The Liquidity Coverage Ratio and Monetary Policy Implementation

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Background

- Basel III introduces a framework for **liquidity** regulation
  - objective: ensure banks hold a more liquid portfolio of assets, limit maturity mismatch
- Two components:
  - Liquidity Coverage Ratio (LCR):
    - bank must have sufficient quantity of high-quality liquid assets to survive as 30-day period of market stress
  - Net Stable Funding Ratio (NSFR)
    - establishes minimum amount of funding from “stable” sources
- Scheduled implementation: Jan 2015 (LCR), Jan 2018 (NSFR)

The question

- How might the introduction of an LCR affect monetary policy implementation?
- Many central banks target the interest rate on interbank loans …
  … of reserve balances (a high-quality liquid asset)
- If the LCR changes the demand for such loans,
  - it seems likely to change the structure of market interest rates
- Would like to understand:
  - how the LCR is likely to affect interbank interest rates
  - whether these effects could impair a CB's ability to move the interest rate to target

Our approach

- Develop a simple model to analyze this issue
  - difficult issue; this is a first step
  - goal is to identify possible implications of the LCR
- We start with a standard framework based on Poole (1968)
  - add an LCR requirement, term interbank lending
- We study a generic operational framework
  - symmetric corridor system; no reserve averaging
  - can be adapted to specific approaches of various central banks

Results

- When banks face the possibility of an LCR shortfall, process of implementing monetary policy changes
  - the LCR tends to push **down** the overnight rate
  - yield curve can be much steeper at the very short end
  - in some cases, a symmetric corridor system is ineffective
- Moreover, the *form* of central bank operations matters
  - purchases vs. repos
  - treasury securities vs. other assets
- Conclude: central banks may want to reassess operational procedures

The standard model (Poole, 1968)

- Each bank begins with:

Assets		Liabilities	
Loans	L	Deposits	$D - \varepsilon$
Bonds	B	Interbank borrowing	Δ
Reserves	$R + \Delta - \varepsilon$	Equity	E

- Faces a reserve requirement:

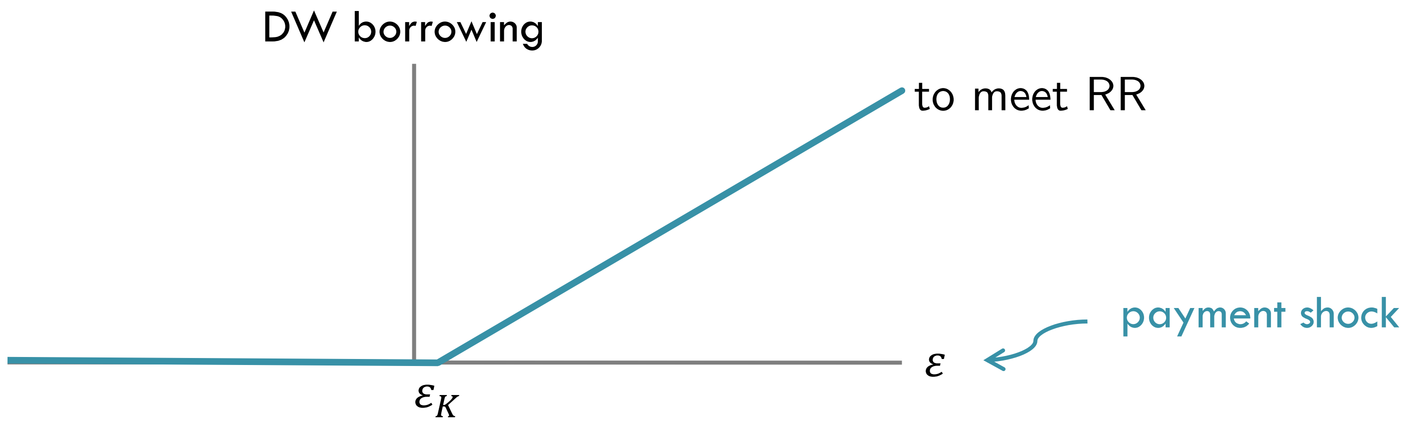
$$\text{Reserves} \geq K$$

- Can borrow and lend in an overnight interbank market
- After markets close, bank experiences end-of-day payment shock ε
  - unanticipated late-day customer payment (or deposit inflow)
- If $R + \Delta - \varepsilon < K$, bank must borrow from central bank's standing facility

- Bank chooses Δ to maximize expected profit

$$E[\pi] = r_L L + r_B B - r_D D + r_{IORR} K - r\Delta + \begin{Bmatrix} r_{IOER}(R + \Delta - \varepsilon - K) \text{ if} > 0 \\ r_{DW}\,(R + \Delta - \varepsilon - K) \text{ if} < 0 \end{Bmatrix}$$

- Given $R + \Delta - K$, amount bank must borrow from CB is:



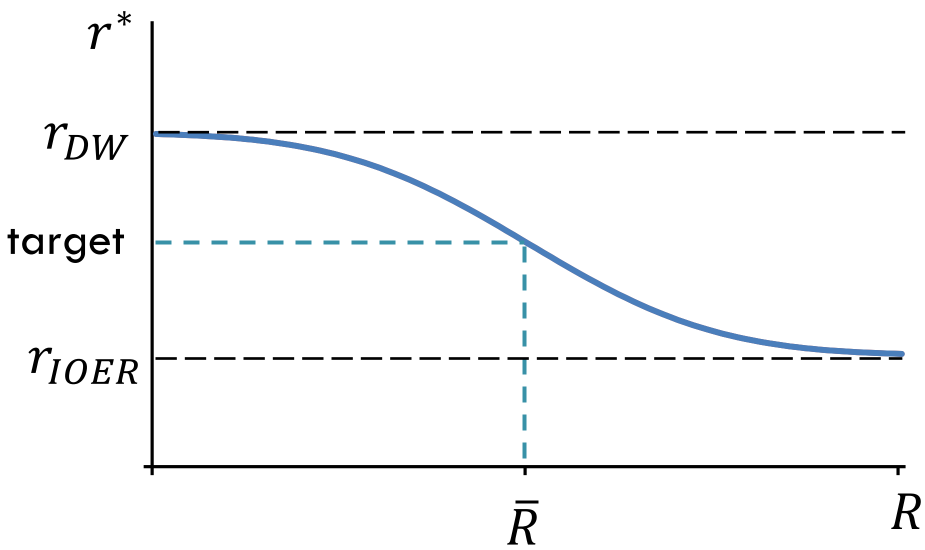
- Optimal choice:

$$r = r_{IOER} \times \text{prob}[\varepsilon < \varepsilon_K] + r_{DW} \times \text{prob}[\varepsilon > \varepsilon_K]$$

Equilibrium

- Net interbank lending = 0 ⇒ ε_K is determined by $R - K$

$$r^* = r_{IOER}(\text{prob}[\varepsilon < \varepsilon_K]) + r_{DW}(\text{prob}[\varepsilon > \varepsilon_K])$$



- Central bank determines R (and r^*) through open market operations

Our model

- Include both overnight and term loans
  - but still an essentially static framework
- Introduce an LCR requirement:

$$LCR = \frac{B + R + \Delta + \Delta_T}{\theta_D D + \Delta} \geq 1$$

- Runoff rates for different types of liabilities:
  - deposits: $\theta_D = 5\%$ or 10%
  - overnight borrowing: 100%
  - term borrowing: 0%

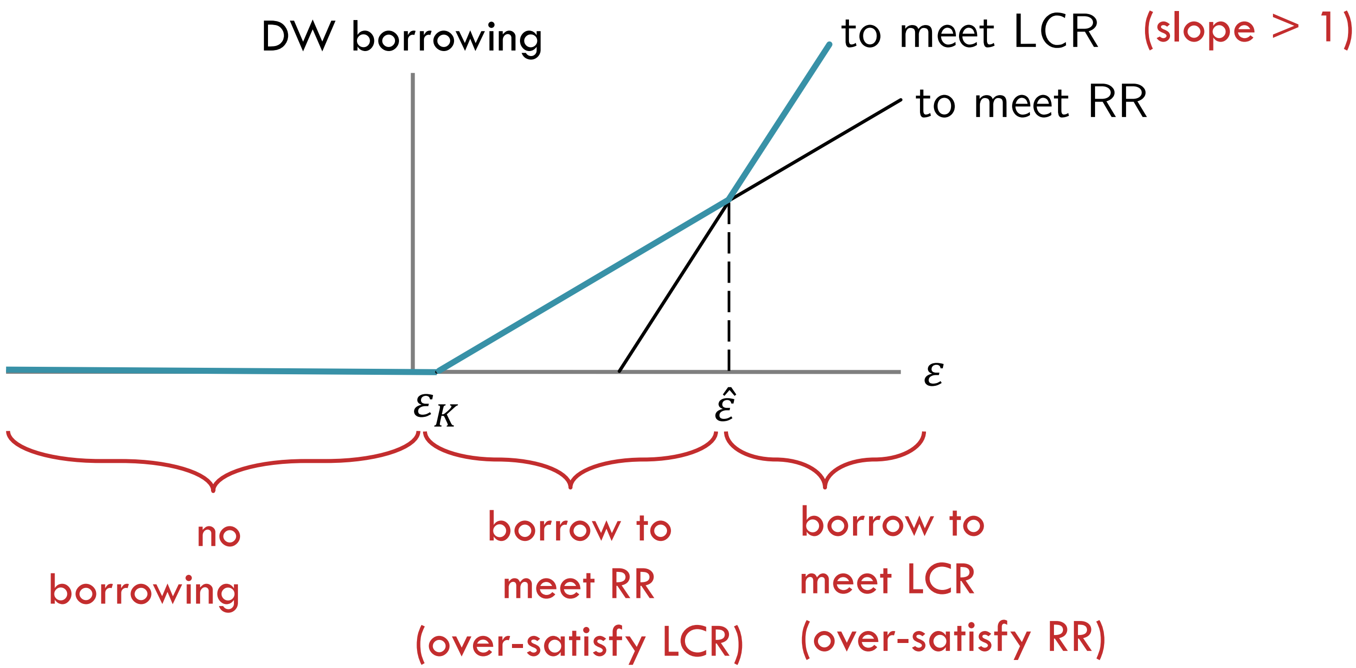
- After shock, bank borrows from CB if needed to meet **either** requirement
- Amount borrowed (X) satisfies both

$$R + \Delta + \Delta_T - \varepsilon + X \geq K$$

and

$$LCR = \frac{B + R + \Delta + \Delta_T - \varepsilon + X}{\theta_D (D - \varepsilon) + \Delta + \theta_X X} \geq 1$$

- Borrowing from CB has (minimum) runoff rate of $\theta_X = 25\%$
  - to make up a €1 LCR shortfall, must borrow > €1



In equilibrium:

$$r^* = r_{IOER}(prob[\varepsilon < \varepsilon_K] + prob[\varepsilon > \hat{\varepsilon}]) + r_{DW}\, prob[\varepsilon_K < \varepsilon < \hat{\varepsilon}]$$

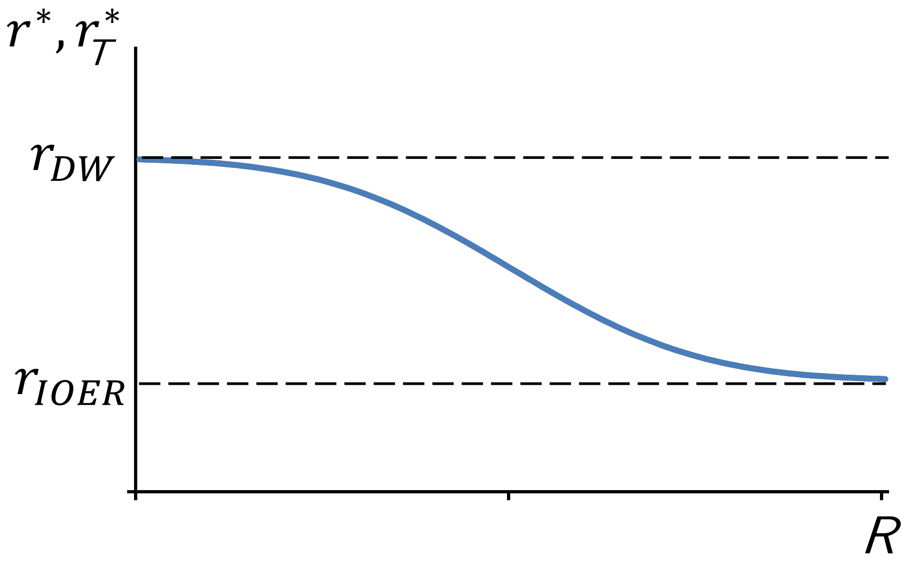
$$r_T = r^* + \frac{r_{DW}}{1-\theta_{DW}} prob[\varepsilon > \hat{\varepsilon}]$$

term premium emerges

overnight rate lower

Results

- If banks comfortably satisfy the LCR using only bonds ($\hat{\varepsilon}$ is very large)



$$B \gg \theta_D D$$

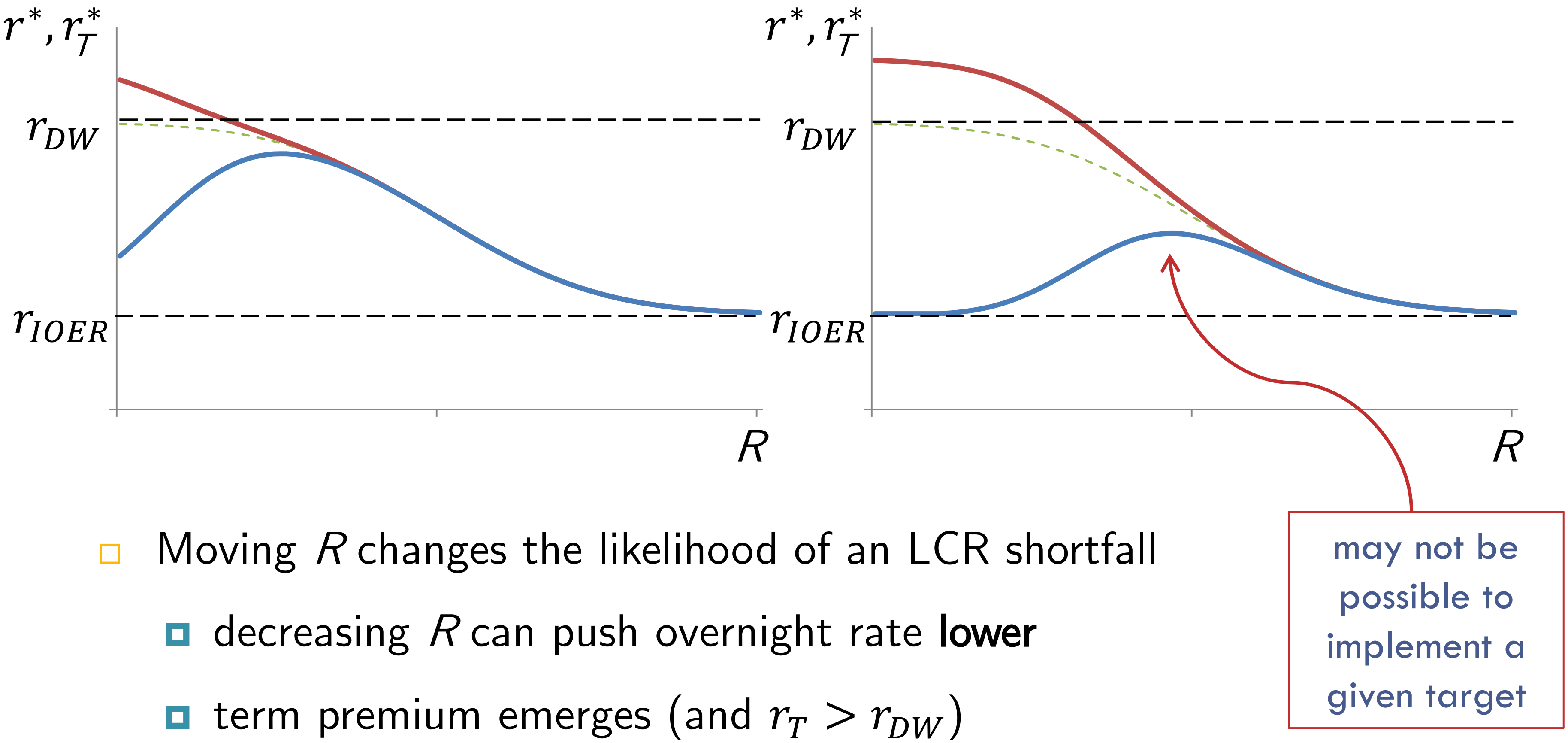
$$\left\{ LCR = \frac{B + R + \Delta + \Delta_T}{\theta_D D + \Delta} \right\}$$

- Monetary policy implementation is unaffected
- No term premium (in this simple setup)

reduces to the standard model

Results

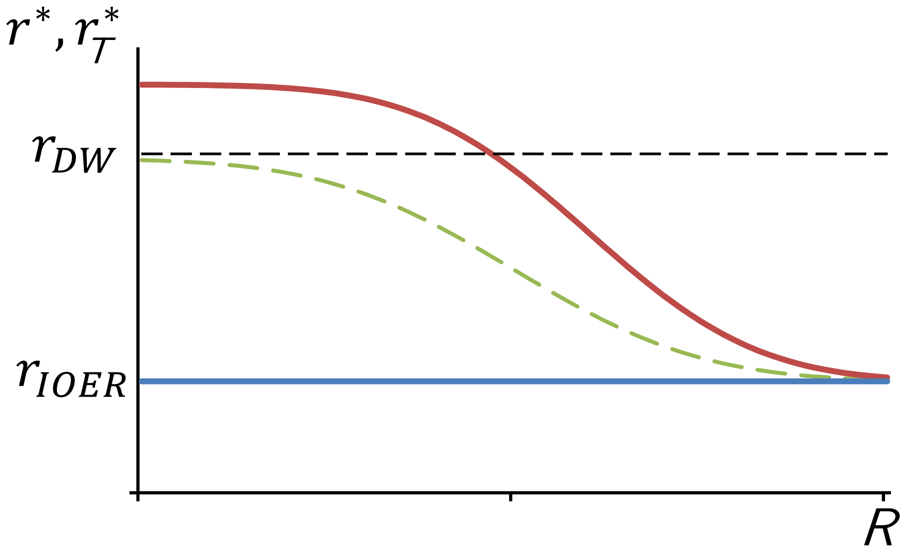
- If large shocks lead some banks to violate the LCR ($\hat{\varepsilon}$ is moderate)



- Moving R changes the likelihood of an LCR shortfall
  - decreasing R can push overnight rate **lower**
  - term premium emerges (and $r_T > r_{DW}$)

Results

- If banks rely on excess reserves to satisfy LCR $(\hat{\varepsilon} < \varepsilon_K)$



$$B + K < \theta_D D$$

$$\left\{ LCR = \frac{B + R + \Delta + \Delta_T}{\theta_D D + \Delta} \right\}$$

  - overnight rate is always at the floor
  - term premium is large

Form of open market operations matters

- If CB buys government bonds from banks:

$$LCR_{new} = \frac{HQLA_0 + \Delta Reserves - \Delta Bonds}{Outflows_0} = \frac{HQLA_0}{Outflows_0} = LCR_0$$

- If CB buys government bonds from non-banks:

$$LCR_{new} = \frac{HQLA_0 + \Delta Reserves}{Outflows_0 + 10\% \Delta Deposits} > LCR_0$$

- If CB buys illiquid assets from banks:

$$LCR_{new} = \frac{HQLA_0 + \Delta Reserves}{Outflows_0} > LCR_0$$

$\Rightarrow$ Each type of operation leads to different values for (r^*, r_T^*)

Possible adjustments

- In this setting, a central bank could:
  - switch to targeting a term rate
  - set IOER rate equal to the target rate ("floor system")
- More broadly:
  - could lend assets other than reserves (like TSLF program)
  - could allow banks to meet LCR on average over time (like reserve averaging)
- General message: central banks will likely need to pay attention to the LCR when implementing monetary policy

Conclusions

- Analysis so far is somewhat basic …
  - …but points to an important possibility
- Much more can be done
  - including more portfolio choices in the model
  - tailoring the framework to different operating regimes

Key takeaways:

- Process of implementing monetary policy may be altered
- LCR will tend to make very short end of the yield curve steeper
- Central banks need to consider structure as well as size of operations