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In Search of a More Efficient Retirement Plan

By Lee Gold

Defined benefit (DB) or defined contribution (DC)? The debate has raged for years about which type of retirement plan is the best. Opinions on this matter depend largely on which plan characteristics a person feels are most important. There are certainly positive qualities to both DB and DC plans. The problem with this debate is that it is based on the assumption that these are the only two options. What's missing from the debate is an option that blends the best features of both DB and DC plans. The variable annuity plan (VAP) is one such option and is the focus of this paper.

Traditional DB plans have failed the American worker. The reason for this failure is that these plans have become unacceptable to employers. The single-year funded status risk from investments and interest rates is too high. Employers have been closing and freezing traditional DB plans for years, and employees are certainly impacted. As these employers move from supporting DB plans to supporting DC plans, many employees find that their retirement benefits have been slashed. Older employees have been especially hard hit as their significant DB accruals are replaced with much smaller DC contributions.

With an emphasis on removing financial risks from employers, the most redeeming feature of DB plans has been forgotten: longevity pooling. By pooling longevity risk, employers are able to provide lifetime income to retirees at relatively low risk compared to other types of risk, such as investment risk. Employees benefit greatly from longevity pooling, because the cost to self-insure longevity risk is expensive. A DB plan that could leverage the benefits of longevity pooling while eliminating investment and interest rate risk would be a great plan. Employers would not be afraid to sponsor these plans because the financial risks would be very limited. And employees would welcome these plans because of the lifetime income guarantee they can provide. The VAP is such a plan.

This paper will present modeling results that provide numerical evidence that a VAP can be superior to a DC plan in terms of the income provided to retirees. Due to length limitations, this paper will not focus on the accumulation phase and the various accrual characteristics of DB or DC plans. Rather this paper will focus on the outcomes achieved during retirement by looking at the retirement income received under various designs and spend-down approaches. The reason for this is to allow for appropriate comparisons. Determining "equal cost" plans can be difficult, given all the various elements that go into determining the costs of any retirement program. Consequently, the analysis that follows will assume that a pool of employer money has been accumulated at retirement to fund the retirement benefits of a group of retirees. That asset pool can be used to pay benefits annually to the retirees who are still alive each year, or it can be divided equally at the time of retirement (into individual accounts) among the group

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of retirees. Using this individual account, the retiree can then receive benefits under a variety of withdrawal approaches.

Risk Allocation: Employer Risks

What is the biggest source of risk for an employer sponsoring a DB plan? It is not mortality risk—the risk of individuals living longer than expected. It is interest rate risk and investment risk. Interest rate risk—the risk of liabilities increasing when market interest rates fall—is a newer risk that has emerged as pension liabilities begin to incorporate elements of financial theory. The impact of changing interest rates on funded status over a short time frame can be significant. Investment risk can have a significant impact on single-year funded status if investments change dramatically. If investment risk and interest rate risk can be removed, the resulting plan is much more likely to have an acceptable level of risk for the employer.

In the analysis that follows, I have ignored interest rate risk. The goal in the modeling is to see whether an initial pool of assets is sufficient to pay all promised benefits. The periodic reporting of the liability based on market interest rates is not important for this analysis. I have also ignored interest rate risk (used in calculation of liabilities) because it doesn't exist in a DC plan and because in a VAP, interest rate risk is eliminated. Due to length limitations, this paper will not explore how interest rate risk is eliminated within a VAP. I encourage you to seek other sources for a discussion of this issue (such as the Pension Committee of the American Academy of Actuaries' *Exposure Draft of the Public Policy Practice Note*, *Variable Annuity Plans*, December 2015).

Figure 1 is based on 1,000 female retirees who have been promised $7,870 per year for their lifetime. A fund of $100 million has been accumulated to pay this benefit to each of these retirees who, at the beginning of the year, are living. Payments to these retirees have been modeled under 1,000 economic and mortality scenarios. The benefit amount of $7,870 was arrived at by assuming that mortality experience is as expected and annual asset returns are 5.79 percent. However, there will be some variation as to the exact timing of each death. There will also be variation in the annual asset returns. Is $100 million really enough to provide the promised benefit?

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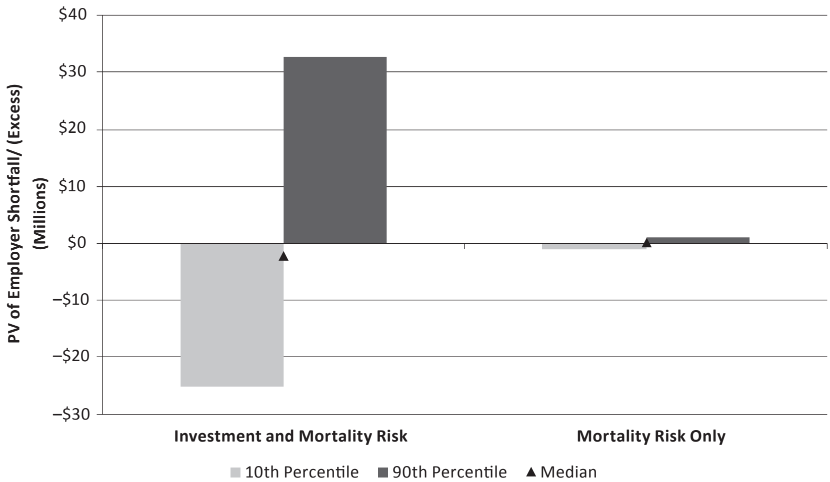
FIGURE 1

Investment vs. Mortality Risk



At the median, the answer is yes. In this simulation of outcomes, the median present value (at retirement) of the amount of extra funding the employer needs above $100 million was actually a negative $2.1 million, meaning that $97.9 million is the median amount needed to fund the benefits. But what happens with other outcomes at the 10th and 90th percentile? With a probability of 10 percent, an additional $32.7 million or more will be needed at retirement to fund these benefits. Also, with a 10 percent likelihood, $25.1 million or less money will be needed. The employer has a 10 percent probability of needing at least $132.7 million or no more than $74.9 million to fund the promised benefits depending on what investment scenario plays out. That's a lot of uncertainty for employers!

What happens if we remove any uncertainty in asset returns and simply allow people to die based on Monte Carlo simulations according to probabilities of an underlying mortality table? The variation drops significantly. Now there is a 10 percent probability that more than $101.0 million will be needed at retirement to fund these benefits, or less than $98.9 million will be needed. That's a pretty tight range of outcomes.

What if the underlying mortality assumption is simply wrong? Even if assumed mortality rates are 20 percent too high at every age, the amount of extra funding needed at retirement to account for this is only $3.9 million at the median and $4.8 million at the 90th percentile, much less than what may be needed due to the uncertainty of asset returns.

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To summarize, the largest risk factor in determining whether an employer will need to provide additional funding is clearly investment risk. Mortality risk is very small by comparison.

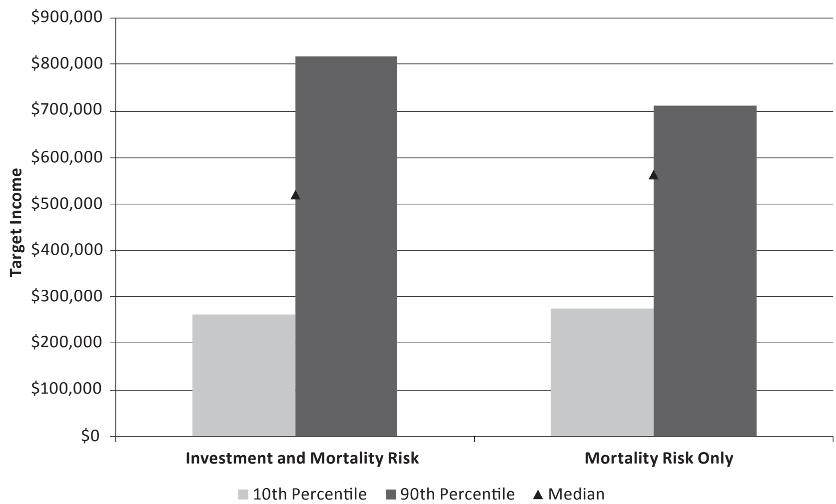
Risk Allocation: Employee Risks

Turning to the employees, what is the biggest source of risk during retirement for the retirees who want to receive a certain amount of income during their entire lifetime? It turns out that how long the retirees will live is the most important factor in determining whether they have enough money to retire, not what investment returns will be.

Figure 2 is based on a simulation of 1,000 female retiree lives and economic scenarios, with the goal of replacing 35 percent of preretirement income (of $100,000) increased annually for life with inflation (2.2 percent). The amounts shown in Figure 2 are the 10th and 90th percentile values representing the amount of funds needed at retirement to provide the desired level of income for life.

FIGURE 2

Retirement Funds Needed to Meet Desired Target Income



A female retiring at age 65 will need either 2.6 times preretirement income or 8.2 times preretirement income with equal likelihood, when considering both investment and mortality risk. If asset returns during retirement are guaranteed, then the necessary fund amounts become 2.8 (10th percentile) and 7.1 (90th percentile) times preretirement

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income. How long an individual will live accounts for a large portion of the variation in how much money will be needed during retirement.

Based on this analysis of risk, the apportionment of that risk could be done so that the party most able to bear the risk does so. In this case, employers should take on longevity risk and employees should assume investment risk. Traditional DB and DC plans do not apportion risk in this manner. To do so requires a different design.

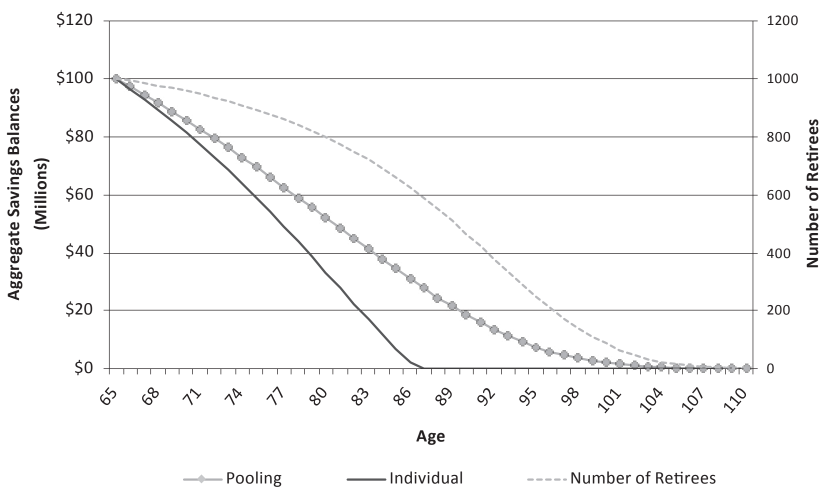
The Power of Pooling

While employers are best positioned to bear mortality risk, the pooling of mortality risk (such as in a DB plan) has beneficial impacts for retirees as well.

For this analysis, we start with our population of 1,000 female retirees and our accumulated assets of $100 million. What if we pay each surviving retiree $7,342 at the start of each year in which the individual is alive? For the individual account option, when the retiree dies, any remaining amount in the individual account is given to the retiree's heirs or estate. This residual amount does not remain in the overall pool of assets. Figure 3 shows the number of retirees expected to be alive at each age (right axis) and the value of the asset pool at each future age, assuming the assets earn 5 percent per year (left axis). For the individual account approach, the value of the asset pool is just the sum of all the individual accounts.

FIGURE 3

Fund Balance Under Individual vs. Pooling Approach



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A few initial observations:

- Under the individual account approach, the sum of all remaining account balances reaches $0 following payouts at age 86. There are 626 retirees still alive at age 86 when their account balances reach $0.
- Life expectancy for these female retirees is 23.7 years, almost age 89.
- Although difficult to see from the figure, assets under the pooling approach reach zero only after paying the last surviving retiree her final payment at age 110.
- The total amount of payments made under these two approaches is shown in Table 1.

TABLE 1

Total Benefit

	POOLING APPROACH (MILLIONS)	INDIVIDUAL ACCOUNT APPROACH (MILLIONS)
Total amounts retirees receive	$173.6	$136.3
Total amounts heirs or estates receive	$0	$16.6

The reason for the higher retirement income received under the pooling approach is most easily seen by simply looking at the seven individuals expected to die before reaching age 66. Under the pooling approach, these individuals each receive $7,342 in year one and nothing further because they have passed away. Under the individual account approach, these seven individuals each also receive $7,342 as a withdrawal, but then their heirs or estate receive the remaining $92,658 in each of their accounts. Under the pooling approach, the $92,658 for each of the seven individuals would have remained in the pool, continuing to earn interest, and would eventually be used to continue payments to those who live beyond age 86. The pooling approach is able to pay out more than $37 million to retirees and more than $20 million in total (retirees and heirs combined).

In summary, by moving to individual accounts, money that would have remained in the pool to provide payments to those living beyond age 86 will now be provided to the heirs or estates of those who die prior to reaching age 86, ensuring that no individual will be able to receive $7,342 beyond age 86. Is providing an inheritance of enough importance that more than 60 percent of the retirees will now receive less retirement income than if a pooled approach was employed? And it's not just that they receive less money. More than 60 percent of the retirees will also face the stress of still being alive, not knowing when they are going to die, and being out of money.

DB plan critics will rightly point out that the $100 million may prove to be insufficient to support the promised payment of $7,342 per month if 5 percent is not earned each year. Thus, the plan sponsor would have to contribute even more funding to make up

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the potential shortfall. DC critics will also rightly point out that under the individual account approach, the $100,000 may also not be enough to take withdrawals of $7,342 per month up to age 86 before the account balance reaches zero. The account balance may reach zero sooner (or later).

To deal with these uncertainties and limit employer risk, we need a different approach. A plan is needed where future investment returns and interest rates are irrelevant because the benefit amount is self-adjusting, eliminating market risk for the employer. The plan also needs to provide a lifetime income stream to the retirees. The VAP will accomplish these objectives.

Brief Review of VAPs

A VAP is a retirement plan that provides a benefit based on a formula. That formula consists of both an annual benefit accrual and an annual benefit adjustment.

The annual accrual is typically in the form of a career average formula, such as 1.5 percent of current year pay. These annual accruals are converted to units, and the units are added together to determine the total benefit the employee earns. The number of units an employee accumulates will not decrease. The value of those units may change, thus changing the dollar value of the benefit received.

The unit value is adjusted, usually annually. These annual adjustments take the beginning-of-year unit value and adjust it for asset performance during the year relative to a "hurdle rate" of return. Suppose the hurdle rate for the plan is 5 percent. Earnings above 5 percent will cause the unit value to increase. Earnings below 5 percent will cause the unit value to decrease. Any accrual for the current year is converted to units using the end-of-year unit value.

For example, suppose an individual is making $100,000 annually in compensation. The VAP formula is 1.5 percent of each year's pay. Thus, after one year of service, the employee has accrued a benefit of $1,500, which is payable annually beginning at normal retirement age (e.g., age 65). At the end of the second year of employment, plan assets grew during the year at an annual rate of 6 percent. Since 6 percent is higher than the hurdle rate of 5 percent, the prior year end-of-year benefit will increase. Table 2 illustrates the calculations.

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TABLE 2

VAP Benefit Accrual Calculation

	CALCULATION SPECIFICS	UNITS	UNIT VALUE	BENEFIT
Salary during year 1 and year 2	$100,000			
Accrued benefit at beginning of year 1		0.00	$10.0000	$0.00
Accrual for year 1	1.5% of $100,000	150.00	$10.0000	$1,500.00
Accrued benefit at beginning of year 2		**150.00**	**$10.0000**	**$1,500.00**
Adjustment for year 2 earnings	Earnings in year 2: 6% Hurdle rate: 5% 1.06/1.05 × $10 = $10.0952	150.00	$10.0952	$1,514.29
Accrual for year 2	1.5% of $100,000	148.58	$10.0952	$1,500.00
Accrued benefit at beginning of year 3		**298.58**	**$10.0952**	**$3,014.29**
Adjustment for year 3 earnings	Earnings in year 2: 4% Hurdle rate: 5% 1.04/1.05 × $10.0952 = $9.9991	298.58	$9.9991	$2,985.58
Accrual for year 3	1.5% of $100,000	150.01	$9.9991	$1,500.00
Accrued benefit at beginning of year 4		**448.60**	**$9.9991**	**$4,485.58**

Modeling Outcomes: Variable Annuity Versus DC Plans

In this section, we will allow the annual withdrawal from the DC plan to be modified each year based on asset performance relative to a 5 percent hurdle rate. In other words, if the annual return is less than 5 percent, the withdrawal will decrease in the following year. Conversely, if the year's return is more than 5 percent, the withdrawal amount will increase. The amount of the decrease or increase will be equal to $W \times [(1 + I)/1.05 - 1]$ where W is the prior year withdrawal amount and I is the annual investment return for the year. This adjustment will make the annual withdrawals from the DC plan equal to the annual payments being received from the VAP, as long as there are still DC funds available to withdraw.

The analysis that follows is based on these additional assumptions.

- Retirees pass away based on Monte Carlo simulations rather than using a predetermined expected number of deaths at each age.
- Initial amount withdrawn from DC plan is based on a life annuity factor for a 65-year-old female retiree.
  - Life annuity factor at 5 percent (hurdle rate): 13.171
  - Initial withdrawal amount: $100,000 divided by 13.171 = $7,593
- For comparisons, additional initial withdrawal amounts were modeled (7 percent, 6.5 percent and 6 percent of initial balance).

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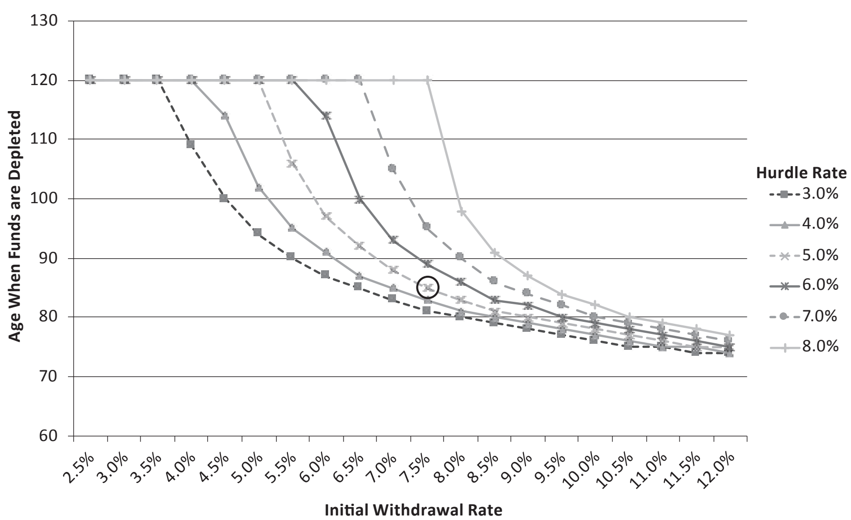
KEY OBSERVATION
For an individual account using this withdrawal process, the combination of hurdle rate and initial withdrawal rate determines how long the withdrawal pattern can continue before the account balance reaches zero. The age at which the account balance reaches zero is only dependent on the combination of the hurdle rate and the initial withdrawal rate. The actual returns over time have no impact. For example, using a 5 percent hurdle rate and a 7 percent initial withdrawal rate, the account will reach $0 at age 88, regardless of asset returns from age 65 to age 88. The total amount received during the 23-year period will obviously depend on returns during that period, but the mechanics of determining the annual withdrawal will cause the funds to be depleted by age 88 under all economic scenarios.

Figure 4 shows some additional hurdle rate/initial withdrawal rate combinations and the age at which funds will be depleted in an individual account if this annual withdrawal adjustment method is followed. Data points at age 120 indicate that payments will last to an age in excess of 120.

FIGURE 4

Affects of Hurdle Rate and Withdrawal Rate on Age of Depletion



RESULTS OF ANALYSIS
Withdrawing $7,593 initially and adjusting annual withdrawals based on asset performance relative to a 5 percent hurdle rate will cause individual account assets to be depleted at age 85 (approximately where the circle is in Figure 4). The likelihood of an individual living beyond age 85 is more than 60 percent. To decrease the likelihood of running out of money, the initial withdrawal rate will need to be lowered. The analysis that follows includes scenarios where 7 percent, 6.5 percent and 6 percent withdrawal

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rates were used to lengthen the time that the fund will have a positive balance. Using these withdrawal rates, the ages at which the individual account funds are exhausted are 88, 92 and 97 respectively.

Table 3 summarizes the results of 1,000 economic and lifetime scenarios for a single retiree. Shown is the total income received under the various payout scenarios. A couple of observations:

- The VAP provides the highest level of payouts at each percentile.
- Lower initial withdrawal rates cause the pool to last longer and can increase the total amount paid out for those who live a long time.

TABLE 3

Total Income Received in Retirement

PERCENTILE	VAP	INDIVIDUAL ACCOUNT (7.59% WITHDRAWAL)	INDIVIDUAL ACCOUNT (7.0% WITHDRAWAL)	INDIVIDUAL ACCOUNT (6.5% WITHDRAWAL)	INDIVIDUAL ACCOUNT (6.0% WITHDRAWAL)
5%	$39,032	$39,032	$35,986	$33,415	$30,845
25%	$120,785	$112,130	$107,506	$102,563	$95,246
50%	$187,991	$153,552	$157,458	$155,142	$148,311
75%	$274,697	$190,677	$200,280	$208,802	$211,746
95%	$441,818	$253,262	$277,215	$296,781	$328,332

Assume that a retiree is risk averse and would like to limit the chances of outliving the assets. Consequently, this person chooses a 6 percent withdrawal rate from the individual account, meaning that the funds will last until age 97. Figure 5 summarizes the 1,000 economic and lifetime scenarios by percentile, looking at the difference in total benefits received between the VAP and an individual account using a 6 percent initial withdrawal rate. The VAP always provides more, because the payments start out higher ($7,593 vs $6,000), and the annual benefit adjustment for asset returns is always the same percentage increase or decrease for both. Thus, the individual account benefit payment can never catch up to the level of the VAP payment.

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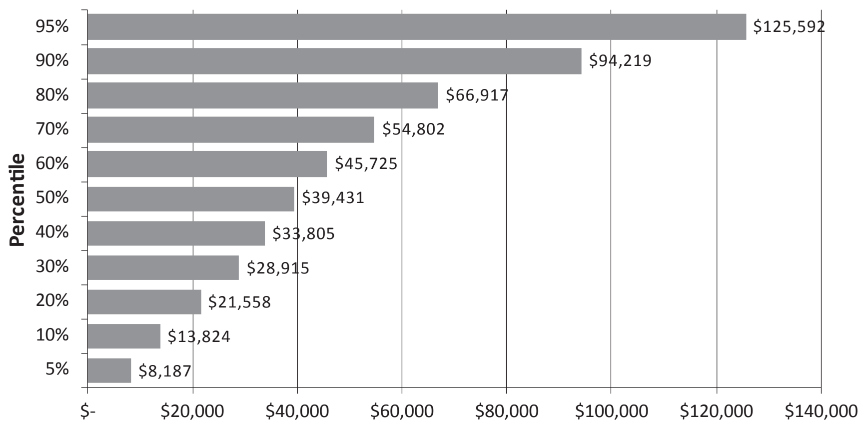
FIGURE 5

Difference in Total Payouts, VAP Minus Individual Account With 6 Percent Initial Withdrawal Rate (Amounts to Heirs not Included)



For individuals who do not outlive their assets, the ratio of the total amounts received under the various payout options (same hurdle rate) will be a constant ratio equal to the ratio of the initial withdrawal rates. For individuals with an initial withdrawal rate of 7.593 percent (also the VAP payout rate), the VAP and the individual account payments will be identical until the individual account runs out of money. For initial payout rates below 7.593 percent, the ratio of total payments from the VAP versus the other methods will be greater than 1.0.

For example, for an initial payout rate of 6 percent, the ratio of total payments received will be 7.593 percent divided by 6 percent or 1.2655. The VAP will payout 26.55 percent more than the individual account option. This will be true regardless of the age at which the person dies up until age 97. Anyone living longer than age 97 will benefit even more from the VAP, because the VAP keeps paying, while the individual account option will no longer have any funds available to withdraw. Said another way, an employee wanting funds to last until age 97 will need to save 26.55 percent more money to provide the same level of income as a VAP could provide.

For comparability, we have assumed that assets in the VAP and the individual account are invested in the same manner: 55 percent global equity and 45 percent in bonds. For retirees, especially older retirees, this may feel too risky. Consequently, some retirees may invest more conservatively as they get older. On an expected basis, this will lower the amount of expected retirement income further, because earnings over the retired life are expected to be lower.

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CONCLUSIONS FROM ANALYSIS

By keeping all funds in a VAP and paying out benefits to those retirees still living, the VAP can pay out more in benefits to everyone—with a lifetime guarantee—than an individual account under multiple withdrawal method scenarios could provide. So, who benefits when individual accounts replace a pooled approach? There are a few categories of winners in our example:

1. Retirees who die before age 85, who know they will die early, and who can spend the funds in their account before they die.
2. Retirees who withdraw funds from their account slowly, leaving more of their account to grow with interest, which they then withdraw at the end of life. While they may be winners in total benefits received during retirement, they receive less almost every year than they would have under other payout methods. Are they really winners?
3. Heirs and estates of retirees who die early, leaving residual amounts in their accounts as an inheritance.

The losers are everyone else . . . the majority who will live beyond age 85. These individuals will now be forced to receive less money annually than they would under a VAP to ensure that their money can last a lifetime.

It doesn't have to be this way. If employers spend their retirement dollars for a VAP instead of a DC plan, most employees would enjoy better outcomes (more money received in retirement) with more security, knowing they will not have to worry about outliving their money. And employers can do this without the financial risks of traditional DB plans.

Employers Who Should Consider VAPs

Employers should consider adopting a VAP if the following statements resonate:

- Employer retirement funds are intended to provide retirement income only (to retiree and spouse) and are not intended to provide an inheritance.
- Efficiency is a business imperative, and retirement income benefits should be no different. If more retirement income can be provided for the same amount of money under a different plan, that plan should be looked at immediately.
- Costs for the business must be reasonably predictable. Zero risk and variation are not needed, but the risks associated with traditional DB plans are unacceptable.
- DC plans rely too heavily on employees to engage in the right savings and investing behaviors.
- Employees' inability to retire, because they need to keep working and saving, becomes a workforce management issue with real costs to the employer.

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What's Not to Like

VAPs are not perfect. They would work best if certain changes or clarifications are made to current pension legislation. Here are some common complaints about these plans:

- The need to pay Pension Benefit Guaranty Corporation (PBGC) premiums, which are becoming very expensive.
- The uncertainty in determining a lump sum value.
- The participants' inability to choose their own risk level (investments) for the funds backing the VAP benefit.
- The monthly benefit can go down.

To address these complaints and make VAPs more attractive, I offer several suggestions.

- PBGC premiums: These plans present vastly lower risk to the PBGC than traditional DB plans. By design, they should never have variable rate premiums. The per-participant premium should be waived or significantly reduced for these plans.
- Lump sums: Clarification as to how the lump sum value of a variable annuity should be determined would be very helpful.
- Allow hurdle rates below 5 percent without becoming subject to statutory hybrid rules. In today's low-yield and lower-return environment, 5 percent is not as easily achievable as it once was.
- Allow demographic gains or losses to also impact the benefits (not just asset returns). This would make VAPs essentially risk free to the employer, because the funded status would always be 100 percent. In conjunction with this, perhaps plans could be allowed to fund to 105 percent of expected costs so that small losses do not impact benefit values. Benefit values only change when the funded status falls below 100 percent.
- For employers willing to assume some additional risk:
    - Explicitly allow for return floors and ceilings, below or above which no further benefit adjustments will be required. For example, benefit adjustments are provided for asset returns during the year, but the return used in the calculation will be no less than 0 percent and no more than 10 percent.
    - Explicitly allow for return collars, in between which no benefit adjustments will be required. For example, benefit adjustments are provided for asset returns during the year, but returns within 3 percent of the hurdle rate (below or above) require no adjustment to the benefit.
- Allow unrelated employers to band together in a multiemployer plan and gain the advantages of a larger pool of lives and economies of scale (investments, administration).
- Not more often than annually, allow employees to choose one portfolio—among a set of portfolios—to which the following year's benefit adjustment will be tied. These portfolios would have different risk and return profiles, allowing employees to pick the option they think is best for their situation. For employees failing to make an active choice, default elections would be based on age (perhaps using target-date funds).

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Conclusion

Due to the failure of traditional DB and DC plans in providing adequate retirement income to retirees, a new approach is needed. That approach—the VAP—already exists within our legislative framework and should be more widely discussed than it is today. By using longevity pooling, VAPs provide income for life and can do so much more efficiently than DC plans, while dramatically limiting risk for plan sponsors. In business, 20 percent to 30 percent inefficiency would not be tolerated in other areas of a business, so why should retirement benefits be any different? Employers who realize the value these plans can bring to their employees have the potential to capitalize on a competitive advantage in attracting and retaining key talent.

Employers are not able to fund the full cost of what is necessary for a secure retirement, so DC plans will not be going away. Employees will need to continue to set aside some of their own earnings to fund their retirement, and DC plans are the best vehicle for doing so, taking advantage of automatic enrollment, automatic escalation and sound default investment options. However, for employer funds, the VAP is a more efficient way to provide retirement income to retirees and offers an approach to providing retirement income that should be seriously considered.

Appendix: Modeling Methods and Assumptions

The analysis within this paper is based on the following:

- Assumed equity returns: 9.1 percent arithmetic return with 18.8 percent standard deviation (7.5 percent geometric return).
- Assumed fixed income returns: 3.8 percent arithmetic return with 5.3 percent standard deviation (3.7 percent geometric return).
- Asset allocation is 55 percent equities, 45 percent bonds unless stated otherwise.
- Retiree population consisting of 1,000 female retirees, all age 65.
  - All were hired at the same time, making the same salary.
- Individual accounts of $100,000 each.
- Pooled funds of $100,000,000.
- Mortality based on RP-2014, projected with MP-2016 to 2030.

This paper has left aside the issue of how these dollars are accumulated before retirement. Suffice it to say, that $100 million has been accumulated for a group of 1,000 female retirees, all age 65 with equal service and pay histories. Both a pooled plan and an individual account plan could be developed such that annual contributions plus earnings would equal $100 million when the group reaches age 65. Presumably, the annual contributions for both of these plans and the investment approach could have been identical and thus both plans are considered equal-cost plans.

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Comments on

"In Search of a More Efficient Retirement Plan"

By Jeanette Cooper

Lee Gold's paper on variable annuity plans makes a compelling case for employers to consider adopting this type of design. To make his argument, Gold models pension outcomes for 1,000 females retiring at age 65 under a variable annuity plan (VAP) and a defined contribution (DC) plan.

Description of the Variable Annuity Plan

In the beginning of his paper, Gold describes the VAP as an option that blends features from defined benefit (DB) and DC plans.

SIMPLICITY AND TRANSPARENCY

In his explanation of the VAP, Gold describes a common design where the benefit earned to date is converted into units, the units are then adjusted annually by the market return on plan assets relative to a hurdle rate (in this case, 5 percent), and then the units are converted back into a benefit amount. This allows him to make the statement that the number of units will not decrease although the value of a unit can increase or decrease.

While this is technically true, the design is easier to understand and more transparent to employees and retirees if the conversion between benefits and units is eliminated from the calculation. The ultimate result is that the benefit can increase or decrease and the units are just a distraction.

The example shown under "Brief Review of VAPs" could be restated more simply as shown in Table 1.

TABLE 1

Adjusted VAP Benefit Accrual Calculation

YEAR	SALARY	ACCRUAL	ADJUSTMENT FACTOR	BENEFIT AT YEAR-END
1	$100,000	1.5% × $100,000 = $1,500.00	Not applicable in the first year	$1,500.00
2	$100,000	1.5% × $100,000 = $1,500.00	1.06 / 1.05 = 1.0095238	$1,500.00 × 1.0095238 + $1,500.00 = $3,014.29
3	$100,000	1.5% × $100,000 = $1,500.00	1.04 / 1.05 = 0.99047619	$3,014.29 × 0.99047619 + $1,500.00 = $4,485.58

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VARIATIONS ON THE COMMON DESIGN

Gold describes benefits based on salary that float throughout retirement. He also mentions the possibility of return floors, ceilings and collars. It is worth noting that plan sponsors are considering other design options, such as:

- Eliminating the floating feature at retirement (puts back considerable investment risk on the employer)
- Benefits based on hours using a fixed-dollar multiplier (common for multiemployer plans)
- Basing the annual adjustment on an average of recent years' returns to dampen the year-to-year volatility in benefits

Risk

Gold then moves on to outline risks for employers and employees with DB and DC plans and how VAPs can help overcome these.

EMPLOYER RISK

As Gold explains, VAPs do an excellent job of limiting an employer's exposure to investment risk. However, the introduction of floors and collars or fixing the benefit at retirement can erode that protection. Employers who want to avoid that risk while not dramatically reducing participants' benefits during a market downturn may wish to consider one-time adjustments, assuming there is sufficient money to provide for this. Providing guaranteed protections in the initial design can limit an employer's ability to avoid investment risk at a time when it may need to do so.

Another employer risk mentioned in the paper but ignored in the modeling is interest rate risk, the risk of liabilities increasing when market interest rates decrease. This is identified as a newer risk due to plans having to use market interest rates for various purposes, including funding single employer pension plans. The use of these rates discourages maintaining an ongoing DB plan because of the higher required contribution levels. It would be interesting to see some modeling that shows the impact on employer contributions levels over the last 30 years of the variable annuity design versus a more traditional DB plan—and, ignoring stabilization, taking into account what the required interest rates would have been.

EMPLOYEE RISK

Interestingly, Gold identifies mortality risk rather than investment income as the main risk for employees having adequate retirement income. In his modeling example, he describes a scenario where an annual withdrawal from a DC plan is adjusted each year based on market returns relative to a 5 percent hurdle rate. Gold then points out in the "Key Observation" that the age at which the account balance is depleted is only dependent on the combination of the hurdle rate and the initial withdrawal rate, while

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the actual returns over time have no impact. However, this is only due to the initial conditions posited on the withdrawal.

In reality, if investment returns are low enough or inflation high enough, retirees may need to withdraw more than allowed under the initial conditions. Therefore, while the main risk for employees with sufficient retirement income at retirement is longevity risk, serious market downturns or high inflation periods cannot be ignored. Even if inflation for most products is relatively low, drug costs and end-of-life care can seriously erode retirees' standard of living regardless of careful planning. That said, the VAP does provide a better overall lifetime income.

Other Considerations

Gold wraps up the paper with conclusions from the analysis, including noting which employers should consider VAPs and unpacking aspects not to like about VAPs.

COMMON COMPLAINTS

Four common complaints Gold identifies are required Pension Benefit Guaranty Corporation (PBGC) premiums, uncertainty in determining lump sum values, participants' inability to choose investments and therefore their risk level, and the fact that the benefit can go down.

I see participants' inability to choose the investments as a positive feature of these plans. In general, the typical DB plan enjoys higher returns than individuals' DC accounts. Having individuals select a risk portfolio would likely reduce the overall return on the fund. Using target date funds for the many participants who would fail to make an election would limit older individuals from sharing in higher returns that the pooled investments would be able to earn. The addition of individual elections also adds unnecessary administrative complexity.

A fifth complaint would be the benefit's uncertainty. Although benefits are more likely to go up more often than they go down if the hurdle rate is sufficiently low, retirees cannot count on annual increases and may be unpleasantly surprised when their benefit is adjusted downward. Clear and frequent communication can help mitigate this complaint.

A sixth complaint would be a lower initial benefit at retirement than under a traditional DB plan. Most DB plans in the single employer and multiemployer sectors do not provide cost-of-living adjustments. Assuming a plan sponsor switching to a VAP with benefits floating throughout retirement wants to provide benefits at a similar cost to the current plan—and assuming that by design—benefits in most years would increase, rather than decrease, then the initial benefit at retirement would need to be lower than under the current plan.

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Applicability to Public and Multiemployer Sectors

Plan sponsors of public and multiemployer plans are also expressing interest in the variable annuity design.

Like single employer plan sponsors, government entities are looking at hybrid approaches. For some of these plans where the participants do not participate in U.S. Social Security, a plan design that avoids investment risk but still provides an annuity benefit is an appealing option.

Multiemployer plans are looking at this option as a way to reduce employers' investment risk, including the risk of incurring withdrawal liability.

In conclusion, Gold's paper provides additional insights into the variable annuity design. This paper is an excellent tool for consulting actuaries to use when faced with a client who is considering eliminating DB accruals in favor of a DC arrangement or for a client who has frozen a DB plan and is now looking for a way to better manage employees' ability to retire.

The opinions expressed in this response are my own and not those of my employer.

Jeanette Cooper, FSA, EA, FCA, MAAA, is a vice president and consulting actuary at Segal Consulting in Atlanta.

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Author's Response to Comments by Jeanette Cooper

By Lee Gold

I am grateful to Jeanette Cooper for her thoughtful comments on my paper. I now provide this response to her comments, with the hope that the combination of my original paper, Cooper's comments and this response will give the reader a clear understanding of variable annuity plans (VAPs) and why employers should give these plans more serious consideration.

Simplicity and Transparency

Cooper states that the concept of units should be eliminated from the conversation with employees, because this concept is a distraction. I have a more flexible view of this. Having introduced a new VAP to numerous employee groups, I can state that for some employees, the introduction of units does improve their understanding. Many employees understand the concept of mutual fund shares and that the value of those shares change over time. The concept of benefit units or benefit shares resonates with these employees. However, I also will agree with Cooper that, for some employees, avoiding the concept of units may be the wiser course of action.

My advice: When introducing VAPs to employers (and ultimately to employees), consider the audience and what will be relatable to them. Start with the simplest explanation, but don't be afraid to introduce the analogy to mutual fund shares. I have found this an effective way to explain the concept for some individuals. Be clear that the mutual fund shares provide the shareowner with the right to a one-time payment of the shares at the current share price. The variable benefit units, in contrast, provide a right to a lifetime payment of the shares (annually, spread over 12 months) at the share price for each year.

Variations on the Common Design

I agree with Cooper that variations on the basic design are plentiful. In fact, the potential variations are innumerable. Current regulatory guidance for these plans leave some questions unanswered as to what variations are acceptable. The attractiveness of these plans would be maximized if national retirement policy accommodates variations, allowing employers the flexibility to share risks with employees in ways that each employer finds most beneficial for their organization. If employers are allowed to provide the bookends of either (1) traditional fixed pension benefits or (2) fully adjustable variable benefits, then offering benefits that adjust somewhere in between these two extremes should be acceptable.

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Employee Risk

Cooper states that investment risk should not be ignored for retirees, and I concur. The fact that a mathematical formula exists for determining how long a lump sum will last does not mean that the monthly income provided under that formula will be enough. My primary point in raising the mathematically determinable "age at ruin" for a lump sum (using an initial withdrawal rate and a hurdle rate) is to show that the VAP is more efficient. While a withdrawal rate and hurdle rate can be established to mimic the payout of a VAP, the lump sum will be depleted before the individual reaches life expectancy. To gain longevity protection with an account-based plan, the individual must be willing to settle for a lower withdrawal rate, such that the funds will last into the individual's 90s. This longevity protection is costly. The VAP, by comparison, is able to provide that longevity protection through pooling and can do so at a higher initial withdrawal rate.

Employer Risk

Cooper raises an excellent point about interest rate risks. I ignored interest rate risk in my modeling, because interest rates do not affect the determination of liabilities under a VAP. However, for comparison purposes with traditional defined benefit plans, the relative risk of traditional defined benefit plans would be even higher than portrayed in my paper if market interest rate volatility were included in the modeling. Traditional defined benefit plans would show an even higher level of year-to-year risk than VAPs.

Common Complaints

Cooper mentions the administrative complexity introduced if employees are placed in age-appropriate target date funds as opposed to a single benefit pool. The administrative burden does increase under this approach. However, for employers that wish to address the varying risk profiles presented by a multigenerational workforce or that value choice, this is an option that I would like to see available to them. Again, I fully support allowing employers flexibility as to how they design their retirement plans. Keep in mind that target date funds under a VAP may have different glide paths than what we typically see in defined contribution (DC) plans. Retirees, in particular, who have a VAP may be more tolerant of investment risk, since they do not carry longevity risk at the same time.

Cooper mentioned two additional complaints. First, the uncertainty of the benefit is definitely an issue when compared to traditional fixed-benefit defined benefit plans. Since most employers are looking to DC plans to address or avoid the risks of traditional defined benefit plans, benefit uncertainty is a reality, whether an employer adopts a VAP or a DC plan. VAPs eliminate one uncertainty that DC plans do not, and that is the certainty of payment. While the amount may be uncertain, the retirees have certainty that they will receive a payment (and cannot outlive the benefit).

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Second is the potential for a lower benefit when compared to an equal-cost traditional defined benefit plan. Cooper correctly points out that the variable benefit likely has some expected inflation protection built in and is expected to increase more often than decrease, even after retirement. She also correctly points out this truism—for a given (1) pool of money, (2) annual returns on that money, (3) mortality rates and (4) benefit payout approach—the payments that can be provided are determinable. For example, by knowing these four elements, an individual can determine the level monthly payment the assets will support.

By changing element No. 4 from a level monthly payment to a variable payment based on the prior year's asset return (variable annuity), a different payment pattern emerges. In situations where element No. 2 is higher than the hurdle rate, the plan will pay lower benefits initially (compared to the level payment approach) but will be able to pay increased benefits later on. This is the situation Cooper addresses. In contrast, if element No. 2 is lower than the hurdle rate, the VAP will pay higher benefits initially (compared to the level payment approach), but the benefit will decrease over time.

All of this highlights the key advantage of the VAP compared with a fixed-benefit pension plan. Fixed-benefit pension plans are funded based on an assumed rate of return. If that assumption is realized, the amount funded will be sufficient to pay the promised benefits. Unfortunately, actuaries live in a world where they know actual experience will be different than their assumptions. The key is to have assumptions that are very close to experience. Asset returns have proven to be very difficult to estimate. Consequently, amounts initially funded to pay for fixed-benefit pension plans (the service cost) will always be too much or too little, depending on how asset returns actually play out. For VAPs, the self-adjusting nature of the benefit means that the initial amount funded (service cost) will be very close to the amount actually needed to fund the promised benefits. The actual returns no longer have any influence on whether the promised benefits can be provided with the assets available. (Note that this last comment is theoretical. Differences in the frequency of benefit adjustments and payment frequency can lead to small deviations from the theoretical answer.)

Applicability to Public and Multiemployer Sectors

Indeed, public sector plans and multiemployer plans are looking for different approaches that limit risk and will find the VAP to have many attractive features, as Cooper points out. In fact, I was involved in the redesign of a public sector plan that ultimately chose a variable annuity design.

My continued hope is that consultants and employers will become informed about VAPs and include them in their decision-making process. While VAPs may not be the answer for all situations, informed decision-making is best, and the VAP should be a part of retirement redesign discussions.

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