

IBM's New Cash Balance Pension Plan – A Structured Note Trader's Perspective

Mixing one's wines may be a mistake, but old and new wisdom mix admirably!

- Bertolt Brecht

A long time ago on a trading desk not so far away, a young man began his finance career as a structured note trader. It was intellectually challenging to assemble and take apart new and secondary structured notes, and I learned a lot about derivatives in that seat. Given that the heyday of the structured note market has long passed, readers might rightly be puzzled about the applicability of that skillset to today's financial markets. However, those who can stay awake to the end of this article may find that structured notes can shed some light on the economics and market implications of the newest superstar in the US pension space – IBM's cash balance pension plan.

Rather than needing to buy long-maturity bonds, IBM's new pension product would result in a net sale of bonds and derivatives in the long end of the yield curve beyond 10yrs.

The Taylor Swift of the US Pension Universe – IBM's Retirement Benefit Account

On November 10, 2023, IBM announced that, starting on January 1, 2024, it would end its Defined Contribution 401(k) matching contribution and instead offer a Retirement Benefit Account (RBA) to its US employees. Some media reports describe this as a return of the Defined Benefit (DB) plan¹. We disagree. The RBA is unlike a traditional DB plan in many respects: the plan's crediting rate is transparent to beneficiaries (at least for the first 10 years), the benefits are based on the cash value of the account and may be withdrawn in either a lump sum to be rolled over into an IRA or annuitized at then market rates. These characteristics make the RBA appear more like an annuity product than a traditional DB plan.

IBM has been a perennial thought-leader in the US pension world. It was the first defined benefit (DB) plan sponsor to offer Defined Contribution (DC) plans, one of the first to close off its DB plan to new participants, and is now one of the first to turn off its DC contribution match in favor of a new cash-balance pension plan. History suggests that many other pension plans may follow in IBM's footsteps on this move as well.

At the end of 2007, IBM closed its DB plan to new participants and only offered DC plans because there was a substantial economic incentive to do so. It would be logical to assume there would be an economic benefit for IBM to make this switch from DC to RBA. Our goal in this article is to quantify

¹ "IBM Shocking New Type of Pension is the Old Defined Benefit Plan", Teresa Ghilarducci, Forbes. 10 Nov 2023. <https://www.forbes.com/sites/teresaghilarducci/2023/11/10/ibm-shocking-new-type-of-pension-is-the-old-defined-benefit-plan/?sh=75d899dc3391>

the economics of the RBA for IBM and perspective plan sponsors, and to assess the long-term market implications of this program. To keep things simple, we will analyze the economics and risks associated with the contributions that are invested into the RBA plan on day 1 of the rollout.

The terms of IBM's RBA plan are listed in the following table:

FIGURE 1. CREDITING RATE OF IBM'S CASH BALANCE PENSION PLAN

	Credit Rate
Years 1-3	6.00%
Years 4-10	10yr Treasury Yield (3% minimum)*

**We assume each year's crediting rate is reset based on the then-current 10-yr Treasury yield*

Sources: IBM, Bloomberg

Upon reading the above terms, my structured note trader alter-ego (which had been hibernating in the back recesses of my brain) awoke and jabbered excitedly that this was a structured note. After re-reading the terms, I concluded that this was a correct assessment.

Economic Analysis of RBA

The starting point of understanding the economics of the plan is to match the structure of its crediting rates – fixed for the first 3 years, floating based on 10-year rates for the last 7 years. We engage in the following steps:

- 1) Convert a set of SOFR floating rate cashflows into a fixed rate set of cashflows for 3 years. This is basically an interest rate swap.
- 2) Convert SOFR floating rate cashflows into a floating rate set of cashflows for 7 years, forward-starting in 3 years. This is done via a basis swap between SOFR and 10yr CMS (constant maturity swap). We also include the cost of a 3% minimum floor for those 7 years.
- 3) Convert CMS into 10yr Treasury yield (aka CMT, or Constant Maturity Treasury) using the current 10-year swap spread. Note that unlike the first two steps, the CMS-to-Treasury spread cannot be locked in over the term of the swap, so this is an approximate solution and not an arbitrage. That is, unlike steps 1 and 2, we cannot lock in the 10yr swap spread starting in 3yrs for 7yrs.

We pick SOFR as the starting floating rate cashflow to gauge the economic cost of the crediting rate. We quantify the equivalent spread to SOFR needed to satisfy the crediting strategy of IBM's RBA plan. It allows us to estimate the credit rating of assets that would be purchased to fully offset the crediting rate of the RBA plan.

FIGURE 2. CREDITING RATE OF IBM'S CASH BALANCE PENSION PLAN VERSUS SOFR EQUIVALENT

	Credit Rate	SOFR-Equivalent Rate*
Years 1-3	6.00%	4.10%
Years 4-10	10yr Treasury Yield (3% Floor)	10yr Treasury Yield (3% floor) minus 1.3%

*SOFR-equivalent rate expressed in Annual Act/360 terms.

Data as of 13 Dec 2023. Sources: IBM, Bloomberg

The last step is to calculate the deficit per annum between the RBA crediting rate and the SOFR-equivalent rate, and to calculate the NPV and the yield equivalent per annum.

FIGURE 3. CREDITING RATE OF IBM'S CASH BALANCE PENSION PLAN, SOFR EQUIVALENT AND SOFR YIELD DEFICIT

	Credit Rate	SOFR-Equivalent Rate	SOFR yield deficit vs RBA
Years 1-3	6.00%	4.10%	-1.90%
Years 4-10	10yr TSY*	10yr TSY* - 1.3%	-1.30%

*3% Floored 10y TSY yield. Data as of 13 Dec 2023. Sources: IBM, Bloomberg

Spreading the deficit evenly over the full 10-year period and net-present valuing yields the following:

- 1) SOFR deficit vs RBA over 10-year term: 1.5% yield per year for 10 years
- 2) SOFR deficit vs RBA over 10-year term: 12.7% net present value of contribution

If IBM were to invest in an asset that yielded SOFR +1.50% for 10 years, it should (after various derivative transactions) be able to approximately match the yield on the RBA for the first 10 years.

What types of assets would RBA purchase, and what is the economical impact of this decision? We use the OAS spreads of Bloomberg's AAA/AA, Single-A and Baa 5-10yr US corporate bond indexes to calculate the equivalent SOFR spread of these investments and the resulting yield deficit/surplus.

FIGURE 4. VARIOUS ASSETS, OAS SPREAD TO SOFR AND IMPACT ON YIELD DEFICIT VS RBA CREDITING STRATEGY

	Equivalent SOFR Spread	Asset Yield Deficit vs RBA (NPV Deficit % Contribution)
AAA/AA Corporate Bonds	+77bps	-73bps/yr (-6.1% NPV)
A Corporate Bonds	+135bps	-15bps/yr (-1.3% NPV)
Baa Corporate Bonds	+170bps	+20bps/yr (+1.7% NPV)

Spreads to SOFR calculated from OAS of Bloomberg 5-10yr US corporate bond indexes. Sources: Advocate, Bloomberg

If the RBA were considered purely on its own merits, IBM could opt for the BBB corporate investment to achieve a funding advantage relative to the RBA crediting strategy. Alternatively, IBM may elect to subsidize crediting rates if it invests in a higher quality asset such as AA corporate bonds.

Given that RBA was launched to replace IBM's 401(k) plan which carried a full employer-match up to the maximum beneficiary contribution amount (up to 5% of salary), a complete analysis would require the inclusion of the following: beneficiary contribution to the 401(k) plan (and hence the savings to IBM from no longer having to match), IBM's contribution to the RBA, employee contribution to the RBA, and the types of investment that would be made.

FIGURE 5. 401(K) TO RBA COST ANALYSIS

401(k) Match Savings*	IBM Contrib To RBA*	Employee Contrib to RBA*	Net Investment Into RBA*	IBM Savings (RBA vs DC)*	RBA Asset	NPV Deficit (% of Contribution)	NPV Deficit*	IBM Benefit*
5%	5%	0%	5%	0%	AAA/AA	-6.1%	-0.5%	-0.5%
					A	-1.3%	-0.1%	-0.1%
					Baa	+1.7%	0.1%	0.1%
0%	0%	100% [§]	100% [§]	0%	AAA/AA	-6.1%	-6.1% [§]	-6.1% [§]
					A	-1.3%	-1.3% [§]	-1.3% [§]
					BBB	+1.7%	1.7% [§]	1.7% [§]

*All percentages shown are in % of Employee Salary per year, unless otherwise noted.

§ Last row percentages reflect percentage of DC balance that is rolled over to the RBA

Sources: Advocate, Bloomberg

The first line in Figure 5 represents an employee who had been contributing contributed 5% of his or her salary to the 401(k) plan. As a result, IBM was obligated to match this contribution, costing it 5% of the employee's salary. Not having to offer the DC plan would thus save IBM this matching amount per annum. In the new RBA plan, IBM will contribute 5% of the employee's salary to the RBA, while the employee contributes 0%, resulting in the same 5% net contribution to the pension. Since IBM is putting in 5% into the RBA, its net savings in going from DC-to-RBA is zero. If IBM chooses to invest in AAA/AA corporate bonds, the present-value deficit due to the yield difference between the Treasury investment and the RBA crediting rate is 6.1% of each dollar of contribution. Since the total contribution is 5% of the employee's salary, this equates to a -0.5% deficit of the employee's salary. The net benefit to IBM is thus the 0% contribution savings in switching from DC-to-RBA, minus the 0.5% asset-to-RBA crediting deficit, or 0.5% of an employee's salary per annum.

The bottom line represents the economics to IBM for any 401(k) plan participants that elect to roll over to the new RBA plan. The deficits or advantages are expressed as percentage of the balance that is rolled over from the DC to the RBA plan.

Our analysis shows that if IBM were to invest in a mix of 10yr Single-A and BBB-rated corporate bonds, it would likely be able to, in today's market, deliver sufficient yield to cover the RBA's crediting strategy.

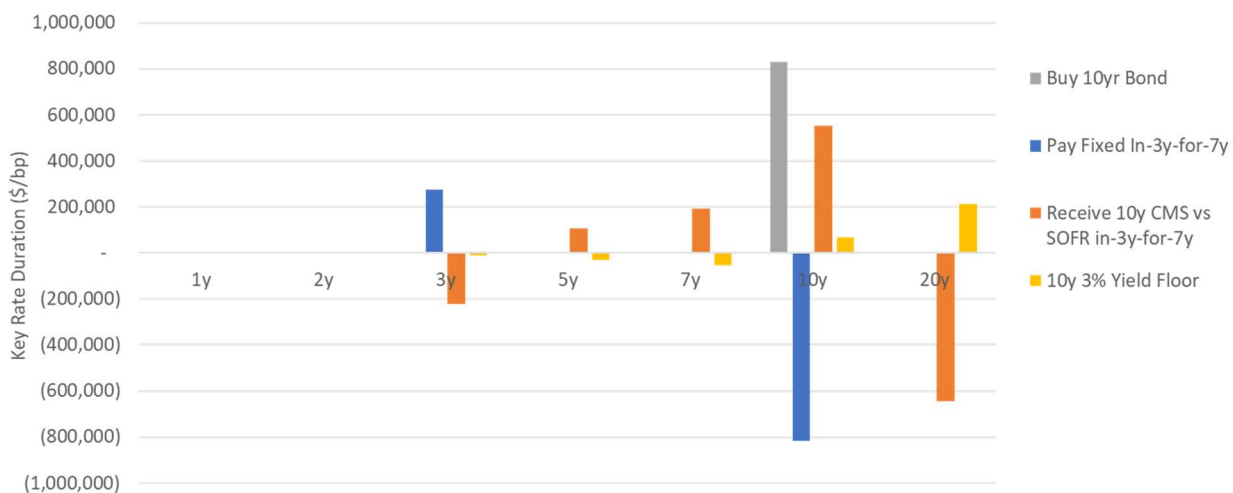
Risk Analysis - RBA will Upend the “Buy Long Bond” Calculus of Pensions

Life insurers and typical DB pension plan are often the buyers of first and last resort for long-dated bonds (and Principal-Only STRIPS) to match their long-dated liability cashflows. RBA’s crediting strategy would turn this logic on its head. By crediting beneficiaries at the 10-year Treasury yield in the future, IBM would need to hedge this risk by receiving 10yr Treasury yield on a floating rate basis. This hedge, stripped down to its essence, is a sell-duration hedge. In order to pay IBM more yield on a hedge if long-term interest rates go up, bank counterparties would effectively need to sell long-duration assets (or pay-fixed on long-dated swaps) to generate this excess yield.

We use Key Rate Duration to quantify the market impact of each of the 4 components of our RBA-replication strategy:

- 1) IBM buys a 10yr fixed coupon bond
- 2) IBM pays fixed on a forward-starting swap (in 3yrs for 7yrs) to turn the last 7yrs fixed coupon into SOFR. This effectively turns the market risk of the 10yr bond into a 3yr bond and reduces its duration by more than 2/3.
- 3) IBM enters into a “basis swap” to convert its SOFR cashflows into 10yr Treasury yield for the last 7yrs of the 10yr bond’s life.
- 4) IBM implicitly purchases a 3% strike floor on 10yr Treasury yield starting in 3yrs for 7yrs.

FIGURE 6. KEY RATE DURATION OF \$1BN NOTIONAL OF 10YR BOND, SWAP 1 (CONVERT FIXED TO SOFR, IN-3Y-FOR-7Y), SWAP 2 (CONVERT SOFR TO 10YR CMS, IN 3Y-FOR-7Y), AND 3% FLOOR ON 10YR TREASURY YIELD



Sources: Advocate, Bloomberg

The net result of the purchase of the 10yr bond plus the two swaps necessary to convert the investment into RBA crediting strategy is shown below.

FIGURE 7. KEY RATE DURATION OF COMBINATION OF 10YR BOND, TWO SWAPS AND 3% FLOOR TO CONVERT \$1BN 10YR FIXED COUPON BOND INTO RBA CREDITING STRATEGY (FIXED 3YRS, 3% FLOORED 10Y TREASURY YIELD LAST 7YRS)



Sources: Advocate, Bloomberg

We note the following:

- 1) The total impact of the purchase of the 10yr bond plus the two swap and floor is only 54% of the bond purchase alone. In other words, the derivatives necessary to convert the fixed bond to the RBA crediting strategy removed 46% of the durational impact of the 10yr bond purchase.
- 2) The net impact of the asset allocation and derivatives equates to a fractional bond purchase plus a large yield curve steepener in the long end of the yield curve. Every \$1Bn notional of RBA would require approximately \$520mm (10yr notional equivalent) of a yield-curve steepener position between the sub-10yr maturity sector and the >10yr sector. **Instead of pensions needing to buy long-maturity bonds, the RBA crediting strategy would result in a net sale of bonds and derivatives in the long end of the yield curve beyond 10yrs.**

Key Ingredients for Success for Plan Sponsors That May Wish to Follow IBM

Plan sponsors that might consider following IBM should consider the following prerequisites that would help make this move a success:

- 1) Have an existing DB plan and a funding surplus
- 2) Wish to utilize said DB plan surplus to meet RBA funding obligations
- 3) Have an employee demographics that skews older – older employees closer to retirement will likely appreciate the fixed/Treasury yield proposition more than younger employees.
- 4) Provide employees with more educational materials on why the RBA crediting strategy may be more attractive than 401(k), or at least more diversifying.

Conclusion –RBA Allows IBM to Utilize Its DB Pension Surplus and Could Significantly Change Bond Market Dynamics

Using structured note methodologies, we decomposed the components of IBM’s RBA crediting strategy to provide some economic and market risk perspectives. Our analysis showed that IBM’s pension beneficiaries are not getting a raw deal, at least from an economic perspective as IBM is likely to, given reasonable asset allocations, break even in moving from its 401(k) offering to the RBA. So why did IBM make this DC-to-RBA switch? A reasonable answer suggested by Kiplinger² is that any deficits associated with the RBA can be met with IBM’s existing DB pension funding surplus which was \$15Bn at the end of 2022. In other words, any RBA-related deficits may be funded out of its DB pension surplus rather than on a current basis.

RBA’s market impact may loom large for bond market participants. Our analysis clearly shows that RBA plan sponsors seeking to neutralize their funding risks would need to sell a substantial amount of long-dated bonds via long-end yield curve steepeners. IBM’s RBA plan may ultimately, like Anakin Skywalker, bring some balance to the long end of the yield curve which until now has been dominated by DB and insurer purchases.

Scott Peng
Chief Investment Officer
Advocate Capital Management

² “What to Do if Your Employer Stops Its 401(k) Match”, Mike Palmer, Kiplinger.com, 22 Nov 2023. <https://www.kiplinger.com/retirement/401k-what-to-do-if-your-employer-stops-its-match#:~:text=Why%20did%20IBM%20do%20this,pension%20of%20roughly%20%2415%20billion.>

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