Tax Advantages and Imperfect Competition in Auctions for Municipal Bonds

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Municipal Borrowing Costs and Tax Expenditures

1. State and local gov'ts finance spending with muni bonds
   - $3.8 trillion of outstanding municipal debt in 2014
   - Interest payments $124 billion $\geq$ UI, policing, workers comp
   - To reduce borrowing cost, muni interest income excluded from federal and (some) state taxation
   - **Do tax advantages lower municipal borrowing costs?**

2. Tax advantage is a *tax expenditure* for fed and state gov'ts
   - 10-year cost to fed gov't alone $\geq$ $500 billion, rises over time, benefits top-income filers
   - Over 120 proposals to limit/eliminate subsidy, including every Obama budget from 2012-2016
   - New tax law affects tax advantages by changing tax rates and reducing SALT deduction
   - **Is this an efficient way to lower borrowing rates?**

Our Approach

- Study effect of tax advantage on auctions for muni bonds
  - Half of bonds issued through auctions (underwriters bid)
  - Use over 14,000 muni bond auctions from 2008-2015
  - Exploit variation in state and federal taxes to identify effect of taxes on bids (borrowing costs)

- How do tax advantages affect the auction market?
  - One-for-one passthrough in competitive auctions
  - Passthrough in imperfectly competitive auctions depends:
    1. direct effects of subsidy
    2. strategic bidding
    3. strategic participation of potential bidders
  - Show that the interaction of tax advantages and imperfect competition can generate greater-than-unity passthrough elasticities of tax advantages to borrowing rates

Preview of Main Results

1. Large reduced-form effects of taxes on borrowing costs
   - 3pp. increase in tax reduces mean costs by 9-10%
   - Effects imply a passthrough of the borrowing rate to the tax advantage of 1.748-1.872
   - Tax advantages lead to more competitive auctions

2. Identify mechanisms and provide non-parametric evidence
   - Show that effect on strategic bidding/entry and markups can lead to greater than unity passthrough
   - Non-parametric analysis confirms effect of taxes on strategic bidding and on markups

3. Estimate empirical auction model
   - Quantifies median markups at 11bp. or 5% of interest cost
   - Simulations show every $1 reduction in federal tax expenditure increases municipal borrowing costs by $2.8

Outline

1. Background and Data
2. Reduced-Form Evidence on Passthrough
3. Empirical Auction Model (see paper)
4. Fundamentals of a Greater-than-unity Passthrough
5. Counterfactual Analysis
6. Conclusion

The News&Observer

ELECTIONS

NOVEMBER 08, 2016 8:45 PM

Durham County voters back $170M in bonds

BY VIRGINIA BRIDGES
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DURHAM — Voters supported $170 million in bonds for Durham Public Schools, Durham Technical Community College, the Museum of Life and Science and the Main Library downtown, according to results at 9:50 p.m.

DPS's $90 million bond will support replacing Northern High School on its current site and renovating Eno Valley Elementary School. Construction for Northern could start in spring 2018, with the new building opening and the old building being demolished in fall 2020. The money will also support systemwide security and safety measures, roofing upgrades, HVAC system upgrades, lighting upgrades, renovations and repairs to high school athletic facilities and improvements projects.

Muni Bonds: Size, Purpose, Auctions

- Used to fund public projects including school construction, highway repair, and water and sewage facilities
- Bought by underwriters who resell them on the secondary market to final consumers
  - 50% via auctions, rest by negotiation and private placement
  - Secondary market characterized by low liquidity
- Auction process:
  - Municipality posts notice of sale
  - Bids placed in first-price, sealed, low bid auctions
  - Bid for entire series of bonds related to offering
  - Bids are "True Interest Cost Bids" (interest rate paid by municipality)
  - Bidders do not observe how many others bid

Tax Treatment of Municipal Interest Income

- Federal:
  - Since 1913 interest income from most muni debt is exempt from federal income taxes
- States:
  - Of the 43 states with personal income, only 5 tax interest income on own muni bonds.
  - All 43 tax interest income from other states' muni bonds
- Controversial, but enduring:
  - Simpson-Bowles Commission on Fiscal Responsibility and Reform of 2010 sought, and failed, to eliminate the tax exemption on all interest from new municipal bonds
  - In its last 4 years, the Obama Administration proposed a reduction in the tax advantage for these bonds

Data Sources

- Bond Buyer (all bids, bidders) & SDC Platinum (details)
- NBER TAXSIM & State Tax Handbooks

- Effective tax rate for a top-earner in state s at time t:

$$\tau_{s,t} = \tau_t^{Federal}(1 - \tau_{s,t}^{State}) + \tau_{s,t}^{State} \times \mathbb{I}[\text{Tax Exempt}]_{s,t}^{State}$$

- Variation stems from changes in:
  - $\tau_t^{Federal}$, $\tau_{s,t}^{State}$ and their interaction
  - Whether state taxes apply to muni interest income
  - Some states allow federal taxes to be deducted from state taxable income

Effect of Effective Rate on Winning Bid

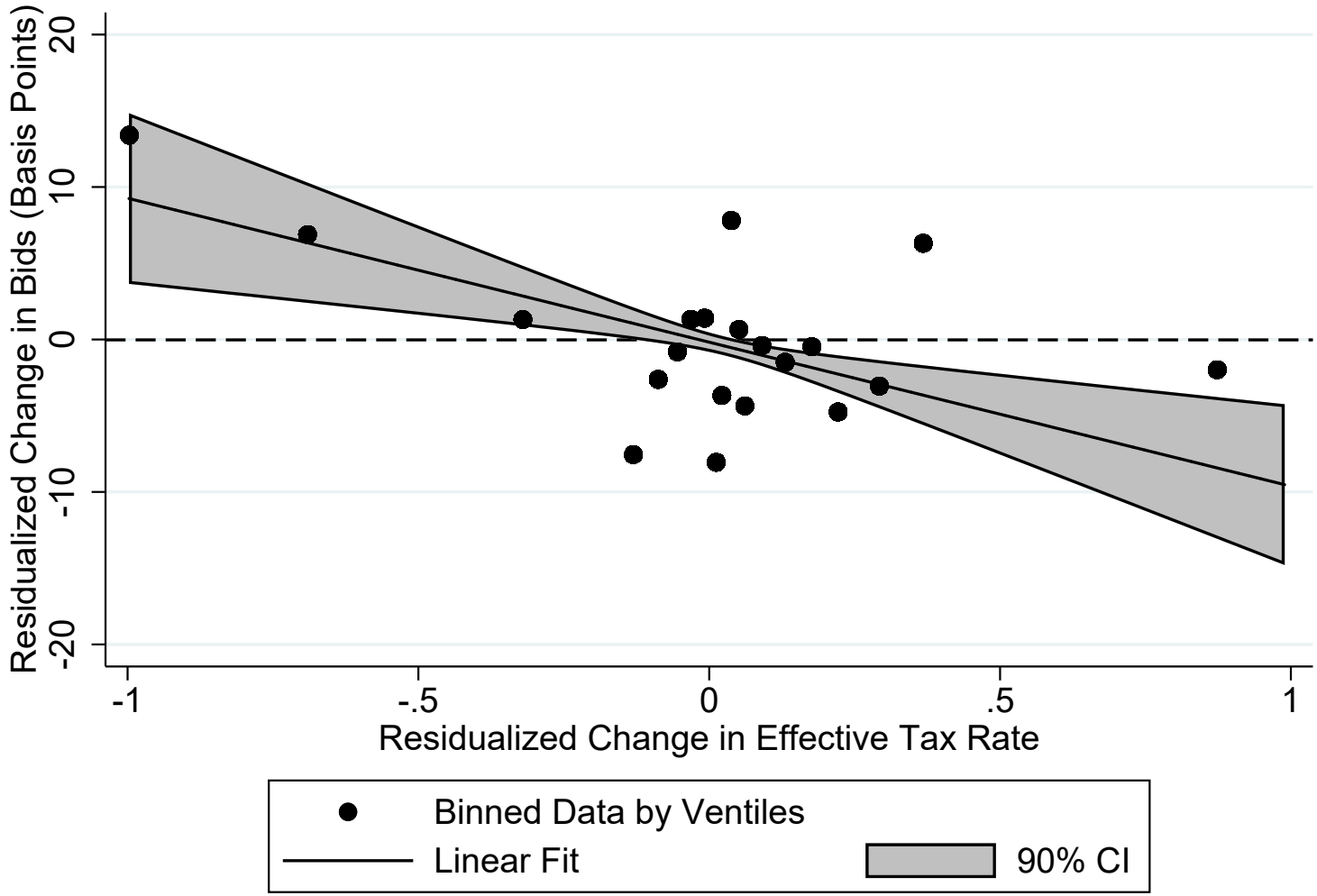
Estimating equation: $b_{1ist} = \beta\tau_{st} + \alpha_s + \eta_t + X_{ist}\Gamma + \varepsilon_{ist}$

	(1)	(2)	(3)	(4)	(5)
Unconditional Effect of Effective Rate on Bid					
Effective Rate	-6.531	-6.994	-6.819	-6.813	-6.806
	(2.689)	(2.432)	(2.918)	(2.899)	(2.879)
	0.019	0.006	0.024	0.023	0.022
Observations	14,631	14,631	14,631	14,631	14,631
Median Bid	221.200	221.200	221.200	221.200	221.200
Median Effective Tax	40.790	40.790	40.790	40.790	40.790
Unconditional Elasticity	1.748	1.872	1.825	1.824	1.822
at the Median	(0.720)	(0.651)	(0.781)	(0.776)	(0.771)
	0.015	0.004	0.019	0.019	0.018
Year Fixed Effects	Y	Y	Y	Y	Y
State Fixed Effects	Y	Y	Y	Y	Y
Maturity and Size Controls	Y	Y	Y	Y	Y
Quality and Refund Controls	Y	Y	Y	Y	Y
Political Party Controls		Y	Y	Y	Y
Personal Income Tax Base			Y	Y	Y
Sales Tax Controls				Y	Y
Business and Property Tax					Y

Notes: SEs clustered by state in parenthesis, p-values below SEs.

Effect of Effective Rate on Winning Bid: Changes

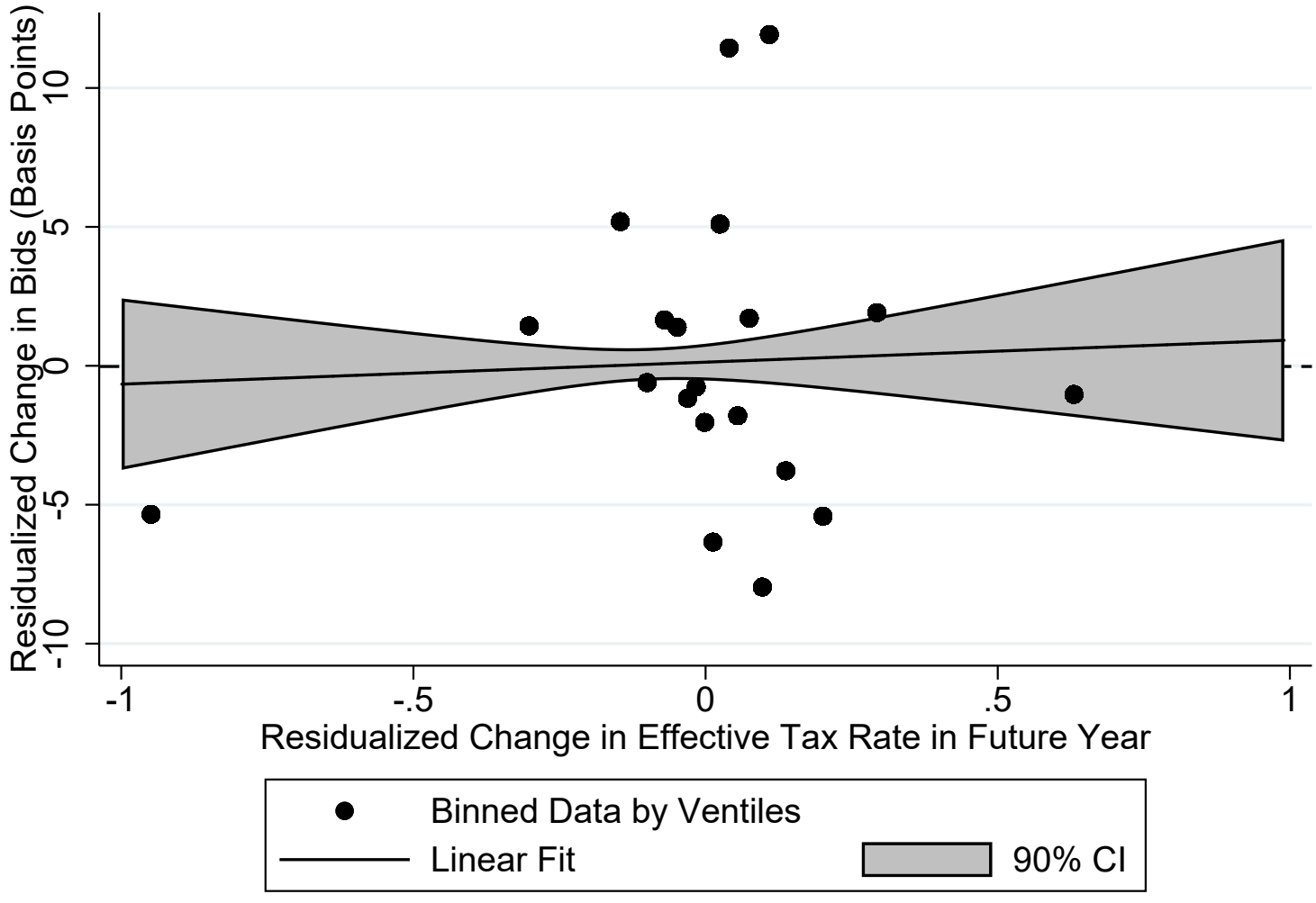
Estimating equation: $\Delta b_{1ist} = \beta \Delta \tau_{s,t} + \Delta \eta_t + \Delta X_{ist} \Gamma + \Delta \varepsilon_{ist}$



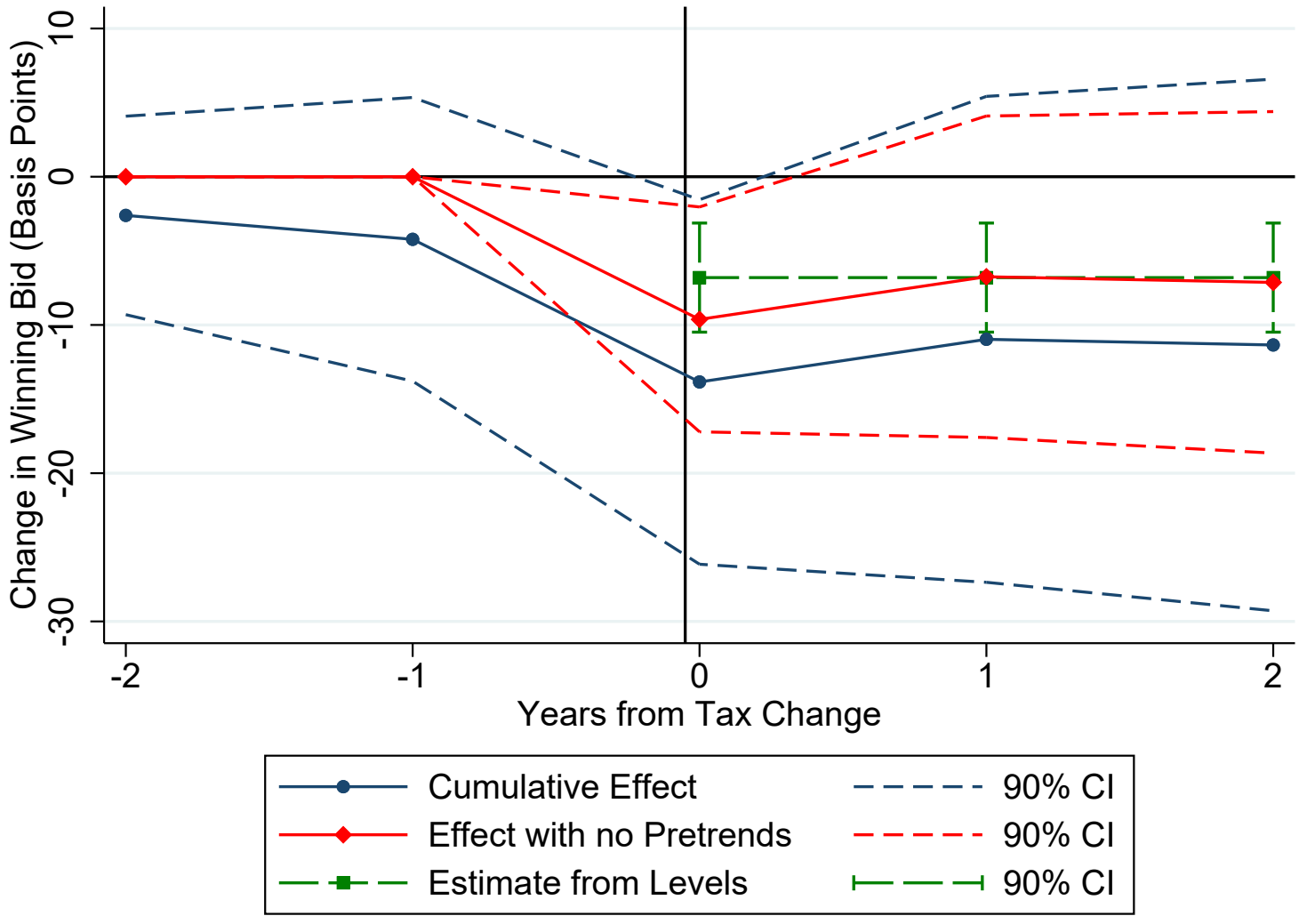
The slope of the regression line is -9.73 with standard error 2.59 and p-value .001

Placebo Test: Effect of Future Tax Rate

Estimating equation: $\Delta b_{1ist} = \beta \Delta \tau_{s,t+1} + \Delta \eta_t + \Delta X_{ist} \Gamma + \Delta \varepsilon_{ist}$



Effect of Effective Rate on Winning Bid: Event Study



Winning Bid Effects: Comments

- 3pp. increase in τ decreases borrowing costs by 9-10%
- Amounts to $\approx$ \$12 billion savings per year
- Passthrough elasticity of tax advantage
  $(1 - \tau) \approx 1.748 - 1.872$

- Exclusion restriction: τ independent of other factors that also affect the borrowing costs of municipalities
  - Columns (2)-(5) explore plausibility of assumption
  - Stable estimates across specifications strengthen support for exclusion restriction
  - Additional robustness to including bidder & issuer FE, gov't spending & transfers, econ conditions, etc.
  - Formalize coefficient stability with Altonji/Elder/Oster test

- We now explore effect of τ on auction competitiveness as source of large passthrough effects

Effect of Effective Rate on Potential Bidders

Estimating equation: $N_{ist} = \beta\tau_{st} + \alpha_s + \eta_t + X_{ist}\Gamma + \varepsilon_{ist}$

	(1)	(2)	(3)	(4)	(5)
Effect of Effective Rate on N					
Effective Rate	0.581	0.571	0.559	0.559	0.547
	(0.127)	(0.133)	(0.128)	(0.129)	(0.128)
	0.000	0.000	0.000	0.000	0.000
Observations	14,631	14,631	14,631	14,631	14,631
Median Bid	221.200	221.200	221.200	221.200	221.200
Median Effective Tax	40.790	40.790	40.790	40.790	40.790
Year Fixed Effects	Y	Y	Y	Y	Y
State Fixed Effects	Y	Y	Y	Y	Y
Maturity and Size Controls	Y	Y	Y	Y	Y
Quality and Refund Controls	Y	Y	Y	Y	Y
Political Party Controls		Y	Y	Y	Y
Personal Income Tax Base			Y	Y	Y
Sales Tax Controls				Y	Y
Business and Property Tax					Y

Notes: SEs clustered by state in parenthesis, p-values below SEs.

- 4 pp. increase in τ increases N by about 2 potential bidders
- Effect robust to alternative definition of N, actual bidders

More

Motivation for Structural Model

Progress so far

- Reduced-form effects show large effects of τ on b, N
- Low competition suggests markups may be important

Limits to reduced form analysis

- Want to measure equilibrium markups
- Want to understand equilibrium effects of tax changes
- Want to simulate (large) changes in τ (by state)

Overcome these issues with empirical auction model

- Taxes affect strategic entry and bidding
- Flexibly controls for determinants of bids/values

Average Estimated Markups by Issuer Type

- Model allows us to quantify equilibrium markups

	Markup (BP)	Markup Rate (%)	Markup Value ($)
Total	16.803	17.402	173,476
States and State Authorities	10.141	6.374	893,260
Counties, Parishes, and Colleges	15.088	14.131	214,318
School and Utility Districts	17.447	16.300	155,743
Cities, Towns, and Villages	16.876	20.124	128,612

- Schools and districts have average of 5 bidders $\rightarrow$ high rate
- States have average of 8 bidders $\rightarrow$ low rate
- States have larger bond package $\rightarrow$ lager value of markup

Intuition for Passthrough

- Reduced-form evidence consistent with greater-than-unity passthrough
- Where does large passthrough come from?
- We highlight the role of imperfect competition for disciplining these passthrough estimates
- As τ increases, 3 forces depress bids:
  1. After-tax values decline
  2. Potential entrants increase
  3. Bid more aggressively

Intuition for Passthrough

- Magnitude of these effects depends on *changes* in the ability of bidders to extract information rents
- Standard optimal bidding: $b = v + \frac{Pr[win|b]}{-Pr'[win|b]} = v + \mu$
- Letting $m = \frac{\mu}{b}$, decompose $\varepsilon^b_{1-\tau}$:

$$\varepsilon^b_{1-\tau} = (1-m)\varepsilon^v_{1-\tau} + m\varepsilon^\mu_{1-\tau}$$

  - Note if $\varepsilon^v_{1-\tau} = 1$ and $\varepsilon^\mu_{1-\tau} > 1$, then $\varepsilon^b_{1-\tau} > 1$
  - Decompose $\varepsilon^\mu_{1-\tau} = \underbrace{\varepsilon^{\mathbb{P}r}_{1-\tau}}_{\text{change in share}} + \underbrace{\varepsilon^{-1/\frac{\partial}{\partial b}\mathbb{P}r}_{1-\tau}}_{\text{change in slope of Pr}}$

Nonparametric Evidence of Passthrough & Mechanisms

- Analyze effect of τ increasing from 35% to 39%
- Take v_0 =Median bid, $N = 6$, and estimate effects on bids

	N	Value v	Optimal b	$\varepsilon^b_{1-\tau}$	$\varepsilon^\mu_{1-\tau}$
1. Baseline	6	$v_0 = 1.621$	1.896		
2. Own-value Changes No Change to $Pr[win]$	6	$v_1 = 1.521$	1.830	0.567	
3. All-values Change $Pr[win]$ reflects τ_1, N_0	6	v_1	1.761	1.155	2.068
4. All-values + Entry $Pr[win]$ reflects τ_1, N_1	8	v_1	1.692	1.748	6.145
Unit-Passthrough		v_1	1.779	1	1

- Optimal bids are not equilibrium outcomes
- Estimate equilibrium markups à la Li et al. (2000)
- $\varepsilon^b_{1-\tau} > 1$ due to tax effect on information rents i.e. $\varepsilon^\mu_{1-\tau} > 1$

Intuition for Passthrough: How does τ affect μ?

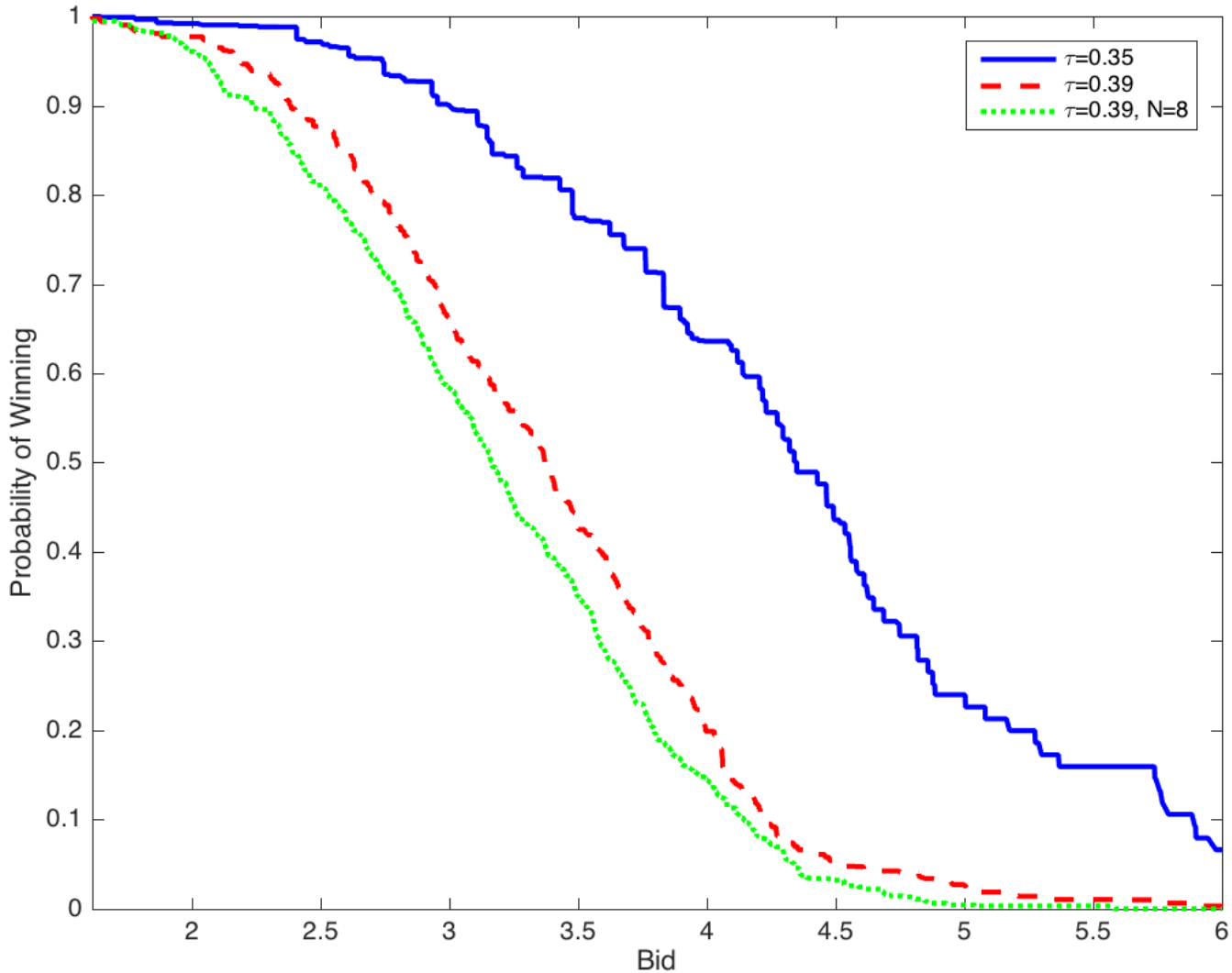
- What determines $\varepsilon^{\mu}_{1-\tau}$?
  1. Probability of winning (decreased by entry)
  2. Slope of the probability of winning (increased by compression of distribution)
     - Consistent with Babina et al (2015)

- Provide nonparametric evidence of these effects by estimating:

$$\Pr[\widehat{b_{-i} > b}|N, X] = \frac{\sum_j \frac{1}{n} \mathrm{I}(b_j > b) K\left(\frac{X_j - X}{h_X}\right)}{\sum_j K\left(\frac{X_j - X}{h_X}\right)}$$

  - j is an indicator for each auction
  - $\mathrm{I}(b_j > b)$ is an indicator that b is below all bids in auction j
  - $K(\cdot)$ is triweight kernel
  - X includes N, τ, and maturity

Nonparametric Estimates: Probability of Winning (N=6)



N=4,8,10

Average Effects of Counterfactual Policy Reform

(a) Bids and markups simulated on sample data for different policies

	(1)	(2) Trump	(3) Obama	(4) No Federal Exclusion	(5) No State Exclusion	(6) No SALT	(7) TCJA17
	$\alpha = 1$	$\alpha = 0.96$	$\alpha = 0.73$	$\alpha = 0$			$\alpha = 0.96$
Winning Bid							
Partial	1.91	1.96	2.27	3.03	2.10	1.83	1.88
Full	1.91	2.00	2.50	3.64	2.21	1.79	1.86
Markups							
Partial	0.18	0.19	0.26	0.62	0.22	0.17	0.08
Full	0.18	0.22	0.52	1.58	0.35	0.15	0.07

(b) Percentage change from $\alpha = 1$

	(1) Trump	(2) Obama	(3) No Federal Exclusion	(4) No State Exclusion	(5) No SALT	(6) TCJA17
	$\alpha = 0.96$	$\alpha = 0.73$	$\alpha = 0$			$\alpha = 0.96$
Winning Bid						
Partial	2.56%	18.56%	58.59%	9.61%	-4.57%	-1.81%
Full	4.32%	30.65%	90.42%	15.76%	-6.36%	-2.54%
Markups						
Partial	4.65%	40.67%	240.21%	21.30%	-8.07%	-3.50%
Full	20.34%	185.28%	766.71%	92.00%	-20.47%	-9.49%

Are Tax Advantages for Muni Bonds Efficient?

- Consider Obama proposal of limiting exemption to 28%...
- Average borrowing costs rise by 30.6%
- Implies additional $38 billion in interest payments by state and local governments
- Reduces Fed tax expenditures by $135 billion over decade ($\approx (1 - 0.73) \times \$500$), or $13.5 billion/year
- For every $1 $\downarrow$ in Federal tax expenditures, state and local governments' interest payments rise by $2.8

Conclusions

- Huge tax expenditure/subsidy:
  - Bigger than expenditures on unemployment insurance, policing, and workers' compensation.
- Tax break for the "1%-ers," a "loop-hole"
- But because it encourages competition to underwrite the bonds it reduces markups, information rents
- The frequent proposals to reduce or eliminate the tax advantage would result in inefficiencies
- Other policies that aim to increase competition in these auctions would likely be beneficial

EXTRA SLIDES

Effect of Effective Rate on Winning Bid

Estimating equation: $b_{1ist} = \beta\tau_{st} + \alpha_s + \eta_t + X_{ist}\Gamma + \varepsilon_{ist}$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Unconditional Effect of Effective Rate on Bid										
Effective Rate	-6.519	-6.659	-6.687	-6.215	-6.559	-6.698	-6.695	-6.517	-6.655	-6.738
	(2.655)	(2.885)	(2.595)	(3.505)	(2.749)	(2.920)	(2.710)	(2.723)	(2.918)	(3.224)
	0.018	0.025	0.013	0.082	0.021	0.026	0.017	0.021	0.027	0.042
Observations	14,631	14,613	14,631	14,631	14,631	14,631	14,631	14,631	14,613	14,613
Median Bid	221.200	221.010	221.200	221.200	221.200	221.200	221.200	221.200	221.010	221.010
Median τ	40.790	40.790	40.790	40.790	40.790	40.790	40.790	40.790	40.790	40.790
Unconditional Elast. at the Median	1.745	1.784	1.790	1.664	1.756	1.793	1.792	1.745	1.783	1.805
Base	Y		Y	Y	Y	Y	Y	Y	Y	Y
Structural Model		Y							Y	Y
Bidder FE			Y						Y	Y
Issuer FE				Y					Y	Y
Unemp Rate					Y				Y	Y
GDP						Y			Y	Y
State Spending							Y		Y	Y
State Transfers								Y	Y	Y
Political Party										Y
Pers. Tax Base										Y
Sales Tax										Y
Bus.&Prop. Taxes										Y

Back

Effect of Effective Rate on Winning Bid

Estimating equation: $b_{1ist} = \beta\tau_{st} + \alpha_s + \eta_t + X_{ist}\Gamma + \varepsilon_{ist}$

	(1)	(2)	(3)	(4)
Unconditional Effect of Effective Rate on Bid				
Effective Rate	-6.806	-6.529	-6.834	-6.617
	(2.244)	(2.187)	(2.224)	(2.176)
	0.003	0.003	0.002	0.003
1-Year Swap Rate		14.630		11.243
		(4.548)		(4.582)
		0.001		0.015
SIFMA VRDO Interest Rate			9.137	7.855
			(1.308)	(1.228)
			0.000	0.000
Observations	14,631	14,631	14,631	14,631
Median Bid	221.2	221.2	221.2	221.2
Median Effective Rate	40.79	40.79	40.79	40.79
Elasticity (Median)	1.822	1.748	1.829	1.771
	(0.601)	(0.585)	(0.595)	(0.583)
	0.002	0.003	0.002	0.002
All Base Controls	Y	Y	Y	Y

- 1-Year Swap Rate is the Payer's cost to receive the 3-month LIBOR
- SIFMA Interest Rate is 7-day, AAA rated muni debt interest rate annualized

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Effect of Effective Rate on Winning Bid: Robustness

Estimating equation: $b_{1ist} = \beta\tau_{st} + \alpha_s + \eta_t + X_{ist}\Gamma + \varepsilon_{ist}$

	(1)	(2)	(3)	(4)	(5)	(6)
Unconditional Effect of Effective Rate on Bid						
Effective Rate	-6.531	-6.347	-6.721	-6.394	-6.607	-5.486
	(2.527)	(2.445)	(2.529)	(2.849)	(2.564)	(2.442)
	0.010	0.010	0.008	0.025	0.010	0.025
Observations	14,631	14,631	14,631	14,631	14,165	14,631
Median Bid	221.2	221.2	221.2	221.2	217.9	221.2
Median Effective Rate	40.79	40.79	40.79	29.15	40.79	39.62
Elasticity (Median)	1.748	1.699	1.799	2.048	1.795	1.497
	(0.677)	(0.654)	(0.677)	(0.912)	(0.697)	(0.667)
	0.010	0.009	0.008	0.025	0.010	0.025
Primary Controls	Y	Y	Y	Y	Y	Y
Muni Market and Swap Price Controls		Y				
Callable Controls			Y			
90^{th} Percentile Income Tax Rate				Y		
States and State Agencies Excluded					Y	
Federal Tax Rate Held Constant						Y

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Effect of Effective Rate on Winning Bid: Potential Biases

- Suppose an omitted variable Z has effect δ on bids and is "true" driver of effect
- Bias in estimate would be:

$$b = \underbrace{\beta}_{<0} + \frac{\mathbb{C}ov(Z,\tau)}{\mathbb{V}ar(\tau)}\delta$$

- Examples:
  - Negative Budget Shock. $\frac{\mathbb{C}ov(Z,\tau)}{\mathbb{V}ar(\tau)} > 0$ and $\delta > 0 \Longrightarrow b \to 0$
  - Positive Rating Shock. $\frac{\mathbb{C}ov(Z,\tau)}{\mathbb{V}ar(\tau)} < 0$ and $\delta < 0 \Longrightarrow b \to 0$

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Effect of τ On Number of Auctions

	Frequency		ln(Frequency)	
	(1)	(2)	(3)	(4)
Effective Rate	1.853	1.816	0.001	0.005
	(10.136)	(10.020)	(0.087)	(0.088)
	0.856	0.857	0.989	0.957
Observations	400	400	382	382
R^2	0.984	0.984	0.958	0.958
Dependent Var. Mean	101.885	101.885	3.338	3.338
Effective Rate Mean	39.962	39.962	39.884	39.884
Elasticity of Supply at Mean	1.092	1.070	0.047	0.187
	(5.973)	(5.904)	(3.481)	(3.499)
	0.855	0.856	0.989	0.957
Year Fixed Effects	Y	Y	Y	Y
State Fixed Effects	Y	Y	Y	Y
State Policy Controls		Y		Y

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Oster Coefficient Stability Tests

	(1)	(2)	(3)
	Table 2, (1)	Table 2, (1)	Table 2, (5)
Effective Rate	-6.531	-6.531	-6.806
	(2.527)	(2.527)	(2.244)
	0.010	0.010	0.003
R^2	0.898	0.898	0.899
	Table 2, (5)	Table 12, (10)	Table 12, (10)
Effective Rate	-6.806	-6.738	-6.738
	(2.244)	(2.218)	(2.218)
	0.003	0.003	0.003
R^2	0.899	0.953	0.953
Observations	14,631	14,613	14,613
δ such that $\beta^* = 0$	$[< 0]$	$[< 0]$	113.424
Corrected β^*	-34.614	-6.915	-6.679

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Effect of Effective Rate on Potential Bidders

Estimating equation: $N_{ist} = \beta\tau_{st} + \alpha_s + \eta_t + X_{ist}\Gamma + \varepsilon_{ist}$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Effect of Effective Rate on *N*										
Effective Rate	0.561	0.523	0.547	0.636	0.561	0.554	0.563	0.544	0.563	0.519
	(0.128)	(0.130)	(0.116)	(0.180)	(0.129)	(0.094)	(0.129)	(0.083)	(0.084)	(0.099)
	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Observations	14,631	14,613	14,631	14,631	14,631	14,631	14,631	14,631	14,613	14,613
Median Bid	221.200	221.010	221.200	221.200	221.200	221.200	221.200	221.200	221.010	221.010
Median τ	40.790	40.790	40.790	40.790	40.790	40.790	40.790	40.790	40.790	40.790
Base	Y		Y	Y	Y	Y	Y	Y	Y	Y
Structural Model		Y							Y	Y
Bidder FE			Y						Y	Y
Issuer FE				Y					Y	Y
Unemp Rate					Y				Y	Y
GDP						Y			Y	Y
State Spending							Y		Y	Y
State Transfers								Y	Y	Y
Political Party										Y
Pers. Tax Base										Y
Sales Tax										Y
Bus.&Prop. Taxes										Y

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Effect of Effective Rate on Potential Bidders

Robustness to Definition of N

	(1)	(2)	(3)	(4)	(5)
Effect of Effective Rate on Number of Bidders					
Effective Rate	0.363	0.345	0.335	0.340	0.315
	(0.094)	(0.099)	(0.109)	(0.111)	(0.098)
	0.000	0.001	0.003	0.004	0.002
Effect of Effective Rate on *N* (Definition 1)					
Effective Rate	0.561	0.554	0.542	0.550	0.547
	(0.128)	(0.133)	(0.148)	(0.149)	(0.128)
	0.000	0.000	0.001	0.001	0.000
Effect of Effective Rate on *N* (Definition 2)					
Effective Rate	1.373	1.413	1.411	1.467	1.345
	(0.416)	(0.403)	(0.420)	(0.403)	(0.366)
	0.002	0.001	0.002	0.001	0.001
Year Fixed Effects	Y	Y	Y	Y	Y
State Fixed Effects	Y	Y	Y	Y	Y
Maturity and Size Controls	Y	Y	Y	Y	Y
Quality and Refund Controls	Y	Y	Y	Y	Y
Political Party Controls		Y	Y	Y	Y
Personal Income Tax Base Controls			Y	Y	Y
Sales Tax Controls				Y	Y
Business and Property Tax Controls					Y

- N (Definition 1): number of unique bidders across similar auctions in a given state and month
- N (Definition 2): number of unique bidders across all auctions in a given state and month

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Effect of Effective Rate on Winning Bid Controlling for Potential and Actual Bidders

Estimating equation: $b_{1ist} = \beta\tau_{st} + \alpha_s + \eta_t + X_{ist}\Gamma + \varepsilon_{ist}$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Conditional Effect of Effective Rate on Bid										
Effective Rate	-4.673	-4.704	-4.886	-4.505	-4.699	-4.838	-4.812	-4.734	-5.111	-5.475
	(2.614)	(2.895)	(2.533)	(3.242)	(2.732)	(2.843)	(2.669)	(2.822)	(3.142)	(3.410)
	0.080	0.111	0.060	0.171	0.092	0.095	0.078	0.100	0.110	0.115
Observations	14,631	14,613	14,631	14,631	14,631	14,631	14,631	14,631	14,613	14,613
Median Bid	221.200	221.010	221.200	221.200	221.200	221.200	221.200	221.200	221.010	221.010
Median τ	40.790	40.790	40.790	40.790	40.790	40.790	40.790	40.790	40.790	40.790
Conditional Elast.	1.251	1.260	1.308	1.206	1.258	1.295	1.288	1.267	1.369	1.467
at the Median	(0.700)	(0.775)	(0.678)	(0.868)	(0.731)	(0.761)	(0.715)	(0.755)	(0.842)	(0.914)
	0.074	0.104	0.054	0.165	0.085	0.089	0.071	0.093	0.104	0.108
Base	Y		Y	Y	Y	Y	Y	Y	Y	Y
Structural Model		Y							Y	Y
Bidder FE			Y						Y	Y
Issuer FE				Y					Y	Y
Unemp Rate					Y				Y	Y
GDP						Y			Y	Y
State Spending							Y		Y	Y
State Transfers								Y	Y	Y
Political Party										Y
Pers. Tax Base										Y
Sales Tax										Y
Bus.&Prop. Taxes										Y

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