Anticipated and Repeated Shocks in Liquid Markets

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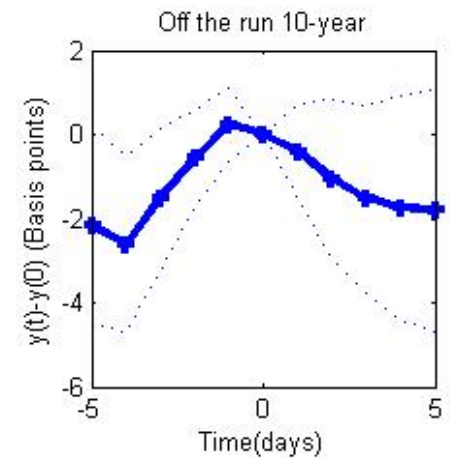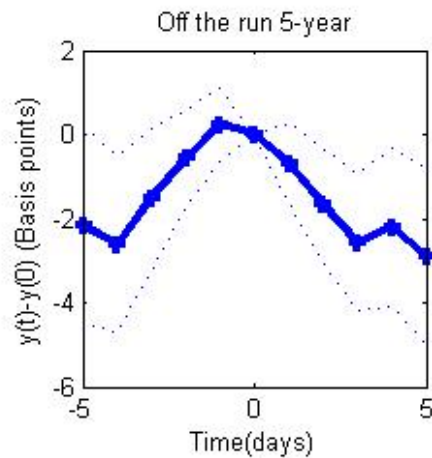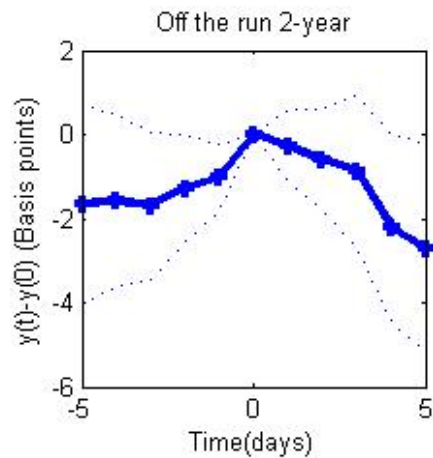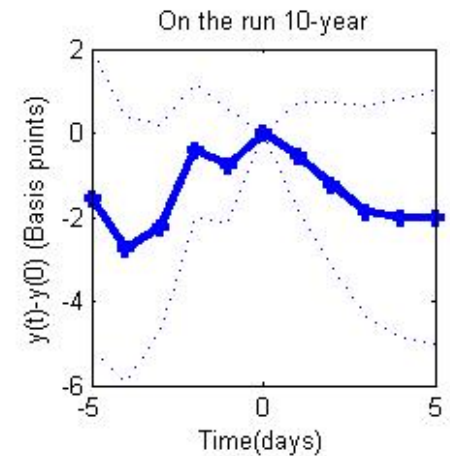
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Motivation

- How does a financial system absorb supply shocks?
  - when capital mobility is **imperfect**
- Anticipated
- Repeated
- Liquid markets
- US Treasury auctions
  - Treasury market
  - Repo market
  - Stock market

Main Results
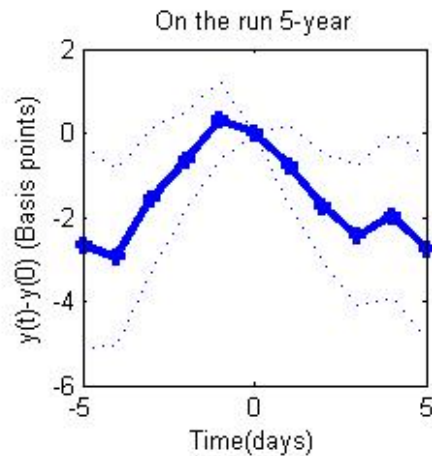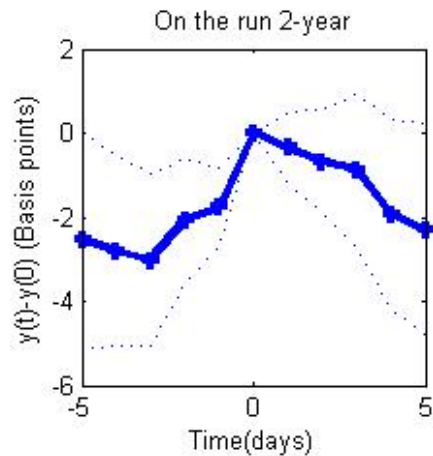
Why is this a big deal?

- Treasury appears to sell at low prices
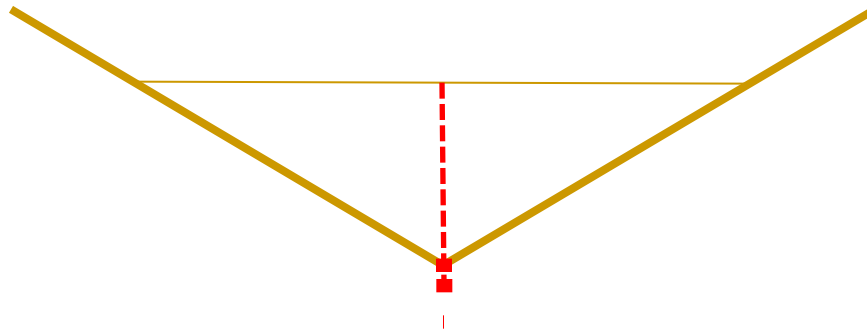
- Large issuance cost e.g., 5 days
  - 2-year note   9 basis points
  - 5-year note   17 basis points
  - 10-year note   18 basis points
  - E.g., for 2007, $649 million

Trading profit

- Short 2-y note before each auction

- Long it after each auction

- Duration hedge

-10 … -3 -2 -1 0 1 2 3 … 10

- Sharpe ratio in the full sample: 1.08

- In the last 10 years: 1.44

- After bid-ask spread: 0.95

Implication for theory

- Large price pressure in the secondary market

-10 … -3 -2 -1 0 1 2 3 … 10

$\Delta CR(5) = 9$ b.p.

2-year note

$\triangle CR(5) = 49$ b.p.

stock market

5-day

5-day
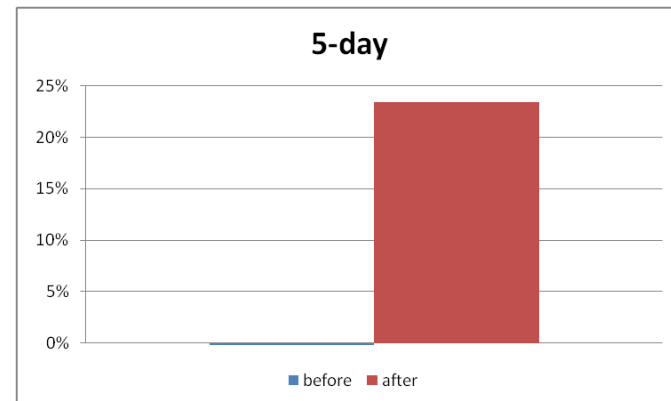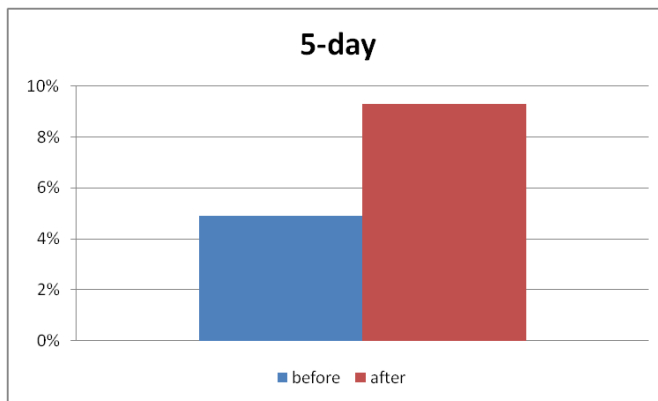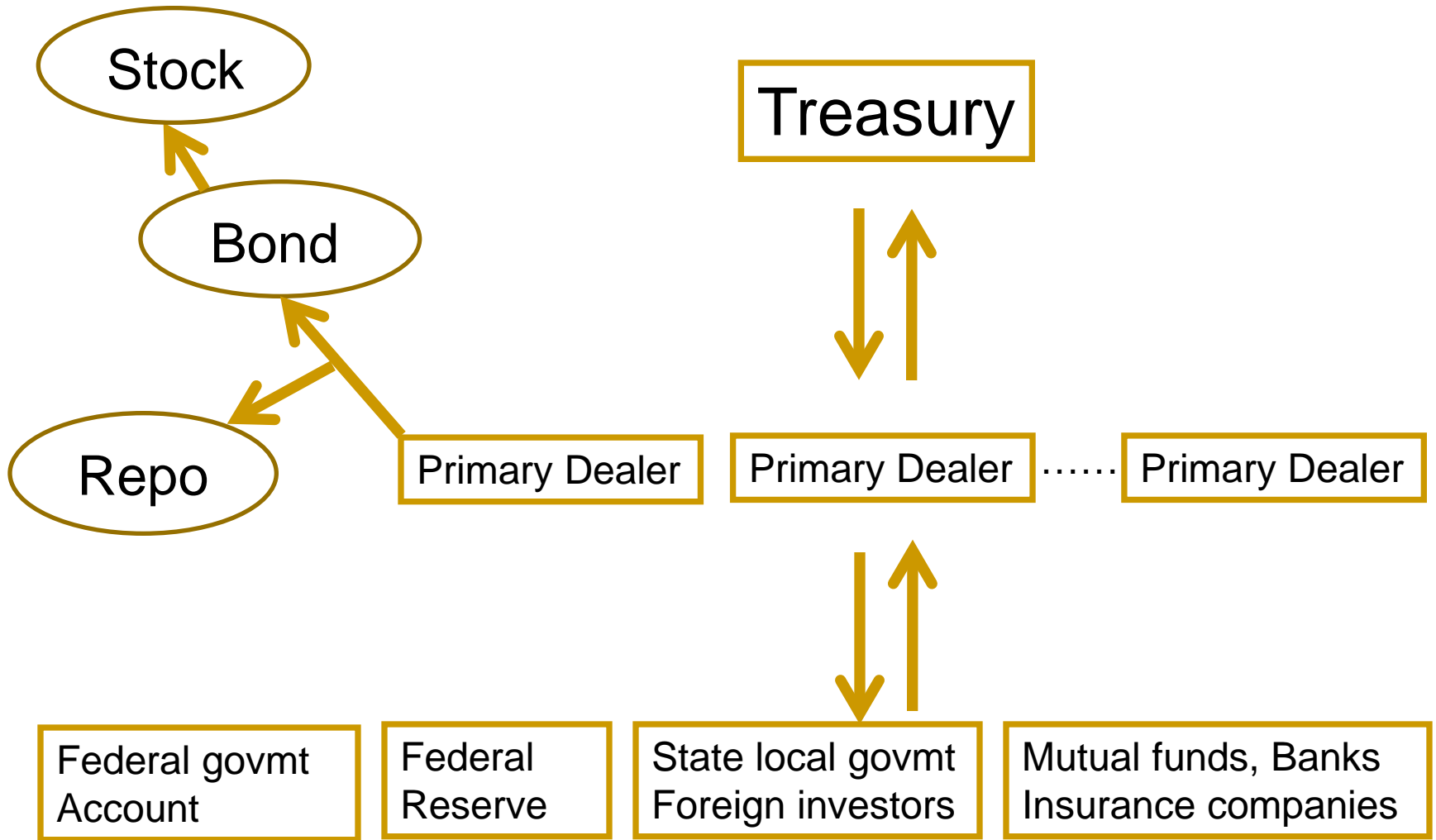
Interpretation

Summary

- Capital immobility is of first-order importance.
  - Even liquid markets are slow in absorbing anticipated shocks, which are relatively *small*
  - Trading profit
  - Large issuance cost
- Interpretation
  - Limited risk bearing capacity
  - The immobility of End Investors' capital
- Guidance for finance theory, auction design

Policy Proposal

A   A

A   A   A   A
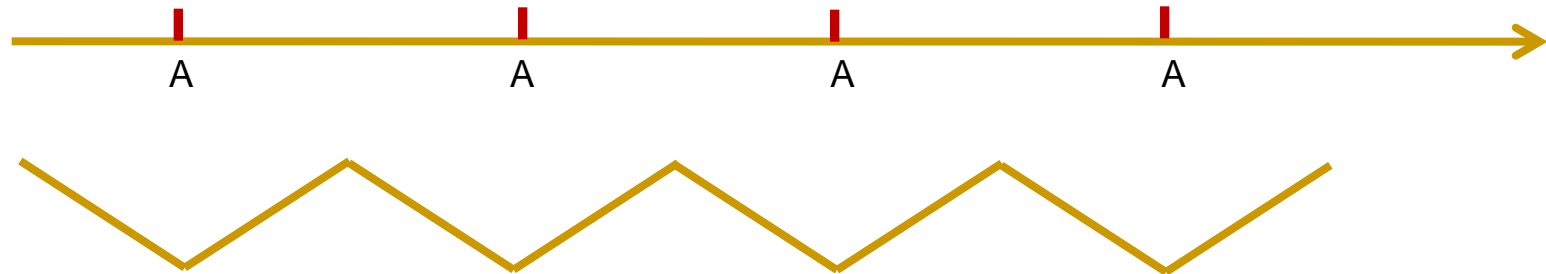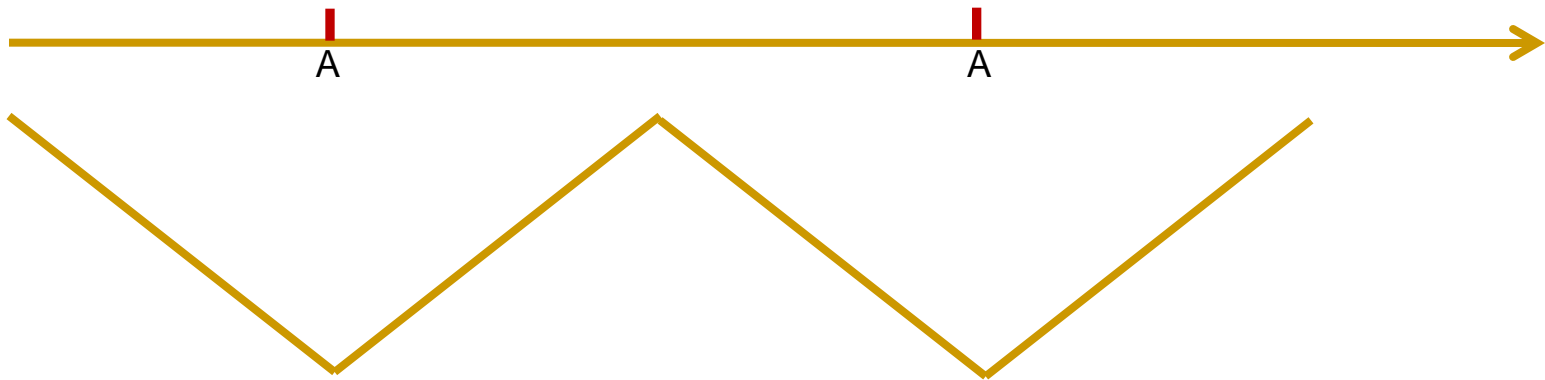
Policy Proposal (cont'd)

- Treasury
  - Benefit: lower issuance costs
  - Cost: "no known side-effects"
- Dealers
  - Benefit: smaller amount of capital
  - Cost: more complex planning?

- Hedge funds

Data

- **Treasury Note Auctions (2- 3- 4- 5- 7- 10-year)**
  - US Treasury Department , 1980-2008
- **Bond and Stock data**
  - CRSP, COMPUSTAT
- **Implied Interest Rate Volatility**
  - Bond option prices from CBOE
- **Repo Rates**
  - Bloomberg
- **Insurance company trading**
  - NAIC
- **Fund flow data**
  - Trimtabs

Treasury Auctions

- Treasury markets 3 trillion issuance per year

- Dates: scheduled months in advance

- Amounts: announced several days in advance

- We focus on Notes: 2, 5, 10-year

Treasury Returns Around Auctions

Panel A: On-the-run Treasury note returns around subsequent auctions: $\Delta CR(t)$						
Days around	2-year notes		5-year notes		10-year notes	
auctions	Mean	t-Value	Mean	t-Value	Mean	t-Value
1	3.68***	(3.90)	1.98	(0.99)	8.61	(1.53)
2	3.54**	(2.21)	9.94***	(4.03)	10.87	(1.13)
3	6.15**	(2.42)	16.86***	(4.28)	26.37**	(2.31)
4	8.66***	(2.87)	20.86***	(4.34)	31.61***	(2.75)
5	8.89***	(2.69)	22.54***	(3.67)	23.84*	(1.78)
6	10.20***	(3.62)	17.12**	(2.07)	16.44	(1.31)
7	9.42***	(2.63)	21.21**	(2.20)	17.44	(1.01)
8	9.61**	(2.28)	27.59***	(3.01)	30.4*	(1.67)
9	9.08**	(2.23)	22.85**	(2.43)	40.68**	(2.02)
10	9.20**	(2.02)	22.77**	(2.53)	32.45	(1.39)
No. Obs.	332		210		132	

Cost of Issuance

	2-year notes		5-year notes		10-year notes		All notes
t	Percentage (basis points)	Amount (Millions)	Percentage (basis points)	Amount (Millions)	Percentage (basis points)	Amount (Millions)	Amount (Millions)
1	6.72	172	6.57	103	9.42	79	354
2	7.22	185	10.48	164	10.53	88	437
3	8.33	213	14.23	222	19.68	165	600
4	8.95	229	16.06	251	22.11	186	665
5	9.07	232	16.81	262	18.43	155	649
6	9.86	252	14.31	223	15.32	129	604
7	10.03	257	16.43	256	16.84	141	654
8	9.95	255	19.51	304	24.88	209	768
9	9.31	238	16.89	263	30.42	256	757
10	9.34	239	16.85	263	26.68	224	726

Panel B: Costs of issuance based on the average yield on days -t and t

Trading Profit

	Panel A: Hedge portfolio returns in the full sample (1980-2008)		
t	Mean	t-value	Sharpe Ratio
1	1.04*	(1.67)	0.34
2	2.40***	(2.89)	0.66
3	4.41***	(3.35)	0.94
4	4.96***	(3.30)	0.98
5	5.87***	(3.10)	0.95
6	6.39***	(3.95)	1.05
7	8.17***	(4.00)	1.20
8	8.10***	(3.88)	1.12
9	8.24***	(3.60)	1.08
10	8.62***	(3.65)	1.08
No. Obs		319	

	Panel B: Hedge portfolio returns in the period of 1998-2008		
t	Mean	t-value	Sharpe Ratio
1	-0.40	(-0.47)	-0.14
2	1.37	(1.60)	0.50
3	2.61***	(2.68)	0.84
4	4.15***	(4.01)	1.05
5	4.78***	(3.48)	1.06
6	6.85***	(4.66)	1.32
7	8.02***	(5.14)	1.56
8	7.62***	(4.64)	1.41
9	8.13***	(5.08)	1.44
10	8.52***	(4.95)	1.44
No. Obs		116	

Further Predictions

- Primary dealers' limited risk-bearing capacity
    - Spill over to other maturities
    - Auction size
    - Market risk

- The immobility of end-investors' capital

Spillover Across Maturities

Days around	around 2-year note auctions		around 5-year note auctions	
auctions	Mean	t-Value	Mean	t-Value
-5	-1.48	(-1.50)	-2.71**	(-2.26)
-4	-1.44	(-1.61)	-2.89**	(-2.51)
-3	-1.41*	(-1.72)	-1.57	(-1.60)
-2	-0.96	(-1.63)	-0.69	(-1.00)
-1	-1.20***	(-2.70)	0.01	(0.01)
1	-0.74*	(-1.93)	-0.22	(-0.42)
2	-0.44	(-0.67)	-2.12***	(-2.98)
3	0.23	(0.22)	-3.08***	(-4.18)
4	-0.68	(-0.60)	-2.31***	(-2.90)
5	-0.8	(-0.61)	-3.22***	(-3.00)
No. Obs.	275		144	

10-year Treasury yields around 2- and 5-year note auctions: $Y(t) - Y(0)$

Limited risk-bearing capacity

Panel A: Dependent Variable = *HRet (10)*		
	Coefficient (*10000)	*t*-value
Offering Amount	4.58*	(1.71)
Implied Volatility	1.68**	(2.28)

Panel B: Dependent Variable = daily 2-year note return		
	Coefficient (*10000)	*t*-value
Dependent Variable = daily 2-year note return		
OSI(5)	0.029***	(2.79)
Dependent Variable = daily 2-year note return		
OSI(10)	0.046***	(3.83)

Immobile End-investor

- 40% of the $10 Trillion is nonmarketable
- Fed 9%
- State, local and foreign governments
- Insurance companies (70% make <5 trades)
- Bond mutual funds
  - Index funds
  - Active funds

Mutual fund-investors

Days around auctions	bond funds		equity funds		hybrid funds	
	Mean	t-Value	Mean	t-Value	Mean	t-Value
1	-0.03%**	(-2.22)	0.00%	(-0.37)	-0.03%***	(-2.60)
2	-0.02%	(-1.11)	0.01%	(0.52)	-0.02%	(-1.58)
3	0.03%**	(2.03)	-0.01%	(-0.32)	-0.02%	(-1.21)
4	0.05%***	(3.01)	-0.01%	(-0.55)	-0.01%	(-0.73)
5	0.06%***	(3.06)	-0.02%	(-0.84)	-0.03%	(-1.32)
6	0.14%***	(2.82)	-0.03%	(-1.30)	-0.05%*	(-1.86)
7	0.15%***	(2.87)	-0.03%	(-1.05)	-0.05%*	(-1.81)
8	0.15%***	(2.95)	-0.02%	(-0.89)	-0.05%*	(-1.74)
9	0.16%***	(3.15)	-0.03%	(-1.05)	-0.04%	(-1.14)
10	0.16%***	(3.02)	-0.04%	(-1.29)	-0.09%**	(-2.16)
No. Obs.	120		120		120	

Mutual fund flows around 2-year Treasury note auctions: ΔFLOW(t)

Repo Market

Days around auctions	Average Repo rate around auctions: ΔRepo(t) (basis point)					
	Overnight		One-week		One-month	
	Mean	t-Value	Mean	t-Value	Mean	t-Value
1	1.38	(0.99)	1.33	(1.50)	-0.70*	(-1.65)
2	3.69**	(2.39)	2.43***	(2.72)	0.11	(0.27)
3	5.09***	(3.29)	3.78***	(3.84)	0.78	(1.62)
4	6.53***	(4.53)	4.47***	(4.31)	1.11*	(1.78)
5	6.75***	(4.83)	4.39***	(4.36)	1.41**	(2.03)
6	6.50***	(4.67)	3.94***	(3.80)	1.08	(1.30)
7	5.85***	(4.26)	3.41***	(3.22)	0.81	(0.86)
8	4.85***	(3.49)	2.78**	(2.28)	0.43	(0.37)
9	4.13***	(2.79)	2.19	(1.59)	0.11	(0.08)
10	3.47**	(2.21)	1.68	(1.10)	-0.19	(-0.12)
No. Obs.	198		198		198	

Implication for theory

- **Large price pressure in the secondary market**

-10 ... -3 -2 -1 0 1 2 3 ... 10

- $\Delta CR(5) = 8.89$ b.p.   (t=2.69)
- Expected return around auctions
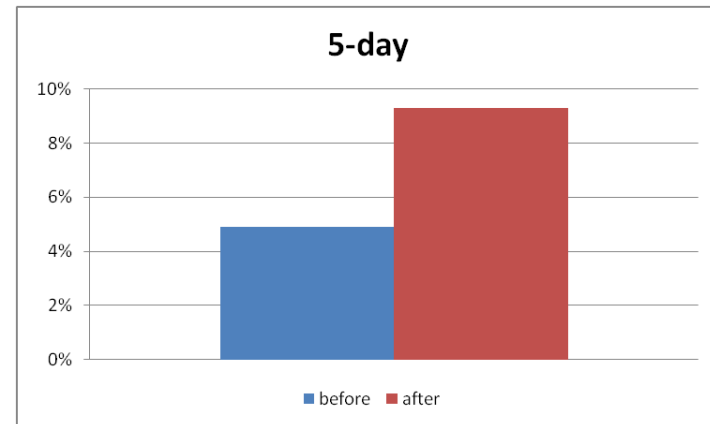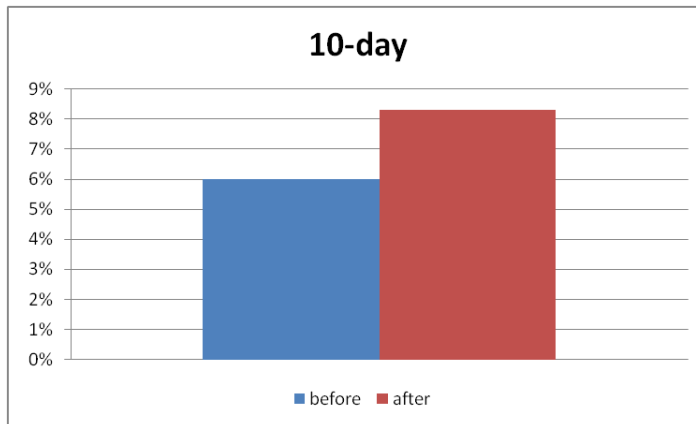
Stock Returns Around Auctions

- Spillover to the stock market

-10 ... -3   -2   -1   0   1   2   3   ... 10

- $\triangle$CR(5) = 49 b.p.   (t=3.11)
- Expected stock return around auctions
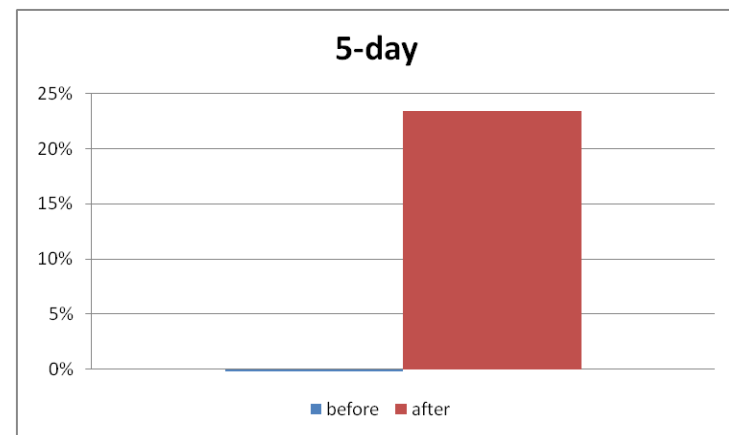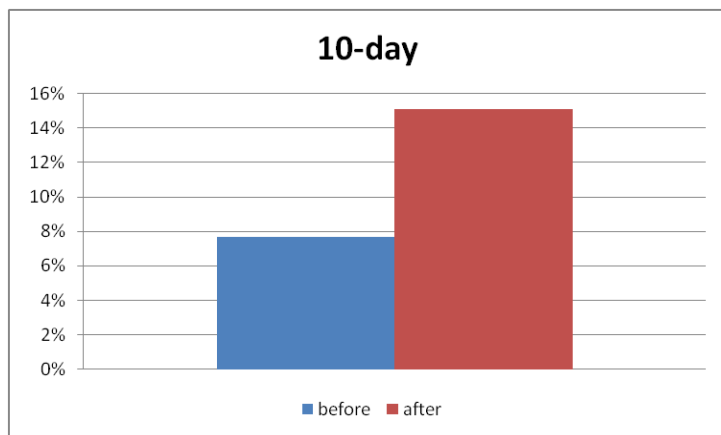
Robustness

- Off-the-run
- Subsample
- Turn of the month effect
- Where to put the auction day
- Uneven calendar days
- Information revelation around auctions

Conclusions

- Anticipated and frequently repeated shocks have significant price impacts
  - Treasury market
  - Repo market
  - Stock market
- Large issuance cost
- Limited risk-bearing capacity, and capital immobility
- Implication for Macroeconomics and Finance