

# Cash-Balance Pension Plans: the Next Generation

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for background and results for existing plans: “The Cost and Duration of Cash-Balance Pension Plans,” by David T.

Brown, Philip H. Dybvig, and William J. Marshall, *Financial Analysts Journal* **57**, no. 6, 50–62.

## Pension Plans

- Traditional plans
  - defined-benefit (DB) plans
  - defined-contribution (DC) plans
- Cash-Balance plans
  - contributions made as in DC plans
  - accumulation based on market rates
  - regulated as DB plans with special rules
  - transparent and simple to administer
- Proposal for the future
  - change tax rules to allow indexing based on equities and TIPs
  - focus on returns not quoted rates

## Traditional Defined-Benefit (DB) plans

typical example:

- Value at retirement a fraction of the last three years' average salary
- The fraction increases with each year of service at a rate depending on age
- Vesting occurs within a short time period
- Cashing out is at a value determined by an actuarial calculation
- Ownership of surplus is ambiguous, firm supposed to replace any shortfall
- PBGC covers the shortfall in the event the firm fails

## Traditional Defined-Contribution (DC) plans

typical example:

- Contributions a proportion of salary depending on seniority and age
- Contributed funds are invested and beneficiaries get actual returns, good or bad
- Cashing out must be near the market value of the assets
- Beneficiary-managed DC plans tend to have high costs
- Employer-managed plans may suffer from conflicts of interest
- Too much flexibility may lead to large losses by some
- Small plans may be subject to fraud by employers who claim large losses

## Cash-Balance (CB) plans

final claim or cash out at the *cash balance*. Two types of accruals to the cash balance:

- Pay-related credits typically linked to salary, seniority, and age
- Interest-related credits typically linked to market rates (not returns)
  - yield on a Treasury bill, plus a margin, or
  - T-Bill discount, plus a margin, or
  - CPI-U, plus a margin

## Appeal of Cash Balance Plans

- Simple for employees to understand, since it looks similar to a bank account
- Subject to IRS guidelines, the plan can pay departing employees the cash balance without arbitrary PBO calculations
- Mismatch between the cash balance and the market value is probably small compared to traditional DB plans (and can be reduced with the proposed changes below). This simplifies regulation of underfunding.
- Transparency may reduce the potential for fraud and agency problems.

Note: controversy in the press concerned whether different beneficiaries were treated fairly in transitions, not anything intrinsic to plans themselves

## About the IRS Guidelines

The IRS allows departures to be paid the cash balance if the margin is *no larger than* the values in the table on the following slide. Although this is formally an upper bound, usual practice seems to be to follow the guideline exactly.

It may seem strange that the IRS would protect pensioners by putting a cap on returns on their pensions, but their motivation is that they want to make sure departing pensioners are paid something that is not too much less than the fair market value. A defined-benefit plan that pays departing beneficiaries the cash balance retains the tax exemption without being subject to the usual PBO calculation to determine fair payment.

The guidelines seem to have no sound economic basis. I suspect they are derived from a naive interpretation of historical rates.

## IRS Suggested Guidelines for Crediting Rates

<b>quantity</b>	<b>standard index</b>	<b>associated margin</b>
discount rate	3-month T-Bills	175 basis points
discount rate	6- or 12-month T-Bills	150 basis points
yield	1-year Treasuries	100 basis points
yield	2- or 3-year Treasuries	50 basis points
yield	5- or 7-year Treasuries	25 basis points
yield	10-year or longer Treasuries	0 basis points
rate of change	CPI-U (urban cost-of-living)	300 basis points

## Observations and Intuitions

- Investing in a 30-year bond is much different from crediting at the 30-year bond yield
- Valuation is typically different from the cash balance but not too much different
- The yield is typically different from return on underlying
  - maturity mismatch
  - crediting at the yield does not include gain or loss
  - yield includes any risk premium but may not reflect the actual risk
  - IRS premium

## Nonstochastic interest rates example: background

- future spot rates = forward rates  $f_1, f_2, \dots$
- Liability credits at the 2-year zero-coupon rate
- computing the cash balance four years out and its present value
- simplified linearization (no compounding etc.) to keep ideas clear (in this example only)
- looks at \$1 worth of cash balance today for investment to a known maturity, ignoring “actuarial” issues such as time of cash-out and mortality

Fourth year cash balance and present value for the Liability

$$\begin{aligned} B_4 &= B_0 \left( 1 + \frac{f_1 + f_2}{2} + \frac{f_2 + f_3}{2} + \frac{f_3 + f_4}{2} + \frac{f_4 + f_5}{2} \right) \\ &= B_0 \left( 1 + \frac{f_1}{2} + f_2 + f_3 + f_4 + \frac{f_5}{2} \right), \end{aligned}$$

$$\begin{aligned} C_0 &= B_0 \frac{1 + \frac{f_1}{2} + f_2 + f_3 + f_4 + \frac{f_5}{2}}{1 + f_1 + f_2 + f_3 + f_4} \\ &\approx B_0 \left( 1 + \left( \frac{f_1}{2} + f_2 + f_3 + f_4 + \frac{f_5}{2} \right) - (f_1 + f_2 + f_3 + f_4) \right) \\ &= B_0 \left( 1 + \frac{1}{2} (f_5 - f_1) \right). \end{aligned}$$

Approximate equation for the valuation

$$B_0 \left( 1 + \frac{M-1}{2} (f_0^T - f_0^1) \right) (1 + \pi)^T$$

where

$M$  = duration of the underlying asset whose yield is used for crediting

$T$  = time to payment of the unit of liability

$\pi$  = margin over the yield used for crediting

## Cash Balance Equals Market Value?

- Cash balance  $<$  mkt value if any nonzero IRS premium (except maybe on CPI or in a very extreme yield curve environment)
- Uncertainty has a small impact on valuation (numerical result)
- If maturity of underlying  $>$  crediting interval (usual case)
  - cash balance  $<$  mkt value in a rising yield curve (usual case), since discount rates  $<$  crediting rates
  - cash balance  $>$  mkt value in a falling yield curve, since discount rates  $>$  crediting rates

## Drawbacks in Current Cash-Balance Arrangements

- Typically, cash balance  $\neq$  market value
  - cash-out value not fair
  - gaming of pricing errors in transitions or departures
  - regulation of underfunding is unnecessarily complicated
- Hedging (asset-liability management) is subtle
- IRS sanctioned spreads lack a sound economic basis
- Market reward for taking equity risk is not available

## Proposed Changes in IRS-Sanctioned Crediting Rates

- Allow crediting rates based on realized returns rather than yields or discounts
  - eliminate the mismatch between cash balance and economic value
  - makes valuation trivial
  - makes hedging much easier
- Allow crediting rates tied to equity returns to allow beneficiaries to benefit from the risk premium in the stock market
- Include TIP returns in the menu to allow hedging of inflation
- Allow some “portfolios” (e.g. 50% of the return on TIPs plus 50% of the return on the AMEX-NYSE value-weighted index) to permit a choice of risk exposure

## Some Economic Questions

- Why the form of traditional DB plans—approx. solution given habit formation and no outside savings?
- If outside savings
  - transparency is important for beneficiaries
  - can beneficiaries take on hedges etc. to do what they do not like in the plan
- optimal over/under-funding
  - tax-free investment vs. value of default option
  - why not immunize? perhaps liquidity premium
- flexibility: good and bad points

## Conclusion

- Cash balance plans are interesting and appealing institutions
- Transparency a plus
- Current regulation restricts them unnecessarily
- Proposed improvements:
  - allow crediting at realized returns instead of yields
  - include equities to allow beneficiaries to be rewarded for taking risk
  - include TIPs to provide inflation hedging
  - include “portfolios”