

The image shows the exterior of the Federal Reserve Bank of New York building, a grand structure with classical architectural features like arched windows and stone masonry. An American flag flies from a tall pole in front of the building. In the background, other modern skyscrapers of the city are visible under a clear sky.

FEDERAL RESERVE BANK *of* NEW YORK

# Discussion of Funding Liquidity, Market Liquidity and TED spread: A Two-regime Model

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Tobias Adrian, NY Fed, Sixth Annual NYU Volatility Institute Conference

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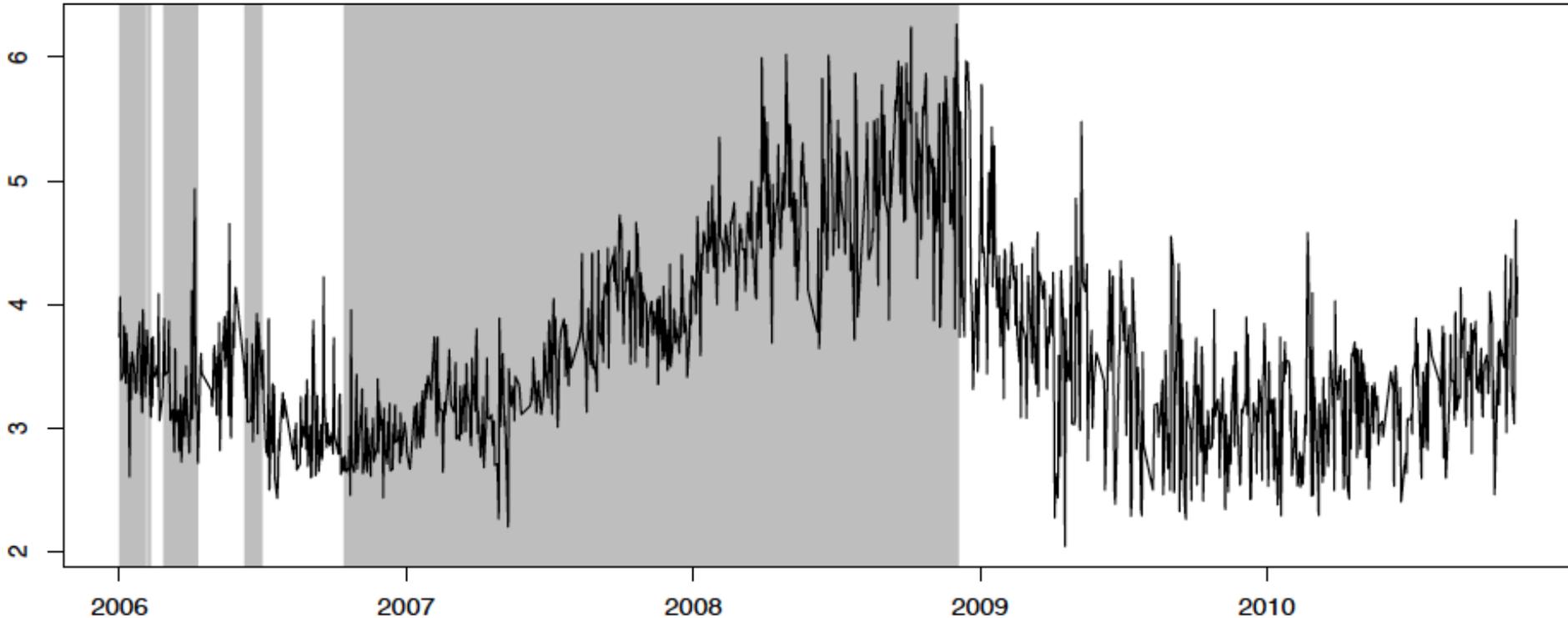
# Overview

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1. Overview of the paper
2. Econometrics
3. Economics of stock lending
4. Economics of liquidity



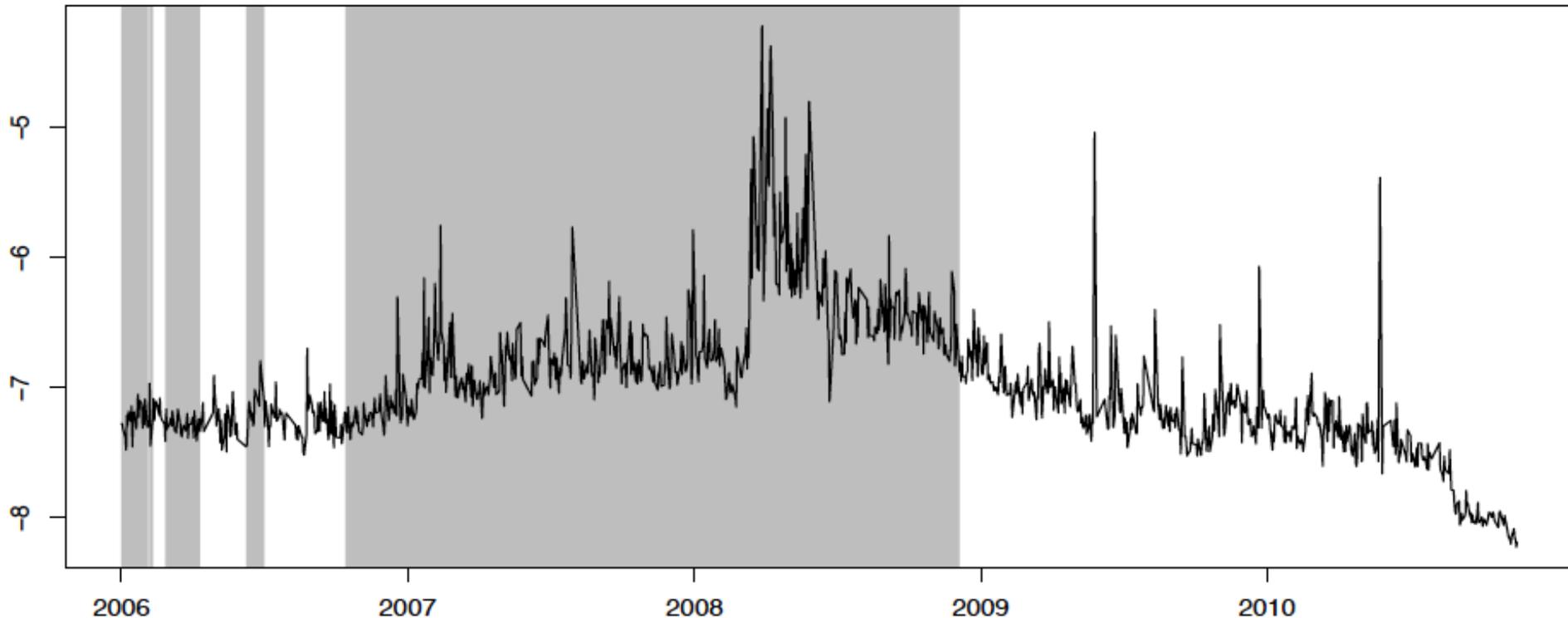
# Stock lending fees



- Stock lending fees are used to measure for funding liquidity
- Gray area denotes threshold for TED spread of 48 basis points
- Log of volume weighted average S&P500 lending fee
- Data from Data Explorer



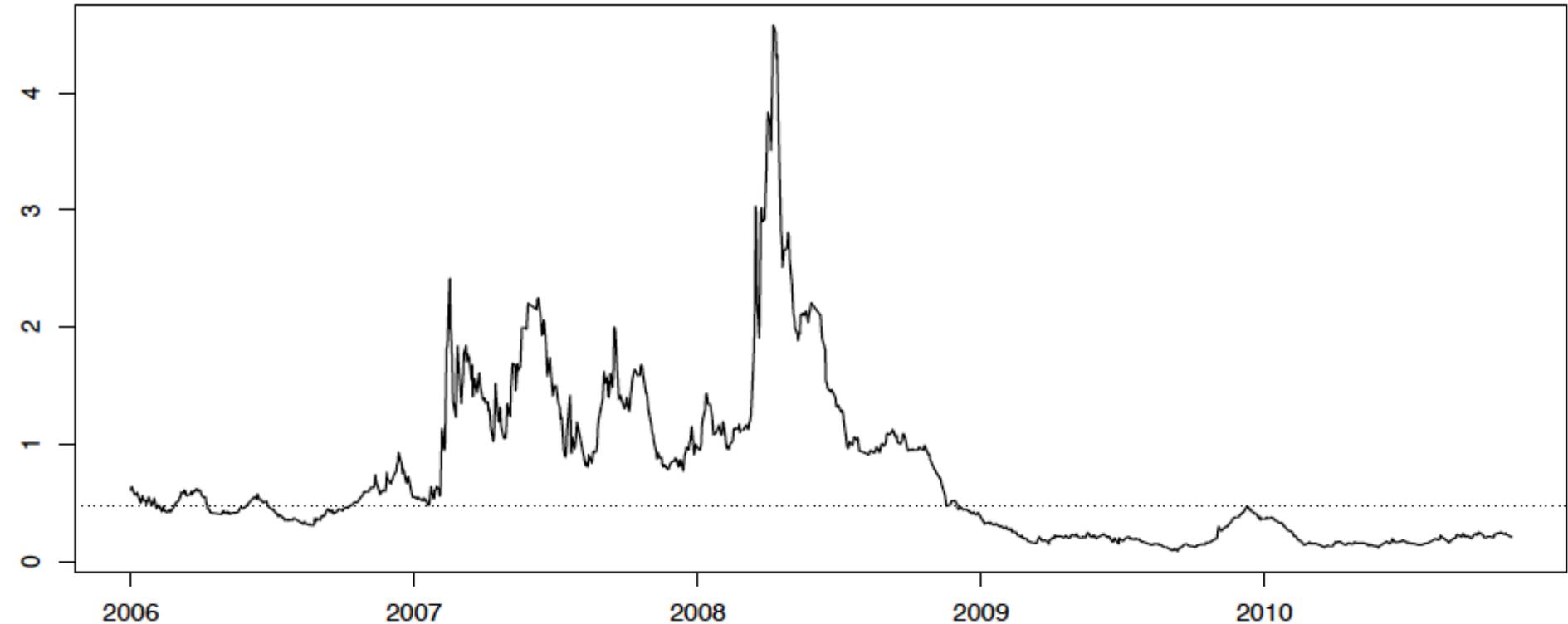
# Bid ask spreads



- Bid ask spread is used to measure for market liquidity
- Gray area denotes threshold for TED spread of 48 basis points
- Log of bid ask spread for S&P500
- Data from CBOE as reported by Bloomberg

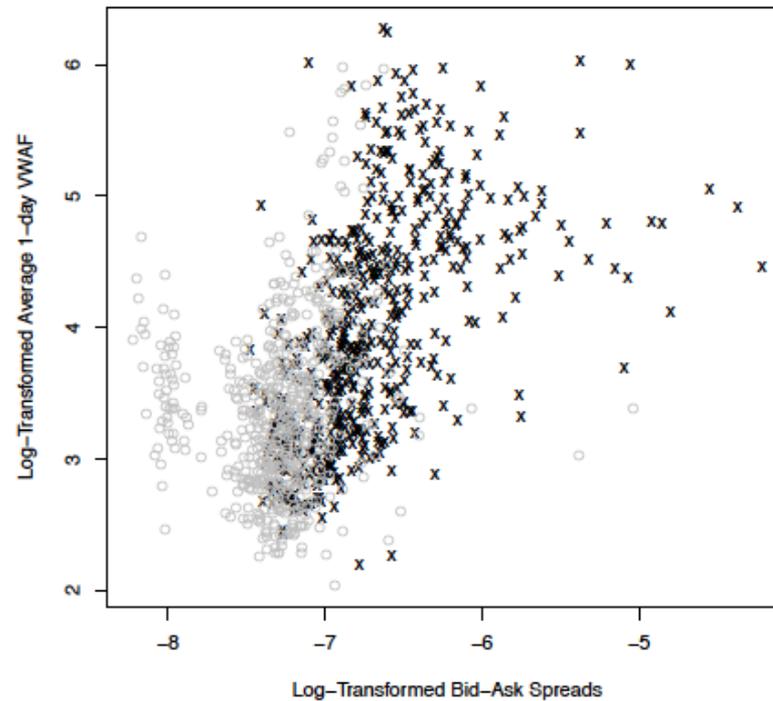


# Thresholds for the TED spreads



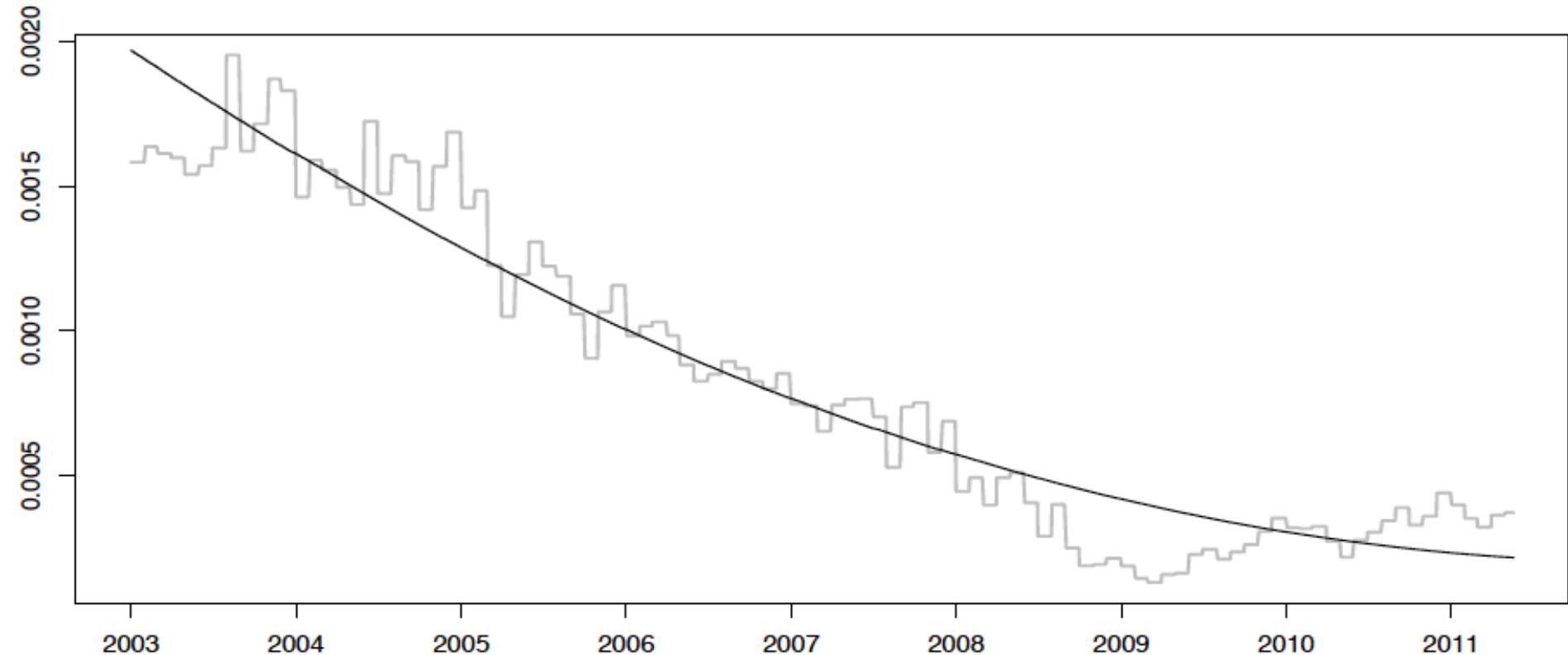
- TED spread increases starting in 2007, then declines
- Cutoff level is 48 basis points, already breached in 2006
- Bank funding liquidity, not necessarily stock market liquidity

# Time series correlation



- There is time series correlation between bid ask spreads and lending fees when TED above threshold

# Instruments



1. Long term trend of time between trades on NASDAQ (plotted)
  2. Lagged market volatility
  3. AAA-Tbill spread
- These three variables are supposed to be correlated with market liquidity but not funding liquidity



# First stage regression

Dep. Variable:	<i>mktilliqt</i>	<i>vol<sub>t</sub></i>	<i>volsq<sub>t</sub></i>	<i>ted<sub>t</sub></i>	<i>stressmktilliqt</i>	<i>stressvol<sub>t</sub></i>	<i>stressed<sub>t</sub></i>
<i>(intercept)</i>	<b>-8.03</b> (0.11)	0.01 (0.01)	-0.01 (0.01)	-0.01 (0.03)	0.12 (0.07)	-0.00 (0.01)	0.03 (0.03)
<i>(stressintercept)</i>	<b>0.12</b> (0.06)	-0.01 (0.00)	<b>-0.01</b> (0.00)	<b>0.00</b> (0.01)	<b>-7.38</b> (0.04)	<b>0.08</b> (0.00)	<b>0.24</b> (0.02)
<i>durtrend<sub>t</sub></i>	64.27 (134.95)	-17.04 (10.14)	3.54 (9.52)	-1.92 (34.75)	<b>-546.25</b> (88.78)	<b>-69.01</b> (11.29)	<b>-243.71</b> (38.73)
<i>aaaliqt</i>	-0.10 (0.10)	<b>-0.04</b> (0.01)	<b>-0.03</b> (0.01)	<b>0.57</b> (0.03)	0.03 (0.07)	<b>-0.03</b> (0.01)	<b>0.59</b> (0.03)
<i>vol<sub>t-1</sub></i>	<b>3.35</b> (0.45)	<b>1.00</b> (0.03)	<b>0.09</b> (0.03)	0.09 (0.12)	-0.03 (0.29)	-0.04 (0.04)	<b>-0.33</b> (0.13)
<i>volsq<sub>t-1</sub></i>	<b>-3.08</b> (0.54)	<b>-0.13</b> (0.04)	<b>0.77</b> (0.04)	-0.23 (0.14)	<b>-0.92</b> (0.35)	<b>0.19</b> (0.04)	<b>0.75</b> (0.15)
<i>ted<sub>t-1</sub></i>	<b>0.69</b> (0.12)	0.01 (0.01)	0.01 (0.01)	<b>1.01</b> (0.03)	<b>0.57</b> (0.08)	<b>0.11</b> (0.01)	<b>0.36</b> (0.04)
<i>stressvol<sub>t-1</sub></i>	<b>0.87</b> (0.25)	<b>0.05</b> (0.02)	0.04 (0.02)	0.07 (0.06)	<b>2.23</b> (0.16)	<b>0.80</b> (0.02)	<b>-0.42</b> (0.07)
<i>stressed<sub>t-1</sub></i>	<b>-0.45</b> (0.13)	-0.01 (0.01)	0.00 (0.01)	<b>-0.33</b> (0.08)	<b>-0.11</b> (0.01)	-0.02 (0.03)	<b>0.62</b> (0.04)
Adjusted $R^2$	<b>0.66</b>	<b>0.96</b>	<b>0.94</b>	<b>0.99</b>	<b>0.99</b>	<b>0.98</b>	<b>0.99</b>
F-statistic	<b>164.74</b>	<b>3758.05</b>	<b>2157.82</b>	<b>6596.42</b>	<b>331.67</b>	<b>2525.90</b>	<b>5140.07</b>

# Regression results

Independent Variables	Linear Model		Two-Regime Model	
	OLS	IV	OLS	IV
<i>(intercept)</i>	<b>4.732</b> (0.516)	<b>8.399</b> (2.746)	<b>2.594</b> (0.665) [1.239 ; 4.054]	<b>-26.327</b> (18.332) [-90.913 ; 25.638]
<i>mktilliq<sub>t</sub></i>	<b>0.323</b> (0.0645)	<b>0.790</b> (0.348)	<b>0.014</b> (0.082) [-0.152 ; 0.202]	<b>-3.612</b> (2.283) [-11.690 ; 2.788]
<i>vol<sub>t</sub></i>	<b>6.263</b> (0.655)	<b>4.953</b> (1.290)	<b>5.192</b> (0.652) [3.782 ; 6.776]	<b>13.093</b> (7.240) [-4.809 ; 33.909]
<i>volsq<sub>t</sub></i>	<b>-4.550</b> (0.894)	<b>-3.627</b> (1.206)	<b>-8.303</b> (0.924) [-10.458 ; -6.150]	<b>-6.818</b> (6.712) [-26.888 ; 16.820]
<i>ted<sub>t</sub></i>	<b>0.012</b> (0.042)	<b>-0.174</b> (0.134)	<b>0.717</b> (0.292) [0.117 ; 1.468]	<b>3.965</b> (1.962) [-4.100 ; 12.460]
<i>stress<sub>t</sub></i>			<b>2.466</b> (0.977) [0.002 ; 4.535]	<b>40.553</b> (13.222) [-14.790 ; 144.736]
<i>stressmktilliq<sub>t</sub></i>			<b>0.382</b> (0.124) [0.064 ; 0.642]	<b>5.210</b> (1.685) [-1.881 ; 18.471]
<i>stressvol<sub>t</sub></i>			<b>4.824</b> (0.649) [3.256 ; 6.206]	<b>-6.267</b> (4.853) [-39.343 ; 13.580]
<i>stressed<sub>t</sub></i>			<b>-1.055</b> (0.296) [-1.792 ; -0.449]	<b>-4.599</b> (1.617) [-14.292 ; 3.289]
<b>Threshold <math>\kappa</math></b>			<b>0.429</b> [0.417 ; 0.443]	<b>0.479</b> [0.438 ; 0.487]



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1. What is the paper doing
2. Econometrics
3. Economics of stock lending
4. Economics of liquidity



# Econometrics

1. Persistent regressors and persistent instruments
2. Errors lack autocorrelation adjustments
3. First stage of IV regression picks up trends
4. No robustness of the two-state specification --- many other possible nonlinear specifications
5. No robustness of TED spread as conditioning variable
6. Cross section is not exploited



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# Economics of stock lending

- Stock lending fees clear demand and supply in the market for borrowing stocks:
  - **Supply:** clearing banks (BONY, State Street) lend on behalf of clients (money managers, pension funds, insurance companies)
  - **Demand:** dealers borrow on behalf of their clients (hedge funds, primarily long-short equity)
- While lending in fixed income markets is primarily done via repo, lending in stock markets is primarily done in securities lending
- **Literature generally agrees that stock lending fees are reflecting heterogeneous views about valuation levels**
  - Funding is constrained by haircuts



# Economics of stock lending (D'Avolio JFE 2002)

- Average borrowing cost is low around 25 basis points
- Most stocks can be borrowed, those that don't are tiny
- Over 90% of stocks are “general collateral” (low lending fee)
- Very small amount of stocks are “special” (high lending fee)
- Fewer than 1% of stocks demand negative rebate rates (loan fee in excess of the interest rate) (some of them huge fees such as 50%)
- Proxies for disagreement among investors (high turnover, high dispersion in analyst forecasts, increased message board activity, and low cash flows) predict specialness



# Economics of stock lending

- Are stock lending fees a funding liquidity indicator?
- Consider a long-short equity hedge fund:
  - Leverage is “funded” with short position
  - Lending fee impacts cost of shorting and hence funding costs

## **BUT:**

1. Funding liquidity of the fund is primarily determined by the haircuts and risk management constraints
  2. Most stocks have very small lending fees
  3. Increase in lending fees during the crisis reflects increased heterogeneity of beliefs of where the economy is going
- **Stock lending fee only loosely related to funding liquidity**



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# Economics of liquidity (Vayanos-Weill JF 2008)

- Paper is motivated by Gromb-Vayanos (2002, 2010) and Brunnermeier-Pedersen (2009)
- Vayanos-Weill (2008) might be the relevant paper:
  - Search spot market and search repo market
  - Search externalities lead short-sellers to endogenously concentrate in certain assets
  - Endogenous emergence of specialness, market liquidity differences, and on-the-run/off-the-run spreads
  - Lending fees/repo rates emerge endogenously
- In this setting, lending fee reflects market liquidity
- **Specialness can be associated with higher funding liquidity**



# Conclusion

1. Repo rates are great to think about, Data Explorer useful source
2. Econometrics need to go beyond time series correlations
3. Stock lending fees reflect demand/ supply in sec lending market
4. Specialness might be associated with higher funding liquidity

