

Municipal Finance Conference 2019

Learning about Default: Municipal Spillovers from Puerto Rico

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Motivation

- Municipal debt market is over \$3.8 trillion. Crucial source of financing for many government units in U.S.
- Legal structure for state-level bankruptcy is non-existent and without (modern-day) precedent
- Legal uncertainty may contribute to borrowing costs for municipal governments ⇒ policy implications.
- PR provides unique environment to explore relationship between borrowing costs and legal uncertainty.
- "Some of the legal **precedents** potentially being set, whether or not technically binding outside Puerto Rico or the 1st Circuit, erode the expectations and good order of the municipal bond marketplace that finances the activities of states and municipal instrumentalities nationwide." (Len Weiser-Varon, William Kannel, Bond Buyer, March 21, 2018)

Research Question

- Do U.S. state municipal markets react to news in Puerto Rico?
- Do state bond markets see events in Puerto Rico as setting a precedent for future state default events?
- How were these effects related to the credit risk of each state prior to the event?
- More generally: What is the effect of legal uncertainty on municipal debt prices?

- Statistically significant reactions to events surrounding Puerto Rico legislation.
- Puerto Rico may be setting precedent for state governments, which markets are reacting to.
- Effects are consistently negative suggesting this may be a reduction of uncertainty channel.
- Swain decision evidence is particularly strong (increase in spreads).
- No evidence of interaction effects.
- My regressions are subject to a lot of noise, but a first step in understanding legal spillovers.

How to Think About Legal Effects?

- Riskiness of debt (i.e. yield) depends on probability of default and expected recovery.
- If news increases probability of default or decreases recovery rate, should result in increase in spread (and vice versa).
- Decreases in uncertainty about probability of default or recovery, should decrease risk premia.
- Legal shocks: Investors "learn" about debt recovery and default rates from legal decisions within own state and other states.
- Shocks may have different effects based on current distance-to-default.

- See Chari, Leary, Phan (2017) for more comprehensive survey.
- For individual event analysis, focus on four main events:
 - Puerto Rico Public Corporation Debt Enforcement and Recovery Act (Recovery Act - June 30, 2014): PR courts create legal structure for agencies (state owned corporations) of PR to restructure debt.
 - Debt Moratorium and Financial Recovery Act (Debt Act - April 6, 2016): Law attempted to allow PR to stop making debt payments.
 - PR Oversight, Management, and Economic Stability Act (PROMESA - June 30, 2016): Enacted by US Congress, creates bankruptcy framework under which PR could restructure debts (Passed by House June 9, 2016).
 - Judge Swain Revenue Bond Decision (Swain - January 30, 2018): Judge Swain rules that special revenue bond payments are "optional" by Puerto Rico during bankruptcy proceedings.

- Use universe of state municipal bond transaction data from EMMA from 2014-2018.
- Mergent: Individual bond characteristics for controls: callability, put options, issue size, insurance information, coupon type.
- Limit sample to tax-exempt, non-insured, general obligation bonds (for Swain decision I use revenue bonds only), with fixed coupons.
- Convert yields to pre-tax yield. Top marginal total tax rate by state/year from NBER.
- Generate credit spread by subtracting maturity matched risk-free rate. Risk-free rate is interpolated treasury rate.
- Credit rating's from Moody's. Low rating defined as below Aa.

Individual Event Empirical Strategy

Methodology based on Gao and Murphy (2018).

- For each event at date T , estimate the following:

$$s_{i,t} = \alpha + \beta I_t + \gamma' X_{i,t} + \epsilon_{i,t}$$

- where $I_t = 1$ if $t \geq T$ and 0 otherwise.
- Cluster standard errors at CUSIP and day level.
- Controls ($X_{i,t}$) include TTM, issue size, and indicators for bond insurance, callability, and redemption type.
- Perform for various windows $t \in [T - x, T + x]$.
- Additional test for interaction with low credit quality:

$$s_{i,t} = \alpha + \beta I_t + \phi I_t \times (LowRating)_{i,t} + \gamma' X_{i,t} + \epsilon_{i,t}$$

	(1)	(2)	(3)	(4)	(5)	(6)
Post-Ruling	-3.328 (-1.93)	-3.328 (-1.64)	-3.328 (-1.45)	-6.378** (-2.66)	-8.301** (-2.95)	-8.301 (-2.11)
N	37295	37295	37295	18629	12374	12374
R ²	0.267	0.267	0.267	0.309	0.302	0.302
Cluster	-	CUSIP	Date	CUSIP	CUSIP	Date
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Window	30 days	30 days	30 days	15 days	10 days	10 days

t statistics in parentheses

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

	(1)	(2)	(3)	(4)	(5)	(6)
Post-Ruling	-7.954*** (-5.11)	-7.954*** (-4.33)	-7.954** (-3.04)	-7.396** (-3.04)	-4.728 (-1.80)	-4.728 (-1.63)
N	41482	41482	41482	21251	14491	14491
R ²	0.168	0.168	0.168	0.142	0.154	0.154
Cluster	-	CUSIP	Date	CUSIP	CUSIP	Date
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Window	30 days	30 days	30 days	15 days	10 days	10 days

t statistics in parentheses

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

PROMESA (Final Passage): 6/30/2016

	(1)	(2)	(3)	(4)	(5)	(6)
Post-Ruling	-7.691*** (-4.15)	-7.691*** (-3.92)	-7.691* (-2.56)	-4.213 (-1.62)	4.353 (1.41)	4.353 (1.30)
N	37137	37137	37137	18895	12058	12058
R^2	0.115	0.115	0.115	0.106	0.111	0.111
Cluster	-	CUSIP	Date	CUSIP	CUSIP	Date
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Window	30 days	30 days	30 days	15 days	10 days	10 days

t statistics in parentheses

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

	(1)	(2)	(3)	(4)	(5)	(6)
Post-Ruling	7.837*** (7.45)	7.837*** (6.77)	7.837*** (4.82)	8.080*** (5.84)	6.738*** (3.93)	6.738 (2.13)
N	50770	50770	50770	27506	18521	18521
R ²	0.221	0.221	0.221	0.222	0.220	0.220
CUSIP FE	No	No	No	No	No	No
Cluster	-	CUSIP	Date	CUSIP	CUSIP	Date
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Window	30 days	30 days	30 days	15 days	10 days	10 days

t statistics in parentheses

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

	(1)	(2)	(3)	(4)	(5)	(6)
Post-Ruling	0.139 (0.07)	0.139 (0.06)	0.139 (0.06)	-2.822 (-1.20)	-4.030 (-1.50)	-4.030 (-1.17)
Low Rating	82.43*** (30.15)	82.43*** (13.97)	82.43*** (15.43)	85.80*** (12.87)	106.9*** (12.89)	106.9*** (5.20)
Post x Low. Rat.	124.4*** (27.04)	124.4*** (14.67)	124.4*** (17.49)	116.0*** (10.92)	95.22*** (8.26)	95.22*** (4.39)
N	37295	37295	37295	18629	12374	12374
R ²	0.330	0.330	0.330	0.375	0.377	0.377
Cluster	-	CUSIP	Date	CUSIP	CUSIP	Date
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Window	30 days	30 days	30 days	15 days	10 days	10 days

t statistics in parentheses

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

	(1)	(2)	(3)	(4)	(5)	(6)
Post-Ruling	-8.497*** (-5.83)	-8.497*** (-5.08)	-8.497** (-3.36)	-8.269*** (-3.75)	-6.432** (-2.81)	-6.432* (-2.27)
Low Rating	265.0*** (71.71)	265.0*** (20.82)	265.0*** (39.40)	241.7*** (17.46)	241.4*** (16.96)	241.4*** (32.44)
Post x Low. Rat.	-5.404 (-1.09)	-5.404 (-0.71)	-5.404 (-0.65)	11.08 (1.08)	16.61 (1.40)	16.61 (1.33)
N	41480	41480	41480	21251	14491	14491
R ²	0.334	0.334	0.334	0.282	0.312	0.312
Cluster	-	CUSIP	Date	CUSIP	CUSIP	Date
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Window	30 days	30 days	30 days	15 days	10 days	10 days

t statistics in parentheses

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

	(1)	(2)	(3)	(4)	(5)	(6)
Post-Ruling	-1.104 (-0.65)	-1.104 (-0.73)	-1.104 (-0.54)	4.515* (2.16)	7.002** (2.91)	7.002 (2.12)
Low Rating	304.3*** (88.45)	304.3*** (23.60)	304.3*** (46.15)	308.4*** (19.65)	298.5*** (17.82)	298.5*** (35.63)
Post x Low. Rat.	0.180 (0.03)	0.180 (0.02)	0.180 (0.02)	-11.76 (-1.05)	17.10 (1.11)	17.10 (0.90)
N	37118	37118	37118	18885	12056	12056
R ²	0.342	0.342	0.342	0.327	0.330	0.330
Cluster	-	CUSIP	Date	CUSIP	CUSIP	Date
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Window	30 days	30 days	30 days	15 days	10 days	10 days

t statistics in parentheses

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

Conclusion

- Statistically significant reactions to legislation around Puerto Rican default.
- Puerto Rico may be setting precedent for state governments which markets are reacting to.
- Swain decision has strongest evidence as it directly sets precedent.
- No evidence of interaction effects, could be due to high noise.
- First step in understanding role of legal precedent/uncertainty on state borrowing costs.