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To cite this article: Ralph Goldsticker (2007) A Mutual Fund to Yield Annuity-Like Benefits, Financial Analysts Journal, 63:1, 63-67, DOI: [10.2469/faj.v63.n1.4408](https://doi.org/10.2469/faj.v63.n1.4408)

To link to this article: <https://doi.org/10.2469/faj.v63.n1.4408>



Published online: 02 Jan 2019.



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PERSPECTIVES

A Mutual Fund to Yield Annuity-Like Benefits

Ralph Goldsticker, CFA

In recent years, the inexorable shift away from corporate and public defined-benefit (DB) pension plans has accelerated. In addition, proposals have been made to shift the U.S. Social Security system toward a defined-contribution structure through the introduction of personal savings accounts. The two changes will have similar results: They will eliminate sponsor-provided life annuities that are received upon retirement in favor of tax-advantaged savings plans, such as 401(k) plans. As a result, to fund their retirement, workers will become more and more dependent on the pool of assets they have accumulated in savings plans. Stated another way, both longevity and investment risks are being transferred from pension fund plan sponsors to retirees.

This transfer of risk to retirees has two significant implications. First, retirement income is becoming ever more dependent on the rate of return earned by retirees' investments, which depends, in part, on retirees' skills in managing their assets. In addition, and perhaps more importantly, post-retirement standards of living are becoming more dependent on the rate at which retirees choose to consume their assets after retirement.

Many social policy issues relate to the question of who is best able to accept and/or diversify retirement plan risks, but such issues are beyond the scope of this article. In addition, much has been written about how best to invest during one's accumulation phase and how to invest and withdraw one's assets following retirement. Much of that literature also addresses the issues related to incorporating annuities into financial plans and ways to structure annuities to address some of their perceived drawbacks. I do not address the financial planning issues of how to optimally manage one's portfolio or how to structure and use annuities in a plan.

I do accept the need for annuity-like investments as a financial alternative. In fact, the continued loss of life annuities embedded in DB pension

plans should increase the demand for purchased annuities. The question I address is: Can a tontine-like investment vehicle be developed to provide many of the benefits of life annuities without some of their drawbacks?^{1,2}

Annuities: Benefits and Drawbacks

Retirees' incomes are critically dependent on the speed at which retirees withdraw and consume their investments. If they draw down their savings too fast, they face the risk that they will spend all of their retirement savings before they pass away. Drawing down savings too slowly may mean forgoing a higher standard of living and then dying with a significant pool of assets remaining. To most retirees, the prospect of outliving their savings is the more worrisome. As a result, most are conservative and plan for a long life—probably longer than they will actually live. Thus, they settle for a lower standard of living than might otherwise be possible.

A traditional solution to this problem is to purchase a life annuity upon retirement. The drawback to this solution is that annuities are expensive, because offering annuities requires accepting considerable risk—risk for which insurers must be compensated. Annuities pose both investment and actuarial risk to the insurer. The first is the risk that the insurer will not be able to earn the rate of return used in calculating the promised annuity payments. Although the insurance company can diversify the longevity risk of individual retirees, actuarial risk still arises from the scenario in which, on average, the insured live longer than predicted. Whether the cause is faster-than-expected longevity drift (i.e., unexpected changes in the longevity of the general population) or larger-than-expected adverse selection (i.e., the case in which those who choose to participate live longer, on average, than the general population), the result will be the same: The insurance company will pay out more than it expected.

For the annuitant, purchasing an annuity contract that promises a certain retirement income does not completely eliminate risk. The annuitant has, in effect, swapped longevity and investment risk for credit risk—the possibility that the insurance company will default on its obligations. The obligations

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implicit in the annuity may run for 30 years or more, and the annuitant has no guarantee that an insurance company rated AAA today will maintain that rating or even be in business for that long. Insurance regulators and state insurance pools offer some protection, but it is unlikely to be complete.

Mutual Fund/Tontine Alternative

I propose introducing a mutual fund/tontine hybrid vehicle.³ It would be a pooled fund serving as a low-cost vehicle to provide annuity-like cash flows. It could replace the fixed annuities that are being lost in the move away from DB plans. The mutual fund/tontine hybrid would require retirees to retain investment risk, but the structure would allow them to diversify their individual life expectancy, or longevity, risk. By retaining the systematic investment and actuarial risks, tontine participants could save the costs inherent in transferring those risks to an insurance company.

Tontine-like vehicles could be used in several structures. They could be offered directly to investors through a vehicle that would have characteristics of both mutual funds and tontines, or they could be embedded in cash-balance pension plans as a way to annuitize the participants' investments upon retirement. Because a mutual fund/tontine hybrid with fixed payments is the most straightforward investment vehicle for this approach, I use it to illustrate the mechanics of the concept.

The mutual fund/tontine hybrid would be structured as follows:

- Each year, a new fund would be offered to an age- and gender-specific cohort (e.g., 65-year-old men). Once the money was invested in the tontine, it *could not* be withdrawn. However, it would provide annuity-like payments for the remainder of each investor's life.
- The money would be invested in the public securities markets. The participants desire fixed, annuity-type payments, so the assets would be invested in a diversified portfolio of high-grade fixed-income securities.⁴ The tontine could minimize investment risk by holding a portfolio of securities that would be laddered to match the expected cash flows to participants, much in the way pension plan sponsors can immunize their liabilities.
- At the start of each year, actuaries would calculate the "fair" annuity payment based on current market values, expected returns, and actuarial expectations. From year to year, the payments would vary as a result of the performance of the assets in the pool, changes in expected returns, and demographic patterns that might differ from those assumed in the annuity calculation used the prior year. The periodic payments paid to each participant would be in proportion to the assets each surviving investor paid in at the inception of the fund.
- Upon death of the participant, the participant and heirs would lose all rights to the assets that remained in the investment pool. In combination with the inability to withdraw funds, this feature creates the tontine-like nature of the hybrid.
- The process would be much like an annuity: It would repeat each year as long as any participants survived or until some preestablished termination date or condition was reached, at which time the remaining assets would be distributed among the survivors.

To evaluate the benefit of the hypothetical tontine relative to a purchased annuity, I estimated monthly payments for five annuities. All are based on a hypothetical 65-year-old male making a single \$1 million contribution. For a real-world reference, I started by using an Internet site that allows one to shop online for single-premium, immediate life annuities. It quoted a monthly annuity of \$6,460 for our retiree.

For the remaining calculations, I assumed that our investments earned a fixed rate of 4.5 percent a year, net of costs.⁵ At 4.5 percent interest, investing \$1 million will produce the same monthly payments of \$6,460 of the first annuity for 19.33 years. According to the Social Security Administration (SSA), the life expectancy for a 65-year-old male is 16.05 years. If the retiree plans to live only to the average life expectancy and invests and budgets accordingly, he can withdraw \$7,316 a month from his savings. If he plans for the possibility that he will live for 30 years, however, the monthly withdrawal will be only \$5,067.

If he can participate in the mutual fund/tontine hybrid, then (based on the SSA mortality tables and the same 4.5 percent net return on assets) he can expect to receive monthly payments of \$7,925 for the rest of his life. That amount is 123 percent of the purchased annuity and 108 percent of the 16-year withdrawal plan.^{6,7} The actual data illustrate the significance of longevity diversification: Participants in the tontine who pass away sooner than the cohort average "subsidize" the survivors. But even the early-demise participants benefit from the higher monthly payout than they could have had otherwise.

Keep in mind the key differences between the tontine and a purchased annuity. A significant benefit for the retiree of the tontine is the lack of default risk. The tontine's payment level, however, is not

guaranteed. The tontine calculation assumed a return on assets, net of costs, of 4.5 percent a year. Higher or lower rates of return would increase or decrease the tontine's payments. For example, if the retirees were willing to take on some investment risk, so their assets could earn 5.5 percent, the expected payments would rise by about 10 percent from those given in the preceding analysis. An important aspect is that the tontine calculation assumed that the participants had the same demographic expectations as the general population. Longer life expectancy would reduce the payments.

Alternative Tontine Structures

For ease of illustration, I described in the preceding section the most straightforward tontine structure. The intent of the proposed tontine structure is to provide a mechanism that allows investors to diversify their individual longevity risks without the expenses associated with transferring aggregate longevity and investment risks to an intermediary, such as an insurance company or a DB pension fund plan sponsor. In practice, the assets of more than one cohort could be pooled; the assets would not need to be invested in only fixed-income securities; and the tontine's expected payments would not need to be constant over time.

As an alternative to launching funds for specific cohorts, firms could create funds that pool assets among cohorts. In such tontines, each participant would have an individual account. The "annuity" payments would be determined by each participant's account value, age, and probability distribution of expected mortality. But the change in the account values would be determined by actual mortality and investment experiences versus expectations for the entire pool, not by the experiences of a specific cohort. This approach would also allow pooling of immediate- and deferred-annuity participants' assets. Used in this manner, tontines could be an alternative mechanism for annuitizing cash-balance pension plans.

By investing in fixed-income assets laddered to match the expected cash flows, the tontine would behave as a fixed annuity. By investing in riskier assets with higher expected returns, the tontine could be expected to provide higher cash flows. The trade-off is that the cash flows would be more volatile. Cash-flow volatility would be muted, however, because the payments would be based on annuitizing the fund balance over the expected lives of the participants.

The tontine's expected payments do not need to be constant in nominal terms. They could be inflation adjusted. (This approach would require

an inflation forecast.) To hedge the risk of unexpected inflation, a "real" tontine's assets could be invested in Treasury Inflation-Protected Securities (TIPS). Alternatively, if one believes that income requirements decline with age, the tontine could be structured to provide declining payments.

Implementation Questions

The discussion so far has assumed that the parameters required to estimate the "fair" payments are known with certainty. In fact, most of the parameters would need to be estimated. The most important are the expected mortality distribution of the participants and the expected return on assets. Inaccurate estimates would result in payment patterns that differ from what was expected and that vary over time. In a fixed annuity, actuarial risk results in unexpected wealth transfers between the insurance company and the annuitants. In a tontine, forecast errors would result in unexpected fluctuation of payments over time. At the expiration of the tontine, however, the aggregate payment to all participants as a group would be actuarially and economically fair. Unexpected transfers of "wealth" would have occurred but solely between the tontine participants. The direction and size of the transfers would depend on the type and size of estimation errors.

The provider of a tontine would need to forecast the expected mortality distribution for the participants—which introduces longevity risk. If the average realized longevity is longer than expected, payments will be too high in the early years and, as a result, will fall in the later years. Unexpected longevity can arise from faster-than-expected longevity drift or from higher-than-expected adverse selection. In a tontine sold directly to investors, adverse selection is likely to occur because the participants will disproportionately include people who expect to live longer than average. In fact, for someone who believes that his or her life expectancy is significantly shorter than that of the other participants, participation will not make sense. In short, much as insurance companies forecast mortality for the annuities they provide, the tontine's sponsor would need to forecast longevity drift and the level of adverse selection when setting the tontine's payment level.

The tontine's payments to participants would also be a function of forecasts of expected returns. And another implementation problem is related to those forecasts. If a participant invested in a tontine promising a fixed nominal rate of return and the tontine's assets were, in turn, invested in a portfolio of zero-coupon bonds matching the expected cash flows, and if the mortality forecast

was correct, the participant would incur no investment risk. Tontines would probably use riskier assets and investment strategies, however, in order to promise higher expected returns. Those payments would fluctuate as the realized investment results differed from the expected returns. If the expected returns were unbiased forecasts, then the deviations would constitute normal investment risk and the fluctuation in payments would be appropriate. If the forecasts were biased, however, the result would be undesired variation in payments. If the forecasts of expected returns were too high, the payments in the early years would be larger than “fair” and payments in the later years would be smaller. As with longer-than-expected longevity, the results would be an unexpected wealth transfer from longer-lived participants to ones that died earlier. If the forecasts were too low, the transfer would go in the other direction.

The earlier discussion of forecasting errors assumed that the forecasts would be unbiased. But by assuming slower longevity drift, less adverse selection, and higher expected returns, tontine managers could “promise” higher payments. As a result, offering the tontine in a mutual fund-like vehicle creates a risk that, in an attempt to gather more assets, a manager would deliberately bias its forecasts to quote a higher-than-sustainable level of payments. Consequently, some type of regulation might be needed to mitigate this risk. If management fees did not vary among tontines, then—as with the other forecast errors—biased estimates would not transfer wealth between the participants and the manager. Instead, the payments in the later years would be lower than participants were led to expect when they invested in the tontine.

Many of the issues described here suggest that the most attractive use of a tontine would be as a package with a cash-balance pension plan that mandated conversion of the ending cash balance to a tontine-type annuity upon retirement. In this structure, the risk of adverse selection would largely disappear. The mortality experience of the tontine would reflect the average experience of all the employees and retirees of the sponsor. The risk of unexpected longevity drift would remain, but by including more than one age cohort, that risk could be diversified among generations. Having more than one age cohort in the tontine would also provide “time diversification”—reducing the risk that over any participant’s life span, the average realized returns would be materially different from expected. Finally, because the assets in the cash-balance plan would be “captive,” the sponsor would have no reason to bias its forecasts to gather assets.

Conclusion

The investment and budgeting problems faced by retirees are real, and often, annuities should be part of the solution. With the continuing shift away from DB pension plans, the demand for annuities should grow. I propose developing a new, tontine-like investment vehicle as an alternative to purchased annuities. A mutual fund/tontine hybrid could provide benefits similar to those of purchased annuities but also offer many advantages.

- *Diversification of individual life-expectancy risk.* As a result of pooling among many participants, payments would be based on average life expectancy. Therefore, retirees would not need to underconsume for fear of living longer than average and outliving their assets.
- *Higher potential payouts.* Because the participants would retain the systematic investment and actuarial risks (rather than transferring them to an insurance company), investors in tontine-like vehicles would avoid paying the risk premiums embedded in insurance company products. Thus, all of the investment returns would flow to the participants. Payment levels would not be contractually guaranteed but would, instead, be adjusted each year in line with changes in participant demographic experience, investment performance, and return expectations.
- *Higher living standards.* In addition to providing higher payments than traditional annuities, because payments would be based on average life expectancy rather than the maximum, tontines should provide higher standards of living than the systematic plans to draw down savings used by those without annuities.
- *Reduced event risk.* Because the assets would be invested in a diversified portfolio of publicly traded securities, participants in a tontine would not need to worry about the bankruptcy risk involved in contracting with an insurance company for a product that might have an expected life of 30 or more years. Of course, the tontine’s manager might fail, but as with a pension plan or a mutual fund, the tontine’s assets would be segregated from the assets of the manager.
- *Flexible investment objectives and structures.* Tontine-like vehicles provide ways to annuitize investors’ assets. Implementation would be flexible; tontines could be established with investment objectives ranging from conservative to aggressive. They could be structured for one cohort (e.g., 65-year-old men) or combine multiple cohorts to enhance demographic

diversity. The pattern of payments could be fixed or scheduled to meet participants' changing requirements as they aged. Finally, mutual fund/tontine hybrids could be offered by an intermediary or embedded in a retirement plan.

- *Transparency.* Full transparency is an important benefit of the tontine. Investors are concerned about the opacity and costs of various features of purchased annuities, and to address their concerns and preferences, the annuity landscape is rapidly evolving.⁸ Even with the new features and tools, however, annuity contracts leave significant levels of systematic risk with the insurance companies—and they must price the contracts accordingly. Tontines would not

require transfers of systematic risks affecting expected cash flows in ways that cannot be observed or evaluated by the consumer, and they do not have expected-return assumptions that cannot be observed.

Although tontines are not legal today, laws can be changed. The coming demographic wave of Baby Boomer retirees, combined with the steady disappearance of DB pension plans, creates a demand for new approaches to help retirees manage their finances. I believe properly structured tontine-like vehicles can make an important contribution in meeting that objective.

This article qualifies for 0.5 PD credit.

Notes

1. A tontine is defined by *Black's Law Dictionary* as a financial arrangement in which a group of participants shares in the arrangement's advantages until all but one has died or defaulted, at which time the whole goes to that survivor. The scheme is named after Neapolitan banker Lorenzo de Tonti, who is generally credited with inventing it in France in 1653. Tontines are illegal in the United States. The fear is that they may have the unintended effect of encouraging participants to assure that they become the surviving party by arranging the early demise of other participants. I do not believe the mutual fund/tontine hybrid that I propose creates such a moral hazard. The pools would contain the contributions of thousands of anonymous investors, so a participant is unlikely to perceive a benefit from attempting to eliminate other participants.
2. For the remainder of this article, I use the term "annuity" to refer to any annuity purchased from an insurance company and the term "tontine" to refer to an investment vehicle that provides annuity-like cash flows but does not involve insurance contracts or guarantees.
3. Wadsworth, Findlater, and Boardman (2001) discussed annuitized funds, but they proposed them as modifications to annuity contracts sharing investment risks between the annuitants and the insurance companies rather than as self-contained investment vehicles. Davidoff, Brown, and Diamond (2003) discussed "true variable life annuities" but used a mutual fund framework, in which shares would pass to surviving investors, rather than proposing a vehicle structured to provide annuity-like payments.
4. If the participants were willing to accept more investment risk in hopes of higher payments, the assets could be invested in an appropriate mix of equity and fixed-income securities. If participants desired an annuity with payments that were constant in real terms, the portfolio could be invested in Treasury Inflation-Protected Securities.
5. This rate is similar to the yield on 30-year U.S. T-bonds in February 2006.
6. An annuity from the insurance company includes internal forecasts that cannot be observed. They include the expected return on assets, cost, projected mortality distribution, and profit margin. The tontine calculation uses the interest rate on long U.S. T-bonds, and Social Security mortality tables. As a result, an apples-to-apples comparison of the annuity quote from an insurance company and the expected payment from the model-based annuities and tontine is impossible. In the analysis, I assumed that competition among insurance companies keeps them from using unrealistic forecasts to earn higher-than-economic profits at the expense of the annuitants.
7. The 8 percent difference between the expected payments from the tontine and the 16-year withdrawal plan arises because the impact of the investment horizon on annuity payments is not linear. For example, the payment from a 16-year plan is almost 5 percent less than the average of the payments from a 12-year and a 20-year plan. In addition, the distribution of life expectancy is highly skewed, which further affects the calculation.
8. Some of the changes involve the sharing of investment risk between the insurance company and the beneficiaries. Also, attempts have been made to issue mortality derivatives to allow insurance companies to hedge demographic risks.

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