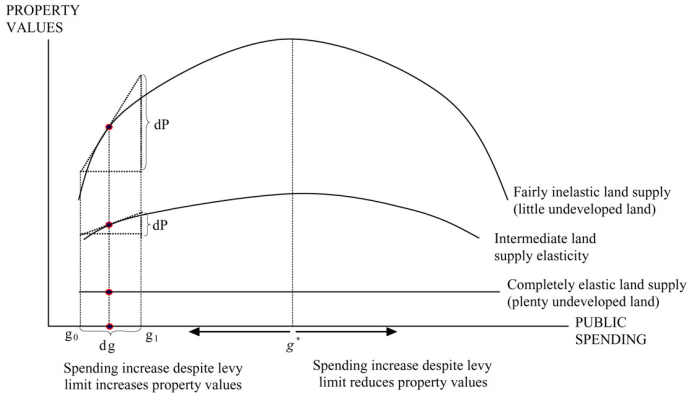
Does private school enrollment reduce capitalization? - Return



Does land supply elasticity mitigate capitalization? - Return

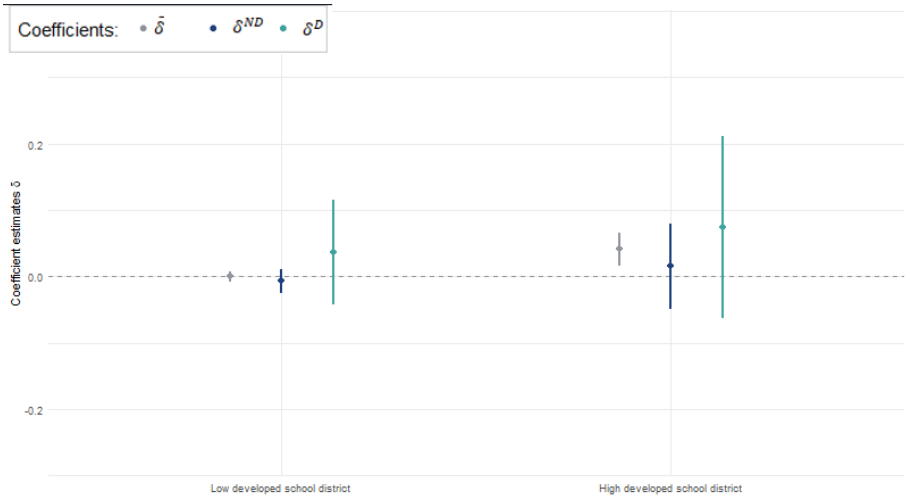
In areas with high availability of land:

- we should expect a supply response rather than capitalization (price response)



Hilber & Mayer - Journal of Urban Economics - 2009

Does land supply elasticity mitigate the capitalization estimates? - Return



Commercial properties taxation and capitalization estimates - Return

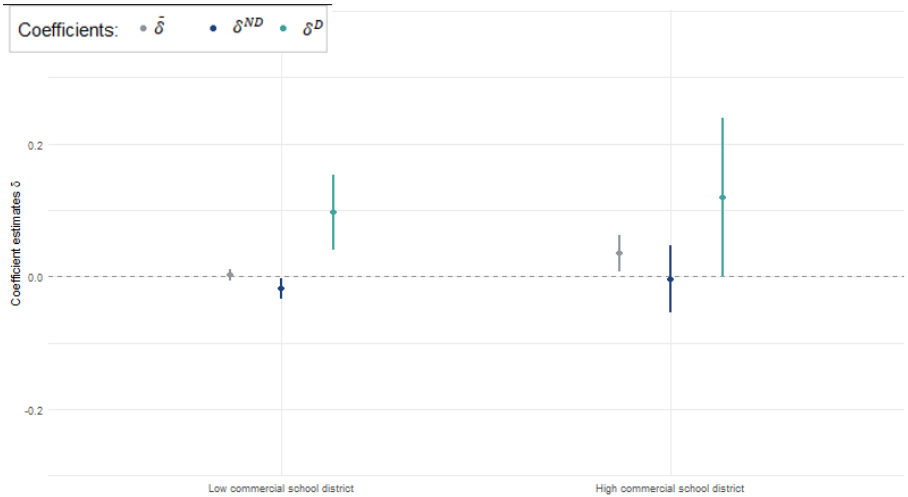
Some school districts tax both residential and commercial properties:

Government budget constraint: $\tau(P^r + P^c) = C(g)$.

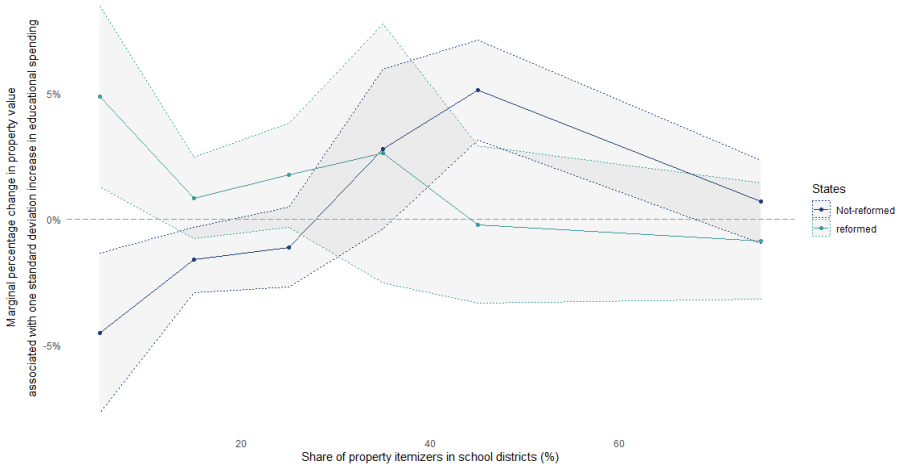
In school districts with higher level of commercial properties, capitalization should be greater (i.e. the tax burden is lower)

- Use the National Land Cover Database (NLCD) and compute the ratio of land that is highly developed over land that is developed

Commercial properties taxation and capitalization estimates - Return



States that reformed their school systems - Return



References