

NEPC CORPORATE PENSION FOCUS

INTEREST RATE RISK AND ASSET/LIABILITY MANAGEMENT FOR CASH BALANCE PLANS

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The Challenge

Sponsors of cash balance pension plans seeking to reduce funded status volatility over time may need to look beyond traditional liability hedging solutions to achieve their goals. This paper provides plan sponsors with a background on cash balance plans and how their characteristics may impact asset allocation strategy. We discuss how a cash balance plan's interest crediting rate may impact liability hedging with fixed income. We also outline our best ideas for investing return seeking assets within cash balance plans.

Background

Over the past decade, the corporate defined benefit landscape has undergone a significant shift in investment philosophy. Many traditional plans have revised their approach to pension asset investing following the Pension Protection Act and amid increasing volatility in funded status. The primary goal has shifted from meeting return objectives to managing funded status volatility. For example, in NEPC's 2015 Defined Benefit Plan Trends Survey, over 70% of respondents indicated that they were currently using or considering liability driven investments (LDI) in their plan (<http://www.nepc.com/research/173-nepcs-2015-defined-benefit-plan-trends-survey-we-binar>). Concurrently, many plan sponsors have moved to freeze or close pension plans. In addition, many sponsors converted from a traditional Defined Benefit (DB) plan (with an annuity benefit based on final average earnings and years of service) to a Cash Balance Plan (CBP).

Around since the mid-1980s, CBPs are a hybrid between defined contribution and traditional defined benefit plans. Participants are provided a service credit each year into their individual ac-

count balance, and an interest credit on the accumulated balance. While an annuity benefit must be available, most employees opt for the accumulated lump sum benefit on termination or retirement. Unlike a defined contribution plan, there are no actual individual accounts, and the plan sponsor maintains control of the investments while reporting the obligation on its financial statements. Conversions from traditional DB plans to CBPs were expected to reduce long-term costs and volatility of funded status and contributions. However, costs for all defined benefit plans have been increasing due to mortality table adjustments and increased Pension Benefit Guaranty Corporation (PBGC) premiums. Thus, many CBP sponsors are expected to have a similar ap-

Exhibit 1: Corporate Defined Benefit Plans: CBP vs. Traditional

Corporate Defined Benefit Plans: Cash Balance vs. Traditional		
	Cash Balance	Traditional
ERISA Governance	Yes	Yes
Minimum funding requirements	Yes	Yes
Penalties for underfunding	Yes	Yes
Income statement impact (expense)	Yes	Yes
Balance sheet impact (funded status)	Yes	Yes
Volatility impact on financials	Yes	Yes
Long-term Cost to Employer	Expected to be lower	Higher
Benefit accruals	Based on formula established by the employer. Account balances tracked separately for each participant with increases based on salary and specified interest credits.	Based on formula established by the employer. Annuity based on years of service and/or salary.
Duration	Generally lower than traditional DB - benefits typically offered as lump sums. Interest crediting rate may also reduce duration.	Generally higher than CBP.
Ability to effectively hedge liability	Yes, although may be more difficult depending on interest crediting rate.	Yes, generally.
Ability to transfer risk to insurance companies	Yes, although may be more costly depending on plan complexity	Yes

Source: NEPC Corporate Pension Team

petite for de-risking and risk transfers as traditional DB sponsors. This creates the challenge of how to effectively invest assets for CBPs.

Exhibit 1 compares corporate cash balance plans to traditional pensions.

Given the bond-like qualities of traditional DB liabilities, interest rates are typically the biggest driver of funded status risk in these types of plans. As outlined in our research on LDI, liability duration is a key input for NEPC in assisting clients in building a liability-driven allocation strategy. However, duration is only one part of the bigger picture, which includes, for instance, funded status, unique liability characteristics and goals of the plan sponsor.

These features of CBPs potentially render standard estimates of liability duration and common hedging approaches less meaningful. At NEPC, we tailor our proposed solutions based on each client's unique goals and plan characteristics, while carefully determining the asset allocation strategy implications of a client's CBP.

Below, we discuss the **key drivers of interest rate risk in CBPs and implications for asset liability management**. Using some basic assumptions and a simple de-risking allocation, we show how an increase in interest rates can impact a CBP differently than a traditional DB plan.

(i) Lump sum features: Assuming no other unique characteristics, the lump sum feature of CPBs can lead to lower duration than traditional plans that assume participants elect an annuity. Sponsors should endeavor to assess how the lump sum option relative to the annuity option and plan status impacts duration. Finally, since annuities by regulation must be the "most valuable benefit," the sponsor faces interest rate risk right up until the lump sum is paid.

(ii) Legacy issues: Many CBPs were converted from traditional DB plans. A deeper dive into the various types of participant benefits may be required to understand how much of the overall plan liability relates to the cash balance formula compared to the traditional formula, and how this mix may

change over time. In the event that a significant portion of the liability will continue to be based on the traditional benefit formula, a more conventional hedging approach may be appropriate.

(iii) Interest-crediting rate: Interest-crediting rates are defined by the plan and can be tied to various interest rates. A crediting formula based on Treasury rates is the most common although several variations exist, including a CPI base, flat rates and interest rate caps and floors. The interest-crediting rate formula should be assessed to determine the degree of interest rate sensitivity of the plan and where it may be focused along the yield curve. In some cases, the duration of the interest-crediting rate and the duration of the discount rate may partially offset each other.

(iv) Interest-crediting rate assumption: To calculate a liability, an assumption for future interest-crediting rates is made by the plan's actuary. Interest-crediting rate assumptions are based on long-term forecasts and tend to be more fixed in nature; they do not change from year to year like a discount rate typically does. Therefore, the corresponding liability acts similarly to a traditional plan, with a more stable interest-crediting rate projecting benefits in the numerator, and a marked-to-market rate discounting them back in the denominator. In this case, there is actually

Exhibit 2: Interest Rate Change Impact on CBP vs. Traditional Plan

Assumptions	
Frozen Plan (no service credits)	
Participant Age	45
Crediting Rate: 30-year Treasury Rate	3.0%
Discount Rate	5.0%
Starting Participant Cash Balance	\$ 80,000
Funded Status	100%
Asset Allocation	70% Growth/30% Long Treasury
Future Liability Projected to Age 65	\$ 144,489
Discounted Liability	\$ 54,456
Cash Balance Plan - Impact of 1% increase 30-year Treasury	
Liability after 1% increase in 30-year Treasury	\$ 54,656
Change in Liability	\$ 200
Starting Assets	\$ 54,456
Estimated Assets after 1% increase 30-year Treasury	\$ 52,496
Change in Assets	\$ (1,960)
Change in Funded Status \$	\$ (2,161)
Change in Funded Status %	-4.0%
Traditional DB Plan - 1% Increase in 30-year Treasury	
Change in Liability (assuming 10-year duration)	\$ (5,446)
Change in Assets (assuming same as above)	\$ (1,960)
Change in Funded Status \$	\$ 3,485
Change in Funded Status %	7.1%

Source: NEPC Corporate DB Team



very little rate offset between the crediting rate assumption and the discount rate, unless the two assumptions are changed in tandem.

Therefore, changes in the actual interest-crediting rate from year to year have a small effect on a plan's liabilities, with deviations from the expected liability growth tracked as a gain or loss item. However, changes in the assumption of future interest-crediting rates can have a significant impact on liabilities, potentially leading to hedging mismatches.

Exhibit 2 outlines an example, assuming the interest-crediting rate is tied to the 30-year Treasury rate. We compare the impact of a 1% increase in the 30-year Treasury rate on the funded status of a cash balance plan and a traditional defined benefit plan. To demonstrate the potential hedging mismatch issues in CBPs with traditional LDI approaches, we assume a simple allocation of 70% to diversified growth assets and 30% to long Treasuries.

The example in Exhibit 2 shows that a 1% increase in the 30-year Treasury has little impact on the liability in the CBP. This is due to the offsetting impact of projecting the liabilities at the 30-year Treasury rate and discounting them back at a corporate bond yield that is influenced by the same Treasury rate. While sponsors in traditional DB plans would welcome a 1% increase in rates, a CBP asset allocation that included only long Treasuries for the hedging allocation would actually experience a decrease in funded status.

risk-free rate under this crediting rate.

Summary of crediting rate formulas and interest rate sensitivity

Exhibit 3 summarizes the key sensitivity and hedging implications of various crediting rate formulas.

As shown in the table, the type of crediting rate impacts the liability hedging approach. While there is still a lag effect with mark-to-market crediting rates, the implication is that a more nuanced approach to hedging may be required relative to a traditional DB plan.

In addition to the above types of crediting rate, sponsors may elect to use the actual plan return. In the event actual returns are negative, participants are still entitled, at a minimum, to receive the sum of all contributions to their account. This provides a floor for the participant and shifts risk back to the sponsor. Sponsors using the actual return approach may also create sub-asset allocation strategies within their plan, which allows them to customize the strategy to the unique characteristics of each population. Once again, sponsors bear the risk of losses in this scenario if actual returns fall short of objectives.

NEPC's Approach

The example crediting rate in Exhibit 2 assumed no change in growth assets, which are typically highly correlated to credit assets. Widening credit spreads would help reduce the liability, but this may coincide with a difficult period for growth

assets—likely a significant portion of assets—especially at the earlier stages of de-risking. Sponsors should carefully assess how closely correlated the portfolio's growth assets are to credit spreads as potential benefits of liability reduction could be offset by asset declines. Referring to the crediting rate in the above example,

Treasuries would lose some of their benefit as portfolio diversifiers to offset credit risk. NEPC believes that incorporating an allocation to absolute return-oriented strategies makes sense in CBPs. Absolute return strategies are generally

Exhibit 3: Interest Crediting Rate Types

Crediting Rate	Mark to market			Fixed (long-term assumption)		
	Interest Rate Sensitivity	Credit Spread Sensitivity	Hedging Implications	Interest Rate Sensitivity	Credit Spread Sensitivity	Hedging Implications
30-year Treasury Rate	Low	Similar to traditional DB	Credit spread focus	Similar to traditional DB. Hedging based on key plan criteria (plan status, duration). Key risk is change in assumption. Traditional hedging plus dynamic, total return seeking portfolio to keep pace with potential changes in assumptions.		
Shorter-dated Treasury Rates	Based on changes in shape of the curve	Similar to traditional DB	Credit spread plus custom Treasury			
Treasury Rate with a Floor	Based on key rate duration	Similar to traditional DB	Dynamic, custom Treasury and credit spread			
CPI	Low to the extent rise in CPI is offset by rising discount rate	Similar to traditional DB	Credit spread focus			
CPI + absolute return (e.g. 3%)	Low to the extent rise in CPI is offset by rising discount rate	Similar to traditional DB	Credit spread focus			

Source: NEPC Corporate DB Team

A key assumption in this analysis is no change in credit spreads. Relaxing that assumption shows that funded status would be more sensitive to changes in the credit spread than changes in the



less sensitive to market direction and are better at preserving capital in down markets, which helps diversify equity and credit risk. Absolute return strategies can be accessed directly or indirectly through hedge funds, fund of funds or liquid hedge fund alternatives. NEPC also believes flexible strategies, for instance, global macro and global asset allocation, can also play a role in portfolios, as outlined in NEPC's white paper "Investing in Volatile Times: A Dynamic Approach to Asset Allocation," which can be accessed on our website here:

<http://www.nepc.com/research/89-investing-in-volatile-times-a-dynamic-approach-to-asset>.

The ability of these strategies to diversify and reduce risk makes them potentially attractive to consider in CBPs.

End Game Considerations for CBPs

Interest among plan sponsors in a hibernation approach or an eventual exit of the pension plan via a risk transfer to an insurance company was also reflected in NEPC's 2015 annual survey of corporate trends. NEPC has assisted several clients in managing asset allocation through de-risking transactions, including lump sum offerings and partial and total plan termination. Traditional DB plans are relatively more straightforward from an insurer's perspective and sponsors can create a customized asset portfolio to effectively hedge liability in either a hibernation or risk transfer scenario. However, careful consideration should be given by CBPs to investigate insurer appetite to take on these plans' liabilities given their unique characteristics. In general, a plan with a higher level of complexity and risks that are less well-defined could lead to higher termination costs for the employer. The insurer will look to price in higher risks accordingly. The challenges with CBPs from the viewpoint of an insurer are the amount and timing of lump sums and the interest crediting rate. The interest crediting rate will be frozen prior to plan termination and is typically set as an average of the last five years. While this amount is defined to the insurer, the ability to consistently hedge is less certain.

Conclusion

While duration management in CBPs is still required to reduce interest rate risk, the allocation will need to be targeted or adjusted to ensure it is properly aligned with the liability and underlying interest crediting rate. We recommend that sponsors interested in de-risking CBPs carefully assess the implications of their plan's unique characteristics on asset allocation strategy. Please contact your NEPC consultant if you would like to learn more on this subject.

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