

# Variable Annuities, Lifetime Income Guarantees, and Investment Downside Protection

Access to variable annuities with a guaranteed minimum withdrawal benefit can result in welfare gains of up to 4%.

Participants in self-directed retirement plans may fail to understand and mitigate investment and longevity risk, putting their retirement security in jeopardy. One way to rectify this problem is to include variable deferred annuities with lifetime income and investment guarantees in the retirement plan menu.

The study summarized here – [Variable Annuities, Lifetime Income Guarantees, and Investment Downside Protection](#) by Raimond Maurer, Goethe University; Olivia S. Mitchell, The Wharton School of the University of Pennsylvania; Vanya Horneff, Goethe University; and Ralph Rogalla, St. Johns University – examines how one such product, a deferred variable annuity with a guaranteed minimum withdrawal benefit rider (or “GMWB” for short), affects lifecycle consumption and portfolio allocation patterns of investors.

To read the full report, click the study link above or see: Horneff, Vanya, Raimond Maurer, Olivia S. Mitchell, and Ralph Rogalla. (2015). “Optimal Life Cycle Portfolio Choice with Variable Annuities Offering Liquidity and Investment Downside Protection.” *Insurance: Mathematics and Economics*. 63: 91–107.

## How GMWBs work

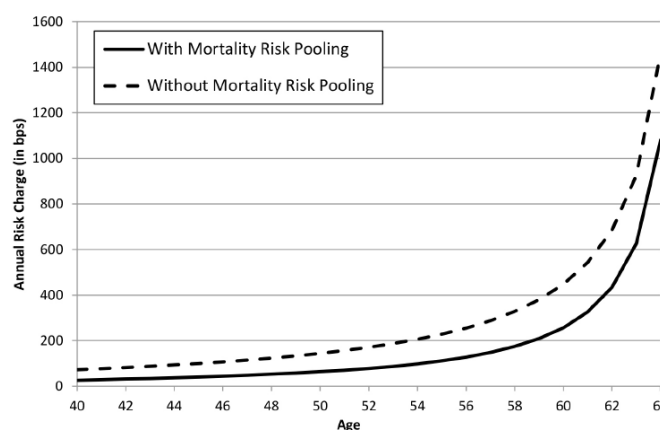
GMWBs are insurance products with both investment and income components. During the deferral period, the policyholder pays premiums to a life insurer which invests the premiums after expenses in mutual fund-style sub-accounts. The policyholder may elect to take back the premiums in small portions over a certain time frame, regardless of the underlying portfolio’s investment performance. If the “fund account” into which the premiums are invested is depleted during the deferral period, or if the total guaranteed withdrawal amount available to the policyholder exceeds the fund account balance, the insurer must pay the shortfall using its own resources.

At the end of the deferral period, any remaining capital in the policyholder’s account can either be converted into a lifelong annuity or paid out in a lump sum. With these features, the GMWB provides access to equity investments, downside protection against market risk, and hedging of longevity risk.

## Mortality risk pooling lowers annual risk charge

In many cases, the insurer selling the GMWB must levy an appropriate risk charge to cover the income and investment guarantees. To put a value on these guarantees, the study’s authors used techniques from options pricing theory. Applying this approach, they derived the insurer’s annual risk charge expressed as a percentage of the policyholder’s fund account (see the figure below).

## Annual Risk Charges of Single Premium GMWBs at Alternative Purchase Ages



Annual risk charges are in basis points (bps) of the current fund account value. A basis point is equal to 0.01%. The fund account is assumed to be fully invested in equities with a volatility of 18%, the risk-free rate is 2%, and the deferral period ends at age 65.

“The GMWB provides access to equity investments, downside protection against market risk, and hedging of longevity risk.”

As shown in the figure on the prior page, the risk charge for the GMWB must rise with the participant's age because the charge is paid annually until the deferral period ends; hence younger buyers pay the charge over more years. And assuming the insurer can pool mortality risk, when a policyholder dies, the remaining wealth in her account transfers to the insurer. This generates the well-known mortality credit due to mortality risk pooling, which the insurance company incorporates in calculating the product risk charge.

For instance, in their model, the authors show that a policyholder who purchases a GMWB at...

- ...age 40 pays an annual fee of 26 bps of her fund account until the deferral period ends at age 65.
- ...age 50 pays an annual fee of 64 bps (assuming the same deferral period).
- ...age 64 pays an annual fee of 1,080 bps, but only for a single year.

By contrast, the dashed line in the figure shows the annual risk charge to cover a death benefit, if one is provided in a product. A life-contingent GMWB purchased at age 40, for example, would involve a risk charge of 26 bps versus 72 bps for a product that included a death benefit. At age 60, the annual risk charges would be 257 bps versus 448 bps, respectively.

## Before retirement is optimal time to buy a GMWB

Whereas other studies have predicted that consumers will wait to buy deferred annuities late in life, this study's results suggest investors optimally purchase measurable amounts of GMWBs well before retirement, because of the product's flexibility and access to the stock market. This finding is consistent with empirical evidence of the growth in variable annuity demand over time.

## GMWB access raises consumption in retirement

The researches also analyzed how GMWB access affects policyholders' optimal lifetime consumption by computing people's average annual consumption with and without access to a GMWB. Before retirement, consumption differences appear to be small. In retirement, however, people with GMWBs benefit from a guaranteed lifelong income stream. Thus, until around age 80, they can afford to consume annually some \$1,000 (3%) more than their counterparts who lack GMWBs. Later in the lifecycle, the differences in annual income and associated consumption are even larger.

## For more information

To learn more about converting savings to income in retirement, go to [tiaainstitute.org](http://tiaainstitute.org) > Research > Lifetime Income and Retirement Security



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