



# Product Matters!

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## Trends in the Universal Life and Indexed UL Market

By Susan J. Saip

Universal life (UL) and indexed universal life (IUL) continue to be key areas of interest in the life insurance market today as revealed in Milliman, Inc.'s fifth annual comprehensive survey covering these markets. Survey results provide UL/IUL carriers with a benchmark to evaluate their practices relative to those prevalent in the industry.

UL/IUL insurance accounted for 39 percent of U.S. individual life sales (based on annualized premium) for calendar year 2011 and the first quarter of 2012<sup>1</sup>, continuing to play a significant role in the life insurance market. IUL sales represented more than 25 percent of overall UL sales in the first quarter of 2012.<sup>1</sup>

The scope of the Milliman survey included UL with secondary guarantees (ULSG), cash accumulation UL (AccumUL), current assumption UL (CAUL), indexed UL with secondary guarantees (IULSG), cash accumulation IUL (AccumIUL), and current assumption IUL (CAIUL) products. A record 31 carriers of UL/IUL products participated in this annual survey. Key findings of the survey are highlighted in this article.

### UL Sales

The mix of UL sales (excluding IUL sales) reported by survey participants for calendar years 2008 through 2010 and for 2011 as of Sept. 30, 2011 (YTD 9/30/11) is shown in Figure 1 (See pg. 4). For purposes of the survey, sales were defined as the sum of recurring premiums plus 10 percent of single premiums. The product mix over the survey period changed significantly for many of the survey participants. However, many

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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 Jim Filmore, Kurt Guske or Paul Fedchak by Nov. 9, 2012.

## Chairperson's Corner

# Reflections on a **Three-Year Term**

By Donna Megregian

**B**y the time you read this, a new Section Council will have been elected and gearing up for a new section council year. Many thanks to the other members who are departing the council—Mitch Katcher and Lisa Renetzky. Thank you to all those who volunteered to run for the council and congratulations to those who were elected to serve on the council. For those not elected, the council can use your input. Please become or stay a friend of the council and please take part in the council meetings and consider running again next year. We look forward to seeing what another year will bring in terms of new ideas, sessions at meeting, research, connecting with fellow members and all those things that your section council provides to you. Best wishes to Paula Hodges as she takes over the chairperson position.

“Every new beginning comes from some other beginning’s end”—that lyric just popped into my head as I exit my term in the product development section council. Just three years ago I was in a very different place in life as I entered into the section council. I was a fairly new mother, a relatively new consultant, an eager volunteer, and willing to say yes to about anything thrown at me! Fast forward three years. Now I am a mother of two, a slightly more established consultant, still an eager volunteer, but no quite as willing to say yes to anything thrown at me.

Being a part of the council has helped me learn a few more things about reliance on others to help get things done. No highly successful person is able to do it all. Letting go and delegating is a skill. Thankfully, the council members and friends of the council are willing to help out where they can as well. Also, sometimes you have to learn to say no and find where your limits are. Finding my own limits and saying no has probably helped more with the establishment of children in my life, but it certainly translates to duties at work. Also, responsibility is best owned when someone knows it is theirs. What I mean is that thinking someone knows what they are supposed to do without actually straight up telling them may be a recipe for failure. Communication is critical. That should be no surprise, right? Oh, but how often are things miscommunicated? More often than we would like. One thing you have to remember about delegation and responsibility—someone needs to know what they are responsible for before they can succeed at getting it done. If you don’t tell me what I am responsible for, how can I get it done for you? Speak up. It’s the only way you’ll be heard. So thank you section council, for helping me be better at being me.

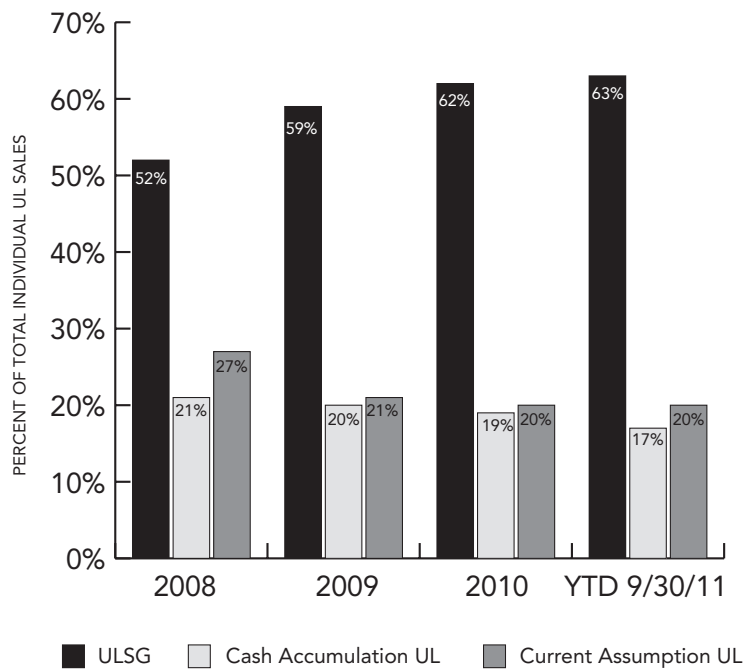
We face a lot of issues as this section council year closes. On a global scale, economies are trying to recover only to be pulled down again for various reasons and issues. As a nation, we look toward presidential elections, high unemployment, and concerns over our own economy. As a society of actuaries, we face increasing our own value to employers and the possibility of merging with other actuarial organizations. As members of this section, we face the daunting task of developing and managing ourselves and a portfolio of products that have to provide value to the companies we work for in the chaotic global and national environment. We have a lot of work ahead, and we need to rely on each other to get things done. If there is something that you are missing, and the SOA or this section can do something about it, the best thing you can do is tell us and we will work to see if we can get it done.

Over the next few months, you should see webcasts, research, maybe even a podcast produced by or supported by the PD section. Continue to provide input and ideas to the council through letters to the editor, via the LinkedIn PD section group or email a council member directly. All are open to feedback, so please feel free to use whatever medium you are most comfortable with to enhance this section’s value to you. Thank you for three great years and let’s keep this section growing and providing valuable information and support in the years to come. ▣



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**Figure 1: UL Product Mix by Year**



of the changes were offset when looking at overall survey results. Ten participants reported movement away from ULSG products, with four of the 10 discontinuing sales of ULSG. Seven participants reported movement to ULSG products, with four of the seven discontinuing sales of other UL products.

Average amounts per policy reported by survey participants for ULSG and cash accumulation UL decreased from 2010 to YTD 9/30/11, and remained flat for current assumption UL on a premium basis. On a face amount basis, average amounts per policy decreased for ULSG and current assumption UL, but increased for cash accumulation UL. However, from 2010 to YTD 9/30/11, the total individual UL average premium per policy increased slightly from \$9,126 to \$9,527. The total individual UL average face amount per policy increased from \$362,867 to \$370,466. The highest average amount per policy among the UL product types (based on both premium and face amount) was reported for current assumption UL each period from 2008 through 9/30/11.

**Figure 2: Average Ages, All Distribution Channels Combined**

BASIS OF SALES	ULSG	CASH ACCUMULATION UL	CURRENT ASSUMPTION UL
BASED ON 2010 SALES			
PREMIUM	61	53	61
FACE AMOUNT	55	41	54
BASED ON YTD 9/30/11 SALES			
PREMIUM	60	51	62
FACE AMOUNT	55	40	55

A weighted average issue age was determined for sales of survey participants by distribution channel. For all distribution channels combined, average ages dropped for all products except current assumption from 2010 to YTD 9/30/11. There was an increase in the average issue age for current assumption UL products. During 2010 the lowest average age was reported in the worksite channel. The highest average was reported in the stockbroker and financial institutions channels when measured by premium and in the financial institutions channel alone when measured by face amount. Similarly, during YTD 9/30/11, the lowest average was reported in the worksite channel on a premium basis and the worksite and MLEA channels on a face amount basis. The highest average was reported in the financial institutions channel. The table in Figure 2 summarizes the average ages calculated based on sales reported by issue age range for all distribution channels combined for 2010 and YTD 9/30/11.

With the exception of ULSG, the YTD 9/30/11 sales distribution by underwriting class shifted significantly

relative to that for 2010. In general, there was movement to better underwriting classes for current assumption UL, and movement to worse underwriting classes for cash accumulation UL when comparing 2010 sales to YTD 9/30/11 sales.

### IUL Sales

Survey participants reported total IUL sales, measured by the sum of recurring premiums plus 10 percent of single premiums, of \$499.8 million and \$503.5 million respectively for calendar year 2010 and YTD 9/30/11. This is notable because total IUL sales and total accumulation IUL sales were higher in the first three quarters of 2011 than in all of 2010. The level of sales reported for both periods was higher than sales reported for the two preceding calendar years by survey participants. Cash accumulation IUL products dominate the IUL market with a share of 88 percent reported during YTD 9/30/11. From 2010 to YTD 09/30/11, the average premium per policy reported by survey participants for AccumIUL increased from \$12,538 to \$14,307. The AccumIUL average face amount per policy decreased from \$494,273 to \$478,915.

For all distribution channels combined, average issue ages remained flat from 2010 to YTD 9/30/11 for IULSG. There was an increase in the average issue age for AccumIUL for all channels combined when measuring sales on both a premium and face amount basis. Average issue ages decreased for current assumption IUL products for all distribution channels combined. During 2010 the lowest average age was reported in the worksite channel on a premium basis and the stockbroker channel on a face amount basis. The highest average was reported in the brokerage channel. Similarly, during YTD 9/30/11, the lowest average was reported in the financial institutions channel on a premium basis and the stockbroker channel on a face amount basis. The highest average was again reported in the brokerage channel. The table in Figure 3 (above) summarizes the average ages calculated based on sales reported by issue age range for all distribution channels combined for 2010 and YTD 9/30/11.

**Figure 3: Average Ages, All Distribution Channels Combined**

BASIS OF SALES	IULSG	CASH ACCUMULATION IUL	CURRENT ASSUMPTION IUL
BASED ON 2010 SALES			
PREMIUM	58	54	48
FACE AMOUNT	51	46	37
BASED ON YTD 9/30/11 SALES			
PREMIUM	58	55	46
FACE AMOUNT	51	47	35

With the exception of cash accumulation IUL, the YTD 9/30/11 sales distribution by underwriting class shifted significantly relative to that for 2010. In general, there was movement to better underwriting classes for IULSG, and movement to worse underwriting classes for current assumption UL when comparing 2010 sales to YTD 9/30/11 sales. For both products, the movement seems to be driven by the results of a single company.

### LTC/Chronic Illness Rider Sales

Sales data is becoming more available on UL/IUL products with chronic illness and long-term care (LTC) riders as more and more companies begin to offer and track such products. Sales of chronic illness riders and

“ Sales data is becoming more available on UL/IUL products with chronic illness and long-term care riders. ... ”

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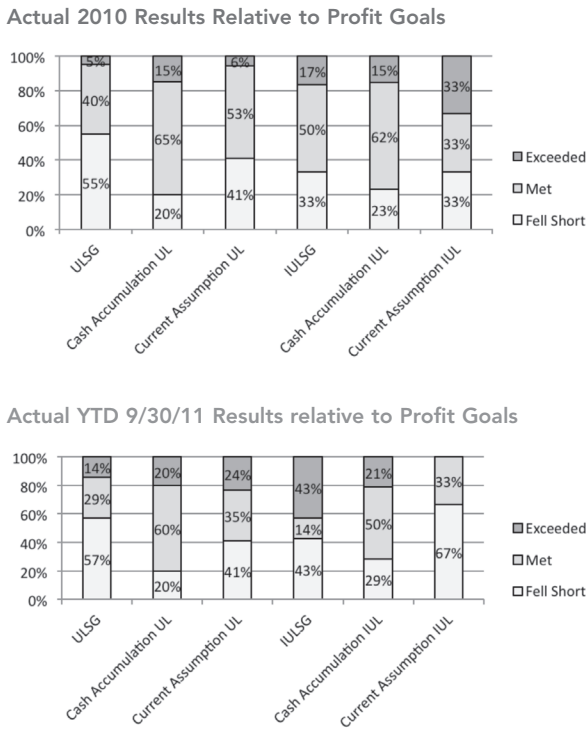
**Figure 4: Chronic Illness and LTC Rider Sales as a Percent of Total Sales**

CALENDAR YEAR	TOTAL INDIVIDUAL UL	ULSG	CASH ACCUMULATION UL	CURRENT ASSUMPTION UL
UL SALES WITH CHRONIC ILLNESS RIDERS AS A PERCENT OF TOTAL UL SALES				
2010	14%	15%	18%	7%
YTD 9/30/11	14%	16%	14%	7%
UL SALES WITH LTC RIDERS AS A PERCENT OF TOTAL UL SALES				
2010	7%	11%	3%	1%
YTD 9/30/11	12%	16%	4%	3%
IUL SALES WITH CHRONIC ILLNESS RIDERS AS A PERCENT OF TOTAL IUL SALES				
CALENDAR YEAR	TOTAL INDIVIDUAL IUL	IULSG	CASH ACCUMULATION IUL	CURRENT ASSUMPTION IUL
IUL SALES WITH CHRONIC ILLNESS RIDERS AS A PERCENT OF TOTAL IUL SALES				
2010	22%	2%	23%	84%
YTD 9/30/11	20%	3%	20%	88%
IUL SALES WITH LTC RIDERS AS A PERCENT OF TOTAL UL SALES				
2010	<1%	1%	<1%	2%
YTD 9/30/11	1%	2%	<1%	2%

sales of LTC riders as a percent of total sales reported by survey participants are shown in Figure 4 (above). Note that there is some overlap between the participants that offer a chronic illness rider and those that offer an LTC rider.



**Figure 5: Actual Results Relative to Profit Goals**



### Profit Measures

Only 45 percent of survey respondents met their profit goals on UL with secondary guarantee products in 2010. This figure dropped to 43 percent during the first nine months of 2011. For current assumption IUL, 66 percent met their profit goals in 2010 and this figure dropped to 33 percent during YTD 9/30/11. The chart in Figure 5 (above) shows the percentage of survey participants reporting they fell short of, met, or exceeded their profit goals by UL product type.

### Reserves

Most respondents to the survey expect that principle-based reserves (PBR) will be in place in 2015 at the earliest. Participants' comments regarding their outlook on the impact of PBR were primarily related to the expectation of a reduction in reserves or no material impact. The majority of participants have examined the underwriting criteria scoring system or another actuarially sound method for establishing a valuation mortal-

“ Only 45 percent of survey respondents met their profit goals on UL with secondary guarantee products in 2010. ”

ity table. Of those responding, 61 percent reported the credibility of their UL business at 80 percent or greater. Also, few survey participants have modeled PBR-type reserves on existing UL products, but the number is growing. Sixteen survey participants participated in the National Association of Insurance Commissioners (NAIC) impact study of a VM-20 principle-based approach to valuations. Eight of the 16 impact study participants reported that results were consistent with expectations, seven reported that results were not as expected, and the final participant did not compare the outcome to its expectations.

### Underwriting

Table-shaving programs are offered by 11 of the 31 participants, and all except two of those 11 reported their programs will be continued. Seventeen of the 31 participants use a credit program or other type of program that improves ratings for favorable risk factors. Modifications have been made to such programs in the last two years by six participants.

The most popular of five specific newer underwriting tools used by survey participants for fully underwritten business are cognitive impairment testing (24), prescription drug database searches (24), tele-underwriting/telephonic screening (22), activities of daily living (ADL) measures (21), and additional questions on applications (17).

Ten survey participants reported offering simplified issue (SI) underwritten UL/IUL products. The individual middle-/upper-income and corporate-owned life insurance (COLI)/bank-owned life insurance (BOLI) markets were the top two markets among survey participants where such products are offered. The most popular channel where SI UL products are offered is the brokerage channel with nine of the 10 offering products in this channel. The most common underwriting tools

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used in this market are MIB reports (10), prescription drug database searches (8), and a motor vehicle report (6). Four participants add “actively at work” questions to their simplified issue UL/IUL application that are not found in their fully underwritten UL/IUL application.

### Product Design

Fourteen of the 31 participants re-priced their UL/SG design in the last 12 months, and nearly all reported that premium rates on the new basis versus the old basis increased. Fifteen participants intend to modify their secondary guarantee products in the next 12 months.

Eight survey participants currently offer a long-term care (LTC) accelerated benefit rider on either a UL or IUL product. Four of the eight expect to develop an enhanced LTC combination product in the next 12 to 24 months and five additional companies expect to develop an LTC combination product in the next 12 to 24 months. This implies that nearly 42 percent of survey respondents expect to market LTC combination plans within two years.

The popularity of chronic illness benefits has been growing recently and 11 of the 31 participants reported they currently offer a chronic illness accelerated benefit rider on either a UL or IUL chassis. Six additional

companies expect to develop such a rider in the next 12 to 24 months. This implies that nearly 68 percent of survey respondents expect to market either an LTC or chronic illness rider.

### Compensation

Compensation structures are quite varied among survey participants. Ten of 26 participants reporting compensation do not vary commissions and marketing allowables by product type. Median commissions were similar between all UL products and cash accumulation IUL. Indexed UL with secondary guarantees and current assumption IUL had slightly higher first-year commissions.

Few survey participants offer asset-based compensation on UL/IUL products, but its use is highest for cash accumulation UL/IUL. The same is true for levelized compensation on cash value enhancement (CVE) riders.

Rolling target premiums are the most common in cash accumulation IUL compensation programs, with 83 percent of AccumiUL respondents rolling target premiums. A rolling target means that if premium less than the commissionable target premium is paid in the first year, future premiums on the difference will attract first year compensation if those premiums are paid within a specified time. Target premiums are commonly rolled for a period of two years.

### Pricing

The use of stochastic modeling to evaluate UL/SG investment risk is used by 17 of 23 participants. This level of use is a significant increase over what has been reported for the past several years and may be attributed to the industry’s greater awareness of the risks involved in UL/SG products and the movement from a formula-based valuation framework to a principle-based approach.

Fourteen survey participants reported that the slopes of their mortality assumptions are more similar to the 2001 Valuation Basic Table (VBT) than the 1975–1980 Select & Ultimate Table or the 2008 VBT, and another




10 reported they are more similar to the 2008 VBT than the 2001 VBT or the 1975–1980 Select & Ultimate Table. Most participants vary their preferred-to-standard ratios by issue age and/or by duration. More than 71 percent of the companies assume that preferred-to-standard ratios eventually converge. Seventeen of the 31 participants assume mortality improvement in pricing UL/IUL products.

### Illustration Testing

Twenty of the 31 survey participants reported they find that illustration actuary requirements create constraints in UL/IUL pricing. The majority of those participants also believe the constraints are more severe for certain product types, especially ULSG. Various solutions were reported to overcome illustration actuary challenges. Also, a variety of practices are employed regarding illustrating in-force policies if the lapse support test fails. About half of the responses indicated a negative impact of the low interest rate environment on the ability to support illustration testing of in-force business and illustration testing of new business.

### Conclusion

How does your UL/IUL product portfolio compare to the competition? This is a market that requires constant attention to the latest trends and issues to remain competitive. The information in this article provides a benchmark for UL/IUL carriers to answer this question.

A complimentary copy of the executive summary of the May 2012 Universal Life and Indexed Universal Life Issues report may be found at <http://insight.milliman.com/> 



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#### END NOTES

<sup>1</sup> LIMRA International, Inc.

## Model Efficiency Study Results Report Now Posted

The report summarizes the findings of a stochastic modeling efficiency study.

View the report at [SOA.org](http://SOA.org)—click on research, completed research projects and life insurance.

# Highlights of the June 2012 Life and Annuity Symposium

By Kurt Guske and Jim Filmore



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**K**urt and I wanted to share some of our personal highlights from the Society of Actuaries June 2012 Life & Annuity Symposium in Los Angeles. We encourage members of the Product Development Section to take advantage of our LinkedIn group so you can share your thoughts on any of the sessions you attended at the Life and Annuity Symposium as well as any others topics of professional interest.

## Session 31: "Life Insurance Illustration Regulation: 15 Years Later" (Jim Filmore)

One of the most memorable sessions for me was "The Life Insurance Illustration Regulation: 15 Years Later." In that session, Kurt Guske moderated speakers Gayle Donato and Donna Megregian. The presentations started with a recap of why the life illustration regulation was created: namely, to address concerns regarding illustrations that were potentially misleading due to vanishing premiums, illustration of aggressive non-guaranteed assumptions (such as interest or dividends) or use of inconsistent terminology in illustrations created by different companies. The Life Insurance Illustration regulation was effective for certain life policies with non-guaranteed elements issued after Jan. 1, 1997. They highlighted key elements to consider when demonstrating that a policy is not lapse supported and that it also meets the self-support test. A large part of the discussion revolved around special considerations regarding indexed universal life and in-force policy testing. Throughout the presentation, Gayle and Donna polled the audience to see how they interpret or would apply sections of the regulation and Actuarial Standards of Practice (ASOP) 24. That certainly made for a lively debate as it appears there are still grey areas when it comes to application of the regulation and ASOP. If you missed the meeting, then the PowerPoint slides can be found on the SOA website under Day 2, Session 31; the session recording is also available. However, nothing can replace being there to participate in the debate, which continued even after the session ended.

## Session 53: "Advanced Mortality Topics" (Jim Filmore)

Kimberly Steiner moderated this session with Tim

Rozar and Lloyd Spencer as the speakers. In this session, Tim and Lloyd both did a great job covering a variety of topics related to mortality. Consequently, I found this session to be particularly interesting and relevant to my role as an individual life pricing actuary.

Tim opened by sharing some news: The global death rate has remained constant at 100 percent. Personally, I found that news shocking as I have been waking up daily at 5 a.m. to do a boot camp workout. I may start "sleeping in" to 6 a.m. given that immortality is apparently not feasible.

Next, Tim went into mortality topics such as compression, deceleration and seasonality. He defined compression as, "the tendency of older age mortality to improve at a slower rate than younger ages, leading to a rectangularization of the survival curve." Essentially, that means mortality improvements at younger ages are redistributed to deaths at older ages. I would add that you may also have heard others refer to this as a "squaring of the survival curve." Tim illustrated this point by graphing mortality in the United States and other markets (Canada, Australia, etc.) by issue age band and calendar year. There was a consistent downward trend in all issue ages as one moves forward in time. However, the younger issue ages had a steeper decline in mortality by calendar year. The phrase "rectangularization" or "squaring" of the survival curve comes from the graph that Tim displayed showing the percent surviving (y-axis) by attained age (x-axis). Over time, that graph has essentially moved from a diagonal line from the top left to the bottom right to an inverted hockey stick (an analogy hopefully appreciated by our members in cold weather locations in both the United States and Canada). If you can't visualize, then it may help to view slide 16 in the hand outs from this session, which can be found on the SOA website.

The next topic covered was mortality deceleration, which Tim defined as "the tendency for the rate of increase in mortality rates to slow down at older ages." Tim gave examples of other organisms (non-humans) showing that they typically exhibit this same mortality deceleration at their respective advanced ages.

Tim then defined mortality seasonality as “the tendency for deaths to be correlated with seasonal weather patterns.” He dispelled some common myths with respect to the seasonality of mortality and clarified any elements of truth in those myths.

Lloyd Spencer then took over as presenter and gave his thoughts regarding pricing life products with limited underwriting. He moved on to speaking about emergence of post-level term experience. In particular, I recall him displaying a graph containing data points of the post-level shock lapse rate and the resulting observed mortality. I enjoyed his reference to the “ocular method,” which he used to draw the trend line for the data points. If you don’t remember that from your statistics course, I encourage you to re-read your old textbooks (just don’t spend too much time on that one). Lloyd then went through additional post-level term analysis, including strategies that could be implemented to maximize profitability. Lloyd mentioned the “slow boil” method of raising post-level term rates as opposed to a rapid increase in rates. Personally, I have always used the “boiling a frog” analogy, but Lloyd’s use of lobsters in his analogy sounds tastier.

### Session 64: “Life and Annuity Product Development Strategies in the Wake of Low Interest Rates” (Kurt A. Guske)

In this session, it was my pleasure to moderate for an all-star cast of presenters: Rob Stone, David Weinsier and Tim Pfeifer. These experts discussed life insurance and annuity product development, in-force strategies, and pricing and risk management techniques to address risk in the current low interest rate environment. Rob focused on life products and risk management tools. David discussed annuity and in-force strategies. Tim talked about product alternatives and insurance company reactions to the environment, and gave some insights for how to handle the future.

#### **Life and Universal Life With Secondary Guarantee (ULSG) Products**

Rob’s discussion centered around universal life policies. He started with the fact that the ULSG market will continue to increase due to a market need. These products are easy to understand and for the agent to

“... the ULSG market will continue to increase due to a market need”

explain, and they provide a permanent product sale for the agent. In addition, there is not a lot of accumulation potential in today’s economic environment.

With the continuing ULSG market, Rob expressed concern with the long-term interest rate risk and how to evaluate the risk. Displaying a lot of pretty graphs, he suggested using deterministic interest rate scenarios, stochastically-generated scenarios, or a combination of deterministic and “hand-picked” stochastic scenarios to perform risk analysis. Deterministic scenarios are easier to explain the results to management as leaders can relate to the likelihood of the scenarios happening, for example, a Japan scenario.

One key takeaway for me on the impact of low interest rates was the realization that the long-term life statutory valuation rate for 2013 new issues is dropping to 3.5 percent.



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“ ... the long-term life statutory valuation rate for 2013 new issues is dropping to 3.5 percent. ”

#### **Annuity and In-Force Management**

David emphasized active in force management to combat the effects of low interest rates. On the asset side, he discussed several macro-hedging techniques such as structured trades, swaps, swaptions, and forwards to protect GAAP income and capital. On the liability side, he discussed how companies have lowered credited rates and increased non-guaranteed charges, fees and COIs.

David also talked about how companies are turning their attention toward fee-based products, revising profit targets based on a risk free rate plus spread approach, and lowering comp.

Lastly he emphasized that regardless of the strategy your company chooses, for capital planning and risk analysis it is critical to have the necessary tools in place for financial forecasting. The financial forecasting tools

enable strategic business decisions to be made under a wide range of potential economic scenarios in order to measure accounting and economic impacts.

#### **New Product and Corporate Strategies**

Tim stated there's no silver bullet for dealing with interest rates. There are risks to interest rates falling further as well as rapidly increasing.

Company reactions to the low interest rate environment include lowering crediting rates, lowering guaranteed rates on new products, and increasing policy loads.

Product strategies include indexed products—especially with guaranteed lifetime withdrawal benefits (GLWB) to provide future income. He expects to see more market value adjustments. There will be pressure for more leveled compensation.

A key takeaway from Tim's discussion was the fact that 7702 guidelines become more artificial the further interest rates fall. There could be issues with policies complying as a result. □



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**UL Deep Dive Part I—Protection Market/UL Deep Dive Part II—Accumulation Market**

Sessions 42 and 54

Part 1 will review the role of universal life products in the protection market, recent changes in product design, and the influence of economic and regulatory environments. Part II will cover the role of universal life products in the accumulation market, recent changes in product design, and the influence of economic and regulatory environments.

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Session 135

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# Report on Premium Persistency Assumptions of Flexible Premium Universal Life Products

By Carl Friedrich, Donna Megregian and Sue Saip

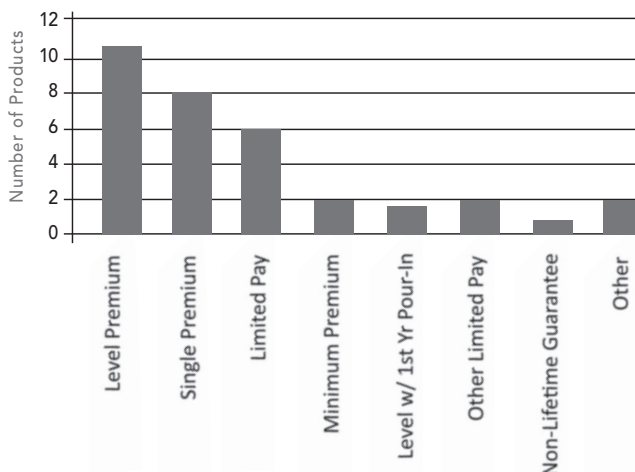
Premium persistency assumptions were the focus of a Society of Actuaries report published in May 2012. This particular assumption was of interest to many since industry data is relatively scarce and with principle-based reserves requirements, studies related to this topic are desirable to validate and weigh against company data.

The 88-page report details assumptions for products including universal life with secondary guarantees (ULSG), cash accumulation universal life (CashAccum), current assumption universal life (CAUL), indexed universal life (IUL) and variable universal life (VUL). The 29 companies and 83 products represented in the report allow for an interesting perspective on premium persistency assumptions used in pricing, cash flow testing (CFT) and generally accepted accounting principals (GAAP)/international financial reporting standards (IFRS) functions. This article will cover some general results and ULSG-specific results. Details on other products covered in report can be found at <http://www.soa.org/Research/Research-Projects/Life-Insurance/research-premium-persist-assumptions.aspx>.

## Highlighted Findings

Many participants assume 100 percent premium persistency, but it is applied across different premium

**Figure 1**  
Funding Patterns Assumed in ULSG Pricing



payment patterns. For example, various patterns would include 10-pay, 20-pay and lifetime pay and each of those patterns would have 100 percent premium persistency. This is noted as interesting since the report writers did not believe that all funding patterns actually result in 100 percent premium persistency. However, even if that assumption is valid, with the various funding scenarios recognized, the overall premium pattern for the product would be a declining premium.

Almost half of the ULSG participants indicated they adjust premium persistency assumptions to keep the policy in force in pricing but not much is done in CFT or GAAP/IFRS. It appears that for CFT purposes or for GAAP/IFRS purposes, a simplified approach is preferable. CFT and GAAP/IFRS tend to have few premium payment patterns and less modification of premium persistency assumptions.

The major modification area for premium persistency assumptions was duration. Other areas such as distribution channel, age, gender and inclusion of rolling target commissions did not affect the premium persistency assumption materially, if at all.

Sensitivity testing of premium persistency assumptions and dynamic premium persistency assumptions were rarely used by the participants of the survey. Those that did sensitivity test this assumption reported seeing variation in profit. Changes in premium persistency would likely impact profitability and may need to be considered when analyzing risks for flexible premium products. If the assumption is being handled through other testing, this exercise may not be as important.

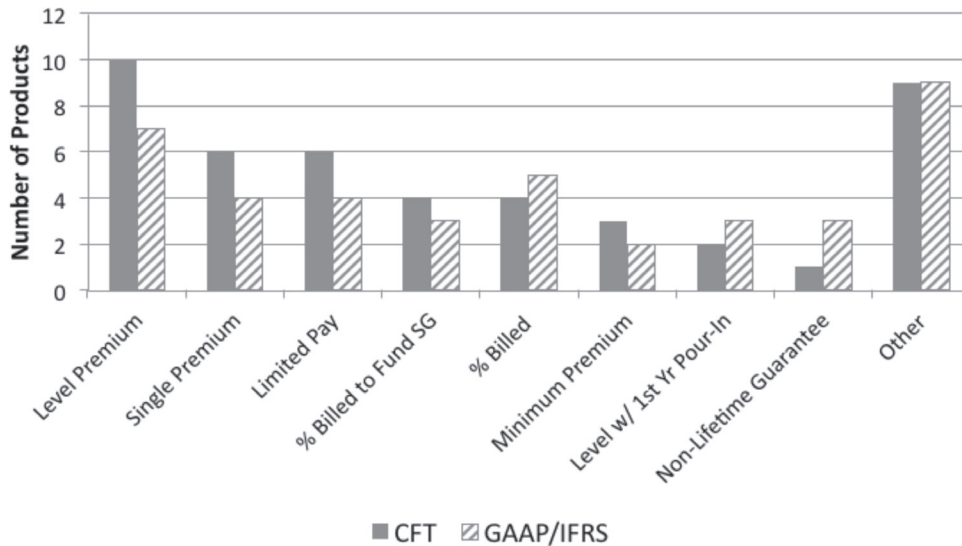
## ULSG-Specific Results

Figure 1 (left) shows the funding patterns assumed in ULSG pricing and Figure 2 (page 14, top) shows funding patterns assumed in CFT and GAAP/IFRS. More diversity is reported for CFT and GAAP/IFRS than for pricing, but that could be explained by the fact that more information is available to companies then, including premium histories and planned premiums for each policy.

Many companies reported pricing assumptions were not the same as used in CFT or GAAP/IFRS. Only



**Figure 2**  
**Funding Patterns Assumed in ULSG CFT and GAAP/IFRS**



three responses indicated that pricing, CFT and GAAP/IFRS were equal as shown in Figure 3 (right).

The average premium persistency assumption for pricing for those companies not reporting 100 percent persistency is summarized in Figure 4 (pg. 16, top).

In noting the large first-year numbers relative to the number in duration 2 and later from Figure 4, these factors would include single pay and roll-over business. Notable drops in duration 11 would reflect the inclusion of limited 10-pay business.

Much lower average factors were reported when looking at CFT and GAAP/IFRS. Figures 5 (pg. 16, bottom) and 6 (pg. 17) show the average premium persistency factors for ULSG CFT and GAAP/IFRS respectively.

FIGURE 3	
Comparison	Number of ULSG Products
Pricing ≠ CFT = GAAP/IFRS	12
All different	6
All equal	3
Pricing = GAAP/IFRS ≠ CFT	2
Other	2

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**FIGURE 4**

Average Premium Persistency Factors for ULSG Pricing

Duration	Issue Age Range							
	<20	20-29	30-39	40-49	50-59	60-69	70-79	80+
1	153%	240%	348%	456%	456%	510%	770%	770%
2	81	85	85	85	85	85	76	76
3-5	80	84	84	85	85	85	76	76
6 - 10	80	84	85	85	85	85	76	76
11-15	77	81	82	82	80	80	70	68
16 - 20	77	81	82	82	80	80	68	68

**FIGURE 5**

Average Premium Persistency Factors for ULSG CFT

Duration	Issue Age Range							
	<20	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79	80+
1	136%	136%	136%	136%	136%	136%	136%	136%
2	66	66	66	66	67	66	66	66
3	64	64	64	64	64	64	64	64
4	63	63	63	63	64	64	63	63
5	62	62	63	63	63	63	63	63
6	62	62	62	62	63	63	62	62
7	62	62	62	62	62	62	62	62
8	61	61	62	62	62	62	62	62
9	61	61	61	62	62	62	61	62
10	61	61	61	61	62	62	61	61
11	61	61	61	61	60	60	59	57
12	61	61	61	61	60	60	59	57
13	60	61	61	61	60	60	59	57
14	60	60	61	61	60	60	59	57
15	60	60	60	61	60	60	59	57
16	60	60	60	61	59	59	57	57
17 - 20	60	60	60	60	59	59	57	57



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**FIGURE 6**

Average Premium Persistency Factors for ULSG GAAP/IFRS Purposes

Duration	Issue Age Range							
	<20	20 – 29	30 – 39	40 – 49	50 – 59	60 – 69	70 – 79	80+
1	163%	163%	172%	181%	181%	185%	201%	201%
2	67	71	71	72	72	72	66	66
3	65	69	69	69	70	70	64	64
4	64	68	68	68	69	69	63	63
5	62	67	67	67	68	68	62	62
6	62	66	66	67	67	67	61	61
7	61	66	66	66	66	66	60	60
8	60	65	65	65	66	66	60	60
9	60	65	65	65	65	65	59	59
10	59	64	64	65	65	65	59	59
11	59	64	64	64	63	63	57	55
12	58	63	64	64	63	63	56	55
13	58	63	63	63	62	62	56	55
14	57	63	63	63	62	62	56	54
15	57	62	63	63	62	62	55	54
16	57	62	62	62	62	62	54	54
17	57	62	62	62	61	61	54	54
18	57	62	62	62	61	61	54	54
19	56	62	62	62	61	61	53	53
20	56	61	61	61	61	61	53	53



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## Conclusion

The report and addendum material is extensive and valuable. Although assumptions used in pricing, CFT and GAAP/IFRS are not always the same, there are some good reasons for them not to be. Premium persistency assumptions tend to be detailed when used in pricing (as opposed to valuation). We believe that is appropriate and is warranted to identify and mitigate risks in the products. CFT and GAAP/IFRS can use actual premium

persistency data that may not vary as much as pricing. The report results imply simpler patterns and scenarios are often used when working with larger models such as CFT and GAAP/IFRS. There may be reason to include more premium persistency assumption stress testing in pricing, as often variation in premium persistency will impact profit results, potentially materially. □

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# A Primer on Reinsurance Pricing Strategy: A Checklist for Optimizing Reinsurance Negotiation

By Larry Warren

*Editor's Note: The following article is part two of a two-part series regarding reinsurance quote negotiation. For part 1, see the June 2012 issue of Product Matters!*

This article is written with the idea that both the reinsurer and the direct writer could benefit from fully exploring all appropriate assumptions and considerations directly and indirectly impacting reinsurance pricing. The reinsurer benefits by being able to offer the lowest yearly renewable term (YRT) rates and the most competitive pricing it can justify, enabling it to win a share in the pool. The direct writer benefits by giving the reinsurer the additional insights and justification for a lower priced quote, thus reducing its reinsurance premiums and increasing bottom-line net income. This article addresses such assumptions and considerations based on my experience on the direct writer side of the negotiation. Part 1 of this article addressed important assumptions in reinsurance pricing. Part 2 addresses other important considerations.

## Important Additional Considerations

### 1. Reinsurance is Not a Commodity

Purchasing First Dollar Quota Share YRT reinsurance is not exactly like purchasing a commodity where reinsurers with the lowest prices are necessarily the best deals.

Credit rating, financial strength, services provided, jumbo limits, facultative capacity, and transactional facility (ease of doing business) are some of the important attributes that should be recognized when selecting reinsurers.

### 2. Treaty Language and Provisions

Treaty language and provisions often vary from reinsurer to reinsurer and play an important role in the amount of effort and manpower needed in the overall administration of the reinsurance arrangement, meeting the expectations of both parties and the associated costs. Provisions such as errors and oversights and policy changes should be crisply and clearly written to prevent potential future disputes. Inclusion in your treaty documents of specific, clarifying examples may be quite helpful in preventing future interpretation issues.

Writing, defining and structuring treaty language and provisions is a specialist task requiring painstaking

attention to detail. But the effort can pay dividends in litigation savings for both sides by preventing conflict in the first place. Elaborating on this aspect is beyond the intended scope of this article but it is worth mentioning two particular treaty provisions that, if not drafted with precision, can have significant financial ramifications for both parties.

## Reinsurer Premium Guarantee Provision

The premium guarantee language must be clear, effective and have teeth. As indicated in part 1, the reinsurer's choice of which mortality table to assume (i.e., which mortality table they believe reflects the appropriate slope for the company to which they are quoting) and what level of mortality improvement factors to assume, have the greatest financial impact in pricing. There is clearly a significant amount of judgment and subjectivity involved in these two important assumptions and hence in projecting future mortality which the reinsurer uses in developing its pricing.

In a scenario where the actual claims are following the slope of the 1990–95 mortality table and the reinsurance premiums have been based on the 1975–80 mortality table, the mortality claims will increase at a faster rate than the reinsurance premiums. In a few short years, the reinsurers would find themselves in a situation where mortality claims are now considerably higher than the reinsurance premiums. This observation, or shall we say revelation, comes at a time as the experience unfolds, when the reinsured block of in-force business has become quite large and is generating significant losses to the reinsurers. A similar effect would also occur if the mortality improvement that the reinsurer built into its pricing fails to materialize.

To avoid or mitigate the recurring impact of significant losses, the reinsurers may consider raising rates, especially when the premium guarantee provision in the treaty is weak, unclear or ambiguous, which has very often been the case in YRT reinsurance.

An example of recommended premium guarantee language in YRT treaties that should prevent the reinsurer from raising its premium rates on in-force business follows:



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1. *“We anticipate that the YRT rates shown in this agreement will be continued indefinitely for all business ceded under this agreement. However, because of statutory deficiency reserve requirements, the only guaranteed premiums are premiums equal to the 2001 CSO Mortality Table discounted with the maximum prevailing statutory interest rate according to the issue year.”*

#### AND

2. *“We may only increase YRT rates if we increase rates for our entire class of YRT business with **each** of our clients. If we increase YRT rates, then you have the right to immediately recapture without penalty or recapture fee, any business affected by such increase.”*

The original intent of the first paragraph of the premium guarantee provision was to guarantee the current reinsurance premium rates in such a way that the reinsurer could not raise its rates. If the reinsurer, however, explicitly guaranteed the current rates, it would be required to set up deficiency reserves. Therefore, the language was constructed in a way that falls short of actually guaranteeing the treaty rates.

The first paragraph, although quite common, gives the direct writer limited protection against the reinsurer increasing its rates on in-force business for any reason it considers justified—or even for any reason at all. The ambiguity in this paragraph can lead to disputes and arbitration proceedings with serious financial repercussions to the direct writer, reinsurer, or both.

The second paragraph denies the reinsurer the right to raise the treaty YRT rates unless it also raises YRT rates applicable to all other clients. Thus, by virtue of the second paragraph, a reinsurer experiencing significant losses as in the scenario alluded to above can only raise rates if it does so globally across all its YRT treaties, even for clients with favorable experience. Only a reinsurer exiting the YRT business would follow this course of action. Even in such an extreme case, the direct writer would have the ability to recapture without fee or penalty.

Clearly, the addition of the second paragraph substantially protects the ceding company. Keep in mind that requesting the reinsurer make treaty changes to the benefit of the direct writer in one particular area may require concessions from the direct writer on other items in order to make the agreement work for both parties. The direct writer may need to prioritize the provisions most important to them to maintain the appropriate balance for both sides.

#### Recapture Provision

In a reverse scenario, if the actual mortality claim rates are following the slope of the 1975–80 mortality table and the reinsurance premium rates have been based on the 1990–95 table, then the reinsurance premiums will increase at a faster rate than the death claims. After a few years, the direct writer will find itself in a situation where the YRT reinsurance premiums are now considerably higher than its mortality claims. This usually occurs at a time when the reinsured block of in-force business is quite large and is generating significant reinsurance losses to the direct writer. The direct writer will be strongly motivated to improve its situation and will likely attempt to recapture its business.

The recapture provisions in most reinsurance treaties are ambiguous for first dollar quota share arrangements, usually to the detriment of the reinsurers. For example, some treaties have no limitation at all regarding the business eligible for recapture. They merely allude to a recapture period (often shown on a separate schedule page). Other treaties refer to the fact that facultative and reduced retention cessions are not eligible for recapture, but never clearly identify quota share arrangements as reduced retentions. In addition, treaty provisions are often silent as to whether an increase in the ceding company’s quota share retention (e.g., 10 percent to 100 percent), represents a true increase in retention scale or not. Of course, the ceding company would assert that it is to strengthen its justification to recapture. Since it is typically the reinsurers’ intent that quota share business not be subject to recapture, the treaty provision language must deal with this issue clearly and unambiguously.



Until such time that the reinsurers revise and clarify the recapture provisions in their treaties, we will find management teams of direct writers that will be compelled to focus on any ambiguous, unclear or vague treaty language to recapture business experiencing significant reinsurance losses. For additional information and details of the importance of this issue, see this author's article "The Recapture Provision, Is it up to Date?" in the March 2004 issue of the SOA publication *Reinsurance News*.

Another helpful article titled, "How to Lose a Million Bucks Without Really Trying: Oversights in Negotiating Reinsurance Treaties" by Clark Himmelberger, may be found in the January 2011 issue of *Reinsurance News*.

### **3. How Many Reinsurers Should be Selected to Participate in the Pool?**

There is no universal answer to this question. A higher number of reinsurers participating in your pool (e.g., six to eight) may increase the number of facultative outlets for your underwriters and increase automatic binding limits. It would certainly add stability to the pool in the event that some reinsurers decide to drop out after giving the required notice of termination. These are all important attributes of a pool of many reinsurers.

However, in today's business environment where most companies are very cost conscious, I suggest that a smaller reinsurance pool be considered.

There is typically an increase in overall reinsurance costs as we increase the number of participating reinsurers in our pool. When a large number of reinsurers participate in the reinsurance pool, there is an added burden and hence added cost related to managing paperwork and assisting multiple reinsurers through routine on-site underwriting, administration, and claims audits. Additional costs, which can become significant, relate directly to higher aggregate reinsurance premiums due to the fact that, in forming your pool, typically the lowest priced reinsurers are selected first. Therefore, each additional reinsurer will have a higher reinsurance premium rate than the previous one.

“ I suggest that a smaller reinsurance pool be considered. ”

Let's assume a pool consisting of only three or four reinsurers can be formed to support both the automatic binding limits and facultative outlets your underwriting team requires. This should not be too difficult to obtain. Then the remaining attribute still lacking is stability; thus we must be able to assure that, if one or two members terminate, there is sufficient time to find replacement reinsurance companies before actual termination takes place.

Establishing stability in a smaller reinsurance pool can be accomplished during the negotiation process by requesting that the customary 90-day notice of termination be changed to a 365-day notice. We now will have produced the same attributes of a large reinsurance pool with stability, lower reinsurance premiums and a less costly smaller pool.

### **4. Modification or Changes to Underwriting Guidelines or Requirements**

#### **A. Minor Changes in Underwriting**

When the direct writer modifies or changes its underwriting guidelines or requirements, there will be no credible mortality experience (reflecting this change or modification) to rely upon for some time afterward. Without credible mortality experience, the reinsurer will typically be more conservative out of necessity. If the underwriting guidelines or requirements were recently tightened, then the credible mortality experience reflecting the previous underwriting standards could be used as a starting point. A scaling factor recognizing the anticipated improved mortality can then be negotiated with each reinsurer. Some reinsurers will be more optimistic than others in their assumption of the level of mortality improvement resulting from the tightened underwriting, which can provide an opportunity for obtaining a more competitive quote from an aggressive reinsurer. Naturally, all of the considerations previously discussed in this article should be addressed in the negotiation process.

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When, on the other hand, underwriting guidelines or requirements are to be loosened, the rationale for this modification should be carefully explained to each reinsurer. The direct writer's underwriting department can be very helpful in communicating to each reinsurer what impact, if any, this underwriting change is expected to have on mortality for new business. The direct writer hopes this allows the reinsurer to get comfortable using the mortality experience reflecting the previous underwriting standards without any upward adjustment.

### **B. Major Changes in Underwriting**

Significant changes in underwriting requirements continue to be made throughout the industry. For example, the transition from using blood and urine to oral fluid (subject to age and face amount limitations) was a major change in underwriting. Some reinsurers were initially more cautious than others in determining what impact this would have on mortality rates and how to reflect this in their pricing. Even today, there is still a noticeable variation in reinsurer pricing differentials when comparing blood-tested business and non-blood tested (oral fluid) business. We will address this issue further in our discussion on flexible reinsurance selection procedure below. Increasingly, companies are moving away from oral fluid testing toward the use of the prescription drug (Rx) database, subject to age and face amount limitations, and often with the incorporation of automated underwriting programs. The objective is to accelerate, simplify and streamline the agent and customer application and underwriting process.

Exactly what impact this will have on mortality rates and how to reflect this in their pricing is currently a big challenge to both direct writers and reinsurers alike. It should therefore come as no surprise that currently there is a significant variation among reinsurers in their pricing differential between blood-tested and nonblood-tested (using an Rx data base) business.

### **5. Flexible Reinsurance Selection**

After discussing and fully exploring all appropriate assumptions and considerations with each reinsurer as outlined in this article, it may be advantageous to consider the feasibility of using a flexible reinsurance selection procedure (FRSP), a term I took the liberty to

coin and which will be addressed shortly. Typically, on a first dollar quota share arrangement, each reinsurer would assume a fixed percentage of the face amount for each and every life reinsured regardless of the risk classification of that life (e.g., male/female, smoker/nonsmoker, blood-tested/nonblood-tested, etc). The ranking of the various reinsurance quotes is then developed by applying weights to the YRT rates of each reinsurer based on an assumed distribution of new issues by underwriting risk classification.

Some reinsurers have very competitive rates for male lives, but are not as competitive for female lives. This could happen, for example, when reinsurers build in aggressive mortality improvement factors for male risks but little or no mortality improvement factors for female risks. Similarly, some reinsurers can have very competitive rates for blood-tested business, but uncompetitive rates for nonblood-tested business. (This disparity can be especially pronounced in those situations when the use of the prescription drug database replaced the collection of oral fluid and urine).

In these situations, one should consider using an FRSP by reinsuring the blood-tested business and the nonblood-tested business separately. This would enable the direct writer to choose one group of reinsurers with the lowest prices for their blood-tested business and another group of reinsurers with the lowest prices for nonblood-tested business. Of course, some reinsurers will be competitive for both blood-tested business and nonblood-tested business and will be chosen for both risk pools. A similar approach could be employed when and if a big a disparity in rates exists between male and female lives.

It is hoped the ideas touched upon in this article will give the reader additional insights and knowledge into the important pricing concepts and considerations called upon in reinsurance pricing, and will serve as "a checklist for optimizing reinsurance negotiation." □



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# Target Volatility Fund: An Effective Risk Management Tool for VA?

By Yuhong (Jason) Xue



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In the past few years, many institutional investors and hedge and mutual funds managers have embraced an investment strategy known as volatility targeting, aimed at maintaining a stable level of volatility for the whole portfolio. Compared to the traditional fixed-allocation strategy such as the popular 70 percent equity and 30 percent bond strategy (70/30), a target volatility fund moves money from risky assets (i.e., stocks) to safer assets (i.e., bonds), or vice versa, to achieve the right level of volatility for the investment.

This concept is behind many investment buzz words related to controlling risk such as risk allocation, risk budgeting, or risk parity. It relies on two basic empirical facts about the market: 1) market volatility and return have strong negative correlation; and, 2) high or low volatility tends to cluster together for a sustained period of time. Recent market history has reinforced these empirical facts such as with the highly volatile market crash of late 2008 and the calm period of double-digit returns of the late 1990s. During these two periods, we can clearly observe that spans of high or low volatility tend to persist for a sustained stretch of time.

Over the past year, many insurance companies have added target volatility funds to their variable annuity

(VA) fund lineup. Unlike typical mutual fund investors, VA policyholders have a very long investment horizon. Is volatility targeting a better strategy than the traditional fixed-allocation strategy over the long term? Unfortunately, the history of these funds is too short to answer this question. A literature search of academic and industry research does, however, provide positive answers.

In research published by the EDHEC Risk Institute, Stoyanov (2011) used the Heston model calibrated to long-term equity market data to show that volatility targeting reduces downside exposure and improves upside potential compared to a fixed-allocation strategy for long-term investors. Busse (1999) empirically found positive correlation between mutual fund returns and their volatility timing activity. Other academic research papers based on various volatility forecasting models have also shown positive economic value for volatility timing.

However, there are a few important pieces missing from the existing research:

1. The researchers assume the instantaneous volatility of the market is known, and they use the continuous market assumption. In reality, fund managers will make allocation decisions based on a combination of historical realized volatility and market-observed implied volatility. In other words, fund managers react to the market with a lag. Thus, these funds are vulnerable to a sudden market movement, or jump risk. The market has experienced sudden jumps, such as the 1987 crash, the 9/11 terrorist attack, or the more recent S&P downgrade of the U.S. government. With the looming debt crisis in the eurozone and ever-increasing geopolitical risks, sudden market jumps look more likely than ever. How well will volatility targeting hold in this environment? Existing research has not provided an answer.
2. Some funds use leverage to enhance returns, but leveraging can greatly amplify the jump risk. Yet existing studies have not been focusing on the impact of leveraging on the risk profile.
3. Finally, the existing research has been focusing on



the ultimate wealth accumulation for the investors. However, most VAs offer step-ups, roll-ups, or other bonuses. The increased wealth of the policyholders may not reduce the risk of the VA writers because the guarantees may also increase. Is volatility targeting effective in reducing the risk for VA writers as well as investors?

Contrary to existing research that favors volatility targeting over fixed allocation, this article will show that because of the existence of market jump risk, target volatility strategy does not necessarily offer an improved risk profile for VA writers. Investors may favor one strategy over the other based on their own evaluation of the jump risk. Further, target volatility coupled with leveraging can significantly increase tail risk for insurance companies.

### The Approach

The analysis uses a model of one VA policy with a lifetime guaranteed minimum withdrawal benefit (GMWB) rider, which will start withdrawing the guaranteed amount after 10 years. The policy assumptions are shown in the chart below.

There are only two asset classes, equity and cash. Equity returns are modeled stochastically. The cash is assumed to return 2 percent per annum with zero volatility.

Two investment strategies are modeled. The fixed allocation strategy invests 70 percent in equity and 30 percent in cash. The investment is adjusted monthly so that it always maintains a 70 percent weighting in equity. The target volatility strategy rebalances monthly so that the trailing six months realized volatility of the whole portfolio is as close to a long-term target as possible.

The long-term volatility target is set to be equal to the long-term volatility of the 70/30 strategy so that the strategies can be compared directly.

Both account value (AV) and the guaranteed withdrawal balance (GWB) are projected at the end of years 10 and 15. We will simulate 1,000 equity paths and compare the distribution of AV and in the moneyness (ITM), defined as AV/GWB of the two strategies. The AV represents the accumulated wealth of the policyholder while the ITM reflects the risk of the VA writer.

Issue age	Gender	Initial Premium	Step up	Roll up bonus	Guaranteed withdrawal rate at year 11	Rider charge (bps)	M&E fee (bps)	Fund expenses (bps)
60	Female	\$100,000	Annual	7%	5%	90	130	90

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“ Volatility tends to cluster together. It tends to remain high or low for a sustained period of time. ”

### The Equity Model

There has been strong empirical evidence that suggests against the normality hypothesis used in traditional market theory. In fact, market participants have observed:

- Volatility tends to cluster together. It tends to remain high or low for a sustained period of time;
- Return distributions are fat-tailed and skewed; and
- Current price changes depend on past price changes.

A model that reflects these characteristics in continuous time was proposed by Heston (1993). Its volatility follows a square root stochastic process with mean reversion.

However, equity market returns can experience jumps, a phenomenon that challenges the continuous assumption of the Heston model and other models based on a smooth market. An extension to the Heston model introduces a jump term to the stock returns. It is often called the stochastic volatility jump diffusion (SVJD) model, or the Heston model with jumps. The jump’s occurrence is controlled by a Poisson process and its size is log-normally distributed with a downward bias. The stock distributions modeled by SVJD are not only fat-tailed with clustering volatility, but they are also more skewed with strong asymmetry in the upside and downside potential. SVJD is therefore used widely in studying dynamic asset allocation for long-term investors.

Due to the above considerations, this exercise uses SVJD to model equity returns. However, instead of directly calibrating the model to historical data, the analysis uses a phased approach. First, the Heston model calibrated to historical S&P monthly total returns over the past 10 years was used to validate the conclusions of some of the existing research on target volatility. Then a jump term of varying size and frequency was added to the return to study the impact of jumps on the risk profile. Finally, the model allowed

a certain amount of leverage in the fund, to study the impact of jumps on leveraged investment.

### Phase 1: The Calibrated Heston Model

In the Heston model, the equity return dynamic is described by the following stochastic differential equations (SDEs):

$$dS_t = \mu S_t dt + \sqrt{v_t} S_t dW_s$$

$$dv_t = \pi(\theta - v_t)dt + \sigma\sqrt{v_t}dW_v$$

$$dW_s dW_v = \rho dt$$

where  $\rho$  is the correlation coefficient of equity return and volatility,  $\pi > 0$  is the speed of mean reversion,  $\theta > 0$  is the long-run level and the unconditional mean of  $v_t$ , and  $\sigma > 0$  is the volatility of volatility.

Stoyanov (2011) calibrated the Heston model to the monthly S&P 500 return for February 2002 to June 2010. The following are the parameter estimates:

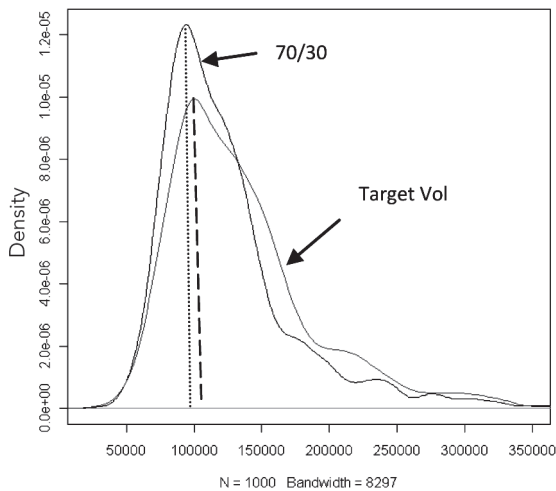
$\pi$	$\theta$	$\sigma$	$\rho$	$\mu$
0.2145	0.0314	0.0955	-0.65	0.0072

The model simulated 1,000 equity paths and projected the AV along each path under the 70/30 and target volatility strategies. The equity weighting is capped at 90 percent in the target volatility case to prevent leveraging at this phase. It will be increased in phase 3 when impact of leveraging will be tested. Similar to Stoyanov, the target volatility strategy results in a better risk profile than the fixed 70/30 strategy. Figure 1 shows the comparison of the densities of the two distributions. The AV and ITM distribution produced by the target volatility strategy tilt to the right compared to those produced by the 70/30 strategy. It limits the left tail but at the same time increases the upside potential on the right side. And the target volatility distribution always peaks at a point (on the X-axis) bigger than the



70/30 does. This suggests that under the Heston model, target volatility is a better strategy not only for the investors (AV) but also for the VA writers (ITM). But will this conclusion hold under jump risk?

**Distribution of AV end of year 10: Heston**



**Distribution of ITM end of year 10: Heston**

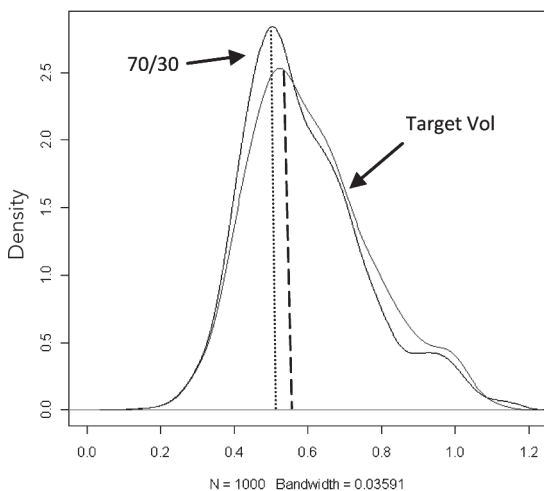


Figure 1: Distribution produced by Heston model. Density of distribution using target volatility compared to density of distribution of 70/30 strategy.

**Phase 2: Layering on Jumps**

The SDE of the SVDJ can be specified as follows:

$$dS_t = (\mu - \lambda g)S_t dt + \sqrt{v_t}S_t dt + (e^q - 1)dQ$$

$$dv_t = \pi(\theta - v_t)dt + \sigma\sqrt{v_t}dW_v$$

$$dW_s dW_v = \rho dt$$

Compared with the Heston model, the process of  $v_t$  is exactly the same. But the equity return process has an extra jump term.  $dQ$  is a Poisson process with intensity  $\lambda$ . The probability of having  $n$  jumps over the investment horizon  $\tau$  is  $e^{-\lambda\tau} \frac{(\lambda\tau)^n}{n!}$ . The term  $g = E(e^q - 1)$  captures the mean percentage jump conditional on the jump happening;  $q$  is assumed to be normally distributed with  $N(\mu_q, \sigma_q^2)$ . The drift term of the return process of the Heston model is adjusted by  $\lambda g$  so that the overall average return stays the same.

Wu (2003) has calibrated the jump parameters specified in Merton's model to the S&P 500 index using data from the period of 1962–97. Although the model used by Wu is different and the data used in the calibration is not recent, the jump size and intensity are nevertheless indicative, and the author will use them as a starting point. The size and intensity of the jump term will be gradually increased to study the impact of this risk. The following are Wu's jump parameters:

$\lambda$	$\mu_q$	$\sigma_q$
0.45	-0.044	0.088

One thousand equity paths were simulated using the Monte Carlo method based on the SVJD model. The target volatility and 70/30 strategies were also simulated along each path. Figure 2 (see pg. 26, left) shows one equity path, the trailing six-month realized volatility and the equity weighting of the portfolio assuming a target volatility strategy. The equity weighting is capped at 90 percent to prevent leveraging at this time.

CONTINUED ON PAGE 28

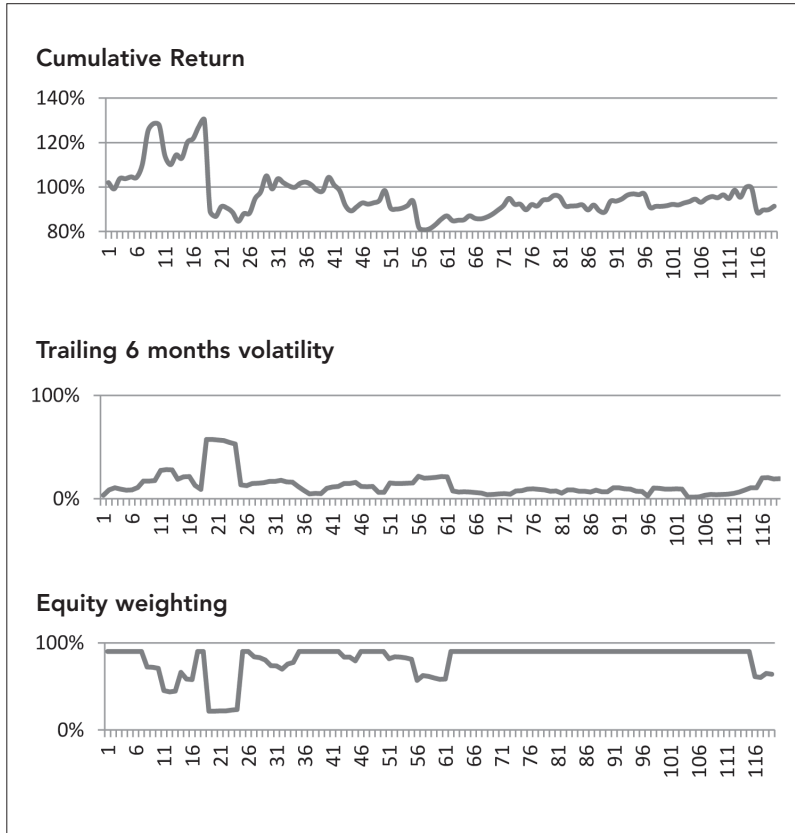


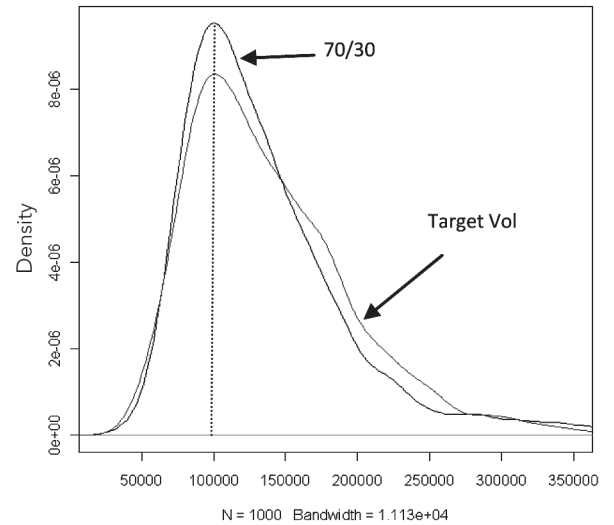
Figure 2: One simulated equity path based on the SVJD model for the first 120 months

Figure 3 (right) shows the projected AV and ITM at the end of 10 years along these 1,000 paths. Although target volatility thickens the right side of the distribution, unfortunately it also fattens the left side. The distributions of both strategies also peak at around the same point on the X axis. In fact, volatility targeting seems to simply flatten the distribution, which is an indication of increased risk.

Intuitively, because the rebalancing of funds is a reaction to market movement, it always lags behind in terms of adjusting to the right equity weighting. When the market is smooth, it allows the strategy to catch up and adjust to the right equity proportion. But when the market experiences a significant dislocation, the portfolio suffers a big loss or misses a big market run up before it has time to adjust. Depending on the size and intensity of the jumps, target volatility strategy may not

produce a better risk-and-return relationship than the traditional fixed-allocation strategy.

Distribution of AV end of year 10: SVJD



Distribution of ITM end of year 10: SVJD

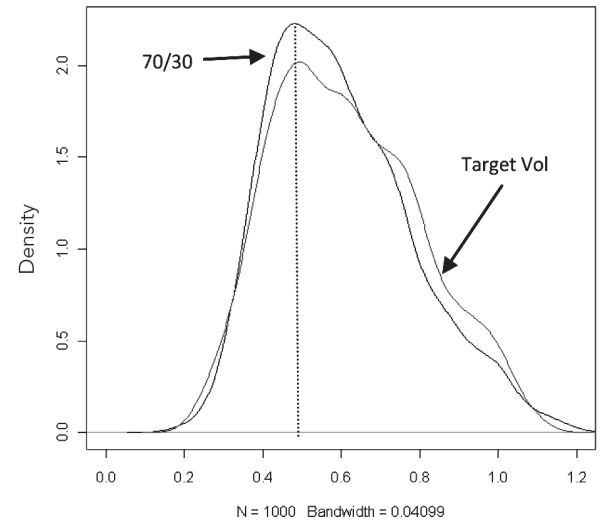


Figure 3: Distributions produced by SVJD model. Density of distribution using target volatility compared to density of distribution of 70/30 strategy.

### Phase 3: Impact of Fund Leveraging with Jump Risk

Some investment strategies based on target volatility rely on leveraging to enhance returns. Does it really work? The projection of AV and ITM for 10 years

was repeated, but this time, the equity weighting was allowed to go as high as 200 percent of the portfolio, essentially borrowing cash to purchase equity when volatility is significantly below the target. The jump frequency and size were also doubled to mimic somewhat extreme conditions. Figure 4 (right) displays the result.

The distributions of the AV and ITM are significantly flattened by the target volatility strategy. Both the left and the right tails are undoubtedly thickened, more so in the case of the ITM which reflects the risk to the insurance company. This result clearly demonstrates the danger of leveraging in the presence of market jump risk. Although leveraging can sometimes produce a higher mean return, the distribution is significantly widened, suggesting greater variance and risk.

### Final Thoughts

The results of this analysis, using the SVJD model, suggest that volatility targeting may not be a superior strategy to traditional fixed allocation in terms of risk-and-return profile, contrary to some existing research. The main reason is market jump risk. Big market surprises will sometimes lead to underperformance for a volatility targeting fund since it cannot react instantly. In addition, if leveraging is also allowed in such a fund, the jump risk will be amplified.

The VA writers should not automatically regard the volatility targeting strategy as a risk management tool. When offering funds with such a strategy under the GMxBs, companies should ensure that leveraging is not used and hedging strategies are in place within the fund to deal with the jump risk. More importantly, in analyzing the risks of any fund with some variation of the target volatility strategy, the equity scenarios generated by a process with the continuous market assumption may not be adequate any more. Companies should adopt a scenario-generation model that properly captures the jump risk, such as the SVJD.

The above analysis assumes a jump frequency and size consistent with the historical market data. One can have a different view with regard to these parameters and arrive at a different conclusion. Particularly, one can justify investing in a target volatility fund if he or she believes the equity market will have fewer surprises in the future.

**Distribution of AV end of year 10: SVJD/Leveraged**

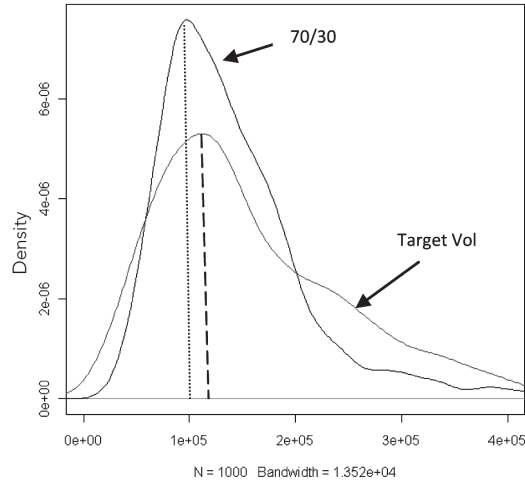
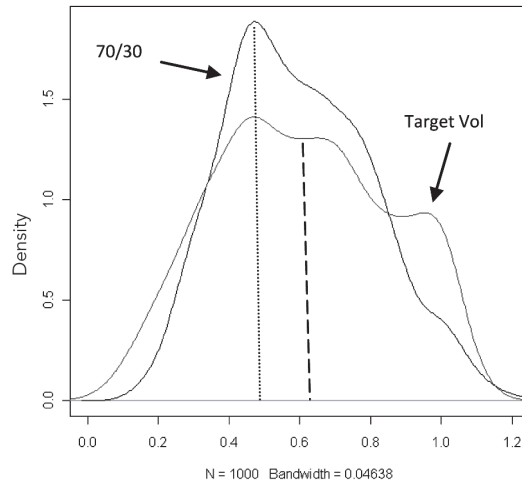


Figure 4: Distributions produced by SVJD model allowing fund leverage. Density of distribution using target volatility compared to density of distribution of 70/30 strategy.

**Distribution of ITM end of year 10: SVJD/Leveraged**



### Acknowledgement

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Wu, J., 2003, "Jumps and Dynamic Asset Allocation," *Review of Quantitative Finance and Accounting*, 20:207-243, 2003. □

# Around The World: Ghana

## Mobile phone insurance - err, no - mobile life insurance

By Greg Becker



Greg Becker is a product development actuary at the Reinsurance Group of America, in a role that covers Europe, the Middle East and Africa. He can be contacted at: [gbecker@rgare.com](mailto:gbecker@rgare.com).

This is the second article in our new series. Each issue focuses on the protection market of a different country or region, looking at interesting product developments, new distribution ideas, regulatory responses and industry initiatives. Ghana is leading the way with the sale of life insurance with the distribution and administration centered around a mobile phone. Will the future regulatory environment stimulate this type of innovative response, or prevent it?

The developing world continues to come up with innovations and solutions for distributing insurance products. Some may not be transferable to all markets, but this initiative shows the scope for mobile-based distribution. Many firms are currently looking at Smartphone applications, such as, iPhone apps. Some have decided to wait for a winner to emerge in the platform race. This interesting initiative shows what can be done with the type of cell phones Americans owned 10 years ago.

MTN<sup>1</sup>, one of the largest cellular operators in Africa, has been an innovator and is recognized as a global leader in pre-paid airtime. The company has made significant strides into financial services with its mobile banking, which currently comprises the MobileMoney account and related credit cards. MTN has looked to extend this success with a move into insurance with the launch of milife in Ghana, “the world’s first mobile money m-insurance service.”

MTN has partnered with Mobile Financial Services (MFS) Africa,<sup>2</sup> Hollard Insurance<sup>3</sup> and Golden Life Assurance Company to create this insurance:

- MFS sees itself as having the skills to bring value-added services to providers of mobile wallets;
- Hollard has had a proven track record of innovations, where it regularly develops new partnerships with distributors that have a well-known and trusted brand. It has generated more than \$190 million in premium income from the lower income market.
- The products are underwritten by the Golden Life Assurance Company of Ghana.

The milife initiative uses mobile phones in all customer communication, whether the application process, the collection of premiums from the policyholders’ mobile wallets, responding to customer service questions or claims reporting. Mobile phones also facilitate alternative forms of customer communication, including SMS-based reminders and the use of interactive menus that all combine to empower the customer. This administration platform allows them to offer a cost-effective product. This solution, with monthly premiums as low as 75 cents, is 50 percent to 70 percent cheaper than competitor products, according to a general manager for the company.<sup>4</sup> This is partly because MTN is able to benefit from the mobile-based administrative cost savings and also potential scale advantages.

It may surprise some that this initiative has been first launched in Ghana. It is likely a strategic decision to pilot this program in a smaller country in the MTN stable and in one with low HIV+ rates. If it is a success, then the combination of MTN’s infrastructure and Hollard’s track record of rolling out initiatives around the continent suggest that it will soon be seen in many African countries.

Many have looked to develop direct-to-consumer propositions, and in the United States and United Kingdom, most of these have been built around the Internet. Internet penetration (including broadband) is very low in Africa, and alternative routes to customers are needed. This shows the scope for insurance sales that are done without a bank branch or even a computer connected to the Internet. While necessity may be the mother of all invention, is a profitable opportunity the father?

Anyone looking at mobile insurance strategies should be advised to reconsider the role that Smartphones will play. Smartphone penetration is continually increasing and some platforms are rapidly gaining prominence, most notably Google Android. The introduction of tablet computers offers another intriguing opportunity, which has already been picked up by those in Lloyd’s

Market and various agent networks. Many commentators are debating as to whether this is the perfect piece of hardware to facilitate a discussion between a financial adviser and a customer. New ways to interact with customers will continue to emerge, and the low-cost characteristics and scale arguments should be equally applicable in the United States as they are in Ghana. Will the regulatory framework welcome new initiatives? Let's hope it will. □

#### END NOTES

- <sup>1</sup> <http://mtn.com>
- <sup>2</sup> <http://mfsafrica.com/>
- <sup>3</sup> <http://www.hollard.co.za/>
- <sup>4</sup> <http://blogs.ft.com/beyond-brics/2011/03/23/ghana-gives-mobile-insurance-a-go/>

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