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Antifragile **Product Design**

By Wendy Yu

Financial institutions perform the pivotal role of bringing together people who want to invest and people who need funding. Prior to the financial crisis, some banks brought together providers of short term funding and those who needed long term funding. The resulting bank failures led to new regulatory requirements.[1] These requirements essentially discourage short term investors from making long-term funding commitments. Hence, long-term investors should benefit from more investment opportunities.

What can the life insurance industry do to benefit from these opportunities? Can today's life and savings products provide funding in a way that would enable the industry to make the most of these opportunities? Or do they prevent the industry from capitalizing on the new regulatory requirements?

The first part of this article illustrates why long duration recurring premium products are particularly risky using the concept of fragility. To price recurring premium products[2], we make assumptions about how future premiums would be invested and how much investment income would be generated. Even if these assumptions are correct on average, profits are likely to be lower than expected due to the cycle of de-risking and re-risking.

The second part explores some ideas for antifragile products, which would enable the industry to benefit from the new banking requirements.

How Fragility Complicates Decision Making

As actuaries, we know that no assumption is perfect and that the purpose of setting assumptions is to be good enough on average. This year, mortality may be 1 percent higher than expected, resulting in X million in losses. Next year, mortality may be 2 percent lower than expected, resulting in 2X million in gains. If 1 percent deviation always translates into X million impact (i.e., a linear function), gains and losses will offset over time so that the mortality assumption is good enough on average.

If gain/loss is a nonlinear function, the average is meaningless. In *The Black Swan*, Nassim Taleb gives the following advice: "Don't cross a river if it is four feet deep on average."[3] The gain associated with the one foot deep section (i.e., quick and easy crossing) cannot offset the loss (i.e., drowning) associated with the seven feet deep section.

In his January 2012 Econ Talk, Taleb uses fragility to describe nonlinear exposure to tail events.[4] For the fragile, shocks bring higher harm as their intensity increases (see figure 1) and decisions cannot be made based on averages. For the very fragile, decisions cannot be made based on the 98th percentile result because the 99th percentile result is much worse. For the robust, where exposure to tail events is linear, decisions can be made based on averages, given sufficient patience and capital. For the antifragile, shocks bring more benefits as their intensity increases.

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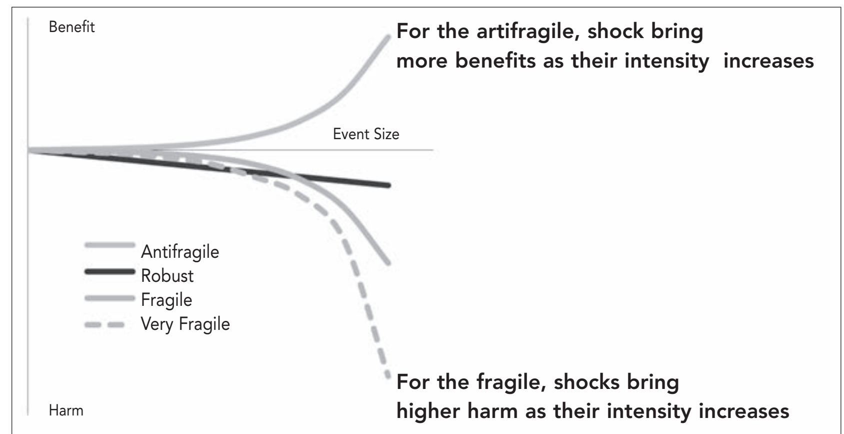

Figure 1: Defining Antifragility

Why Long Duration Recurring Premium Products Are Fragile

Long duration recurring premium products are fragile because of the cycle of de-risking and re-risking.

In higher interest rate environment, guaranteed products are priced attractively and tend to dominate the product mix. In lower interest rate environment, adjust-

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able products are more marketable since they enable policyholders to benefit from rising interest rates. Hence, lower investment income as rates decline is not offset by higher investment income as rates rise (see figure 2). A larger event size (i.e., more dramatic interest rate cycles) would amplify the swing in the product portfolio and exacerbate this nonlinearity.

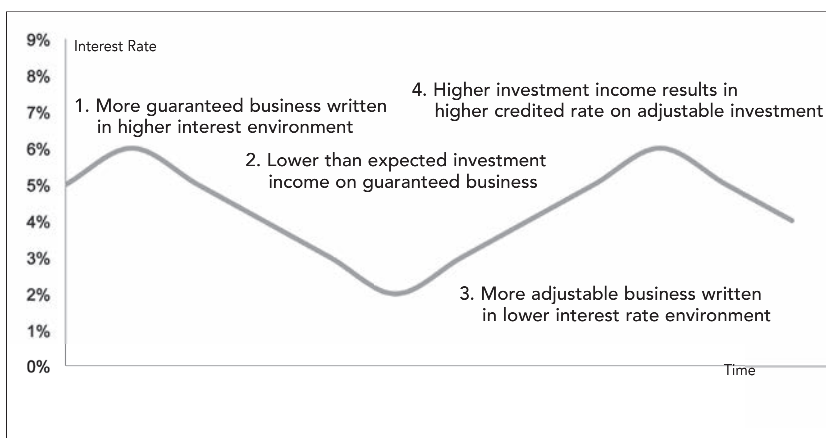


Figure 2: Interest Rates & Product Mix

Certain aspects of today's environment are unique, but the cycle of de-risking and re-risking is a familiar one, as illustrated by this quote from an Oliver Wyman paper5 written almost 10 years ago:

"The late 1990s boom and the following correction were felt most by European life insurers, who benefited from—and then suffered from—their leveraged equity positions and the impact of declining interest rates on guarantee liabilities."

"Unsurprisingly, the management agenda in Europe (as well as in developed Asian markets, who have suffered from declining interest rates that have exposed high guarantees) has for the last four years been overwhelmingly defensive: retrenching back into core markets, de-risking, re-capitalizing and cost-cutting."

If re-risking and de-risking lead to re-capitalizing and retrenching, then the nonlinearity is even greater. Debt or equity may be issued under unfavorable conditions. Market share gained over time through great effort is lost and the ability to pursue new opportunities is constrained.

Yes, it is possible to address interest rate exposure using derivatives, but hedging creates counterparty or liquidity risk. When hedging reinvestment risk associated with single premium long duration products, the risk may be manageable. For example, we can increase the liquidity of the asset holdings to neutralize the liquidity requirements created by the derivatives. For long duration recurring premium products, reserves build up over time so the asset portfolio may not be big enough to absorb the risk. Of course, counterparty and liquidity exposures are also nonlinear[6], so hedging merely transforms one kind of fragility to another.

If long duration recurring premium products are fragile, what product would be antifragile?

Antifragile Competitive Advantage

Some consider the ability to offer long duration interest rate guarantees one of the key competitive advantages of life insurers relative to other financial institutions. I think the ability to sell illiquid products (i.e. products with low cash value) and generate stable funding is a more compelling competitive advantage. Liquidity is likely to become a critical driver of investment return. Investment return is critical to the profitability of inforce business and the competitiveness of new products.

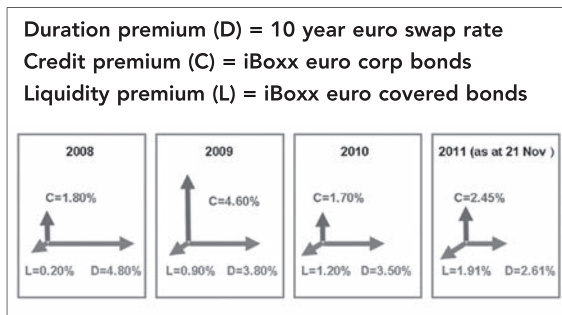
This is not to suggest that selling illiquid products is easy but that, by adding features such as acceleration of payments on disability, life insurers have the capability to create illiquid products that meet individual liquidity needs. As liquidity premium becomes a much more important component of any long-term investment strategy, illiquid products would garner more interest.

In simplistic terms, yield is the sum of duration premium, credit premium and liquidity premium. Duration premium is the yield pickup from investing in assets with longer maturity. Credit premium is the yield pickup from investing in assets with credit exposures. Liquidity premium is the yield pickup from investing in illiquid assets.

According to Philip Turner, Global Head of Strategic Product Development & Marketing at RBS:[7]

"Pre-crisis, liquidity was abundant and the liquidity premium negligible compared to credit premiums (returns linked to asset prices) and duration premiums (returns linked to interest rates). There was, therefore, no particular need for insurers and pension firms to consider liquidity as an investment factor."

"In the teeth of the crisis the premium for a risk-free asset moved up to 200bps, while in 2010 those spreads were around 120bps. They are moving higher as the spectre of Basel III approaches."



The ability to sell illiquid products and generate stable funding is an antifragile competitive advantage since it would enable the industry to benefit from higher liquidity premium in stressed market conditions.

Obviously, product design is heavily influenced by regulation, so it was encouraging to see the launch of the OECD Long Term Investment Project in February 2012. The objective is to identify and promote policy options to support "patient capital," which "allows investors to access illiquidity premia, lowers turnover, encourage less pro-cyclical investment strategies and therefore higher net investment rate of returns and greater financial stability."

Antifragile Value Proposition

Antifragile being a desirable characteristic, is it possible for life insurers to create an antifragile value proposition without taking on nonlinear exposure to tail events? In The Black Swan, Taleb recommends a "barbell" strategy in which investors put 85 percent to 90 percent of their portfolios in extremely safe instruments and the remaining 10 percent to 15 percent in highly speculative bets. This is an antifragile investment strategy for the customer since the downside exposure (10 percent to 15 percent of the portfolio) is much smaller than the upside potential created by the highly speculative bets. Please note that the insurer is not taking on nonlinear exposure to tail events; the downside protection comes from the extremely safe instruments, not a guarantee from the insurer.

> "...the ability to sell illiquid products (i.e., products with low cash value) and generate stable funding is a more compelling competitive advantage."

In many parts of Asia, perhaps because the 85 percent to 90 percent floor gives comfort to more risk adverse investors, this barbell strategy is quite popular. If an asset management firm is known for its ability to pick highly speculative bets, it could also gather the safety-seeking assets by offering combination products where deposits are allocated between a speculative fund and a safe fund. I think life insurers are also uniquely positioned to offer these kinds of products because some highly speculative bets require patient capital, which can only be provided by institutions with stable funding.

Is Antifragile Possible?

Both ideas above would require a single premium product structure. Liquidity premium is volatile and ability to source good speculative bets varies over time, so guaranteeing either would be imprudent. Is it possible to sell a product if pricing and availability change frequently?

Client Demands

A common view is that clients demand long term guarantees on future premium deposits. If priced to reflect the potentially huge costs associated with tail exposures, guarantee charge would have a massive impact on expected return so that these products would only be attractive to a small market segment.

Distribution Needs

Another common view is that advisors need a stable

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product portfolio so that they can provide their financial planning expertise without unnecessary complexities. The reality is that product portfolios have never been stable.

To quote Albert Gibbons and Stephan Leimberg in their 2010 *Estate Planning* article:[8]

"We experienced an earthshaking change in the early 1980s from whole life to universal life with its consequent shift of risk to the policy owner. In the 1990s, there was a further move to equity-based variable universal life. Post-2000 saw no lapse guarantee products take center stage."

"Planners can expect a continuing-to-change landscape. The questions are: 'Is the direction outlined above short-term or long-term?' 'How do professionals navigate these waters on behalf of their clients?'"

To successfully launch an antifragile product, the life insurer would need to work with the advisor to manage client expectations.

Call to Action

Because life insurers operate in an environment where regulatory requirements and client needs are so complex, we cannot know what works until we try. And try again. Here is a call to action. Let us experiment and make our products more robust and perhaps even antifragile. ◻

END NOTES

1. The Liquidity Coverage Ratio and the Net Stable Funding Ratio standard.
2. In this article, recurring premium products refer to those with investment guarantees. Recurring premium products without investment guarantees should not be very sensitive to investment assumptions.
3. *The Black Swan: The Impact of the Highly Improbable* was released in April 2007
4. *Antifragile: How to Live in a World We Don't Understand* was released in December 2012
5. *Going on the Offensive – the $1600BN Prize* originally published in June 2004 by Oliver Wyman
6. For example, an insurer can pay a third party to provide liquidity, but if multiple institutions need liquidity at the same time, the costs may be much higher than expected.
7. *Finding yield: a liquidity trade off* published in June 2011
8. Are No-Lapse Guarantee Life Insurance Products Disappearing? Forever? - Insurance Trends and Topics, ESTATE PLANNING by Albert E. Gibbons and Stephan R. Leimberg