

# Cash Balance Plans: What You Need to Know

The cash balance plan is the fastest-growing plan design in the country, but they can be tricky for sponsors to hedge.



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## Executive summary

The adoption of cash balance (CB) plans has grown rapidly, positioning them as a transformative component of corporate retirement planning. Combining features of both traditional defined benefit (DB) plans and defined contribution (DC) plans, CB plans offer flexibility and predictability but introduce unique challenges, particularly in liability hedging and interest crediting rate (ICR) risk management.

This paper provides a comprehensive guide for a diverse audience:

- **For plan sponsors new to cash balance plans:** Gain an understanding of foundational concepts, mechanics, and the critical differences between CB and DB plans.
- **For sponsors currently managing CB plans:** Explore different approaches for managing fluctuations in the ICR, including how to navigate the ICR “floor” in low- and high-rate environments.

## Key insights include:

- 1. Foundational mechanics:** Cash balance plans, while legally defined benefit plans, express participant benefits as notional account balances, which require careful consideration of pay and interest credits. A common misconception is equating the account balance with the plan’s liability.
- 2. Interest crediting rate:** The largest challenge plan sponsors face with cash balance plans is the interest crediting rate (ICR). Special LDI hedging techniques are available to hedge the account growth based on the sponsor-selected ICR. An emerging trend of sponsors selecting a market-based ICR in new CB plan designs has the potential to further ease this challenge.
- 3. Impact of lump sum take rates:** Actuaries’ assumptions about lump sum take rates in CB plans are critical for estimating liability duration; high take rates shift focus to short-duration, liquid assets, while low take rates require long-term, duration-matched investments to fund future annuity streams.

## Understanding the mechanics of a cash balance plan

### How does a cash balance plan work?

CB plans represent a significant evolution in retirement planning, combining the predictability of defined benefit plans with the flexibility and portability of defined contribution plans such as 401(k)s. From a legal perspective, CB plans are considered a form of defined benefit plan. In practice, a CB plan is essentially a “hybrid” type of DB pension plan that incorporates elements from both traditional DB and defined contribution plans.

#### CB plan anatomy

- **Account balance representation:** Each CB plan participant’s benefits are represented as a notional account balance, simplifying understanding and transparency.
- **Pay and interest credits:** Contributions to CB plan accounts come in the form of pay credits, typically a percentage of compensation, and interest credits, which are usually tied to a fixed or variable rate such as a Treasury rate.
- **Interest crediting rate:** The ICR is crucial, as it affects the growth of the notional account balance and can include a minimum floor to protect against low-interest-rate environments.

### Key differences between DB and CB plans

While both plans offer tax advantages and are governed by ERISA rules (i.e., tax deductions on contributions apply to both DB and CB plans), they differ in how benefits are calculated. Traditional DB plans promise a specific pension based on a formula, whereas CB plans express the benefit as a hypothetical account balance made up of pay and interest credits. Additionally, in a CB plan, the interest credit can vary and might not reflect the actual

investment performance. See below for more details on each plan type.

#### Defined benefit pension plan mechanics

- A DB plan promises a specific pension amount, often based on factors such as salary and years of service. This amount isn’t kept in individual accounts but is recorded collectively and funded by sponsor contributions and investment returns in a trust.
- Contributions to the plan aren’t taxed immediately, and investment earnings grow tax-free. Taxes are only applied when funds are withdrawn, typically during retirement. The investments are managed according to ERISA rules, which include the “prudent person rule” and “fiduciary duties.”
- Upon retirement, participants receive an annuity for life.

#### Cash balance plan mechanics

- A CB plan is a type of DB plan, but it calculates benefits differently. The benefit is made up of “pay credits” and “interest credits,” both of which are defined in the plan document.
- Pay credits are earned each year of service by active participants.
- Interest credits are applied to the notional account balance and accrue for both active and terminated vested participants, even if the plan is frozen.
- It’s important to note that the interest credit may not always match the actual investment return on plan assets. However, a recent trend for newly created CB plans (e.g., [Southwest pilots’ recently opened CB plan](#)) is to link interest credit and investment return, subject to a zero floor so that accrued benefits are never reduced.

Exhibit 1 provides simple examples of common DB and CB structures and how the benefits grow.

### Exhibit 1: DB’s annuity versus CB’s notional account balance

DB and CB plan structures cause their benefits to grow differently. The DB plan (left) is an annuity starting at age 65, while the CB plan (right) is an account balance as of today.

Defined benefit plan example	
Participant current age	45
Final average pay	\$100,000
Current years of service	10
Accrued benefit payable annually upon retirement at age 65	\$10,000

Cash balance plan example	
1/1/202x notional account balance	\$20,000
202x pay credit (4% of eligible comp of \$100,000)	\$4,000
202x interest credit (1.4% of notional account balance)	\$280
12/31/202x notional account balance	\$24,280

Source: Voya IM estimates.

### Lump sum take rates

In a cash balance plan, actuaries' assumptions about lump sum take rates are crucial for estimating liability duration, especially from an LDI perspective. When participants choose lump sums, liabilities are settled immediately, significantly shortening the plan's duration. Conversely, when participants opt for annuities, liabilities extend over a longer horizon, maintaining a higher sensitivity to interest rates. Actuaries base these assumptions on factors such as participant demographics, historical trends, and regulatory influences such as IRS segment rates and mortality tables. Misjudging these assumptions can lead to mismatches between assets and liabilities, impacting the plan's ability to meet obligations without incurring additional costs.

From a hedging perspective, high lump sum take rates shift the focus to short-duration, liquid assets, reducing the need for long-term interest rate hedging but increasing the importance of liquidity management. On the other hand, low lump sum take rates require investments aligned with long-term liabilities, often emphasizing duration-matched bonds and robust interest rate hedging strategies. A significant divergence between assumed and actual take rates could create funding volatility or liquidity challenges. Sponsors and their actuaries must continuously refine their projections to adapt to changing participant behavior, market conditions and regulatory frameworks, ensuring the LDI strategy effectively aligns with the evolving liability profile.

### Trouble in paradise: Actuarial valuations of CB plan liabilities reveal counterintuitive outcomes

On a purely economic basis, the liability of a CB plan appears straightforward: It's the sum of all participants' current account balances. Much like a bank account, this balance doesn't fluctuate with daily interest rate changes. In this sense, the liability seems to have no duration or sensitivity to interest rates.

However, actuaries approach this calculation differently—and their calculations can reveal counterintuitive outcomes. They first project each participant's current account balance to their assumed retirement age, factoring in interest crediting. This projected balance is the numerator in their calculation.

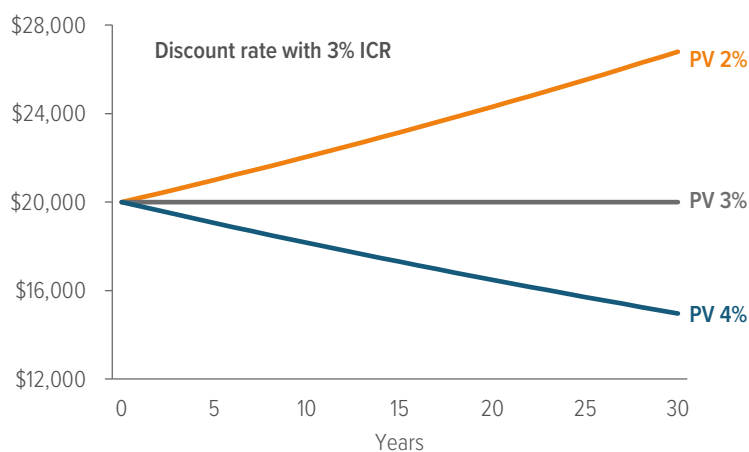
Next, they discount this projected balance back to its present value using an appropriate discount curve. The discount rate is typically set by the IRS for minimum funding requirements and based on high-quality corporate bonds for accounting purposes. This discount rate is the denominator in their calculation.

The relationship between the discount rate and the assumed interest crediting rate is critical. If the discount rate is higher than the ICR, the calculated liability will be lower than the sum of the participants' current account balances, and vice versa (Exhibit 2).

When the discount rate is higher than the ICR, this puts the plan on the hook for a higher CB amount than the liability suggests (before age 65). This can erode funded status and trigger contributions.

#### Exhibit 2: The relationship between plan ICR and discount rate has a large impact on liability calculations

A 35-year-old, terminated and vested with a \$20,000 cash balance today, is projected to have \$48,545 at age 65, assuming an ICR of 3% ( $20,000 * 1.03^{30}$ ). Applying a discount factor above or below the ICR will decrease or increase liability, respectively.



t=	Age	Cash balance	PV 2.0% disc rate	PV 3.0% disc rate	PV 4.0% disc rate
0	35	<b>\$20,000</b>	\$20,000	\$20,000	\$20,000
10	45	\$26,878	\$22,050	\$20,000	\$18,158
20	55	\$36,122	\$24,309	\$20,000	\$16,486
30	65	\$48,545	\$26,800	\$20,000	<b>\$14,967</b>

Given the sensitivity of CB plans to ICR / discount rate differentials, plan sponsors of CB plans can be on the hook for higher cash balances than the liability suggests when the discount rate is higher than the ICR—this can erode funded status and trigger contributions.

As of 12/31/24. Source: Voya IM estimates.

### CB plans have shorter durations than DB plans

Traditional DB plans, such as those using a final average pay (FAP) formula, tend to have higher durations than CB plans. This shorter CB plan duration is largely due to a duration from the ICR that offsets the duration of the traditional DB plan portion of the liability (if there is one). CB plan duration tends to be further reduced due to lump sum take-up upon retirement, which eliminates the post-retirement annuity period that extends the duration in traditional DB plans.

The age of the participants also plays a significant role in the plan’s duration. The older the average age of the participants, the shorter the duration (Exhibit 3). As a participant gets closer to retirement, their account balance becomes less sensitive to changes in the discount rate, thereby reducing the duration. If the assumed ICR is the same as the discount rate, the CB plan’s liability has no duration.

**Exhibit 3: The older the participants’ average age, the shorter a CB plan’s duration**

Age	Years until retirement	CB account (ICR = 3%)	Liability discounted at 2%	Liability discounted at 3%	Liability discounted at 4%
35	30	\$20,000	\$26,800	\$20,000	\$14,967
45	20	\$26,878	\$32,670	\$26,878	\$22,155
55	10	\$36,122	\$39,824	\$36,122	\$32,795
65	0	\$48,545	\$48,545	\$48,545	\$48,545

As of 12/31/24. Source: Voya IM estimates.

### Understanding the ICR (and its challenges)

#### How the ICR works

Given the sensitivity of CB plans to ICR/ discount rate differentials, there are regulations surrounding the setting of plans’ ICRs. In essence, they must reflect market returns while adhering to the “preservation of capital” rule. Most pension plans anchor the ICR to the 30-year U.S. Treasury rate, a conservative choice compared with portfolio returns or the S&P 500.

Here’s how it typically works: The plan sponsor selects a lookback month—one of the five months preceding the start of the plan year—and the average of the 30-year

U.S. Treasury rate of that month becomes the reference rate for the following year. This annual interest credit is then applied uniformly to all CB plan accounts within the plan.

However, aligning investments with this interest crediting approach presents challenges. No single asset class can consistently match the annual yield of the 30-year Treasury bond. Moreover, directly investing in these bonds would expose the portfolio to price fluctuations stemming from changes in yields throughout the year (Exhibit 4).

**Exhibit 4: Monthly fluctuations in long bond yields can significantly affect portfolio values**

Age	ICR based on 30-year Treasury yield	Cash balance account	Value of a portfolio of 30-year Treasury bonds (assumes eff. duration 20 yrs)
0	3.00%	\$20,000	\$20,000
1	4.00%	\$20,600	\$16,667

As of 12/31/24. Source: Voya IM estimates.

Thus, while the 30-year Treasury rate serves as a common benchmark for crediting interest, replicating its performance in the investment portfolio is not straightforward.

**How can sponsors manage ICR fluctuations?**

Since a CB plan’s balance increases and decreases with the rise and fall of the ICR, its sensitivity to the ICR is an offset to discount rate sensitivity. In other words, a shock to the ICR measures its negative duration, which is applied to its respective key rate duration (KRD) node.

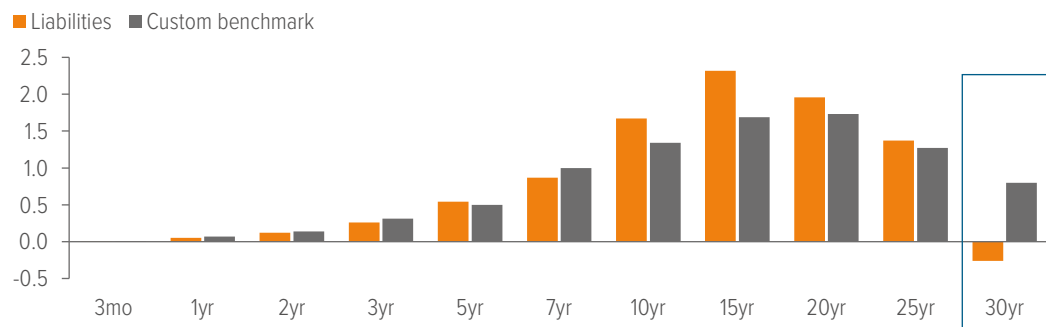
Typically, sponsors determine KRDs and use a custom benchmark as a proxy to the liability. Then the ICR sensitivity is applied to its respective KRD node.

Exhibit 5 shows a custom benchmark that is a proxy to a liability that has an ICR based on the 30-year U.S. Treasury rate, as seen by the negative KRD at the 30-year node. A 99.4% interest rate hedge ratio is achieved, and total duration between custom benchmark and liability are very close. CB liability is 16% of total liability in this case.

**Exhibit 5: Custom benchmark composition and characteristics**

Asset classes	Duration (years)	Yield	Custom benchmark
<b>Liability-matching asset classes</b>			
Bloomberg U.S. Treasury 7-10 Year Index	7.3	4.00%	10%
Bloomberg U.S. Treasury 10-20 Year Index	13	4.40%	10%
Bloomberg Long Corporate Index	12.8	5.40%	50%
Bloomberg Intermediate Corporate (1-10yr)	3.9	5.10%	30%
<b>Total</b>			<b>100%</b>
<b>Characteristics</b>			
Yield			5.04%
Benchmark duration (net of FS & allocation)			8.86
Liability duration			8.92
Benchmark IRHR			99.40%
Benchmark CSHR (DxS)			60.00%
Tracking error			1.06%

KRDs



As of 01/31/2024. Source: Voya IM estimates.

Given the negative duration of CB plans, a strategy that effectively “shorts” the 30-year Treasury can help manage interest rate volatility.

### Managing CB plans in the presence of legacy DB plans

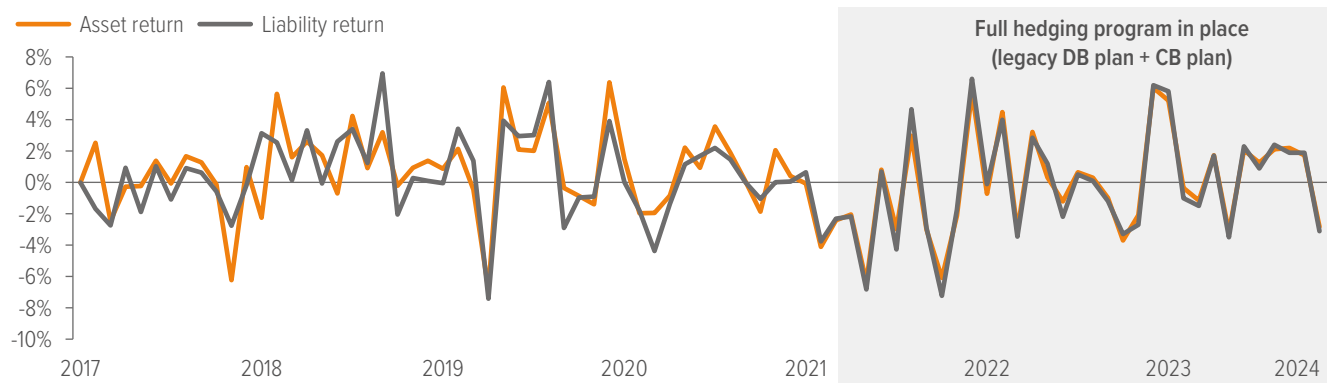
For plans that are mostly CB, there may need to be an outright overlay embedded in the custom benchmark and a short position in the portfolio to actively address the negative duration from the ICR. However, in the example used in Exhibit 5, there is a significant legacy DB plan, which makes it easier to incorporate ICR sensitivity into a broader pension plan hedging strategy (Exhibit 6). Recently, Voya’s LDI team developed a robust hedging program in partnership with a client

for their legacy DB plan, which also had CB features. The custom program, which centers around a custom benchmark that considers ICR sensitivity, was applied to the plan at the beginning of 2022.

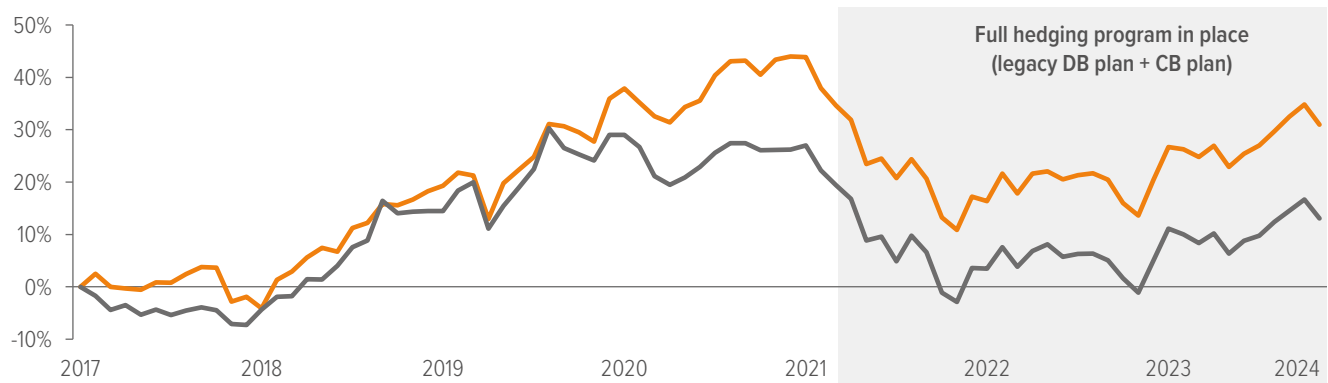
As Exhibit 6 highlights, Voya’s custom benchmarking and hedging program tightly aligned assets with liabilities, effectively “locking in” asset outperformance over liabilities. Additionally, the post-2022 portfolio sustained superior performance of assets, confirming the success of this hedging approach.

#### Exhibit 6: Proper hedging can tightly align overall assets and liabilities when a CB plan exists alongside a legacy DB plan

Asset & liability monthly returns



Asset & liability cumulative returns



As of 10/31/24. Source: Voya IM, Callan.

### The ICR “floor” in low- and high-rate environments

Most CB plans use an ICR that is pegged to U.S. Treasury rates—usually the 30-year, but a few use 10-year or even 1-year rates. To mitigate risk and ensure stability, some plans incorporate a “floor,” which guarantees a minimum return. Floors complicate ICR hedging. When the ICR’s pegged rate falls below the floor, the ICR remains at the floor level. This stabilizes

projected account balances and effectively provides a zero duration from the ICR, which reduces ICR risk.

In low-rate environments, the presence of a floor may lead many to overlook the risks associated with the ICR, relying instead on standard LDI strategies. Exhibit 7 shows a simple example of how the ICR duration is at zero when well below the floor.

**Exhibit 7: Plan impact when the discount rate is below the ICR floor**

<b>ICR:</b> 30-year Treasury, subject to minimum of 4%				
<b>Discount rate:</b>		2%		
<b>30-year UST:</b>		2%		
t	30yr UST rate	ICR	Cash balance	PV of CB to t = 0 discounted at 2%
0	2.00%	4.00%	\$100,000	\$100,000
1	2.00%	4.00%	104,000	101,961
2	2.00%	4.00%	108,160	103,960
3	2.00%	4.00%	112,486	105,998
4	2.00%	4.00%	116,986	108,077
5	2.00%	4.00%	121,665	110,196
<b>Discount rate duration calculation</b>				
a.	PV of liab at t = 5 discounted to t = 0		\$110,196	
b.	Discount rate shocked +25 bp		108,855	
c.	Discount rate shocked -25 bp		111,556	
d.	<b>Discount rate duration (in years)</b>		<b>1.23</b>	
<b>ICR duration calculation</b>				
e.	ICR shocked +25 bp		\$110,196	
f.	ICR shocked -25 bp		110,196	
g.	<b>ICR rate duration (in years)</b>		<b>0.00</b>	
<b>Net total duration</b>			<b>1.23</b>	

Source: Voya IM estimates.

In light of recent high inflation and the corresponding higher interest rate environment, CB plans are facing new challenges that necessitate a thorough re-evaluation of risk management and investment strategies. Treasury yields remain at their highest level since 2007, which means the ICR often surpasses the guaranteed minimum or “floor.” When the ICR is above the floor, then a liability sensitivity to the ICR emerges as a negative duration.

This situation introduces unique exposures to the yield curve, demanding a more dynamic approach to hedging than traditional methods that LDI strategies can provide (Exhibit 8).

**Exhibit 8: Plan impact when the discount rate is above the ICR floor**

<b>ICR:</b> 30-year Treasury, subject to minimum of 4%				
<b>Discount rate:</b>		5%		
<b>30-year UST:</b>		6%		
t	30yr UST rate	ICR	Cash balance	PV of CB to t = 0 discounted at 2%
0	6.00%	6.00%	\$100,000	\$100,000
1	6.00%	6.00%	106,000	100,952
2	6.00%	6.00%	112,360	101,914
3	6.00%	6.00%	119,102	102,884
4	6.00%	6.00%	126,248	103,864
5	6.00%	6.00%	133,823	104,853
<b>Discount rate duration calculation</b>				
a.	PV of liab at t = 5 discounted to t = 0		\$104,853	
b.	Discount rate shocked +25 bp		103,614	
c.	Discount rate shocked -25 bp		106,111	
d.	<b>Discount rate duration (in years)</b>		<b>1.19</b>	
<b>ICR duration calculation</b>				
e.	ICR shocked +25 bp		\$106,096	
f.	ICR shocked -25 bp		103,623	
g.	<b>ICR rate duration (in years)</b>		<b>-1.18</b>	
<b>Net total duration (in years)</b>			<b>0.01</b>	

Source: Voya IM estimates.

The need for re-evaluation extends to liability proxies to ensure they accurately reflect the new ICR risk. Moreover, the costs associated with entering and exiting financial instruments such as swaptions and futures may climb as the ICR fluctuates around the floor, complicating the financial management of these plans.

These are, of course, highly simplified examples. All plans differ in the magnitude of their CB plan relative to overall liability, which will influence hedging strategies.

### Another approach: Invest to outperform the ICR

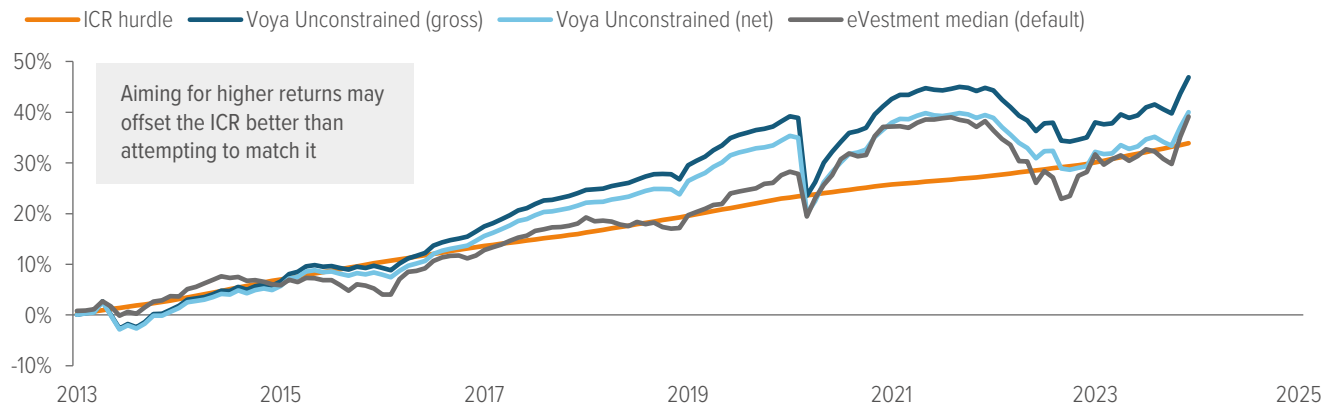
Sponsors can also consider aiming for a long-term rate of return that surpasses the anticipated long-term ICR. While this approach may introduce short-term volatility, potentially necessitating additional contributions from the sponsor, it has the potential to align well with the ICR over an extended time horizon. This strategy leverages the idea that higher returns, albeit with some variability, can ultimately offset the ICR more effectively than more conservative investment approaches.

To illustrate this concept, consider an example using Voya’s Unconstrained Fixed Income Strategy, one of several strategies available for this purpose. This investment approach has a demonstrated ability not only to keep pace with the ICR but to outperform it. Exhibit 9 showcases how Voya’s Unconstrained Fixed Income Strategy has achieved this, highlighting the potential benefits of adopting a more aggressive investment stance.

### Exhibit 9: Aim high

Calendar year and cumulative returns

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
<b>Interest crediting rate / liability return (using 30-year Treasury yield)</b>												
Yield	2.77	3.76	3.20	2.86	2.26	2.80	3.04	2.12	1.36	1.92	3.13	4.28
<b>Hedging instrument (using eVestment Global Unconstrained)</b>												
Return	3.07	1.01	-1.51	4.37	6.95	-1.26	8.27	7.4	0.31	-7.44	8.15	5.24
<b>Hedging instrument (using Voya Unconstrained Fixed Income)</b>												
Return	1.00	4.73	3.69	6.17	6.53	2.20	8.99	2.13	2.61	-6.77	8.78	7.29



As of 12/31/24. Source: Bloomberg, eVestment, Voya IM. (a) Sponsors select an ICR for a given calendar year based on the daily average of the 30yr Treasury yield from one of the five months prior to year end. The analysis above uses the prior August period for calculation, consistent with the Voya cash balance plan. (b) Based on the median return of the eVestment Global Unconstrained peer universe according to each manager’s default reporting method, resulting in a mix of gross and net returns. (c) Voya Unconstrained Fixed Income Strategy, gross and net returns include the reinvestment of income. Gross-of-fees returns are presented before management and custodial fees but after all trading expenses. Net-of-fees returns are calculated by deducting a hypothetical management fee from the gross return on a monthly basis and geometrically linking the results to produce returns shown. The model fee used is based on the highest tier from our advertised fee schedule and will result in a net return that is equal to or lower than a net return using actual fees.



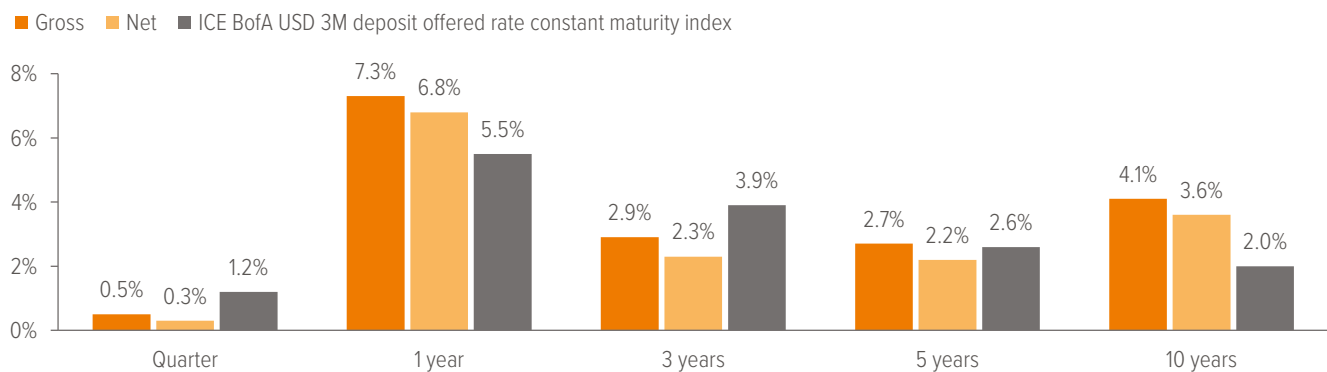
## Conclusion: With CB plans, the devil is in the details

CB plans are a popular design in retirement planning, combining the predictability of traditional defined benefit plans with the flexibility of defined contribution plans. However, their valuation is not so straightforward. Complexities arise in addressing the ICR relative to the prevailing rate environment. As a result, hedging strategies must account for the ICR's sensitivity to interest rate fluctuations, while sponsors must consider custom benchmarks to manage liabilities

effectively and constantly monitor the economic backdrop and periodically re-evaluate the plan's ICR risk management strategies.

While CB plans do offer a balanced option for retirement—offering predictable benefits as well as the flexibility and tax advantages sought by sponsors and employees—they also require added care and maintenance in implementing a robust LDI solution.

### Voya Unconstrained Fixed Income Annualized Composite Returns



As of 12/31/24 unless otherwise noted. **Past performance does not guarantee future results.** Performance numbers for time periods greater than one year are annualized. The Composite represents the investment results of a group of fully discretionary portfolios managed according to the strategy. Returns include the reinvestment of income. Gross-of-fees returns are presented before management and custodial fees but after all trading expenses. Net-of-fees returns are calculated by deducting a hypothetical management fee from the gross return on a monthly basis and geometrically linking the results to produce returns shown. The model fee used is based on the highest tier from our advertised fee schedule and will result in a net return that is equal to or lower than a net return using actual fees. For a description of advisory fees, please see Form ADV, Part II. Gross returns should be used as Supplemental Information only. Please see attached GIPS Compliance Schedule of Composite Performance. eVestment data is based on gross-of-fee returns for the manager universe and Voya Investment Management.

Source: Voya Investment Management and eVestment Alliance.

### A note about risk

Please note that liability valuations can increase due to falling interest rates or credit spreads, among other things, as the present value of future obligations increases with falling rates and falling spreads. Liabilities can also increase due to actual demographic experience differing from expected future experience assumed by the plan's actuary. Please keep in mind that diversification or broad asset allocation, in and of itself, neither assures nor guarantees better absolute performance or relative performance versus the pension plan's liabilities. In addition, investing in alternative investment products (e.g., derivatives) can increase the risk and volatility in an investment portfolio. Since investing involves risk to principal, positive results and the achievement of an investor's goals are not guaranteed.

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