

Online Appendix

Table of Contents

A Online Appendix Tables	39
A.1 Leverage measures	39
A.2 Leverage and defaults	40
A.3 Leverage and local services, excluding cities in default (1930-1937)	41
A.4 Leverage and local services, by median leverage	42
A.5 Leverage and local services, excluding sources of data one by one	43
A.6 Outlay and Demand Proxies	44
A.7 Balance Test on Bond Shocks - 1929 Variables	45
A.8 Moody Leverage and local services, excluding cities in default (1930-1937)	46
 B Online Appendix Figures	 47
B.1 Revenue and Debt	47
B.2 City Revenue and Payments	48
B.3 Composition of City Revenue and Expenditure, 1930	49
B.4 Incurred and retired municipal debt in Massachusetts	50
B.5 Breakdown of Balance Sheet Debt	51
B.6 Moody leverage and various categories of expenditure and debt revenue	52
 C Local Government Sources	 53
 D Moody's	 55

A Online Appendix Tables

A.1 Leverage measures

Table A1

Panel A: Financial leverage (1929) and service expenditure

	Int/Rev	Debt/Rev	Debt/Capita
	(1)	(2)	(3)
leverage x 1924-1926	0.01 (0.01)	-0.00 (0.01)	-0.01 (0.01)
leverage x 1929-1933	-0.00 (0.01)	-0.03*** (0.01)	-0.02*** (0.01)
leverage x 1934-1938	-0.07*** (0.01)	-0.09*** (0.01)	-0.08*** (0.01)
leverage x 1941-1943	-0.05*** (0.01)	-0.06*** (0.01)	-0.02** (0.01)
City FE	✓	✓	✓
Year FE	✓	✓	✓
1930 Pop x Year	✓	✓	✓
Δ1920-30 Pop x Year	✓	✓	✓
Revenue	✓	✓	✓
Region x Year	✓	✓	✓
R-sq (within)	0.61	0.62	0.62
N	10,960	10,953	10,959
Mean(y)	3.63	3.62	3.60
SD(y)	0.75	0.74	0.73

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Panel B: Financial leverage (1929) and capital outlay

	Int/Rev	Debt/Rev	Debt/Capita
	(1)	(2)	(3)
leverage x 1924-1926	0.01 (0.06)	0.12** (0.06)	0.08** (0.04)
leverage x 1929-1933	-0.16*** (0.05)	-0.02 (0.04)	-0.04 (0.04)
leverage x 1934-1938	-0.25*** (0.07)	-0.21*** (0.06)	-0.16*** (0.05)
leverage x 1941-1943	-0.33*** (0.07)	-0.19** (0.08)	-0.23*** (0.08)
City FE	✓	✓	✓
Year FE	✓	✓	✓
1930 Pop x Year	✓	✓	✓
Δ1920-30 Pop x Year	✓	✓	✓
Revenue	✓	✓	✓
Region x Year	✓	✓	✓
R-sq (pseudo)	0.60	0.60	0.56
N	10,960	10,953	10,959
Mean(y)	12.22	12.03	11.29
SD(y)	23.97	23.62	17.57

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents the estimation results of Equation 4.1 where the outcome variable is log per-capita total service expenditure in Panel A (estimated using OLS) and per-capita capital outlays (estimated using Poisson pseudo-maximum likelihood) in Panel B. Standard errors are clustered at the city level. Column (1) contains only city and year fixed effects, while columns (2)–(6) add population, population group (under 10k, 10k-100k, 100k+), 1920s population growth-by-year fixed effects, contemporaneous and lagged log total non-debt per capita revenue, region by year controls, and source by year fixed effects. The 1929 leverage measure used is defined in the header. Columns (7) - (9) reproduce specification (6) using the other leverage measures. Cities with no debt are excluded from the sample.

A.2 Leverage and defaults

Table A2

	Bonds / Assessed Value		Int/Rev		Debt/Rev		Debt/Capita	
	City (1)	District (2)	City (3)	District (4)	City (5)	District (6)	City (7)	District (8)
leverage	0.06*** (0.01)	0.06*** (0.01)	0.07*** (0.02)	0.08*** (0.02)	0.06*** (0.01)	0.06*** (0.01)	0.06*** (0.02)	0.06*** (0.02)
Population (1930)	✓	✓	✓	✓	✓	✓	✓	✓
Population Growth (1920-1930)	✓	✓	✓	✓	✓	✓	✓	✓
Revenue (1930 - 1933)	✓	✓	✓	✓	✓	✓	✓	✓
Region FE	✓	✓	✓	✓	✓	✓	✓	✓
R-sq	0.16	0.17	0.16	0.17	0.16	0.18	0.17	0.18
N	728	728	729	729	731	731	732	732
Mean(y)	0.14	0.15	0.13	0.14	0.13	0.15	0.13	0.15
SD(y)	0.34	0.36	0.34	0.35	0.34	0.35	0.34	0.35

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents the estimation results of an OLS regression of a default indicator on financial leverage. The outcome variables are binary taking the value of 1 if the *Bond Buyer* reported a city (odd columns) or any road district, municipal improvement district, or school district within the city limits (even columns) to be in default between 1930 - 1937. Control variables include log city population in 1930, log city population growth between 1920 and 1930, log per-capita revenue (each year between and including 1930 - 1934), and Census region fixed effects. Financial leverage in 1929 is specified in the header. Robust standard errors are shown in parentheses.

Table A2 presents the results of a linear probability model estimating the likelihood of default based on standardized financial leverage measures. The outcome variables are binary, taking the value of 1 if the *Bond Buyer* reported a city (odd columns) or any road district, municipal improvement district, or school district within the city limits (even columns) as being in default from 1930 to 1937. Control variables include the log of city population in 1930, log of city population growth from 1920 to 1930, log per-capita revenue (annually from 1930 to 1934), and fixed effects by Census region. Across all specifications, one standard deviation in leverage is associated with a 5 to 7 percent increase in the probability of default, which equates to roughly 40 percent of the mean.

A.3 Leverage and local services, excluding cities in default (1930-1937)

Table A3

Panel A: Financial leverage (1929) and service expenditure, excluding defaulting cities

	Bonds/Assessed Value	Int/Rev	Debt/Rev	Debt/Capita
	(1)	(2)	(3)	(4)
leverage x 1924-1926	-0.01 (0.01)	0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)
leverage x 1929-1933	-0.02*** (0.01)	-0.01 (0.01)	-0.03*** (0.01)	-0.02*** (0.01)
leverage x 1934-1938	-0.07*** (0.01)	-0.06*** (0.01)	-0.09*** (0.01)	-0.08*** (0.01)
leverage x 1941-1943	0.00 (0.01)	-0.03** (0.02)	-0.05*** (0.01)	-0.02 (0.01)
City FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
1930 Pop x Year	✓	✓	✓	✓
Δ1920-30 Pop x Year	✓	✓	✓	✓
Revenue	✓	✓	✓	✓
Region x Year	✓	✓	✓	✓
R-sq (within)	0.64	0.63	0.64	0.64
N	9,470	9,579	9,534	9,544
Mean(y)	3.64	3.65	3.64	3.63
SD(y)	0.76	0.76	0.76	0.75

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Panel B: Financial leverage (1929) and capital outlays, excluding defaulting cities

	Bonds/Assessed Value	Int/Rev	Debt/Rev	Debt/Capita
	(1)	(2)	(3)	(4)
leverage x 1924-1926	0.10* (0.06)	0.04 (0.08)	0.13* (0.07)	0.10** (0.04)
leverage x 1929-1933	-0.08 (0.05)	-0.19*** (0.07)	-0.02 (0.05)	-0.04 (0.05)
leverage x 1934-1938	-0.19*** (0.06)	-0.31*** (0.08)	-0.23*** (0.07)	-0.15*** (0.05)
leverage x 1941-1943	-0.12* (0.07)	-0.34*** (0.09)	-0.18** (0.09)	-0.21** (0.10)
City FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
1930 Pop x Year	✓	✓	✓	✓
Δ1920-30 Pop x Year	✓	✓	✓	✓
Revenue	✓	✓	✓	✓
Region x Year	✓	✓	✓	✓
R-sq (pseudo)	0.57	0.58	0.58	0.55
N	9,470	9,579	9,534	9,544
Mean(y)	11.86	12.12	11.95	11.47
SD(y)	20.16	20.69	20.27	17.63

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents the estimation results of Equation 4.1 where the outcome variable is log per-capita total service expenditure in columns (1) - (5) in Panel A or log per-capita revenue generated from debt issuance ("debt receipts"), both estimated using OLS. In panel B, the outcome variable is per-capita capital outlays, and the model is estimated using Poisson pseudo-maximum likelihood. The sample excludes cities that defaulted at any point in 1930-1937 according to the Bond Buyer. Standard errors are clustered at the city level. Column (1) contains only city and year fixed effects, while columns (2)–(5) add 1930 population-year fixed effects, 1920s population growth-year fixed effects, contemporaneous and lagged log total non-debt per capita revenue, region-year fixed effects. Leverage is standardized (mean zero and standard deviation of one) bonded debt over assessed property values in 1929.

A.4 Leverage and local services, by median leverage

Table A4

Panel A: Above median financial leverage (1929) and service expenditure				
	Bonds/Assessed Value	Int/Rev	Debt/Rev	Debt/Capita
	(1)	(2)	(3)	(4)
above median leverage x 1924-1926	-0.01 (0.01)	-0.02 (0.01)	-0.02 (0.01)	-0.01 (0.01)
above median leverage x 1929-1933	-0.04*** (0.01)	0.00 (0.01)	-0.05*** (0.01)	-0.02* (0.01)
above median leverage x 1934-1938	-0.14*** (0.02)	-0.11*** (0.02)	-0.14*** (0.02)	-0.15*** (0.02)
above median leverage x 1941-1943	-0.03 (0.02)	-0.05** (0.02)	-0.12*** (0.02)	-0.08*** (0.02)
City FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
1930 Pop x Year	✓	✓	✓	✓
Δ1920-30 Pop x Year	✓	✓	✓	✓
Revenue	✓	✓	✓	✓
Region x Year	✓	✓	✓	✓
R-sq (within)	0.62	0.61	0.62	0.63
N	10,903	10,960	10,953	10,959
Mean(y)	3.61	3.63	3.62	3.60
SD(y)	0.74	0.75	0.74	0.73
Standard errors in parentheses				
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$				
Panel B: Above median financial leverage (1929) and capital outlays				
	Bonds/Assessed Value	Int/Rev	Debt/Rev	Debt/Capita
	(1)	(2)	(3)	(4)
above median leverage x 1924-1926	-0.03 (0.10)	0.09 (0.08)	0.14 (0.09)	0.16* (0.09)
above median leverage x 1929-1933	-0.23** (0.10)	-0.20** (0.08)	-0.09 (0.09)	-0.01 (0.11)
above median leverage x 1934-1938	-0.33*** (0.11)	-0.39*** (0.08)	-0.44*** (0.10)	-0.14 (0.12)
above median leverage x 1941-1943	-0.17 (0.16)	-0.36*** (0.13)	-0.21 (0.15)	-0.15 (0.15)
City FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
1930 Pop x Year	✓	✓	✓	✓
Δ1920-30 Pop x Year	✓	✓	✓	✓
Revenue	✓	✓	✓	✓
Region x Year	✓	✓	✓	✓
R-sq (pseudo)	0.60	0.60	0.60	0.56
N	10,903	10,960	10,953	10,959
Mean(y)	11.96	12.22	12.03	11.29
SD(y)	23.53	23.97	23.62	17.57
Standard errors in parentheses				
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$				

Note: This table presents the estimation results of Equation 4.1 where the outcome variable is log per-capita total service expenditure in columns (1) - (5) in Panel A or log per-capita revenue generated from debt issuance ("debt receipts"), both estimated using OLS. In panel B, the outcome variable is per-capita capital outlays, and the model is estimated using Poisson pseudo-maximum likelihood. Standard errors are clustered at the city level. Column (1) contains only city and year fixed effects, while columns (2)–(5) add 1930 population-year fixed effects, 1920s population growth-year fixed effects, contemporaneous and lagged log total non-debt per capita revenue, region-year fixed effects. Leverage is standardized (mean zero and standard deviation of one) bonded debt over assessed property values in 1929.

A.5 Leverage and local services, excluding sources of data one by one

Table A5

Panel A: Financial leverage (1929) and service expenditure, excluding sources one by one								
	Bonds / Assessed Value							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
leverage x 1924-1926	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.00 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)
leverage x 1929-1933	-0.03*** (0.01)	-0.03*** (0.01)	-0.02*** (0.01)	-0.03*** (0.01)	-0.03*** (0.01)	-0.01 (0.01)	-0.02*** (0.01)	-0.02*** (0.01)
leverage x 1934-1938	-0.09*** (0.01)	-0.07*** (0.01)	-0.07*** (0.01)	-0.08*** (0.01)	-0.09*** (0.01)	-0.02** (0.01)	-0.07*** (0.01)	-0.07*** (0.01)
leverage x 1941-1943	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.00 (0.01)
City FE	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
1930 Pop x Year	✓	✓	✓	✓	✓	✓	✓	✓
Δ1920-30 Pop x Year	✓	✓	✓	✓	✓	✓	✓	✓
Revenue	✓	✓	✓	✓	✓	✓	✓	✓
Source x Year	✓	✓	✓	✓	✓	✓	✓	✓
R-sq (within)	0.67	0.62	0.65	0.60	0.60	0.59	0.63	0.65
N	7,959	10,203	9,415	9,053	10,039	9,271	10,295	10,086
Mean(y)	3.70	3.57	3.70	3.43	3.54	3.72	3.62	3.65
SD(y)	0.81	0.74	0.74	0.67	0.72	0.71	0.76	0.75
Mean(x)	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
SD(x)	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998
Excluded:	CA	CENSUS	IN	MA	NYCITY	NYTOWN	NYVIL	OH
Standard errors in parentheses								
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$								

Panel B: Financial leverage (1929) and capital outlays, excluding sources one by one								
	Bonds / Assessed Value							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
leverage x 1924-1926	0.07 (0.06)	0.04 (0.06)	0.05 (0.06)	0.09 (0.06)	0.10 (0.07)	-0.01 (0.04)	0.05 (0.06)	0.05 (0.05)
leverage x 1929-1933	-0.09* (0.05)	-0.11** (0.05)	-0.08* (0.05)	-0.08 (0.05)	-0.09 (0.06)	-0.13*** (0.04)	-0.09** (0.04)	-0.10** (0.05)
leverage x 1934-1938	-0.16*** (0.05)	-0.17*** (0.06)	-0.17*** (0.05)	-0.04 (0.06)	-0.16** (0.07)	-0.26*** (0.04)	-0.17*** (0.05)	-0.16*** (0.05)
leverage x 1941-1943	-0.23** (0.09)	-0.22*** (0.08)	-0.20** (0.08)	-0.22** (0.09)	-0.07 (0.09)	-0.25*** (0.08)	-0.22*** (0.08)	-0.19** (0.08)
City FE	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
1930 Pop x Year	✓	✓	✓	✓	✓	✓	✓	✓
Δ1920-30 Pop x Year	✓	✓	✓	✓	✓	✓	✓	✓
Revenue	✓	✓	✓	✓	✓	✓	✓	✓
Source x Year	✓	✓	✓	✓	✓	✓	✓	✓
R-sq (psuedo)	0.57	0.57	0.58	0.59	0.55	0.56	0.58	0.58
N	7,959	10,203	9,415	9,053	10,039	9,271	10,295	10,086
Mean(y)	6.79	5.28	6.33	4.93	5.32	6.14	5.57	5.85
SD(y)	12.88	11.64	12.43	12.11	9.56	11.65	11.49	12.02
Mean(x)	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
SD(x)	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998
Excluded:	CA	CENSUS	IN	MA	NYCITY	NYTOWN	NYVIL	OH
Standard errors in parentheses								
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$								

Note: This table presents the estimation results of Equation 4.1 where the outcome variable is log per-capita total service expenditure in columns (1) - (5) in Panel A or log per-capita revenue generated from debt issuance ("debt receipts"), both estimated using OLS. In panel B, the outcome variable is per-capita capital outlays, and the model is estimated using Poisson pseudo-maximum likelihood. Each column represents the results when cities from the source identified in the last row are dropped. Standard errors are clustered at the city level. Column (1) contains only city and year fixed effects, while columns (2)–(5) add 1930 population-year fixed effects, 1920s population growth-year fixed effects, contemporaneous and lagged log total non-debt per capita revenue, region-year fixed effects. Leverage is standardized (mean zero and standard deviation of one) bonded debt over assessed property values in 1929.

A.6 Outlay and Demand Proxies

Table A6: Capital Expenditure 1930-1935 and Demand Proxies

	(1)	(2)
Debt share, 1925 - 1929	-0.43*	
	(0.23)	
I(Incorporated after 1900)		-0.35**
		(0.17)
Debt (1930)	✓	✓
Region FE	✓	✓
R-sq (within)	0.45	0.54
N	373	380
Standard errors in parentheses		
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$		

Note: This table presents the results of a regression of total per-capita outlay expenditure (1930-1935) on the share of debt issued in 1925-1929 (column 1) and an indicator variable denoting city incorporation after 1900 (column 2). Region fixed effects and total per-capita debt in 1930 are included as controls. Heteroskedasticity robust standard error are shown in parentheses.

A.7 Balance Test on Bond Shocks - 1929 Variables

Table A7

	All	Shock <Median	Shock >Median	Difference
Shock (All)	0.38 (0.15)	0.26 (0.08)	0.51 (0.10)	-0.25*** (0.00)
Log(Population) (1930)	10.32 (1.30)	10.57 (1.49)	10.07 (1.02)	0.50*** (0.00)
Tax revenue	3.88 (0.62)	3.85 (0.59)	3.91 (0.66)	-0.06 (0.32)
Assessed value of property	7.97 (0.45)	7.94 (0.50)	7.99 (0.39)	-0.05 (0.26)
Payments: Total service	3.81 (0.61)	3.81 (0.60)	3.81 (0.63)	-0.00 (0.99)
Bond interest rate (1920s), unweighted	4.76 (0.45)	4.79 (0.39)	4.74 (0.51)	0.05 (0.26)
Bond interest rate (1920s), weighted	4.70 (0.46)	4.73 (0.42)	4.66 (0.50)	0.08 (0.11)
Observations	382	190	192	382

Notes: This table presents summary statistics and a t-test between the above-median *shock* and below-median *shock* groups of cities. The variable *shock* is defined as the proportion of 1929 city debt that was contractually obligated to be repaid between 1930 and 1935, inclusive. Tax revenue, assessed value, and payments are in log per-capita dollars. Bond interest rates are percentage points. Weighted indicates weighted measures by log city population in 1930.

A.8 Moody Leverage and local services, excluding cities in default (1930-1937)

Table A8

Panel A: Moody leverage and service expenditure

	Bonds / Assessed Value	Int/Rev	Debt/Rev	Debt/Capita
	(1)	(2)	(3)	(4)
moodyleverage x 1924-1926	0.02 (0.03)	0.00 (0.02)	0.01 (0.03)	-0.01 (0.01)
moodyleverage x 1929-1933	-0.03** (0.01)	-0.01 (0.01)	-0.03*** (0.01)	-0.01 (0.01)
moodyleverage x 1934-1938	-0.04* (0.02)	-0.02 (0.02)	-0.05** (0.02)	-0.03 (0.02)
moodyleverage x 1941-1943	-0.02 (0.02)	-0.03 (0.03)	-0.06** (0.02)	0.00 (0.02)
City FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
1930 Pop x Year	✓	✓	✓	✓
Δ1920-30 Pop x Year	✓	✓	✓	✓
Revenue	✓	✓	✓	✓
Region x Year	✓	✓	✓	✓
R-sq (within)	0.71	0.70	0.71	0.75
N	3,248	3,260	3,262	3,262
Mean(y)	4.12	4.13	4.12	4.12
SD(y)	0.60	0.59	0.59	0.59

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Panel B: Moody leverage and capital outlay

	Bonds / Assessed Value	Int/Rev	Debt/Rev	Debt/Capita
	(1)	(2)	(3)	(4)
moodyleverage x 1924-1926	0.03 (0.06)	-0.04 (0.08)	-0.09** (0.05)	0.07 (0.06)
moodyleverage x 1929-1933	-0.30*** (0.08)	-0.20 (0.13)	-0.23*** (0.08)	-0.00 (0.06)
moodyleverage x 1934-1938	-0.37*** (0.08)	-0.23* (0.14)	-0.42*** (0.10)	-0.16** (0.07)
moodyleverage x 1941-1943	-0.04 (0.11)	0.00 (0.14)	-0.13 (0.12)	-0.09 (0.09)
City FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
1930 Pop x Year	✓	✓	✓	✓
Δ1920-30 Pop x Year	✓	✓	✓	✓
Revenue	✓	✓	✓	✓
Region x Year	✓	✓	✓	✓
R-sq (pseudo)	0.52	0.51	0.52	0.51
N	3,248	3,260	3,262	3,262
Mean(y)	17.86	17.93	17.91	17.76
SD(y)	23.26	23.42	23.37	22.34

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

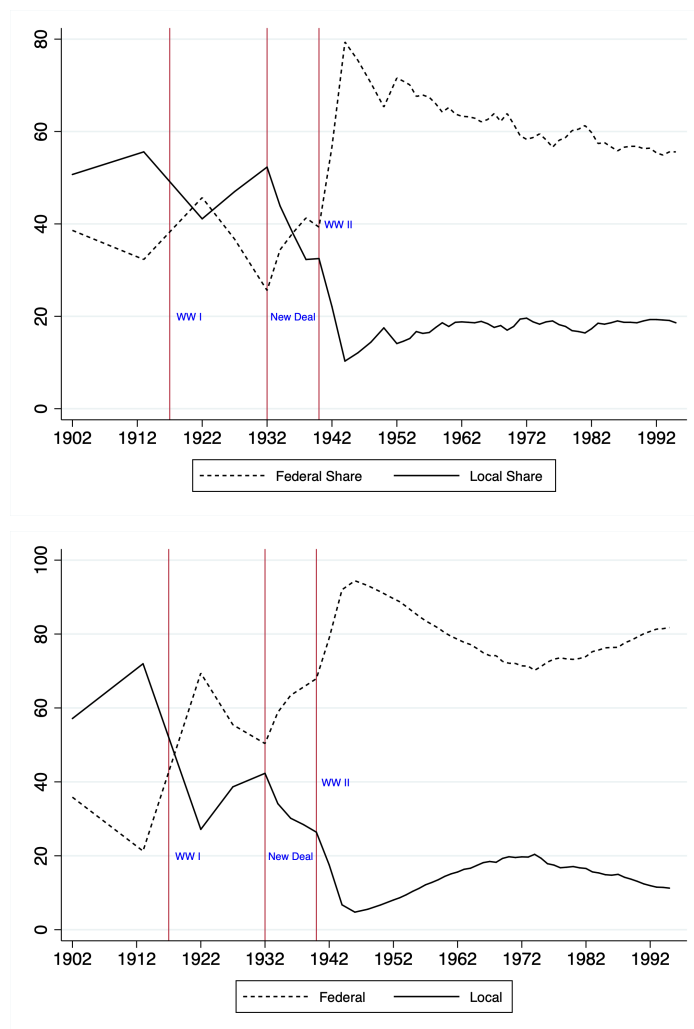
Note: This table presents the estimation results of Equation 5.2 where the outcome variable is log per-capita total service expenditure (Panel A, estimated using OLS) or real per-capita capital outlay (Panel B, estimated using Poisson pseudo-maximum). The sample excludes all cities the defaulted on at least one bond during 1930-1937. Control variables as the same as in Table III and include population, population growth, contemporaneous and lagged log total non-debt per capita revenue, region by year fixed effects. Pre-Depression financial leverage variable is specified in the header. Standard errors are shown in parentheses and are clustered at the city level.

B Online Appendix Figures

B.1 Revenue and Debt

Figure A.1

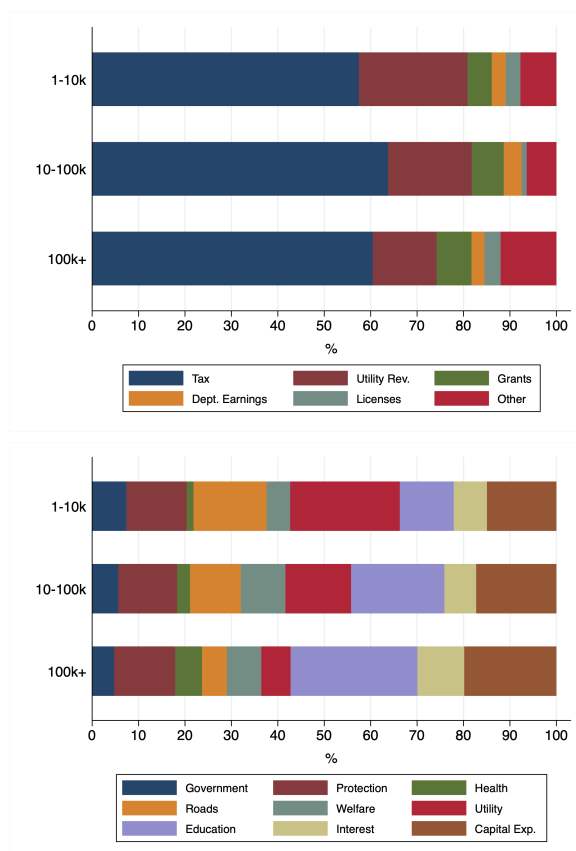
Figure A.2: Revenue [Top] and Debt [Bottom], % of Total



Note: This figure plots total local and federal government revenue and debt as percent of total in the U.S. in the 20th century. Author calculations of data in Historical Statistics of the United States, Series Ea125–131. State government shares are not shown.

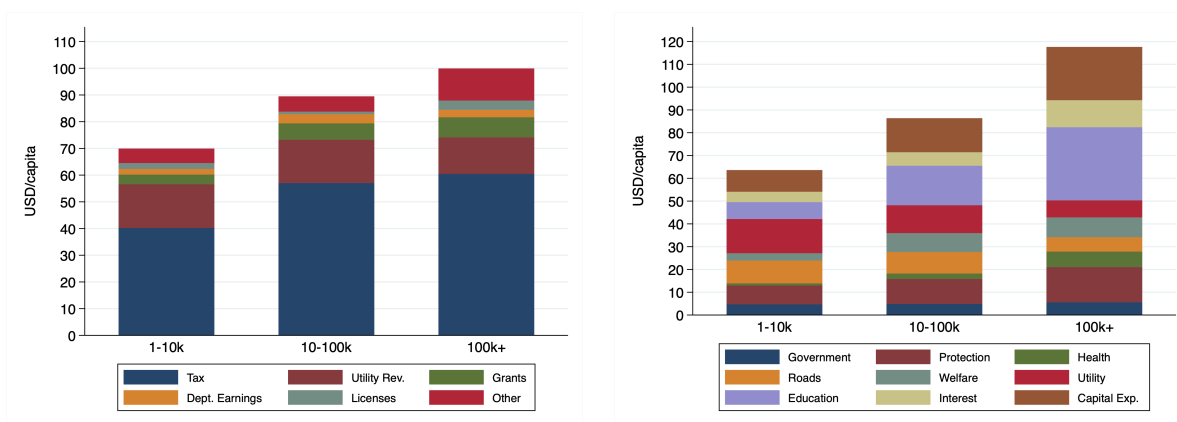
B.2 City Revenue and Payments

Figure A.3: Composition of City Revenue and Expenditure, 1930



Note: The figures show the average composition of city revenue and expenditure in 1930 by population category. Tax includes property tax, local personal income tax, local corporate income tax, and excise taxes. Utility revenue is income from publicly-owned water, gas, and electric utilities. Department earnings is income from government operations. Revenue from special projects is user fees (e.g., tolls). Grants include intergovernmental transfers from the State and Federal governments. Roads expenditure is for maintenance and improvement of roads. Capital expenditure includes construction and land purchases. Protection includes police and fire departments. Health includes all expenses related to the health department and sanitation services. Welfare includes all unemployment benefits, almshouses, and charity hospitals.

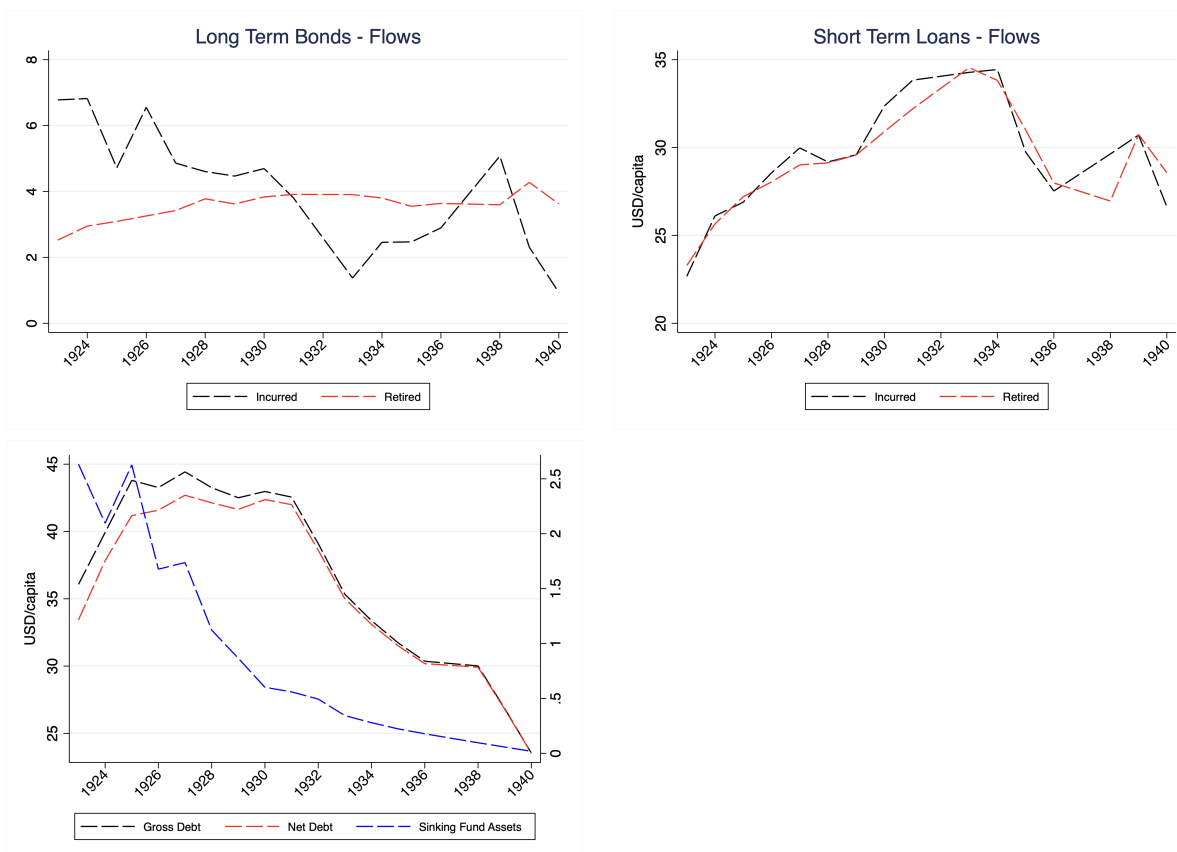
B.3 Composition of City Revenue and Expenditure, 1930



Note: The figures show the average per-capita level (in 1930 dollars) of city revenue and expenditure in 1930 by population category. Tax includes property tax, local personal income tax, local corporate income tax, and excise taxes. Utility revenue is income from publicly-owned water, gas, and electric utilities. Department earnings is income from government operations. Revenue from special projects is user fees (e.g., tolls). Grants include intergovernmental transfers from the State and Federal governments. Roads expenditure is for the maintenance and improvement of roads. Capital expenditure includes construction and land purchases. Protection includes police and fire departments. Health includes all expenses related to the health department and sanitation services. Welfare includes all unemployment benefits, almshouses, and charity hospitals.

B.4 Incurred and retired municipal debt in Massachusetts

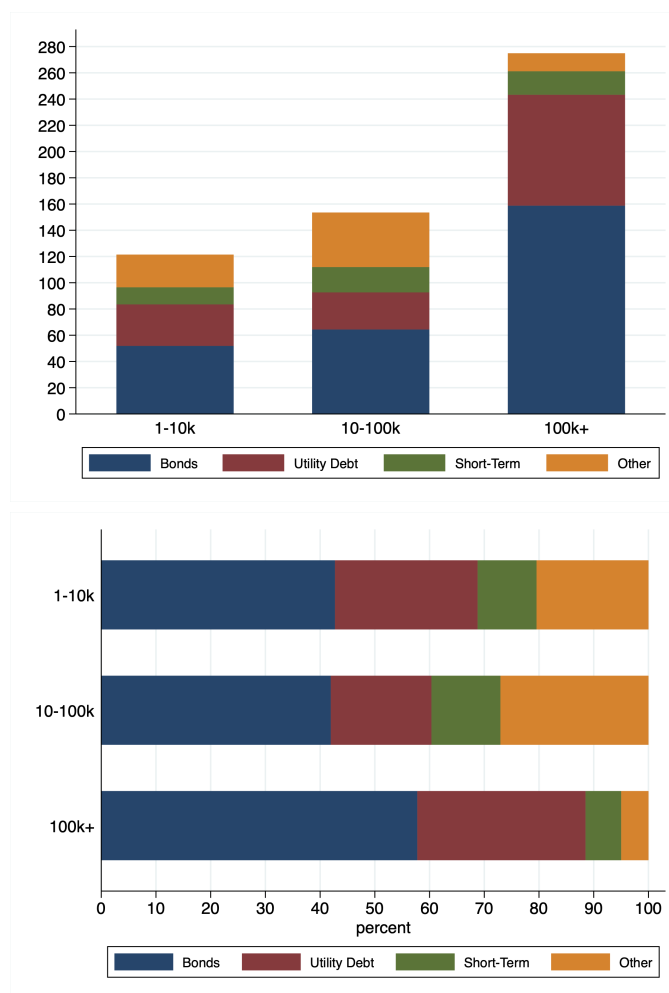
Figure A.4



Note: These figures present the average per-capita debt flows across 108 cities in Massachusetts. Incurred denotes all new bonds issued, and retired denotes all outstanding bonds which were paid off fully during the year. Sinking fund assets consist of cash savings and government securities. Net debt is gross debt minus the sinking fund assets.

B.5 Breakdown of Balance Sheet Debt

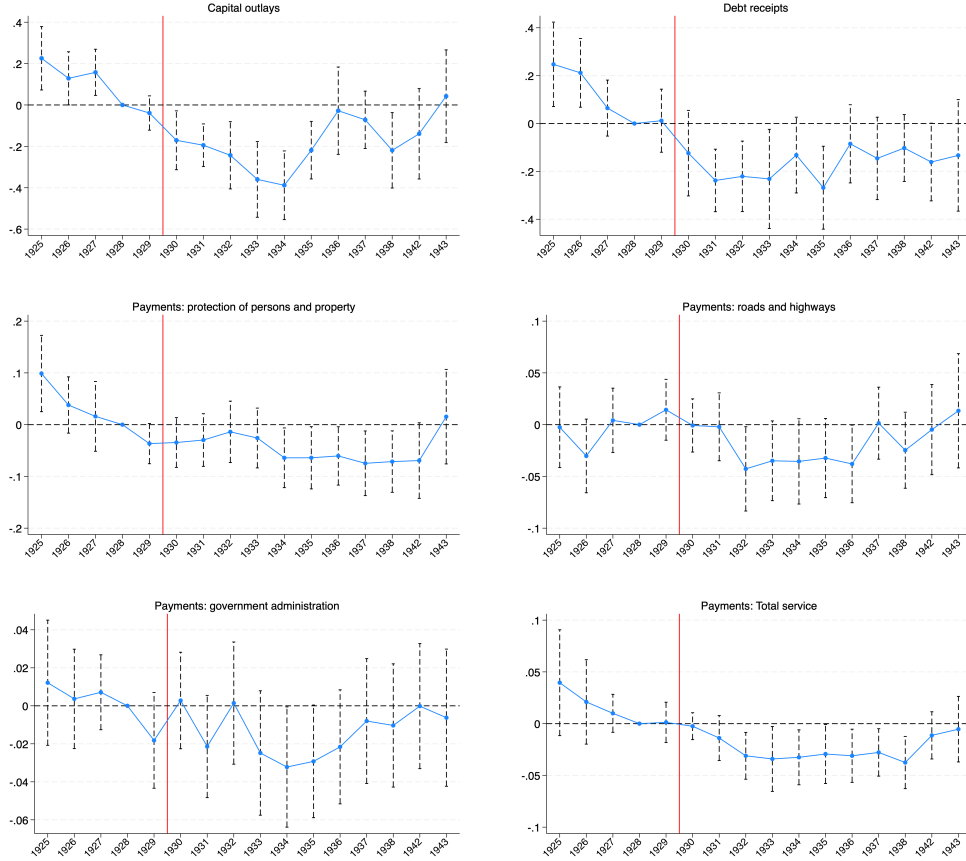
Figure A.5



Note: The figures show the average composition of city debt (in 1930 dollars) in 1930 by population category. Bonds are those long-term (typically over 5 years) issued for general funding purposes or for specific infrastructure projects. Short-term loans are those with a duration below 5 years, primarily collateralized by anticipated tax revenue. Utility debt is all debt incurred by public utilities. Other debt includes any debt incurred by special taxing districts within the city, e.g., water reclamation or sewage districts.

B.6 Moody leverage and various categories of expenditure and debt revenue

Figure A.6



Note: This figure shows the estimated coefficients on $period_{j=t} \times leverage_{29,i}$ in Equation 4.1 where period denotes each individual year using Moody Leverage as the *leverage* measure. Moody Leverage is total municipal debt in 1929 multiplied by *shock* as defined in Equation 5.1. Payment panels are estimated using OLS and Capital Outlays panel is estimated using Poisson pseudo-maximum. Total service expenditure excludes capital expenditure or financing costs. Roads and highways refers to all expenditure for the maintenance of public roads and highways. Protection of persons and property denotes police, jails, and firefighting costs. Capital outlay is expenditure costs for construction projects. All standard errors are clustered at the city level. Ninety percent confidence intervals are denoted by dashed lines. The omitted year and year-post interaction is 1928. The red vertical line denotes the official start of the Great Depression in the U.S.

C Local Government Sources

City-level data on tax revenues, expenditures, and debt come from various publications produced at the state and federal levels. I describe them in this section.

Massachusetts. Data for Massachusetts cities appear in the report *Statistics of Municipal Finances* produced by the Department of Corporations and Taxation of the Commonwealth of Massachusetts. This annual report, first published in 1905, has three parts: list of financial transactions, cash balances, and debt for all cities (Part 1, around 40 cities), for all towns with a population of over 5,000 (Part 2, around 79 towns), and for all towns with a population under 5,000 (Part 1, around 237 towns). Due to budget constraints, this paper only uses data from Parts 1 and 2.

New York. Data for New York cities, towns, and villages appear in the report *Special Report on Municipal Accounts by the State Comptroller* produced by the New York Department of Audit and Control. This annual report is mandated by law (Article 3 of the General Municipal Law). It contains roughly 25 revenue and 25 expenditure variables across 57 cities, 527 villages, and 932 towns. Due to budget constraints, this project uses only the information for all cities and the largest 50 villages and towns.

Indiana. Data for Indiana cities are obtained from the *Statistical Report for the State of Indiana* compiled by the Division of Accounting and Statistics of the state of Indiana. This annual report aggregates, audits, and revises schedules filed by local officers. Of all the sources used in this project, this one is most limited in scope, with only 15 revenue and 24 expenditure variables. Until 1934, this report also contained judicial statistics of municipal and county courts. This publication contains data on roughly 95 cities.

Ohio. Data for Ohio cities come from the report *Comparative Statistics, cities of Ohio* produced by the Bureau of Inspection and Supervision of Public Offices of the State of Ohio. City auditors are required by law (section 291 of the General Code of Ohio) to report financial statements with the Bureau. The report contains four parts: (1) Receipts, (2) Expenditures, (3) Debt, and (4) Memorandum (supplementary data) and contains data for roughly 100 cities.

California. Data for California cities come from the report *Annual Report of Financial Transactions of Municipalities and Counties of California* produced by the Office of State Controller compiled by the authority of Chapter 550 of the State Code. This report contains detailed reports on payments and revenue sources for roughly 280 California cities.

Examples of services funded by expenditure category

This information accompanies the data provided by the Census Bureau in *Financial Statistics*.

- **Roads.** Maintenance of roads, snow removal, street lighting, and waterways.
- **Education.** All costs related to schools and libraries, supplementary to independent school districts.
- **Welfare.** Charities and poor relief, mental institutions.
- **Health.** Health department, prevention/treatment of communicable diseases, collection of vital statistics, food regulation and inspection.
- **Sanitation.** Sewage disposal, street cleaning, garbage collection, public restrooms.
- **Fire.** Wages of fireman and water costs.
- **Police.** Wages of police officers, building inspectors, employment agencies, examiners.
- **Miscellaneous.** Pension expenses, burial of soldiers, administration of trust funds, judgments against the city.
- **Utility** Utilities such as water supply systems, electricity, gas supply, docks, cemeteries, railways.
- **Recreation.** Maintenance of parks and general recreational areas.
- **Government** Wages of all government workers (council members, mayors, treasurer, judges, etc), cost of elections, and rent on government buildings.

D Moody's

Bond-level data was collected from the publication *Moody's Manual of Governments*. The main limitation of this data source is that bonds are not updated annually by Moody's. For example, I observe (in the 1929 Manual) Chicago bonds that *had* \$50,000 remaining during the years 1924–1940, but the amount that is still left to be unpaid by 1929 must be estimated by assuming a plausible repayment scheme from 1924 to 1929.

First, I assume that bonds that are not paid off serially (i.e., have one maturity date, “term” bonds) remain on the city's books at full value. Second, I assume a linear repayment structure for bonds that are listed as serial, and I assign the following weight to each bond:

$$weight_{i,t} = \begin{cases} \frac{Y_i(N)-year_t}{Y_i(N)-Y_i(0)} & \text{if type = serial} \\ 1 & \text{if type = term} \end{cases} \quad (D.1)$$

where $Y_i(0)$ is the first year of bond i 's repayment schedule and $Y_i(N)$ is the last. For example, a \$10,000 bond that matures between 1930–1940 is assigned a weight of 0.9 in 1931, as 90% of the bond is assumed to be outstanding in 1931. For each city, I sum all weight-adjusted bonds to arrive at an aggregate debt figure in each year.

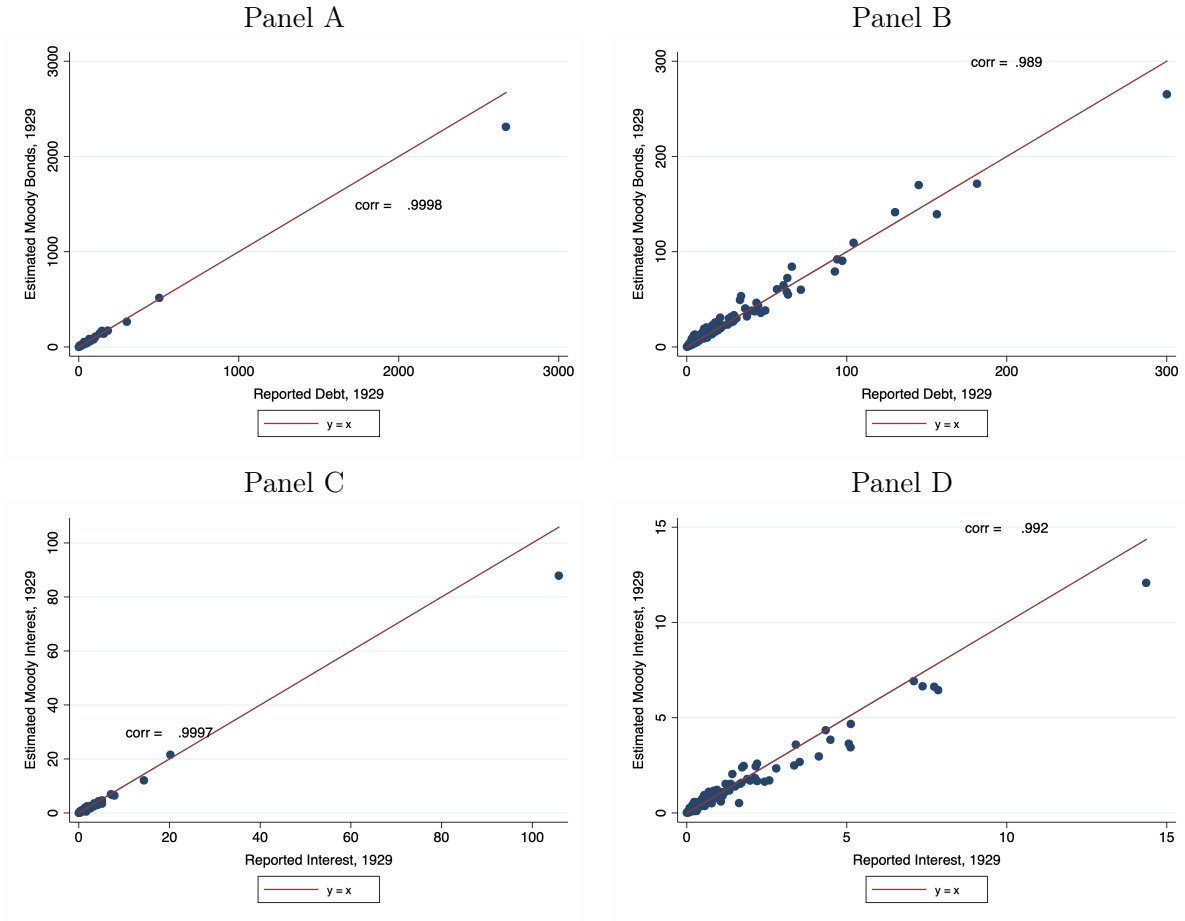
$$Moody_{j,t} = \sum_{\forall i \in j} weight_{i,t} \times face_i \quad (D.2)$$

where the sum is over all reported bonds for city j that have not year matured fully by year t . Furthermore, I compute the total implied interest payment by multiplying the interest rate by the face value and summing across all bonds.

To validate this exercise, I investigate the correlation between imputed Moody aggregates and the totals reported in the financial transactions data. Figure A.7 reports this relationship for total outstanding debt and total interest payments for 1929. With no measurement error, all cities would lie on the 45 degree line. Though imperfect, this imputation strategy produces totals that are close to the truth; the correlation coefficients are 0.98 for debt and interest payments, respectively.

The mean interest rate paid is 4.53. The average bonds in 1929 were issued in 1918. 36% of the bonds were “term” bonds—repaid in full at the end of the maturity period—and the remaining 64% were “serial” bonds—repaid proportionally over time, typically through annual contributions to city-established trust funds called “sinking funds.” The median nominal face value of these outstanding

Figure A.7: Moody Bonds vs. Reported



Note: This figure shows the scatterplots of actual reported bonded debt and interest as reported in the financial transactions data vs. estimated bonded debt and interest using data from the *Moody's* Manuals. The red line is the 45 degree line. The graphs on the left (Panels A and C) include outliers (New York and Philadelphia), while the graphs on the right (Panels B and D) exclude them. The sample includes 341 cities. Both axes are in millions of nominal U.S. dollars.

bonds in 1929 was \$261,000.