SOCIETY OF ACTUARIES

Article from:

Product Matters!

June 2011 – Issue 80

Market-Consistent Pricing as the Market (Sort of) Normalizes

Separating the permanent from the temporary grayness Part 2 of 2

By Eric Clapprood

Eric Clapprood, FSA, CERA, is senior manager for Deloitte Consulting, LLP. He can be contacted at eclapprood@deloitte.com.

In Part 1, we discussed the following:

- There are gray pixels in the area of market consistency that make insurance products particularly difficult to fair value.
- There will, theoretically, always be a consumer market that outstretches the horizon of the liquid, observable traded market.
- For the next 20 years, it will be impossible for global insurers to avoid conflicts among regulators and between regulators and market consistency.
- As promised this follow-up article will address the issues of short-term volatility, the non-equivalency of traders and, most importantly, how product development is being impacted by market consistency.

Short-term volatility and acute market metrics in the insurance industry

"Sometimes," says one insurance executive, "I wish the market would just stay still for a while so we could figure it out." He quickly adds, "but then, this business would be easy."

Life insurance is a long-term business dealing with the reality of short-term volatility. These two concepts collide at the intersection of procyclicality and mean reversion. When things are going well (stocks are rising moderately, interest rates are moderate to high, credit spread are not so low as to limit yield but not so high as to stall liquidity and give a reflection of market panic, etc.), Economic Capital (EC) is very low for many life and annuity products; yet, after a downturn, after suffering losses (sometimes "accounting" only, e.g., reserves; and other times cash-based), additional capital can be sky-high, reflecting the chance of a "crash after a crash." Two phenomena are occurring. One is the disappearance of liquid markets, credit and transparency. The other is the absorption of capital for its intended purpose, a market tail event, followed by an EC "requirement" that capital be held for another crash on top of the first one, or, in many cases, an unprecedented ignorance of mean reversion by the economy.
Consider what happened in the 2008–09 crisis, for instance, with long-dated guarantees. We'll take a hypothetical 20-year GMAB as an example, because it is simple to price with a Black-Scholes model but generally too long to purchase liquid puts with which to hedge. We'll use simplified modeling and assume that the product is 100 percent invested in the S&P, for the sake of illustration, which would result in a cost for the product higher than that seen in the marketplace otherwise, based on the concentration of risk. We'll assume a 1 percent annual lapse rate, which translates to an ultimate persistency of 82 percent. (We'll avoid dynamic lapses in the modeling, but comment later on their complexity.)

We'll look at a two-year cycle that begins with a period (similar to that of early 2008), experiences a bad year (that lands in a position similar to that of early 2009), and then sees a two-year recovery (ending with conditions similar to those of early 2011). (Note that we are using "similar" conditions but not claiming to have exact measurements of where a firm, for instance, might label 20-year volatility. Actual assumed market levels shown below are similar to those of the time periods mentioned.)

Thus, we assume that, as shown below, the S&P starts at 1,390, crashes by almost 40 percent to 872 and then recovers to 1,304; the 20-year swap rate goes from 4.85 percent down over a point to 3.68 percent and almost fully recovers; and the 20-year vol (estimated by the five- to 10-year vols in the marketplace extrapolated) does a round trip from 25 percent to 40 percent and back again:

Point in Time	SPX	20y Swap	20y Vol
Time 0 (Sale)	1,390	4.85%	25.00%
End of 1st year	872	3.68%	40.00%
End of 3rd year	1,304	4.78%	25.00%

Priced at issue, the fair value of the charge is just about 30 bps. To those familiar with the marketplace, where GMXBs invested less than 100 percent in equities and priced in the 50–80 bp range have been criticized as underpriced, this might seem low for a 100 percent S&P 500 product. This is due to three reasons.

1) Excluding dynamic lapses. The story we will show here is exacerbated when including dynamic lapses, which—whether the assumption is right or not—wreak havoc on the perceived notional of the put the firm is short. The debate around dynamic lapses will continue for quite some time, but can be summarized as that between the camp that says, "it makes no sense to assume that no customers who were otherwise going to lapse will change their mind when the option becomes more valuable," and that which says, "the evidence shows that those making efficient decisions consistent with dynamic lapse formulas are offset by those who, in a downturn, need access to liquidity; and this is supported by the results of the 2008–09 crisis." We won't resolve the dynamic lapse debate here but note two key takeaways. First, more work needs to be done identifying the efficient customers versus the inefficient ones (and this is progressing in the industry to some extent); and, second, it is essential to realize that being conservative regarding a given liability value at a point in time is not necessarily desirable if that position is being hedged: The amount lost due to overly conservative assumptions when the market improves is the same as the amount lost due to overly aggressive assumptions when the market worsens.

2) Ignoring the problems with dynamically hedging the risk. This is a much more complex subject that hedging experts can dedicate day-long sessions to, but the essence here is that if the "risk-neutral claims cost" of a product is X, and it is hard to hedge (that is, it must be hedged dynamically because a perfect offset at issue does not exist) then the expected hedge cost will be greater than X. This is, in simple terms, due to the asymmetry of options.

3) Not taking statutory or economic capital into consideration. While, as we pointed out in Part 1,

statutory (AG43 reserves and C3 Phase II capital) and EC approaches are divergent, they have similar impacts on fair value accounting. Each is based on a subjective shock, and that shock does not become less onerous after a first shock. While considered to be market-consistent, EC is actually a hybrid, as it looks at the change in market-consistent pricing over the course of a real-world, subjective tail event. The EC component of this product is what we'll focus on next.

Let's take a look at the EC requirement of just the liability side of this equation, keeping in mind that this example is illustrative quantitatively of other, more complex and longer-dated life and annuity instruments that either cannot be hedged or can be hedged only with short-term, dynamic programs that easily "fall apart" during a dislocation event like that of the 2008 crisis. For simplistic modeling purposes we'll assume that a 99.5 percent event is represented by a 40 percent equity drop, a 1 percent rate drop and a 10 percent vol rise. In these calculations, we presume an appropriately-priced product at issue that is therefore collecting 30 bps.

For $1 billion of sales, at issue, about $54 million is the level of expected fees at issue and the fair value of the

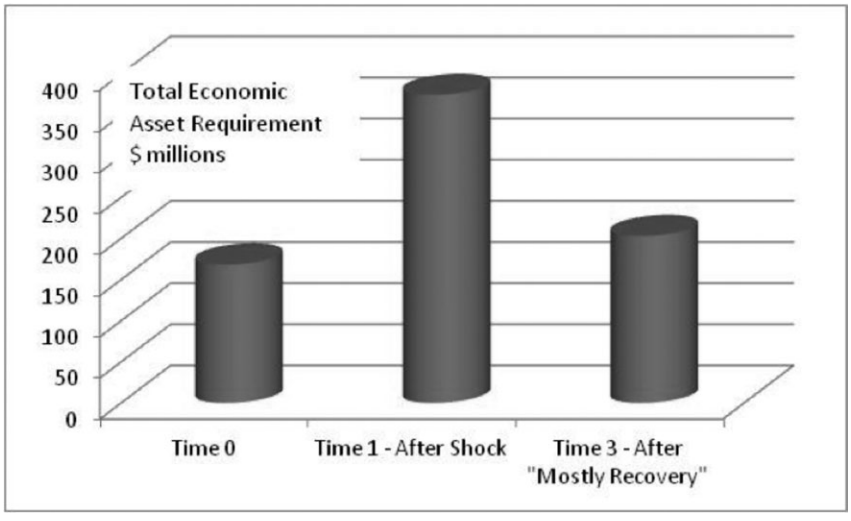
CONTINUED ON **PAGE 18**

liability at issue. On a GAAP SFAS157 basis therefore, these two figures offset and the reserve is zero. On an EC basis, however, about $167 million in capital would be allocated to this product due to the chance that the market crashes.

After the crash indicated a year later, the fair value reserve would be around $201 million, representing a present value of $232 million in liability less $32 million in fees. In other words, this "ate through" the capital allocated to it and then some (an additional $34 million more than the $167 million set aside). This is now the new GAAP and fair value "reserve." Capital, however, assumes the S&P falls from 872 to 523 (another 40 percent drop), the 20-year rate falls to 2.68 percent and the 20-year vol climbs to 50 percent. This results in additional capital of $174 million. Along with the reserve, we now see an asset requirement of $375 million, or almost 38 percent of the account value guaranteed.

To put this in perspective, if priced on a fair-value basis at this time, one year in after the crash, the price would be 190 bps, or over six times the charge being collected.

After two more years—essentially recovery ones—the reserve drops to $25 million (from more than $200 million) and the EC is now $176 million—essentially the same as before the recovery, except that now the total asset requirement is around $201 million instead of $375 million. The fair value cost of this now 17-year option has fallen to 48 bps—still more than 50 percent higher than the initial price, but less than one-third of the cost at the nadir of the crash.



The first question asked here is whether the insurer should have seen corresponding offsets in its asset portfolio. This, however, presumes that "perfect" or near-perfect assets are available. Certainly in some cases, the decision to avoid assets that match is that of a risk-seeker. In other cases the assets are non-existent. The gray area is where assets may exist if generated—meaning, bankers produce market-based offsets that are illiquid and expensive—but are produced for this product only. In the case of our example, the 20-year put is illiquid and would be created for this sole purpose, thereby requiring a high bid-ask spread. In the case of GMXBs and UL guarantees reaching into 40- to 50-year horizons and longer, there are limited hedge instruments available to match the liability tenor.

The next question is whether or not the same shocks should be applied after a shock that were applied prior to that shock in order to determine EC, or, more appropriately, Economic Total Assets Required, which includes economic reserves.

Currently, general industry practice would not adjust the shocks in the above case. The arguments for this are: (1) the shocks are based on long-term views and not adjusted constantly for the tactical position of the markets at any given point; and (2) the guarantee is on the full account value, which after lapses, is about $820 million, and holding $375 million of that amount after such a shock when the future is uncertain is not unreasonable.

The arguments for incorporating mean reversion into the shock are: (1) there is reasoning behind the idea that after a 40 percent down shock, there is less chance that there will be another 40 percent shock on top of that (than there was that the original shock would occur); and (2) in the example above, which is very similar to the 2008–11 cycle and others, insolvency would have

occurred at the nadir, while riding it out alternatively allows for the firm to survive and, perhaps, better serve policyholders.

The above debate is being played out in the Solvency II and other landscapes (such as the NAIC's Solvency Modernization Initiative), but within a given firm's product development area, the key question needs to be answered internally. What strategy is being employed from a risk management standpoint? If the product is not going to be fully hedged (perhaps because such an option is not available; or perhaps because it is cost-prohibitive), what capital will be held? After a shock of the magnitude seen in 2008–09, is the intent to remain solvent, and, if so, by what standard?

The non-equivalence of traders

The second large challenge posed by market-consistent pricing on this backdrop is the lack of equivalence among traders. With liquid instruments like S&P 500 shares and t-bills, transparency is easy, although even with the most liquid of all bonds, the matching of assets to liabilities in a hold-to-maturity fashion will create different views of a given security.

As with the volatility issue above, this too has both regulatory and economic components. From a reporting standpoint, there is sometimes a need to value instruments with imagination—that is, in a world where transactions would occur, as opposed to the real world where those transactions are not occurring. By definition, such an assumption requires mentally changing something about the world, and the change one decides to make to the world to force a market price can determine what that price ends up being. As a product development actuary, understanding when this will occur and how it will be handled is important. Further, this mental exercise forces key questions, such as what potential risk management solutions (e.g., transfer) might be available and why there is an illiquid market. It is not always a bad thing, for instance, to have no benchmark: It may be the hallmark of innovation.

When encountering a true "black hole" of transparency and observable market reads, the product development actuary next should:

1. Decompose the product into its components, those that are observable and those that are not.
2. Price the components that are observable.
3. For those that are not observable, "map" them to "nearest observable" component parts and estimate the difference in price to the nearest analog.
4. Determine the "whole" value inclusive of diversification and interaction within the components.

Complexity of Risk

Transparency of Risk:	Insensitive to Entity's Other Risk	Sensitive to Entity's Other Risks
Observable	market determines price	While the market determines price, different firms will see this as more or less attactive
Unobservable	Different firms should produce relatively similar results	Due to differences of approch, firms may produce relatively different results

This process—the last two steps in particular—can lead to different results for different participants due to risk profiles, strategies, synergies, efficiencies and diversification with other components of the business. It is the combination of unobservable components and sensitivity to writer issues that leads to the most subjective valuation and pricing. In other words, if we return to our 20-year volatility example above, while we know this level is generally not observable, we also know that we can plot out vol in an observable space shorter in tenor than 20 years and have a decent framework for extrapolation. With the volatility of mortality, however, there is much less concrete in the platform from which we can jump off.

How product development is being impacted by market consistency

Post-crisis tackling of market consistency by life insurance product development can be thought of as focusing on two ever-changing and all-important drivers:

CONTINUED ON **PAGE 20**

economics and regulation. To paraphrase our executive friend noted above, if the world's economic conditions could just stop changing, it would be a lot easier for us to price, project and report. On the regulation front, what must be understood is that the complexities of world markets and how they impact financial products are still being embedded into hundreds of governments across the world, and our examples above—how to view the chance of a crash after a crash, and how to report on the market value of an instrument whose only transaction is conducted by the market participant itself.

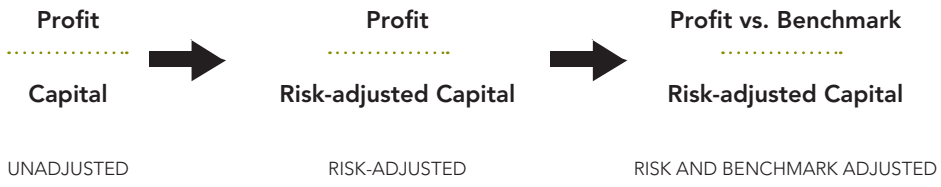
The keys to success are:

1. ***Establishing a product pricing strategy for adding shareholder value that reflects the firm's risk/reward philosophy.*** Derivatives are priced on a risk-neutral basis, which is a lens (a market-consistent one) all products should be viewed through—but not the only lens. Hedging all risk away would result in avoiding any returns in excess of risk-free returns. Similarly, in lieu of hedging, capital is held to cover risk: Holding capital to the extent that it is equivalent to hedging the risk fully means holding so much capital that the return should theoretically not exceed risk-free levels. However, supplying shareholders with ROEs in excess of risk-free rates requires not hedging all of that risk away and not holding so much capital that the same profile as treasuries is returned. Striking that balance and assessing whether a clear relationship between ROE guidance, ownership of capital within the product line and the appropriate pricing metrics is essential.

2. ***Assuring that risk, capital and profit reporting are appropriately designed, funded and operational.*** Here we include "projections" as part of reporting. Managers need the appropriate data and analysis with which to make decisions. The more complex the product, the more care must be put into planning the reporting, which can become exponentially complex and cause corresponding increases in the challenges of technology and people.

3. ***Aligning incentives of management with the firm's objectives (as stated to stakeholders) and policies.*** What objectives exist for new product and in-force product performance, and how do they vary across economic conditions and regulatory regimes? Two dimensions of performance measurement are crucial. One is risk adjusting. If product family A returns greater than product family B, was that because it took greater risk? If so, either a risk-adjusted capital base needs to be implemented such that the denominator of the return metric reflects risk appropriately; or—less likely—it needs to be recognized that product development and management is being incentivized to take greater and greater risks.

How did the product perform?



The second is benchmarking. If risk capital is appropriately determined at the start of a given fiscal year (such that the above risk-incentivizing problem does not occur), and an equity-based product thrives because the markets soared, is that "credit" given to the business unit managing that product? If so, a benchmarking incentive process is likely desired to replace this. For broad-based indices, unless the firm specifically chooses to "double down" on an economic bet, product management is best rewarded when compared to a benchmark, not when market forces happen to deliver a positive scenario.

Once all three of the above have been achieved, two key triangles can be connected. One assures that the capital policy (how capital is invested, including products approved), management incentives and reporting (which allows management the tools to make smart decisions with) are aligned; and the other assures that product design, risk management and capital are connected, such that if one changes, one or two of the others respond in kind.

4. ***Finally, ensure that the firm is strategically positioned to dynamically address regulatory and economic change.*** Establishing a framework for capital and risk management, product strategy, reporting and incentives is a necessary but insufficient step to assure a complex financial institution is prepared for change.

We showed above that a shock to the market that absorbs most of the capital that was intended to protect from such a shock is followed by the question, what capital is required for further shocks? Said differently, what is the plan for remaining solvent? Given that the definition of solvency is dependent not only on an internal view but on that of regulators, answering these key questions required preparation and war gaming on two dimensions: the economic one and the regulatory one.

Insurers today deal with multiple balance sheets: GAAP, IFRS, Tax, MCEV, Solvency II and potentially more than one statutory regime. The ability to explain how an underlying economic strategy translates through multiple regulatory filters has become paramount. For example, when translating an accounting basis' return for a given product to the firm's own view, there may be six starting points but one end point; all six income statements make adjustments to the numerator (profit versus benchmark) and denominator (a risk-adjusted capital metric). Making these adjustments allows for a definition of difference in bases as well as provides the qualitative narrative executives need to speak to analysts, agencies, regulators and investors.

IFRS, Solvency II, the NAIC's Solvency Modernization Initiative (SMI), the Dodd-Frank bill, health care reform and the Foreign Account Tax Compliance Act (FATCA) are just the start of what will be a decade of regulatory change impacting insurers. Instead of addressing regulatory change piecemeal or in a wait-

CONTINUED ON **PAGE 22**

and-see fashion, insurers today are well-advised to establish a dynamic strategy that is prepared for a decade of regulatory change ahead, no matter what the economic dimension brings. Multiple tools and methodologies are available for this purpose, but a general approach will take the above three principles and assure that success is achieved in each key functional area as shown below. The paragon of success is shown for each. ◻

Paragons of Success for a Dynamic Regulatory & Economic Strategy

Component		Product & Marketing Structure	Capital & Risk Management Strategy	Technology & Operations Solution
1 Value & Growth	Pricing strategy for adding shareholder value consistent with the firm's risk/reward philosophy	***Growth plans*** based on distribution, product value and customer relations with specific pricing strategies	***Projection of capital use and contribution*** from in-force and new business, inclusive of risk management plans	Well-defined and understood process for ***setting assumptions, assessing scenarios and running analysis*** on systems
2 Reporting & Projections	Assuring that risk, profit and capital reporting are appropriately designed, funded and operational	***Profitability guidelines*** for in-force and new business, including scenario analysis, sales targets and limits and in-force management tracking plans	***Capital allocation impact assessment and tracking*** consistent across product and project approval processes	***P&L projection capabilities*** for in-force and new business consistent with profitability and capital allocation policies
3 Incentives & Governance	Aligning the incentives of management with the firm's stated objectives and policies	Ownership of product capital-strain decisions connected to ROE guidance	***Risk-adjusted and benchmark-adjusted*** performance management for products and projects	***Clear responsibility for translation of firm's internal economic view to each accounting basis***