Funding Strategies
For Optimizing the Risk/Reward Trade-off
of Funding Assets on the Balance Sheet

Federal Home Loan Bank of Boston Webinar

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Agenda

I. Overview of funding strategy model
   - Objectives and key issues
   - Gathering input to customize strategy
   - How to interpret model output

II. Effective funding strategies for holding long-term, fixed-rate assets
   - 30-year fixed rate mortgages
   - 5-year/20-year amortizing commercial loans
   - 5-year automobile loans
Overview of the Funding Strategy Model
Objectives and Key Issues

- Achieve a reasonable spread without excessive risk
  - Strike a balance between
    - High spread, high interest-rate risk
    - Low spread, low interest-rate risk
  - Spread on the transaction is *at the margin*
    - Spread is pre-tax, without taking on additional overhead expenses or loan loss provision
- Reduce overall interest-rate risk
- Generate additional profit from positive spread
Customize a Funding Strategy - Gathering Inputs and Making Assumptions

- Asset characteristics
  - Loan type, term, fixed-rate period, gross/net coupon, prepayment speeds, price paid or points received, dollar amount of strategy
- Mix of advances being considered
  - Type, term, structure
- Member objectives for interest-rate hedge or earnings
  - Protect interest-rate risk
  - Maximize net interest income in initial period
- Ensure assumptions are reasonable and appropriate
What Does the Model Output Entail?

Graph as a visual representation of the strategy

- Colored lines represent the asset balance over time in different rate environments, illustrating impact of prepayment assumptions.

- Blue shaded area represents FHLB advances.

- White area between the colored line and the blue shaded area represents the portion of the asset that is funded with the member’s cash or short-term advances. White area illustrates the asset balance subject to interest-rate risk.
Model Output Continued

- Assumptions page with details of asset, funding allocation, and prepayment speeds used

- Summary of transaction results for first seven years

**Strategy:**

269 bps - $0.50 MM 5 Year amort and $0.50 MM 7 Year amort.

<table>
<thead>
<tr>
<th>Rate Scenario</th>
<th>Initial Net Spread</th>
<th>TRANSACTION RESULTS</th>
<th>PRO-FORMA IMPACT</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Average Long Term Assets</td>
<td>Average Capital/Assets</td>
</tr>
<tr>
<td>Base Case/ Rates Flat</td>
<td>2.69%</td>
<td>626</td>
<td>11.77%</td>
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<tr>
<td>Up 100 bp</td>
<td>2.69%</td>
<td>737</td>
<td>11.77%</td>
</tr>
<tr>
<td>Up 300 bp</td>
<td>2.69%</td>
<td>789</td>
<td>11.77%</td>
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<tr>
<td>Up 500 bp</td>
<td>2.69%</td>
<td>793</td>
<td>11.76%</td>
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<tr>
<td>Down 50 bp</td>
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<tr>
<td>Down 100 bp</td>
<td>2.69%</td>
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<tr>
<td>Down 150 bp</td>
<td>2.69%</td>
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</table>

**Performance Statistics - All Rate Scenarios**

<table>
<thead>
<tr>
<th>Measure</th>
<th>High</th>
<th>Low</th>
<th>Average</th>
<th>Range</th>
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<tbody>
<tr>
<td>Cost of Funds</td>
<td>2.87%</td>
<td>0.92%</td>
<td>1.47%</td>
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<tr>
<td>Net Spread</td>
<td>2.83%</td>
<td>0.60%</td>
<td>1.66%</td>
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<td>Net Int Income</td>
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<td>Pro-forma ROA</td>
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<td>7.34%</td>
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<td>0.02%</td>
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</tbody>
</table>

* Measures Mean Absolute Deviation from Average
Model Output Continued

- Average balance sheet and income statement year-by-year for first seven years, across seven different interest-rate scenarios

### MEMBER GENERIC
30yr Fixed Rate Mortgage 3.75%
7-Year Annual Return Analysis
($000s)

#### AVERAGE BALANCE SHEET

<table>
<thead>
<tr>
<th>Year</th>
<th>S-T Mtg</th>
<th>S-T Inv</th>
<th>Total Assets</th>
<th>Fxd/Am Adv</th>
<th>Opt Adv</th>
<th>S-T Liabs</th>
<th>Total Liabs</th>
<th>Total Equity</th>
<th>Asset Yield</th>
<th>Cost of Funds</th>
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#### PRE-TAX RATIOS

Interest Rate Scenario : BASE (Rates Flat)

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<th>Year</th>
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#### INTEREST INCOME & EXPENSE

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</table>

Totals 164 - 164 34 - 3 37 127
The Net Interest Spread Will Fluctuate – Why?

- Seven interest rate scenarios are modeled
  - The short-term cost of funds will change based on the rate environment being simulated
- The rate change phase-in period
- Mix of advances and short-term funding changes over time
  - Advances will mature or amortize
  - Structured advance products may reprice, call, extend or expand depending on the rate shock being simulated
- Asset prepayment speeds impact the mix of funding as the short-term rate is used to balance the transaction
  - Excess cash is reinvested at the short-term rate
  - Funding gap is filled with short-term advance
Modeling the Trade-Off: Hedging Interest-Rate Risk Versus Maximizing Potential Earnings

- The various interest rate scenarios illustrate:
  - Potential impact on net earnings if rates change
  - Potential liquidity needs along the asset horizon
  - Effectiveness of the hedge

- Managing to balance sheet sensitivity is crucial for minimizing volatility on earnings in different rate environments
Managing Effective Funding Strategies Over Time

- Cost average with funding requirements
- Manage the transaction over time and ladder in new funding as advances mature or interest-rate risk intensifies
- Evaluate changes in rates and build in protection by extending the funding to closer match balance sheet exposure
- Utilize barbell funding to offset excess deposits
- Implement funding strategies to adjust the aggregate interest-rate risk profile and/or supplement earnings
- Some advances go hand-in-hand for more structured strategies
  - Barbell of Classic Plus Cap and short-term advances
  - Expander advance and Symmetrical Prepayment advance
Effective Funding Strategies for Holding Long-Term, Fixed-Rate Assets
30-Year Fixed-Rate Mortgages

- Residential mortgages are the hardest to fund because the borrower has a free prepay option on the balance.

- Prepayment assumptions for a like-kind MBS are used as a benchmark to estimate prepayments in different interest rate environments.

- Risk of extension versus risk of prepayment impacts the performance of the strategy:
  - If rates rise, mortgage is likely to extend, and funding costs for unhedged balance will be more expensive.
  - If rates fall, mortgage is likely to prepay, and any excess long-term funding will be reinvested at prevailing market rates.
Historical Mortgage Rate and Initial Spread Analysis

Initial Cost of Funds comprised of: 10% 1-m, 10% 1-yr, 10% 3-yr, 20% 5-yr, 50% 7-yr

30-yr FRM Banxquote Avg Conforming Mortgage US (BXCMUS30)
30-Year Fixed-Rate Mortgages – Plain Vanilla

30-yr Fixed Rate Mortgage

- 10% 1-mo Classic advance: 0.33%
- 10% 1-yr Classic advance: 0.37%
- 10% 3-yr Classic advance: 0.77%
- 20% 5-yr Classic advance: 1.24%
- 50% 7-yr Classic advance: 1.86%
- 100% Total Liabilities: 1.32%

Initial Net Spread: 2.43%

Average Net Spread (seven years)
- Down 100 bp: -0.27%
- Down 50 bp: 0.41%
- Base case/Rates Flat: 1.57%
- Up 100 bp: 2.03%
- Up 300 bp: 2.01%
- Up 500 bp: 1.89%

30-yr Fixed Rate Mortgage

- 50% 5-yr Amortizing advance: 0.88%
- 50% 7-yr Amortizing advance: 1.23%
- 100% Total Liabilities: 1.06%

Initial Net Spread: 2.69%

Average Net Spread (seven years)
- Down 100 bp: 0.99%
- Down 50 bp: 2.00%
- Base case/Rates Flat: 2.83%
- Up 100 bp: 2.57%
- Up 300 bp: 1.74%
- Up 500 bp: 0.88%
30-Year Fixed-Rate Mortgages – Structured

30-yr Fixed Rate Mortgage  3.75%

50% 1-mo Classic advance  0.33%
50% 7-yr Classic Plus Cap 3X 3ml Strike 2.50%  2.22%
100% Total Liabilities  1.27%

Initial Net Spread  2.48%

Average Net Spread (seven years)
Down 100 bp  -0.33%
Down 50 bp  0.51%
Base case/Rates Flat  1.68%
Up 100 bp  1.84%
Up 300 bp  2.51%
Up 500 bp  2.11%

30-yr Fixed Rate Mortgage  3.75%

35% 1-mo Classic advance  0.33%
10% 1-yr Classic advance  0.37%
10% 3-yr Classic advance  0.77%
20% 5-yr Symmetrical Prepay advance  1.26%
25% 7/3-yr Expander advance  2.32%
100% Total Liabilities  1.06%

Initial Net Spread  2.69%

Average Net Spread (seven years)
Down 100 bp  0.26%
Down 50 bp  1.19%
Base case/Rates Flat  2.25%
Up 100 bp  2.17%
Up 300 bp  1.68%
Up 500 bp  1.33%
### MEMBER GENERIC

**Analysis of Funding Alternatives for 30-year Fixed Rate Mortgage 3.75%**

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Total Net Interest Income Years 1-7</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategy 1</strong></td>
<td>243 bps - $0.10 MM 1 Yr Bullet, $0.10 MM 3 Yr Bullet, $0.20 MM 5 Yr Bullet, $0.50 MM 7 Yr Bullet and $0.10 MM Short-Term Funding.</td>
</tr>
<tr>
<td><strong>Strategy 2</strong></td>
<td>269 bps - $0.50 MM 5 Year amort and $0.50 MM 7 Year amort.</td>
</tr>
<tr>
<td><strong>Strategy 3</strong></td>
<td>248 bps - $0.50 MM 7 Yr Classic Plus Cap 3X Notional 2.50% LIBOR Strike and $0.50 MM Short-Term Funding.</td>
</tr>
<tr>
<td><strong>Strategy 4</strong></td>
<td>269 bps - $0.10 MM 1 Yr Bullet, $0.10 MM 3 Yr Bullet, $0.20 MM 5 Yr SPA Bullet, $0.25 MM 7/3 Expander- and $0.35 MM Short-Term Funding.</td>
</tr>
</tbody>
</table>

|   | (26) | (13) | 23 | 86 | 113 | 117 | 111 |
|-150 bp | | | | | | | |
|   | (25) | (12) | 23 | 83 | 100 | 142 | 121 |
|   | (3) | 10 | 45 | 105 | 117 | 99 | 79 |

-150 bp -100 bp -50 bp 0 +100 bp +300 bp +500 bp
5-Year/20-Year Amortizing Commercial Loans

5/20-yr Amortizing Commercial Loan 4.25%

100% 5/20-yr Amortizing advance 1.19%
100% Total Liabilities 1.19%

Initial Net Spread 3.06%

Average Net Spread (five years)
- Down 100 bp 2.96%
- Down 50 bp 2.96%
- Base case/Rates Flat 2.96%
- Up 100 bp 2.98%
- Up 300 bp 3.02%
- Up 500 bp 3.06%

5/20-yr Amortizing Commercial Loan 4.25%

18% 1-mo Classic advance 0.33%
83% 5/20-yr Amortizing advance 1.19%

100% Total Liabilities 1.08%

Initial Net Spread 3.17%

Average Net Spread (five years)
- Down 100 bp 3.00%
- Down 50 bp 3.00%
- Base case/Rates Flat 2.99%
- Up 100 bp 2.97%
- Up 300 bp 2.93%
- Up 500 bp 2.88%
5-Year Automobile Loans

5-yr Automobile Loan 3.00%

<table>
<thead>
<tr>
<th>100% 5-yr Amortizing advance</th>
<th>0.88%</th>
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<tbody>
<tr>
<td>100% Total Liabilities</td>
<td>0.88%</td>
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<tr>
<td>Initial Net Spread</td>
<td>2.12%</td>
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Average Net Spread (five years)
- Down 100 bp 2.03%
- Down 50 bp 2.03%
- Base case/Rates Flat 2.03%
- Up 100 bp 2.06%
- Up 300 bp 2.11%
- Up 500 bp 2.17%

Average Net Spread (five years)
- Down 100 bp 2.27%
- Down 50 bp 2.27%
- Base case/Rates Flat 2.22%
- Up 100 bp 2.08%
- Up 300 bp 1.78%
- Up 500 bp 1.46%
For a customized funding strategy, please contact one of the Bank’s financial strategists

Kevin.Martin@fhlbboston.com
617.292.9644

Marianne.Cacciola@fhlbboston.com
617.425.9452