# Federal Tax Deductions and the Demand for Local Public Goods

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- We extend these models to recognize the subsidy to homeowners from the ability to itemize expenses on federal tax returns:

$$v_i = \frac{1}{\theta}\left[R(g_{i(j)}, h_i; y) - \tau_j v_i + \mathbb{I}_i(\tau_j v_i \cdot mtr)\right] \quad (1)$$

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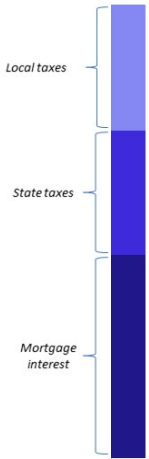

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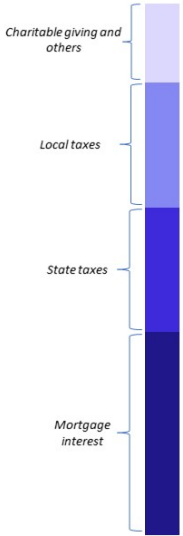


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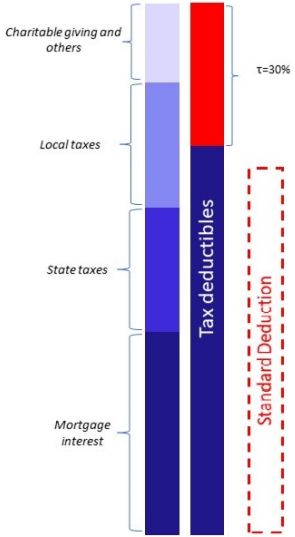


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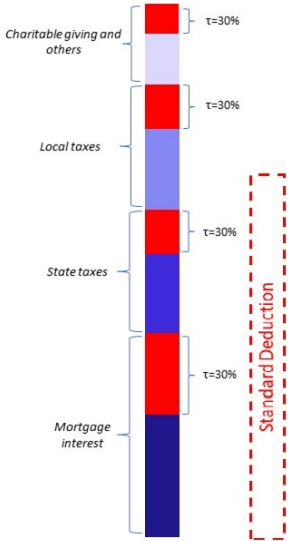


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     - Mortgage: e.g. Sommer & Sullivan (2018)
     - Charitable givings: e.g. Almunia et. al - 2020

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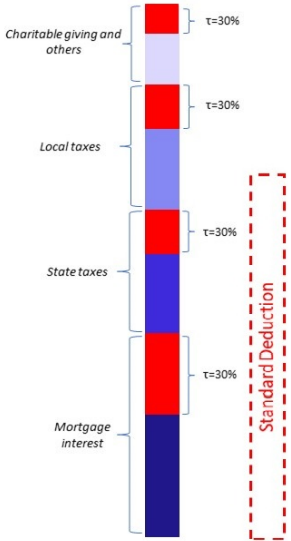


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   - In 2017, local government tax collections were $509 billion
   - In 2017, $219 billion in property taxes deducted from federal income taxes map

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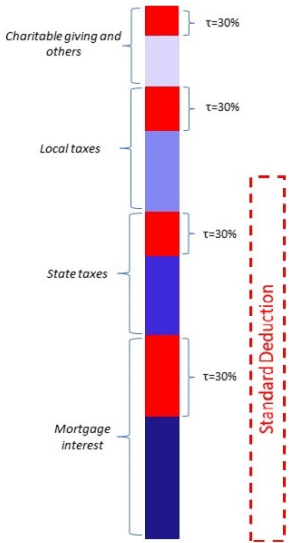


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**Research question:**

- Does deductibility of State and Local Taxes (SALT) increase (1) demand for and (2) provision of LPG?

# Summary and headline findings

1. The loss of deductibility due to TCJA induced a reduction in local ballot approval rates
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   - Capitalization of public goods is greater in areas with higher share of deducters

3. Test the model cross-sectionally with data prior the TCJA
   - Demand for LPG increases with the SALT deductibility benefits

# Contribution to the literature

1. The capitalization of public goods and property taxes into house value well known:
   - *Tiebout, 1956; Oates, 1969; Brueckner 1979, 1982, 1983; ... Bayer et al., 2020*

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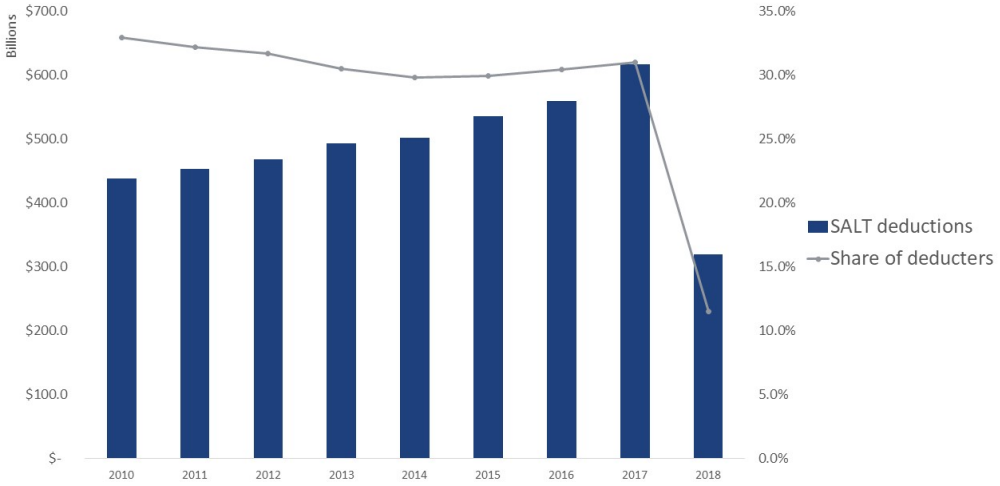
3. The equity of the property tax system
   - *Oates & Fischel, 2016; Avenancio-León & Howard, 2019; McMillen & Singh, 2020; ... Brueckner, 2021*

   → We add evidence on the regressivity of the current system

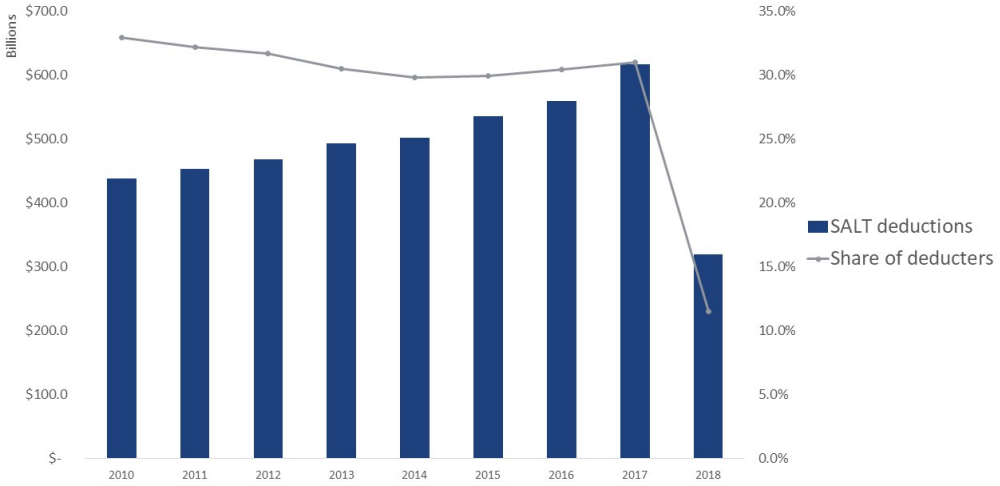
# Identification: 2017 Tax Cut & Jobs Act (TCJA)

Reduced taxpayers deducting SALT by 62%



# Motivating Evidence: 2017 TCJA Impact on Local Bond Referendums

Corresponding decline in voter approval of local referendums



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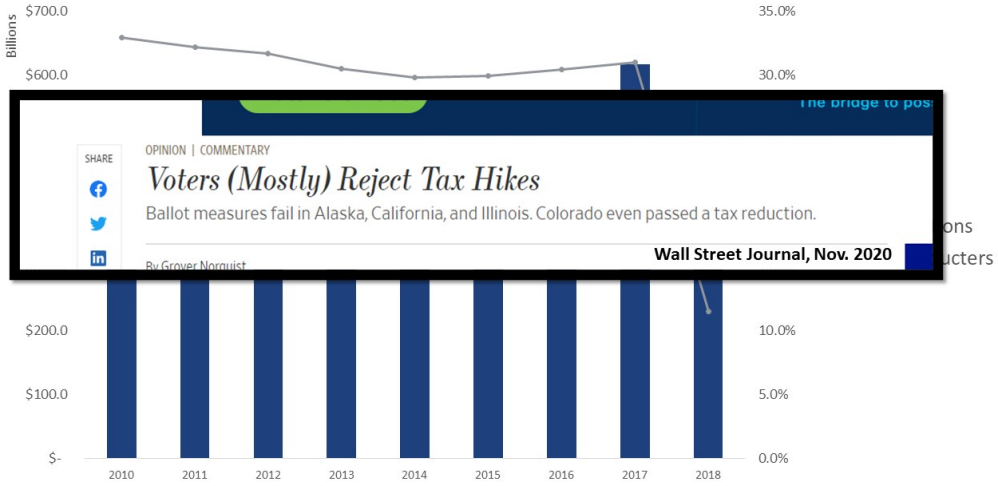

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# Motivating Evidence: California Local School Propositions

1. Collected referendum results on local school propositions in California from 2008-2020
   - Number of yes votes
   - Number of votes total
   - Threshold to pass
   - Ballot type (bond, property tax or parcel tax)
   - Bond amount (if bond)

# Example of referendum - Beverly Hills School District Bond 2018

A **bond issue** was on the ballot for Beverly Hills Unified School District voters in Los Angeles County, California, on June 5, 2018. It was **approved**.

A **yes** vote was a vote in favor of authorizing the Beverly Hills Unified School District to issue $385,000,000 in bonds at a tax rate of $44 per $100,000 of assessed property value, with funds used for construction, safety, health, and technology projects in district schools.

A **no** vote was a vote against authorizing the Beverly Hills Unified School District to issue $385,000,000 in bonds at a tax rate of $44 per $100,000 of assessed property value for school improvements.

A 55 percent supermajority vote was required for the approval of Measure BH.

## Election results

**Beverly Hills Unified School District Measure BH**

| Result | Votes | Percentage |
|---|---|---|
| ✔ Yes | **3,630** | 60.76% |
| No | 2,344 | 39.24% |

**Measure BH: Beverly Hills Unified School District Bond Issue**

**The basics**

**Election date:**
June 5, 2018

**Status:**
✔ Approved

**Majority required:**
55%

**Topic:**
Local school bonds

Amount: $385,000,000

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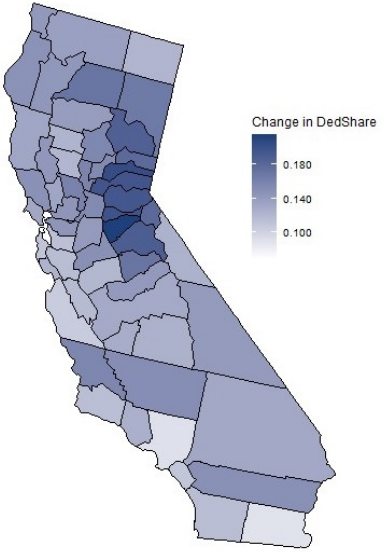
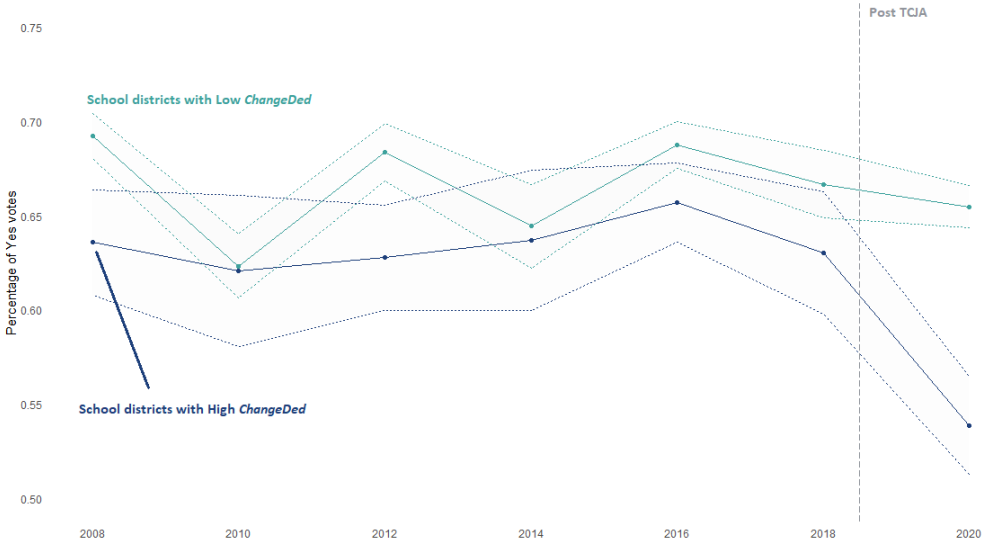
2. Calculate share of residents who stopped deducting SALT from IRS *Survey of Income* at school district level

$$ChangeDed_j = DedShare_{j,2017} - DedShare_{j,2018}$$

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



# Raw data split by school district's exposure to fiscal shock



# Examine change in support for local public goods after TCJA

$$WinningMargin_{j,t} = \alpha_j + \alpha_t + \gamma(ChangeDed_j \times Post_t) + X'_{j,t}\beta + \epsilon_{j,t}$$

- $WinningMargin_{j,t}$: percentage of yes on referendum in district j, at election t

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- $Post_t = 1$ for election after 2018; 0 otherwise
- $X$: election turnout, ballot type, dummy for recently rejected ballot, & property tax rate
- $\alpha_j$: School district fixed effects
- $\alpha_t$: Election fixed effects

Hypothesis: $\gamma < 0$

| | *Dependent variable: Winning Margin (%)* |
|---|---|
| | (1) |
| Post | −6.74*** |
| | (0.97) |
| Post x $ChangeDed$ | |
| School district FE | X |
| Election FE | |
| Control | X |
| Tight election results | |
| Only bonds referendums | |
| Observations | 1,525 |
| $R^2$ | 0.66 |
| Adjusted $R^2$ | 0.41 |

| | *Dependent variable: Winning Margin (%)* | |
|---|---|---|
| | (1) | (2) |
| Post | −6.74*** | 2.14 |
| | (0.97) | (3.94) |
| Post x $ChangeDed$ | | −67.09** |
| | | (31.26) |
| School district FE | X | X |
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| | *Dependent variable: Winning Margin (%)* | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| Post | −6.74*** | 2.14 | |
| | (0.97) | (3.94) | |
| Post x $ChangeDed$ | | −67.09** | −62.32** |
| | | (31.26) | (30.79) |
| School district FE | X | X | X |
| Election FE | | | X |
| Control | X | X | X |
| Tight election results | | | |
| Only bonds referendums | | | |
| Observations | 1,525 | 1,524 | 1,524 |
| $R^2$ | 0.66 | 0.66 | 0.68 |
| Adjusted $R^2$ | 0.41 | 0.41 | 0.43 |

| | *Dependent variable: Winning Margin (%)* | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Post | −6.74*** | 2.14 | | |
| | (0.97) | (3.94) | | |
| Post x $ChangeDed$ | | −67.09** | −62.32** | −51.02** |
| | | (31.26) | (30.79) | (21.93) |
| School district FE | X | X | X | X |
| Election FE | | | X | X |
| Control | X | X | X | X |
| Tight election results | | | | X |
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| Observations | 1,525 | 1,524 | 1,524 | 1,476 |
| $R^2$ | 0.66 | 0.66 | 0.68 | 0.71 |
| Adjusted $R^2$ | 0.41 | 0.41 | 0.43 | 0.47 |

A 10 p.p. decrease in DedShare decreases Yes votes by 5.1 p.p.

| | *Dependent variable: Winning Margin (%)* | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Post | −6.74*** | 2.14 | | | |
| | (0.97) | (3.94) | | | |
| Post x $ChangeDed$ | | −67.09** | −62.32** | −51.02** | −45.64** |
| | | (31.26) | (30.79) | (21.93) | (22.16) |
| School district FE | X | X | X | X | X |
| Election FE | | | X | X | X |
| Control | X | X | X | X | X |
| Tight election results | | | | X | X |
| Only bonds referendums | | | | | X |
| Observations | 1,525 | 1,524 | 1,524 | 1,476 | 1,151 |
| $R^2$ | 0.66 | 0.66 | 0.68 | 0.71 | 0.75 |
| Adjusted $R^2$ | 0.41 | 0.41 | 0.43 | 0.47 | 0.42 |

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# Robustness of the results

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   - Placebo test using different years for Post - Results

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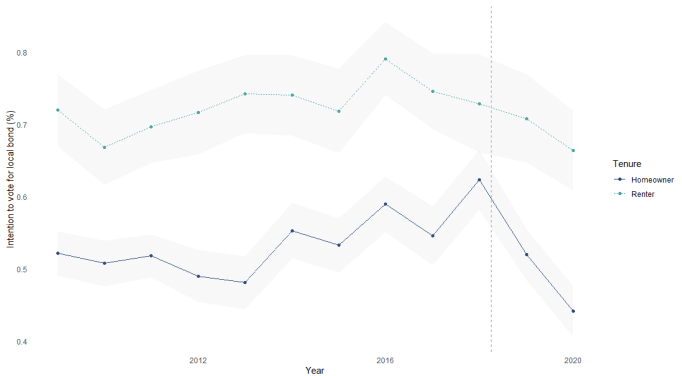
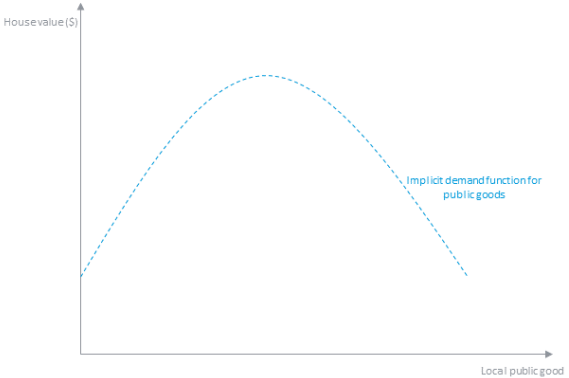
   - Triple interaction with loss due to the SALT cap - Results
4. Drop in approval rate due to Covid-19?
   - Survey of Californian show decline starting in April 2019

# Annual survey of Californian willingness to approve school bonds - Return




**Surveyed Californian indicated reluctance to accept local ballot since 2019**

# Theory: Public goods, property taxes, and house value

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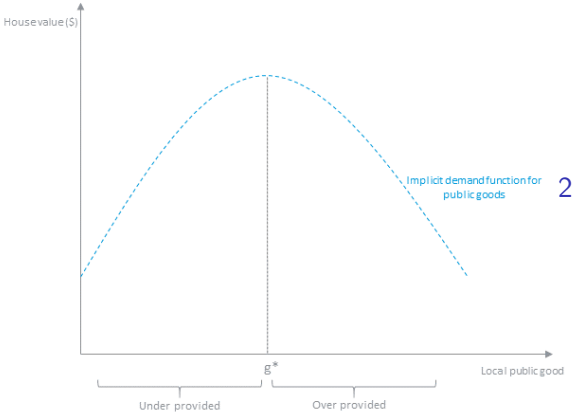


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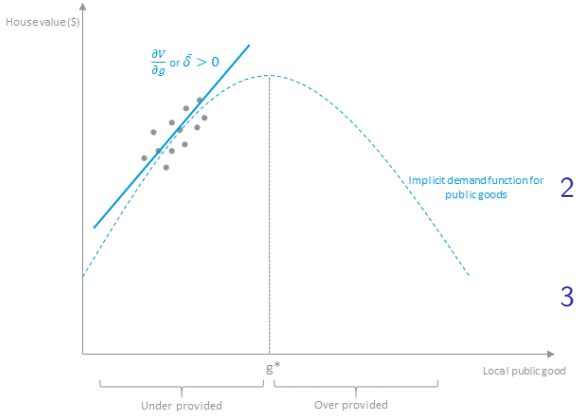


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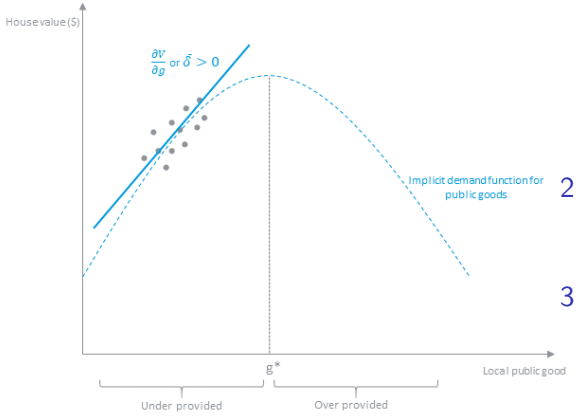


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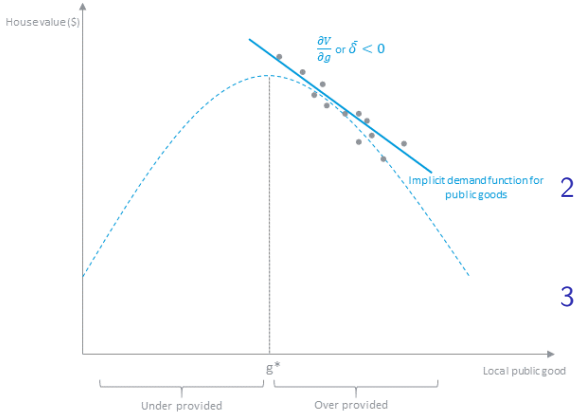


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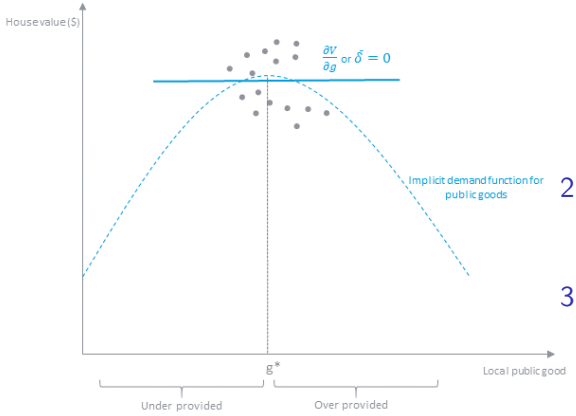


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3. The capitalization of public goods:
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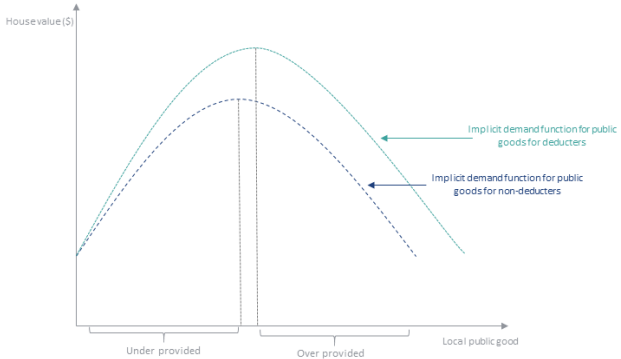
   - Negative if overprovided
   - Zero if efficiently provided

# Theory: LPG capitalization with property tax deductibility




Introducing deductibility lowers the effective cost of providing public goods:

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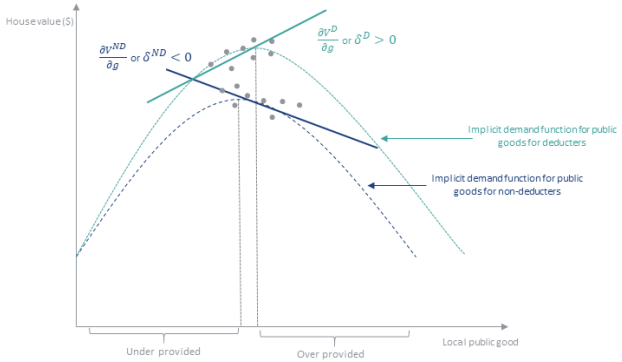


Introducing deductibility lowers the effective cost of providing public goods:

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

# Theory: Cross-sectional testable hypotheses

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

# Cross-sectional testable hypotheses

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

$$\frac{\partial V}{\partial DedShare} = \phi > 0 \tag{2}$$

$$\frac{\partial V}{\partial g} = \delta^{ND} \begin{cases} > 0 & \text{if g is under-provided} \\ = 0 & \text{if g is efficiently provided} \\ < 0 & \text{if g is over-provided} \end{cases} \tag{3}$$

$$\frac{\partial^2 V}{\partial g \, \partial DedShare} = \delta^{D} > 0 \tag{4}$$

The capitalization rate increases with the share of deducters.

# Empirical framework -

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

- $V_j$: Median house value 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 ...)

Main hypothesis: $\delta^D > 0$

Identification

# Data - School Districts Across US

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

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

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

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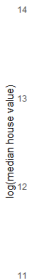
1. House value
   - Zillow Zipcode Single-family Home House price pre-TCJA
2. Public school spending
   - Annual Survey of School System Finances
   - Spatially deflated to compare spending across the nation
3. Share of households deducting property taxes from IRS

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

Heterogeneity in deducting property taxes example

# Main data

1) Zillow Zipcode Single-family Home House price



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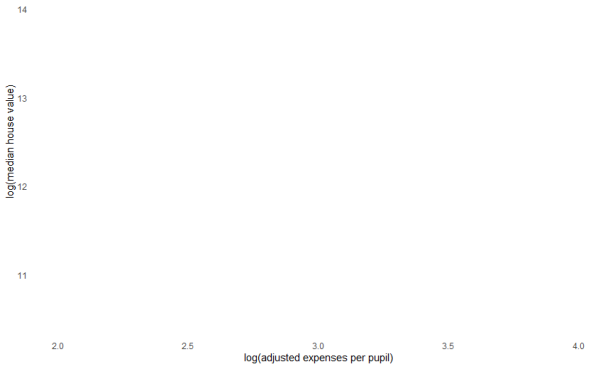


2) Annual Survey of School System Finances

# Main data

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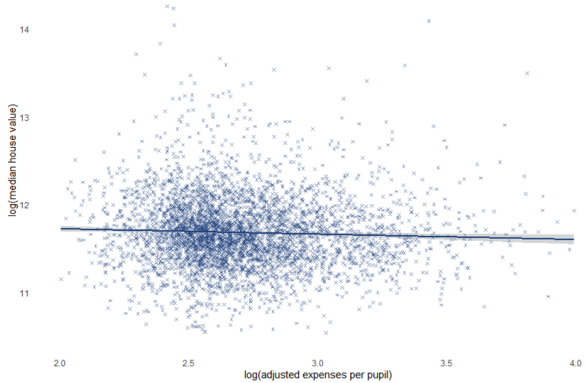


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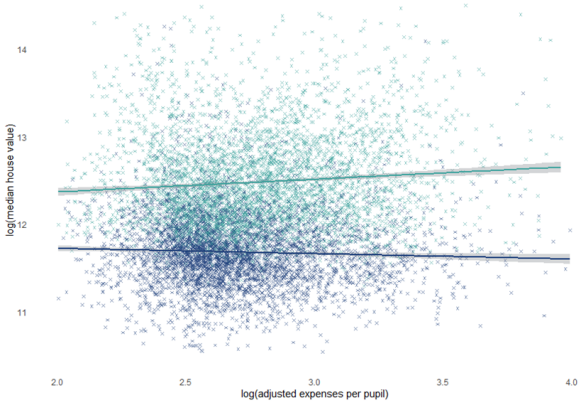


3) IRS: share of households deducting property taxes

2) Annual Survey of School System Finances

# The demand for public goods increases with share of deducters

| | Dependent variable: log(house value) | | | | | |
|---|---|---|---|---|---|---|
| | (1a) | (1b) | (2a) | (2b) | (3a) | (3b) |
| Share of property deducters - $\phi$ | 0.656* | 0.589 | 0.669** | 0.610* | 0.655** | 0.592** |
| | (0.359) | (0.383) | (0.327) | (0.338) | (0.289) | (0.295) |
| Expenses per pupil (standardized) - $\bar{\delta}$ | 0.011 | | 0.004 | | 0.013** | |
| | (0.010) | | (0.005) | | (0.006) | |
| Expenses per pupil (standardized) - $\delta^{ND}$ | | −0.027*** | | −0.024** | | −0.021* |
| | | (0.010) | | (0.011) | | (0.013) |
| Expenses per pupil x DedShare - $\delta^{D}$ | | 0.147*** | | 0.113*** | | 0.134*** |
| | | (0.032) | | (0.039) | | (0.039) |
| Demographics | X | X | X | X | X | X |
| Spatial FE | CBSA | CBSA | + State | + State | County | County |
| Observations | 8,890 | 8,890 | 8,890 | 8,890 | 8,890 | 8,890 |
| Adjusted $R^2$ | 0.914 | 0.914 | 0.918 | 0.919 | 0.932 | 0.932 |

A 10 p.p. increase in share of deducters corresponds to approx. 6% increase in house values.

# Provision of public goods appears efficient without considering federal itemization

| | Dependent variable: log(house value) | | | | | |
|---|---|---|---|---|---|---|
| | (1a) | (1b) | (2a) | (2b) | (3a) | (3b) |
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# Introducing federal itemization creates heterogeneity

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|---|---|---|---|---|---|---|
| | (1a) | (1b) | (2a) | (2b) | (3a) | (3b) |
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- 1 $\sigma$ increase in per-pupil spending $\rightarrow$ a 2.7% reduction in housing value in a school district where residents do not deduct their property taxes.

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| | Dependent variable: log(house value) | | | | | |
|---|---|---|---|---|---|---|
| | (1a) | (1b) | (2a) | (2b) | (3a) | (3b) |
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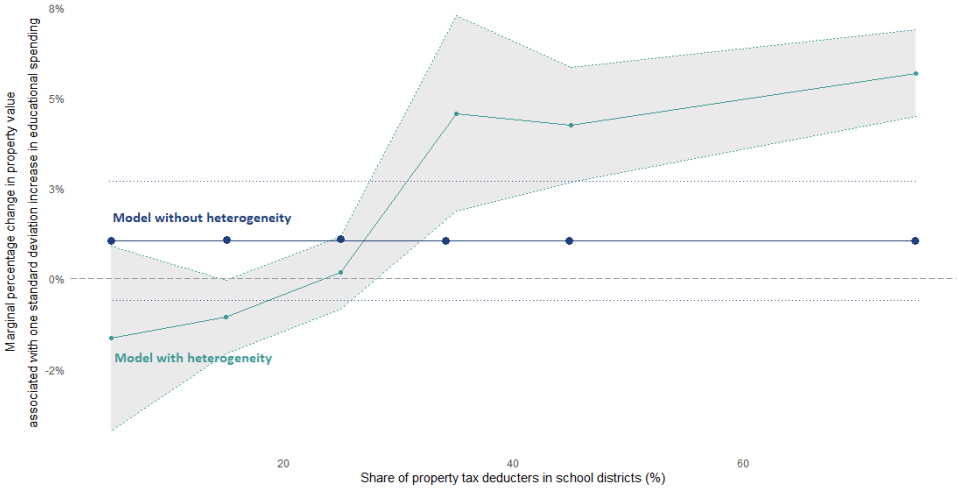
- Property values increase by 0.67% in school districts having the median share of residents that deduct their property taxes (23.0%).

# Capitalization of public goods increases with the share of deducters



# Robustness check: Differing types of educational expenses

| | Dependent variable: log(house value) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | All | Instruction | Support | Others | Non-school | Cap. Exp. | Employees | Non-deflated |
| | (1b) | (2b) | (3b) | (4b) | (5b) | (6b) | (7b) | (8b) |
| Public good (standardized) - $\delta^{ND}$ | $-0.027^{***}$ | 0.008 | $-0.027^{**}$ | $-0.080^{***}$ | $-0.005$ | $-0.024^{***}$ | $-0.030^{***}$ | 0.001 |
| | (0.010) | (0.024) | (0.011) | (0.016) | (0.007) | (0.007) | (0.010) | (0.016) |
| Public good x DedShare - $\delta^{D}$ | $0.147^{***}$ | 0.066 | $0.094^{***}$ | $0.261^{***}$ | $0.077^{**}$ | $0.105^{***}$ | $0.094^{**}$ | $0.074^{**}$ |
| | (0.034) | (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 |

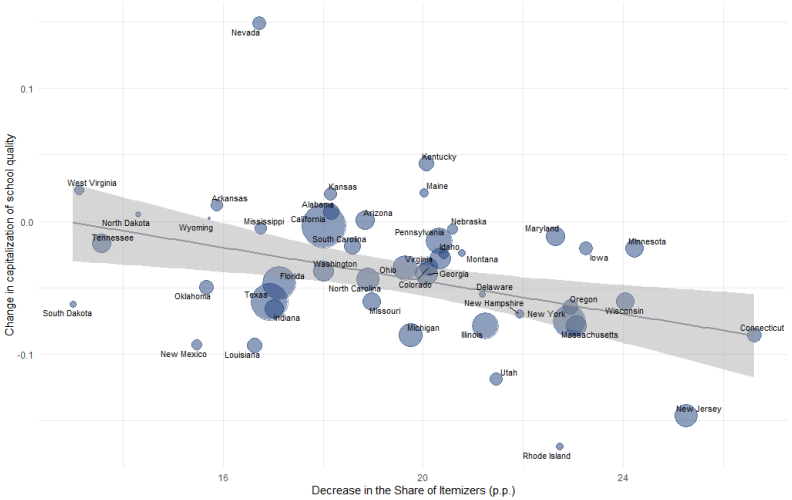
- *Instructional Expenses* not capitalized into house value, except through district test scores.

# External validity - Police funding at county level

| | Dependent variable: log(house value) | | | | | |
|---|---|---|---|---|---|---|
| | (1a) | (1b) | (2a) | (2b) | (3a) | (3b) |
| Expenses per resident (standardized) - $\bar{\delta}$ | −0.027*** | | −0.024*** | | −0.029*** | |
| | (0.008) | | (0.008) | | (0.008) | |
| Expenses per resident (standardized) - $\delta^{ND}$ | | −0.064*** | | −0.037** | | −0.043** |
| | | (0.016) | | (0.018) | | (0.017) |
| Expenses per resident x DedShare - $\delta^{D}$ | | 0.181** | | 0.058 | | 0.068 |
| | | (0.072) | | (0.073) | | (0.072) |
| 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 |
| Adjusted $R^2$ | 0.881 | 0.882 | 0.925 | 0.925 | 0.930 | 0.930 |

- Results are similar to educational spending.

# Robustness: Exploiting Identification from 2017 TCJA




Decrease in capitalization of LPG due to exogenous decrease in itemization - Panel data results

# Potential channels to magnify or mitigate effect

- School districts reliance on local taxation and capitalization
  - Separate districts based on the share of revenue coming from property taxation - Results

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- Does private schools enrollment reduce capitalization?
  - Separate school districts based on enrollment in public schools - Results

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# Potential channels to magnify or mitigate effect

- Does land supply elasticity mitigate capitalization?
  - Separate school districts based on share of land available for development - Results
- Commercial properties taxation and capitalization
  - Separate districts based on the share of developed land being highly developed - Results
- States that reformed their school systems
  - Separate school districts based on whether the states passed a equalization reform - Results

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   - have greater fiscal independence
   - have a large share of pupils enrolled in public schools
   - have lower land available for development,
   - have a larger share of commercial properties.

Prior the TCJA, in absence of deductions residents would prefer to down-size education.

# Implications

1. Property tax deductibility increases demand for local public goods
   - Capitalization of public goods is greater in areas with higher share of deducters
   - The loss of deductibility due to TCJA induced a reduction in local ballot approval rates

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1. Property tax deductibility increases demand for local public goods
   - Capitalization of public goods is greater in areas with higher share of deducters
   - The loss of deductibility due to TCJA induced a reduction in local ballot approval rates

2. The results point toward a future reduction in support for local public spending
   - Especially in jurisdictions that were highly impacted by TCJA
   - and for public goods that residents can alter (capital expenditure, school administration, transportation, extra-curricular activities ...)

# Thank You!

Appendix

- Motivating evidence
- Mechanism results

Appendix

- Motivating evidence
- Mechanism results

# 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 |

# Regressions results using panel data

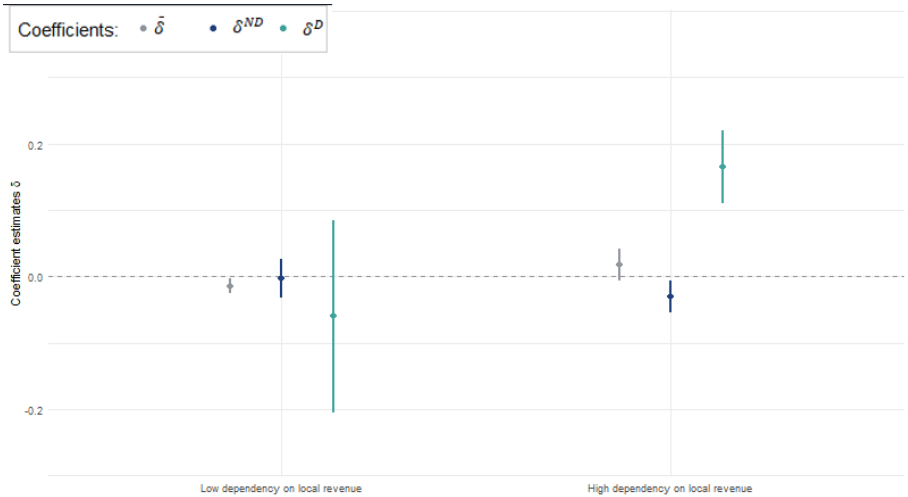
Return

| | Dependent variable: log(house value) | | | | | |
|---|---|---|---|---|---|---|
| | (1a) | (1b) | (2a) | (2b) | (3a) | (3b) |
| Share of property deducters - $\phi$ | 0.546*** | 0.530*** | 0.454*** | 0.446*** | 0.167*** | 0.131*** |
| | (0.170) | (0.179) | (0.154) | (0.162) | (0.035) | (0.030) |
| log(Expenses per pupil) - $\bar{\delta}$ | | 0.010 | | | | |
| | (0.004) | | (0.007) | | | |
| log(Expenses per pupil) - $\delta^{ND}$ log(Expenses per pupil) - $\delta^{ND}$ | | −0.024*** | | −0.018** | | |
| | | (0.004) | | (0.009) | | |
| log(Expenses per pupil) x DedShare - $\delta^{D}$ | | 0.167*** | | 0.143*** | | 0.078*** |
| | | (0.013) | | (0.029) | | (0.010) |
| Demographics | X | X | X | X | X | X |
| Income Decile FE | X | X | X | X | X | X |
| CBSA x year FE | X | X | | | | |
| County x year FE | | | X | X | | |
| School District FE | | | | | X | X |
| Year FE | | | | | X | X |
| Observations | 53,300 | 53,300 | 53,300 | 53,300 | 53,300 | 53,300 |
| Adjusted $R^2$ | 0.913 | 0.914 | 0.932 | 0.932 | 0.995 | 0.995 |

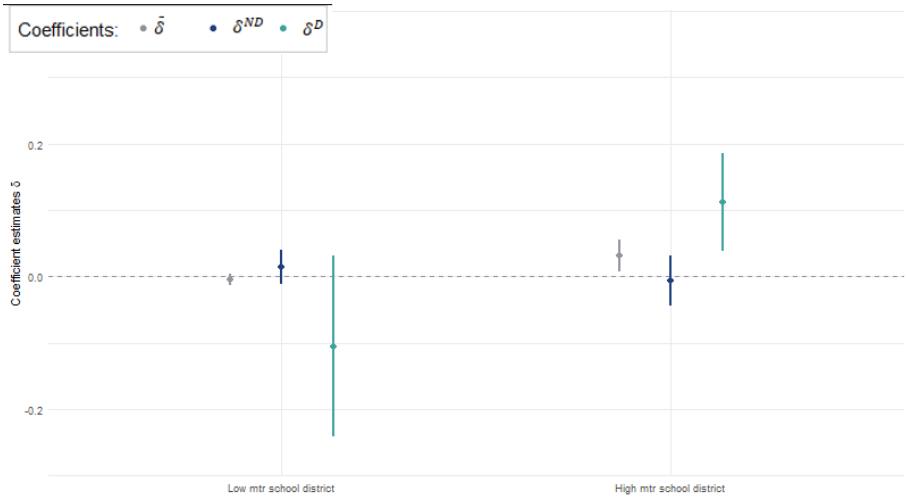
Appendix

- Motivating evidence
- Mechanism results

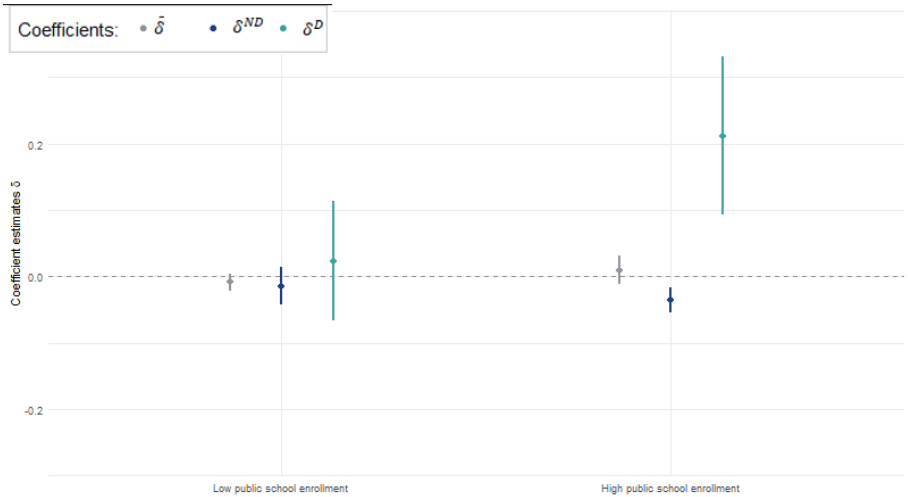
# School districts dependency on local taxation - Return



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



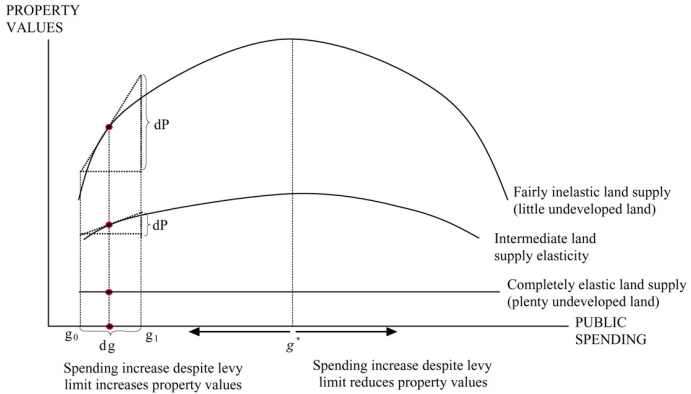
# Does private school enrollment reduce capitalization? - Return



# Does land supply elasticity mitigate capitalization? - Return

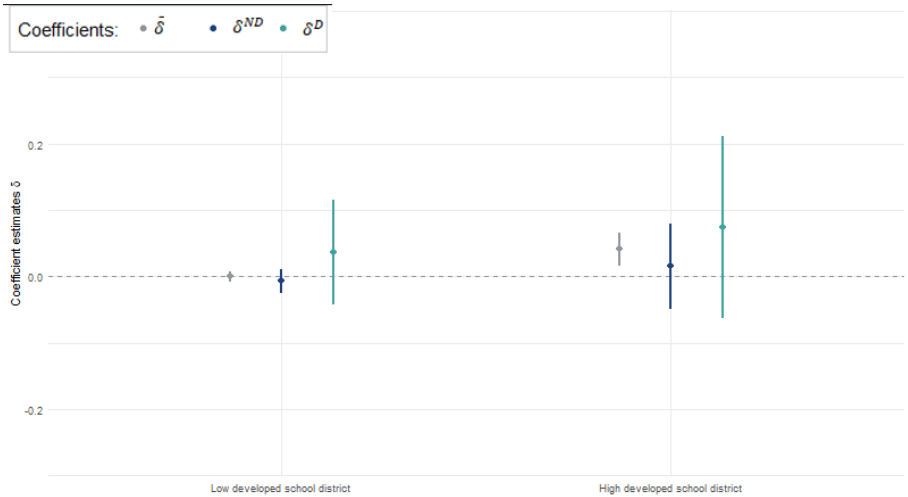
In areas with high availability of land:

- 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

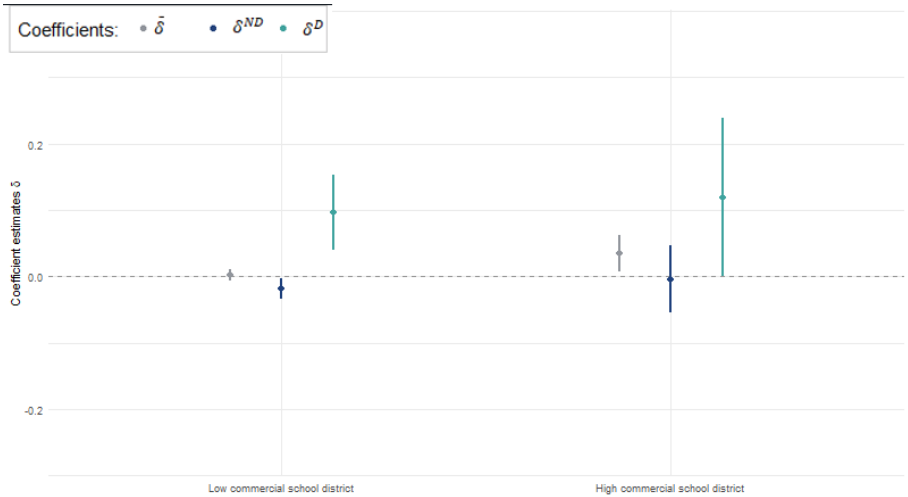
Some school districts tax both residential and commercial properties:

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

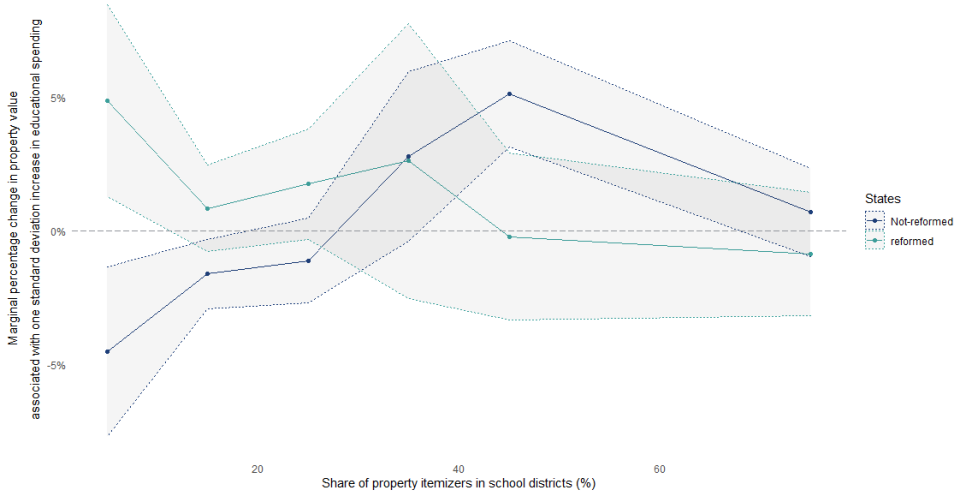
In school districts with higher level of commercial properties, capitalization should be greater (i.e. the tax burden is lower)

- 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



# Identification Issues

- Potential problem: Homeowner itemization status may not be exogenous to house price.
- We do not feel this is a serious concern because:
  - Empirical analysis looking at average home price in school district – not individual level.
  - We control for direct link between itemization and house values by including $DedShare$. Primary focus is on the interaction term [capitalization of public goods].
  - Itemization choice is also a function of items not related to housing: charitable contributions, medical expenses, martial status.

Possible Solution Back to Presentation

# Possible Solution to Identification Issue

Exploit spatial variation in school quality and temporal variation in share of itemizers:

- We can identify the capitalization of school quality using a border discontinuity design using individual house prices and school boundary zones.
- We utilize estimates pre and post-TCJA for areas where a lot of taxpayers itemize pre-TCJA (e.g., NJ) and for areas where few itemize pre-TCJA (e.g., WV).
- So we have four estimates of the capitalization parameters (i.e. the value residents place in additional public goods): $\delta^{pre,high}, \delta^{pre,low}, \delta^{post,high}, \delta^{post,low}$.
- We can use these four estimates to test the main hypothesis of the paper: The capitalization rate increases with deductibility benefits if

$$\frac{(\delta^{post,high} - \delta^{pre,high})}{\Delta ValueLPG^{highChangeDed}} - \frac{(\delta^{post,low} - \delta^{pre,low})}{\Delta ValueLPG^{lowChangeDed}} < 0$$

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# Itemizer Heterogeneity Across School Districts

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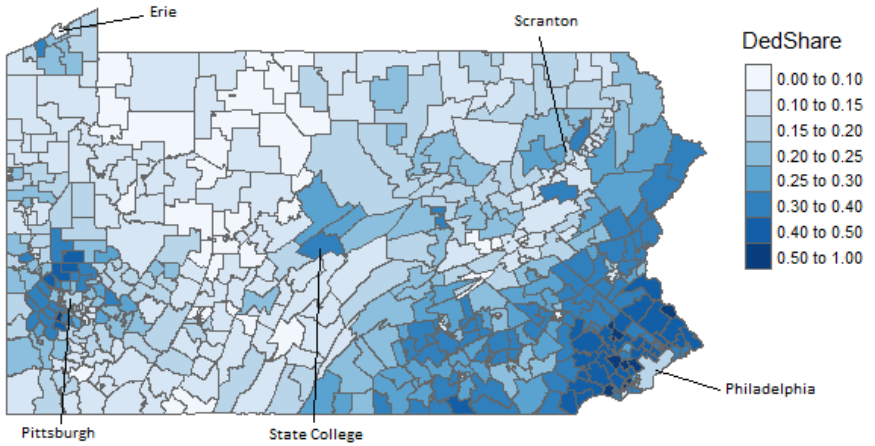


Share of property tax deducters in Pennsylvania school districts in 2017

# Property Tax Deductions per Taxpayer by US Counties in 2017

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