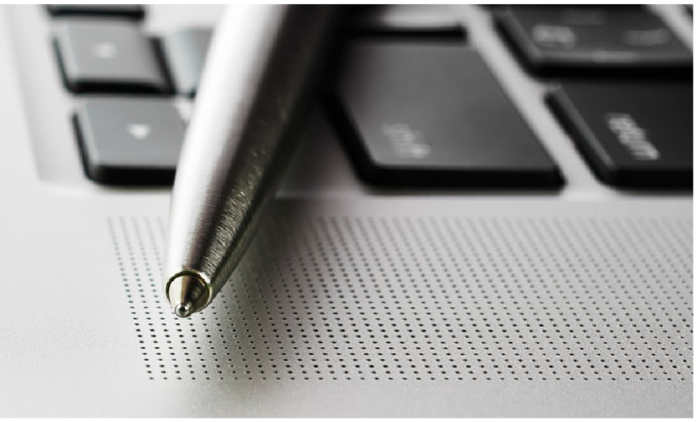
FHLBank Chicago



WHITE PAPER FROM THE
SOLUTIONS DESK

Mortgage Funding/Hedging Strategies

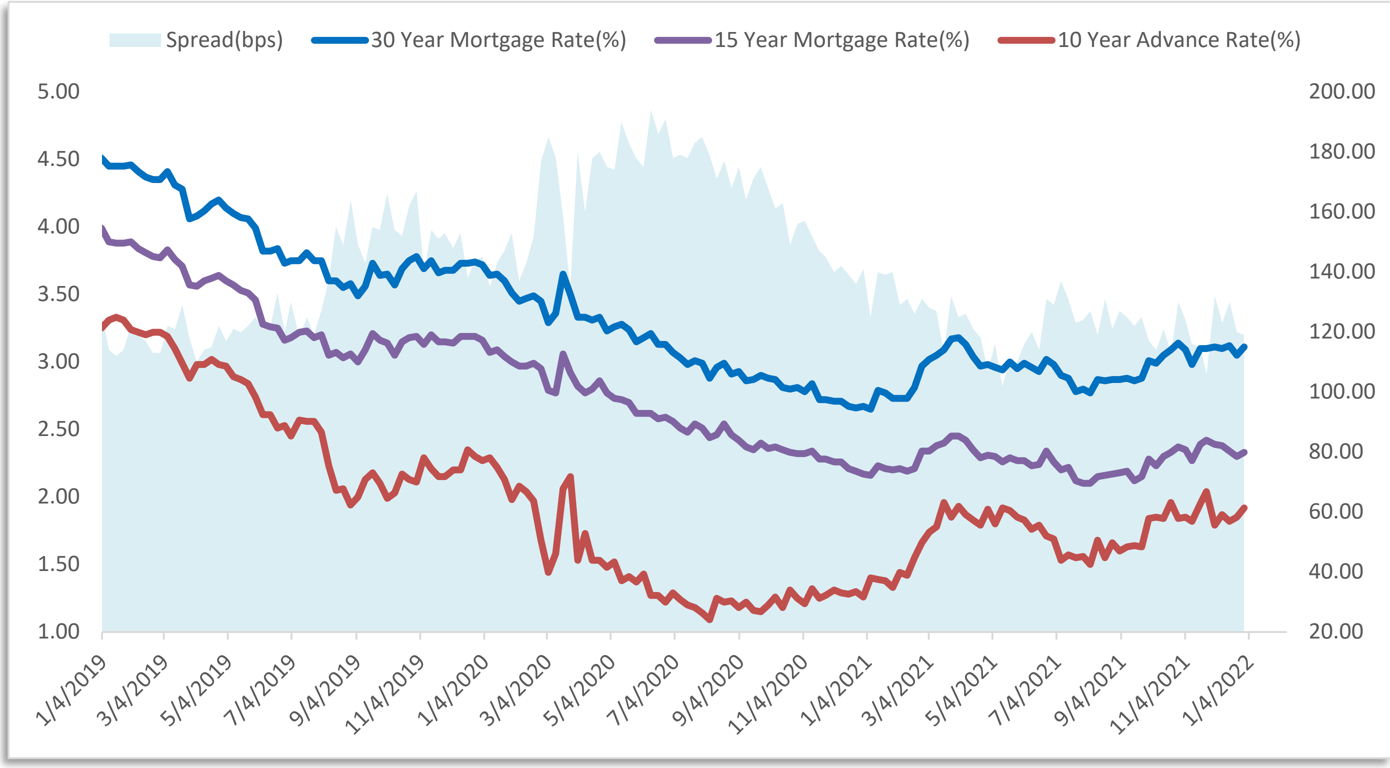
Kwabena Osei-Yeboah, CFA, FRM, Senior Fixed Income Analyst, Sale, Strategy and Solutions
Chris Milne, Managing Director, Sales, Strategy, and Solutions

Q2 2022

Overview

As the U.S. economy's recovery gained ground in 2021, the impact of coronavirus is gradually reducing with economic growth in 2022 expected to transition to a more normal but still strong growth of approximately 3.1%. Inflation rose sharply in 2021, with the Consumer Price Index (CPI) recording a high of 7.9% in February 2022 and is expected to remain elevated in 2022. From the backdrop of high inflationary pressures coupled with rising interest rates as the Federal Reserve Bank (Fed) tightens monetary policy, mortgage rates are projected to drift upward.

Purchase originations are anticipated to lead all originations as refinances wane with mortgage rates climbing higher. Since the pandemic started, the 30-year mortgage rate from Freddie Mac has steadily retreated from its high in Q3 2019 along with FHLBank Chicago's 10-year advance rate. However, with the Fed expected to increase the pace of monetary policy tightening to curb the surge in inflation, rates have moved higher and are likely to continue to do so. The spread between the 30-year mortgage rate to 10-year advance rate (see below graph) is poised to moderately widen. As market conditions change, keeping mortgages on the balance sheet is becoming a more attractive prospect.



Holding Mortgages on the Balance Sheet

Financial institutions often choose between selling or holding originated mortgage loans on their balance sheet based on the overall macroeconomic environment coupled with other factors such as term of the loan, type of loan (i.e. conforming loans, non-conforming loans), level of deposit rates, and amount of liquidity on hand. Retaining mortgage loans exposes financial institutions to credit risk, which is interest rate risk impacting risk-based capital ratios from regulatory capital held against these loans but also improves net interest margin (NIM).

FHLBank Chicago has a myriad of customized solutions for our members if you intend holding originated loans on your balance sheet. In this White Paper, we analyze hedging a 15-year and 30-year mortgage portfolio with a mix of advances and its resulting impact on NIM using forward rates as of February 28, 2022. We assumed an average deposit rate of 0.16%, cost of funds of 1% adjusted by the forward one month LIBOR, deposit beta of 0.3, and a lag of nine months in each rate shock scenario.

30-Year Mortgage Funding

Table 1 below shows the funding of a portfolio of 30-year mortgage loans at a rate of 3.50%, Table 2 shows the mortgage portfolio funding is with a ladder/mix of fixed rate and callable advances as well as use of deposits to make up for any shortfall in funding. In this scenario, the fixed-rate callable advances gives the FHLBank Chicago member the right to prepay the advances without a prepay fee on specific dates following a lockout period. For example, the 10-year no-call five-year Bermudan callable advance (10NC5Y BERM) is a ten-year fixed advance that may not be called for five years but then is callable every three months thereafter. This funding stack provides a nice mix of interest rate protection and flexibility to decrease some of the funding if the assets prepay quicker than planned.

Table 1: Mortgage Portfolio Detail - 30Y		
Transaction Size	$	10,000,000
Portfolio Yield		3.50%
Servicing Cost		0.00%
Net Portfolio Yield		**3.50%**

Table 2: Funding Solution – 30Y

Advance Summary

Structure		Amount	Rate	Transaction %
Desposits	$	2,575,000	0.16%	25.75%
1Y Fixed Advance	$	1,750,000	1.25%	17.50%
2Y Fixed Advance	$	1,250,000	1.55%	12.50%
3Y Fixed Advance	$	775,000	1.73%	7.75%
4Y Fixed Advance	$	300,000	1.84%	3.00%
5Y Fixed Advance	$	300,000	1.87%	3.00%
6Y Fixed Advance	$	250,000	2.04%	2.50%
7Y Fixed Advance	$	600,000	2.06%	6.00%
10Y Fixed Advance	$	400,000	2.31%	4.00%
5NC2 BERM	$	400,000	1.28%	4.00%
7NC2 BERM	$	400,000	1.21%	4.00%
10NC5 BERM	$	1,000,000	1.64%	10.00%
Total/Weighted Average	**$**	**10,000,000**	**1.23%**	**100%**

We show in Table 3 and Figure 1 below that the FHLBank Chicago member using the above strategy stands to earn a projected starting NIM of 227 basis points (bps). Over a five year horizon, assuming interest rates remain unchanged, the member could also earn 198 bps. NIM compression is also likely as a result of contraction risk where loan prepayments increase amid the backdrop of falling interest rates.

Table 3: NIM and NII Instant Rate Shock - 30Y

	-100	0	100
Starting Avg. NIM	2.27%	2.27%	2.27%
1Y Avg. NII	$211,462	$223,800	$223,991
1Y Avg. NIM	2.11%	2.24%	2.24%
3Y Avg. NII	$525,032	$607,038	$578,277
3Y Avg. NIM	1.75%	2.02%	1.93%
5Y Avg. NII	$839,927	$991,786	$945,476
5Y Avg. NIM	**1.68%**	**1.98%**	**1.89%**

Figure 1: Average NIM Instant Rate Shock Chart - 30Y

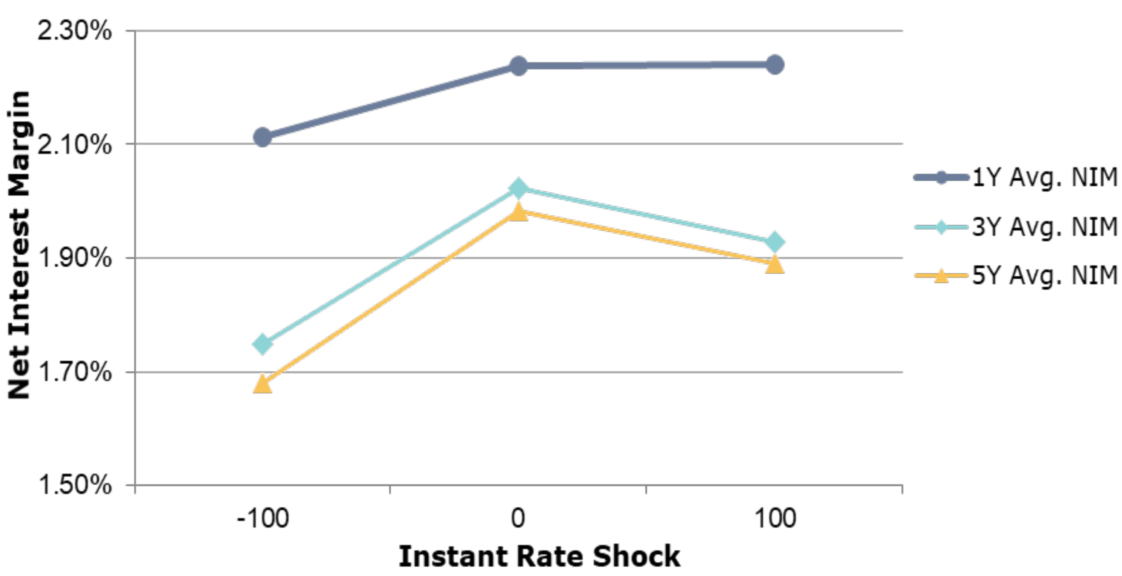


Table 4: Option - Adjusted Duration (Years) - 30Y

	Instant Rate Shock		
	-100	0	100
Loan Portfolio	1.25	3.22	4.84
Advance Funding	3.36	3.53	3.58
Net	-2.11	-0.31	1.26

Table 4 indicates that in a falling rate scenario, the option-adjusted duration of the loan portfolio would fall to 1.25 years while the advance funding would be 3.36 years. The option-adjusted duration of the advance funding would increase in a rising-rate scenario, as the probability of exercising the option for the callable advances decreases.

Another important thing to consider is how holding 30-year mortgages on your balance sheet coupled with the funding strategy above may affect your financial ratios such as return on average equity (ROAE), return on average assets (ROAA), and return on risk-based capital. Table 5 displays the impact on the balance sheet after the mortgage portfolio is added. FHLBank Chicago depository members had an average of $607 million in total assets as of Q4 2021, excluding the top five largest banks by asset size. The $10 million portfolio strategy proposed in this paper represents only approximately 2% of those average assets albeit providing significant value to your institution.

Table 5: Financial Ratios - 30Y

Metrics	Q4 2021 FHLBC Members *	1 YEAR LATER -100	1 YEAR LATER 0	1 YEAR LATER +100	3 YEARS LATER -100	3 YEARS LATER 0	3 YEARS LATER +100
NII & NIM							
Annualized Interest Income (000s)	$21,328	$21,654	$21,670	$21,674	$21,633	$21,671	$21,682
Annualized Interest Expense (000s)	($2,067)	($2,181)	($2,185)	($2,190)	($2,197)	($2,208)	($2,228)
Annualized Net Interest Margin (000s)	$19,261	$19,472	$19,485	$19,485	$19,436	$19,463	$19,454
YTD Average Earning Assets (000s)	$572,425	$582,425	$582,425	$582,425	$582,425	$582,425	$582,425
Annualized Net Interest Margin	**3.36%**	**3.34%**	**3.35%**	**3.35%**	**3.34%**	**3.34%**	**3.34%**
ROA & ROE							
Annualized Net Income (000s)	$6,629	$6,840	$6,852	$6,853	$6,804	$6,831	$6,821
YTD Average Total Assets	$606,600	$616,600	$616,600	$616,600	$616,600	$616,600	$616,600
YTD Average Total Equity	$68,635	$68,635	$68,635	$68,635	$68,635	$68,635	$68,635
Return on Average Assets	**1.09%**	**1.11%**	**1.11%**	**1.11%**	**1.10%**	**1.11%**	**1.11%**
Return on Average Equity	**9.66%**	**9.97%**	**9.98%**	**9.98%**	**9.91%**	**9.95%**	**9.94%**
Risk-Based Capital							
YTD Average Risk-Based Capital	$52,744	$52,744	$52,744	$52,744	$52,744	$52,744	$52,744
YTD Average Risk-Weighted Assets	$557,767	$562,767	$562,767	$562,767	$562,767	$562,767	$562,767
Risk-Based Capital Ratio	**9.46%**	**9.37%**	**9.37%**	**9.37%**	**9.37%**	**9.37%**	**9.37%**
Risk-Based ROA & ROE							
Return on Avg. Risk-Based Assets	**1.19%**	**1.22%**	**1.22%**	**1.22%**	**1.21%**	**1.21%**	**1.21%**
Return on Avg. Risk-Based Capital	**12.57%**	**12.97%**	**12.99%**	**12.99%**	**12.90%**	**12.95%**	**12.93%**

*Depository institutions with membership at FHLBank Chicago excluding the top 5 by asset size.

From Table 5, the sampled FHLBank Chicago members have an ROAA ratio of 1.09% and a ROAE of 9.66%. The 30-year mortgage loan strategy would add an estimated approximately 32 bps of ROAE after one year and approximately 29 bps over the three year period assuming all else remain unchanged. Mortgages must be held at 50% weights for risk-based capital purposes, according to Basel III guidelines. We can infer the institution’s total risk-based capital ratio reduces by 9 bps. However, after one year, the return on risk-based capital is projected to improve by 42 bps in the base case scenario.

15-Year Mortgage Funding

Table 6 below shows the funding a 15-year mortgage loan pool at a rate of 2.50%. Table 7 shows the mortgage portfolio funding solution is a ladder/mix of fixed rate and callable advances as well as use of deposits to make up for any shortfall in funding.

Table 6: Mortgage Portfolio Detail - 15Y	
Transaction Size	$ 10,000,000
Portfolio Yield	2.50%
Servicing Cost	0.00%
Net Portfolio Yield	**2.50%**

Table 7: Funding Solution – 15Y

Advance Summary				
Structure		**Amount**	**Rate**	**Transaction %**
Desposits	$	1,335,000	0.16%	13.35%
1Y Fixed Advance	$	1,250,000	1.25%	12.50%
2Y Fixed Advance	$	1,150,000	1.55%	11.50%
3Y Fixed Advance	$	1,000,000	1.73%	10.00%
4Y Fixed Advance	$	865,000	1.84%	8.65%
5Y Fixed Advance	$	700,000	1.87%	7.00%
6Y Fixed Advance	$	700,000	2.04%	7.00%
7Y Fixed Advance	$	1,550,000	2.06%	15.50%
10Y Fixed Advance	$	1,450,000	2.31%	14.50%
Total/Weighted Average	**$**	**10,000,000**	**1.62%**	**100%**

We show in Table 8 and Figure 2 below that the FHLBank Chicago member using above strategy stands to earn a projected starting NIM of 88 bps. Over a five year horizon, assuming interest rates remain unchanged, the member could also earn 105 bps.

Table 8: NIM and NII Instant Rate Shock - 15Y

	-100	**0**	**100**
Starting Avg. NIM	0.88%	0.88%	0.88%
1Y Avg. NII	$98,364	$100,084	$99,844
1Y Avg. NIM	0.98%	1.00%	1.00%
3Y Avg. NII	$291,968	$288,485	$270,460
3Y Avg. NIM	0.97%	0.96%	0.90%
5Y Avg. NII	$531,800	$523,982	$485,031
5Y Avg. NIM	**1.06%**	**1.05%**	**0.97%**

Figure 2: Average NIM Instant Rate Shock Chart - 15Y

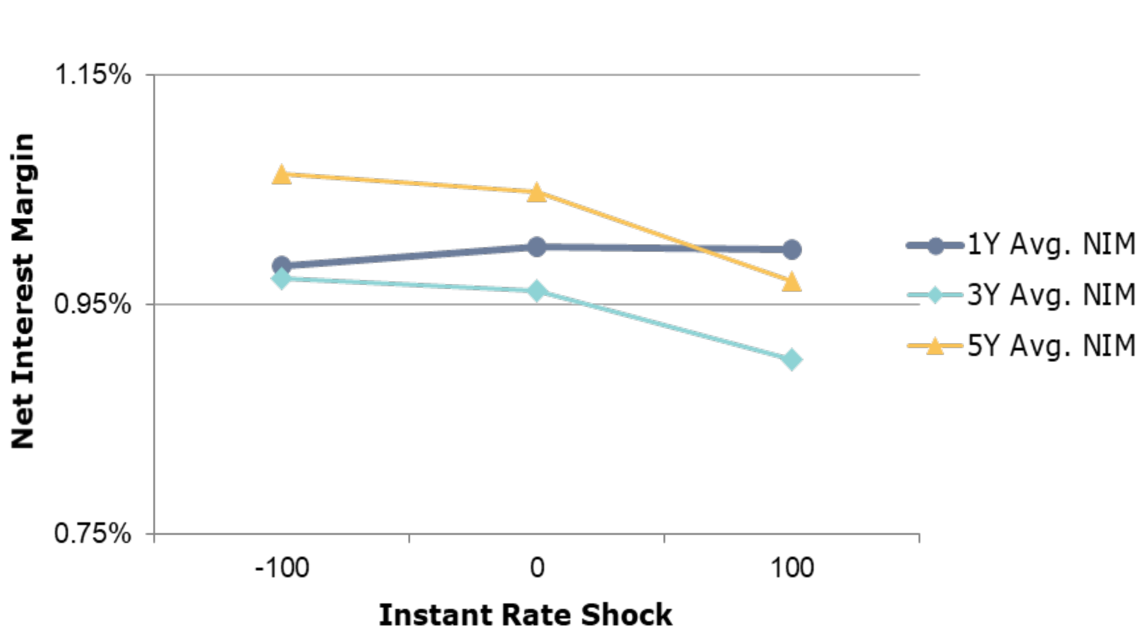


Table 9: Option - Adjusted Duration (Years) - 15Y

	Instant Rate Shock		
	-100	0	100
Loan Portfolio	1.59	2.91	3.75
Advance Funding	3.99	3.83	3.75
Net	-2.40	-0.92	0.00

Table 9 shows that in a down 100 basis point, parallel instantaneous rate shock, the option-adjusted duration of the loan portfolio would fall to 1.59 years, while the advance funding would be 3.99 years. In this scenario, new loans adjusted to a lower yield are assumed to replace the paid-down balances.

Similarly, we look at how holding 15-year mortgage portfolio on your balance sheet coupled with the funding strategy utilized may affect your financial ratios such as ROAE, ROAA, and return on risk-based capital. Table 10 displays the impact on the balance sheet after the mortgage portfolio is added.

Table 10: Financial Ratios - 15Y

	Q4 2021	1 YEAR LATER			3 YEARS LATER		
Metrics	**FHLBC Members***	**-100**	**0**	**+100**	**-100**	**0**	**+100**
NII & NIM							
Annualized Interest Income (000s)	$21,328	$21,574	$21,577	$21,577	$21,577	$21,585	$21,590
Annualized Interest Expense (000s)	($2,067)	($2,215)	($2,216)	($2,217)	($2,219)	($2,228)	($2,239)
Annualized Net Interest Margin (000s)	$19,261	$19,359	$19,361	$19,361	$19,358	$19,357	$19,351
YTD Average Earning Assets (000s)	$572,425	$582,425	$582,425	$582,425	$582,425	$582,425	$582,425
Annualized Net Interest Margin	**3.36%**	**3.32%**	**3.32%**	**3.32%**	**3.32%**	**3.32%**	**3.32%**
ROA & ROE							
Annualized Net Income (000s)	$6,629	$6,727	$6,729	$6,729	$6,726	$6,725	$6,719
YTD Average Total Assets	$606,600	$616,600	$616,600	$616,600	$616,600	$616,600	$616,600
YTD Average Total Equity	$68,635	$68,635	$68,635	$68,635	$68,635	$68,635	$68,635
Return on Average Assets	**1.09%**	**1.09%**	**1.09%**	**1.09%**	**1.09%**	**1.09%**	**1.09%**
Return on Average Equity	**9.66%**	**9.80%**	**9.80%**	**9.80%**	**9.80%**	**9.80%**	**9.79%**
Risk-Based Capital							
YTD Average Risk-Based Capital	$52,744	$52,744	$52,744	$52,744	$52,744	$52,744	$52,744
YTD Average Risk-Weighted Assets	$557,767	$562,767	$562,767	$562,767	$562,767	$562,767	$562,767
Risk-Based Capital Ratio	**9.46%**	**9.37%**	**9.37%**	**9.37%**	**9.37%**	**9.37%**	**9.37%**
Risk-Based ROA & ROE							
Return on Avg. Risk-Based Assets	**1.19%**	**1.20%**	**1.20%**	**1.20%**	**1.20%**	**1.19%**	**1.19%**
Return on Avg. Risk-Based Capital	**12.57%**	**12.75%**	**12.76%**	**12.76%**	**12.75%**	**12.75%**	**12.74%**

*Depository institutions with membership at FHLBank Chicago excluding the top 5 by asset size.

As shown in Table 10, the hedging strategy for a $10 million portfolio of 15-year mortgage loans would add an estimated 14 bps of ROAE after one year, assuming all else remains constant. Similarly, the institution's total risk-based capital ratio is projected to be reduced 11 bps but after one year the return on risk-based capital would have improved by 19 bps in the base case.

While fixed rate mortgage loans are used in this strategy, members could use a variety of different assets, such as hybrid adjustable rate mortgages, commercial and industrial loans, commercial real estate loans, and consumer loans.

By using aforementioned mix of advances to fund/hedge your mortgage portfolio coupled with filling the shortfall with deposits, you can increase income, ROA without heavily impacting your interest rate risk or risk-based capital levels. This reflects an inherent tradeoff made to increase the net portfolio spread at the expense of a slight increase in interest rate risk exposure.

Our Solutions and Sales teams can customize these strategies for you to fit your own institution's risk/return tolerances – feel free to put us to work to meet your objectives!

To Learn More

To learn more about the strategies discussed here, or to have your mortgage portfolio run through our model, please reach out to your Sales Director.

Contributors

Kwabena Osei-Yeboah, CFA, FRM
Senior Fixed Income Analyst
Sales, Strategy, and Solutions

Chris Milne
Managing Director
Sales, Strategy, and Solutions

Disclaimer

The scenarios in this paper were prepared without any consideration of your institution's balance sheet composition, hedging strategies, or financial assumptions and plans, any of which may affect the relevance of these scenarios to your own analysis. The Federal Home Loan Bank of Chicago (FHLBank Chicago) makes no representations or warranties (express or implied) about the accuracy, currency, completeness, or suitability of any information in this paper. This paper is not intended to constitute legal, accounting, investment, or financial advice or the rendering of legal, accounting, consulting, or other professional services of any kind. You should consult with your accountants, counsels, financial representatives, consultants, and/or other advisors regarding the extent these scenarios may be useful to you and with respect to any legal, tax, business, and/or financial matters or questions. In addition, certain information included here speaks only as of the particular date or dates included, and the information may have become out of date. The FHLBank Chicago does not undertake an obligation, and disclaims any duty, to update any of the information in this paper. Moreover, this paper may include forward-looking statements, which are based upon the FHLBank Chicago's current expectations and speak only as of the date(s) thereof. These forward-looking statements involve risks and uncertainties including, but not limited to, the risk factors set forth in the FHLBank Chicago's periodic filings with the Securities and Exchange Commission, which are available on its website. This paper may provide relevant links to other outside web sites unrelated to FHLBank Chicago. FHLBank Chicago is not responsible for such linked sites nor the content of any of the linked sites. You understand that when going to a third-party web site, that site is governed by the third party's privacy policy and terms of use, and the third party is solely responsible for the content and offerings presented on its website. Mortgage Partnership Finance," "MPF," "MPF Xtra," and "eMPF" are registered trademarks of the Federal Home Loan Bank of Chicago.