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# Product Matters!

## The Fundamental Trends Reshaping Life Insurance

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# Chairperson's Corner

By Jeremy Bill

I recently attended a conference in Orlando and heard from a couple of speakers from the Disney Institute. These speakers shared insights about how Disney approaches business and leadership. Of course not everything that they do at Disney translates directly into the insurance business (at least I don't ever recall seeing Mickey Mouse at the SOA Annual Meeting). However, there were still some great takeaways that I think apply to life insurance, and specifically to product development.

One item that Disney does extremely well is to focus on the customer experience. In the context of their theme parks, they are very intentional about crafting the customer experience from the moment that someone arrives at the park.

They have designed the entrance to the parks so that the guests can take care of their basic needs first (strollers, sunscreen, maps, water bottles, etc.) before focusing on all of the "wants" that they may have for their visit. They intentionally keep the doors of their stores open so that the guests feel welcome and can come in to enjoy the air conditioning (and also to buy some

merchandise). They even go so far as to create the smell of fresh baked cookies and send that smell out into Main Street USA for the guests to enjoy. Yes, the park is designed with the customer experience in mind.

As we develop our life insurance and annuity products, I wonder if we are giving that same level of attention to the customer experience. As actuaries, I think our natural tendency is to focus on the financial aspects of the products and the risks that may be involved. These items are definitely important and they cannot be ignored, but I think we also need to recognize how the products we develop will be "experienced" by the customers.

There are many different ways that we can create a better experience for our customers. This may involve making our products or our processes simpler rather than more complex. It may involve using simpler language in describing our products rather than just adding more disclosures. It may involve developing completely new products to meet the needs of consumers. No matter which specific method we choose, the more we can focus on the customer, the more successful we will be.

It truly is amazing how much you can learn from a mouse. ■



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# The Fundamental Trends Reshaping Life Insurance

By Bartłomiej Maciaga, Alpesh Shah and Achim Schwetlick

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Six years after the global financial crisis, the reshaped contours of the market for the life insurance industry are coming into focus. As with any other turn of events, threats and opportunities abound.

The threats—notably low interest rates, regulatory scrutiny, customer concerns, and rising competition from banks, mutual funds, and other asset managers—should not obscure the sizable and growing opportunities.

Demographics and technology are all friendly forces for the industry. Insurers are well poised to help older people manage their assets in mature markets, especially as the government's

role in providing retirement income shrinks. In emerging markets, insurers can cater to the desire of the expanding middle class to save and plan for the future. Digital and mobile technologies are opening new, low-cost channels to consumers in all markets. (See Exhibit 1.)

This new environment will produce winners and losers. To understand what will separate the winners from the pack, we recently concluded a comprehensive global study of the life insurance industry. As part of our research, we interviewed senior executives in the 16 markets that generate 80 percent of global life-insurance premiums.

We detected five trends that will drive success in the future. Two of them describe how the design of products can improve profitability:

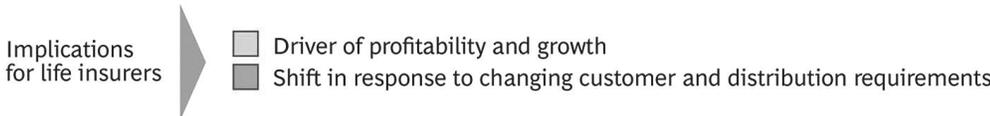
- Creating savings products without guarantees
- Tailoring protection products to untapped segments

Three trends respond to shifting consumer needs and behavior and changing distribution capabilities:

- Simplifying products and sales approaches for the mass market
- Customizing, without complicating, products for the affluent market
- Tapping the workplace as a new distribution channel

Exhibit 1 The Opportunities and Threats for Life Insurers

Opportunities	Threats
<p><b>Aging population</b></p> <ul style="list-style-type: none"> <li>• Rising need for retirement products <input type="checkbox"/></li> <li>• Greater awareness of changing needs because of increasing longevity <input checked="" type="checkbox"/></li> </ul>	<p><b>Low interest rates</b></p> <ul style="list-style-type: none"> <li>• Increasing pressure on profitability and costs <input type="checkbox"/></li> <li>• Worsening value proposition of insurers <input checked="" type="checkbox"/></li> </ul>
<p><b>Reduced support by governments and employers</b></p> <ul style="list-style-type: none"> <li>• Lower government pensions <input type="checkbox"/></li> <li>• Rising need for individual retirement products <input type="checkbox"/></li> </ul>	<p><b>Increasing regulatory scrutiny</b></p> <ul style="list-style-type: none"> <li>• Strengthening new rules for capital <input type="checkbox"/></li> <li>• Greater regulation of sales and conduct <input checked="" type="checkbox"/></li> </ul>
<p><b>Digitalization</b></p> <ul style="list-style-type: none"> <li>• Access to new customer segments <input type="checkbox"/></li> <li>• Need to reformulate personal advice <input checked="" type="checkbox"/></li> </ul>	<p><b>Growing customer concerns</b></p> <ul style="list-style-type: none"> <li>• Selling scandals and loss of trust <input type="checkbox"/></li> <li>• Increasing demand for transparency <input checked="" type="checkbox"/></li> </ul>
<p><b>Future customers</b></p> <ul style="list-style-type: none"> <li>• Emerging middle class <input type="checkbox"/></li> <li>• Demand for simple savings and protection <input type="checkbox"/></li> </ul>	<p><b>Competition from alternative providers</b></p> <ul style="list-style-type: none"> <li>• Banks with more flexible forms of savings <input type="checkbox"/></li> <li>• Asset managers offering retirement products <input checked="" type="checkbox"/></li> </ul>



Source: BCG analysis.

Exhibit 2 How the Trends for Driving Success in the Life Insurance Industry Are Taking Hold

		Profitability and growth drivers		Changing customer and distribution requirements		
		Creating savings products without guarantees	Tailoring protection products to untapped segments	Simplifying products and sales approaches for the mass market	Customizing, without complicating, products for the affluent market	Tapping the workplace as a new distribution channel
Europe	Austria	Established trend	Established trend	Established trend	Developing trend	Developing trend
	Belgium	Established trend	Established trend	Established trend	Developing trend	Developing trend
	France	Established trend	Established trend	Established trend	Developing trend	Developing trend
	Germany	Established trend	Established trend	Established trend	Developing trend	Developing trend
	Italy	Established trend	Established trend	Established trend	Developing trend	Developing trend
	Netherlands	Developing trend	Established trend	Established trend	Developing trend	Established trend
	Poland	Established trend	Established trend	Established trend	Developing trend	Established trend
	Switzerland	Established trend	Established trend	Established trend	Developing trend	Developing trend
	United Kingdom	Established trend	Established trend	Established trend	Developing trend	Established trend
U.S.	United States	Established trend	Established trend	Established trend	Developing trend	Established trend
Mature markets in Asia-Pacific	Australia	Established trend	Established trend	Established trend	Developing trend	Established trend
	Japan	Established trend	Established trend	Established trend	Developing trend	Developing trend
	South Korea	Established trend	Established trend	Established trend	Developing trend	Developing trend
Emerging markets in Asia	China	Established trend	Established trend	Established trend	Developing trend	Developing trend
	India	Established trend	Established trend	Established trend	Developing trend	Developing trend
	Indonesia	Established trend	Established trend	Established trend	Developing trend	Developing trend

Maturity of trend     Established trend     Developing trend

Source: BCG analysis.

These global trends have not taken hold equally in the 16 markets we studied, but they will blossom throughout most of the global insurance marketplace in the coming years. (See Exhibit 2.) The insurers that understand these trends and act quickly to develop products that respond to them will be able to overcome the well-publicized threats facing their industry and surf on the waves of opportunities that demographics and technology provide.

### CREATING SAVINGS PRODUCTS WITHOUT GUARANTEES

For decades, insurers relied on guaranteed savings products that offered high, stable returns, which appealed to customers looking for good yields and security upon retirement. Those days are dwindling. Falling interest rates and rising capital requirements prevent insurers from offering generous guarantees and are forcing them to rethink the savings proposition.

Asset management remains one of the most important strengths of insurers, but they now need to engineer financial solutions that provide assurances—rather than guarantees—of solid, steady, long-term performance. In this new environment,

insurers still have two strong advantages over traditional asset managers and banks: their reputation and their distribution networks, both of which they can use to promote new offers to retail customers.

The Standard Life Investments Global Absolute Return Strategies Fund is an example of this type of solution. From 2008 through 2013, the UK fund exceeded its target return of 5 percentage points over the six-month London Interbank Offered Rate by 3.6 percent annually. This performance, coupled with low volatility, has attracted investors. Assets have increased from £1 billion in 2008 to £20 billion in 2013, despite annual fees exceeding 1.5 percent for retail investors and no guarantee of returns. The fund takes both long and short positions globally and invests judiciously in derivatives to generate returns and minimize risk.

Swiss Life Premium Immo, another successful product without explicit guarantees, invests in commercial real estate in Switzerland and expects to earn around 4 percent annual returns after fees. Investors view the fund as an attractive alternative to purely financial products. Founded in 1857, Swiss Life, the nation's largest and oldest life insurer, is able to draw on the strength of its brand to introduce new product lines.

Moving into a world without guarantees has challenges. The new products will be similar to those offered by mutual funds and banks, and insurers will have to learn how to compete against these institutions. In addition to drawing on their brand and distribution capabilities, insurers will need to deploy sophisticated asset-management tools, such as dynamic portfolio rebalancing and hedging. Explaining these techniques to their sales forces, independent financial advisors, and customers may be challenging. Communication, marketing, and clear product descriptions will become more important than ever.

#### TAILORING PROTECTION PRODUCTS TO UNTAPPED SEGMENTS

As margins deteriorate for traditional savings products, protection products—such as term life insurance, disability insurance, and annuities—are becoming relatively more attractive to insurers. They provide new sources of income, generate steady margins, and diversify risks. Under new capital standards, such as the European Union's Solvency II directive, this diversification can help minimize capital requirements.

These products appeal to two large sources of relatively untapped demand: emerging markets and the low-income segments of mature markets. In emerging markets, the middle class has a growing appetite for protection products, while the low end in mature markets has historically been underserved. In all markets with an aging population, consumers are recognizing the value of products that offer steady retirement income and other services in old age. To broaden their offerings and increase margins, insurers increasingly embed additional services in protection products.

In China, for example, Taikang Life has created an innovative annuity that provides retirees with an apartment for life and optional medical care and other features. The product is aimed at older affluent consumers who are able to pay a large, single-contribution premium. The company plans to sell about 50,000 policies over ten years; 2,000 were sold in the first six months.

This new product enables Taikang Life to build a new revenue source and compete against banks. Other insurers are preparing to offer similar products. The winners will successfully pull together marketing, sales force training, and real estate expertise into an attractive package.

In South Korea, Hyundai Life responded to many consumers' perceptions that life insurance products are too expensive and confusing by offering an à la carte health-protection policy called Hyundai Life Zero. Customers can pick the particular risks, such as cancer, that they want to cover at a fraction of the cost of comprehensive, long-term health-care policies. And the benefits of the plan are so simple to understand that it is offered

online and by phone in addition to traditional channels. The insurer sold 15,000 policies in the product's first six months.

Despite their appeal, however, such products take insurers out of their comfort zone. Insurers do not have deep experience in many of these segments, so risk assessment and pricing—as well as developing low-cost sales channels—will be crucial. Since many of these products will offer coverage that is less than comprehensive, insurers must make sure that communications about coverage are clear and be prepared to manage risk and litigation.

#### SIMPLIFYING PRODUCTS AND SALES APPROACHES FOR THE MASS MARKET

Several forces are combining to encourage product simplification and streamlining. First, regulatory moves, such as the European Union's Insurance Mediation Directive, will impose greater expense, liability, and oversight on traditional products. Those products sold without the need for advice from an agent or sales executive will escape these burdens.

Second, declining returns have reduced insurers' ability to finance expensive channels with high management fees, especially for savings products.

Finally, consumers' buying preferences have changed, too, shifting toward online and direct channels. While such routes are less costly and widen the access of insurers to consumers, new products offered through these channels must be sufficiently simple to be sold without advice.

Insurers need to do more than simply strip away features from existing products. They need to build products that appeal to specific customer segments and that can be sold through direct sales channels. Online marketing material will also need to be simple, transparent, and interactive and be designed to appeal to specific segments.

The online channel will explode with innovation over the next several years. One likely avenue of experimentation will be automated and algorithmic advice that directs potential customers to specific products depending on those individuals' answers to questions.

Scottish Friendly, for example, has created a suite of tax-advantaged individual savings accounts that appeal to specific consumer segments. Each account offers varying levels of choice and financial risk tailored to the sophistication of the customer.

Online marketing material for each account is based on simple graphics, checklists, and descriptions. Telephone support is also available. These accounts helped to double Scottish Friendly's sales in 2013, the first year that they were offered.

Metropolitan Life, the largest U.S. insurer, is pursuing the mass market by offering term life insurance in a box through Wal-Mart stores. Snoopy, the lovable dog in the Peanuts comic strip, is featured prominently in the in-store marketing material. The policies are available with coverage as low as \$10,000, opening the low-income market to insurance products. Customers activate the policies by calling a toll-free phone number and answering simple eligibility and health questions.

For an industry known for complex products, the trend toward simplification presents several challenges. Insurers will need to sharpen their skills in consumer insight to identify the most attractive features and benefits for specific segments. The new products will also need to be successfully integrated into insurers' distribution networks without alienating the existing sales forces.

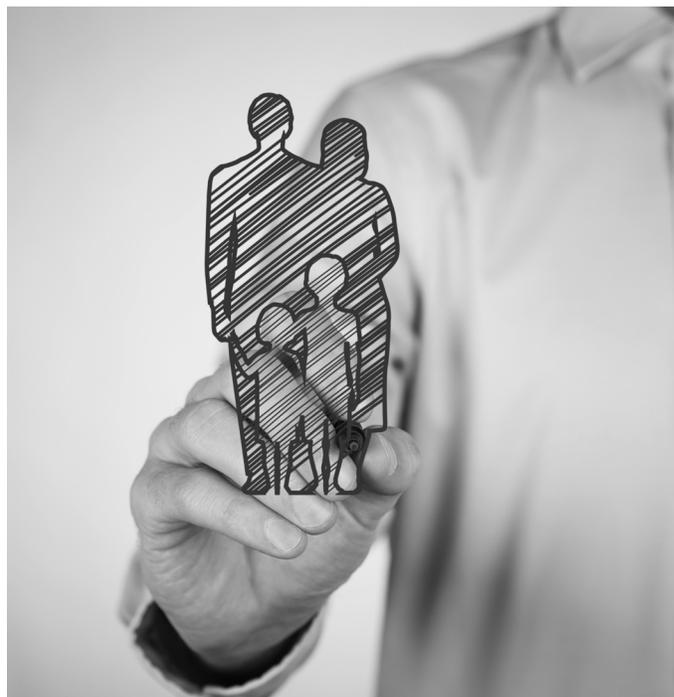
Insurers must address the hybrid needs of more savvy consumers, who often seek streamlined, simple products and services for a specific need—such as life or accident insurance or savings—but still require some support during sales and service. Such a multichannel approach could combine the best of worlds by leveraging simplicity and personalization.

#### CUSTOMIZING, WITHOUT COMPLICATING, PRODUCTS FOR THE AFFLUENT MARKET

Simplification is a smart strategy for new and low-end insurance customers, but it is generally unsuitable for the affluent segment. These customers have the means and the desire to pay for advice, customization, and more advanced financial-savings products. Despite changes in the industry, the best financial advisors still have a role to play and can actually increase their earnings by focusing on affluent customers and sophisticated products.

Italy's Assicurazioni Generali designed a three-phase product for German consumers in their fifties who want to maintain flexibility at the start of their policy and receive protection and benefits as they enter retirement. During the first two years, the policies are fully liquid. In the second phase through retirement, withdrawals are still allowed. In the third phase, the product converts to an annuity. Long-term care and critical-illness riders are available. The product was so successful at launch, taking in €1.5 billion in premiums in 2011 and 2012, that Generali had to impose sales and production measures to manage capital.

Insurers should not go crazy with customization, or they will land in an economic trap. Instead, they should rely on stringent economic calculation and rigorous customer segmentation to provide varying levels of customization. For example, the mindset and expectations of a customer whose net worth is \$500,000 may be similar to those of a customer whose net worth is \$10 million—but they have very different financial needs. Insurers will also need to allow agents to customize without creating un-



necessary complexity—or risk overwhelming both agents and customers.

#### TAPPING THE WORKPLACE AS A NEW DISTRIBUTION CHANNEL

In many markets, consumers have grown frustrated with the increasing complexity of life insurance products and the lack of transparency and questionable sales practices of insurers themselves. These consumers have gravitated toward other savings products, such as bank accounts, mutual funds, and employers' savings plans. Meanwhile, regulators have encouraged employees to save for retirement by supporting auto enrollment in their companies' plans and providing tax benefits that promote participation.

These trends have helped raise the importance of using the workplace as a sales channel. Insurers may now integrate several insurance and savings offers into one customer-friendly package that carries the employer's stamp of approval. Insurers have offered basic life and disability insurance through the workplace for a long time already. But they now offer a much wider range of products and services and developing an integrated workplace-marketing machine that combines industry-specific expertise with scale and technology.

Insurers are able to leverage their expertise in relevant industries and product areas, such as income protection; provide products aimed at specific occupational groups; and offer other services. In the UK, Unum, a specialist in financial protection products, offers a suite of products through the workplace. These include

income protection insurance, which provides a rehabilitation program to help employees return to work, and a program called Unum LifeWorks, which provides legal, lifestyle, and fitness assistance for employees.

Insurers can also leverage their long-term relationships with employers to position themselves in the role of orchestrator, providing employees with a range of products and services from several insurers. Aon Hewitt, a benefits advisor, has created an insurance marketplace for employees at large U.S. corporations, allowing them to shop from a range of products offered by several insurers. Life insurers are also well positioned to organize private marketplaces in the workplace.

Conventional wisdom is wrong. There is growth potential in the life insurance business. So long as people are averse to risk, demand for insurance will remain. However, insurers will not be able to grow in the same way they have in the past, positioning themselves as pure financial organizations and relying on asset returns to solve all their problems. They will have to challenge both their business models and the way they operate in order to ride the waves created by these five trends. ■

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The advertisement features a map of Iowa with several location pins. One pin is highlighted with a circular portrait of a man. The map shows major highways like I-380, I-20, and I-151, and cities like Dubuque and Cedar Rapids. The text 'Upper Mississippi River National Wildlife...' and 'Mississippi River' are also visible on the map.

# 2017 CSO Implementation: Product implications and considerations

By Mary Bahna-Nolan

In December 2015, the NAIC adopted the 2017 Commissioners' Standard Ordinary Table (2017 CSO) and the corresponding 2017 CSO Preferred Structure Tables. The adoption was via adoption of a series of amendments to the Valuation Manual, including sections VM-00, VM-02, VM-20, VM-A and VM-M.

As with prior CSO tables, the CSO is the table loaded with a margin to be used in determining Net Premium Reserves, Tax Reserves, and non-forfeiture; it is also the basis for 7702 and 7702A and is often considered the cap for universal life cost of insurance charges. While there are many similarities between the 2017 CSO and the 2001 CSO, there are a few primary differences.

1. Unlike prior versions of the CSO that used a loading formula divided by the expectancy of life, the 2017 CSO uses a flat percentage load that grades down by attained age. This results in a percentage load that decreases by age and an absolute load that generally increases by age. This compares to a load pattern in the 2001 CSO Table, which was highest in the early durations of the select period. The table below compares

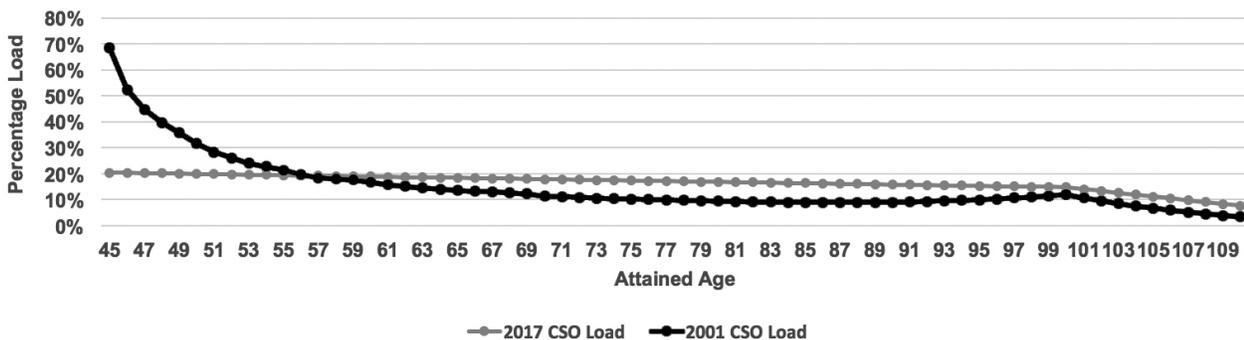


the percentage loads from the 2017 CSO and the 2001 CSO for Male, NS, Issue Age 45.<sup>1</sup>

2. The preferred structure tables were developed from first principles in which the unloaded tables were developed and then the load applied to each. This differs from the development of the 2001 CSO Preferred Structure Tables which were developed subsequent to the development of the 2001 CSO NS/SM tables.

In the development of the 2001 CSO Preferred Structure Tables, the unloaded VBT tables utilizing the three non-smoker and two smoker class system were developed after the 2001

Comparison of Percentage Loads  
Issue Age 45, Male, NS



CSO and 2001 VBT NS/SM distinct tables. A conservation of total deaths approach was used to determine the residual standard class mortality and to ensure that the preferred structure tables aggregated back to the SM/NS distinct VBT tables. For the 2017 CSO Preferred Structure Tables, a first principles approach was used to develop all the tables and then tested to make sure that they overall aggregated back to the smoker/nonsmoker distinct tables.

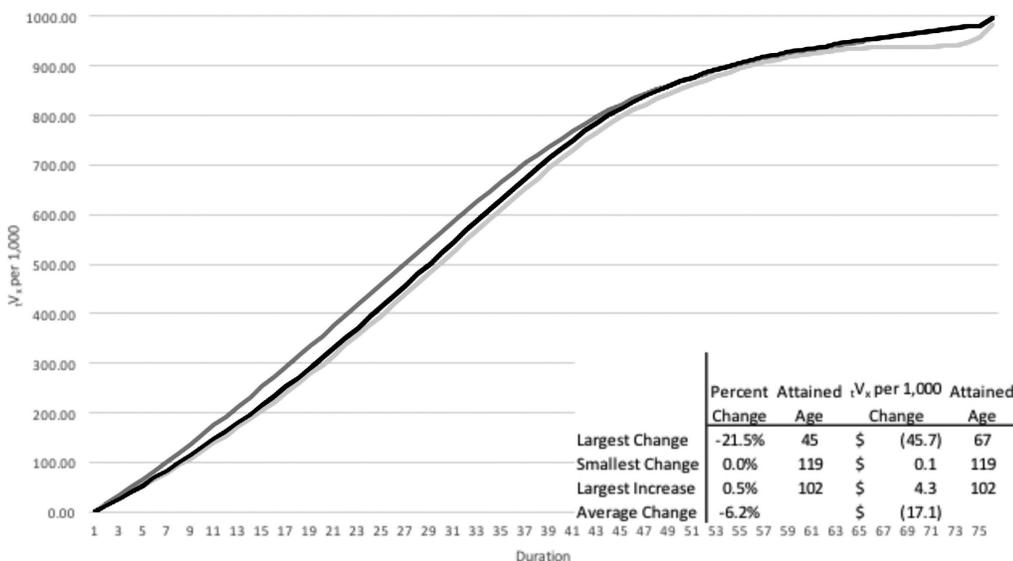
The difference in the approaches to develop the preferred structure tables resulted in a residual standard class (both smoker and non-smoker) which was much higher in the 2001 CSO than what is observed in the 2017 CSO.

3. The select period varies between the smoker and non-smoker tables, with a shorter select period (20 years versus 25 years) for the 2017 CSO Smoker tables. In addition, the select period and resulting ultimate mortality rates for the Composite (i.e., uni-smoke) tables is different from either the smoker or non-smoker distinct select period. Also, the composite ultimate mortality rates are, at certain younger ages, in excess of the smoker ultimate mortality rates. This was not a desired outcome of the Joint American Academy of Actuaries' Life Experience Committee and Society of Actuaries' Preferred Mortality Oversight Group CSO Subgroup (The Joint Committee) that developed the CSO tables and is a function of the underlying 2015 VBT Composite tables. The relationship of the Composite tables to the smoker/nonsmoker distinct tables is currently being revisited by the Joint Committee.

The Joint Committee performed analysis of the reserve impact for the 2017 CSO relative to reserves determined under the 2001 CSO for select issue ages and risk classes for both a whole life plan and a typical 20-year level term plan. In addition, the SOA sponsored an Impact Study, which was led by Milliman USA. The Impact Study further tested the reserve and non-forfeiture impact of various plans under current and PBR/VM-20 reserve methodology. The findings of the Impact Study with respect to reserve impacts were consistent with those from the Joint Committee. The final report on the Impact Study can be found here: <http://www.soa.org/Research/Research-Projects/Life-Insurance/research-cso-impact-study.aspx>.

Both the analysis performed by the Joint Committee and in the Impact Study demonstrated that the reserve impact of the new table varies considerably by product. For whole life plans, the CRVM reserves reduce some but not significantly with the new tables. For the WL plans, this is mostly driven by the cash value floor. As shown in the graph below, the average reserve change for a male, non-smoker, issue age 40 was just over 6 percent, with the largest reserve change at the beginning of the projection period. On average, the whole life reserve reduction ranged between 3 percent and 9 percent. Overall, mean reserves for whole life plans will experience a small decrease in the mean reserves but it is not significant and wears off over time. The Impact Study showed Whole Life reserves reduced 6 percent to 10 percent in the early durations (i.e., by duration five) but the reduction graded off to an immaterial difference by the end of the projection period.

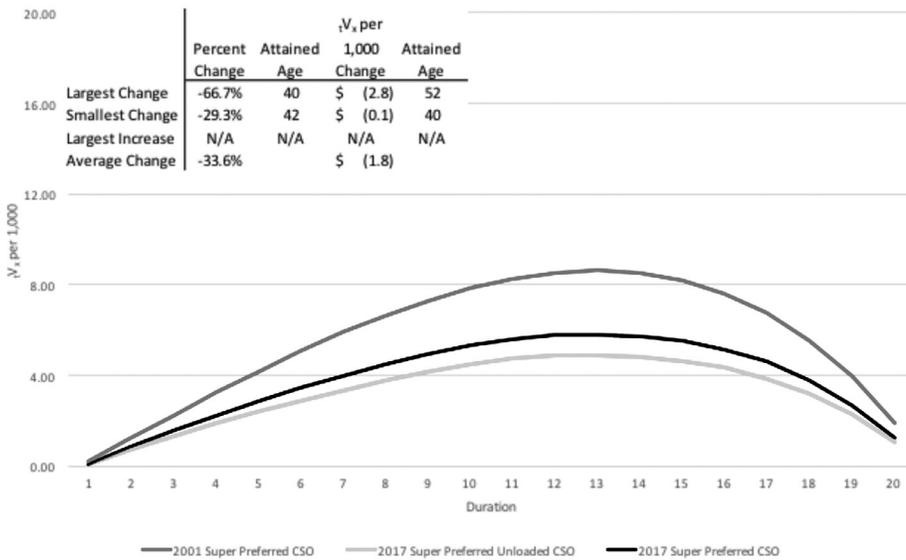
CRVM Whole Life Mean Reserves  
Ultimate Table, 3.5 Interest Rate Fully Continuous  
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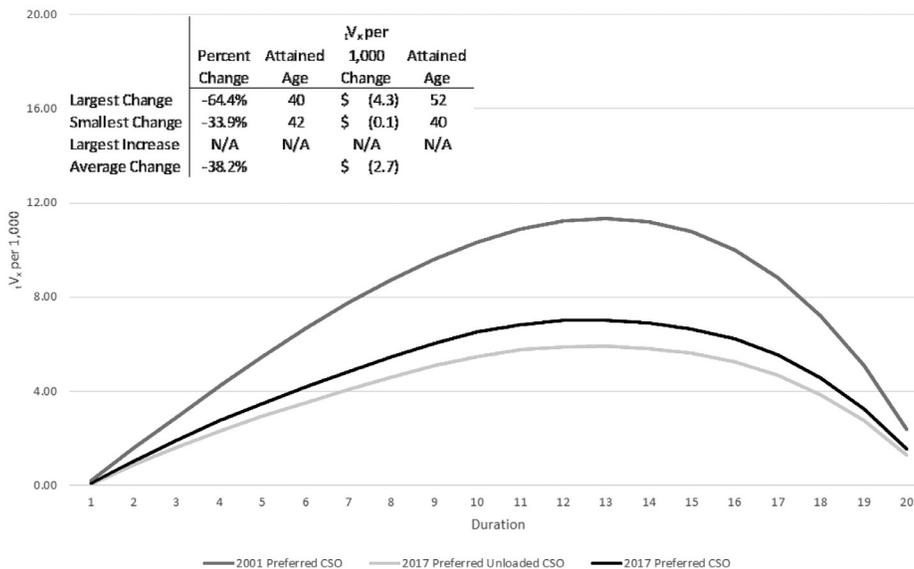
The comparative graphs are excerpted from the “Report on the 2017 CSO and 2017 CSO Preferred Structure Table Development” issued by the Joint Committee. In analyzing the results, one should focus on both the percentage change as well as the dollar amount of change in the reserves to understand the overall magnitude of any change.

For level term plans, the reduction in the CRVM XXX Reserve was much more pronounced and varied by risk class. In general, the average reduction in reserves ranges from 25 percent to 45 percent for NS risks and approximately 5 percent to 36 percent for smoker risks. As noted above, the largest reductions were observed for the residual standard classes and younger ages (between 30 and 50). These reserve changes were consistent with those observed in the Impact Study, which showed level term reserves reduced across all durations anywhere from 30 percent to nearly 50 percent, depending on risk class structure.

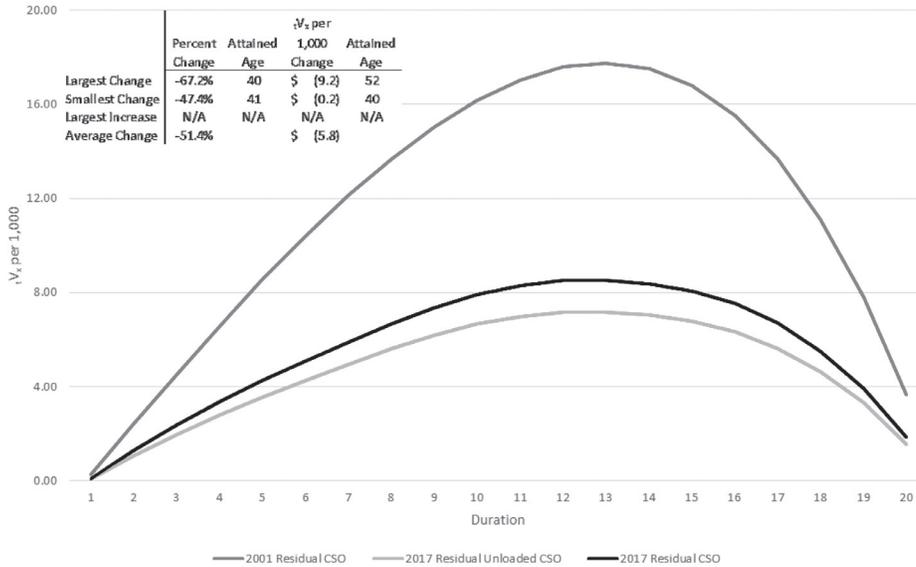
Regulation XXX LT20 Mean reserves  
 Super Preferred Select & Ultimate Table, 4.5% Interest Rate, Fully Continuous  
 Female, Nonsmoker, Issue Age 40



Regulation XXX LT20 Mean reserves  
 Preferred Select & Ultimate Table, 4.5% Interest Rate, Fully Continuous  
 Female, Nonsmoker, Issue Age 40



Regulation XXX LT20 Mean Reserves  
Residual Standard Select & Ultimate Table, 4.5% Interest Rate, Fully Continuous  
Female, Nonsmoker, Issue Age 40



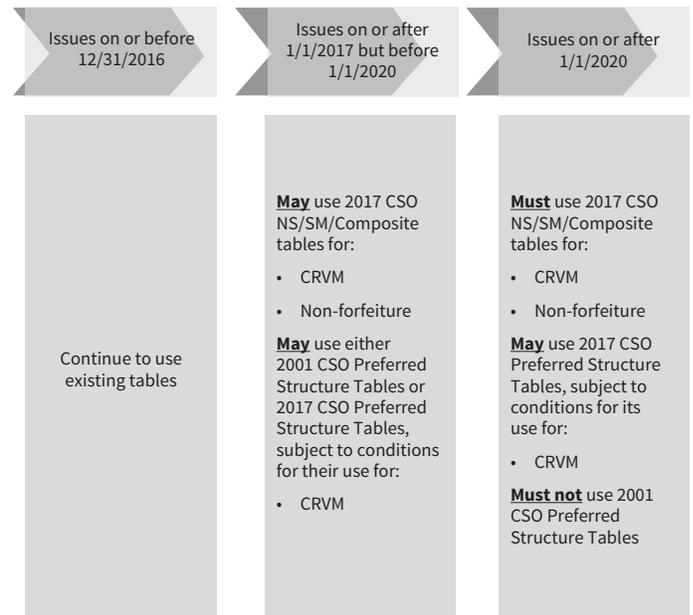
The Joint Committee did not test ULSG reserves but they were tested via the SOA Impact Study. ULSG reserves reduced 6 percent to 11 percent in the early durations with the differential reducing over time, but at a much more gradual pace than with the whole life plans.

In addition to variation by product, the Impact Study also showed the change in reserves via implementation of the 2017 CSO varied by duration, by age and by risk class as follows:

- The new table reduced reserves for male risks more than for female risks;
- The new table reduced reserves for non-tobacco/nonsmoker risks more than for tobacco/smoker risks;
- The 2017 CSO reduced reserves for younger ages more than for older issue ages (55 and above);
- The 2017 CSO reduced reserves for the residual classes in a multi-class structure more than for the preferred and super preferred classes; and
- Net premium reserves determined using the ultimate form of the table were generally lower than those determined using the select and ultimate form.

A company has the option to delay implementation of the 2017 CSO up to three years but must implement for issues on or after 1/1/2020. A company may defer implementation of PBR but still adopt use of the 2017 CSO within the transition period or vice versa. This is true for statutory reserves and non-forfeiture and

tax. In order to use the 2017 CSO Preferred Structure Tables, a company will need to meet similar qualification tests to those in place for use of the 2001 CSO. These tables are not able to be used for non-forfeiture.



Transition rules also apply for tax reserves in which there is a three-year transition period to adopt the use of the Prevailing Industry Table. The Prevailing Industry Table becomes effective beginning for issues on or after January 1 of the year following adoption of the NAIC CSO table in at least 26 states. Since over 26 states have adopted the Valuation Manual, they have also de facto adopted the 2017 CSO. Once the Valuation Manual becomes operative, it is believed that triggers the 2017 CSO table as the Prevailing Industry Table for determination of tax reserves and 7702/7702A and the start of the three-year transition period.

So what are some of the considerations for a company to determine whether implementing the new CSO table makes sense?

### 1. FINANCIAL SOLUTIONS

A company may have structured financial solutions in place which remove some of the redundancy in the term and/or ULSG statutory reserves over what companies believe to be a more economic reserve. Many of these structures are also subject to AG48. The new table goes a long way to reduce the perceived conservatism in the 2001 CSO table; however, for many companies, there will continue to be redundancy in the net premium reserves determined with the 2017 CSO. New issues from 1/1/2017 may still benefit from some form of financed or structured solution with the 2017 CSO, though the cost to finance will be less due to a lower level or expected redundancy. For some companies, the reduction in the tax reserves with use of the 2017 CSO could alter the attractiveness of certain financing structures. Therefore, deferral of the 2017 CSO may be beneficial under certain structures, even with the increased financing costs.

### 2. COMPLIANCE FOR USE OF THE 2017 PREFERRED STRUCTURE TABLES

As with the 2001 CSO Preferred Structure Tables, a company must demonstrate they meet the qualification test for use of the preferred tables as outlined in VM-20, §3.C.1.e. For use of both the preferred nonsmoker and preferred smoker tables, the appointed actuary must annually certify (other than the residual standard class tables) to the following:

- (a) *The present value of death benefits over the next ten years after the valuation date, using the anticipated mortality experience without recognition of mortality improvement beyond the valuation date for each class, is less than the present value of death benefits using the valuation basic table corresponding to the valuation table being used for that class.*
- (b) *The present value of death benefits over the future life of the contracts, using anticipated mortality experience without recognition of mortality improvement beyond the valuation date for each class, is less than the present value of death benefits using the valuation basic table corresponding to the valuation table being used for that class.*



The qualification tests are essentially the same as with the 2001 CSO Preferred Structure Tables where a company must demonstrate their best estimate mortality assumption is less than the unloaded mortality underlying the 2017 CSO. The underlying mortality is much lower than the 2001 VBT, with a significantly higher exposure amount for preferred mortality, female, older age and higher face amount risks. This could make it more difficult for companies to qualify for use of the preferred structure tables, or at least for the best preferred class.

### 3. OTHER CONSIDERATIONS FOR PRICING

- a. **Interaction with PBR by product:** Companies will need to evaluate the timing and implementation of PBR and the 2017 CSO tables together for each product. While they can be implemented at different times within the three-year transition period, there are development, administrative and filing costs associated with revisions to the policy form. For certain products, such as whole life, there may not be enough of a reduction in the reserves with the new CSO table to justify early adoption.
- b. **Impact to maximum cost of insurance charges in various universal life contracts:** Companies often align their maximum guaranteed cost of insurance charges with the CSO rates corresponding to the reserving and non-forfeiture basis in the policy form. Companies should consider re-evaluating whether the new CSO rates provide sufficient margin or buffer for adverse experience. In the margin analysis the Joint Committee performed, the margin was sufficient to cover mortality for 70.6 percent of the contributing companies in

aggregate. This varied significantly by age group, gender and smoking status.

c. **Approach for SI/GI products:** Currently, simplified issue and guaranteed issue products use the 2001 CSO for reserves. While there are new valuation tables currently in development for the guaranteed issue and simplified issue plans, it is unclear if they will be in place for issues on 1/1/2017. Given the reduction in mortality and change in the loading structure between the 2017 CSO and 2001 CSO table, the 2017 CSO may not result in adequate reserves for products with less underwriting than what underlies the contributing data to the 2017 CSO. This is an area currently under discussion with the NAIC Life Actuarial Task Force, specifically for sim-

plified issue products where development of a one-size-fits all table is difficult.

Given the above, there are many considerations for a company to evaluate in determining when to implement the 2017 CSO. While reserves are typically lower under the 2017 CSO, it may not always be in a company's best interest to adopt immediately. Product segment, age mix, implementation timeframes and costs, interaction with tax reserves, non-forfeiture and principles based reserves should all be considered. We can likely expect market disruption over the three-year transition period to adopt both the 2017 CSO tables and PBR. ■

#### ENDNOTES

<sup>1</sup> Joint American Academy of Actuaries' Life Experience Committee and Society of Actuaries Preferred Mortality Oversight Group CSO Subgroup, 2015



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# End-to-End Assumption Documentation Practices

By Hua Li and Alex Zaidlin

**O**n Oct. 30, 2015, the SOA Assumption Development and Governance Group, an informal discussion group consisting of nearly 200 actuaries interested in topics pertaining to actuarial assumption development and governance, organized an industry discussion call on end-to-end assumption documentation practices. The purpose of this call was to generate a large list of ideas for best-practice assumption documentation. More than 30 companies were represented in the call, including direct insurers, reinsurers and consulting firms.

During the one-hour discussion, the group touched upon eight components of assumption documentation, which could provide insights on building best practices. These components represented a collection of current industry assumption documentation practices. They touched on various areas of assumption management including the process, organizational structure, and governance. The eight components include:

- General assumption document standards,
- Assumption review planning,
- Internal experience studies,
- External experience,
- Assumption proposal,
- Approved assumptions,
- Communication of approved assumptions to the modeling team, and
- Assumption implementation.

Trends show increased scrutiny on assumption development and governance, which requires documentation for evidence of peer review of experience studies and assumption development, ongoing monitoring of emerging experience, and documentation of assumptions that are not changing.

## GENERAL ASSUMPTION DOCUMENT STANDARDS

This section addresses general requirements not discussed in the other seven documentation components. A process flow chart can link all assumption development and governance information together: from data source, to experience studies and assumption development and the governance process. The ap-

proval date and implementation date for the assumption should be documented.

## Assumption Purpose

For each assumption the documentation should identify the applicable business unit, product group and type, and actuarial intended uses. The business unit definition would depend on the company's organizational structure. Examples of business units include Property, Casualty, Life, Annuities, Health and Group Insurance. Examples of product groups and types within the Annuities business unit can be variable annuity, fixed annuity, and indexed annuity. Examples of actuarial intended uses are GAAP financial reporting, statutory financial reporting and pricing.

## Organizational Structure

Organizational structure is an important aspect of assumption management within insurance companies. The assumption developer and owner should be identified, their roles should be clearly defined and they must be held accountable for their respective responsibilities. The developer and the owner may not be the same person. The owner should understand the underlying business and have relevant expertise in the assumption development process.

## Data Source

The data source should be identified in the documentation, and the relevant experience study used for assumption development should be noted. Experience monitoring methods should be specified and relationships to other assumptions should be disclosed. This section of documentation should answer questions such as:

- Is the data extracted from an internal administrative system, obtained from a third party administrator, or purchased from external vendors?
- Is there an internal experience study performed or is there reliance on an industry experience study?
- Is there any ongoing monitoring for the emerging experience?
- Does the resulting assumption have any interaction or dependency on other sets of assumptions?

## Storage Location

The supporting file location should be included in the relevant experience study and assumption development documentation. Large companies may have separate storage places for experience study and assumption development documents, especially if a centralized team performs experience studies that are used for various actuarial purposes.

The access rights to the storage place of approved assumptions need to be carefully controlled. Generally people should be given read only access; read/write access should only be given to storage gatekeepers.

## ASSUMPTION REVIEW PLANNING

The planning stage scopes, prioritizes, and categorizes assumptions to facilitate effective and efficient review processes. The documentation would lay out the process roadmap and ensure a successful assumption review process.

A comprehensive inventory of all assumptions intended to be reviewed is essential for planning. Each year, the inventory should be updated by adding new assumptions and removing expiring assumptions. Other information may indicate the assigned assumption developer and owner, last review date, review frequency, source of update, a brief description of experience study methodology, key drivers of the assumption and materiality levels.

The review frequency should be set for each set of assumptions and will vary with the materiality of the assumption, credibility of the block and other factors. The criteria for determining the review frequency should be documented. Assumption updates may be triggered either by the internal study results or developments in external experience. The materiality of assumption levels can be low, medium and high. A key assumption should be categorized as high materiality even if no change would be made.

Past assumption development processes should be reviewed in order to develop a review plan for the current year. The current year plan should be communicated to management and any concerns should be addressed prior to starting the development process. To help keep the work on track and hit all the key milestones, a 12-month rolling prospective calendar may be established. The planned calendar may be compared with the actual process to inform the priorities for the next year's review.

Additional items may be included in plans for some of the more complex assumptions. For example, sensitivity tests may be planned for highly variable assumptions, such as the dynamic lapse assumption for variable annuity products.

Testing of resulting assumptions should also be included as part of the plan. The documentation should identify the impacted models and applications, as well as indicating the estimated effort to implement the assumption.

## INTERNAL EXPERIENCE STUDIES

Well documented internal experience studies cover two major aspects of the process. The first aspect is the study methodology, which includes items like data preparation, data segmentation and methodology for development of expected figures. The other aspect of experience study documentation is the related validation and controls pertaining to the relevant studies.

Among other items, the study methodology documentation should include:

- Any business segments that are excluded,
- How the data is prepared for the intended use,
- The boundaries of the study period,
- How the exposure basis is defined,
- Whether the claims are on a paid basis or an incurred basis,
- The study tools and methods that are used, and
- Experience study results.

Examples of excluded business may be sub-standard classes, closed blocks or large cases. These blocks may not be relevant to the assumption basis in question or may cause unwanted skewness of results. Data preparation processes should comply with ASOP 23 (Data Quality). The exposure basis can be account value, face amount, premiums, or other indicators of the size or count of the studied policies. The methods used for smoothing and trending should also be documented, as should the method used to determine the experience credibility. The study results may be grouped at a high level to allow for efficient management review with supporting data files with more granular output for detailed investigation.

Documentation of controls and validation processes for internal studies is a critical aspect of the experience study documentation. Generally, a well-established assumption with credible experience may have tighter controls than a first-attempt assumption development. This part of the document should answer the following questions:

- Is the data reconciled with a recognized source within tolerance, such as the claim amounts being within a certain percentage of reported claims in the financial statement?
- How do the study results compare to results from the last study?
- Are the study process and results peer reviewed and signed off on?
- Is the 'E' of the A/E analysis still valid, and are the study results within a reasonable range of expectation?
- What are the low credibility experience segments and how were results different for these?

## EXTERNAL EXPERIENCE

Whether for benchmarking purposes, or to back-fill low credibility areas in experience, the assumption development process and its documentation should also consider and reflect the applicable external experience. The external experience may be in the shape of generally accepted industry tables, relevant reinsurance data or population statistics. Even if company data is fully credible, it's recommended that the applicable external data still be considered for possible emerging trends and potential

“... the assumption development process and its documentation should also consider and reflect the applicable external experience.”

adjustments. The relevance of the external experience needs to be assessed, and similarities and differences should be explained.

When participating in an industry study, controls consistent with internal experience studies should be in place and documented to ensure accuracy. When preparing the data for the industry study, refer to ASOP 23 for data quality compliance. Due diligence questions should be asked; the data submitted to the industry study should be reconciled with the summarized company data received after the industry study; and reasonableness checks should be performed against relevant internal or other external studies.

#### ASSUMPTION PROPOSAL

Clear and streamlined assumption proposal documentation can facilitate effective review and efficient final management approval processes.

The assumption proposal documentation would highlight:

- Proposed assumptions,
- Major changes in the proposed assumptions from the current assumptions,
- Comparison of proposed assumptions to those of similar products, and
- Relevant implementation considerations.

The proposal would include the actual values of the assumption, illustrate the assumption development process, explain relevant trends and justify the actuarial judgment used. Examples of trends are those in claims practices, sales practices, and underwriting practices.

Major drivers of assumption changes should be explained and impacts should be assessed. The experience credibility, the impact of assumption changes and the assumption sensitivity should be considered together holistically to determine the materiality of an assumption.

Comparison of the proposed assumptions to those of similar products would be especially important if the underlying product experience is new and not credible. Credible experience

from similar products could provide useful insight into setting the new product's assumption in a consistent manner.

Implementation complexity should be considered early in the assumption development process to minimize downstream surprises. Implementation and testing timelines should be established and followed once the proposal is approved.

The level of details for the assumption proposal can vary by the level and needs of the approvers. For the business unit level review, the proposal should be comprehensive enough to answer detailed questions about the assumption development process and results. For senior management review, a high-level presentation is preferred, that would walk them through the highlights on the proposal background, high-level process description and major drivers and materiality of assumption changes.

The assumption development and proposal should comply with applicable ASOPs. For instance, ASOP 41 (Actuarial Communications) and ASOP 10 (GAAP Methods & Assumptions) should be considered.

#### APPROVED ASSUMPTIONS

The documentation for approved assumptions requires special care given its importance to downstream modeling implementation and its impact on financial reporting, product development and other intended uses.

The core documentation of approved assumptions can be a memo including related experience study results, assumption development adjustments, justification and impact summary on the business. Additional supporting documentation, in the form of appendices, can include meeting minutes recording assumption review discussions and decisions, certification of assumption working group or committee, evidence of peer review for the assumption development, detailed assumption tables and other supporting information.

Even if there are no proposed changes to assumptions, the documentation should justify the reason for keeping assumptions unchanged. This is done to keep the documentation comprehensive as well as to fulfill control and audit requirements.

#### COMMUNICATION OF APPROVED ASSUMPTIONS TO MODELING TEAM

The modeling team should play an active role in the assumption development process. It should be part of the assumption review meetings, which would ensure that the assumptions are developed and implemented in a manner that will allow for easy and consistent implementation into the models. Alternatively, although not recommended, assumption owners may meet with the modeling team to hand off the assumptions once they have

been approved and are ready for implementation. It is preferable to have a single point of contact on the assumption development team that would communicate with the modeling team throughout the process. This would ensure seamless communication and minimize inconsistency and errors.

For complex assumptions, assumption owners should work with the modeling team throughout the coding and model testing process. Assumption owners would write the business requirements for intended implementation and the modelers would send back the sample policies for review. Proper controls for seriatim level policy testing should be established.

Before the assumption gets coded into the model and tested, a high-level assessment of the assumption impact would be helpful to judge the reasonableness of results.

### ASSUMPTION IMPLEMENTATION

The modeling team should ensure proper documentation of assumption implementation into the models. This documentation would summarize the process and controls around it. Model documentation should answer the following questions:

- Is there evidence of comparison between model inputs and approved assumptions?
- Is there evidence of validation for accurate implementation?
- Is there appropriate management through the modeling change control process?

It may not be feasible to implement the proposed assumptions into every model. Any approximation or simplification of assumptions for the purpose of implementation should be thoroughly documented.

An automated process may be established to format and transfer the approved assumptions into the models to enhance the consistency and accuracy of assumption implementation.

### CLOSING REMARKS

This industry discussion call covered an extensive list of ideas for best-practice assumption documentation, including eight main components: general assumption document standards, assumption review planning, internal experience studies, external experience, assumption proposal, approved assumptions, communication of approved assumptions to the modeling team, and assumption implementation.

One thing to highlight is the documentation for evidence of fulfilling controls, which may include baseline and peer review of experience study methodology, peer review of assumption development, and proper assumption governance with sign offs.

Consistent and comprehensive assumption controls documentation will minimize the risks of the assumption development, governance and implementation process. ■

#### SOA ASSUMPTION DEVELOPMENT AND GOVERNANCE GROUP

- Is an informal discussion group with topics around actuarial assumption development and governance
- Consists of nearly 200 interested actuaries
- Received endorsed support from the SOA Financial Reporting Section and SOA Product Development Section
- LinkedIn group: SOA Assumption Development and Governance Group
- For more information or to get involved, please contact us



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# Long-Term Care Meeting Needs through Product Flexibility

By Vera Ljucovic

Editor's Note: *This article previously appeared in the June 2015 issue of SCORviews. It has been reprinted here with permission.*

## EXECUTIVE SUMMARY

Companies in the individual long-term care insurance (LTCI) market have learned much since the introduction of their first wave of products. Today's LTCI products feature a combination of premium enhancements, cost containment efforts and product flexibility that ensure that coverage sold today will balance consumer value and increased cost certainty for the carrier.

At the same time, sales of permanent life insurance with an LTC accelerated death benefit (ADB) rider have taken hold, registering sales growth even through the financial crisis. Could such hybrid or "combo" products portend a new wave of life-cycle type products?

A relatively new and significant development in the diagnosis and management of Alzheimer's disease is the identification of a genetic marker, apolipoprotein E (APOE), which can predict the risk of developing Alzheimer's disease as much as seven years earlier than currently available tests. A blood test is expected to be available to researchers and physicians in the next year. The test is an improvement over previous tests, which require expensive imaging techniques or invasive extractions of spinal fluids.

Earlier diagnosis allows individuals to plan for the future and take preventive measures. However, if the test results are part of the client's medical records, purchasing long-term care insurance (LTCI) may become more expensive or unavailable as carriers would have to rate such applicants.

The Genetic Information Nondiscrimination Act (GINA) of 2008 prohibits the use of genetic information for underwriting or setting health insurance premiums. The Act does not currently apply to life insurance, disability, or long term care. Insurers cannot require genetic testing, but if the results become part of the medical records, the insurer may reflect this in their decision to provide insurance.

As APOE is a relatively new marker, we don't know how credible the test is or how a positive result translates into mortality or

morbidity. Still, it provides an opportunity for the life insurance industry to revisit the challenges in providing older-age products.

Figure 1  
Alzheimer's Disease in Brief

Accounts for 60%-80% of all dementia cases
5.2 million diagnosed cases, including over 200,000 under age 65
500,000 deaths annually
Affects women by a 2:1 ratio (68% of cases)
17.7 billion hours of unpaid caregiving annually, from more than 15.5 million caregivers
Annual cost to economy about \$220 billion
Codependency issues – higher incidence of stress and depression among caregivers
(Source: Alzheimer's Disease Facts and Figures, 2014. Alzheimer's Association)

## LEARNING FROM THE PAST

LTCI came to market in the early 1980s, but product pricing missed the mark in a big way. Many insurers still have in-force blocks on their books and continue to face losses. Most companies left the individual LTCI market completely: By 2013, according to LIMRA, about 36 companies offered individual LTCI, and five accounted for nearly 75% of new business.

Still, the underlying need for these products is growing, and insurers understand that this market presents a real opportunity for organic growth. Companies currently in the market have introduced significant design changes and higher rates. They have tied benefit triggers more closely to need – replacing the activities of daily living (ADL) trigger with the more challenging independent activities of daily living (IADL) – and eliminated lifetime benefits in favor of shorter benefit periods. Lastly, they have moved to a per-diem compensation approach, one that encourages the insured to seek an affordability/level-of-care balance. While underwriting experience continues to develop, companies have learned much about how to classify an applicant, and the Alzheimer's test mentioned above may be helpful in the future.

Product changes and premium hikes have caused new business to fall, with premiums falling 30% in 2013 to \$406 million. There was relatively no change in terms of lives covered on an in-force basis from 2012 to 2013 (U.S. Individual Long-Term Care Insurance: Annual Review 2013. LIMRA International, 2014.).

## REINSURER INVOLVEMENT

Reinsurer participation in the LTCI market was limited over the first wave of products, as many companies lacked sufficient experience to properly assess the products' performance. Recently, however, reinsurers have begun to enter this market.

## MOVING TO A LIFE-CYCLE APPROACH

One of the challenges associated with the current wave of LTCI policies is the relatively high premium. A promising development has been the introduction of accelerated death benefit (ADB) riders to permanent life insurance policies with payouts that mimic LTCI. These so-called “combo” products come at a small additional premium and transform the underlying life insurance policy into something more akin to a life-cycle policy. Benefits are triggered and paid similarly to current LTCI products. Total benefits available are a percentage of the life insurance policy’s face amount and vary by company (Figure 2). Some companies offer an extension of benefit rider which pays out additional LTC benefits once the payouts from the ADB have been exhausted. A monthly benefit is elected and a benefit period is selected. One company offers a lifetime benefit period on the rider, which is the most comprehensive option available to the consumer.

While growth in stand-alone individual LTCI policies has fallen, interest in such combo products has been robust. According to LIMRA’s “Individual Life Combination Products 2013 Annual Review,” 2013 marked the fifth consecutive year of double-digit growth in such plans, even through the heart of the financial crisis. About 98,000 policies were issued, with new-business premium of more than \$2.6 billion – six times the premium income from stand-alone LTCI products in the same year. Average face amount for recurring-premium policies was \$350,000, with an average annual premium of about \$8,850. By far the most popular chassis for this rider is universal life, though variable life policies saw the highest new business growth rate in 2013 (128%).

## REINSURER INVOLVEMENT

Life reinsurers have demonstrated varying degrees of participation in combo products. Depending on the structure of the

Figure 2  
Benefits Structure

John Smith, a 70 y/o N/S Male, applies for \$1 million of permanent life insurance with a chronic illness rider. John’s chronic illness benefits provide for 2.5% of the face amount per month. Subsequent obligations are dependent on the type of rider he chooses. At age 83, John suffers a stroke and is unable to perform two ADLs, qualifying for the chronic illness benefit. (Note: for illustrative purposes only)			
	Discounted Death Benefit	Policy Lien	Rider Premium
Premium	Standard premium for underlying policy	Standard premium for underlying policy	Standard premium for underlying policy, plus premium for Chronic Illness Rider
Rider Benefit at Time of Claim (Age 83)	\$300,000/year (\$1m * .025 * 12), until discounted death benefit is depleted	\$300,000/year, until the death benefit is reached	\$300,000/year or IRS maximum LTC per diem disbursement, whichever is less, until death benefit is depleted
Repayment schedule	Policies with such riders usually include a waiver-of-premium (WP) provision, triggered by the first disbursement; no repayment	Continued premium payment (unless WP provision, then zero). Will be required to repay loan according to repayment schedule	Policies with such riders usually include a WP provision, triggered by the first disbursement; no repayment
Resulting Death Benefits	Any remaining face amount available at time of death	The life insurance policy’s death benefit, less outstanding loan principal	Any remaining face amount available at time of death

Figure 3  
Top Causes of Long-Term Care

Dementia/Alzheimer’s disease	~25%
Stroke	9%
Arthritis	9%
Injury/Accident	9%
Cancer	8%
Nervous disorders (e.g., Parkinson’s disease)	6%
Respiratory diseases	5%

(Source: American Association for Long-Term Care Insurance)

ADB, a reinsurer may prefer to reinsure the rider alone, the underlying mortality (but not the rider) or the product as a whole.

All of these products incorporate a waiver-of-premium (WP) provision if the ADB is triggered. As a result, the difference between assuming the underlying mortality risk or the product risk as a whole is small. Because of the WP provision, we assume full death benefits will eventually be paid. The key difference, then, amounts to a cash flow issue. The face amount will be paid in its entirety. For pure mortality coverage, the reinsurer pays under terms similar to any other pure life reinsurance coverage. If the reinsurer participates on the rider it may pay out some portion of the death benefits early (per treaty terms), with the remaining balance paid upon death – just as the direct writer pays. The math comes in, then, by estimating the number of insureds who will file for the ADB and the time-value-of-money impact on claims payments.

## CONCLUSION

Today's combo products are simpler than the first generation of LTCI policies and, if attached to a life insurance policy's death benefits, help the insurer more accurately quantify its risk. At the same time, this simpler product helps meet an important consumer and growing societal need. It is in effect a life-cycle product, providing valuable benefits while the insured is alive, and ensuring that premature death also is covered. As the number of Baby Boomers retiring continues to increase each year, the market is ripe for such a product, and sales figures seem to confirm this point. ■



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# An Actuarial Analysis of the Oregon Death with Dignity Act

By Jay M. Jaffe

**T**he Oregon Death with Dignity Act<sup>1</sup> (DWDA) was enacted in 1997. The purpose of the act is to allow terminally ill Oregon citizens “to obtain and use prescriptions from their physicians for self-administered, lethal doses of medications.”<sup>2</sup> There are now three other states (California, Vermont, and Washington) with similar acts and a fourth state, Montana, where the state Supreme Court has ruled that “nothing in the state law prohibited a physician from honoring a terminally ill, mentally competent patient’s request by prescribing medication to hasten the patient’s death.”<sup>3</sup>

This article, however, mainly reviews the Oregon act because it has been operative for the longest time. Each year Oregon’s Public Health Division publishes a report of the experience under the DWDA that provides insight into the actual operation of the law.

## DWDA HIGHLIGHTS<sup>4</sup>

The Oregon DWDA is available only to individuals 18 or older.

The DWDA requires a patient to make an “informed decision . . . that is based on an appreciation of the relevant facts.” The decision occurs only after a patient is “fully informed by the attending physician of” the following:

- a) The patient’s medical diagnosis;
- b) The patient’s prognosis;
- c) The potential risks of the prescribed medication;
- d) The probable results of the prescribed medication; and
- e) The feasible alternatives (e.g., palliative care, hospice, etc.)

Only patients who have a “terminal disease” are eligible to request to receive the medication. The DWDA defines a terminal illness as “an incurable and irreversible disease that has been medically confirmed and will, within reasonable medical judgment, produce death within six months.”<sup>5</sup>

## GENERAL PROGRAM EXPERIENCE

During the period from 1998 to 2014 there were 869 deaths under this program in Oregon. The median age of pa-

tients who have availed themselves of the program is 71.<sup>6</sup>

Almost 80 percent of the patients have suffered from some form of a malignant neoplasm. The next largest underlying illness category (8 percent) has been amyotrophic lateral sclerosis (ALS). Thus, over 85 percent of all patients can be classified into these two general illness groups.<sup>7</sup>

The three major end of life concerns<sup>8</sup> given by the patients prompting them to utilize the DWDA are:

- Loss of autonomy (92 percent)
- Less ability to engage in activities making life enjoyable (89 percent)
- Loss of dignity (79 percent).

These reasons are very understandable given the types of illnesses from which the patients had been suffering and the terminal nature of these conditions.

Patient usage of the DWDA definitely varies by age. At least until now patients in the 45 to 74 year old category have been proportionately the largest users of the DWDA. As a percentage of total deaths in Oregon, the 45 to 74 year old age group has utilized the DWDA 50 percent and 400 percent more often than those in the age groups 75 to 84 and 85+, respectively. There seems to be logic to greater usage by age given the underlying concerns the patients described as prompting them to utilize the DWDA. Namely, younger patients are more concerned about quality of life rather than longevity.

## RELATIONSHIP TO INSURANCE AND ANNUITY POLICIES

The DWDA recognizes the interrelationship between its provisions and life, health, accident insurance or annuity policies. It specifies that “the sale, procurement, or issuance” of any of the enumerated policies “shall not be conditioned upon or affected by the making or rescinding of a request by a person for medication to end his or her life in a humane and dignified manner.” It then continues to state that “a qualified patient’s act of ingesting medication to end his or her life in a humane and dignified manner” shall NOT have an effect upon any of the aforementioned insurance policies.<sup>9</sup>

A brief discussion of the issues associated with the DWDA in relation to several types of insurance follows.

### 1. Underwritten Life Insurance

Life insurance policies almost always exclude suicide during

the first two years of coverage. However, Section 880 of the DWDA states that “actions taken in accordance with [the DWDA] shall not for any purpose, constitute suicide . . .”<sup>10</sup>

It follows that the DWDA might override the policy terms in at least one situation. For example, in the event an insured were to apply and be approved for a life insurance policy while in good health but shortly after the policy effective date be diagnosed with a terminal illness and elect to terminate his or her life under the DWDA, under these tragic circumstances it is likely that the full death benefit would have to be paid.

## 2. Accidental Death Insurance

Accidental Death (ADB) insurance is issued both as a rider to a life insurance policy and as standalone policy. An accidental death benefit might also be provided during the initial period of coverage for a graded death benefit policy.

ADB policies and riders almost always exclude suicide. The exclusion would usually read similar to the following: “Any attempt at suicide, or intentionally self-inflicted injury, while sane or insane.” For ADB coverage the suicide provision is operative for all years and not just the first two years.

An accidental death is typically defined as: “An accidental bodily injury sustained by the Insured which is a direct result of an accident, independent of disease, bodily or mental illness, infirmity, or any other cause, which occurs while the Policy is in force.” Moreover, the word injury is probably defined using language such as “injury does not include any accidental result from medical, surgical or dental treatment.”

Therefore, it would appear that under accidental death insurance where accidental death is defined such as described in the prior paragraph, while suicide under the DWDA would not be excluded, the insurance company would not be liable for any accidental death benefit because the cause of death did not involve bodily injury.

The takeaway from the analysis is that when drafting the definition of accidental death used in policies or riders, the DWDA or similar legislation in other states needs to be carefully considered if this cause of death is to be excluded from ADB coverage. Because assisted death acts are not uniform by state, it is advisable to consider the specific language in each state-by-state laws when drafting any future ADB exclusion provisions.

## 3. Health Insurance

Assuming that the patient is covered by a health insurance policy, the terms of the health insurance policy would deter-

mine whether (a) the medications prescribed for the patient and (b) any medical expenses arising from the taking of the medications would be covered. (However, it is highly unlikely that the circumstances described in (b) would occur.)

A health insurance company would probably not contest any health insurance related claims considering that several months of qualifying expenses would not be incurred.

## 4. Annuities

Annuity benefits cease at the death of an annuitant (although there could be joint annuitant, certain period, etc. that would require additional annuity benefits.) Conceivably, someone could contend that any annuity benefits should be continued until the end of the patient’s expected lifetime but this would seem to be a very tenuous request given the extremely short life expectancy of the annuitant at the time of death. Practically, there would probably not be enough money at stake to even raise this contention.

### IMPACT ON LIFE INSURANCE PREMIUMS FROM DWDA

During the period 2012 to 2014 there were 263<sup>11</sup> deaths from DWDA patients and 99,586<sup>12</sup> total deaths in Oregon for residents over age 15. There is a slight mismatch between these two statistics because no one under 18 is eligible to utilize the DWDA but any distortion is di minimus. DWDA deaths are 0.26 percent (263/99,586) of Oregon’s total deaths for the DWDA eligible ages during the recent three year period.

Based on statistics just cited, the early payment of life insurance claims, assuming that deaths occur on average three months prior to natural death, can be calculated according to the following simple model.

1. Assumed annual lost investment income rate: 3 percent
2. Impact of three months’ lost investment income (very simplistically) = 3 percent x 0.25 = 0.75 percent
3. Percentage of deaths using DWDA = 0.26 percent
4. Extra death cost from DWDA usage = 0.75 percent x 0.26 percent = 0.2 percent

As the above analysis shows, other than a few DWDA deaths that might would otherwise be denied under the suicide provision during the first year or two of a life insurance policy, the Oregon DWDA should not have any material impact on life insurance claim costs.

### ACTUARIAL OPPORTUNITIES

According to one survey, there are 24 other states that have recently considered the death with dignity matter.<sup>13</sup> End-of-life issues are a growing concern. But even without further death

with dignity legislation, both the life insurance industry and the actuarial profession have many opportunities to ease end-of-life problems relating to financial and non-financial matters.

For example, in the past several decades long term care products have been introduced by insurance companies. Another example of a relatively new end-of-life benefit is the option for insureds to accelerate death proceeds from life insurance policies at the option of the policy owner in order to provide for end-of-life needs. A secondary market for life insurance policies now exists (including viatical settlements) that offers another way to liquidate life insurance policies during the life of the insured.

Nothing can prepare any of us for the inevitable, but actuaries can and should take a leadership role to make more options available to ease how we deal with the final stage of life. Here are a few additional opportunities.

- 1. Promote living benefits in life insurance policies:** Living benefits that are triggered by end-of-life events (e.g., terminal illness) are now being attached to life insurance policies. These benefits can be added at little or no cost. Actuaries can advise and advocate to their employers and clients that living benefits should be an integral part of each life insurance policy. It should even be possible to add living benefits to existing policies.
- 2. Include an end-of-life counseling benefit within health insurance plans:** Discussing end-of-life issues should occur long before each of us is confronted with the issue. It is often too late to have a rational conversation of end-of-life matters (such as between physician and patient or among family members) when death is eminent.
- 3. Offer a package of end-of-life forms to new life insureds:** Many, if not most, people reach end-of-life without having a plan. For example, medical powers of attorney enable a family member or friend to act on our behalf in the event we are incapacitated and help carry out our treatment wishes. Each life insurance policy would be that much more valuable if a new insured could go to a vetted website and find forms to address the most common end-of-life matters in addition to the financial peace of mind they have just acquired through their new life insurance policy.
- 4. Make the secondary market for life insurance more accessible:** Presently, the secondary market for life insurance is practically restricted to larger sized life insurance policies. Life insurance carriers should expand the availability of options to policyholders who need to terminate policies prior to the time an accelerated death benefit is available.

## CONCLUSION

Medical advances are keeping us alive longer. As professionals and individuals, we face an entirely new set of end-of-life issues. In recent years some governments have made additional end-of-life choices available to us. How we deal with such matters and which options we elect is strictly a personal decision.

But as described earlier in this article, there are several relatively easy and low cost ways that the insurance industry can help to relieve some of the anxieties associated with end-of-life events and provide additional value to our products and services. Actuaries are in position to help implement these and other possible programs to our existing products. ■

## ENDNOTES

- <sup>1</sup> Oregon Death with Dignity Act, Oregon Revised Statute Chapter 127.
- <sup>2</sup> Oregon Public Health Division (2014) Death with Dignity Act Annual Report, pg. 1. <https://public.health.oregon.gov/ProviderPartnerResources/EvaluationResearch/DeathwithDignityAct/Documents/year16.pdf>
- <sup>3</sup> Death with Dignity National Center and Death with Dignity Political Fund. <https://www.deathwithdignity.org/>
- <sup>4</sup> Oregon Death with Dignity Act, Section 127.800 §1.01
- <sup>5</sup> Oregon Death with Dignity Act, Section 127.815 §301(L) provides that it is an attending physician's responsibility to prescribe the appropriate medications to be used by the patient.
- <sup>6</sup> Oregon Public Health Division (2014) Death with Dignity Act Annual Report, pg. 4. <https://public.health.oregon.gov/ProviderPartnerResources/EvaluationResearch/DeathwithDignityAct/Documents/year16.pdf>
- <sup>7</sup> Oregon Public Health Division (2014) Death with Dignity Act Annual Report, pg. 5. <https://public.health.oregon.gov/ProviderPartnerResources/EvaluationResearch/DeathwithDignityAct/Documents/year16.pdf>
- <sup>8</sup> Oregon Public Health Division (2014) Death with Dignity Act Annual Report, pg. 6. <https://public.health.oregon.gov/ProviderPartnerResources/EvaluationResearch/DeathwithDignityAct/Documents/year16.pdf>
- <sup>9</sup> Oregon Death with Dignity Act, Section 127.875 §3.13
- <sup>10</sup> Oregon Death with Dignity Act, Section 127.880 §3.14
- <sup>11</sup> Oregon Public Health Division (2014) Death with Dignity Act Annual Report, pg. 1. <https://public.health.oregon.gov/ProviderPartnerResources/EvaluationResearch/DeathwithDignityAct/Documents/year16.pdf>
- <sup>12</sup> Oregon Deaths by Age and Country of Residence, 2012-2014, <http://public.health.oregon.gov/BirthDeathCertificates/VitalStatistics/death/Pages/index.aspx>
- <sup>13</sup> Death with National Center survey



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# Milliman Fixed Indexed Annuity Pricing Survey Summary

By Daniel Rueschhoff, Karthik Yadatore and Aatman Dattani

## INTRODUCTION

Fixed indexed annuities (FIAs) have been one of the fastest-growing segments of the annuity market for the last several years. According to LIMRA, 2015 U.S. sales were approximately \$54.5 billion, which is 13 percent higher than 2014. The addition of living and death benefit guarantees to the fixed indexed annuity chassis has added substantially to the complexity of product pricing and asset-liability management (ALM).

Milliman undertook a survey of 16 companies early in 2016 to gain insight into common industry practices. The objective of the survey was to help indexed annuity writers understand the pricing practices and ALM strategies used by their peers in the industry, especially in light of the prevailing low interest rate environment and a possible rise in interest rates. Specific areas of focus included:

- Pricing metrics
- Lapse and utilization assumptions for living benefits
- Product changes that are due to low interest rates
- Product features to address rising interest rates
- Asset-liability management

The following are some conclusions and observations from the survey. Our conclusions and observations will not necessarily hold true for all companies or in all situations.

## PRICING METRICS

Pricing methods have become increasingly sophisticated with the advent of variable annuities. However, the more traditional pricing techniques and measures continue to apply to FIAs because FIAs are effectively spread-based products.

A majority of participants said that they use internal rate of return (IRR) as a primary pricing metric. Return on assets (ROA) was the second most commonly used metric.

Other metrics used by the companies include profit margins, market-consistent value of new business, breakeven year, and GAAP return on equity (ROE).

Other pricing metrics (as stated by a few participants) were cost of funds, net investment earned-rate less cost of funds, and stat-

utory value of new business. Incorporation of market-consistent principles in pricing is not a prevalent practice.

The acceptable ranges for IRR, return on assets (ROA), and return on equity (ROE) were similar for most companies. The discounting methodology used to arrive at the ranges differed among participants, with an equal number of them using cost of capital and expected earned rates. Some participants also used risk-free rates, earned rates, cost of capital, or hurdle rates based on the pricing metric they were calculating.

## LAPSE AND UTILIZATION ASSUMPTIONS FOR PRICING INCOME RIDERS

Guaranteed Lifetime Withdrawal Benefit (GLWB) features on fixed indexed annuities give rise to some of the more interesting and complex pricing and risk management challenges. GLWB can be an incentive for the policyholders to persist despite less-than-favorable index crediting. Companies have largely altered their lapse assumptions to take that behavior into account. The majority of participants stated that they use dynamic lapse assumptions to model GLWBs, while some participants mentioned that they reduce base lapses statically.

The vast majority of participants model income-rider utilization via a cohort method, i.e., they segment the pricing cells into cohorts, with each cohort having a specific utilization rate.

About two-thirds of the companies assume an income rider utilization of less than 100 percent, while the rest assume a 100 percent utilization. For the companies that do not model 100 percent utilization, the non-utilization assumptions range is fairly wide, from 5 percent to 30 percent for policies with income riders.

Around a quarter of participants use predictive modeling to study and analyze policyholder behavior when setting the above assumptions. We did not ask companies to provide details on their predictive models, but we think of such models as formulaic representations of policyholder behavior that are derived from statistical models and reflect key characteristics of the policies, the policyholders, or the economic environment.

## PRODUCT CHANGES THAT ARE DUE TO LOW INTEREST RATES

Low interest rates have become the new normal. While the average daily 10-year Treasury rate since 1945 has been approximately 6.35 percent, this benchmark rate has been below 3.75 percent for the last five years. The low interest rate environment has resulted in over 75 percent of the participants making changes to their FIA products along the following lines:

- Lowered interest spread requirements
- Added market value adjustment (MVA) features

- Lowered commission rates
- Reduced richness of bonus features
- Reduced richness of the Guaranteed Minimum Withdrawal Benefit (GMWB) riders via reduction to payout and roll-up rates and shortening the roll-up period
- Increased rider charge fees
- Stopped selling a few products

In addition, a few respondents stated they started selling FIAs because of the prevailing low interest rates.

## PRODUCT FEATURES TO ADDRESS RISING INTEREST RATES

In addition to the persistent low interest rates there is a potential risk that is due to rising interest rates. The following are some ways in which companies mitigate the risk of rising interest rates:

About two-thirds of the participants stated that the MVA feature, combined with surrender charges in their product, will mitigate adverse effects of a spike or a gradual increase in interest rates.

Roughly one-third of participants mentioned that GMWB portions and/or the guaranteed income shadow accounts of their product portfolios provide an offsetting risk profile.

## ASSET-LIABILITY MANAGEMENT (ALM)

FIAs have a zero floor on the index-based interest credited, hence there is limited equity risk associated with the living and death benefit guarantees. Interest rate risk is the primary market risk and ALM is the preferred industry tool to manage this risk. We asked participants if they have an ALM plan to address the potential volatility in interest rates.

Around 40 percent of participants have plans to address both gradual and sharp increases in interest rates via one or a combination of rate-setting activities, continuous monitoring via stress analysis, or adjusting asset portfolio durations, bond futures, floating interest rate assets, interest rate swaptions, or interest rate caps.

A quarter of participants do not have a plan for a gradual increase but do have plans in place for a sharp rise in interest rates via one or a combination of interest rate swaptions, interest rate caps, reinsurance activities, or additional liquidity from other product portfolios. The rest do not have any plan in place for either a sharp rise or for a gradual increase in interest rates.

With regard to goals of ALM and managing the guaranteed benefits:

- All participants hedge index-based interest crediting.
- All or a majority of participants mention that duration matching and addressing liquidity concerns were the two

most important goals of their hedging programs. Some participants mentioned that convexity matching was one of the key considerations of their ALM programs.

- Over a third of participants used their ALM programs to manage tail risk.
- None hedge Guaranteed Minimum Death Benefits (GMDBs) and GMWBs, nor segregate assets between policies with and without income riders.
- None have considered a buyout of high in-the-money (ITM) policies, similar to VA buyouts, as a part of their liability in-force management strategies.

## CONCLUSION

The survey showed there is consistency in pricing practices across the participants. It also showed that, in addition to ALM, modifying product features is another way to manage interest rate risk. Current lapse and income rider utilization assumptions appear to be simplistic, thus we anticipate further development of innovative methods such as predictive modeling to more accurately reflect policyholder behavior.

As this article was being written, the Department of Labor released the final version of its Fiduciary Rule. In the new regulations, fixed indexed annuities (FIAs) have been included in the Best Interest Contract exemption (BIC exemption) along with variable annuities (VAs). Although FIAs did not fall under the BIC exemption in the proposed rule, their complexity (caps, participation rates, spreads, multiple indices, etc.) makes the new classification understandable. It is still too early to know how this new regulation will impact the annuity market. One thing is certain: FIAs have been a popular product in recent years, and FIA writers will continue to innovate and develop new strategies to address the evolving market and regulatory environment. ■



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# The Drivers of Future Mortality: An underwriter's perspective

by Philippe Aussenel

## EXECUTIVE SUMMARY

Presented in a breakout session at the 2015 Canadian Reinsurance Conference in Toronto, this article discusses how mortality and longevity have evolved over time, what were the major determinants of past mortality improvements, and the most significant drivers of future mortality.

## INTRODUCTION

Globally mortality has improved over time, though most of the reduction has been attained over the last 150 years. This decline in mortality rates resulted in life expectancies at birth increasing by 30 to 40 years, up to 80 to 85 years in developed countries. From the beginning of human history, life expectancy at birth has been estimated at about 25 years, and little progress was made through the Roman Empire. By the 1700's, life expectancy at birth reached 37 years in England, rising to about 41 by circa 1820. It remained stable during the period of the Industrial Revolution (1820 to 1870) and by the dawn of the 20th Century, life expectancy had reached 50 years.

## HISTORICAL DETERMINANTS OF MORTALITY IMPROVEMENTS

Complex and intermingled factors contributed to these past mortality improvements. They appeared in sequence, building on the improvement provided by each previous factor:

- **Nutrition:** In the 18th Century, agricultural quality and yields increased with the mechanization of the farming industry. British physician and demographer Thomas McKeown argued that better nutrition improved the population's health. This was later evidenced by Robert Fogel between 1977 and 2004. Opponents to the "Nutrition" theory argue that the disease burden changed mostly as a result of strong public health interventions.
- **Public health:** Samuel Preston made the case that the reduction in mortality occurred because of improved public health in the context of increases in income. Major macroeconomic projects had taken place over several decades—e.g., filtering and chlorination of water, sanitation systems, swamp drainage, milk pasteurization, and mass vac-

inations. Microeconomic efforts also contributed—better food conservation and protection from insects, promotion of better hygiene, ventilation of homes and preventative medicine programs. It is estimated that about 50 percent of the mortality gains occurred early in the 20th century, mostly due to better water sanitation. Developments of new therapeutics to treat people with diseases—such as antibiotics developed in the 1930 and 40s—also contributed to the early steep mortality improvements. Advances in medicine regarding cardiovascular disease were a fairly recent development in the 1960s and it is only by 1970 that water and foodborne diseases were quasi-eliminated from North America.

- **Urbanization:** Initially, large-scale urbanization had a negative effect on health and overall mortality due to the effects of unsanitary living conditions, which facilitated the spread of diseases in more crowded cities. Gradually, the situation improved as urban sanitation (running water, sewage, and garbage collection), housing and access to health care improved.
- **Socio-economic changes:** Growing evidence suggests that reducing economic and social inequality has a positive effect on a population's health. Even in countries that have income inequality, overall mortality has improved, as the less fortunate of today are much more prosperous than their peers a century ago. In effect, while income inequality may actually increase, prosperity (and hence mortality) still improves as the entire scale moves up.
- **Behavioral and lifestyle factors:** Research indicates that non-smokers have had greater mortality improvement than smokers. In general, people who engage in "healthy habits," such as regular medical check-ups, may be more likely to engage in other positive habits (wearing seat belts, teeth cleaning, etc.) and tend to exhibit better mortality than those who do not. Other lifestyle risk factors, such as moderate drinking, regular physical activity, healthy eating choices, and the use of preventative care (mammograms, prostate examination, colonoscopies, etc.) have all a positive correlation to improving long-term mortality.

## DRIVERS OF FUTURE MORTALITY IMPROVEMENTS, SPECIFICALLY IN NORTH AMERICA

According to S. Jay Olshansky, the future mortality improvement rate may be slowing down, since some of the reductions obtained in the 20th century may not be reproducible. With mortality at younger ages already low, it has become more difficult to raise life expectancies at birth. According to Olshansky, the focus is on improving the mortality for the middle and older

ages, where the impact may be less, and hence his argument for an improvement-rate slowdown. Other renowned experts, most notably Prof. James Vaupel, dispute this perspective.

#### MEDICAL ADVANCES IN DIAGNOSTICS, TREATMENT AND OTHER LIFE-SUSTAINING METHODS

When can we expect the next major breakthrough that will push the average life expectancy from 80 to 85 today to 100 or higher? Even today, numerous medical advancements in the areas of cancer, heart and circulatory diseases make it possible for individuals to survive the initial disease onset. Olshansky notes that even if we discovered an intervention that effectively eliminates a major mortality factor, the possibility exists for nature to replace this gain with another human killer. We have seen some of this already as the mortality improvement from smoking reduction is gradually being replaced by increased incidence in obesity, diabetes, and other metabolic diseases.

What could the next breakthrough in medical advancements be? Presently, many people are living longer and better due to pacemakers, beta-blockers, statin drugs, or HIV combined therapies, etc. Though current biomedical research is generating much knowledge about the genetic basis for diseases, their practical and large-scale implementation remains challenging. So, will future improvements be subtler in the sense of “one person at a time” versus an entire segment of a population? Will the past and current public health philosophy of “the greatest good for the greatest number” be broken?

#### BEHAVIORAL AND LIFESTYLE CHANGES

What is the impact of social inequality and access to health care on mortality? Some research indicates a very high correlation of longevity between level of education, income and overall wealth, as well as early-life and childhood living conditions, social conditions in adulthood, and family genealogy. Other behavioral and lifestyle factors need to include further reduction in smoking, safer driving standards, better nutritional knowledge and exercise, higher occupational safety standards and improved work conditions. The list is almost endless, and does not even encompass natural disasters!

Forecasting is an inexact science, and behaviors are very complex to predict. It would be an unfortunate setback if the increase in obesity in North America became so significant that it could wipe out the mortality improvements obtained:

- Less smoking (one third reduction since the 1960s),
- Less excess drinking (20 percent decline since the 1980s), and
- Overall improved risk factor control and treatment for cardiovascular diseases?



Could further improvement be achieved by improving our education about preventative medicine and compliance to the recommended medication, dosage and physician follow-ups?

#### INFECTIOUS DISEASES

Animals and non-living sites (soil, water) are reservoirs for disease. Stronger regulations may need to be implemented to protect the public from infectious diseases, by eliminating the pathogen from its natural reservoir or interrupting its route of transmission. Past measures like creating a safe water supply, effective sewage treatment and disposal, education about food safety, animal control, and mass vaccination and education programs have helped reduce and even eliminate some of the most dangerous and common infectious diseases. On the other hand, resistance to anti-microbial treatments—in particular to malaria and tuberculosis—is rising at an accelerating rate. New infectious diseases have appeared in the last few decades such as AIDS, Legionnaire’s disease, Hantaviruses, Lyme disease, prions, West-Nile virus, Ebola, and the new Zika virus, just to name a few. Most emerging infections appear to be caused by “sleeping” pathogens. They are “activated” when there is a change in the pathogen’s natural environment, such as ecological changes due to agriculture, economic development or anomalies to the climate, human demographic changes and behavior, travel and commerce, microbial adaptation, resistance and mutation, and breakdown in public health measures.

#### CONCLUSION

How mortality improvement will emerge in the future remains uncertain, but two main schools of thought have evolved:

- a. Mortality improvement will continue indefinitely and follow a linear trend, with people living to age 150 and beyond (e.g., James Vaupel); and
- b. Humans have, by design, a limited life span, and future mortality gains will be smaller because of real and observable natural limitations (e.g., S. Jay Olshansky).

Reliable projections are complex due to the large number of past determinants and future drivers. If mortality rates improved at the same rate as in the last 15 years or so, then a life expectancy of 100 could be reached by the turn of the 21st century in Canada. However, some populations in North America are experiencing a slowdown in the rate of improvement and it appears that future gains in mortality may be measured in years, rather than decades. Changes of health patterns (smoking, obesity, diabetes, etc.), economic and social disturbances (recessions, downturns, fiscal restraints and austerity measures), or the (re)emergence of old and new infectious diseases may temporarily influence future longevity gains.

Does the prospect of ever-longer life remain the holy grail of societal achievement, and is an extra year of life expectancy worth the economic efforts required? These and other ethical questions will be the next area of debate, as isolated public health care providers begin to shift their focus on improving the quality of end-of-life years. How this trend will affect mortality improvement rates going forward from an actuarial standpoint will need to be determined.

*Note: The views expressed herein are those of the author and do not necessarily reflect the views of SCOR Global Life. ■*



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# LIVING to 100

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Registration for the 2017 Living to 100 Symposium will open soon. This prestigious event on longevity brings together a diverse range of professionals, scientists and academics to discuss:

- How and why we age;
- Methodologies for estimating future rates of survival;
- Implications for society, institutions and individuals;
- Changes needed to support an aging population increasing in size;
- Applications of existing longevity theories and methods for actuarial practice.



# Implementing VM 20

By Claudel Laguerre

## SUMMARY

The purpose of this article is to discuss potential issues and considerations that may be encountered with the implementation of VM 20. Crucial considerations include the modeling software used, validation effort, assumptions used, complexity of the process, documentation, and run time. A key takeaway is that an integrated modeling platform with solid automation and asset-liability capabilities is imperative for addressing the issues and considerations encountered.

## INTRODUCTION

In recent years, there has been growing interest in principle based reserve (PBR) requirements for life insurance products. Although not final, section VM-20 of the NAIC Valuation Manual provides guidance on the calculation of the minimum statutory reserve for life insurance products using PBR. We are moving closer to the adoption of the valuation standard, which will likely make PBR effective for all U.S. life insurance companies in 2017.

VM-20 defines the reserve as the greatest of three components, a net premium reserve (NPR), deterministic reserve (DR), and stochastic reserve (SR). The net premium reserve is a formulaic liability-only reserve calculation set under prescribed assumptions. The deterministic reserve is a gross premium valuation which uses best estimate assumptions plus a margin. The stochastic reserve is equal to the CTE 70 of the greatest present value of accumulated deficiency under prescribed scenarios, and uses best estimate assumption plus a margin. Both the stochastic and deterministic reserves include the modeling of assets. Refer to Table A for further details on VM 20.

Not only will VM 20 yield significant changes in the statutory reserve amount held, but also implementing VM 20 will present a multitude of issues and considerations for the processes and models supporting all actuarial functions (e.g., pricing, valuation, and projections).

## ISSUES AND CONSIDERATIONS

**Actuarial software:** It is crucial to have an integrated software system which allows for the simultaneous modeling of VM 20's three main components and their complex interdependencies,

and the modeling of assets with the company's investment strategy. These should be carried under one platform both at time zero and future points in time. Otherwise, one will have to resort to approximations for projecting VM 20 reserves which is needed for both pricing and forecasting. Without an as accurate as possible representation of future reserves, it is possible to misprice or not truly understand the risk profile. Therefore, the use of approximation is far from ideal.

A frequently found approach for handling PBR reserve requirements with many moving parts such as VA CARVM is to use multiple independent models for modeling the different pieces. This approach presents difficulties in validating, maintaining and reconciling the separate models and their results.

**Validation:** VM 20 processes will be needed for different actuarial functions such as pricing, valuation and projection. Each of these will be complex processes presenting challenges for conducting an appropriate validation effort. A successful validation will require good planning. The validation effort should be separated into two parts, the process and the results. Validating the process ensures the correct information gets transferred among the different components at any time of the projection. Validating the results is to make sure they are reasonable. An understanding of how the product features over the projection period drives the three elements (NPR, DR, SR) is crucial when assessing the reasonableness of results. It is an intensive exercise since not only each component needs to be evaluated, but also the interactions among them have to be validated. It is important that the software used allows users to track each of the three projected components. Auditability, the ability to pick a point in time, and reproduce the reserve amount is also an important feature for the modeling tool being used. Finally, comparing the IRRs, cashflows and reserve patterns under VM 20 versus those under the current statutory minimum reserve requirement (XXX/AXXX) will ensure that results are behaving as expected.

**Tax Reserves:** Determining the tax reserve to use for pricing and projections is something that needs to be considered. On July 31, 2015, the IRS and Treasury released their Guidance Priority List (GPL) which included a project described as "Guidance under sections 807 and 816 regarding the determination of life insurance reserves for life insurance and annuity contracts using principle-based methodologies, including stochastic reserves based on conditional tail expectation." To date, no guidance on this issue has been published. However, the listing of this project on the GPL indicates that the IRS and Treasury are actively considering guidance on the use of the VM20 reserves for tax reserving purposes. We believe that the current statutory minimum reserve requirement (XXX/AXXX), NPR or the calculated VM 20 are options that are being considered. The considerations on the use of the VM20 are related to the policy by

policy calculation requirements and the tax assumptions under IRS Section 807(d).

**Required Surplus:** There is no unique guidance on the required surplus to be used for life insurance products in a PBR environment. The factors for insurance risk (C2) and business risk (C4) of the current RBC formula can be applied to a reserve amount. Naturally, one would use the reported reserve, this implies that the software used needs to be able to tie to the VM 20 reserve amount at every point in time during the projection period for calculating the required capital amount. This is not a given for non-formulaic reserve methodology with many moving parts such as VM-20.

**Supporting assets:** Setting the starting asset requires an iterative process since the aggregate statement value of starting asset must be within two percent of the VM 20 reserve, which depends on the starting asset. The company will have to provide reasonable assurance that the reserve is not materially understated in the PBR actuarial report. To prevent this, the VM 20 reserve will have to be recalculated with the new starting asset set equal to the VM 20 reserve until it is within the two percent range. This iterative process may not present many issues for a valuation exercise since it is performed only at the valuation date. However, it will be problematic for pricing exercises where reserves are calculated at future points in time. It is important to have actuarial software that has the capabilities to handle this iterative process combined with the other calculations required under VM 20.

Considerations should also be given to the degree to which the modelled assets parallel the actual supporting asset portfolio, and the impact on results. Also, when conducting a pricing exercise, pricing metrics should be evaluated over different dimensions (e.g., gender, band, and risk class). Determining how the modelled assets should vary over the different dimensions is something that must be considered. One option is to scale the assets up or down. Another view is to have the asset distribution reflect the company's investment approach used for the pricing view being evaluated.

The above highlights that in order to appropriately capture VM20, it is essential to have an integrated modeling platform with asset-liability capabilities and investment functionalities reflecting the level of sophistication needed to model the interaction between assets and liabilities during a projection.

**Assumptions:** There are several items to be considered regarding the assumptions. The internal process for setting margins should be considered before implementing VM 20. Some companies do not have such a process in place yet. The capabilities



of setting margins at the individual risk level should be assessed before implementing VM 20.

The mortality used in the deterministic and stochastic components grades from the company experience into the industry's experience over a time period. Both the margin level and the grading period depend on the credibility level assessed by the company. This could result into a considerable difference in results which shows the importance of the credibility score. Other than a brief reference to the Panjer method, there is little guidance in the Valuation Manual on how to generate the credibility level. Companies will need to leverage their mortality studies and develop processes to determine the credibility of their experience.

The software used will need to have the flexibility to allow for grading the company experience to the industry mortality table over a defined period, while assigning a margin and to each of the mortality table.

**Contract level allocation:** For tax purposes, depending on the ultimate decision on tax reserves by the Treasury, it may be necessary to allocate the reserve at the contract level if the reserves are driven either by the deterministic or stochastic component, which are both aggregate methods. In these cases, determining

the basis for allocating the VM-20 reserve at the contract level will be a key consideration. There is little guidance on the latest draft of the valuation manual on this point. A reasonable option is to allocate over the NPR, but there are other potential alternatives, which should be evaluated.

**Product Features:** It is important to understand how the product features drive the behavior of the three components of VM 20 as well as the results of the deterministic and stochastic exclusion tests and ultimately the profitability of the product. To that end, an understanding of the product features contributing to passing or failing of the exclusion tests will give a better sense of the results. This will reduce the difficulty in analyzing results.

**Model run time:** VM 20 is calculation intensive and outputs are needed over a wide range of assumptions for pricing and projections. Consideration should be given to parameters, such as the number of projected years, which can be reduced without sacrificing the reliability of results. If the reduction in running time is not sufficient, an efficient grid, cloud, and storage solutions may be required.

**VM 20 interpretation:** The Company should form a shared view on the interpretation of the regulation. This will likely involve discussions with Actuarial Valuation, Accounting Policy and Tax, among others, and will drive a more focused implementation experience.

**VM 20 process:** VM 20 processes are complex and have many moving parts which increase model and operational risk versus the current statutory environment. This change stresses the need for efficient coding and processing, as well as a model environment with strong controls that assigns access level for users depending on his or her clearance. The modeling environment should also allow the establishment of a development, a testing, and a production environment. The modeling software used should be able to accommodate all of these. Since results will be

assessed over many assumptions, the software used should also have strong automation capabilities.

**Documentation:** The complexity of the processes, and support for the assumptions and margins used will increase the need for documentation as reflected by the high documentation requirements in VM 20. Establishing a process that encourages efficient and comprehensive documentation will be critical for both setting the margin and creating a transparent process.

## CONCLUSION

U.S. life insurers' readiness regarding VM 20 likely ranges from "I am very" to "I am absolutely not." At a minimum, VM 20 is on U.S. life insurers' radar. By thoughtfully and intentionally addressing the issues and considerations raised in this article, the likelihood of reaping the benefits of a successful implementation should improve. In particular, a careful selection of tools and techniques is important for a successful transition to the new requirements. A key takeaway is that the benefits of an integrated modeling platform with comprehensive automation and asset-liability capabilities should be considered when planning the execution of VM 20.

*Disclaimer: The information contained herein is of a general nature and is not intended to address the circumstances of any particular individual or entity. Although we endeavor to provide accurate and timely information, there can be no guarantee that such information is accurate as of the date it is received or that it will continue to be accurate in the future. No one should act upon such information without appropriate professional advice after a thorough examination of the particular situation.*



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TABLE A- VM20 Reserve

VM 20 = MAX (NET PREMIUM RESERVE, DETERMINISTIC RESERVE, STOCHASTIC RESERVE)

	NET PREMIUM RESERVE	DETERMINISTIC RESERVE	STOCHASTIC RESERVE
Methodology	Formula-based Similar to CRVM Seriatim required	Principles-based	Principles-based Clustering techniques allowed
Valuation basis	Net premium valuation	Gross Premium valuation	CTE 70 of the greatest PV of accumulated surplus plus starting asset under prescribed scenarios.
Assumptions	Prescribed statutory assumptions	Best estimate assumptions plus margins  Margins are set according to credibility of experience and level of risk  Blending of company's experienced mortality and industry table based on company's credibility level	Best estimate assumptions plus margins  Margins are set according to credibility of experience and level of risk  Blending of company's experienced mortality and industry table based on company's credibility level
Scenarios	Flat discount rate	Single deterministic scenario	Set of prescribed economic scenarios of yield curve and equity return rates
Discount rate	Discount rate based on issue year	projected net portfolio rates	105 percent of the projected 1-year U.S. treasury rates
Exclusion test	N/A	Pass if A>B  Where:  A=Sum of future guaranteed gross premiums  B= Sum of future Val Net premiums and lapse rates are set to 0 percent.	Pass if test ratio<4.5 percent  Where :  test ratio= [ (b - a) / c]  a= reserve for baseline scenario  b= max reserve over 16 prescribed scenarios  c= total PV benefits  reserve is GPV using anticipated experience with no margins



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