The Option Value of Municipal Liquidity: Evidence from Federal Lending Cutoffs during COVID-19

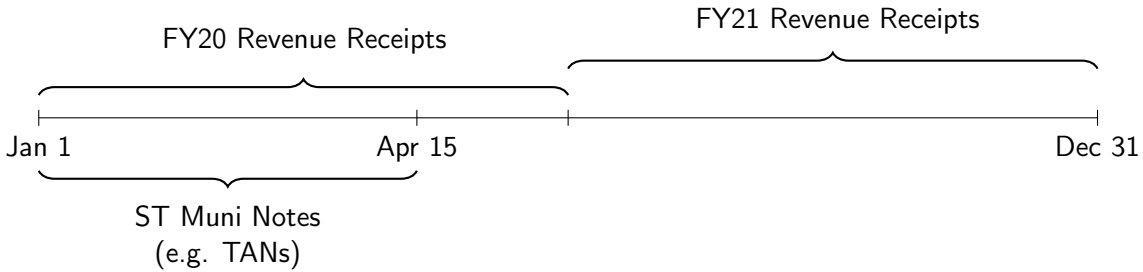
Andrew Haughwout, Ben Hyman, Or Shachar

Federal Reserve Bank of New York

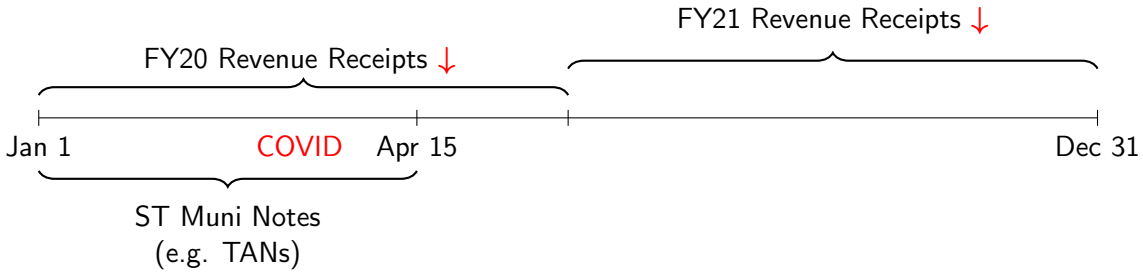
July 12, 2021

Brookings Annual Municipal Finance Conference

Motivation (1): COVID-19 Effects on State & Local Budgeting

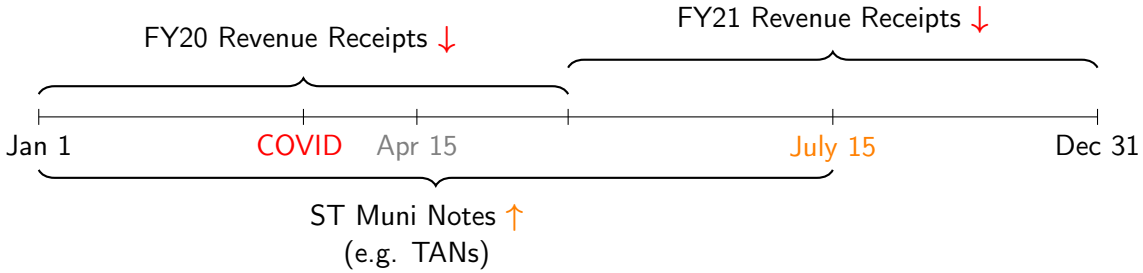


Motivation (1): COVID-19 Effects on State & Local Budgeting



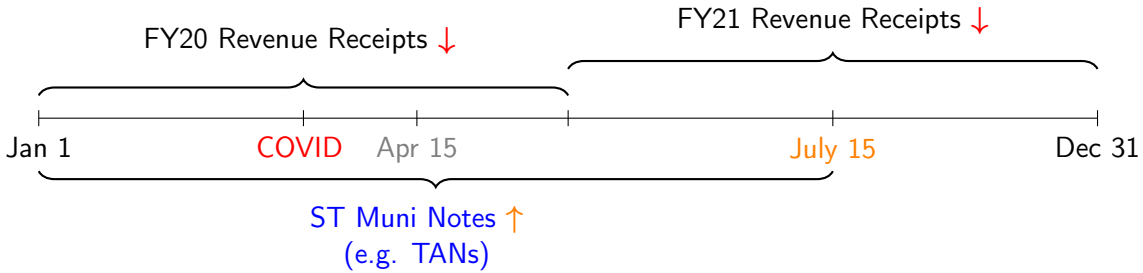
- Shutdowns induced unexpected income shock → *Decline* in Revenue & Assessments

Motivation (1): COVID-19 Effects on State & Local Budgeting



- Shutdowns induced unexpected income shock → *Decline* in Revenue & Assessments
- Federal tax deadline extension to July 15 → *Delay* in Revenue ($Q^s_{STmunis} \uparrow$)

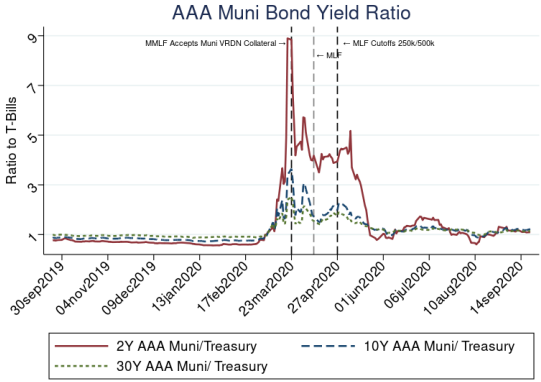
Motivation (1): COVID-19 Effects on State & Local Budgeting

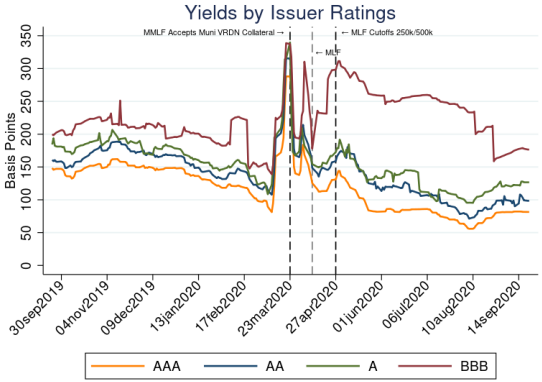


- Shutdowns induced unexpected income shock → *Decline* in Revenue & Assessments
- Federal tax deadline extension to July 15 → *Delay* in Revenue ($Q^s_{STmunis} \uparrow$)
- Investor flight to liquidity and quality → *Frozen* muni mrkts ($Q^d_{STmunis} \to 0$)

Motivation (2): Muni Market Turmoil by Tenor & Credit Rating

- ST & LT yields spiked with crisis: (1) investor sell-off for liquidity; (2) illiquid positions required compensation for uncertain credit downgrade risk $\rightarrow$ both costly for new issuance

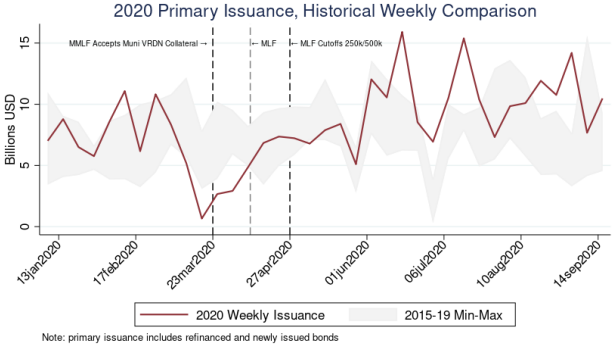


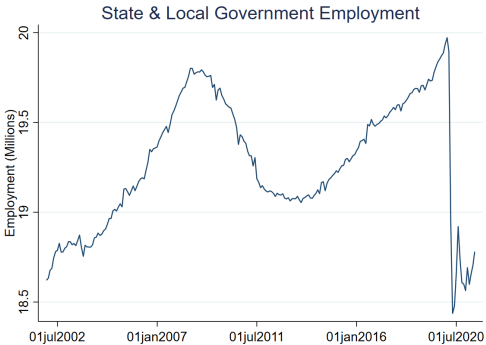


Source: Bloomberg, originally calculated in Cipriani et al. (June, 29, 2020)

Motivation (3): Muni Market Turmoil and the Real Economy

- New primary issuance came to historical standstill, mirroring secondary market pricing before mean reverting. Public sector employment dropped sharply, and remained low.





Source: *Left:* Bloomberg, originally calculated in Cipriani et al. (June, 29, 2020); *Right:* CES (FRED), Seasonally Adjusted through May '21

This Paper: Option Value of Municipal Liquidity

- **Research Questions:**
  1. *Program Evaluation:* Did the Municipal Liquidity Facility (MLF) help restore muni market liquidity, and to what extent did this impact S&L gov. issuance and hiring (recall) decisions?
  2. *Academic:* Can we learn the extent to which municipalities are liquidity vs. credit constrained by randomly providing liquidity option to differently rated issuers when distressed?
     - Neutral response across the ratings distribution $\implies$ relaxed liquidity constraint
     - Greater response lower on distribution $\implies$ additional credit-risk sharing channel

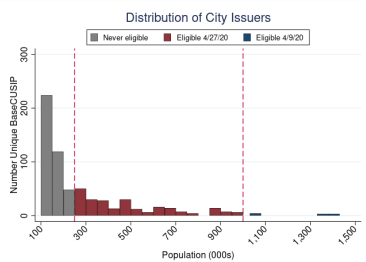
This Paper: Option Value of Municipal Liquidity

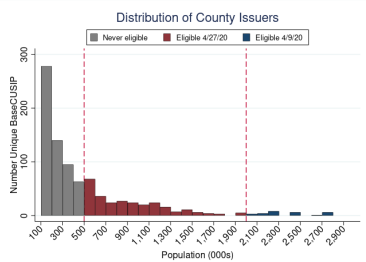
- **Research Questions:**
  1. *Program Evaluation:* Did the Municipal Liquidity Facility (MLF) help restore muni market liquidity, and to what extent did this impact S&L gov. issuance and hiring (recall) decisions?
  2. *Academic:* Can we learn the extent to which municipalities are liquidity vs. credit constrained by randomly providing liquidity option to differently rated issuers when distressed?
     - Neutral response across the ratings distribution $\implies$ relaxed liquidity constraint
     - Greater response lower on distribution $\implies$ additional credit-risk sharing channel
- **Methodology:**
  - Estimate **option value of access** to Municipal Liquidity Facility (MLF) by ratings bin using lending eligibility cutoffs in regression discontinuity—cities>250k, counties>500k
    - Bond yield effects estimate *investor-perceived* value of last-resort lending
    - Public sector hiring effects reflect *government-perceived* value of last-resort lending

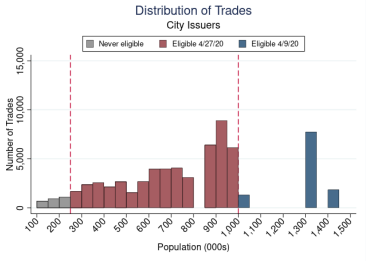
Background: 3 Key Muni Market Interventions in 2020

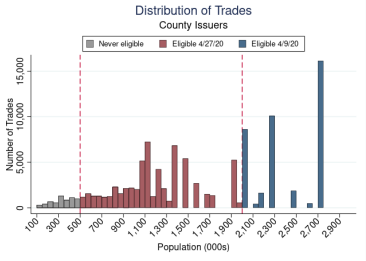
- **March 23:** Money Market Mutual Fund Liquidity Facility (MMLF) expands to include municipal variable rate demands note (VRDN) collateral after record muni outflows ($45b sell-off)
  - IRS filing extension (March 21); CARES (March 27, included similar direct aid cutoffs)
- **April 9:** Municipal Liquidity Facility (MLF) announced with $35b UST initial equity investment (appropriated through CARES act) as backstop for max $500b lending of *short-term* muni notes (TANs, RANs, TRANs, BANs) for cash flow management (13(3) Special Purpose Vehicle)
  - Eligible issuers include states, cities $>$ 1m pop, counties $>$ 2m in pop, under 2-yr maturities priced at penalty to private mkt index by rating. "Downstreaming" permitted, but limited by state legislative approval and borrowing caps.
- **April 27:** MLF eligibility expanded to **cities** $>$ **250k** pop, **counties** $>$ **500k** pop, up to 3-yr maturities, minimum pre-COVID and at-issuance rating by issuer type, thorough Dec 31, 2020
  - *Extensions:* MLF pricing grid announced (May 11); expansion to 2 revenue bond issuers (RBIs) and 2 additional cities/counties per state (June 3); pricing grid lowered (Aug 11)

MLF Cutoffs: Chosen to "Prioritize Speed to Announcement and Execution"









McCrary/Fransden

Data: Linking MSRB Trades and QCEW to Census Populations

- **Data linking steps:**
  1. Bloomberg issuer lists by gov type (city/county), including issuer name, 6-digit BaseCUSIP
  2. MSRB secondary market active trades: yields, prices, issuer names; Mergent bond characteristics and untraded primary issuance (linked by 9-digit CUSIP)
  3. Census Bureau populations to determine MLF-eligibility: issuer names and populations (cities: '18; counties: '19); involved cleaning for places $<$ 50,000 population
  4. S&P, Moody's, Fitch, Bb monthly bond ratings (aggregated to issuer w/ plurality rules)
  5. QCEW monthly local government employees by county (May '21 revision)

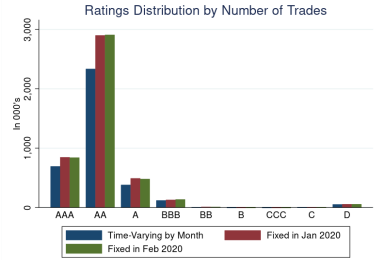
Data: Linking MSRB Trades and QCEW to Census Populations

- **Data linking steps:**
  1. Bloomberg issuer lists by gov type (city/county), including issuer name, 6-digit BaseCUSIP
  2. MSRB secondary market active trades: yields, prices, issuer names; Mergent bond characteristics and untraded primary issuance (linked by 9-digit CUSIP)
  3. Census Bureau populations to determine MLF-eligibility: issuer names and populations (cities: '18; counties: '19); involved cleaning for places $<$ 50,000 population
  4. S&P, Moody's, Fitch, Bb monthly bond ratings (aggregated to issuer w/ plurality rules)
  5. QCEW monthly local government employees by county (May '21 revision)

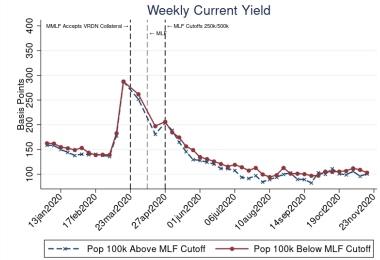
- **After sample restrictions:**
  - City/County Linked Yields Sample: Jan 1, 2019 to Nov 20, 2020 (full sample)
    - 2,857,105 trades, 195,926 bonds, 8,042 unique issuers
  - Smallest Yields Subset (Low-rated (A & BBB) city/county, post-MLF):
    - 94,104 trades, 7,207 bonds, 758 issuers; 8.3% bonds within 100k of cutoff

Variation in City/County Yields by Ratings, 100k around Cutoff

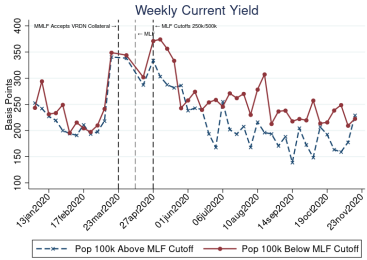
Ratings dist:



High-Rated (AAA & AA):



Low-Rated (A & BBB):



- Stronger effects for low rated (max 100bp spread!); strongest for BBB A vs. BBB Issuer List
- Low-rated *eligible* decline mimics high-rated recovery; *ineligible* tracks agg. BBB distress
- These yields largely comprise LT bonds $\implies$ ST to LT transmission; **how?**
  - One channel: ST notes applied to GO debt servicing if operating budget statutorily fungible

Regression Discontinuity Design around MLF Eligibility Cutoff

$$Y_{n(bi)t} = \alpha + \beta_t * \mathbb{1}(pop \geq cutoff)_i + \gamma_t * (pop - cutoff)_i + \delta_t * \mathbb{1}(pop \geq cutoff)_i (pop - cutoff)_i + \mathbf{X}_{bit} + \varepsilon_{n(bi)t} \quad (1)$$

- Y $\in$ {yields, Pr(primary issuance), Pr(credit downgrade), Δ **public sector employment**}
- Sample $\in$ {cities, counties, pooled} x {High-Rated (Jan 2020), Low-Rated (Jan 2020)}
- Trade n, Bond b, Issuer i, period $t \in$ {pre-23mar20; post-27apr20; dynamic (bi-weekly)}
- 2-sided IMSE optimal bandwidth selection with triangular kernel and non-parametric first order polynomial (Calonico et al., 2014). Allows for precision controls (X): preferred specification has state & month FEs, but not required. IMSE Simulation Kernel Weights
- For employment outcomes, **differenced RD design** to overcome data limitations

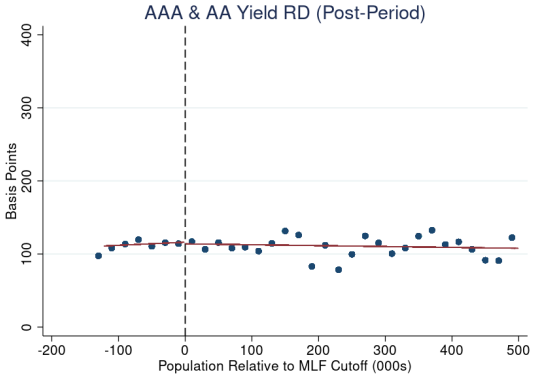
RD Effects Constrained to Low-Rated Issuers

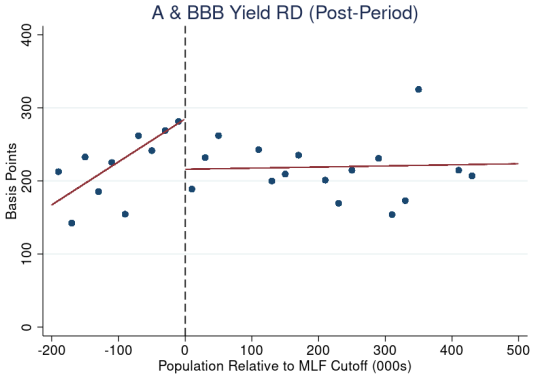
	Discontinuity	Standard Error	Control Mean	N (IMSE-bwdth)
a. Pooled Post:				
Current Yield (Overall)	-19.26	19.51	156.77	187,976
City Only	-27.97	25.59	172.03	91,628
County Only	-15.06	23.74	134.06	53,874
High-Rated (AAA & AA)	-1.54	7.66	124.97	178,256
Low-Rated (A & BBB)	-72.28**	33.05	305.73	38,299
b. Pooled Pre (Placebo):				
Current Yield (Overall)	-13.25	12.17	194.13	70,569
City Only	-9.13	12.16	196.30	32,853
County Only	-21.61	19.17	191.88	28,325
High-Rated (AAA & AA)	-6.15	7.86	177.44	67,169
Low-Rated (A & BBB)	-24.87	21.45	263.11	12,756

Effects on current yields (in b.p.), pooled in pre and post periods by subgroup. RD estimates from MSRB active trades, Jan 1 2020 - Nov 20 2020. Each row corresponds to separate regression with yield as dep. variable, and state and month FEs. Standard errors clustered by population relative to cutoff. Control Mean is value just left of relative population 0. IMSE-optimal bandwidths calculated separately on each side of cutoff with triangular kernel weights. Sample sizes vary with bandwidth. *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$.

Balance Table Sensitivity to Controls

Yields RD Plots Over Running Variable, by Ratings



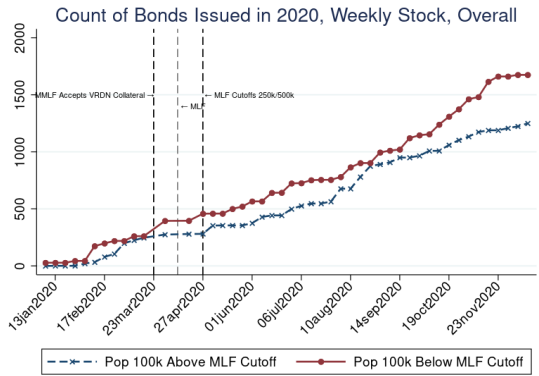


- Plots are nearly invariant to composition controls: GO/RB, Refi, tax-adjustment method, maturity size, amt outstanding, tenor length, remaining duration.

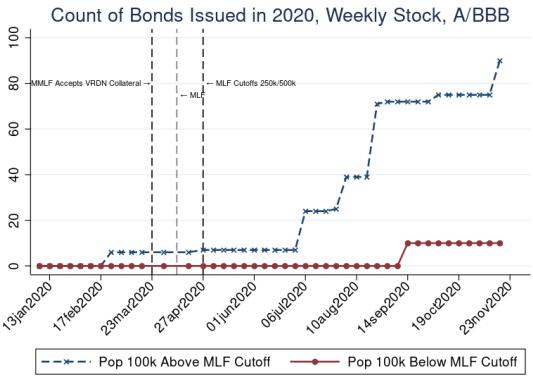
Dynamic RDs Placebo RDs

Effects on Cumulative Primary Issuance

(a) Cumulative New Issuance Overall



(b) Cumulative New Issuance, A & BBB

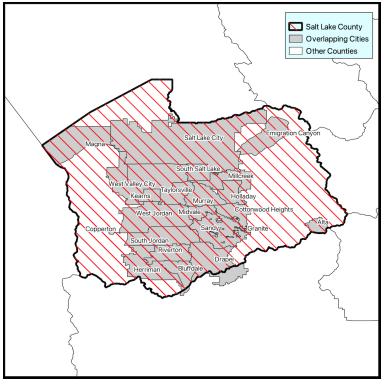


- Only 5 A/BBB issuers in post, but stat. significant and consistent sign w/ yields
- Secondary Mrkt LT Yields → Primary Mrkt New Issuance

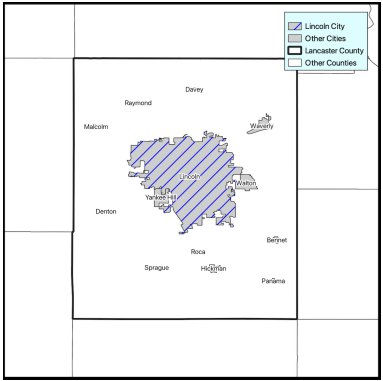
New Issue Seasonality | Shares | RD Table

First Difference Modification for Employment RD Effects

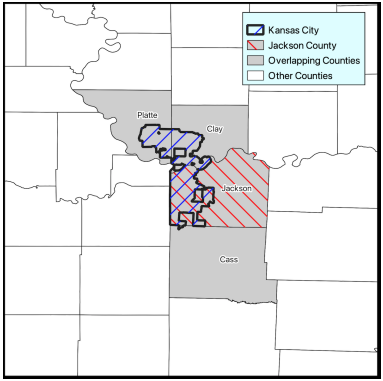
(a) County-Only: Salt Lake Cnty, UT



(b) City-Only: Lincoln, NE



(c) Both: KC & Jackson Cnty, MO



- We exclude type (b) counties, compare (a) & (c) vs. neither-treated types (not shown)
- To extent that this breaks RD randomization, we focus on year-on-year first differences

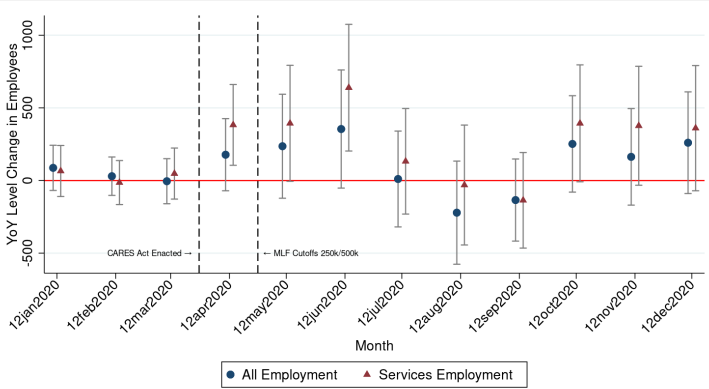
RD Effects on Public Sector Employment

	Emp. (1)	Emp. (2)	Δ Emp. (3)	Δ Emp. (4)	% Δ Emp. (5)	% Δ Emp. (6)	N (fixed-bwdth)
a. Pooled Post:							
Overall Employment	-477	323	325	297	1.19	1.18	945
	(1,016)	(1,854)	(239)	(223)	(0.96)	(0.83)	
– Goods Employment	-42	-49	1	2	2.61	3.93	248
	(63)	(37)	(5)	(5)	(3.85)	(4.27)	
– Services Employment	-412	-666	422*	517**	1.61	1.69**	711
	(1,134)	(2,001)	(238)	(242)	(1.00)	(0.85)	
b. Pooled Pre (Placebo):							
Overall Employment	-828	189	53	58	0.23	0.26	946
	(1,042)	(1,995)	(84)	(82)	(0.41)	(0.37)	
– Goods Employment	-44	-51	-1	-1	-0.38	0.51	248
	(64)	(38)	(3)	(3)	(2.23)	(2.76)	
– Services Employment	-762	-896	41	26	0.10	0.04	712
	(1,128)	(2,188)	(98)	(93)	(0.50)	(0.41)	
Month FEs		X					
State FEs		X		X		X	
Control Mean (post): Overall Employment	18,835	13,346	-1,717	-1,259	-8.06	-8.13	
Control Mean (post): Goods Employment	162	127	-7	-5	-6.44	-7.16	
Control Mean (post): Services Employment	18,506	14,054	-1,674	-1,349	-7.96	-8.58	

- *Post:* May & June; *Pre:* Jan & Feb; Control mean = mean emp. loss just left of cutoff

RD Plots

RD Employment Effects by Month

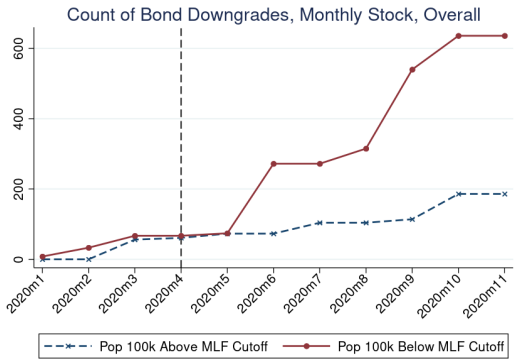


- School-year effects pattern: *Education and Health Services* recalls despite shutdowns
- Sustained in the long run, but only for *high* rated governments $\implies$ over-cautious furloughs By Ratings
- April 12 effects point to CARES not MLF; further supported by:
  (1) Decomposition Test; (2) Yields RD at MLF-only cutoff; (3) Employment RD at MLF-only cutoff

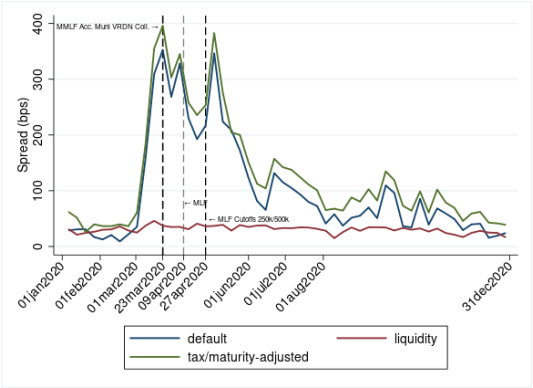
Credit-Risk Sharing Mechanism

- Yields respond to MLF access lower on credit-rating distribution. Did crisis induce greater downgrade and/or default uncertainly? Did MLF implicitly share credit risk? Two tests:

(a) Cumulative Downgrades Overall



(b) Default-Liquidity Decomposition



Discussion and Remaining Puzzles

Findings:

1. Improved overall market functioning (yields decline) in response to interventions
2. MLF-eligible credit-risk sharing "explains" aggregate LT wedge between BBB's & high-rated
3. Some evidence that MLF induced new debt issuance and prevented credit risk downgrades
4. Large S&L employee recalls (25%-30%): suggestive evidence mostly through CARES not MLF

Discussion:

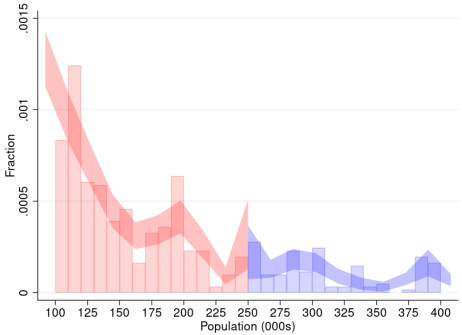
- Muni market outcomes likely would have been worse absent MLF
- High government hiring response to emergency funding during school shutdowns, and among the least distressed, consistent with S&L govs. overly-cautious with furloughs (Sheiner, 2021)
- Why only \$6.56b (Illinois x2 & MTA x2) of \$500b taken up; why strongest effects for low-rated?
  - Further work needed to determine whether high penalty and/or non-linear MLF pricing grid across ratings incentivized lower rated issuers and issuance. Pricing Grid

Appendix

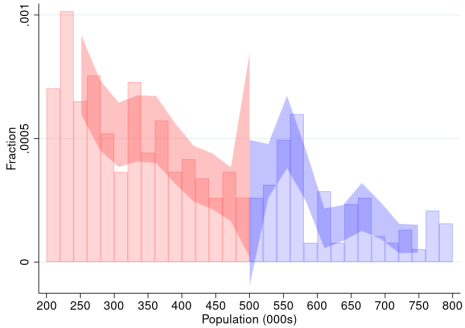
Manipulation Tests

- McCrary (2008) tests using Cattaneo et al. (2019) local polynomial density method:

(a) City Issuers:



(b) County Issuers:

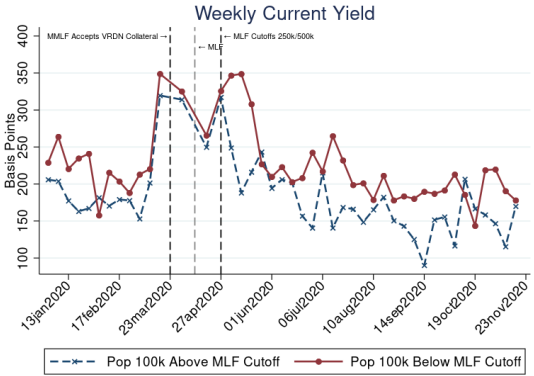


- Fransden (2017) discrete running variable p-values: 0.967 (cities) and 0.388 (counties).

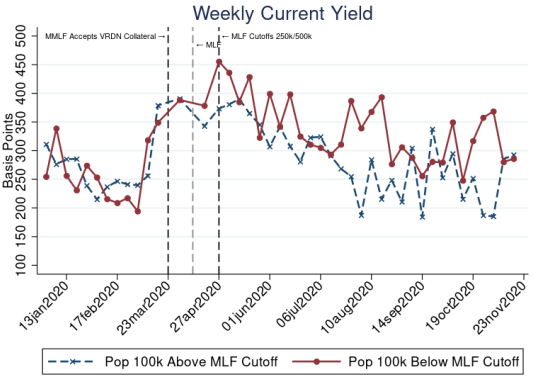
Back

Separate Means for A and BBB-Rated Bonds

(a) A-Rated Issuers in Jan 2020:



(b) BBB-Rated Issuers in Jan 2020:



Back

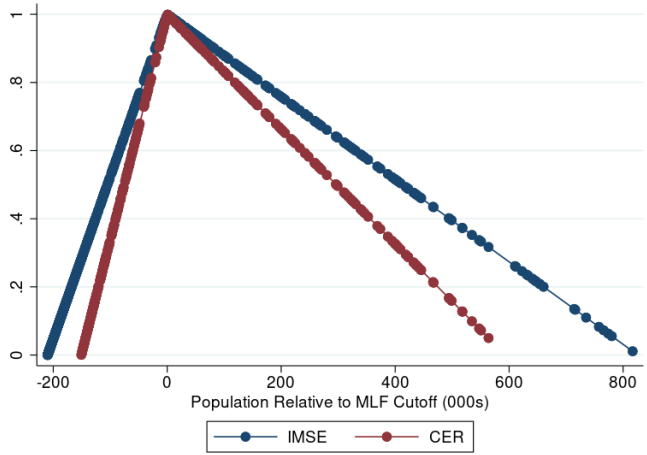
Low-Rated Issuers (A/BBB) within 100k of MLF Cutoff

Issuer Name	State	Issuer Type	No. CUSIPs	MLF
Newark (1)	NJ	Local	89	1
Newark (2)	NJ	Local	8	1
Buffalo	NY	Local	81	1
Toledo	OH	Local	73	1
Irvine (1)	CA	Local	37	1
Irvine (2)	CA	Local	35	1
Reno	NV	Local	27	1
St. Paul	MN	Local	25	1
St. Louis (1)	MO	Local	22	1
St. Louis (2)	MO	Local	6	1
Reno (1)	NV	Local	16	1
Reno (2)	NV	Local	1	1
Summit County (1)	OH	County	58	1
Summit County (2)	OH	County	13	1
Lincoln	NE	Local	9	1
Montgomery County	OH	County	8	1
Pasco County	FL	County	4	1
Volusia County	FL	County	2	1
Riverside	CA	Local	1	1
Anne Arundel County	MD	County	1	1

Back

Issuer Name	State	Issuer Type	No. CUSIPs	MLF
Providence (1)	RI	Local	15	0
Providence (2)	RI	Local	5	0
North Las Vegas (1)	NV	Local	34	0
North Las Vegas (2)	NV	Local	7	0
Shreveport	LA	Local	31	0
Lucas County	OH	County	29	0
Irving	TX	Local	28	0
Little Rock	AR	Local	10	0
Hollywood	FL	Local	9	0
Macon Bibb County	GA	Local	8	0
Overland Park	KS	Local	7	0
Escondido	CA	Local	4	0
Fontana	CA	Local	2	0
Modesto	CA	Local	2	0
Tacoma	WA	Local	2	0
Palmdale	CA	Local	1	0
Aurora	IL	Local	1	0
Pembroke Pines	FL	Local	24	0
Akron	OH	Local	22	0
Macon Bibb County	GA	Local	21	0
East Baton Rouge Parish	LA	County	20	0
Salinas	CA	Local	19	0
Cameron County	TX	County	14	0

Kernel Weights for Low-Rated Yield Estimation in Post Period



Back

RD Balance Test in Placebo Period (no controls)

	Discontinuity	Standard Error	Control Mean	N (IMSE-bwdth)
Coupon Rate (b.p.)	-23.37	17.53	435.36	99,073
Security Price (per 100 par)	-1.97	1.12	109.95	109,817
Current Yield (b.p.)	-6.13	16.23	185.81	70,569
Δ Yield (Feb20-Jan20)	-0.03	0.05	-0.10	66,349
Δ Yield YoY (Jan20-Jan19)	-0.23	0.20	-0.94	54,808
Δ Yield YoY (Feb20-Feb19)	0.04	0.11	-1.01	53,284
Amount Outstanding (MM)	-19.40	191.01	474.46	90,172
Maturity Size (MM)	11.99	268.49	708.56	88,918
Tenor of Bond (Years)	0.35	0.90	12.89	111383
Remaining Duration of Bond (Years)	-0.20	0.86	8.26	96,340
Market Share of Issuer	0.03	0.10	0.18	91,623
Number of Securities by Issuer	-29.78	43.29	228.10	129,872
Par Traded of Bond (1000s)	38.40	35.91	91.70	94,622
S&P Ratings (1-7 scale)	0.08	0.14	5.60	89,519
Moody's Ratings (1-7 scale)	0.13	0.18	5.72	87,454
Fitch Ratings (1-7 scale)	-0.03	0.17	5.69	74,930
Time of Day of Trade (minute)	10.62**	4.85	768.33	101,467

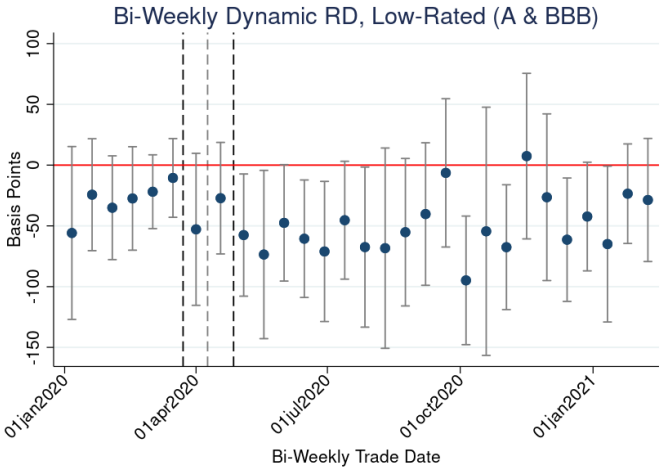
Back Baseline Summary Stats incl. 2019

Sensitivity to Controls, Effects on A/BBB Yields

	(1)	(2)	(3)	(4)	(5)	**(6)**	(7)	(8)	(9)	(10)	(11)	(12)
a. Pooled Post:												
Current Yield (Overall)	-9.88	-11.13	-11.24	-18.51	-16.17	**-19.26**	-20.60	-19.53	-19.97	-20.46	-21.15	-20.18
City Only	-13.26	-13.79	-13.85	-25.46	-24.38	**-27.97**	-30.63	-28.14	-27.13	-26.72	-25.74	-23.18
County Only	-19.81	-21.99	-21.95	-12.73	-11.11	**-15.06**	-12.79	-15.58	-13.69	-13.43	-15.46	-20.23
High-Rated (AAA & AA)	4.36	4.44	4.50	-1.06	0.43	**-1.54**	-2.97	-1.73	-1.37	-1.96	-7.77	-6.75
Low-Rated (A & BBB)	-121.90***	-121.27***	-121.06***	-69.87**	-69.78**	**-72.28****	-73.81**	-72.91**	-62.92*	-64.86**	-57.04*	-53.21*
b. Pooled Pre (Placebo):												
Current Yield (Overall)	-6.13	-6.81	-6.95	-14.59	-12.99	**-13.25**	-13.52	-14.64	-13.50	-13.61	-11.73	-11.23
City Only	-1.20	-1.31	-1.30	-8.12	-7.89	**-9.13**	-9.34	-10.92	-8.05	-7.89	-5.37	-4.91
County Only	-24.49	-26.48	-26.81	-24.05	-22.29	**-21.61**	-19.84	-19.46	-20.23	-20.42	-22.40	-24.29
High-Rated (AAA & AA)	1.68	1.85	2.16	-5.94	-5.10	**-6.15**	-6.66	-5.70	-5.76	-5.93	-7.11	-5.68
Low-Rated (A & BBB)	-56.58**	-54.88**	-54.90**	-21.62	-23.20	**-24.87**	-25.87	-31.43	-16.19	-18.88	-21.73	-20.54
Fed. Tax Adjust		X	X	X								
St. & Fed. Tax Adjust			X	X								
State FE				X	X	**X**	X	X	X	X	X	X
Month FE						**X**	X	X	X	X	X	X
Revenue/GO Bond							X					
Day/Week of Trade								X				
Maturity Size									X			
Amount Outstanding										X		
Tenor Length											X	
Duration												X
Sample Restrictions	X	X	X	X	X	**X**	X	X	X	X	X	X

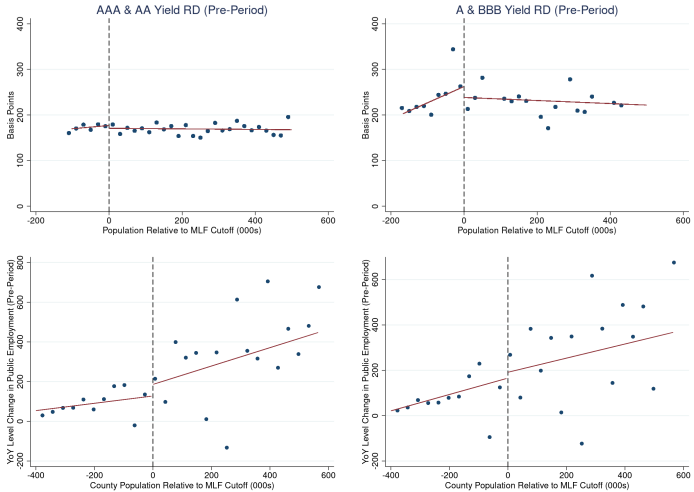
Back

RD Dynamic Effects on Yields



Back

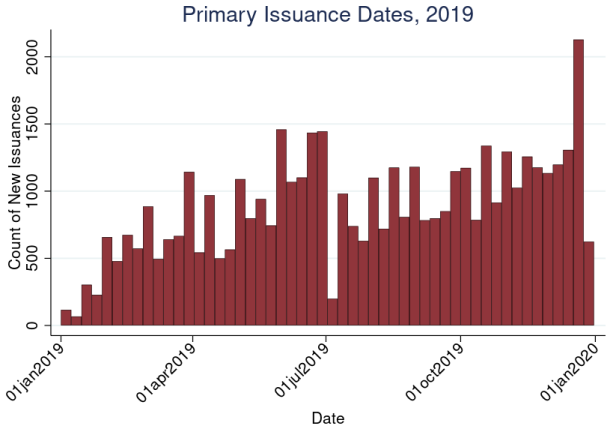
Yields and Employment Placebo RD Plots



Placebo period: Jan. 1 to Mar. 23, 2020

Back → Yield RD Back → Employment RD

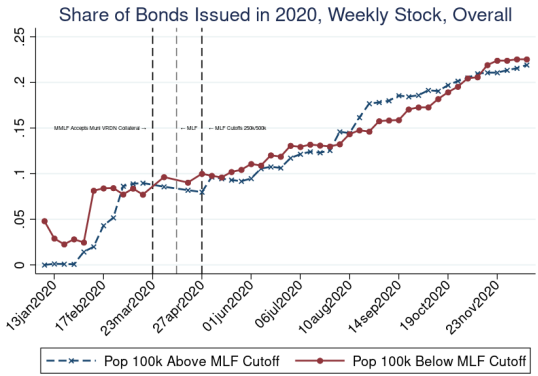
2019 Seasonality in Primary Issuance



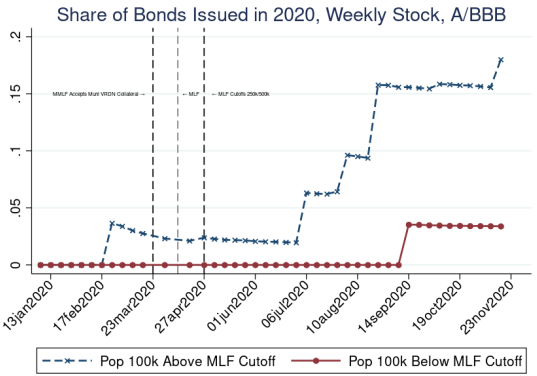
Back

RD Effects on Primary Issuance: Cumulative Shares

(a) Cumulative New Issuance Overall



(b) Cumulative New Issuance, A & BBB



- Note: imbalanced panel results in non-monotonicity increasing.

Back

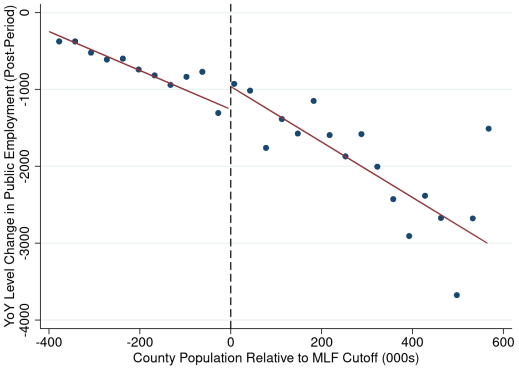
RD Effects on Primary Issuance Probability

	Discontinuity	Standard Error	Control Mean	N (Fixed-bwdth)
a. Pooled Post:				
Prob(CUSIP Issued in 27apr-20nov), Overall	0.08**	0.04	0.11	83,100
Prob(CUSIP Issued in 27apr-20nov), A & BBB	0.25**	0.11	-0.08	7,753
b. Pooled Pre (Placebo):				
Prob(CUSIP Issued in 01jan-23mar), Overall	0.07**	0.03	0.02	45,451
Prob(CUSIP Issued in 01jan-23mar), A & BBB	0.11	0.08	-0.10	3,977

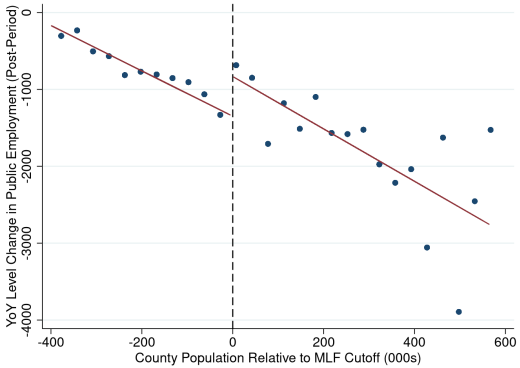
Back

Employment RD Plots

(a) Δ Overall Employment Post-MLF



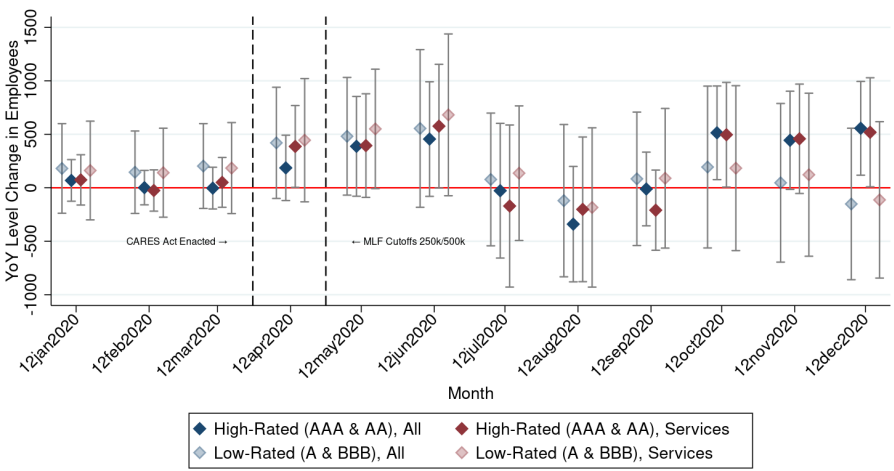
(b) Δ Services Employment Post-MLF



- May and June year-on-year estimates (2020 - 2019) pooled together here

Back Placebo RDs

RD Employment Effects by Month and Ratings

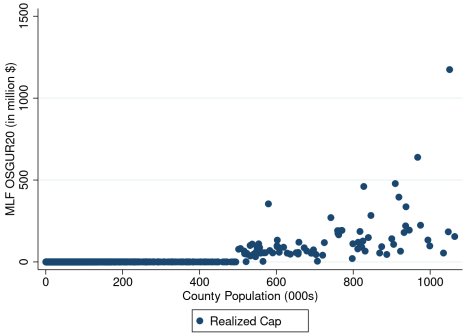


- LT effects sustained only for high-rated

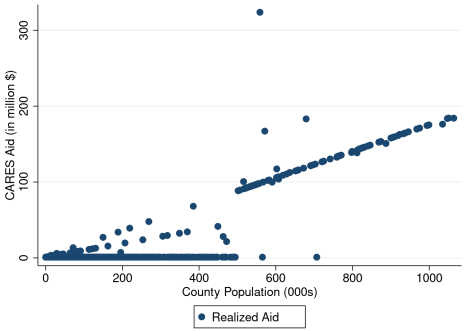
Back

MLF vs. CARES Dosage Response Decomposition: Realized Caps

(a) MLF Lending Caps (20% of OSGUR)

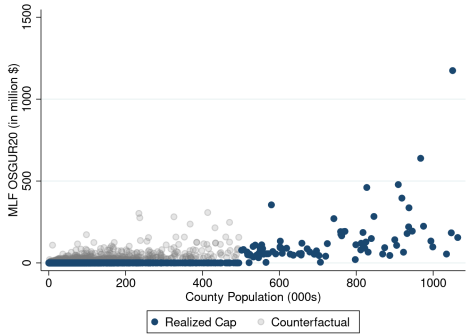


(b) CARES Aid CRF Allocation

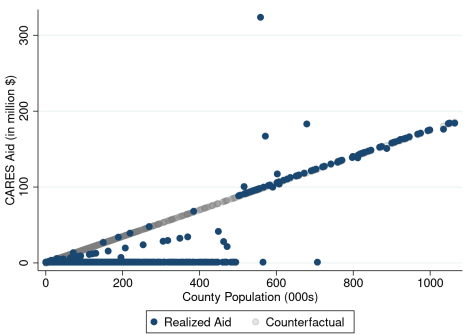


MLF vs. CARES Dosage Response Decomposition: Counterfactual Caps

(a) MLF Lending Caps (20% of OSGUR)



(b) CARES Aid CRF Allocation



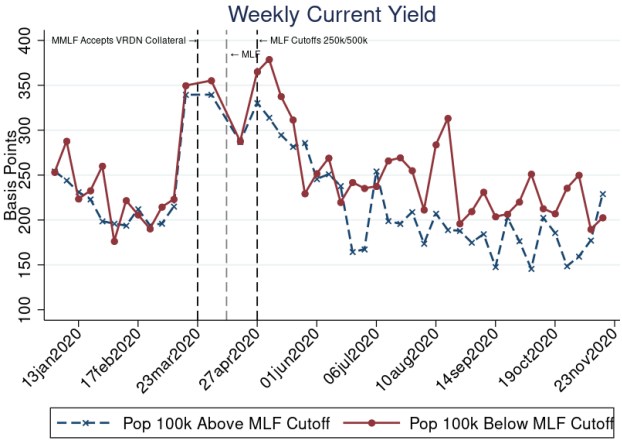
$$Y_{gt} = \alpha + \beta_{1t} * \mathbb{1}(pop \geq cutoff)_g + \beta_{2t} * \mathbb{1}(pop \geq cutoff)_g \widehat{OSGUR20}_g + \gamma_t * (pop - cutoff)_g \quad (2)$$
$$+ \delta_t * \mathbb{1}(pop \geq cutoff)_g (pop - cutoff)_g + \phi_t * \widehat{OSGUR20}_g + \mathbf{X}_{bit} + \varepsilon_{gt}$$

MLF vs. CARES Dosage Response Decomposition: Results

	YoY Level Changes			YoY Percent Changes		
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-1473.0***	-1417.2***	-1412.3***	-10.09***	-9.967***	-9.400***
	(200.3)	(192.3)	(180.0)	(0.715)	(0.665)	(0.538)
1(pop $\geq$ cutoff)	620.3*	554.0*	531.9*	3.021**	2.959**	2.168**
	(266.3)	(272.2)	(261.2)	(0.930)	(0.933)	(0.810)
1(pop $\geq$ cutoff)*$\widehat{OSGUR}20$	-0.678			-0.0110		
	(1.408)			(0.00747)		
1(pop $\geq$ cutoff)*$\widehat{OSGUR}20/CARES$		39.88			0.143	
		(91.57)			(0.286)	
1(pop $\geq$ cutoff)*$\widehat{OSGUR}20/\widehat{CARES}$			36.71			-0.104
			(140.6)			(0.461)
(pop - cutoff)	-3.279***	-3.164***	-3.074***	-0.00587**	-0.00548*	-0.00311
	(0.681)	(0.670)	(0.644)	(0.00220)	(0.00215)	(0.00214)
1(pop $\geq$ cutoff)*(pop - cutoff)	-0.227	-0.218	-0.384	0.00269	0.00391	0.000710
	(1.173)	(1.113)	(1.102)	(0.00353)	(0.00327)	(0.00334)
$\widehat{OSGUR}20$	1.135			0.0153*		
	(0.998)			(0.00713)		
$\widehat{OSGUR}20/CARES$		0.594			0.0156*	
		(0.993)			(0.00664)	
$\widehat{OSGUR}20/\widehat{CARES}$			41.10			0.674*
			(43.44)			(0.333)
N	684	684	684	684	684	684

Back

Yields Robustness to CARES Aid: Cities Only (MLF cutoff only)



Back

RD Effects on Public Sector Employment: City Cutoff (MLF Only)

	Emp. (1)	Emp. (2)	Δ Emp. (3)	Δ Emp. (4)	% Δ Emp. (5)	% Δ Emp. (6)	N (fixed-bwdth)
a. Pooled Post:							
Overall Employment	-948	-1,045	-52	-49	-1.21	-0.56	29,609
	(694)	(781)	(94)	(94)	(0.89)	(0.72)	
– Goods Employment	-87**	-113***	-1	0	-4.55	-2.29	5,370
	(35)	(41)	(3)	(3)	(5.00)	(4.35)	
– Services Employment	1	-597	-98	-62	-1.01	0.37	19,669
	(826)	(943)	(124)	(120)	(1.03)	(0.74)	
b. Pooled Pre (Placebo):							
Overall Employment	-740	-867	54**	52**	1.04***	1.14***	29,643
	(725)	(819)	(24)	(23)	(0.40)	(0.33)	
– Goods Employment	-83**	-110***	-1	-1	0.22	-3.06	5,260
	(35)	(42)	(2)	(2)	(3.12)	(2.56)	
– Services Employment	281	-229	69**	65**	0.86**	1.20***	19,606
	(880)	(966)	(28)	(28)	(0.42)	(0.39)	
Month FEs		X					
State FEs		X		X		X	
Control Mean (post): Employment	10,067	9,487	-779	-730	-6.64	-7.09	
Control Mean (post): Goods Employment	154	134	-5	-4	-5.28	-4.92	
Control Mean (post): Services Employment	8,555	8,022	-701	-653	-6.94	-7.75	

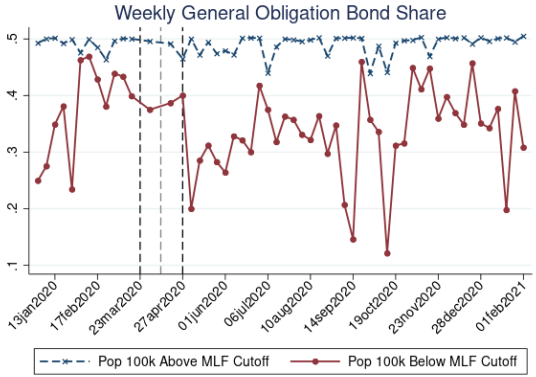
Back

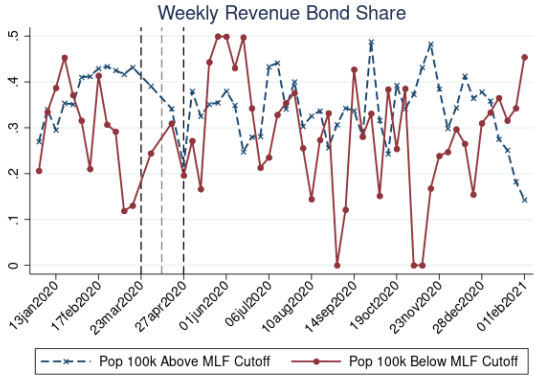
Baseline Summary Statistics (01jan2019-23mar2020)

	MLF Eligible		MLF Ineligible		MLF Eligible - Ineligible
	Mean/SD (1)	# Observations (2)	Mean/SD (3)	# Observations (4)	Δ/SE (5)
A. MSRB-Bloomberg Trade-Level Data					
Coupon Rate (b.p.)	430.3	669,311	384.2	844,395	46.2***
	[135.1]		[116.6]		(0.21)
Security Price (per 100 par)	108.0	671,659	105.8	844,500	2.23***
	[8.95]		[7.45]		(0.014)
Current Yield (b.p.)	203.0	620,560	209.6	825,352	-6.68***
	[83.2]		[80.3]		(0.14)
Δ Yield (Feb20-Jan20)	-0.066	281,596	-0.14	153,899	0.078***
	[1.21]		[0.95]		(0.0033)
Δ Yield YoY (Jan20-Jan19)	-0.89	262,725	-1.11	124,523	0.22***
	[4.28]		[1.17]		(0.0090)
Δ Yield YoY (Feb20-Feb19)	-1.00	242,935	-1.07	110,336	0.074***
	[1.56]		[1.07]		(0.0045)
Amount Outstanding (MM)	2328.8	671,659	144.5	844,500	2184.3***
	[2982.3]		[224.1]		(3.65)
Maturity Size (MM)	3542.0	671,659	215.7	844,500	3326.2***
	[4209.3]		[305.5]		(5.15)
Tenor of Bond (Years)	14.8	671,464	13.2	844,500	1.55***
	[7.64]		[6.98]		(0.012)
Remaining Duration of Bond (Years)	9.22	671,464	8.72	844,500	0.51***
	[7.02]		[6.74]		(0.011)
Market Share of Issuer	0.95	671,659	0.064	844,500	0.89***
	[1.06]		[0.11]		(0.0013)
Number of Securities by Issuer	306.4	671,659	123.0	844,500	183.3***
	[210.6]		[107.5]		(0.28)
Par Traded (1000s)	290.9	671,659	95.4	844,500	195.5***
	[1915.2]		[579.9]		(2.42)
S&P Ratings (1-7 scale)	5.67	575,172	5.83	624,205	-0.16***
	[0.86]		[0.65]		(0.0014)
Moody's Ratings (1-7 scale)	5.78	557,662	5.88	474,590	-0.099***
	[0.90]		[0.92]		(0.0018)
Fitch Ratings (1-7 scale)	5.65	424,063	5.63	149,058	0.018***
	[1.03]		[0.79]		(0.0026)
Time of Day of Trade (minute)	770.6	671,659	776.1	844,500	-5.53***
	[131.7]		[132.2]		(0.22)
B. QCEW Month-County Loc. Gov. Emp. Data					
Δ Employment	627.8	228	19.9	5,250	607.9***
	[861.7]		[99.5]		(57.1)
Δ Goods Employment	9.77	130	0.20	2,402	9.57***
	[35.4]		[8.89]		(3.11)
Δ Service Employment	1509.8	228	23.1	5,250	1486.7**
	[10905.4]		[414.9]		(722.2)

Back Back → Robustness

Composition Sensitivity: GO and RB Trends





Back → Robustness

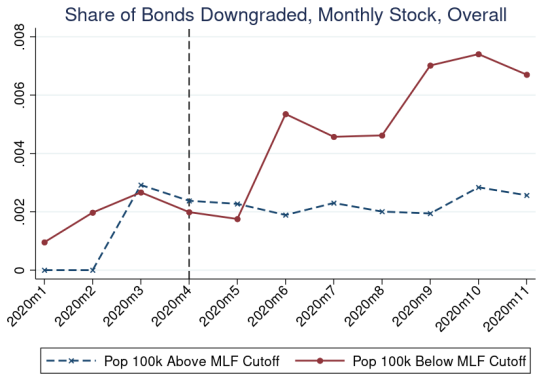
RD Effects on Probability Credit Rating Downgraded

	Discontinuity	Standard Error	Control Mean	N (Fixed-bwdth)
a. Pooled Post:				
Pr(Downgrade), Overall (27apr-20nov)	-0.03	0.04	0.06	139,479
Pr(Downgrade), A & BBB (27apr-20nov)	0.06	0.16	0.16	11,756
Number of Downgrades, Overall (27apr-20nov)	-0.03	0.04	0.06	139,479
Number of Downgrades, A & BBB (27apr-20nov)	0.05	0.16	0.16	11,756
b. Pooled Pre (Placebo):				
Pr(Downgrade), Overall (01jan-23mar)	-0.02	0.01	0.02	119,200
Pr(Downgrade), A & BBB (01jan-23mar)	-0.05	0.05	0.05	10,046
Number of Downgrades, Overall (01jan-23mar)	-0.02	0.01	0.02	119,200
Number of Downgrades, A & BBB (01jan-23mar)	-0.05	0.05	0.05	10,046

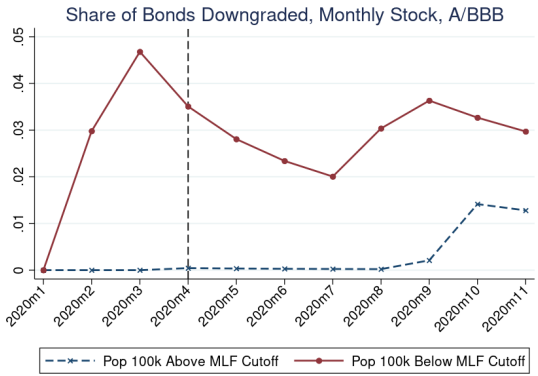
Back Back → Robustness

RD Effects on Credit Downgrades: Cumulative Shares

(a) Cumulative New Downgrades Overall



(b) Cumulative New Downgrades, A & BBB



- Note: balanced panel issues mean not monotonically increasing.

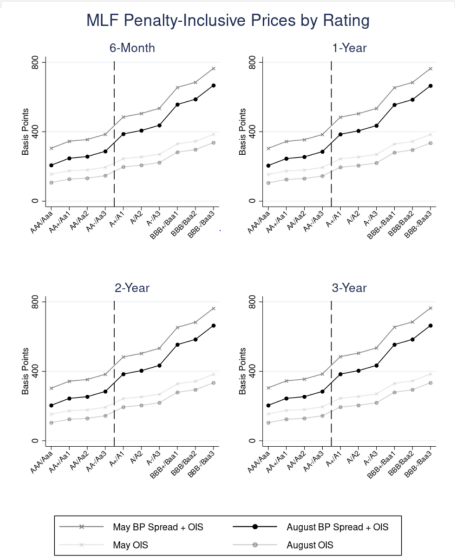
Back Back → Robustness

Unlikely manipulated... rather a result of speed to market

*We had to undertake very quickly to enter into the market, and our four principles that were guiding us in terms of our design were: speed to announcement and execution—**do not let the perfect be the enemy of the good**; ensure that State and local governments had access to liquidity for operating cash—this is what we heard overwhelmingly from individual issuers and associations like GFOA; restore market confidence and stability given the unprecedented liquidity crisis in the market; and finally, to your point, to design a uniformly applicable, transparent, easy-to-administer facility*

—Kent Hiteshew, Federal Reserve Board Deputy Associate Director for Financial Stability, Congressional Oversight Commission, Sept 17, 2020

MLF Pricing Grid



Back