Market and Liquidity Risk Assessment Overview

Federal Reserve System
Overview

- Inherent Risk
- Risk Management
- Composite Risk
- Trend
Market and Liquidity Risk: Inherent Risk

- Definition
- Identification
- Quantification
Definition

- **Market risk** = The potential change in a bank's earnings or value due to adverse movements in market rates or prices, such as interest rates, foreign exchange rates, equity prices or commodity prices.

- **Liquidity risk** = The inability to sell assets or obtain adequate funding on reasonable terms. Very large players may also be exposed to the inability to unwind or offset exposures without significantly influencing market prices.
# Identification of Risks

<table>
<thead>
<tr>
<th>A Bank’s Products</th>
<th>A Bank’s Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investments</td>
<td>Trading</td>
</tr>
<tr>
<td>Foreign Exchange</td>
<td>Retail vs. Wholesale Loans</td>
</tr>
<tr>
<td>Type of Loans</td>
<td>Branch Banking</td>
</tr>
<tr>
<td>Type of Deposits</td>
<td>Venture Capital</td>
</tr>
<tr>
<td>Loan Commitments</td>
<td>Merchant Banking</td>
</tr>
<tr>
<td>Borrowings</td>
<td></td>
</tr>
<tr>
<td>Derivatives</td>
<td></td>
</tr>
</tbody>
</table>
Identification of Risks

Example: Investments

Type – Debt vs. Equity
Sovereign Debt vs. Corporate Debt
AAA Debt vs. BBB Debt

Tenor - 1 year vs. 10-year

Optionality - Callable vs. Noncallable
Identification of Risks

Example: Funding

Type - Wholesale vs. Retail Deposits
   Core Deposits
   Placements
   Repos

Tenor - Overnight vs. 5-year

Optionality - Callable vs. Noncallable
Identification of Risks

Internal Bank Sources

- Balance Sheet & Income Statements
- ALCO/Investment Committee Minutes & Packages
- IRR Compliance Reports
- Liquidity Compliance Reports
Identification of Risks

External Public Sources

- Required Public Reports
- Company Press Releases
- Rating Agencies
- Sell-side Analysts
- General market/economic news
- Rumors in the market
Quantification of Market Risk

- Gap Analysis
- Earnings (NII) Simulation
- Economic Value of Equity (EVE) Simulation
- Value-at-Risk (VaR)
### Quantification of Market Risk

- **Gap Analysis**
  - Identifies mismatches in **repricing** of assets and liabilities in selected time buckets.

<table>
<thead>
<tr>
<th>Time Bucket</th>
<th>Assets ($ millions)</th>
<th>Liabilities ($ millions)</th>
<th>Gap ($ millions)</th>
<th>Cumulative Gap ($ millions)</th>
<th>Cum Gap as % of Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3 mos</td>
<td>$50</td>
<td>$48</td>
<td>$2</td>
<td>$2</td>
<td>0.40%</td>
</tr>
<tr>
<td>3-12 mos</td>
<td>$125</td>
<td>$178</td>
<td>($53)</td>
<td>($51)</td>
<td>-10.20%</td>
</tr>
<tr>
<td>1-3 yrs</td>
<td>$85</td>
<td>$184</td>
<td>($99)</td>
<td>($150)</td>
<td>-30.00%</td>
</tr>
<tr>
<td>3-10 yrs</td>
<td>$90</td>
<td>$35</td>
<td>$55</td>
<td>($95)</td>
<td>-19.00%</td>
</tr>
<tr>
<td>&gt;10 yrs</td>
<td>$150</td>
<td>$5</td>
<td>$145</td>
<td>$50</td>
<td>10.00%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$500</strong></td>
<td><strong>$450</strong></td>
<td><strong>$50</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Quantification of Market Risk

- Earnings (NII) Simulation
  - NII represents total interest income minus total interest expense.

<table>
<thead>
<tr>
<th>Rate Change (bp)</th>
<th>-300</th>
<th>-200</th>
<th>-100</th>
<th>0</th>
<th>+100</th>
<th>+200</th>
<th>+300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest Income</td>
<td>29</td>
<td>30</td>
<td>33</td>
<td>35</td>
<td>42</td>
<td>47</td>
<td>50</td>
</tr>
<tr>
<td>Interest Expense</td>
<td>15.8</td>
<td>16.4</td>
<td>18.5</td>
<td>20</td>
<td>26</td>
<td>30.5</td>
<td>33</td>
</tr>
<tr>
<td>Net Interest Income</td>
<td>13.2</td>
<td>13.6</td>
<td>14.5</td>
<td>15</td>
<td>16</td>
<td>16.5</td>
<td>17</td>
</tr>
<tr>
<td>Percent Change</td>
<td>-12.0%</td>
<td>-9.3%</td>
<td>-3.3%</td>
<td>0.0%</td>
<td>6.7%</td>
<td>10.0%</td>
<td>13.3%</td>
</tr>
</tbody>
</table>

Net Interest Income Simulation: Rate Shock ($ million)
Quantification of Market Risk

Economic Value of Equity (EVE) Simulation

Bank as a Whole

Economic Value of Asset Cash Flows
- Economic Value of Liability Cash Flows
+ Economic Value of OBS Cash Flows
= Economic Value of Equity (EVE)
## Quantification of Market Risk

### Economic Value of Equity (EVE) Simulation

<table>
<thead>
<tr>
<th>Rate Change (bp)</th>
<th>Economic Value of Equity Simulation: Rate Shock ($ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-300</td>
</tr>
<tr>
<td><strong>Assets</strong></td>
<td>638</td>
</tr>
<tr>
<td><strong>Liabilities</strong></td>
<td>588</td>
</tr>
<tr>
<td><strong>EVE</strong></td>
<td>50</td>
</tr>
<tr>
<td><strong>EVE Change from base</strong></td>
<td>-3.8%</td>
</tr>
</tbody>
</table>
Quantification of Market Risk

- **Value-at-Risk (VaR)**
  - Considers historical prices and relationships.
  - Incorporates IR, FX, Equity and Commodity risks.
  - Generates one risk number: *e.g.* if your trading book VaR at the 95% confidence level is $100MM, that means that your trading book loss will be $100MM or larger only 5% of the time.
Quantification of Liquidity Risk

<table>
<thead>
<tr>
<th>Tool</th>
<th>Type of Risk</th>
</tr>
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<tbody>
<tr>
<td>Maturity Gap Analysis</td>
<td>Funding Risk</td>
</tr>
<tr>
<td>Yield on Deposits</td>
<td>Funding Risk</td>
</tr>
<tr>
<td>Public Debt Ratings</td>
<td>Funding Risk</td>
</tr>
<tr>
<td>Loan-to-Deposit</td>
<td>Market-liquidity Risk</td>
</tr>
<tr>
<td>Bid-Ask Spread</td>
<td>Market-liquidity Risk</td>
</tr>
</tbody>
</table>
Quantification of Liquidity Risk

- Maturity Gap Analysis
  - Large liability-sensitive gap increases funding pressure.
    - Bank will have to find funds to support current level of assets as liabilities mature.
    - May be exacerbated if balance sheet is growing.
    - Could send signal to market.
Quantification of Liquidity Risk

- **Yield on Deposits**
  - Higher required yield may reflect risk premium demanded by depositors.
  - May indicate an institution’s limited access to a market.
Quantification of Liquidity Risk

- Public Debt Ratings
  - Based on assessment of financial well-being
  - Common indicator; easily understood.
  - Can impact access to financial markets.
Quantification of Liquidity Risk

- Loan-to-deposit ratio
  - Loans are generally more illiquid.
  - High loan-to-deposit ratio may mean fewer liquid investments.
Bid-Ask Spread
- Represents one metric of the potential cost to liquidate.
- Indicates breadth of liquidity (more highly liquid instruments generally have lower spreads).
Quantification of Risk

- High
- Moderate
- Low
Quantification of Risk – High

Risk levels are unacceptable and the level of risk taken by the institution is an imminent threat to its viability.
Quantification of Risk - Moderate

Risk levels are substantial and there is significant potential that the earnings performance or capital position will be adversely affected. The level of earnings and capital may not adequately support the degree of risk taken by the institution.
Quantification of Risk – Low

Risk levels are well controlled and there is minimal potential that the earnings performance or capital position will be adversely affected. The level of earnings and capital provide substantial support for the degree of risk taken by the institution.
Assessing Risk Management Practices

Four Pillars of Risk Management

Board and Senior Management Oversight
Policies, Procedures and Limits
Measurement, Monitoring and MIS (including ALM Models)
Internal Controls and Audit
Board and Senior Management Oversight

- Understand core and new activities
  - Receive business line summaries
    - Monitor position reports and profit and loss statements
    - “Just as important to understand how income was made as how much income was made”
  - Set and monitor risk tolerance
    - Set risk limits
    - Determine which activities are allowed and which are prohibited
Policies, Procedures, and Limits

- Reflect the institution’s risk profile and strategy
- Function as a guide for the activities undertaken by the institution
- Limits:
  - Expression of the Board’s risk appetite
    - Exposures
    - Concentrations
  - Limits should be true constraints
  - Policy should contain procedures for addressing limit violations
Measurement, Monitoring, and MIS

● Documentation for models
  – Methodology (metrics, ratios, etc.) should be clear
  – Assumptions should be documented and supported with statistical information where possible
  – Stress tests should be regularly performed on key parameters

● Adequacy of Monitoring Reports
  – Reports should address all material risks
  – Reports should be tailored to audience
  – The timeliness and frequency of reports should be appropriate for the company
  – Reports should clearly tie actual positions to limits
Internal Controls and Audit

- Establish clear lines of authority and responsibility
- Allow for separation of duties: risk taking vs. risk measurement
- Evaluate culture of risk management and its implementation
- Create a strong audit function
  - Appropriate expertise for technical areas
  - Independence from business lines
Risk Management - Strong

Risk management practices are appropriate for the level and complexity of market and liquidity risk.
Risk Management – Acceptable

Risk management practices are satisfactory given the level and complexity of market and liquidity risks accepted by the institution.
Risk Management - Weak

Risk management practices are wholly inadequate for the level and complexity market and liquidity risks accepted by the institution.
Next Step: Developing the Risk Assessment Hypothesis

- **High Risk**
  - Weak RM Process
  - High Exposure
  - Strong RM Process

- **Low Risk**
  - Weak RM Process
  - Low Exposure
  - Strong RM Process
Developing the Risk Assessment Hypothesis

High Risk - Weak Mgmt.
- Confirm Risk Assessment
- Low Reliance Internal Measures
- Full on-site procedures

High Risk - Strong Mgmt.
- Confirm Risk Assessment
- Rely on Internal Measures
- Modified on-site procedures targeting specific areas

Low Risk - Weak Mgmt.
- Confirm Risk Assessment
- Low Reliance Internal Measures
- Target “Management” Section of on-site procedures

Low Risk - Strong Mgmt.
- Confirm Risk Assessment
- Rely on Internal Measures
- Minimal on-site procedures
Determine Composite Risk

- This measure indicates the level of supervisory concern, which is a summary judgment incorporating the assessments of the quantity of risk and the quality of risk management (weighing the relative importance of each).
- Composite risk is characterized as high, moderate, or low.
Risk Trend

- A function of changes in inherent risk and risk management.
- The probable change in the bank’s risk profile over the next 12 months – increasing, decreasing, or stable.
- The direction of risk often influences the supervisory strategy, including how much validation is needed.
Questions?
References

- SR 95-51(SUP): Rating the Adequacy of Risk Management Processes and Internal Controls at State Member Banks and Bank Holding Companies
- Joint Policy Statement on Interest Rate Risk
- Principles for the Management and Supervision of Interest Rate Risk
  http://www.bis.org/publ/bcbs108.htm