# Variable Annuity Hedging

## EFFECT ON THE VALUE OF A COMPANY

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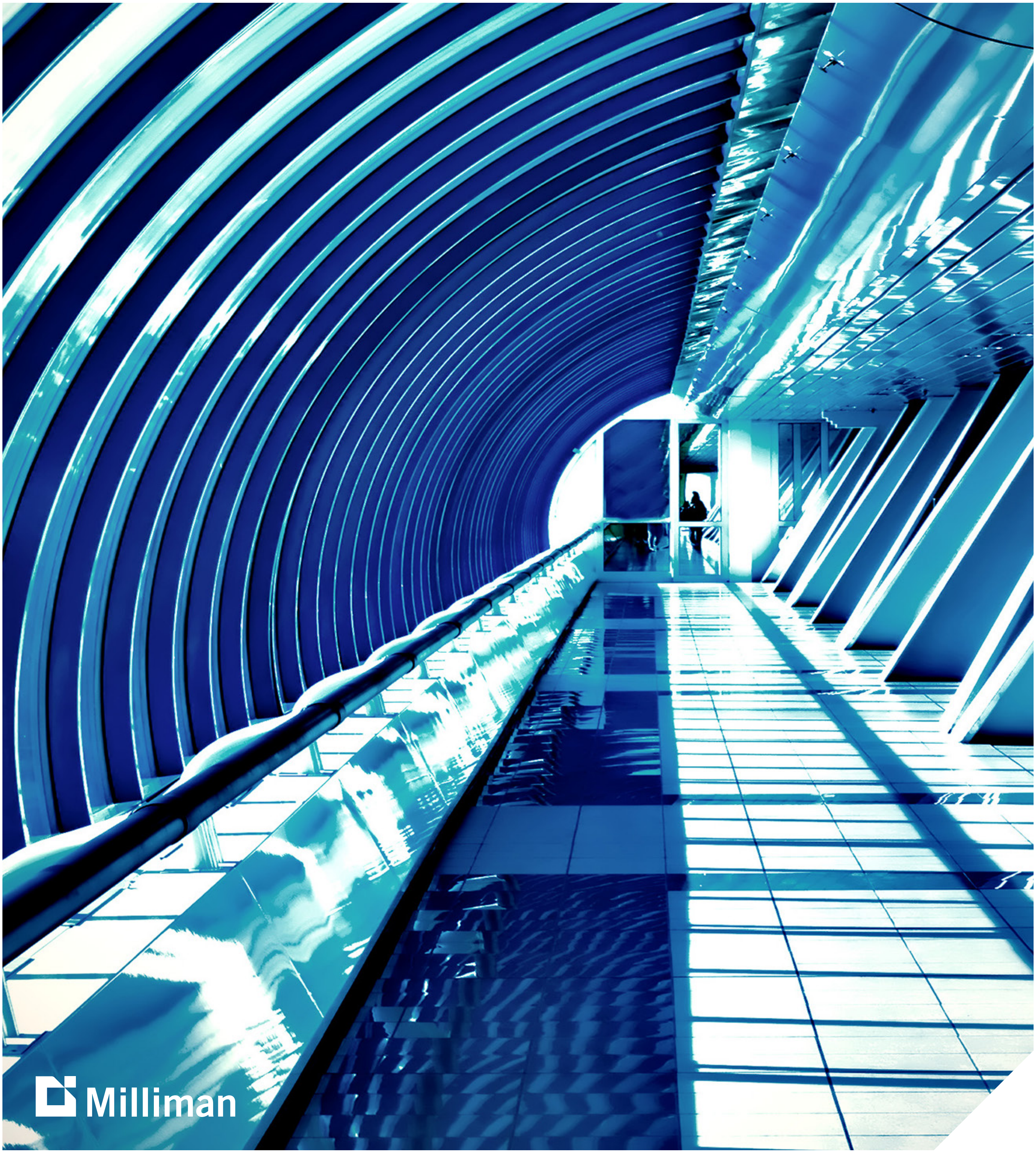

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## BACKGROUND

Life insurers' P/E[1] ratios have historically been significantly lower than the average S&P P/E of 15.7.[2] Variable annuity writers, in particular, have experienced high betas[3] and have typically traded below their book values in recent years. The average beta and P/E ratio of some of the largest VA writers is 1.5 and 8, respectively.[4]

Variable annuity guarantees are generally perceived by market participants (and rightly so) as extremely risky products with significant market exposure. While companies have had tremendous success in managing this risk primarily via hedging, market participants have not fully appreciated the value of such risk management techniques. Decreased confidence in VA writers leads to excessive trading and volatility, which translates into high betas and low P/E ratios.

This article attempts to illustrate, through an example, that hedging VA guarantees can smooth company earnings. Even though the majority of VA writers have implemented hedge programs to manage the market risk, P/E ratios continue to be low.

## VALUATION

The value of a VA writer can, quite simply, be broken down into the following components:

**Value = Fees – Expenses – Guarantee**, where:

- Fees is a percentage of the account value, and hence, mimics a total return swap
- Expenses are fixed (administrative/maintenance/marketing)
- The guarantee is a floor against market movements, and thus, mimics a put option the company sells to the policyholder

The guarantee in the above equation results in the most fluctuation in the value of a company. If this guarantee if fully hedged, then volatility is considerably reduced, and the value of the company becomes:

**Value = Fees – Expenses – Hedge Cost**

In practice, it is difficult – if not impossible – to fully hedge the guarantee. Even then, earnings can be substantially stabilized through hedging.

## ILLUSTRATION

We simulated the earnings of a hypothetical variable and fixed annuity block of business (Company XYZ) using historical (30 year) S&P 500 and US aggregate bond returns. Below is the data and assumptions we used to value this block:

- Variable Annuity (VA) and Fixed Annuity (FA) allocation is 50%/50%
- Fixed Annuity:
  - The company earns a fixed spread (similar to buying and selling a bond)
- Variable Annuity:
  - Guaranteed Minimum Withdrawal Benefit (GMWB) 5% partial withdrawals
  - Policyholder invests AV in a fund that is 75% S&P and 25% Bond
  - Annual ratchets
  - 2% rider charge
  - 3% M&E
  - Fixed expenses of $100

## RESULTS

With no hedging, the hypothetical company's return on earnings are about 35% <u>more</u> volatile than the S&P 500 index returns. With hedging (assuming 85% hedge efficiency[5]), the company's return on earnings are about 10% <u>less</u> volatile than the S&P 500 index returns.

[1] The price-to-earnings ratio (or P/E ratio) measures the current share price of the company relative to its net income per share

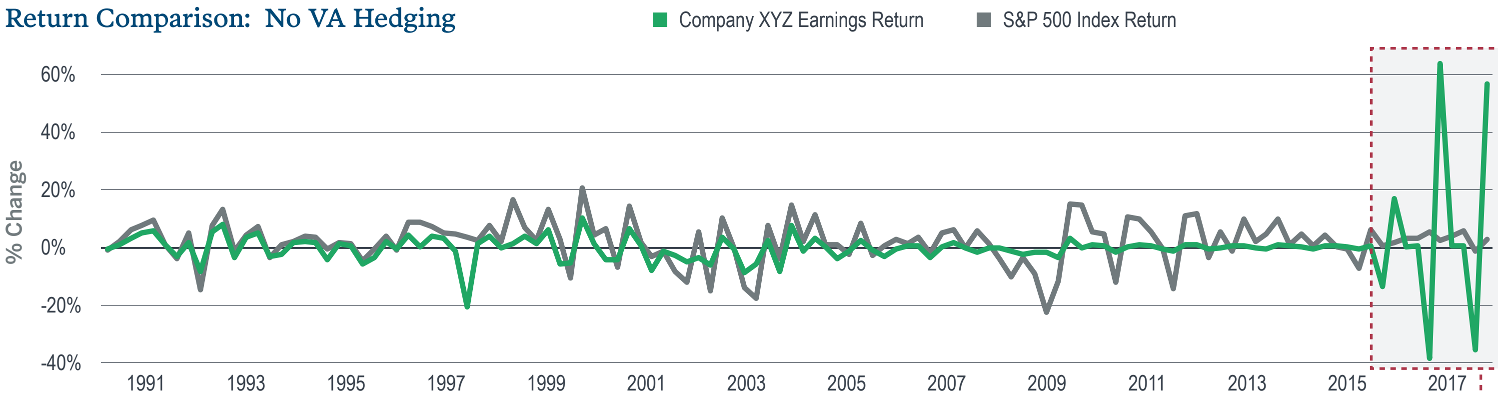
[2] Source: http://www.multpl.com/

[3] Beta of a company measures the volatility of its share price relative to the market as a whole.

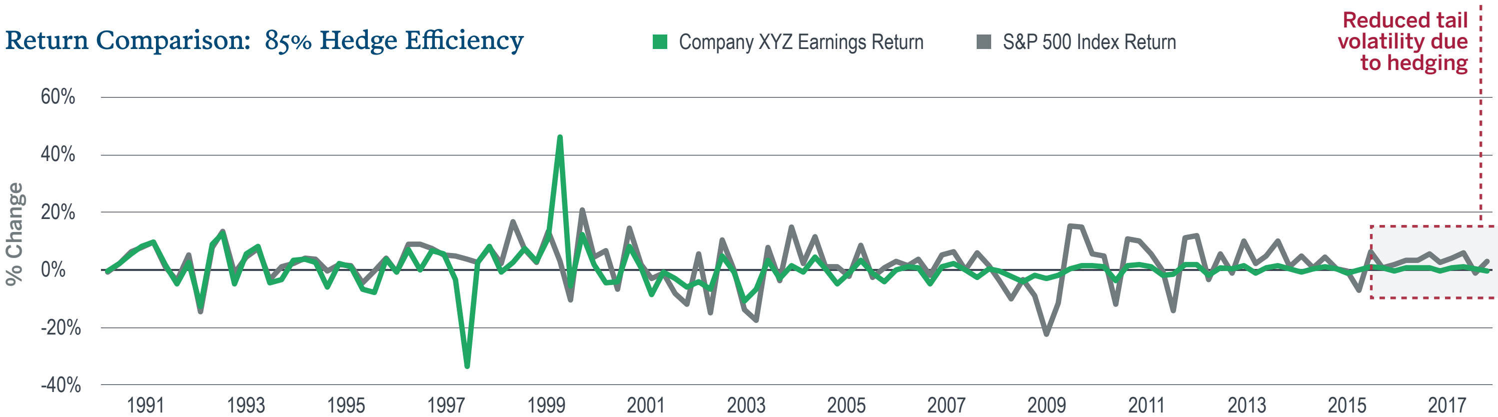
[4] Source: Yahoo! Finance

[5] Hedge efficiency refers to how effective the hedge is. A hedge efficiency of 85% indicates that underlying hedge assets are able to offset 85% of the change in value of the claims and fees related to the GMWB rider.

## Return Comparison: No VA Hedging




## Return Comparison: 85% Hedge Efficiency




RESULTS BASED ON SIMULATED OR HYPOTHETICAL PERFORMANCE RESULTS HAVE CERTAIN INHERENT LIMITATIONS. UNLIKE THE RESULTS SHOWN IN AN ACTUAL PERFORMANCE RECORD, THESE RESULTS DO NOT REPRESENT ACTUAL TRADING. ALSO, BECAUSE THESE TRADES HAVE NOT ACTUALLY BEEN EXECUTED, THESE RESULTS MAY HAVE UNDER-OR OVER-COMPENSATED FOR THE IMPACT, IF ANY, OF CERTAIN MARKET FACTORS, SUCH AS LACK OF LIQUIDITY. SIMULATED OR HYPOTHETICAL TRADING PROGRAMS IN GENERAL ARE ALSO SUBJECT TO THE FACT THAT THEY ARE DESIGNED WITH THE BENEFIT OF HINDSIGHT. NO REPRESENTATION IS BEING MADE THAT ANY ACCOUNT WILL OR IS LIKELY TO ACHIEVE PROFITS OR LOSSES SIMILAR TO THESE BEING SHOWN. MILLIMAN DOES NOT MANAGED THE UNDERLYING FUND.

As hedge efficiency decreases, earnings volatility increases. However, even at lower hedge efficiency levels (up to 50%), we noticed that the company's surplus return volatility was lower than the S&P index return volatility.

### CONCLUSION

Although simple, the above analysis depicts a very striking and crucial point: *Hedging variable annuity guarantees can be effective at dropping the volatility of a company's earnings below market.*

Why then does beta continue to be so high? People have a tendency to make illogical and irrational decisions when it comes to investments. Behavioral biases such as overconfidence and herding can produce suboptimal financial outcomes.

Overconfidence is when investors excessively rely on their own judgment. Variable annuities are complex products and difficult to understand, and it is possible for investors to assume they know the ins and outs of VA writers when that may not necessarily be the case. This can lead to overtrading, and increase the volatility of the stock price. Herding occurs when an investor or a group of investors mimic the actions of another group without giving much thought to it. If one group sells (buys), the investor will sell (buy) as well. This can lead to unnecessary trading and hence, volatility.

A high beta results in an increase in the cost of equity, which puts downward pressure on the value of the company since the possibility of earning a return high enough to cover the cost decreases.

The above analysis and reasoning show that VA writers' beta is overstated and P/E is understated. As a result, there is a fundamental need to educate analysts and investors about the benefits of hedging variable annuities.

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