Public Pensions and State Government Debt Spreads

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Research Question

- How much do "off balance sheet" public pension liabilities contribute to borrowing costs?
- How are markets incorporating them into prices?
- How do the "effects" compare with long-term bonded debt?
- How much are states already paying in borrowing costs due to underfunding?
- How does local pension funding affect state spreads?

Motivation

- Over $\$1.1$ trillion in state bonds outstanding in U.S.
- Schwert (2017) suggests municipal debt spreads are primarily default risk.
- U.S. state-level underfunded pension liabilities of over $\$1.75$ trillion.
- Novy-Marx and Rauh (2012) show negative relationship between debt spreads and pension assets in financial crisis.
- Legal priority of obligations is not certain.
- "... Illinois is simply the poster child for what is wrong with states." - USA Today (July 12, 2017)

Pension vs. Debt Obligations

- Debt spreads (yields over treasuries) are directly tied to **bonded debt** obligations.
- States also have large contractual public pension obligations (liabilities).
- Unclear whether bondholders or pension members take priority in fiscal crisis.
- Unions may extract rents during or prior to default, leading to lower recovery or higher likelihood of default.
- Detroit Bankruptcy - both sides ended up taking haircuts.

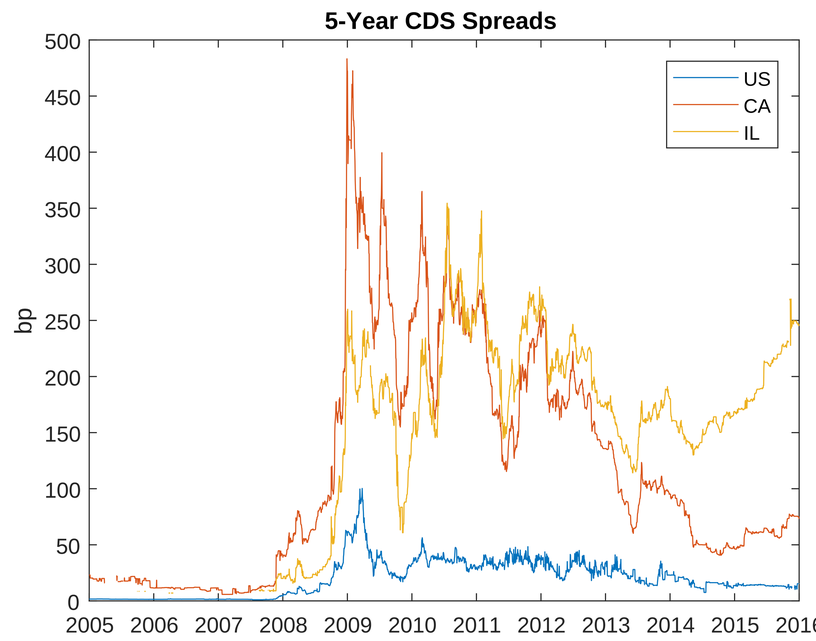
Data

- Use Credit Default Swaps (CDS) on state government as proxy for borrowing costs/default risk.
- Standardized contracts: five-year maturity, use restructuring clause.
- Use annual observations from Markit corresponding with end of FY (usually June).
- Collect fiscal data line items from state government Comprehensive Annual Financial Reports (CAFR) from 2002-2017 for 27 states with traded CDS.
- Supplement with public pension plan data from Boston College's Center for Retirement Research.
- Currently expanding analysis to all GO Bonds (results consistent).

Pension Funding Time-Series Data

	(PA-PL)/GDP				
Year	Mean	StDev.	Min.	Med.	Max
2005	-0.03	0.03	-0.10	-0.03	0.02
2006	-0.03	0.03	-0.11	-0.03	0.01
2007	-0.03	0.03	-0.10	-0.03	0.01
2008	-0.04	0.03	-0.09	-0.03	0.02
2009	-0.06	0.04	-0.13	-0.05	0.01
2010	-0.06	0.04	-0.15	-0.05	0.01
2011	-0.06	0.04	-0.13	-0.06	0.01
2012	-0.07	0.04	-0.14	-0.06	0.01
2013	-0.07	0.05	-0.15	-0.06	0.00
2014	-0.06	0.04	-0.15	-0.05	0.00
2015	-0.06	0.04	-0.16	-0.06	-0.00
2016	-0.07	0.05	-0.16	-0.06	-0.00

CDS Spread Examples



Main Specification

- What is the relationship between fiscal health, pension funding (Assets - Liabilities), and CDS spreads?

$$Spread_{s,t} = \alpha_t + \beta \frac{PA - PL}{GDP} + \gamma' X_{s,t} + \epsilon_{s,t}$$

- All deficits scaled by GDP.
- Explore marginal impact of ST vs. LT solvency concerns.
- Year fixed effects pick up common variation. Control for other fiscal conditions.
- 208 Annual CDS/Fiscal Data observations (s for state, t for year) from 2005 - 2016.
- All RHS variables scaled by one standard deviation, for interpretation.
- Rev-Exp: Revenues - Expenses; CA - CL: Current Assets - Current Liabilities; A-LTL: Long Term Assets - Long Term Liabilities; PA-PL: Pension Assets - Pension Liabilities

Main Results

	(1)	(2)	(3)	(4)
Rev-Exp	-29.32***	-29.32***	-7.879	-7.879
	(-6.00)	(-4.64)	(-1.72)	(-1.85)
CA-CL	-5.676	-5.676	-3.503	-3.503
	(-1.64)	(-1.23)	(-0.99)	(-0.77)
A-LTL	0.629	0.629	-12.93**	-12.93*
	(0.14)	(0.11)	(-3.13)	(-2.47)
PA-PL	-19.01***	-19.01**	-18.15***	-18.15**
	(-5.13)	(-3.36)	(-5.62)	(-3.33)
N	208	208	206	206
R^2	0.340	0.340	0.594	0.594
Within R^2			0.335	0.335
Year FE	No	No	Yes	Yes
Cluster	-	State	-	State

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

- Directional relationships are "economically" consistent with distance to default.
- Strongest statistical correlation for longer-term considerations.
- Pension effects are independent of economic and "other" fiscal conditions.
- Robust to other economic indicators, weighted least squares, alternative scaling (e.g. income/revenue), and running in changes.

Instrumental Variables - Pension Returns

Use pension asset returns (exogenous shock to pension funding not associated with fiscal conditions cross-sectionally) as an instrument for funding status, and perform regression in changes (interpertation is no longer one sd), to test "causal" relationship.

	(1)
$\triangle$ PA-PL	-125.4***
	(-3.87)
$\triangle$ R-E	-17.29*
	(-2.29)
$\triangle$ CA-CL	4.609
	(0.48)
$\triangle$ A-LTL	-6.678
	(-1.24)
N	180
Year FE	Yes
Cluster	State
IV	Pens. Ret.

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Relationship with Local (sub-State) Pensions

	(1)	(2)	(3)	(4)	(5)
Rev-Exp	-7.879	-9.071	-5.813	-8.032	-5.471
	(-1.85)	(-0.94)	(-0.65)	(-1.92)	(-0.61)
CA-CL	-3.503	3.615	-0.684	-3.717	0.00910
	(-0.77)	(0.92)	(-0.13)	(-0.81)	(0.00)
A-LTL	-12.93*	-24.47*	-13.56	-12.49*	-12.87
	(-2.47)	(-2.75)	(-1.94)	(-2.14)	(-1.89)
PA-PL	-18.15**		-15.95*	-18.14**	-16.97**
	(-3.33)		(-2.62)	(-3.27)	(-3.10)
PL Local Def/GDP		-15.11	-16.01*		-17.08*
		(-1.73)	(-2.66)		(-2.89)
Proactive				3.589	-7.263
				(0.34)	(-0.54)
N	206	140	140	206	140
R^2	0.594	0.586	0.611	0.593	0.609
Within R^2	0.335	0.344	0.382	0.332	0.380
Year FE	Yes	Yes	Yes	Yes	Yes
Cluster	State	State	State	State	State

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Proactive is indicator for states that have active policies for aiding municipalities in Chapter 9 bankruptcy.

Magnitude of Relationship

- One standard deviation "improvement" in pension funding ratio, leads to 18.15 bps decrease in credit spreads (20% of average spread).
- For Illinois, if they moved to full funding, they would have a 60 bps improvment in spreads.
- They are paying $\sim \$157$ million in borrowing costs due to unfunded pension liabilities, or 9% of total debt service.
- If you assume a 40% loss given default 60 bps $\sim$ 24 bps change in risk neutral probability of default (an increase of 25%).

Conclusion

- Pension funding has strong, robust relationship (similar to bonded debt) with spreads, even after controlling for fiscal and economic conditions.
- Local pension liabilities matter, and are associated with higher spreads at the state level.
- Borrowing costs are already affected by underfunded pensions.