Liquidity Regulation and the Implementation of Monetary Policy

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Presented by Nick Goldman
Overview

- 2008 financial crisis → Clear need for financial stability improvements
- Basel Committee on Banking Supervision (BCBS) implements new international regulations, known as Basel III
- New banking parameters supplement existing reserve requirements
- **Liquidity Coverage Ratio (LCR)** entails additional liquid assets in case of financial stress
- Potential **unintended effects** of LCR:
  - Deviation of untargeted interest rates
  - Interference of monetary policy
Agenda

- Outline Liquidity Coverage Ratio
- Present the model
- Introduce LCR into the model
- Effects on interest rates
- Effects on monetary policy
Liquidity Coverage Ratio

\[ LCR = \frac{\text{Stock of unencumbered high-quality liquid assets}}{\text{Net cash outflows over the next 30 calendar days}} \geq 1. \]

- Banks must hold **sufficient quantity of High-Quality Liquid Assets (HQLA)** to survive a 30-day period of market stress

- Two types of HQLA
  - Level 1: Cash, central bank reserve, certain marketable securities
  - Level 2: Government securities, corporate debt, residential MBS, certain equities

- Projected net cash outflows
  - Multiply size of each type of liability (or obligation) by its respective runoff rate in a stress scenario
The model
The model

- Single time period – divided into three stages (0, 1, 2)
- Three participants in this economy
  1. Continuum of Banks, [0, 1]
  2. Central bank
  3. Representative investor
     - Aggregate financial position of households + non-financial firms
Balance Sheets

<table>
<thead>
<tr>
<th>Bank i</th>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$L^i$</td>
<td>$D^i$</td>
</tr>
<tr>
<td></td>
<td>$B^i$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$R^i$</td>
<td>$E^i$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Central Bank</th>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$L^{CB}$</td>
<td>$R$</td>
</tr>
<tr>
<td></td>
<td>$B^{CB}$</td>
<td>$E^{CB}$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Investors</th>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$L^H$</td>
<td>$E^H$</td>
</tr>
<tr>
<td></td>
<td>$B^H$</td>
<td></td>
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<tr>
<td></td>
<td>$D$</td>
<td>$E^H$</td>
</tr>
</tbody>
</table>

\[
\int_0^1 L^i di + L^{CB} + L^H = \bar{L} \]
\[
\int_0^1 B^i di + B^{CB} + B^H = \bar{B}. \]
\[
\int_0^1 D^i di = D, \]
\[
\int_0^1 R^i di = R. \]
Timeline - single period

- Two securities traded in the market
  - a: overnight loans
  - b: term loans
- Payment shock *after* markets close
- CB discount window remains open
### End-of-Period Balance Sheet

<table>
<thead>
<tr>
<th>Assets</th>
<th>Bank $i$</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loans $L^i$</td>
<td>Deposits $D^i - \varepsilon^i$</td>
<td>Net interbank borrowing $\Delta^i_a + \Delta^i_b$</td>
</tr>
<tr>
<td>Bonds $B^i$</td>
<td></td>
<td>Borrowing from CB $X^i$</td>
</tr>
<tr>
<td>Reserves $R^i + \Delta^i_a + \Delta^i_b - \varepsilon^i + X^i$</td>
<td>Equity $E^i$</td>
<td></td>
</tr>
</tbody>
</table>
Balance Sheet + Requirements

Reserve Requirement

\[ R^i + \sum_{j=a,b} \Delta_j^i - \varepsilon^i + X^i \geq K^i. \]

K = RR for the period

LCR Requirement

\[ LCR^i = \frac{B^i + R^i + \sum_j \Delta_j^i - \varepsilon^i + X^i}{\theta_D(D^i - \varepsilon^i) + \sum_j \theta_j \Delta_j^i + \theta_X X^i} \geq 1. \]

\[ \theta = \text{runoff rate} \quad j = a,b \]
Market interest rates

Bank profits

\[
\pi^i(\varepsilon^i) = r_LL^i + r_BB^i - r_D (D^i - \varepsilon^i) - \sum_j r_j \Delta_j^i + r_K K^i + r_R \max\{R^i - K^i + \sum_j \Delta_j^i + X^i - \varepsilon^i, 0\} - r_X X^i.
\]

\[
X^i = \max\{X^K_i, X^C_i\}.
\]

In aggregate,

Profits = (interest on assets) – (interest on liabilities)

Interest rates

- \(r_R\) = excess reserves
- \(r_X\) = Discount window
- \(r_X > r_R\)
  - rate corridor
Equilibrium rates under LCR
Borrowing to meet requirements

**Reserve Requirement**

\[ R^i + \sum_{j=a,b} \Delta_j^i - \varepsilon^i + X^i \geq K^i. \]

\[ \varepsilon_K^i \equiv R^i - K^i + \sum_{j=a,b} \Delta_j^i. \]

**LCR Requirement**

\[ LCR^i = \frac{B^i + R^i + \sum_j \Delta_j^i - \varepsilon^i + X^i}{\theta_D(D^i - \varepsilon^i) + \sum_j \theta_j \Delta_j^i + \theta_X X^i} \geq 1. \]

\[ \varepsilon_B^i \equiv S^i + \sum_{j=a,b} \frac{1 - \theta_j}{1 - \theta_X} \Delta_j^i. \]

\[ S^i = \frac{B^i + R^i - \theta_D D^i}{1 - \theta_D}. \]

\[ g(\varepsilon) \]

(i) \( \varepsilon_K^i < \varepsilon_C^i \)

(ii) \( \varepsilon_K^i > \varepsilon_C^i \)
Borrowing to meet requirements

- When the LCR is the constraining requirement:
  - Overnight rate is lower (vs no LCR)
  - Term loan rate is higher
  - Term loans are advantageous because of their **lower runoff rate**
  - This represents a **regulatory premium**

\[
\begin{align*}
   r^* &= r_R (\text{prob}[\varepsilon < \hat{\varepsilon}^*]) + r_X \text{prob} [\varepsilon > \hat{\varepsilon}^*] \\
   r_T^* &= r^* + (r_X - r_R) \text{prob}[\varepsilon^*_C < \varepsilon < \hat{\varepsilon}^*]
\end{align*}
\]
if time...

Open market Operations
Open market Operations

- Central Bank buys (or sells) assets from (to) banks

- $Z$ = assets involved in OMO

- $\alpha$ = proportion of assets exchanged with banks, as opposed to the general investor
Example: CB buys bonds from banks (α = 1)

- LCR risk remains unchanged
- RR risk increases
- Overnight rate falls

Another example of the regulatory premium

Red is term loan rate
Blue is overnight rate
Thank you
Sources
