Liquidity Regulation and Financial Intermediaries

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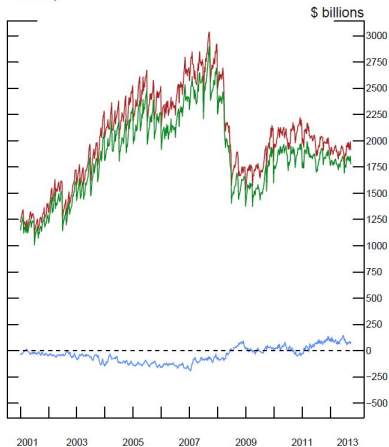
[1]Federal Reserve Board

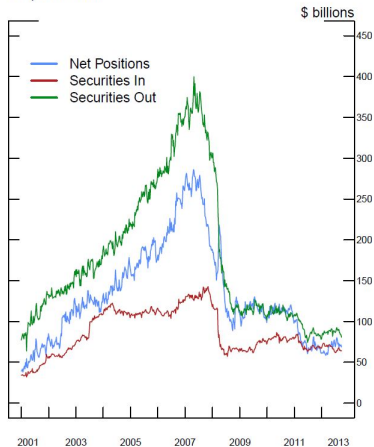Bank of Italy–FRBNY Post Crisis Financial Regulation Workshop
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1. Effect of post-crisis liquidity regulation (LCR) on broker-dealers

2. Did dealers de-risk after crisis or wait for regulation to do so?

Focus on specific dealers' activities

1. Repos to finance inventories (*net positions*)
2. Repos to finance reverse repos (*matched book*)
   2a. Collateral transformation
   2b. Maturity transformation

	Inventory Financing				Matched Book			
	Initial	T1	T2	Final	Initial	T1	T2	Final
Cash	20	-1,000	980	0		-1,000	1,000	
Inventories		1,000		1,000				
Reverse Repo						1,000		1,000
Repo			980	980			1,000	1,000
Equity	20			20				

$$\text{Liquidity Coverage Ratio} = \frac{\text{HQLA}}{\text{30-Day Net Cash Outflows}} \geq 100$$

More stringent U.S. implementation leads to

1. Term structure changes in tri-party repos

   - unchanged for Treasury collateral
   - some terming out in Agency MBS ($\downarrow$ Outflows)
   - large terming out in corporate debt ($\downarrow$ Outflows)

2. Treasury inventories rely less on repo financing ($\uparrow$ HQLA)
3. Less collateral downgrades –Agy for Tsy– ($\uparrow$ HQLA , $\downarrow$ Outflows)
4. Maturity transformation still elevated across collateral

Corporate inventories rely much less on repo financing
- postcrisis & pre-LCR $\Rightarrow$ endogenous de-risking

Effects of post-crisis regulations

- Leverage Ratio & Window Dressing
    - Anbil, Senyuz (2016) on triparty Repos
    - Keating, Macchiavelli (2017) on unsecured funding

- Post-crisis Reg & Corp Bond Liquidity
    - Adrian et al. (2017) JME
    - Bao et al. (2018) JFE
    - Bessembinder et al. (2018) JF
    - Trebbi, Xiao (2017) MS

- LCR Details & Incentives

- Data

- Empirical Strategy & Results

- Conclusion

$$\text{Liquidity Coverage Ratio} = \frac{\text{HQLA}}{\text{30-Day Net Cash Outflows}} \geq 100$$

HQLA – unencumbered & can be monetized:

- Level 1 (0% haircut) – Treasuries, Ginnies
- Level 2A (15% haircut) – Agencies, upper-IG Corp Debt
- Level 2B (50% haircut) – lower-IG Corp Debt, select Equities

Run-offs for $\leq$30-day Repos (Outflows) and Rev Repos (Inflows) :

- Level 1 – 0% run-off
- Level 2A – 15% run-off
- Level 2B – 50% run-off

Run-offs for $>$30-day Repos and Rev Repos $=$ 0% across Levels

Same Collateral

Level 1

Level 2

Collateral Downgrade (for dealer)

$$\text{Liquidity Coverage Ratio} = \frac{\text{HQLA}}{\text{30-Day Net Cash Outflows}} \geq 100$$

1. Term out repos backed by low-quality collateral ($\downarrow$ Outflows)

2. Reduce excessive maturity transformation ($\downarrow$ Net Outflows)

3. Unencumber high-quality assets ($\uparrow$ HQLA)

4. Reduce collateral downgrades ($\uparrow$ HQLA , $\downarrow$ Net Outflows)

LCR Timelines

Basel Committee
- Dec 2010: introduction of LCR
  - computed with quarterly average of *month-end* snapshots
- Jan 2013: LCR finalized & proposed timeline:
  - Jan 2015: LCR $\geq$ 60%; +10% each year
  - Jan 2019: LCR $\geq$ 100%

EU & Japan Implementations
- follow Basel proposal, except
- EU anticipates full compliance (100%) to Jan 2018

US Implementation – most stringent
- Dec 2011: proposed US rule, based on *daily* averages
- Sep 2014: US rule finalized & accelerated timeline:
  - Jan 2015: LCR $\geq$ 80%; +10% each year
  - Jan 2017: LCR $\geq$ 100%

Data

Tri-party repo [post-2011 vintage]

- borrowers both Primary Dealers and other dealers
- daily
- outstanding collateral pledged by type
- maturities

FR2004 [pre-2013, post-2013, post-2015 vintages]

- both foreign and domestic Primary Dealers
- weekly
- Securities Out: repos & sec lending & margin collat delivered
- Securities In: rev repos & sec borrowing & margin collat received
- Long, short and net positions for each collateral type
- collateral types (Tsy, AgyDebt, AgyMBS, Corp Debt, Eqty)
- maturity buckets (pre- vs post-2013)

Empirical Strategy

Diff-in-Diff-style analysis

1st Diff: change in behavior after key LCR dates
- Dec 2011 – US rule proposed (daily averages)
- Sep 2014 – US rule finalized
- Jan 2015 – US rule effective, 80% phase-in

2nd Diff: US implem more stringent than foreign ones
- US daily averages vs foreign month-end/quarter-end snapshots
- US accelerated phasing-in
- US maturity mismatch add-on

Stop in July 2016 – GSIB-affiliated foreign dealers subject to US LCR

$$Share(>30)_{i,t} = \beta_0 Post + \beta_1 Basel + \beta_2 US + \beta_3 Basel \cdot Post + \beta_4 US \cdot Post + \varepsilon_{i,t}$$

Collateral:	Treasuries		Corporate Debt	
	Share >30	Share >90	Share >30	Share >90
	(1)	(2)	(3)	(4)
Post US LCR announcement – Dec 2011				
Post	0.034	0.023	0.137**	0.035
	(0.026)	(0.022)	(0.068)	(0.022)
Post · Basel	-0.011	-0.014	-0.016	0.060
	(0.032)	(0.028)	(0.086)	(0.038)
Post · US	0.016	0.007	**0.153****	**0.116****
	(0.025)	(0.022)	(0.069)	(0.046)
Obs.	51405	51405	40039	40039
N. of Dealers	56	56	48	48
N. of Days	1241	1241	1239	1239
Dealer FE	Yes	Yes	Yes	Yes

▸ Figures

$$\Delta SO_{i,t} = \alpha_0 \Delta INV_{i,t} + \alpha_1 US \cdot \Delta INV_{i,t} + \alpha_2 Post \cdot \Delta INV_{i,t}$$
$$+ \alpha_3 US \cdot Post \cdot \Delta INV_{i,t}$$
$$+ \beta_0 \Delta SI_{i,t} + \beta_1 US \cdot \Delta SI_{i,t} + \beta_2 Post \cdot \Delta SI_{i,t}$$
$$+ \beta_3 US \cdot Post \cdot \Delta SI_{i,t} + \mu_t + \varepsilon_{i,t}$$

where

- Securities Out (SO) $\approx$ repos $+$ sec lending
- Securities In (SI) $\approx$ reverse repos $+$ sec borrowing
- Inventories (INV) $\approx$ long $-$ short positions

α = % of Inventories financed by "repoing out"

β = % of Reverse Repos financed by "repoing out"

$$\Delta SO_{i,t} = \alpha_0 \Delta INV_{i,t} + \alpha_1 US \cdot \Delta INV_{i,t} + \alpha_2 Post \cdot \Delta INV_{i,t}$$
$$+ \alpha_3 US \cdot Post \cdot \Delta INV_{i,t}$$
$$+ \beta_0 \Delta SI_{i,t} + \beta_1 US \cdot \Delta SI_{i,t} + \beta_2 Post \cdot \Delta SI_{i,t}$$
$$+ \beta_3 US \cdot Post \cdot \Delta SI_{i,t} + \mu_t + \varepsilon_{i,t}$$

	Δ Securities Out	
Collateral:	Treasuries	Corporate Debt
Δ INV	0.326***	0.151
	(0.053)	(0.092)
US $\cdot$ Δ INV	0.021	-0.051
	(0.082)	(0.101)
Post Announce $\cdot$ Δ INV	0.001	0.183**
	(0.057)	(0.081)
Post Announce $\cdot$ US $\cdot$ Δ INV	0.027	-0.161
	(0.085)	(0.101)
Post 80% $\cdot$ Δ INV	0.145***	0.005
	(0.049)	(0.090)
Post 80% $\cdot$ US $\cdot$ Δ INV	**-0.279****	0.047
	(0.105)	(0.144)
Obs.	6648	6648
Dealer, Week FE	Yes	Yes
SI controls	Yes	Yes

$$\Delta SO_{i,t} = \alpha_0 \Delta INV_{i,t} + \alpha_1 US \cdot \Delta INV_{i,t} + \alpha_2 Post \cdot \Delta INV_{i,t}$$
$$+ \alpha_3 US \cdot Post \cdot \Delta INV_{i,t}$$
$$+ \beta_0 \Delta SI_{i,t} + \beta_1 US \cdot \Delta SI_{i,t} + \beta_2 Post \cdot \Delta SI_{i,t}$$
$$+ \beta_3 US \cdot Post \cdot \Delta SI_{i,t} + \mu_t + \varepsilon_{i,t}$$

	Δ Securities Out	
Collateral:	Treasuries	Corporate Debt
Post Announce* $\cdot$ US $\cdot$ Δ SI MBS	**-0.527*****	0.008
	(0.132)	(0.006)
Post 80% $\cdot$ US $\cdot$ Δ SI MBS	-0.131	0.044
	(0.195)	(0.048)
Obs.	6648	6648
Dealer, Week FE	Yes	Yes
INV, SI controls	Yes	Yes

	Δ Securities Out			
Collateral:	Treasuries		Corporate Debt	
Tenor:	ON	Term	ON	Term
Post* $\cdot$ US $\cdot$ Δ SI MBS ON	**-0.369*****	-0.189	0.020	0.001
	(0.119)	(0.142)	(0.014)	(0.012)
Post* $\cdot$ US $\cdot$ Δ SI MBS Term	-0.330	0.135	-0.046	0.031
	(0.384)	(0.334)	(0.039)	(0.026)
Obs.	6648	6648	6648	6648
Dealer, Week FE	Yes	Yes	Yes	Yes
INV, SI controls	Yes	Yes	Yes	Yes

$$\Delta SO_{i,t} = \alpha_0 \Delta INV_{i,t} + \alpha_1 US \cdot \Delta INV_{i,t} + \beta_0 \Delta SI_{i,t} + \beta_1 US \cdot \Delta SI_{i,t} + \mu_t + \varepsilon_{i,t}$$

	(1)	(2)	(3)	(4)	(5)	(6)
		Δ Securities Out			Δ Securities Out	
Collateral:		Treasuries			Corporate Debt	
	ON	[2,30]	> 30	ON	[2,30]	> 30
Δ SI ON	**0.787*****	0.105***	0.030***	**0.810*****	0.042**	0.033
	(0.027)	(0.034)	(0.008)	(0.152)	(0.017)	(0.026)
Δ SI [2,30]	0.458***	**0.405*****	0.083**	0.298*	**0.170****	0.125
	(0.075)	(0.064)	(0.033)	(0.169)	(0.062)	(0.116)
Δ SI > 30	0.449***	0.104**	**0.430*****	0.466***	0.063	**0.119**
	(0.102)	(0.048)	(0.114)	(0.148)	(0.039)	(0.089)
US $\cdot$ Δ SI ON	**-0.086**	-0.015	0.011	**-0.792*****	-0.036*	0.003
	(0.063)	(0.048)	(0.016)	(0.162)	(0.019)	(0.040)
US $\cdot$ Δ SI [2,30]	-0.110	**0.106**	0.034	-0.118	**-0.006**	0.123
	(0.111)	(0.101)	(0.047)	(0.297)	(0.083)	(0.228)
US $\cdot$ Δ SI > 30	-0.126	0.222	**-0.099**	-0.560	-0.174	**0.387**
	(0.150)	(0.142)	(0.110)	(0.427)	(0.117)	(0.368)
Obs.	3297	3297	3297	2953	2953	2953
Dealer FE	Yes	Yes	Yes	Yes	Yes	Yes
Δ INV (same)	Yes	Yes	Yes	Yes	Yes	Yes
Δ SI (other)	Yes	Yes	Yes	Yes	Yes	Yes

- **Diagonal = "matched book"**
- Lower-triangular = pos. maturity mismatch $\Rightarrow$ cash rollover
- Upper-triangular = neg. maturity mismatch $\Rightarrow$ collateral rollover

Post-crisis de-risking by US dealers: ↓ Repo financing of Corp INV

The sample goes from Jan 2004 to Jun 2016, excluding the crisis (Aug 2007 to Jul 2009).

	Δ Securities Out	
Collateral:	Treasuries	Corporate Debt
Δ INV	0.556***	0.095**
	(0.051)	(0.034)
US · Δ INV	0.032	**0.340*****
	(0.089)	(0.087)
Post-Crisis · Δ INV	-0.229***	0.056
	(0.060)	(0.108)
Post-Crisis · US · Δ INV	-0.011	**-0.392*****
	(0.105)	(0.130)
Post-Announce · Δ INV	0.032	0.178***
	(0.053)	(0.053)
Post-Announce · US · Δ INV	-0.029	-0.139
	(0.083)	(0.093)
Obs.	9584	8730
Dealer, Week FE	Yes	Yes
SI controls	Yes	Yes

Did dealers change risk profile post-crisis?

1. US dealers reduce repo financing of corp debt ($\downarrow$ fire-sale risk)

Did dealers change risk profile post-LCR?

2. Reduce repo financing of Treasuries ($\uparrow$ liquidity pool)
3. Term out repos backed by lower-quality collateral ($\downarrow$ rollover risk)
4. Reduce some collateral downgrades
5. Still significant maturity transformation

Figures – Repo Terming Out