

# The End of Market Discipline? Investor Expectations of Implicit State Guarantees

**Viral Acharya**

New York University, CEPR and NBER

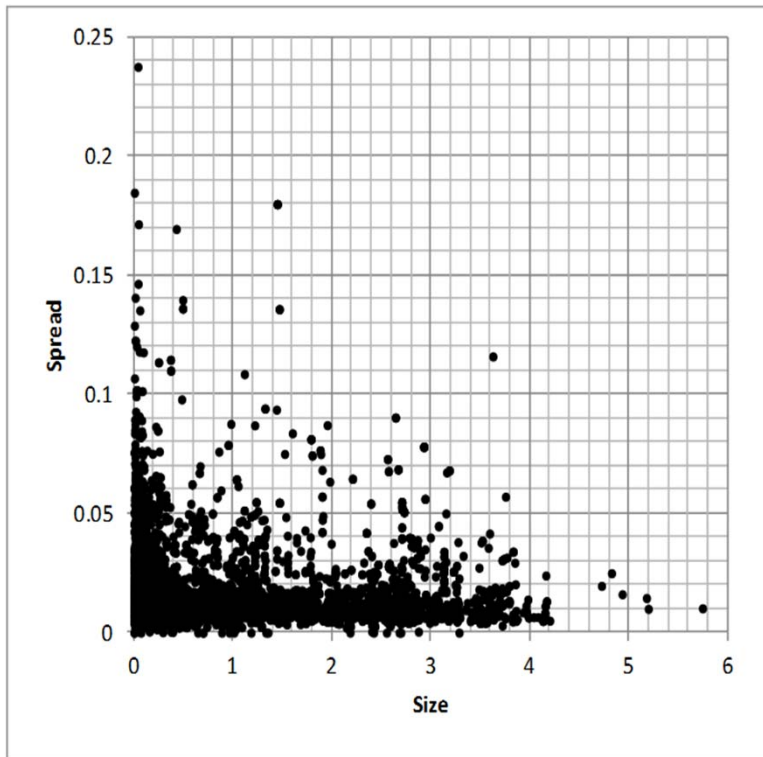
**Deniz Anginer**

World Bank, Virginia Tech

**A. Joseph Warburton**

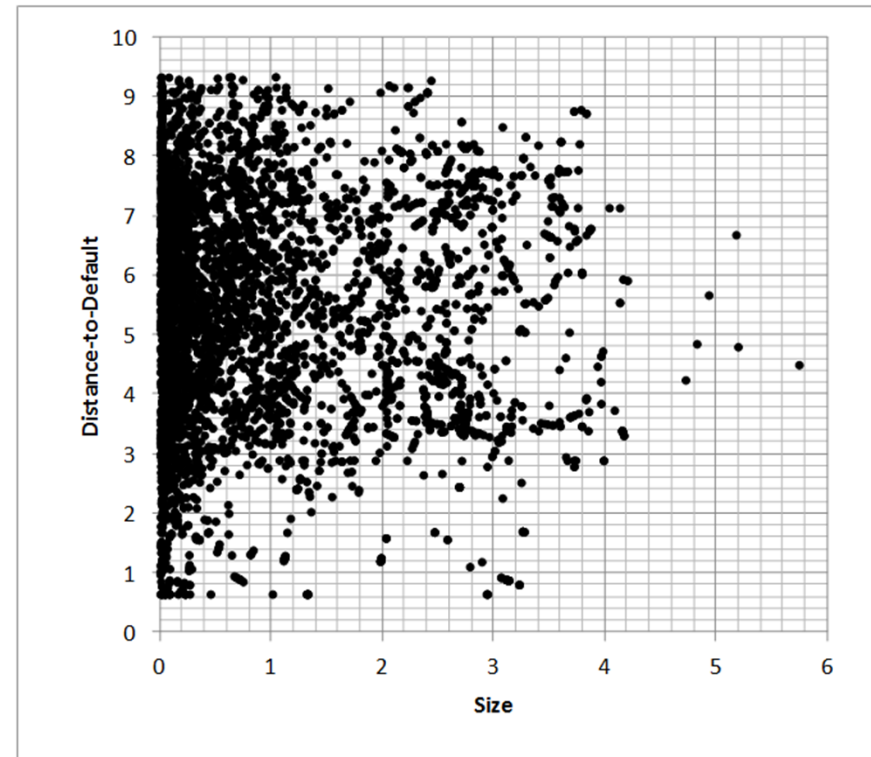
Syracuse University

## Size and Credit Spreads



- Larger Institutions have lower spreads

## Size and Risk



- No relationship between size and risk

## TBTF – Spread Regressions

VARIABLES	(2) spread	(3) spread	(5) spread	(6) spread	(7) spread	(8) spread
ttm	0.006 (0.004)	0.006 (0.004)	0.006 (0.004)	0.005 (0.003)	0.006 (0.004)	0.005 (0.005)
seniority	-0.209*** (0.063)	-0.192*** (0.062)	-0.193*** (0.062)	-0.185*** (0.059)	-0.163** (0.069)	-0.227*** (0.056)
leverage <sub>t-1</sub>	0.334 (0.362)	0.479 (0.354)	0.450 (0.359)	0.528*** (0.202)	0.462 (0.416)	-0.909* (0.546)
roa <sub>t-1</sub>	-18.415** (7.529)	-17.793** (7.176)	-18.091** (7.326)	-17.226*** (4.758)	-17.766** (8.957)	-20.248* (10.679)
mb <sub>t-1</sub>	0.018 (0.032)	0.018 (0.031)	0.018 (0.031)	0.019 (0.025)	-0.051 (0.069)	-0.178* (0.106)
mismatch <sub>t-1</sub>	0.057 (0.127)	-0.060 (0.124)	-0.023 (0.133)	-0.040 (0.101)	-0.060 (0.124)	0.607 (0.578)
def	1.668*** (0.118)	1.663*** (0.118)	1.662*** (0.118)	1.660*** (0.074)	1.706*** (0.127)	1.755*** (0.125)
term	0.097*** (0.024)	0.095*** (0.024)	0.094*** (0.024)	0.098*** (0.017)	0.094*** (0.024)	0.137*** (0.036)
mkt	0.398** (0.154)	0.404*** (0.153)	0.404*** (0.153)	0.406*** (0.139)	0.460*** (0.176)	0.325 (0.243)
mertondd <sub>t-1</sub>	-0.031* (0.017)	-0.035** (0.017)	-0.035** (0.017)	-0.034*** (0.011)	-0.031* (0.018)	-0.033 (0.025)
<b>size<sub>t-1</sub></b>	<b>-0.160** (0.080)</b>					
<b>size 90<sub>t-1</sub></b>		<b>-0.317* (0.169)</b>	<b>-0.519** (0.222)</b>			
<b>size 60<sub>t-1</sub></b>			<b>-0.203 (0.149)</b>			
<b>size 30<sub>t-1</sub></b>			<b>-0.151 (0.112)</b>			
<b>size top 10<sub>t-1</sub></b>				<b>-0.203*** (0.070)</b>		
<b>covar<sub>t-1</sub></b>					<b>2.625** (1.320)</b>	
<b>srisk<sub>t-1</sub></b>						<b>-0.936** (0.402)</b>
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Rating Dummies	Y	Y	Y	Y	Y	Y
Observations	46,308	46,308	46,308	46,308	42,909	27,948
R-squared	0.581	0.582	0.582	0.580	0.576	0.576

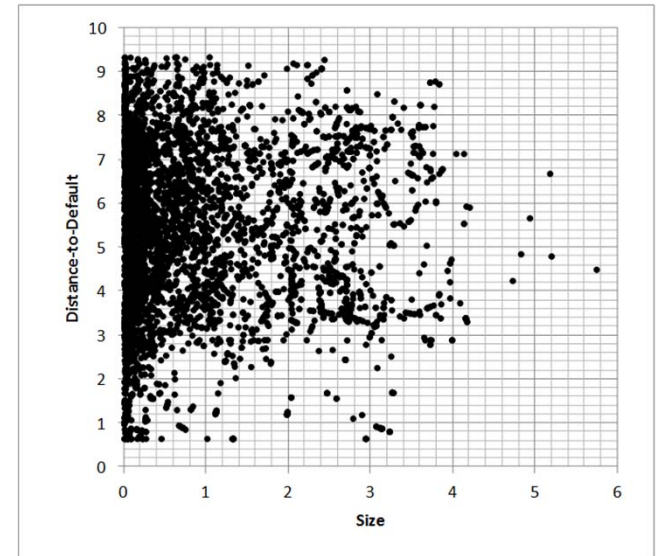
## TBTF – Risk Interaction

	(2)		(3)		(4)
	spread		spread		spread
ttm	0.004 (0.004)	ttm	0.006 (0.004)	ttm	0.004 (0.005)
sendum	-0.196*** (0.058)	sendum	-0.195*** (0.056)	sendum	-0.235*** (0.069)
leverage <sub>t-1</sub>	0.279 (0.254)	leverage <sub>t-1</sub>	0.309 (0.322)	leverage <sub>t-1</sub>	-0.874 (0.633)
roa <sub>t-1</sub>	-18.772*** (4.888)	roa <sub>t-1</sub>	-12.842** (5.183)	roa <sub>t-1</sub>	-19.881* (10.528)
mb <sub>t-1</sub>	0.018 (0.021)	mb <sub>t-1</sub>	0.032 (0.029)	mb <sub>t-1</sub>	-0.152 (0.104)
mismatch <sub>t-1</sub>	0.012 (0.313)	mismatch <sub>t-1</sub>	0.138 (0.136)	mismatch <sub>t-1</sub>	0.498 (0.568)
def	1.630*** (0.075)	def	1.744*** (0.136)	def	1.598*** (0.149)
term	0.114*** (0.018)	term	0.065** (0.029)	term	0.132*** (0.032)
mkt	0.333** (0.150)	mkt	0.370** (0.162)	mkt	0.421** (0.210)
size <sub>90,t-1</sub>	-0.502* (0.258)	size <sub>90,t-1</sub>	0.148 (0.173)	size <sub>90,t-1</sub>	0.069 (0.404)
zscore <sub>t-1</sub>	<b>-0.002***</b> <b>(0.001)</b>	volatility <sub>t-1</sub>	<b>2.286***</b> <b>(0.758)</b>	Beta <sub>t-1</sub>	<b>0.408***</b> <b>(0.123)</b>
size90 <sub>t-1</sub> *zscore <sub>t-1</sub>	<b>0.002*</b> <b>(0.001)</b>	size90 <sub>t-1</sub> *volatility <sub>t-1</sub>	<b>-1.641***</b> <b>(0.612)</b>	size90 <sub>t-1</sub> *Beta <sub>t-1</sub>	<b>-0.434**</b> <b>(0.216)</b>
Firm FE	Y		Y		Y
Year FE	Y		Y		Y
Rating Dummies	Y		Y		Y
Observations	42,240		46,279		27,948
R-squared	0.587		0.588		0.579

➤ For the largest FIs, spreads are less sensitive to risk

## Robustness: TBTF – Risk Relationship

VARIABLES	(1) mertondd	(2) mertondd	(3) zscore	(4) zscore
leverage <sub>t-1</sub>	0.437 -0.425	0.437 -0.426	-8.414 -12.28	-7.918 -12.214
roa <sub>t-1</sub>	15.372*** -1.907	15.345*** -1.905	213.148*** -49.983	213.255*** -49.792
mb <sub>t-1</sub>	-0.044** -0.022	-0.044** -0.022	2.318** -1.039	2.310** -1.037
mismatch <sub>t-1</sub>	-0.086*** -0.026	-0.086*** -0.026	5.336*** -1.299	4.944*** -1.33
size <sub>t-1</sub>	0.155 -0.109		2.264 -2.314	
size90 <sub>t-1</sub>		-0.105* -0.055		1.599 -1.623
Year FE	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Observations	7,615	7,615	6,977	6,977
R-squared	0.725	0.724	0.549	0.549



➤ Large FIs are not less risky

# Robustness: Ratings

VARIABLES	(3) spread	(4) spread	(5) spread
ttm	0.004 (0.004)	0.002 (0.005)	0.004 (0.004)
seniority	-0.334*** (0.061)	-0.320*** (0.053)	-0.305*** (0.058)
leverage	0.431 (0.598)	0.521 (0.690)	0.098 (0.509)
roa <sub>t-1</sub>	-29.199*** (8.667)	-38.531*** (13.162)	-13.863 (9.946)
mb <sub>t-1</sub>	0.009 (0.072)	0.000 (0.083)	0.006 (0.061)
mismatch <sub>t-1</sub>	0.773 (0.625)	0.700 (0.453)	0.865 (0.602)
def	1.428*** (0.128)	1.458*** (0.143)	1.471*** (0.145)
term	0.113*** (0.036)	0.112** (0.045)	0.130*** (0.038)
mkt	0.137 (0.181)	0.086 (0.195)	0.067 (0.218)
mertondd <sub>t-1</sub>	0.021 (0.030)	0.054 (0.111)	0.349*** (0.097)
stand-alone rating <sub>t-1</sub>	-0.039 (0.114)	0.191 (0.157)	
issuer rating <sub>t-1</sub>	0.370** (0.171)		0.669*** (0.149)
stand-alone rating <sub>t-1</sub> * mertondd <sub>t-1</sub>		0.007 (0.031)	
issuer rating <sub>t-1</sub> * mertondd <sub>t-1</sub>			-0.071*** (0.020)
Firm FE	Y	Y	Y
Year FE	Y	Y	Y
Observations	16,107	16,127	16,120
R-squared	0.655	0.644	0.668

Excludes external support

Includes external support  
Lower number indicates better rating

## Robustness: Ratings

VARIABLES	(1) issuer rating	(2) issuer rating	(3) stand-alone	(4) stand-alone
leverage <sub>t-1</sub>	-2.510**	-3.691***	-0.451	-0.706
	-1.126	-1.219	-0.89	-0.802
roa	-39.008	-49.355	-50.706*	-52.797*
	-36.231	-43.279	-26.317	-26.38
mb	-0.815***	-0.661***	-0.619***	-0.587***
	-0.174	-0.216	-0.147	-0.139
mismatch <sub>t-1</sub>	1.01	2.03	-1.206	-1.025
	-1.323	-1.365	-1.236	-1.174
size <sub>t-1</sub>	-0.728***		-0.103	
	-0.132		-0.073	
size 90 <sub>t-1</sub>		-1.163***		-0.051
		-0.27		-0.109
constant	14.648***	7.048***	5.476***	4.402***
	-1.353	-0.659	-0.792	-0.347
Year FE	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Observations	16,120	16,120	16,127	16,127
R-squared	0.622	0.492	0.527	0.518

Size affects issuer  
but not stand  
alone ratings



# Robustness: Event Study

5 day window around event

Bear Stearns		
(post=1 if date>=3/17/2008)		
VARIABLES	(1) spread	(2) spread
def	2.784***	2.785***
	-0.828	-0.829
term	0.310***	0.309***
	-0.086	-0.085
mktrf	-1.858***	-1.801***
	-0.581	-0.572
post	1.054***	0.651**
	-0.345	-0.271
mertondd <sub>t-1</sub> * post	-0.119**	-0.063*
	-0.047	-0.038
size90 <sub>t-1</sub> * post	-0.250***	2.682
	-0.094	-1.805
size90 <sub>t-1</sub> mertondd <sub>t-1</sub> * post		0.37
		-0.233
Issue FE	Y	Y
Observations	1301	1301
R-squared	0.948	0.949

← After rescue of Bear Stearns, large FIs have greater **decreases** in spreads



## Robustness: Event Study

VARIABLES	Bear Stearns		Lehman	
	(post=1 if date>=3/17/2008)		(post=1 if date>=9/15/2008)	
	(1) spread	(2) spread	(3) spread	(4) spread
def	2.784*** -0.828	2.785*** -0.829	2.192 -2.235	2.331 -2.273
term	0.310*** -0.086	0.309*** -0.085	1.856*** -0.262	1.813*** -0.257
mktrf	-1.858*** -0.581	-1.801*** -0.572	0.714 -2.491	0.51 -2.453
post	1.054*** -0.345	0.651** -0.271	3.739*** -1.05	0.901 -0.868
mertondd <sub>t-1</sub> * post	-0.119** -0.047	-0.063* -0.038	-0.657*** -0.182	-0.151 -0.144
size90 <sub>t-1</sub> * post	-0.250*** -0.094	2.682 -1.805	2.174*** -0.817	20.427*** -4.485
sizeg90 <sub>t-1</sub> mertondd <sub>t-1</sub> * post		0.37 -0.233		-2.820*** -0.6
Issue FE	Y	Y	Y	Y
Observations	1301	1301	1,382	1,382
R-squared	0.948	0.949	0.813	0.825

← After collapse of Lehman, large FIs have greater **increases in spreads**

## Robustness: Event Study

VARIABLES	Bear Stearns (post=1 if date>=3/17/2008)		Lehman (post=1 if date>=9/15/2008)		Dodd-Frank (post=1 if date>=6/29/2010)	
	(1) spread	(2) spread	(3) spread	(4) spread	(5) spread	(6) spread
def	2.784*** -0.828	2.785*** -0.829	2.192 -2.235	2.331 -2.273	1.328** -0.545	1.521*** -0.549
term	0.310*** -0.086	0.309*** -0.085	1.856*** -0.262	1.813*** -0.257	-0.389*** -0.14	-0.377*** -0.14
mktrf	-1.858*** -0.581	-1.801*** -0.572	0.714 -2.491	0.51 -2.453	0.34 -0.645	0.319 -0.644
post	1.054*** -0.345	0.651** -0.271	3.739*** -1.05	0.901 -0.868	0.051 -0.046	0.021 -0.05
mertondd <sub>t-1</sub> * post	-0.119** -0.047	-0.063* -0.038	-0.657*** -0.182	-0.151 -0.144	-0.052** -0.022	-0.032 -0.026
size90 <sub>t-1</sub> * post	-0.250*** -0.094	2.682 -1.805	2.174*** -0.817	20.427*** -4.485	-0.074** -0.031	0.036 -0.059
sizeg90 <sub>t-1</sub> mertondd <sub>t-1</sub> * post		0.37 -0.233		-2.820*** -0.6		-0.088** -0.041
Issue FE	Y	Y	Y	Y	Y	Y
Observations	1301	1301	1,382	1,382	1,869	1,869
R-squared	0.948	0.949	0.813	0.825	0.983	0.983

Insignificant

## Dodd- Frank 6 month window

VARIABLES	(1) spread	(2) spread
mertondd <sub>t-1</sub>	-0.012 (0.111)	-0.266 (0.179)
sizeg90 <sub>t-1</sub>	-0.722*** (0.130)	-0.499** (0.191)
post	-0.225** (0.102)	-0.591*** (0.217)
sizeg90 <sub>t-1</sub> * post	0.077 (0.094)	0.550* (0.276)
mertondd <sub>t-1</sub> * post		0.237* (0.123)
sizeg90 <sub>t-1</sub> * mertondd <sub>t-1</sub> *post		-0.370* (0.187)
Constant	1.939** (0.755)	2.130*** (0.701)
Firm FE	Y	Y
Year FE	Y	Y
Rating Dummies	Y	Y
Observations	1,810	1,810
R-squared	0.547	0.548

## Summary

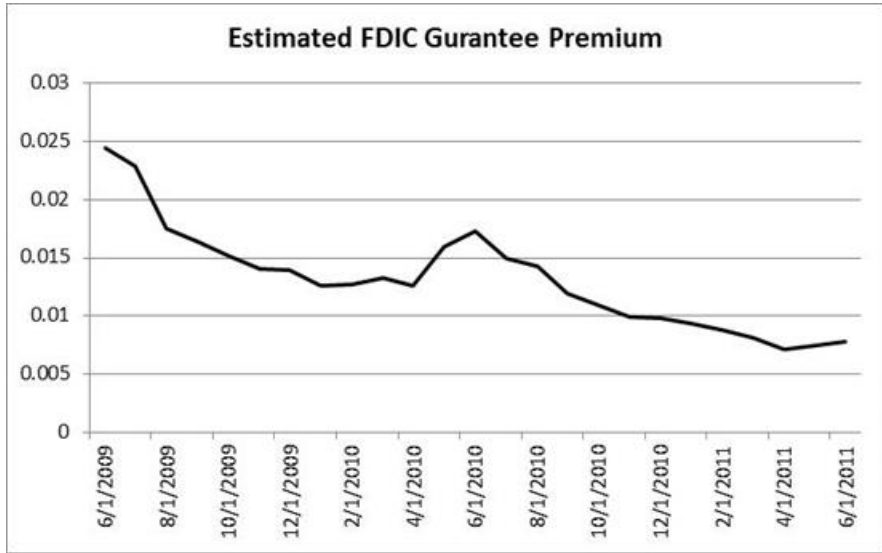
### Main Findings

- TBTF institutions have lower spreads than other institutions
- TBTF institutions have spreads that are less sensitive to risk

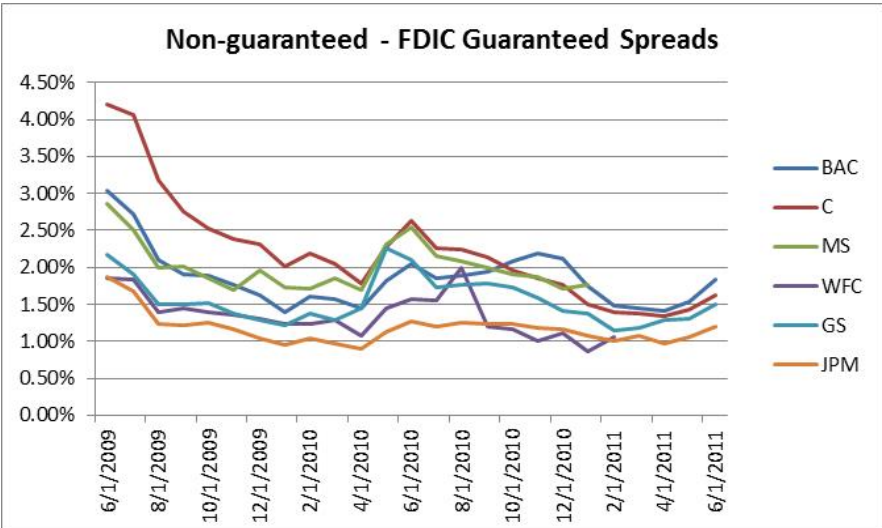
### Robustness

- Alternative proxies for TBTF status
- Size is not related to risk
- Ratings as exogenous measures of risk and implicit support
- Shocks to investor expectations of support
- • Comparison to debt explicitly guaranteed under FDIC Temporary Liquidity Guarantee Prog.
  - FDIC-guaranteed bonds had lower spreads than similar non-guaranteed bonds issued by same firm
  - Spread differential reduced upon Dodd-Frank
    - Implicitly-guaranteed debt became more like explicitly-guaranteed debt

# FDIC Guarantee



Estimated FDIC guarantee premium:

$$Spread_{i,b,t} = \alpha + \beta^1 \times Bond\ Controls_{i,b,t} + \beta^2 \times Guarantee_{i,b,t} + Firm\ FE + \varepsilon_{i,b,t}$$


FDIC guaranteed – non-guaranteed spread

## Summary

### Main Findings

- TBTF institutions have lower spreads than other institutions
- TBTF institutions have spreads that are less sensitive to risk

### Robustness

- Alternative proxies for TBTF status
- Size is not related to risk
- Ratings as exogenous measures of risk and implicit support
- Shocks to investor expectations of support
- Comparison to debt explicitly guaranteed under FDIC Temporary Liquidity Guarantee Prog
- • Non-Financial and Liquidity
  - Compute risk sensitivity for non-financials
  - Control for bond liquidity

## Non-Financials and Liquidity

VARIABLES	(5) spread	(6) spread	(7) spread	(8) spread	(9) spread
size 90 industry $t_{-1}$	-0.006			0.081	
	-0.145			-0.386	
size 90 all $t_{-1}$		0.106			-0.014
		-0.134			-0.361
size $_{t-1}$ * mertondd $_{t-1}$			0.003		
			-0.006		
size 90 industry $t_{-1}$ * mertondd $_{t-1}$				-0.009	
				-0.029	
size 90 all $t_{-1}$ * mertondd $_{t-1}$					0.012
					-0.026
Firm FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Observations	68,905	68,905	68,905	68,905	68,905
R-squared	0.709	0.709	0.71	0.709	0.709

← Insignificant

VARIABLES	(1) spread	(2) spread	(3) spread
size 90 $t_{-1}$	-0.130**	-0.334*	-0.948***
	-0.063	-0.17	(0.427)
liquidity $t_{-1}$		-0.090***	
		-0.02	
turnover $_{t-1}$			-0.038*
			-0.022
Firm FE	N	Y	Y
Issue FE	Y	N	N
Year FE	Y	Y	Y
Rating Dummies	Y	Y	Y
Observations	46,308	46,308	14,003
R-squared	0.705	0.582	0.624

← After controlling for liquidity