Balancing Income and Bequest Goals in a DB/DC Hybrid Pension Plan

Grace Gu; David Kausch, FSA, EA, PhD; Kristen Moore, ASA, PhD; Virginia Young, FSA, PhD
Gabriel Roeder Smith & Co; University of Michigan, Ann Arbor

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INTRODUCTION

Individuals face competing objectives in retirement planning: do they want a steady stream of guaranteed income? Do they want to accumulate wealth for healthcare costs, bequest, or unforeseen expenses? Or do they want some combination of the two? We quantify the trade-offs between the income security of a DB plan and the potential for wealth accumulation in a DC plan by simulating the investment returns and the time of death and examining the following outcomes for different combination of DB and DC:

- Probability of depleting DC assets
- Age of depletion of the DC fund
- Probability of reaching the bequest goal
- Bequest amount, conditional on not depleting DC assets
- Mean, standard deviation and coefficient of variation of discounted lifetime retirement income

Thus, we are able to quantify the bequest potential forfeited by increased focus on retirement income, and vice versa.

METHODOLOGY

To calculate the DB normal cost and DC contribution rate, we started with pure DB and pure DC plans on a deterministic basis, assuming the market return happens to be the median rate of return. The DB multiplier, DB normal cost, and the DC contribution rate are calculated so that they provide a 70% replacement ratio on a deterministic basis. We then consider an employee who can choose how to allocate between DB and DC. In Figure 3, we see that the payout-risk is not strictly increasing with DB weight \( \alpha \). This non-monotonicity is caused by the different influences of investment and longevity risks on the retiree's payout.

RESULTS

1. Probability of Depletion (DC Plan)

Our simulation result suggests that nearly half of the participants (47%) will outlive their DC assets regardless of the allocation to the DB plan because we used the median rate of return to compute DC contribution rate. Among these, we calculated the depletion age, the age at which a retiree's asset runs out. Figures 1 and 2 show the mean, the median and various percentiles of the simulated age of death and DC plan age of depletion.

2. “Payout Risk”

Our model suggests that the expected discounted value of lifetime income increases linearly (or almost linearly) with \( \alpha \). However, the standard deviation of discounted lifetime payout is not monotonic. To have a better sense of the risk-return tradeoff, we adopted another measurement -- the reciprocal of coefficient of variation (CV). It measures how many dollars of expected discounted lifetime payout one receives per dollar of risk.

3. Wealth Accumulation in DC Plan

An attractive feature of DC plan is the potential for significant wealth accumulation. In Figures 4 and 5, we examine the distribution of the total death benefit (from both DB and DC plans) for those retirees who do NOT deplete their DC savings. For example, we find that over 8% of males who are enrolled in the pure DC plan reach a bequest of over $5 million.

4. Probability of Reaching Bequest Goal (Probability of Success)

Suppose the retiree has a bequest goal of $M$, and the pure DB has a death benefit of $M'$, which is small compared to $M$. For a hybrid pension plan, the total death benefit is given by $uM + max(0, DC$ assets at death$)$. Here, we call the event of reaching the bequest goal “success”. In our model, we let pure DB death benefit $M$ be $10,000 and examined the relationship between DB weight and probability of success with a small ($100,000) and large ($500,000) bequest goal.

CONCLUSION

Individuals who are concerned with both retirement income and bequest should invest in a hybrid plan. There is no unique “best \( \alpha \) ” – the choice of \( \alpha \) depends on the retiree’s bequest goal and her preference retirement income and bequest. However, we observed some values of alpha that performed particularly well relative to the metrics under the assumptions of our model.