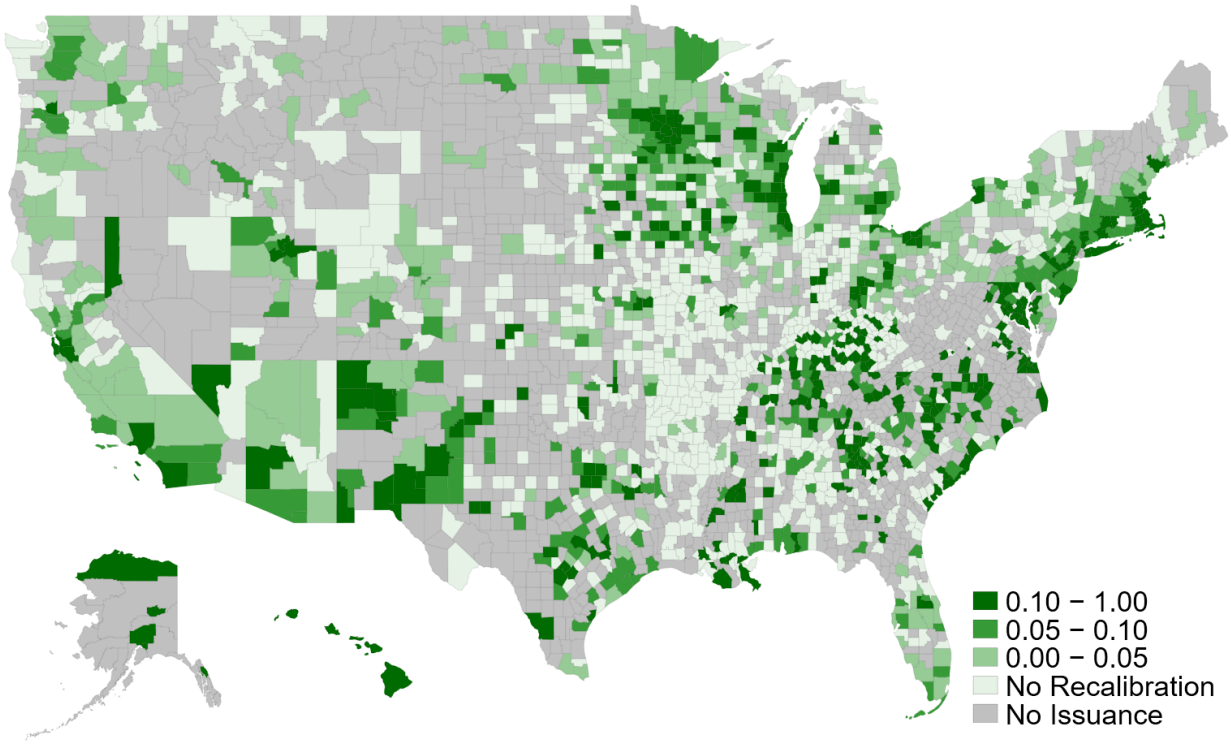
Online Appendix

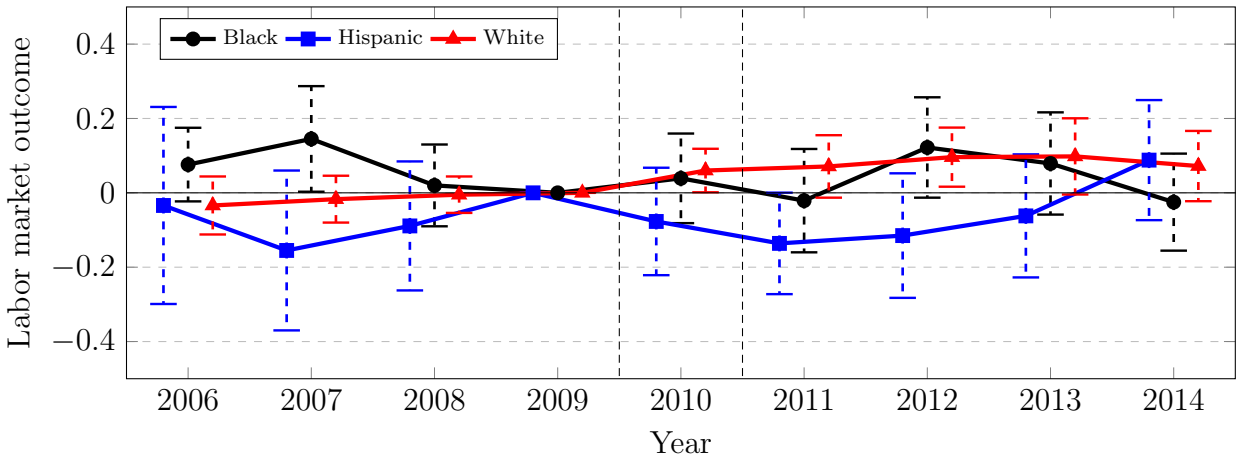
Public Financing and Racial Disparities: Does A Rising Tide Always Lift All Boats?

Tian Qiu



Online Appendix Figure A1
Geographic Distribution of Moody's Recalibration

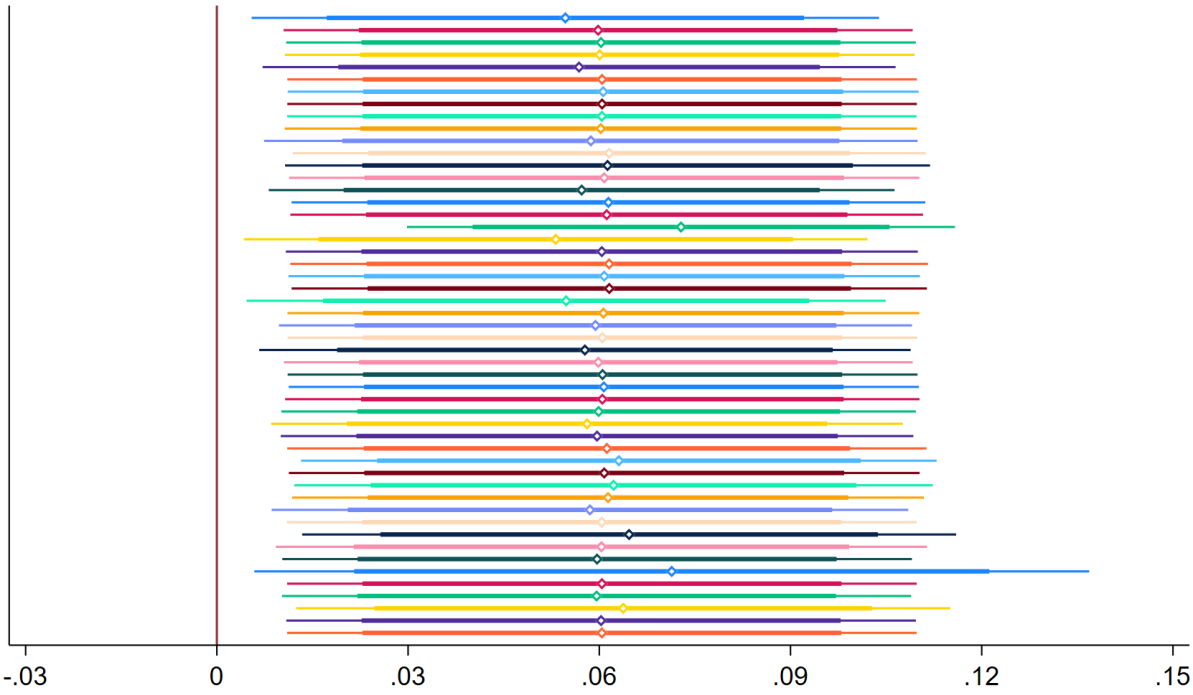
This map demonstrates the geographic distribution of Moody's municipal bond rating recalibration. Variations in color shades represent the fraction of treated local government units in a county. Grey colored counties either do not have local government bonds issued in the three years prior to recalibration or do not have a rating from Moody's.



Online Appendix Figure A2
Event-Time Estimation of Labor Market Outcome Index (by Race)

This figure documents the event-time estimation of the following regression equation below. County and state-by-year fixed effects are included. Standard errors are clustered at the county level. Dashed lines represent 95% CI. The point estimates are staggered for ease of reading.

$$Outcome_{c,t,i} = \sum_{j} \beta_j (Recalibration_c \times Year\ Indicator_t) + \gamma_c + \gamma_{s \times t} + \epsilon_{c,t,i}$$



Online Appendix Figure A3
Robustness of Result to Removing One State at a Time

This figure plots coefficients of β_j from column (1) from Panel A of Table 5, but remove one state from the sample at a time. The coefficients are alphabetically ordered based on state name abbreviation and legends are omitted due to space constraints. The Diamonds are point estimates and the thicker (thinner) lines represent the 95% (99%) CIs.

Online Appendix Table A1
Additional Summary Statistics

Variable	N	Mean	S.D.	P5	P95
Moody's Recalibration	(County level observations)				
Recalibration	3,101	0.03	0.08	0.00	0.18
SEDA SES	(County-Year level observations)				
White Household	20,412	0.07	0.56	-0.86	0.94
Black Household	16,023	-2.39	0.87	-3.78	-0.72
Hispanic Household	18,634	-1.23	0.61	-2.20	-0.16
White-Black Gap	15,974	2.49	0.65	1.32	3.62
White-Hispanic Gap	18,613	1.39	0.43	0.70	2.07
SEDA Unemployment	(County-Year level observations)				
White Household	20,412	0.07	0.02	0.03	0.11
Black Household	16,023	0.14	0.06	0.05	0.22
Hispanic Household	18,634	0.08	0.03	0.02	0.14
SEDA SNAP	(County-Year level observations)				
White Household	20,412	0.10	0.05	0.03	0.18
Black Household	16,023	0.26	0.08	0.12	0.39
Hispanic Household	18,634	0.18	0.07	0.07	0.29

Note: This table reports additional summary statistics including SEDA SES, SEDA unemployment rate, SEDA SNAP rate, and Moody's recalibration intensity.

Online Appendix Table A2
Effect of Moody's Recalibration on Local Government Expenditure

	ln(Total Expenditure)		ln(Current Expenditure)		ln(Capital Expenditure)	
	(1)	(2)	(3)	(4)	(5)	(6)
Post × Recalibration	0.117	0.083	0.135	0.098	0.150	0.055
	(0.025)	(0.032)	(0.022)	(0.026)	(0.169)	(0.179)
Sample	All Counties	Issuer Counties	All Counties	Issuer Counties	All Counties	Issuer Counties
State × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	County	County	County	County	County	County
R^2	0.997	0.997	0.999	0.999	0.917	0.927
Observations	17,904	10,500	17,904	10,500	17,904	10,500

Note: This table reports the effect of Moody's recalibration on local government expenditure. Columns 1, 3, and 5 use the full universe of counties. Columns 2, 4, and 6 use the subsample of counties that have issuance rated by Moody's prior to the recalibration. The unit of observation is a county-year and county and state-by-year fixed effects are included. The outcome variables are the natural logarithms of total expenditure (columns 1 and 2), current expenditure (columns 3 and 4), and capital expenditure (columns 5 and 6) in the county year. Standard errors reported in parentheses are clustered at the county level.

Online Appendix Table A3
Effect of Moody's Recalibration on School District Spending

	ln(Current Spending)		ln(Capital Spending)	
	(1)	(2)	(3)	(4)
Post × Recalibration	-0.025	0.023	0.014	-0.003
	(0.084)	(0.094)	(0.155)	(0.169)
Sample	All Districts	Issuer Districts	All Districts	Issuer Districts
State × Year FE	Yes	Yes	Yes	Yes
School District FE	Yes	Yes	Yes	Yes
Cluster	County	County	County	County
R^2	0.972	0.982	0.812	0.806
Observations	100,523	73,744	100,523	73,744

Note: This table reports the effect of Moody's recalibration on school district spending. Columns 1 and 3 use the full universe of school districts. Columns 2 and 4 use the subsample of districts in counties that have issuance rated by Moody's prior to the recalibration. The unit of observation is a district-year and school district and state-by-year fixed effects are included. The outcome variables are the natural logarithms of current spending (columns 1 and 2), and capital spending (columns 3 and 4) in the district year. Standard errors reported in parentheses are clustered at the county level.

Online Appendix Table A4
Effect of Municipal Financing on Labor Market Index (by Race)

	Baseline			Exclude Movers			Control for Great Recession		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	White	Black	Hispanic	White	Black	Hispanic	White	Black	Hispanic
Post × Recalibration	0.093	-0.021	0.009	0.075	-0.020	-0.001	0.059	-0.030	-0.074
	(0.047)	(0.038)	(0.065)	(0.044)	(0.039)	(0.067)	(0.026)	(0.038)	(0.055)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	County	County	County	County	County	County	County	County	County
R^2	0.186	0.191	0.174	0.186	0.193	0.174	0.185	0.195	0.174
Observations	6,201,961	1,159,711	1,652,130	5,791,417	1,071,825	1,521,428	5,913,122	1,042,841	1,546,222
Outcome Variable Mean	0.127	-0.342	-0.210	0.127	-0.342	-0.210	0.135	-0.342	-0.195
White-Minority Gap		0.114	0.084		0.093	0.076		0.089	0.133
		(0.051)	(0.062)		(0.048)	(0.062)		(0.044)	(0.059)

Note: This table reports the effect of Moody's recalibration on the labor market outcome index by race. The sample universe is IPUMS ACS individuals with ages between 18-65. The unit of observation is an individual and weighted accordingly in the regressions using person weight (perwt). Control variables include gender, age, age^2, marital status, years of education, and the number of children. The outcome variable mean is measured using observations from 2009. County and state-by-year fixed effects are included. Standard errors reported in parentheses are clustered at the county level.

Online Appendix Table A5

Effect of Municipal Financing on Labor Market Outcomes (by Race)

	In labor force			Employed			Weekly hours worked			Earnings			SNAP		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	White	Black	Hispanic	White	Black	Hispanic	White	Black	Hispanic	White	Black	Hispanic	White	Black	Hispanic
Post × Recalibration	0.016	-0.007	0.006	0.016	-0.006	-0.005	1.065	-0.010	0.084	1714.767	-67.694	606.579	-0.022	0.015	-0.005
	(0.009)	(0.009)	(0.011)	(0.010)	(0.010)	(0.014)	(0.545)	(0.417)	(0.643)	(959.230)	(642.193)	(1448.111)	(0.007)	(0.014)	(0.044)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	County	County	County	County	County	County	County	County	County	County	County	County	County	County	County
R^2	0.106	0.118	0.117	0.101	0.125	0.108	0.164	0.166	0.167	0.258	0.238	0.206	0.099	0.197	0.164
Observations	6,201,961	1,159,711	1,652,130	6,201,961	1,159,711	1,652,130	6,201,961	1,159,711	1,652,130	6,201,961	1,159,711	1,652,130	3,093,269	587,865	680,727
Outcome Variable Mean	0.794	0.757	0.775	0.728	0.637	0.684	31.854	27.945	29.359	39527.163	24256.845	22049.707	0.061	0.226	0.166
White-Minority Gap		0.023	0.011		0.022	0.021		1.075	0.981		1782.461	1108.188		-0.038	-0.017
		(0.012)	(0.013)		(0.012)	(0.013)		(0.588)	(0.594)		(1000.301)	(1148.946)		(0.014)	(0.042)

Note: This table reports the effect of Moody's recalibration on the labor market outcomes by race. The sample universe is IPUMS ACS individuals with ages between 18-65. The unit of observation is an individual or a household (for SNAP) and weighted accordingly in the regressions using person weight (perwt) or household weight (hhwt, for SNAP). Control variables include gender, age, age^2, marital status, years of education, and the number of children. The outcome variable mean is measured using observations from 2009. County and state-by-year fixed effects are included. Standard errors reported in parentheses are clustered at the county level.

Online Appendix Table A6
Effect of Municipal Financing on Composite SES (SEDA Data)

	Socioeconomic Status				
	(1)	(2)	(3)	(4)	(5)
	White	Black	Hispanic	W-B Gap	W-H Gap
Post × Recalibration	0.076	-0.031	-0.178	0.136	0.233
	(0.027)	(0.079)	(0.098)	(0.069)	(0.079)
State × Year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
Cluster	County	County	County	County	County
R^2	0.968	0.876	0.839	0.833	0.761
Observations	20,692	16,019	19,088	15,970	18,686

Note: This table reports the effect of Moody's recalibration on household socioeconomic status (SES) by race using SEDA data and the following county-year level regression:

$$SES\ Outcome_{r,c,t} = \beta(Post_t \times Recalibration_c) + \gamma_c + \gamma_{s\times t} + \epsilon_{c,t}$$

where $SES\ Outcome_{r,c,t}$ is the SES index for race r in county c in year t. $Post_t = 1$ for the year 2010 and afterward. $Recalibration_c$ is continuously measured as the fraction of local government units that receive recalibration. The unit of observation is a county-year and county and state-by-year fixed effects are included. Standard errors reported in parentheses are clustered at the county level.

Online Appendix Table A7
Effect of Municipal Financing on Unemployment and SNAP (SEDA Data)

	Unemployment			SNAP		
	(1)	(2)	(3)	(4)	(5)	(6)
	White	Black	Hispanic	White	Black	Hispanic
Post × Recalibration	-0.008	0.005	0.007	-0.014	0.007	0.023
	(0.002)	(0.007)	(0.006)	(0.003)	(0.008)	(0.013)
State × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	County	County	County	County	County	County
R^2	0.897	0.664	0.738	0.950	0.828	0.809
Observations	20,692	16,019	19,088	20,692	16,019	19,088

Note: This table reports the effect of Moody's recalibration on unemployment and SNAP by race using SEDA data and the following county-year level regression:

$$Outcome_{r,c,t} = \beta(Post_t \times Recalibration_c) + \gamma_c + \gamma_{s\times t} + \epsilon_{c,t}$$

where $Outcome_{r,c,t}$ is the unemployment or SNAP rate for race r in county c in year t. $Post_t = 1$ for the year 2010 and afterward. $Recalibration_c$ is continuously measured as the fraction of local government units that receive recalibration. The unit of observation is a county-year and county and state-by-year fixed effects are included. Standard errors reported in parentheses are clustered at the county level.

Online Appendix Table A8
Effect on Labor Market Outcome by Education Level

	HS or Less		More than HS	
	(1)	(2)	(3)	(4)
	White	Minority	White	Minority
Post × Recalibration	0.041	-0.080	0.094	0.031
	(0.054)	(0.048)	(0.045)	(0.042)
Controls	Yes	Yes	Yes	Yes
State × Year FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
Cluster	County	County	County	County
R^2	0.138	0.144	0.168	0.148
Observations	1,818,481	1,487,257	4,383,480	1,324,586
Outcome Variable Mean	-0.371	-0.556	0.346	0.089
White-Minority Gap		0.121		0.064
		(0.065)		(0.046)

Note: This table reports the effect of Moody's recalibration on the labor market outcome index by individual's education level. Columns 1 and 2 (HS or Less) include individuals with high school diplomas or lower education levels. Columns 3 and 4 (More than HS) include individuals with at least some college education and above, including up to graduate and professional degrees. The sample universe is IPUMS ACS individuals with ages between 18-65. The unit of observation is an individual and weighted accordingly in the regressions using person weight (perwt). Control variables include gender, age, age^2, marital status, years of education, and the number of children. The outcome variable mean is measured using observations from 2009. County and state-by-year fixed effects are included. Standard errors reported in parentheses are clustered at the county level.

Online Appendix Table A9
The Role of Implicit Racial Bias

	High Racial Bias				Low Racial Bias			
	HS or Less		More than HS		HS or Less		More than HS	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	White	Minority	White	Minority	White	Minority	White	Minority
Post × Recalibration	0.002	-0.118	0.027	-0.027	0.296	0.122	0.339	0.312
	(0.054)	(0.042)	(0.029)	(0.038)	(0.094)	(0.162)	(0.064)	(0.092)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	County	County	County	County	County	County	County	County
R^2	0.139	0.142	0.171	0.151	0.136	0.151	0.163	0.144
Observations	1,287,978	916,919	2,882,405	885,724	530,503	570,338	1,501,075	438,862
Outcome Variable Mean	-0.374	-0.590	0.360	0.098	-0.364	-0.500	0.320	0.070
White-Minority Gap		0.120		0.053		0.174		0.027
		(0.069)		(0.046)		(0.160)		(0.085)

Note: This table reports the effect of Moody's recalibration on the labor market outcome index by individual's education level across areas with high and low implicit racial bias. Columns 1 through 4 (5 through 8) include individuals from states with high (low) implicit racial bias. The sample universe is IPUMS ACS individuals with ages between 18-65. The unit of observation is an individual and weighted accordingly in the regressions using person weight (perwt). Control variables include gender, age, age^2, marital status, years of education, and the number of children. The outcome variable mean is measured using observations from 2009. County and state-by-year fixed effects are included. Standard errors reported in parentheses are clustered at the county level.

Online Appendix Table A10
Weighting by Enrollment Size

	Test score				
	(1) White	(2) Black	(3) Hispanic	(4) W-B Gap	(5) W-H Gap
Post × Recalibration	0.052	0.001	0.014	0.038	0.035
	(0.020)	(0.033)	(0.042)	(0.020)	(0.021)
State × Year × Grade × Subject FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
Cluster	County	County	County	County	County
R^2	0.883	0.817	0.879	0.631	0.674
Observations	186,199	93,602	95,848	158,508	171,926

Note: This table reports the change in academic achievement using the number of test takers as regression weights. The unit of observation is a county-year-grade-subject and county and state-year-grade-subject fixed effects are included. Standard errors reported in parentheses are clustered at the county level.