SOCIETY OF ACTUARIES Product Development Section

Product Matters!

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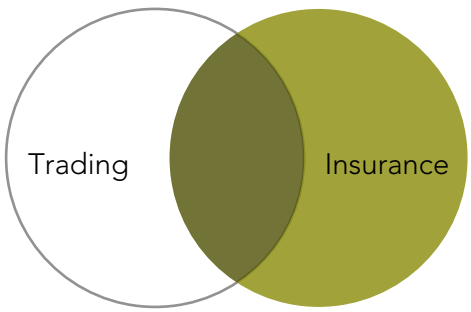
Market-Consistent Pricing
As the Market (Sort of) Normalizes
Separating the permanent from the temporary grayness
Part 1 of 2

By Eric Clapprood and Mitch Katcher

The influence of market-consistent pricing proponents was growing with perhaps more momentum than ever in 2008, when the bottom suddenly fell out of the financial infrastructure of the U.S. and global economy. "*The resulting freeze in credit markets and lack of transactions in previously liquid instruments showed that just when the 'tail' we all feared emerged, the data became unavailable to calibrate to, rendering market consistency meaningless."*

Wait—hold on. "*Actually, those who had transacted prior to the crash and covered or transferred risk off their balance sheets embodied the principles of market consistency with those very transactions, and the benefits of those decisions clearly show that market consistency is the only way to price."*

No—just a minute. *"Now that we've seen this crisis play out for a year-and-a-half, we know that there were incredibly volatile and irrational moments during that time that should not have been reflected in valuations because they were simply not credible, demonstrating the flaws of market consistency for a solvent insurer whose view is long-term, not day-to-day."*



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Articles Needed for the Next Issue of *Product Matters!*

While all articles are welcome, we would especially like to receive articles on topics that would be of interest to Product Development Section members based outside of the United States.

Please e-mail your articles to Christie Goodrich or Paul Fedchak by 11/19/2010.

Chairperson's Corner: **Election Time**

By John Currier

We've recently completed our Society of Actuaries elections and are about to unveil our new President-Elect, board members, and section council members. For those of you involved as candidates, please accept my heartfelt thanks for your willingness to volunteer to advance our profession. For those of you who participated in the balloting, I offer my thanks as well for taking the time to engage in an important process.

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Of course, there are a few other elections going on. In the United States, it is that time of year when our televisions are filled with those who hope to represent us on the school board, town council, state government, the hallowed halls of congress and seemingly every possible other representative body. With pivotal mid-term elections just weeks away, voters are about to determine the next two years of legislative policy (or if you happened to be in an early primary/caucus state it may seem that the presidential election is as imminent). The choices can be overwhelming, the differences in candidates are sometimes difficult to determine, and many folks just don't feel like they have the knowledge to make the right choice. Some will choose not to participate, others will act on the advice of those they know and trust, some will choose based on who they find personally appealing, and others still will invest a significant amount of energy to understand all they can about each and every choice before they enter the polling place. After all is said and done, those who voted will have narrowed the cast down to the select few who will have the responsibility to represent us and (hopefully) a set of promises they intend to keep.

In many ways our job in product development is like running a campaign.

When we build a candidate (product), we first start with our "party platform"—be it life, health, longevity, disability income, or others type. We need to understand what promises (guarantees) we are planning to make and which of those we can afford to make—through diligent study and analysis, of course. We then may conduct some polling to determine how our "candidate" is going to resonate with the voters (agents, customers and our risk committees among others). We may conduct some qualitative polling and we usually work off some rigorous "polling" data compiled by experience studies, policyholder behavior research, empirical testing, and stochastic models.

Like all good candidates, we must balance the potential competing needs of the voters we serve—some will care most about the "price," others care most about the long-term value created in terms of peace of mind, some may be most concerned with profit potential, and others are most concerned with tail risks. All of their views are valid and the best candidate will be one who can balance meeting all of their needs in a way where everyone feels like their voice was heard and considered.

Finally, we put our candidate out on the campaign trail—we launch our products and best position our value proposition so that it appeals to the voters. This is where our customers vote every day. Just like voters in an election, some vote on diligent research, some on charisma, some on advice, and some choose to abstain from the process. No matter how they made (or didn't make) the decision to be a part of our constituency, we need to make sure our candidate is serving them as best we can.

We also need to poll constantly (monitor experience) and adjust what we can based on that data or at least use that to inform the candidate we put up for the next election. In the end, remember that what we do serves our customers, that we make promises we have to keep, and our job in product development is to make sure that we have taken enough care in making those promises that we leave something viable for the long term.

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Maybe the analogy is a stretch and maybe I was just thinking about it out of candidate advertising fatigue, but I think there are some lessons that resonate. What we do matters (Product Matters! after all) and there are a lot of voters out there counting on us to deliver the goods!

We have another opportunity to vote—or let your voice be heard at least. We want you to let us know how you feel about the Section, the content, what we can do better, what we should stop or start, or just engage in some meaningful dialogue about a topic presented here or at a meeting. We are adding a "letters to the editor" section and encourage you to participate. We want to know how to better serve you!

I look forward to seeing you at the annual meeting and seeing the results of one of your recent votes—our new society leadership. I'm sure you chose great new council members (you couldn't have gone wrong with anyone on our slate) who will be helping shape our policy for the next three years.

-John

A Letter to the Readers of the Product Matters! Newsletter:

We want to hear from you! Starting in the February 2011 issue of the Product Matters! newsletter, we are incorporating a new "Letters to the Editor" section. This is your chance to comment on articles you have read, make suggestions for future articles, or provide feedback on items that you like or could use improvement in the newsletter. It is our main goal to make this a useful source of information for the members of the Product Development Section. We value your input and we hope to hear from you soon.

Your editors,

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This is the debate occurring in that gray area where the black insurance industry circle overlaps with the white market consistency circle. Indeed, those colors are precisely how some market purists would describe the convergence of insurance and trading (after all, there is no market without trades): Trading is clear and transparent while insurance is a black box.

GrayPixels

The gray area where insurance and trading are overlapping consists of many pixels, but unlike those in your flat-screen T.V., not all pixels are the same size here. The larger ones are:

- Long-dated (and other obscure) measurements
- Regulatory requirements and accounting differences
- Short-term volatility
- The non-equivalency of traders

Some of the above pixels will clarify over the next two to five years, as market-consistent pricing "technology" rolls out its new T.V.s, but others will likely remain perpetual challenges: in the end, many insurance products' market-consistent pictures will always be an artist's rendering.

Long-dated (and other obscure) measurements

Principle: *There will always be an area of the consumer market that exceeds the horizon of the traded market.*

VA Guarantees: The neo-classic market-insurance hybrid product class is that of the Variable Annuity (VA) riders, the GMXBs that guarantee a payout despite the performance of underlying (mostly) equity-based separate accounts. Consider the attempts by regulators to appropriately value these instruments. One needs to look no further than the United States to find that conclusions drawn and implemented after years of debate by industry experts, all focused on complex, stochastic-calculations-based answers, end up in completely different territories. The NAIC's answer to the challenge was C3 Phase II capital, followed by AG43 (VACARVM) reserving, both of which (in simplistic terms, ignoring the Standard Scenario) set "tail of real-world distributions" as the definition of valuation. Fairly simultaneously, the FASB came to an entirely different conclusion under FASB's *Accounting Standards Codification,* Topic 815, Derivatives and Hedging(formerly SFAS 133) and then *FASB's Accounting Standards Codification* Topic 820 - Fair Value Measurements and Disclosures (formerly SFAS157): fair value, which uses the "average of a risk-neutral distribution" to send pictures out to investors and the public in general. (The risk-neutral approach is called such because the investor theoretically is only concerned about the average of the distribution, not the tail. While this is not generally reality—investors are considered to be risk averse—the model simplification employed includes adjusting the implied vol input to reflect the appropriate price.) Suffice it to say that the two U.S. approaches are very different, and that the reason for this, more than any other, is the obscurity of long-dated and other measurements and their interpretation within two different constructs: exit price and current capital levels.

The obscurity occurs on both the insurance and the market sides of the hybrid product. On the insurance side is the often-subjective prediction of policyholder behavior, which itself needs to be divided into two categories: an approximation of randomness and an approximation of efficiency. From a randomness standpoint, the VA riders contain some of the same risks that have always driven insurers' products, like mortality and lapsation. From an efficiency standpoint, actual use of the rider (withdrawals) the policy owner is paying for is one of the most sensitive pricing components product actuaries need to tackle. At the center of the market consistency/behavior debate is the issue of efficiency of the option holder. While some argue the option holder is always efficient in an options world, the reality is that if a block of business can be sold with certain inefficiency expectations (e.g., lapses and less than full utilization) then that is, in fact, the market, which is a result of an option being attached to an insurance host contract. Certainly there is evidence to show that in an economic downturn some policyholders will lose their jobs and need to access funds to the extent of a full lapse of a VA contract that was in the money. This policyholder did not look to maximize a Black-Scholes formula, but simply needed to pay the mortgage, and he helped define the market.

On the market side, those who have run hedging programs or dealt in any way with the valuation of long-

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dated guarantees will relate to the image of a field scout looking through binoculars at the horizon, having a less and less clear read on implied volatility (vol), until such time that it is clear that there is no line of sight to certain points down the road. What is less often discussed is something so close that the field scout is actually standing in it: the correlation assumptions, beginning not 30 years from now, but today. Such correlations aren't found in newspapers or on Bloomberg screens as easily, but can be traded. One can choose to enter a trade such that you are paid if the rate and equity correlations in the future are higher than X, and you pay the bank if the correlations are lower than X—similar to a futures trade. The level of X is arguably where the market sees correlation in the future. Generally, a higher correlation of rates and equities is bad for the embedded guarantees, and the implied correlation of these trades has been at or above 30 percent for some time. What happens if an insurer is using a model calibrated to historic performance that results in a negative correlation? The set of questions that need to be addressed are similar to those of the long-dated volatility issue.

UL Guarantees: The obscurity issue is not limited to VA measurements. With Universal Life (UL) secondary guarantee products, insurers need a view on where rates will be as far out as 50 or more years in the future, which extends beyond the liquid markets' view. The products will assure that despite poor investment returns, contracts with certain minimum premium payments will stay in force. There's a risk that if rates quickly rise at a certain point, bond (fair value) prices collapse, and there's a risk that long-term rates are too *low* to support required investment returns. What seems simple at first becomes quite a complex series of interest rate puts and calls.

Therefore, in addition to a view on expected rates beyond the typical horizon of the market's binoculars (30-year bond issues and 40 years of increasingly-illiquid futures trading), and perhaps more importantly, is a required view on the volatility of those rates.

For the last several years, insurers have been (mostly) quietly experimenting with what fair value would look like on these long-term rate options. A typical approach to a stochastic rate generator is a two-factor Hull-White model that calibrates to market prices. One need not understand the specifics of such calibration to appreciate the phenomenon that has bothered life actuaries but been overshadowed by the VA challenge. (Be there no doubt that the overshadowing is largely due to the mark-to-market of VA riders under GAAP and a lack thereof for life insurance rate guarantees.) In particular, when one calibrates the major variables of a stochastic rate generator (the volatility and mean reversion factors) to observable rate options (typically five- to 10-year swaptions) and runs a model 40 to 50 years or longer, the rate set will be very high. *Average* rates after several decades will look more like *historically high* rates.

This is because the mean reversion needed to counter the high volatility of rates becomes stronger and stronger as the projection period increases. Part of the reason for this is that while rates are "allowed" to go negative there remains a sensible and economically-explainable bias toward positive rates, skewing returns more in the upward direction than in the downward one, to meet the implied vol requirements associated with traded swaptions.

But the real reason for this is that there is a lack of calibration data on the long end of the curve. If the market were readable for 40-year and 50-year caps and floors, there would be more calibration points that most definitely would revert rates back to "normal." This would not fully solve the problem, though. Using the 40- and 50-year options data (if it existed) would be fine for 40- and 50-year views, but it would then wreak havoc on the shorter end of the curve. The only solution to calibrating to what one thinks 40- and 50-year options might trade for and what five- and 10-year options are trading for is to make the models more complex than they are today—by quite a lot.

In other words, to create market-consistent long-dated rate guarantee pricing one has the challenge of (1) not having enough data for calibration, (2) finding perplexing and completely unreasonable results when calibrating to the data that does exist, and (3) considering the daunting task of increasing the complexity of models exponentially if one day the correct calibration exists.

The temporary grayness here, in our view, relates to a number of methodologies employed by insurers issuing economically similar guarantees, but interpreting the "observable data" differently, often because the data each has available to them is different.

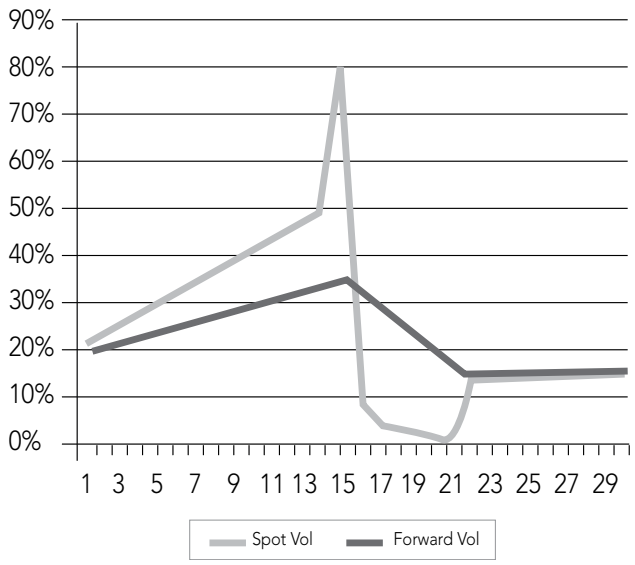
The most visible gnat here is probably implied volatility assumptions for long-dated embedded derivatives. An insurer not trading in long-dated options may not observe long-dated volatility, whereas one making those trades will. In the absence of a liquid, observable market, historic volatility might be used. Some insurers may combine market data with historic returns. A number of questions remain unresolved.

If options are attached to non-tradable host contracts, how does one translate un-attached options of similar construct to the option being valued? One might argue that a pure translation must be made from observable volatility levels for a similar-term option. One might also argue that there is a lack of direct sight into the options market, which is related to, but different from, the "embedded options market."

Some insurers have chosen to use historic volatility throughout the implied volatility curve; others have used market implied volatility as long as 15 years into the projection; and some choose a point between five to 10 years through which market data is used. In all cases that include some use of market implied data, the next question becomes what to do after that data becomes no longer observable. Here there are a finite number of choices: grade to historic volatility; hold the last observed spot or forward vol constant; extrapolate the trend; or develop a method that combines these concepts. A key question underlying this step from what one sees as observable to what one cannot observe is a question of relativity: If, for instance, there is no marketplace for 20-year puts, does that argue for a high vol to be assumed (under the presumption that "envisioning" such a marketplace logically infers the extrapolation of what is usually an upward-sloped vol curve)?

Any downward slope of the spot volatility curve brings with it a precarious interpretation of forward vol. For example, if it is presumed that 10-year spot vol is 25 percent because this is where options are trading, but 20-year spot vol is 15 percent because it is deemed to be valued based on historic market performance, the only way the insurer's model will "get to" 15 percent 20-year spot vol is to use a vol so low in years, 11 to 20 of the model, that it has never been historically observed. Thus, it becomes impossible to model both a realistic 10-year period (years 11 to 20) and a total period over 20 years that it also deemed historically calibrated in aggregate. This is one reason some who avoid use of the market-implied data altogether might argue their interpretation appears more consistent than those who need to make this "grade to historic" decision.

One development that may help remove the grayness is a subset of financial regulatory reform discussions, which centers around derivatives being brought onto exchange platforms. Currently, if one is not active in the options market (on the asset side), it is arguably difficult to call it observable.



The spot volatility curve shown assumes market volatility rising to 35 percent by year 15 and then grades to historic volatility of 15 percent by year 20. This results in a zero forward vol assumption in some cases, raising important questions for insurers who use such a method.

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The permanent grayness is the concept of what will likely be the ever-present (albeit ever-changing) set of risks insurers take on that are not liquid and observable with consistency.

On both the life insurance and annuity side, we have products whose components span the spectrum of clearly-observable market inputs to opaque regions of actuarial estimation. Our principle is that this will always be the case. Imagine all components being market-legible, which would be a requirement for a world where this principle is violated. In such a world, by definition, each piece of the product is traded easily, meaning that the product itself is simply a basket of other traded goods, and the life insurance company is acting merely as broker. This is basically the case with mutual funds, a high-growth area for some U.S. insurers. A non-trivial point we'll return to below is the low ROA and high ROE on those mutual funds, and what it says about insurers' choices in a fully fair-value world, which brings us to the topic of regulatory requirements and accounting differences.

Regulatory Requirements and Accounting Differences

Principle: *For the next 20 years it will be impossible for global insurers to avoid regulatory conflicts with market consistency.*

As we noted above, a major conflict exists in just the United States, between the statutory direction and the FASB direction related to the most glaring intersection of insurance and trading, VA rider guarantees. Were this the result of one framework having recently "modernized" its approach and the other not having done so in several decades, a conclusion could be drawn that a chronological gray fog had temporarily descended upon the city of Pricing. Unfortunately, both the NAIC and FASB very recently (especially in terms relative to regulatory change horizons) concluded on their respective guidance after much debate and analysis. Each pronouncement set (C3 Phase II / VACARVM and FAS133 / FAS157) carried with it that fresh-paint smell that comes with the word "stochastic." Both the Monte Carlo simulation required for FAS157 options replication and the multiple servers needed to project principle-based AG43 reserves seem to be making a quantum leap in valuation.

In the end, though, statutory principles are not market consistent, in large part because they were never intended to be. With a focus on liquidity and capitalization, U.S. stat has a different goal. With regard to embedded guarantees in VAs, for instance, statutory reserve and capital requirements prescribe the use of a scenario set calibrated to historic returns, not the market's view of future returns. Insert at this point a debate, if you choose, over whether or not market implied measures (forward rates or implied vols) have ever "done a good job of predicting" the future. If you make this choice, however, be prepared to realize that such accuracy (markets' "predictions" of the future) is irrelevant. The historic return and vol, respectively, of the S&P 500, are around 11 percent and 15 percent, compared to a risk-neutral set that currently will presume (using a 10-year horizon) less than 4 percent and more than 25 percent respectively. Does this mean that the markets are predicting that stocks return, on average, the same as risk-free investments, and that they will experience a standard deviation on average of 25 percent? No. The markets believe that there is a risk aversion that will on average lead to stocks outpacing bonds' returns. The market believes the distribution of stock returns are—unlike the Black-Scholes assumption—not normal. And there are a half dozen other differences between options pricing formulas' assumptions and what the market truly believes. In the end, though, these are all factored into the implied volatility of the options' price, and the average—not the tail—of a normal distribution of returns is used as the value within Black-Scholes. This is an important concept, because when this average is much worse than the tail of a "real world" stochastic set, it says something fairly bold about the difference between statutory and fair value measurements. The issue, therefore, is not whether the market's implied vol is a good prediction of where vol will be in the future, but the fact that it is what the market would use were it to price the liability at hand.

If an insurer sold a 10-year S&P 500 at-the-money put to a policyholder in today's environment (low rates and high vols), it is quite likely that for a notional amount of the put that would sell for $100 at the same moment "on the street," the insurer could sell it for $90, and see the combination of reserves and required capital (even assuming 100 percent efficiency of the policyholder—we are dealing with a true put, not a VA in this example) consistent with AG43 and C3 Phase II be less than the $90 premium, thus generating an instant profit and potentially infinite ROC. If the company hedged the risk by purchasing an offsetting put, the profit and negative strain disappear. Does the disconnect with market consistency remove an incentive to hedge? Put it this way: If one's only consideration was statutory results, then in this example, it becomes difficult to justify the hedge.

There is an exception to the GMXBs' stat-based hedging incentive, which is the subjective nature of determining the long-term cost of a hedging program. Some insurers have assumed that a hedging program should reduce their statutory reserves and capital, while those who have actually modeled such a program find that reserves worsen, and, quite often, even capital worsens, too, when hedging is layered onto a statutory framework.

The accounting differences become further pronounced when comparing to IFRS, and, again, when comparing capital requirements across various regulatory regimes. Consider the differences between RBC in the United States, SMR in Japan and Solvency II in Europe. The combination of IFRS and Solvency II will lead to an essentially market-consistent income statement and balance sheet for European insurers. However, RBC requirements will remain largely factor-based and result in not only differences of magnitude (i.e., in the case of the impact of an equity drop), but direction as well. If one chooses to hedge the fair value balance sheet for equity guarantees and rates increase while vols fall (both "good things" to the market-consistent metrics), then a hedging program that has worked perfectly will result in an asset loss that offsets the liability gain in US GAAP and IFRS. On the U.S. statutory side of the balance sheet, however, the liability is essentially unchanged, while the asset loss carries over, for a net loss that could be significant.

The lack of market-consistent measurements on GMDBs, some lifetime GMWBs (or their components) and UL guarantees is in no small way responsible for the lack of robust hedging programs addressing those risks (compared to those around period-certain GMWBs and GMABs) according to those who help make these decisions. In addition to benefiting from the relative GAAP smoothness that comes with a lack of mark-to-market on such designs (and avoiding cumbersome, expensive and complex hedging processes), insurers have valid concerns borne out by the recent financial crisis regarding capital measurements. In general, if we had to sum up GAAP versus Stat priorities in the United States for insurers with one rule, it would be, "In good times, think primarily about stable earnings; in bad times, protect the capital."

In other words, insurers can legitimately state that there is not one market-consistent metric when there are multiple markets. One can easily envision a simplified scenario whereby, on a market-consistent basis nothing changes for an insurer (due to a well-run hedging and reinsurance program covering liabilities' worsening during a shock), but on a U.S. RBC basis, things worsen dramatically and result in downgrades and even potential regulatory action.

The above situation didn't occur in 2008. In fact, in some ways the opposite occurred. Market-consistent metrics showed much worse damage in most cases than U.S. stat metrics reflected. Hedging gains due to historic rate plunges and vol jumps flowed into statutory results as a buffer. Going forward, however, the opposite risk is greater: that which is outlined above, whereby hedging market consistent metrics will result in losses due to vols falling and rates rising. Most insurers with hedging programs have spent not an insignificant amount of time envisioning their answers to an analyst's question that is basically, "Why has your capital cushion worsened as the market recovered?"

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The temporary grayness here is, hopefully, the disconnect among accounting principles and capital requirements in the United States, the European Union and Japan. If these three economies' regulators fall in line with each other, much of the rest of the world should follow. In the middle of all of this are the rating agencies, criticized by many post-crisis as being more of a reactionary device than a warning sign. The agencies are in a difficult position, though, regarding taking a view on market consistency versus competing frameworks. If, for instance, an agency believes a fully market-consistent balance sheet is "the way" to go, there remains the risk that local (state) regulators require an action plan or "worse" as a result of traditional RBC ratios falling low (despite no change in a market-consistent balance sheet)—a risk that can't be ignored.

The permanent grayness is probably the inevitable difference of approach among 200 countries. The magnitude of this problem, however, is the least of the "permanent gray" problems we list here, so long as there is an agreement among the Big Three (United States, European Union and Japan).

Up Next: Part 2

In Part 2, we will discuss the phenomenon of short-term volatility; the non-equivalency of traders; and how product development is being impacted by market consistency. □

Serving Up Life Insurance Products **to the Middle Market**

By Winston Hall

For the last few years, an increasing number of life insurers are targeting the middle market. Whether this is an evolutionary stage of life insurance in the United States remains to be seen. Advancements in nontraditional distribution systems are making the possibility of serving this market segment a reality. Regardless of the reasons for targeting the middle market, a life insurer that is developing and distributing life insurance products to the middle market must find ways to overcome the feature that life insurance is usually "sold" rather than "bought." This article will identify the middle market, discuss the attractiveness of the middle market to life insurers, list the characteristics of successful middle market life insurers, and describe two popular middle market life insurance products.

What is the Middle Market?

The statistical characteristics used to identify the middle market are ages 25 to 64 with annual incomes from $35,000 to $125,000. Out of 114 million households in the United States, the middle market is approximately 52 million households. According to survey statistics from LIMRA, 51 percent are not satisfied with their current financial situation and 80 percent feel that they do not currently save enough.[1] However, 82 percent believe that their financial situation will improve over the next five years primarily by reducing debt and/or spending.[2] While 70 percent of middle market households would like to speak with a financial advisor, only 10 percent plan to do so.[3] In addition, 26 percent do not know how to reach their financial goals.[4] These survey results reveal a vast untapped opportunity for middle market insurers. Even more encouraging to potential middle market life insurers are the middle market's views on life insurance. Although the segment assigns higher priority to paying down debt, buying a home, and saving emergency funds, 73 percent believe that life insurance is a necessity.[5] Currently, one-third of middle market households rely on group life to meet their needs and one-third recognize they are underinsured.[6] When faced with a life insurance purchase decision, the middle market consumer will buy what they can afford. Moreover, the middle market consumer gives the highest priority to being able to adjust price by changing coverage and benefits.[7] Although middle market consumers are mostly interested in face-to-face distribution for financial planning products, a majority are comfortable with non-face-to-face distribution for protection products.[8]

Attraction to the Middle Market

Life insurers not currently targeting the middle market have reasons to consider doing so. In fact, life insurance sales are proving to be a bridge to sales of other financial product offerings. For instance, life insurers find that a customer who purchases life insurance is much more likely to purchase additional financial products. In addition, according to LIMRA and consumer advocates, the middle market is underserved and underinsured. Conning Research and Consulting Inc.'s study *Penetrating the Middle Market: Clearing the Distribution Hurdle*, reports that households on average carry enough life insurance to cover 2.8 years of income replacement, while LIMRA recommends enough coverage to replace 7-10 years of income. Current estimates by Conning place the protection gap for all households at $11 trillion and $6.4 trillion for middle market households. Although the middle market represents 46 percent of all households, they represent 58 percent of the protection gap. Each middle market household requires an additional $125,000 in life insurance to close their protection gap. Thus, creating an estimated annual premium potential of $11.4 billion in total for the middle market.

For some insurance companies, middle market product development is also seen as an excellent capital deployment opportunity. Less customer scrutiny and simplified issue underwriting create increased margins, some of which are retained and not passed to the consumer in exchange for increased underwriting and persistency risk. Therefore, by retaining some of the increased margin and barring increased compensation to spur sales, the insurer can earn a higher return on investment. In

FOOTNOTES

1 Retzloff, Cheryl D. "Is There Magic in the Middle Market." News Direct Jan. 2010, Issue No. 61.
2 ibid
3 ibid
4 ibid
5 ibid
6 ibid
7 ibid
8 ibid

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addition, the increased use of Internet technology and nontraditional distribution systems are making it operationally affordable to serve this market. Market surveys show middle market consumers use the Internet to educate themselves on life insurance products. Although the Internet is currently a minimal source of sales it is helping to remove the fear barrier that prevents many middle market consumers from purchasing life insurance. In addition, the Internet is leading an increasing number of prospects to be contacted by an insurance professional. Middle market life insurers have launched interactive Web sites to educate middle market consumers and help them answer the following questions:

What is life insurance?
What obligations do you have?
What is the monetary value of those obligations?
What type of life insurance should you buy?
How much life insurance do you need?

Some insurers that currently serve the middle market are reporting up to half of current sales are a result of these direct distribution channels: mail, Internet, telephone and e-mail.[9] These insurers also report the middle market has massive growth potential. Segmentation of the demographic, proliferation of nontraditional distribution systems, expansion into new markets (banks and financial planning), and deeper penetration into existing markets are all potential sources of growth.[10]

> "Successful middle market life insurers should avoid being all things to all people by segmenting the market and selecting their target."

Reduced Costs + Easy Sale = Key to Success

Profitable middle market life insurers must find ways to reduce the costs of placing new business and maintaining in-force business. For example, the expenses that are generated from selling 10, $100,000 simplified-issue term policies, may exceed the expenses from a single $1,000,000 fully-underwritten term policy. Also, distribution may be reluctant to spend a similar amount of time selling a policy with one-tenth the commission of the larger sale.

Successful middle market life insurers should avoid being all things to all people by segmenting the market and selecting their target. Otherwise, marketing to too many segments is expensive, operationally difficult, and makes it impossible for a company to set itself apart from competitors.[11] Furthermore, the insurer should exploit opportunities that are aligned with their strengths and goals and continuously monitor their targeted markets and their customers' changing needs.

Unsurprisingly, middle market purchasers of life insurance report that their provider was easy to buy from and remains easy to access. Becoming easy to buy from is the result of making significant investment in infrastructure to support the business being sold. Best practices include "quick-issuance" systems that can process simplified issue policies in three to six days and usually provide the buyer with a temporary insurance certificate until processing is completed. Meanwhile, the policy sale should be quick and efficient taking no longer than the time it would take to setup a checking account or purchase a certificate of deposit from a bank.[12] Successful middle market life insurers are also excellent providers of customer service. Best practices include providing 24/7 on-line policy information portals and establishing retail customer service centers. For example, retail customer service centers are normally staffed by two to three persons and tend to be located in retail shopping centers with a significant amount of foot traffic. A retail customer service center can be less expensive than an agency or brokerage office and providers report increased penetration in states with or near customer service centers.[13]

FOOTNOTES

[9] Panko, Ron. "Motivating the middle market: life insurers large and small have begun to crack the code on how to reach middle-income customers." Best's Review. Mar 1, 2008.
[10] DiSylvester, Ben. "Characteristics of Successful Middle Market Companies." New Direct. Jan. 2010, Issue No. 61.
[11] ibid
[12] Panko, Ron. "Motivating the middle market: life insurers large and small have begun to crack the code on how to reach middle-income customers." Best's Review. Mar 1, 2008.
[13] ibid
[14] ibid

Middle Market Product Characteristics

What makes up the perfect middle market life insurance product? Hopefully, this article has already given you a good idea. Middle market consumers are not as "insurance savvy" as the affluent consumer and rarely have third party assistance from financial planners, accountants or attorneys. Therefore, the product must be simple and transparent with regard to its benefits and triggers for those benefits. As discussed earlier, the product should be transaction-based to enable a quick sell. Simplified issue is almost a necessity unless sales volumes are extremely high. Coverage and benefits must be flexible without complicating the product. The middle market consumer is making a budget-based purchase and will want to dial-in coverage and adjust benefits to make it affordable. Features like supplemental coverage, levelized commissions and death benefit pay-out streams are some options that will help make coverage more affordable. A review of a middle market life insurance product should have the following characteristics:

- Simple and transparent,
- Transaction-based,
- Flexible benefits, and
- Affordable.

Sample Middle Market Products

The most prevalent middle market product is affordable 10, 20 or 30-year level term coverage with face amounts that range from $50,000 to $250,000. Coverage is guaranteed renewable up to attained age 75 and almost always guaranteed convertible without requiring medical. Many products surveyed by the author offer living benefits, such as accidental death benefit. The survey also shows that contacting bank or financial services company customers via mail, Internet, or through ads on their respective Web pages are usual direct distribution devices. Normally, underwriting is simplified issue, which results in term rates that are approximately 20 percent higher than fully-underwritten. Rates can be made more affordable by offering the option to have the death benefit paid in an income stream to the beneficiary to some specified attained age. Simple issue entails answering five to 12

questions. Questionnaire results are cross-referenced with an on-line fraud detection service, motor vehicle data and pharmaceutical-benefit aggregation data.[14] The customer is usually provided with a certificate of temporary coverage while the application is processed. Processing time ranges from three to six days. Usually, the provider offers multiple and flexible premium payment methods. First year premium can be made by credit card or electronic funds transfer. For customers contacted via banks or credit card companies, payments can be debited from their existing accounts. Recurring premiums can either be setup for automatic payment, billed or drafted.

Another popular product is no-lapse-guarantee (NLG) universal life. Many offer the ability to adjust premiums while maintaining the NLG by providing these options:

- No-compensation supplemental coverage,
- Adjustable premium payment period from ages 100 to 120, and
- Adjustable policy termination date.

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In addition, levelized commissions can be implemented to offset increased capital requirements and to make guaranteed coverage affordable. Long-term care (LTC) riders may be offered. LTC riders are more attractive to the consumer than stand-alone coverage because they are often cheaper, benefit payments are made directly to the policy owner, and the death benefit eliminates the "use it or lose it" feature. Understanding the NLG methodology has been notoriously complicated and all too often resulted in the policy owner losing the guarantee. To decrease the possibility of losing the guarantee, middle market products offer the following premium monitoring and policy administration processes:

- Backdating premiums,
- Advanced billing,
- Annual statement notifications of guarantee status, and
- Simple catch-up provisions.

Conclusion

With an $11.4 billion annual premium potential, the middle market is a virtually untapped source of new business for life insurers. Advancements in technology are making it affordable to reach out to these prospects en masse. However, tailoring and serving up middle market products is only half of the battle. In conclusion, it is the life insurance industry's responsibility to educate the middle market on the benefits of owning adequate life insurance coverage and to remove the mystique that life insurance is for wealthier people. □

2010 **Life and Annuity Symposium Recap**

By Rob Stone

The Society of Actuaries presented the inaugural Life & Annuity Symposium May 17-18, 2010 at the Tampa Marriott Waterside in Tampa, Fla. This meeting was intended to combine and replace the previously held Spring Meeting and the Product Development Symposium. The SOA wanted to combine the best of each into one event that would meet the needs of attendees and remain relevant amidst a rapidly changing landscape.

Organization of the meeting revolved around four tracks, including a Risk Track, Product Track, Management/Professionalism Track and a Financial Track. The meeting drew 525 attendees, more than the 2009 combined attendance of the replaced meetings. Feedback shows that reaction was very favorable to the new format.

The event actually kicked off on May 16 with a golf outing enjoyed by 16 participants at the Westchase Golf Club. Over the course of the meeting, optional networking opportunities were provided in the form of a hot breakfast sponsored by the Product Development Section and an organized Group Dinner.

Sessions sponsored or jointly sponsored by the Product Development Section included: Update on Indexed Life and Annuity, Combination Product Pricing, VA GLB Risk Management Trends, Longevity Risk/Income Products, Developing Products in a Capital Constrained Environment, Regulatory and Tax Update for Product Actuaries, Life Insurance Protection Products, Risk Management at the Point of Sale, and What ALM and Financial Actuaries Wished Product Actuaries Knew.

Additionally a Measuring Profitability session covered a popular survey on what profit measures are generally being used by companies. Policyholder Behavior: News From the Front, two sessions split into VA-related and non-VA topics, delved into issues companies face in setting and monitoring policyholder behavior assumptions for pricing and in-force management work. A session on Post Level Term Period Experience: Are Your Profit Projections Accurate, shared reinsurer insights and results of SOA-sponsored research on post level term issues.

The section also jointly sponsored two sessions with the American Academy of Actuaries. One session, Beginners Guide to the Illustration Model Regulations and ASOP 24, presented a basic outline of the model regulation, ASOP 24, and the practice notes. This was for people with little experience or who wanted a refresher on the basic requirements of illustration testing. A more advanced session, Current Issues Complying with Illustration Regulations and ASOP 24, was intended for people with experience with the illustration actuary requirements, providing insights on assumption setting, in force testing, and how the practice notes were intended originally.

Also of interest to product development actuaries, the Marketing and Distribution Section sponsored a three-part series of sessions on the Product Development process. These sessions provided insights for current product actuaries as well as a good look "inside the box" for non-product actuaries.

The efforts and insights of all presenters and session organizers were greatly appreciated.

Following the Symposium, the Product Development Section sponsored a full-day seminar on Pricing in 2010 and Beyond. The agenda for this post-seminar focused on updating participants on the status of current principle-based approach initiatives as well as presenting several case studies for life and annuity products.

Overall the meeting was well-received. According to the Society of Actuaries, the average rating of the meeting was four out of a five-point scale. The Section would like to extend its thanks and appreciation for all the volunteers who made this meeting a success. ◻

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A Look at **Older Age Mortality Improvement**

By Jeff Dukes

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Life actuaries have increasingly been making assumptions about future mortality improvement in pricing and earnings forecasts. Today assuming future mortality improvement may be more the norm than the exception. Whether it is wise to make long-term rate guarantees that implicitly assume significant future mortality improvement is a subject for another article.

This article summarizes various historical and projected future rates of mortality improvement, with a focus on older ages, and provides some very high level comments on issues and opinions regarding estimates of future mortality improvement. Much of the discussion here relates to the U.S. population, although I make a few comments on insured life improvement. There are many papers and articles on the subject of historical and future mortality improvement, often of a highly technical nature and almost all of them are focused on population, rather than life insurance, rates of improvement. But an SOA research project on both U.S. and international insured and population mortality improvement is currently underway.

Before presenting any numbers, some general comments are:

1. Tables of population mortality rates for a given calendar year show surprising differences in calculated mortality rates depending on the source. Since calculations of annual rates of population mortality improvement in this article key off mortality rates for different calendar years, differences in those mortality rates can affect the calculated improvement rates.

2. Some experts caution against basing assumptions for future improvement on historical improvement rates observed over a short time interval. The technical panels that provide recommendations to the Social Security Advisory Board (most recently in 2007) suggest something on the order of 50 years to smooth out fluctuations between periods of rapid and slow improvement (or even disimprovement). It is very difficult to take a meaningful look at historical mortality improvement for insured lives over a 50-year time span because of changes in underwriting practices, risk classes and expected bases and because experience studies have only recently been available electronically.

3. There does not appear to be a consensus on future levels of (population) mortality improvement or whether there is a limit on human longevity. Outlier opinions range from assertions that the first person to live to 1,000 is alive today to the view that we may see future disimprovement due to the increasing prevalence of obesity. But my impression is that most experts believe there is room for future improvement.

4. The 2007 Technical Panel Report on Assumptions and Methods for the U.S. Social Security Advisory Board recommended that forecast best estimate (intermediate) average ultimate annual rates of improvement be increased from 0.70 percent to 1.00 percent. They recommended no change in the average low cost (i.e., low rates of mortality improvement) annual improvement assumption and a substantial increase in the high cost average annual improvement assumption (from 1.21 percent to 2.00 percent). Age-specific versions of these recommendations were not provided.

   That report also says (page 36)—emphasis added:

   "Although recent differential trends by sex could plausibly continue for another 10-20 years, ***the Panel recommends that ultimate rates of mortality decline be equal for men and women, derived from trends for the total population***.

   International comparisons can also be helpful as a guide to future mortality trends despite differences in levels. The U.S. differs from other wealthy countries in ways that affect the overall level of mortality (e.g., more inequality, a less extensive social safety net), and the current gap in levels could remain for

"There does not appear to be a consensus on future levels of (population) mortality improvement...most experts believe there is room for improvement."

many years. However, it seems much less likely that the pace of mortality decline will be vastly different over the long term amongst this close-knit group of nations. ***The post-1980 slowdown in mortality reduction for the U.S. was not typical; most high income countries have enjoyed an accelerated mortality decline at older ages during the last two decades****, sometimes starting from lower levels than the U.S. in 1980. These experiences support the Panel's recommendation for a projected recovery from the recent period of slow mortality decline in the U.S.*"

5. Behavioral changes have impacted historical population improvement rates and will impact future observed population improvement rates. Smoking habits are one example of this. But since population mortality tables are not on a smoker/nonsmoker basis, it is not easy to quantify these effects, although there is at least one paper ("Forecasting United States Mortality Using Cohort Smoking Histories," by Haidong Wang and Samuel H. Preston) that attempts to do so for purposes of forecasting future improvement rates:

    - Wang and Preston conclude that there will be a material amount of observed mortality improvement at older attained ages (their analysis focuses on 50 – 84) as cohorts with a history of less smoking move into that age range. For example, in Table 2 of their paper they estimate that the probability of a male surviving from age 50 to age 85 based on forecast mortality rates in 2034 is 0.5775 if the 2034 projected mortality rates reflect changes in smoking histories vs. 0.4714 if changes in smoking histories are not reflected.

    - It seems unlikely to me that much of such "improvement" in population mortality rates would translate into improvement for insured lives issued on a smoker/nonsmoker basis.

    Obesity is another behavioral factor which some experts expect to have a significant (adverse) impact on future mortality rates. For example, the abstract of the paper "Forecasting the Effects of Obesity and Smoking on U.S. Life Expectancy," by Susan T. Stewart, David M. Cutler and Allison B. Rosen (New England Journal of Medicine (NEJM), December 2009) says that, if trends in increasing BMI and declining smoking rates over the past 30 years or so continue, the negative effects of BMI increase will outweigh the positive effects of smoking decline on the life expectancy for a typical 18-year old. Another older paper (March 17, 2005) that also raised concerns about obesity and was also published in the NEJM is "A Potential Decline in Life Expectancy in the United States in the 21st Century" by S. Jay Olshansky, et al. Of course, as with smoking, past trends might not continue and people could change their habits.

6. Since insurance companies underwrite their risks, smoking and obesity effects should be less of a factor when estimating future improvement rates.

    More generally, it seems reasonable to suppose that improvement rates in early policy years might be less than overall population improvement rates since the underwriting process would, theoretically, remove people with, say, cancer or heart disease which should in turn mean that improvements in death rates associated with those sorts of illnesses should have less impact on early duration mortality for underwritten business. The duration of this underwriting effect would probably decrease as issue age increased. However, a statistical analysis of Canadian select and ultimate insured life experience by Siu-Hang Li, Mary Hardy, and Ken Seng Tan ("Report on Mortality Improvement Scales for Canadian Insured Lives"), concluded that they could not find statistical evidence to support different improvement rates during the select period.

7. There are at least two relatively recent papers that analyze the impact of education and socioeconomic class on changes in life expectancy. Both papers appear to conclude that, between roughly 1980 and 2000, people with more education (at least some college) or in a higher socioeconomic class experienced larger gains in life expectancy. The papers (both available on the Internet) are:

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- "Widening Socioeconomic Inequalities in US Life Expectancy, 1980 – 2000," by Gopal K. Singh and Mohammad Siahpush (published May 9, 2006 by Oxford University Press on behalf of the International Epidemiological Assocation); and

- "The Gap Gets Bigger: Changes In Mortality And Life Expectancy By Education, 1981–2000," by Ellen Meara, Seth Richards, and David Cutler (published in 2008 in *Health Affairs, (Millwood)*).

The papers note that this disparity in increase in life expectancies occurred despite significant efforts on the part of the U.S. government to reduce disparities in life expectancy across socioeconomic class, etc.

8. Although I think future mortality improvement is very likely, the theoretical basis for predicting future improvement rates simply based on an analysis of historical improvement rates strikes me as weak since drivers of future improvement will almost certainly differ from the various factors that drove historical improvement. Notwithstanding this concern, an understanding of historical mortality improvement is critical to developing an informed assumption. Much of the remainder of this article will focus on historical improvement rates.

Historical U.S. Population Mortality Improvement Rates

Table 1 shows calculated annual improvement rates for selected older attained ages using mortality rates from tables in the Human Mortality Database (www.mortality.org/). I have noticed that the tables and data in that database were often used by other researchers.

Observations:

1. Over 10-year periods, improvement rates vary considerably by attained age and gender and from period to period.

Table 1
Calculated Annual Rates of Mortality Improvement
For the Indicated Attained Ages and Periods Based on
U.S. Mortality Tables in the Human Mortality Database

Attained Age	1956-1966	1966-1976	1976-1986	1986-1996	1996-2006	1976-2006	1956-2006
Males							
70	(0.7)%	0.9%	1.8%	1.6%	2.7%	2.0%	1.3%
75	(0.1)	0.3	1.8	1.8	1.9	1.8	1.1
80	(0.4)	1.1	0.7	2.0	1.4	1.4	1.0
85	(0.2)	1.3	0.4	0.9	2.1	1.1	0.9
90	(0.2)	1.1	0.4	0.4	3.2	1.3	1.0
95	(0.2)	0.8	0.2	(0.4)	2.6	0.8	0.6
Females							
70	0.7%	1.5%	1.2%	0.8%	1.4%	1.1%	1.1%
75	1.1	1.4	1.7	0.9	1.1	1.2	1.2
80	0.3	2.3	1.1	1.3	0.7	1.0	1.1
85	0.4	2.1	0.9	0.9	1.1	1.0	1.1
90	0.4	1.6	0.9	0.4	1.8	1.0	1.0
95	(0.1)	1.2	0.6	(0.1)	1.4	0.6	0.6

2. Over the 50-year period from 1956 to 2006, improvement has (conservatively) averaged about 1.0 percent for both sexes for attained ages 90 and under and 0.6 percent for attained age 95.

Table 2 is conceptually similar to Table 1, but bases calculated improvement rates on population tables in Actuarial Study No. 120, "Life Tables for the United States Social Security Area 1900 – 2100," by Felicitie C. Bell and Michael L. Miller (August 2005). Improvement rates differ from those in Table 1, even over the 50-year period in the far right column, due to differences in both the mortality rates in the underlying population tables and the periods over which improvement is measured. Table 2.5, on pg 20, uses the same time periods as Table 2, but bases improvement rates on mortality rates from the Human Mortality Database. So, differences between Tables 2 and 2.5 are due solely to differences in the underlying mortality tables.

Table 2
Calculated Annual Rates of Mortality Improvement
For the Indicated Attained Ages and Periods Based on
U.S. Mortality Tables in Actuarial Study No. 120
(by Felicitie C. Bell and Michael L. Miller)

Attained Age	1950-1960	1960-1970	1970-1980	1980-1990	1990-2000	1970-2000	1950-2000
Males							
70	0.1%	0.3%	1.2%	1.7%	1.5%	1.5%	1.0%
75	0.5	0.1	1.0	1.3	1.4	1.3	0.9
80	(0.1)	0.6	1.0	0.9	1.1	1.0	0.7
85	0.2	0.3	0.9	0.7	0.2	0.6	0.5
90	0.3	0.3	0.8	0.4	(0.4)	0.3	0.3
95	0.1	0.5	0.6	0.0	(0.8)	0.0	0.1
Females							
70	1.6%	1.6%	1.3%	0.8%	0.3%	0.8%	1.1%
75	1.7	1.4	1.8	0.8	0.2	0.9	1.2
80	0.5	1.8	2.0	1.0	(0.1)	1.0	1.1
85	0.3	1.5	1.7	1.1	(0.4)	0.8	0.9
90	0.3	1.4	1.2	0.8	(0.7)	0.5	0.6
95	0.3	1.4	0.7	0.4	(1.0)	0.1	0.4

Note: Page 33 of the October 2007 report to the Social Security Advisory Board entitled "2007 Technical Panel Report on Assumptions and Methods" says, "The 1999 and 2003 Panels suggested that unfavorable trends in old-age mortality during the 1980s and 1990s may reflect the delayed effects of increased levels of smoking among women; recent articles offer empirical support for this explanation."

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Table 2.5
Calculated Annual Rates of Mortality Improvement
For the Indicated Attained Ages and Periods Based on
U.S. Mortality Tables in the Human Mortality Database

Attained Age	1950-1960	1960-1970	1970-1980	1980-1990	1990-2000	1970-2000	1950-2000
Males							
70	(0.2)%	0.1%	1.5%	1.9%	1.8%	1.7%	1.0%
75	0.1	0.1	1.5	1.5	1.4	1.5	0.9
80	(0.2)	0.7	0.9	1.1	1.5	1.2	0.8
85	0.4	0.6	0.9	0.9	1.2	1.0	0.8
90	(0.5)	0.7	0.8	0.4	0.3	0.5	0.3
95	0.0	0.6	0.3	0.3	(0.3)	0.1	0.2
Females							
70	1.1%	1.2%	1.8%	0.9%	0.7%	1.2%	1.1%
75	1.1	1.5	2.1	1.1	0.2	1.2	1.2
80	0.2	1.5	1.7	1.4	0.2	1.1	1.0
85	0.6	1.2	1.8	1.1	0.4	1.1	1.0
90	(0.6)	1.1	1.3	1.0	(0.1)	0.7	0.5
95	(0.2)	1.0	0.8	0.5	(0.6)	0.2	0.3

Annual improvement rates over the 50-year period of 1950 to 2000 in the last column of Tables 2 and 2.5 are quite similar, but there are more substantial differences over shorter time intervals. Comparing the 1996 – 2006 column of Table 1 to the 1990 – 2000 column of Table 2.5 suggests that rates of improvement since 2000 have increased substantially, particularly at the very old ages.

Table V.A1 in the 2009 OASDI Trustees Report implies the following annual rates of mortality improvement for attained ages 65 and older, males and females combined, based on the historical age-sex adjusted mortality rates shown in that table:

1950 to 2000: 0.82 percent
1950 to 2005: 0.88 percent
1960 to 2005: 0.96 percent
1970 to 2005: 0.93 percent
1980 to 2005: 0.76 percent
1990 to 2005: 0.64 percent
2000 to 2005: 1.46 percent

The calculated improvement rates in Table 3, on pg. 21, are based on white population mortality rates in tables found on the CDC website. There were different sources for different time periods:

1979 to 1998: www.cdc.gov/nchs/nvss/mortality/hist290.htm
1999 to 2005: www.cdc.gov/nchs/nvss/mortality/gmwk2925.htm
2006: www.cdc.gov/nchs/nvss/mortality/gmwk210r.htm

Finally, Table 4, below, shows implied improvement rates by gender for the 20-year period 1981 to 2001 based on central death rates shown in Table 2 (pgs 20 – 21) of Actuarial Study No. 120 (by Bell and Miller):

These improvement rates are quite different from those for the 20-year period 1986 to 2006 shown in the last column of Table 3.

Forecast U.S. Population Mortality Improvement Rates

There is a great deal of literature related to future (population) mortality improvement. Social Security Bulletin, Vol. 66 No. 1, 2005, "Literature Review of Long-Term Mortality Projections," by Hilary Waldron contains some high level discussion of various forecasts (particularly as they relate to those of the Social Security Administration) and a partial list of relevant papers. Some observations based on a more recent paper, prepared for the MacArthur foundation by S. Jay Olshansky, et al., are discussed after Table 7, on pg. 22.

Table 5, on pg. 22, shows implied forecast average annual mortality improvement rates over various future periods by gender and for selected attained ages based on mortality rates in the projected population tables of Actuarial Study No. 120.

Table 3
Calculated Annual Rates of Mortality Improvement
For the Indicated Attained Ages and Periods Based on
CDC Tables for the White Population

Attained Age Group	1986 to 1991	1991 to 1996	1996 to 2001	2001 to 2006	1986 to 1996	1996 to 2006	1986 to 2006
Males							
65-69	1.8%	1.7%	2.1%	2.5%	1.7%	2.3%	2.0%
70-74	2.5	1.3	1.9	2.7	1.9	2.3	2.1
75-79	2.1	1.4	1.2	2.4	1.7	1.8	1.8
80-84	1.5	1.0	1.5	1.9	1.3	1.7	1.5
85+	0.7	0.0	1.1	3.0	0.4	2.0	1.2
Females							
65-69	1.1%	0.5%	0.8%	2.1%	0.8%	1.5%	1.1%
70-74	1.4	0.1	0.7	1.8	0.8	1.2	1.0
75-79	1.3	0.1	0.2	1.8	0.7	1.0	0.8
80-84	1.4	0.0	0.1	1.8	0.7	0.9	0.8
85+	0.9	(0.5)	(0.3)	2.3	0.2	1.0	0.6

Table 4
Calculated Annual Rates of Mortality Improvement
For 1981 to 2001 and the Indicated Attained Age Groups Based on
Central Death Rates in Actuarial Study No. 120
(by Felicitie C. Bell and Michael L. Miller)

Attained Age Group	Males	Females
65-69	1.67%	0.60%
70-74	1.51	0.46
75-79	1.30	0.42
80-84	0.78	0.30
85-89	0.16	0.10
90-94	(0.41)	(0.26)

CONTINUED ON **PAGE 22**

Table 5
Calculated Annual Rates of Mortality Improvement for the U.S. Population and Selected Future Periods and the Indicated Attained Ages Based on Projected Population Tables in Actuarial Study No. 120 (by Felicitie C. Bell and Michael L. Miller)

Attained Age	Males				Females			
	2010-2020	2020-2030	2030-2040	2010-2040	2010-2020	2020-2030	2030-2040	2010-2040
65	0.9%	0.8%	0.8%	0.9%	0.8%	0.8%	0.7%	0.8%
70	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.7
75	0.9	0.8	0.8	0.8	0.7	0.8	0.7	0.7
80	0.9	0.9	0.8	0.9	0.8	0.9	0.8	0.9
85	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.7
90	0.5	0.6	0.6	0.6	0.5	0.6	0.6	0.6
95	0.5	0.6	0.6	0.6	0.5	0.6	0.6	0.6

Table 6, below, shows implied forecast average annual mortality improvement rates for attained ages 65 and older, male/female combined based on the age-sex adjusted mortality rates in Table V.A1 of the 2009 OASDI Trustees Report. Improvement rates are shown for the Low, Intermediate and High Cost projections.

Table 6
Implied Forecast Average Annual Mortality Improvement Rates Male/Female Combined—Attained Ages 65 and Older—U.S. Population (Based on Table V.A1 of the 2009 OASDI Trustees Report)

Cost Estimate	2010 to 2020	2020 to 2030	2030 to 2040	2010 to 2040
Low	0.16%	0.33%	0.34%	0.28%
Intermediate	0.71	0.83	0.80	0.78
High	1.40	1.49	1.40	1.43

Table 7 compares ultimate (2031 and later) Low, Intermediate and High Cost improvement rate assumptions from the 2007 Trustees Report (for Social Security) to recommendations made in the October 2007 "2007 Technical Panel Report on Assumptions and Methods."

Table 7
Forecast Ultimate (Years 2031 & Later) Improvement Rates U.S. Social Security Projections

Sex	Attained Ages	High Cost	Intermediate Cost	Low Cost
2007 OASDI Trustees Report				
Male	65-84	1.30%	0.72%	0.31%
	85 & Older	1.03	0.62	0.25
Female	65-84	1.23	0.68	0.30
	85 & Older	1.01	0.61	0.26
Combined	All*	1.21	0.70	0.33
2007 Technical Panel Recommendations				
Combined	All*	2.00%	1.00%	0.33%

*Including ages younger than 65.

In December of 2009, a paper was published in *The Milbank Quarterly* entitled, "Aging in America in the Twenty-first Century: Demographic Forecasts from the MacArthur Foundation Research Network on an Aging Society." The authors are S. Jay Olshansky, Dana P. Goldman, Yuhui Zheng and John W. Rowe. The authors project life expectancies in 2050 under two scenarios and compare them to forecast life expectancies produced in 2008 by the Social Security Administration and the Census Bureau.

- **Scenario A**. "Assumes that advances in efforts to combat major fatal diseases (e.g., medical technology, modified behavioral risk factors, aggressive management of symptoms) will occur at an *accelerated pace* over the 50-year projected time frame. … By contrast, the SSA assumes that rates of improvement in U.S. mortality will slow in the coming decades."

- **Scenario B**. "Assumes that forthcoming advances in the biomedical sciences will lead to interventions that slow the rate of biological aging and have a systemic dampening effect on all fatal and disabling diseases simultaneously (Butler, et al., 2008)."

Among the comments made in the Conclusions section of the paper are:

- "A realistic view of the future would entail elements of both scenarios A and B occurring simultaneously."

- "Although there currently are substantial differences in life expectancy in the United States according to race and social class (Meara, Richards, and Cutler 2008; Singh and Siahpush 2006), an underlying premise of the forecasting scenarios described here is that by midcentury, all segments of the U.S. population would benefit equally. Worrisome trends in health (and limits on health care spending) are emerging, however, that could attenuate or even reverse the anticipated rise in life expectancy in the coming decades in unequal measure, by differences in social class. ..."

- "These Network forecasts are based on the premise that the health and longevity challenges now faced by the U.S. population (e.g., smoking and the rise of obesity) will be resolved by midcentury. But this indeed is an optimistic assumption. ..."

- "The Network's future research will, in part, be devoted to documenting how the health and size of the U.S. population would change by midcentury if we fail to reduce or eliminate prevailing health and mortality disparities or if we fail to modulate trends in life-shortening behavioral risk factors."

With all of that as background, Table 8 compares some forecast life expectancies in 2050 under Scenarios A and B to those of the Census Bureau (CB) and the Social Security Administration (SSA).

Table 8
Comparison of Forecast Life Expectancies in 2050*

Gender	SSA	CB	Scenario A	Scenario B
Life Expectancy at Birth				
Male	80.0	80.9	83.2	85.9
Females	83.4	85.3	89.2	93.3
Life Expectancy at Age 65				
Male	19.3	20.6	23.4	27.1
Females	21.4	23.2	27.4	32.4
Life Expectancy at Age 85				
Male	6.5	7.6	9.7	13.6
Females	7.6	8.9	12.3	17.8

* From Table 2 of the paper "Aging in America in the Twenty-first Century: Demographic Forecasts from the MacArthur Foundation Research Network on an Aging Society."

Table 9, on pg. 24, compares forecast life expectancies in 2050 under three alternative annual improvement rate assumptions starting with the 2006 U.S. population table from the Human Mortality Database. The three alternatives are:

- **Alternative 1**. Nineteen years of improvement from 2006 (15 years from 2010) at 1 percent per year for all ages. No improvement after 2025.

- **Alternative 2**. Varies by attained age—0.25 percent to 0.95 percent for attained ages under 29, 1.00 percent for attained ages 29 through 90 then decreasing by 0.1 percent per year of attained age to 0 percent for attained ages 100 and above.

- **Alternative 3**. Assumes that improvement between now and 2050 will result in mortality rates for attained age x in 2050 being identical to the attained age x-8 rate in 2006 for x >= 15. Implied annual improvement rates vary by attained age, but are about 1.7 percent for attained age 80 and still 1.2 percent at attained age 100.

CONTINUED ON **PAGE 24**

Table 9 Comparison of Forecast Life Expectancies in 2050			
Gender	Alternative 1	Alternative 2	Alternative 3
Life Expectancy at Birth			
Male	78.0	80.7	83.3
Females	82.9	85.1	88.5
Life Expectancy at Age 65			
Male	19.1	21.1	23.5
Females	21.8	23.6	26.8
Life Expectancy at Age 85			
Male	7.3	8.2	9.9
Females	8.3	9.0	11.6

Comparing Tables 8 and 9, it seems we can conclude that:

- Alternative 1 improvement rates produce shorter life expectancies than Census Bureau assumptions at the ages shown, but the difference is small at age 85. Comparing to SSA forecasts, life expectancies are comparable at age 65, but Alternative 1 has a longer life expectancy at age 85. To get approximate SSA age 85 life expectancies, annual improvement rates (for 19 years) would have to be about 0.3 percent for both males and females.

- Alternative 2 improvement rates produce life expectancies that are fairly close to those of the CB, except for males at age 85.

- Alternative 3 improvement rates produce life expectancies fairly close to those for Scenario A. For attained ages from 85 to 100, those annual improvement rates gradually decrease from 1.7 percent at age 85 to 1.2 percent at age 100 for males and from 1.8 percent to 1.5 percent for females.

Historical U.S. Insured Mortality Improvement Rates

Quantifying historical mortality improvement rates for insured lives, particularly during the select period, would be extremely challenging with the data available. Changes in observed insured mortality are materially affected by not only real mortality improvement, but also such factors as:

- Changes in the list of companies participating in the industry mortality studies and changes in the relative contributions to that experience from those companies.

- Changes in underwriting practices and requirements.

- Changes in risk class structure and impacts those changes have on premium rates and mix of business. For example, when the nonsmoker class is split into multiple preferred classes, the most preferred risks tend to buy larger policies (since the unit cost is less) which skews experience by amount toward the better risks.

- Changes in product design which affect policyholder behavior and observed mortality experience, such as the shock lapses and accompanying anti-selection on level premium term policies.

Even if the issues cited above could be ignored, it is also very difficult to look at long-term trends in experience because the expected basis (e.g., the 1975 – 80 tables) used to measure mortality experience changes periodically and very little historical experience is available electronically.

One additional problem arises when the focus is on experience at older ages because insurance companies have not sold material amounts of business at older issue ages until recently.

Bearing these *caveats* in mind, various insured life improvement rates are shown in Tables 10 and 11 on pg. 25.

Table 10 shows ultimate experience A/E ratios (1975 – 80 expected basis) and calculated average annual "improvement" rates by gender for the 1982-83 (the first study showing experience relative to the 1975 – 80 tables) and 2005 – 07 study periods.

Table 10
Ultimate* U.S. Life Mortality Experience and Implied Improvement Rates
(1975 – 80 Expected Basis)

Attained Ages	Males			Females		
	1982 to 1983 A/E	2005 to 2007 A/E	Annual Imprmnt	1982 to 1983 A/E	2005 to 2007 A/E	Annual Imprmnt
65-69	89.6%	52.4%	2.3%	101.8%	75.1%	1.3%
70-74	91.6	55.7	2.1	103.0	76.0	1.3
75-79	95.1	63.7	1.7	86.7	75.4	0.6
80-84	93.8	67.7	1.4	84.9	75.4	0.5
85-89	96.8	78.2	0.9	99.8	80.9	0.9
90-95	91.9	87.7	0.2	102.5	87.0	0.7

*Policy years 16+ for 1982 – 83 and years 26+ for 2005 – 07.

Some additional comments on Table 10:

- 2005 – 07 experience for attained ages 90 – 95 is really for attained ages 90 – 94.
- 2005 – 07 experience is by amount and for all companies (as opposed to common companies). I believe that is also the case for the 1982 – 83 experience, but I did not see a clear statement of that in the report (Table 16 on page 46 of the TSA 1983 Reports). There was not a great deal of overlap in the list of companies contributing to each of these studies.
- In both cases, experience is for all amounts combined since there was no information on 1982 – 83 experience for other amount groupings.
- With one exception (Females, Attained Ages "90 – 95"), the 2005 – 07 A/E ratios would be lower (and implied improvement rates higher) if we used A/E ratios for policy years 16+, consistent with the 1982 – 83 experience. I did not include policy years 16+ because then distortions related to the inclusion of smoker distinct experience would be introduced.

Table 11 shows older age ultimate experience (2001 VBT expected basis) for experience years ending in 2003 and 2007, face amounts of $25k and higher and the 21 "common companies" that contributed to each of the five experience years 2002 – 07. To give a sense of the credibility, the number of actual deaths is shown in parentheses below the A/E ratio. Table 11 was developed from the Common Companies ILEC 2002 – 07 pivot table included with the SOA's 2005 – 07 experience study added to the SOA's website earlier this year.

Table 11
Ultimate* U.S. Life Mortality Experience by Amount and Implied Improvement Rates
Face Amounts of $25k and Higher—Common Companies
(2001 VBT Expected Basis)

Attained Ages	Males			Females		
	2002 to 2003 A/E	2006 to 2007 A/E	Annual Imprmnt	2002 to 2003 A/E	2006 to 2007 A/E	Annual Imprmnt
70-79	75.3% (1,209)	68.3% (1,878)	2.4%	93.0% (93)	67.8% (137)	7.6%
80-89	85.8% (1,251)	72.5% (2,194)	4.1%	95.7% (130)	100.1% (286)	(1.1)%
90+	87.1% (295)	87.7% (553)	(0.2)%	133.3% (65)	98.5% (125)	7.3%
70 & Older	81.0% (2,755)	72.1% (4,625)	2.9%	101.6% (288)	88.8% (548)	3.3%

*Policy years 26+.

Some comments on Table 11:

- The annual improvement rates vary enormously.
- The four year time interval over which "improvement" is being measured is almost certainly too

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short to be meaningful as a predictor of future improvement rates. Moreover, any point-to-point calculation such as this can produce misleading results if the experience for the endpoints is anomalous (i.e., better or worse than "normal" due to random fluctuations, changes in the mix of experience by contributing company, or other factors).

Forecast Insured Mortality Improvement Rates

The only quasi-official improvement rate assumptions for U.S. life insurance business that I am familiar with are those used to bring experience underlying the 2001 and 2008 VBT's forward to 2001 or 2008. Those assumptions, which are not really future improvement rate assumptions, are summarized below:

Table 12
Improvement Rates Used to Project Observed Experience to 2001 for the 2001 VBT

Attained Ages	Male	Female
0-45	0.0%	0.0%
55-80	1.0	0.5
85	0.5	0.5
90 & Older	0.0	0.0

Table 13
Improvement Rates Used to Project Observed Experience to 2008 for the 2008 VBT

Attained Ages	Improvement Rate	Attained Ages	Improvement Rate
0-20	0.0%	0-35	0.0%
30-80	1.0	45-80	0.5
90 & Older	0.0	90 & Older	0.0

Notes:

1. Improvement rates grade linearly between attained ages shown. For example, for the 2001 VBT, the male improvement rates grade linearly from 0 percent at attained age 45 to 1.0 percent at attained age 55 and then grade from 1.0 percent at attained age 80 to 0.5 percent at attained age 85.
2. Assumed improvement rates used to develop the 2008 VBT were presented in a table on page 15 of the 2008 VBT Report & Tables .pdf file found on the SOA website under Research, Experience Studies, Individual Life, 2008 Preferred Mortality Reports.
3. Assumed improvement rates used to develop the 2001 VBT were on page 24 of Appendix K (SOA Report of the Individual Life Insurance Valuation Mortality Task Force, November 2001).

There have also been at least two SOA surveys containing some information on the assumptions some actuaries are making for future mortality improvement:

- The first was published in March 2003 (but reflecting practices and views in mid-2000) and was entitled, "Report of the Society of Actuaries Mortality Improvement Survey Subcommittee." At that time only 16 of the 67 companies responding to the study assumed future mortality improvement in pricing. Not much information is provided in the survey on actual assumptions, but Table 12 in the survey report did summarize the assumptions for policy years one through 10, male, issue age 45, best nonsmoker class of 12 companies and the mean annual improvement rate assumption was 0.89 percent.

- The second is the "Report of the Society of Actuaries Mortality Table Construction Survey Committee," which was published in June 2007 and reports on the results of a July 2006 survey on methods used to develop pricing mortality tables for fully underwritten life insurance. According to Table 42 on page 24 of the report, 39 percent of the respondents reflect mortality improvement in their pricing mortality. Some limited information on the respondents' mortality improvement assumptions is provided on pages 24 and 25 of that report.

Concluding Remarks

When and to what extent future mortality improvement will occur is currently impossible to predict with confidence since forecasting improvement necessarily entails predicting such things as:

- The timing and nature of medical breakthroughs, how quickly and widely those breakthroughs get translated into improved treatments for individuals and the impact of the new treatments on mortality; and
- Behavioral changes.

Obviously, financial results for YRT reinsurance and products such as term insurance, for which mortality is a key risk, are very sensitive to mortality improvement. So, actuaries need to stay abreast of the latest thinking on the subject and have a good awareness of the impact on profitability if the future does not emerge as expected. □

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2009 Policyholder Behavior in the Tail Study Results for **Universal Life Products with Secondary Guarantees**

By Jim Reiskytl

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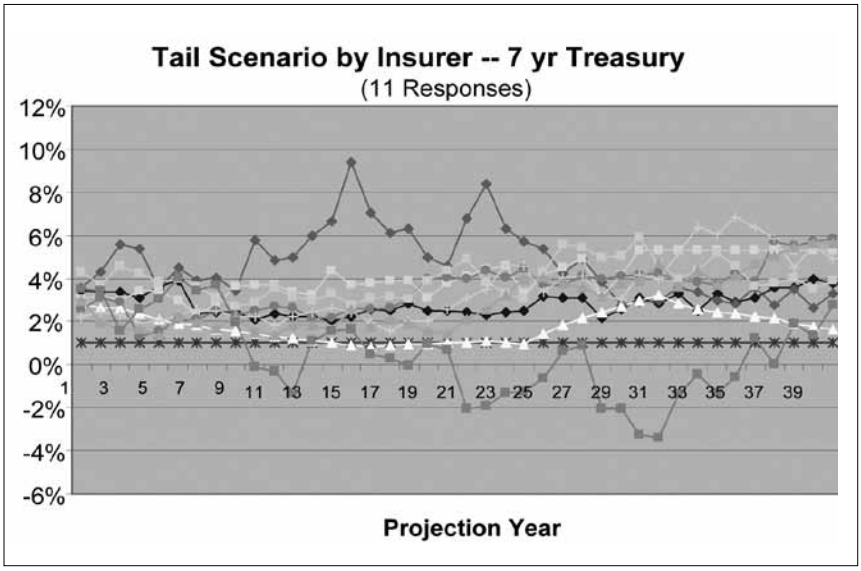
The Society of Actuaries' Policyholder Behavior in the Tail (PBITT) working group conducts surveys to gain insight into companies' assumptions as to policyholder behavior under extreme conditions. Specifically, extreme conditions are defined to be the scenarios in the 90 CTE calculations if stochastically modeled, or the assumptions for events that occur outside two standard deviations of expected experience. Since current RBC and principle-based reserves in some cases place increasing reliance on actuarial judgment, we hope that these surveys will help guide those efforts and provide useful background information. The goal is to examine and ultimately, through annual studies, provide a resource to actuaries for guidance on how to set policyholder assumptions in extreme scenarios and information for the reviewing actuary and/or regulators. It is important to note that all individual company responses to our surveys are kept confidential.

Stephen Hodges, a member of the Working Group, and Brian Grinnell recently completed an analysis and summary report of the 2009 survey data on the range of assumptions actuaries use in pricing, reserving, and risk management of Universal Life (UL) secondary guarantees. Twenty-three companies responded to our survey, although not every company answered every question.



Selected highlights of the 2009 UL secondary guarantee study include:

1. Investment return is the assumption that most respondents considered to be a critical risk; 15 respondents indicated that they felt this assumption was critical for analyzing experience in the tail. Slightly less than half of respondents considered the mortality and/or lapse assumptions to be critical. Respondents were allowed to select more than one.
2. Fewer than 50 percent of respondents use stochastic modeling to set or analyze capital levels for UL with secondary guarantees.
3. Respondents using stochastic modeling to set their capital levels reported using more scenarios than in the previous survey's results; the most common response was 1000 scenarios compared to 200 scenarios in 2008.
4. Interest assumptions used vary widely among respondents for the one-year, seven-year, and 30-year periods. For example, the graph below shows the seven-year results.
5. As shown, assumptions vary widely amongst insurers. In general, rates remain low in the near future durations and rise after duration 20. Additionally, the yield curve tends to flatten over time, with the differences between one-year and 30-year treasuries narrowing.
6. In the tail scenarios, lapse rates also vary widely amongst insurers. In general they decrease with increasing issue age or policy duration. Lapse rates also decrease as the account value approaches zero.
7. Half of respondents model future mortality improvement. Improvements typically vary by gender and are only applied until attained age 85-90.

Hopefully this sample of the highlights will encourage you to read the full report found at www.soa.org/research/risk-management/research-2009-behavior.aspx. The actual survey questions are also included in the report.

We welcome any questions or suggestions for improvements. Please e-mail them to Steve Siegel, SOA Research Actuary, at ssiegel@soa.org or Jim Reiskytl, PBITT Working Group Chair, at jimreiskytl@wi.rr.com. □

Pricing and Hedging Considerations **for Guaranteed Withdrawal Benefit Included In a Fixed Indexed Annuity**

By Daniel R. Patterson

In the last several years the Fixed Indexed Annuity (FIA) product has continued to innovate in its design and offering. One of the latest and successful benefit additions (measured by products sold) has been the Guaranteed Withdrawal Benefit (GWB) rider.

It is not the intent of this article to illustrate a full pricing exercise of the GWB rider in a FIA chassis, but to highlight several key items the pricing actuary should consider when including a GWB rider as a part of their company's product offering.

Guaranteed Withdrawal Benefit

For discussion in this article, the author considers a fairly plain vanilla GWB rider:

1. A bonus equal to 10 percent of premium applied to a Guaranteed Withdrawal Account (GWA),
2. A "rollup rate" equal to 6.20 percent compounded with a cap on the GWA equal to two times premium,
3. One-year waiting period,
4. Single Life Withdrawal Rates based on attained age at income election equal to the following:

    a. attained age [0 – 60]: 0 percent
    b. attained age [61 – 65]: 5.0 percent
    c. attained age [66 – 70]: 5.5 percent
    d. attained age [71 – 75]: 6.0 percent
    e. attained age [76 – 80]: 6.5 percent
    f. attained age [81 +]: 7.0 percent,

5. Annual Rider Charge = 0.5 percent deducted from the account value 1/12 per month, and
6. At election of the GWB, it is assumed the rollup ceases and the GWA remains constant subject to "excess withdrawals" that would require a proportional reduction to eliminate any dollar-for-dollar pricing problems (the article assumes all withdrawals will equal the guaranteed amount).

Modeling Considerations

1. Utilization of the withdrawal benefit

An obvious first consideration when pricing the GWB rider is the assumed election of the GWB. While the rider is relatively new in the FIA product space and experience is limited to a few years, the author feels a reasonable election assumption for pricing (Issue Age 68) could be the following:

Income election assumption: Issue Age 68

Policy Year	Attained age	Benefit utilization
2 (first year available)	69	12%
3	70	10%
4	71	20%
5	72	15%
6	73	10%
7	74	8%
8	75	6%
9	76	15%
10	77	10%
11	78	8%
12	79	6%
13	80	6%
14	81	100%

I base my assumptions on the following key reasons:

- **a. Experience:** Actual observed utilization rates have exceeded 10 percent in the first year the benefit is available.
- **b. Marketing:** GWB riders have become a key benefit in the selling broker's sales story. The author feels this is a nontrivial benefit that the consumer will not forget.
- **c. Pattern of attained age withdrawal rates:** Most designs have increases in payment rate (from 4 percent to 5 percent) as the contract holder reaches a new attained age grouping. These increases (25 percent going from 4- to 5-percent) in the guaranteed benefit will likely create discrete jumps in the election rates of the benefit as a contract owner ages into a new payment rate.
- **d. 100 percent election:** I assume 100 percent of the in-force not having elected income will elect after the rollup ceases, and there being no more increases in payment. This obviously is somewhat conservative, but the author feels it is a reasonable assumption.

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e. **Sensitivity testing:** Lastly, due to the relatively recent introduction of these benefits, the pricing actuary should include a thorough sensitivity testing of the assumption.

2. Dynamic liability modeling

An important second consideration when pricing the GWB rider relates to the dynamic nature of the assumptions and resulting projected financials depending on the policy year that the withdrawal benefit is elected. It would not be surprising to see actuarial pricing models that price the GWB benefit as some form of highly utilized free withdrawal benefit. There are obvious shortcomings to this approach.

The pricing actuary would benefit by having:

a. a pricing model that models withdrawal benefit elections as "new and unique" modeling cells,

b. policy behavior assumptions that vary depending on the policy year of benefit election, and

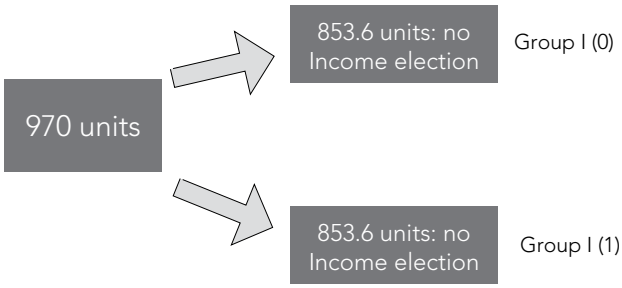
c. a pricing and modeling platform that dynamically adjusts the "hedging amounts" depending on the stochastic index path and the resulting "GWB reserve floor" that the stochastic path creates.

I illustrate bullets a) and b), considering the above GWB benefit for an issue age 68 with an expectation that 12 percent of the issued policies in force at the end of the first elect income for life. I will address bullet c) in its own section later in the article.

We begin by assuming we issue 1000 units sold with inclusion of the GWB rider:

Based on policy behavior assumptions in the first year, we may expect the following in-force experience at the end of the first policy year (immediately prior to GWB election):

Assuming use of a robust pricing model, the 970 units in force at the end of the first year should "segregate" into two separate and unique modeling groups:



At this point, your model should have two distinct groups; Group I(0), those not electing income, and Group I(1), those electing income at the end of the first year. As the pricing model the author utilizes projects into the future, it continues creating new groups as additional units elect income in each of the subsequent policy years.

Questions naturally arise as to the pricing assumptions (policy behavior) of each group. It is likely that actual behavior experience for Group I(0) will evolve significantly different than the experience evolves for Group I(1). To illutrate my point, let us consider a view of expected lapses and patterns of death along with example assumptions to model the expected policy behavior. While there are clearly additional assumptions (free partial withdrawals, etc.) that require reexamination, in the interest of brevity I limit myself to lapses and death, assuming the logical development applies to assumptions not mentioned.

a) Expected Lapses

To make my point, consider an FIA chassis having a 10-year surrender charge. Let us move forward in time to the end of policy year 10. A typical vanilla FIA chassis would have the normal "shock" lapse assumption occuring in policy year 11 when the contract's surrender charge becomes zero.

Consider a comparison of Group I(0) (those at the end of the 10th year that have yet to elect income) and Group I(1) (those electing income at the end of the first

policy year). In policy year 11, we should expect Group I(0) to have a much different lapse assumption than Group I(1). Annuity brokers offering a new product to individuals having a policy where the surrender charge becomes zero contribute significantly to the "shock" lapse at the end of an annuity's surrender period. Group I(1), having elected income for nine years, will likely not lapse their contract realizing the value of the remaining guaranteed payments. In addition, suitability rules will likely be in place that will make it almost impossible for a selling broker to exchange the in-force contract for a newly issued one.

One representation of the lapse assumption dependent on policy year of income election may be the following:

Policy		
Year	Group I (0)	Group 1 (0)
1	3.00%	
2	5.00%	2.00%
3	5.00%	2.00%
4	5.00%	2.00%
5	5.00%	2.00%
6	5.00%	2.00%
7	5.00%	2.00%
8	5.00%	2.00%
9	6.00%	2.00%
10	7.00%	0.00%
11	40.00%	0.00%
12	20.00%	0.00%
13	10.00%	0.00%
14	7.00%	0.00%
15	7.00%	0.00%

The above table highlights three points of interest:

i. **Lapse rates while the surrender charge is positive:** Traditional annuity lapse assumptions assume some positive lapse rate while a contract's surrender charge is positive. Inclusion of a GWB should result in a different assumption set for Group I(1). Individuals in Group I(1) made an important election. Because of this election, the author feels this group will be less likely to exit their contract. It is feasible that there will still be reasons that Group I(1) will, for reasons only they understand want to exit the contract. Prudent pricing would imply a lowering of the assumption when comparing to the group not yet electing income.

ii. **Shock lapse rates when surrender charge becomes zero**: The author feels given suitabilty issues and the economics of the AV compared to the GWB that there should be no shock lapse for Group I(1) at time surrender charge equals zero.

iii. **Ultimate lapse rates equal to zero:** Lastly one may want to consider grading lapse rates that ultimately equal zero after a period of time. Certainly when the account value is exhausted there is no incentive for a person to surrender their contract. While the values assumed are flat at 2 percent for eight years, various assumptions would seem reasonable including assumptions that vary the lapse rate as a function of the PV of annuity payments to the account value (account value less than PV annuity payments implies "out of moneyness").

The above logic applied to Group I(1) should be developed for all Group I(j) where j is the end of the policy year of income election.

b) Pattern of deaths

In addition to the obvious lapse rate behavior, a more subtle, but as important, assumption concerns the dynamics of future mortality and election of the income benefit.

Generally annuity pricing models assume some improved mortality when compared against population mortality. To model an additional mortality component we may want to consider the following modeling method:

i. The "population" buying annuities does not really change with the introduction of the GWB benefit (I realize this statement may be debatable itself, but to illustrate let's assume it to be true), therefore the aggregate mortality assumption of an issue age 68 cohort does not change.

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ii. Policyholders who elect the income benefit will have an assumed lower mortality than the remaining group. Group I(1) mortality (age 69) = ***mortality ratio*** x aggregrate mortality (age 69), leaving Group I(0) mortality to "solve for" aggregate mortality.
iii. The favorable ***mortality ratio*** wears off after a number of years so that Group I(1) "n" years from election will have no noticable mortality difference than GroupI(0) "n" years from now.

Depending on one's view, this assumption can significantly impact profitability. At a minimum, sensitivity around the "allocation" of mortality to the election groups should be considered to understand the financial implications of the "healthy" lives electing the GWB while the remaining lives elect to surrender or death results in payment of the account value at death.

Hedging Considerations

The last item this article considers (but by no means exhausts GWB pricing issues) is hedging. In a traditional plain vanilla annual reset FIA, a hedge strategy is typically defined as an "at the money" option with some hedge ratio (less than one) multiplied by account value in force. Inclusion of the GWB benefit with reasonably high utilization introduces additional complexity to the underlying hedge. To illustrate this complexity, let's consider our issue age 68 cohort assuming the following amounts in force at the end of policy year three.

In force end of policy year three with positive index gains = 4.158 percent in each policy year

Income election year	Premium issued	Index credits since issue	Account Value	GWA	AV reserve	GWA reserve(1)
Not elected	10,000,000	13%	11,300,000	13,175,474	10,470,523	9,889,322
2	1,500,000	13%	1,490,058	1,752,300	1,380,680	1,235,494
3	1,000,000	13%	1,130,000	1,240,628	981,198	875,645

(1) the GWA reserve equals the present value of expected life contingent guaranteed payments using the SPDA valuation rate while the account value is positive and the SPIA valuation rate after the account value is zero plus the present value of expected death benefits (return of positive account value) at the SPDA valuation rate less the present value of GWB charges discounted at the SPDA rate.

Consider a company that is running their typical vanilla FIA hedge where the "at the money" hedge with notional equal to AV multiplied by the Hedge Ratio immunizes increases in STAT profit caused by positive index increases. Under the above scenario, the "normal" FIA hedging will provide satisfactory results.

Now let's consider an alternative scenario. Assume now the same policy experience but consider a reasonable scenario where in each of the three policy years the index provided 0 percent return.

In force end of policy year three with positive index gains = 0.0 percent in each policy year

Income election year	Premium issued	Index credits since issue	Account Value	GWA	AV reserve	GWA reserve(1)
Not elected	10,000,000	0%	10,000,000	13,175,474	9,265,949	9,586,305
2	1,500,000	0%	1,307,247	1,752,300	1,211,288	1,188,701
3	1,000,000	0%	1,130,000	1,240,628	863,369	843,027

Under this reasonable scenario at the end of year three, the GWA reserve is the greater reserve. At this point hedging under the traditional methods will result in less than satisfactory hedge results. The reason being that inclusion of

a GWB creates a "path dependent" floor requiring path dependent hedging resulting in significantly different hedge positions.

The GWB "floor" reserve is akin to the minimum SNFL cash value required on a contract. Most FIA designs make use of the "87.5 percent @ SNFL rate less the FIA haircut" resulting in the SNFL floor being "in the money" (index returns 0 percent for 10 years or more) in a small number of random scenarios. From my experience, most pricing actuaries ignore the SNFL floor, as pricing scenarios where the SNFL floor impacts profitability rarely occur. The same should not be said of the GWB floor.

The likelihood of the GWB floor being "in the money" is much higher and therefore requires attention when pricing a product. Pricing an FIA contract under a single path assuming an "at the money" hedge with notional equal to AV times the Hedge Ratio will result in unintended financial surprises under reasonable index crediting deviations.

A pricing and modeling platform that identifies and models this path dependent hedge process is important. In addition, as contracts issued reach policy anniversary it is important to have a hedge "tracking" tool that identifies the next appropriate hedge for an in-force block.

Conclusion

The above article attempts to illustrate several key pricing issues related to including GWB benefits in FIA contracts. The pricing actuary needs to be comfortable that the modeling platform captures the new dynamics introduced with the GWB. In particular, modeling capabilities that allow robust policy behavior dependent on the election year are critical. Lastly, the author highlights the GWA reserve floor that requires full attention from the pricing and in force hedging actuaries. ◻

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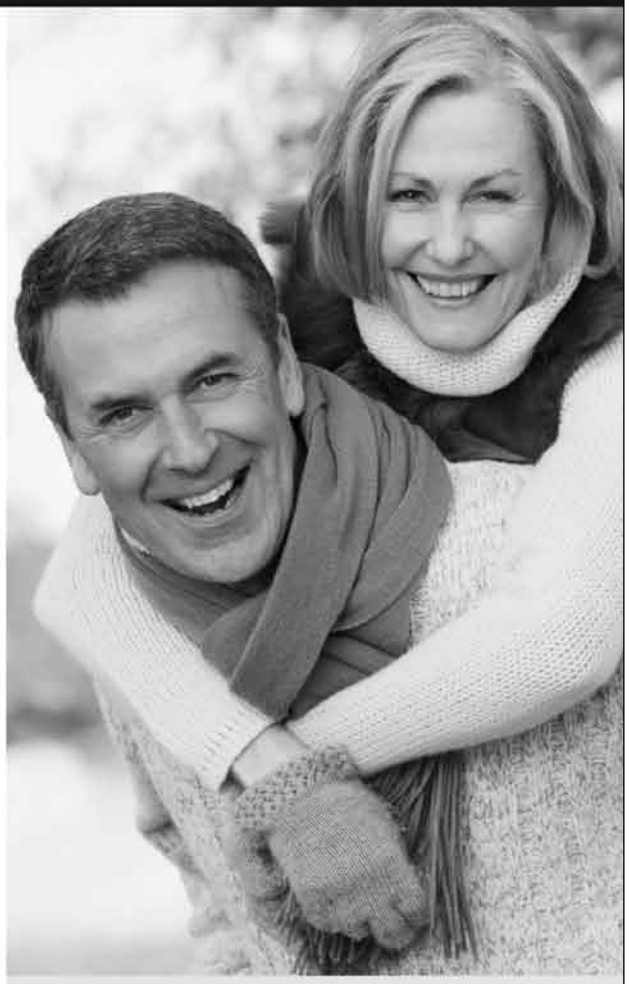

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