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Insights Into Life Principle-Based Reserves Emerging Practices

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Product Matters!

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To join the section, SOA members and non-members can locate a membership form on the Product Development Section Web page at www.soa.org/productdevelopment.

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Chairperson's Corner

By Elena Tonkovski

It is with great pleasure that I introduce to you the first digital issue of *Product Matters!* This is in addition to the print version, which has already been published. Each article in the digital version is entered separately, allowing you to easily pick and choose which articles you'd like to read and forward on to others. I want to thank the SOA for making this possible and to thank each of the authors listed on the front page for contributing new perspectives on relevant product development topics.

I feel fortunate to work in the actuarial field because many SOA members are willing to give back to the profession. The Product Development Section is one of the largest and most active groups within the SOA. The section has multiple activities underway at any given time. If you're interested in finding out how to get involved, I encourage you to contact me or any of the individuals listed on the prior page. It is a great way to expand your professional network, collaborate with like-minded people, and practice your leadership or communication skills while staying abreast of the many changes and influences in the life insurance and annuity industry.

My last three years on the PD Section Council have been very rewarding. I have learned a lot about how the SOA works as well as met some amazing people I might not have met otherwise. Our members and friends of the council come from different backgrounds but share the same passion for product development and leading change. The council is often recognized by the SOA for contributing to the profession and receives high marks from attendees at industry events for the sessions we bring, such as the recent Outstanding Session Award for "Session 157" at the 2018 SOA Annual Meeting & Exhibit in Nashville titled "2017 CSO Friend or Foe" given by Anthony Ferraro, Stacy Koron, Donna Megregian and Curtis Clingerman.

Our section is constantly looking for ways to bring relevant content to industry events through sessions, webcasts, podcasts and articles. We are also always looking for ways to engage our members by asking for research ideas and calls for essays as well as through social media, volunteering opportunities and more.

I see the council as a "community of practice," where the community influences its members and its members influence the community. It is through the process of sharing information and experiences with the group that members learn from each other and have an opportunity to develop personally and professionally.

I look forward to another productive year ahead! ■

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Insights Into Life Principle-Based Reserves Emerging Practices

By Kevin Carr, Andrew Radel and Chris Whitney

In the second quarter of 2018, Oliver Wyman surveyed the life insurance industry on emerging life principle-based reserves (PBR) practices. Forty direct writers and reinsurers with 80 percent market coverage[1] participated. This article highlights key takeaways for product actuaries and provides a deeper dive on select PBR emerging practices to be mindful of, as less than one year remains to optimize all life product offerings for 2017 CSO and PBR requirements.

KEY TAKEAWAYS

Figure 1 highlights key takeaways from the survey related to analysis and implementation of PBR, emerging practices and the road ahead.

PBR IMPLEMENTATIONS ARE HEAVILY BACK-LOADED

Figure 2 (pg. 5) summarizes actual PBR implementations through 2017 and planned implementations through the remainder of the optional phase-in period. The percentages were calculated as (number of participants with at least one product in category on PBR) / (total participants with products in category).

Very few products were moved to PBR during 2017. Most of the moves were for term, which is the easiest to implement. Planned go-live implementations remain surprisingly low for 2018 and 2019. We believe that the back-loading of PBR implementation is driven by the following:

- Competitive pressures and prevalence of reserve financing solutions for term and to a lesser extent ULSG, for which reserve reductions decrease tax leverage.
- Resource constraints and the level of effort required to move products to PBR, including additional reporting and disclosure requirements.

While analysis and repricing are taking place, PBR requirements are still an evolving target and many participants are consciously delaying their actual implementation.

Figure 1
Survey Key Takeaways

Analysis and Implementation

1. PBR implementations are heavily back-loaded across all product types, with implementations through 2017 focused on Term
2. PBR analysis readiness is highest for Term (nearly 90 percent of carriers have analyzed) and second highest for ULSG (62 percent have analyzed)

Emerging Practice

3. Seventy percent of respondents aggregate mortality experience across products, risk classes, tobacco status, and face band for credibility purposes
4. Many writers are assuming that reinsurers will not raise non-guaranteed YRT rates to recoup all of the excess mortality assumed under PBR

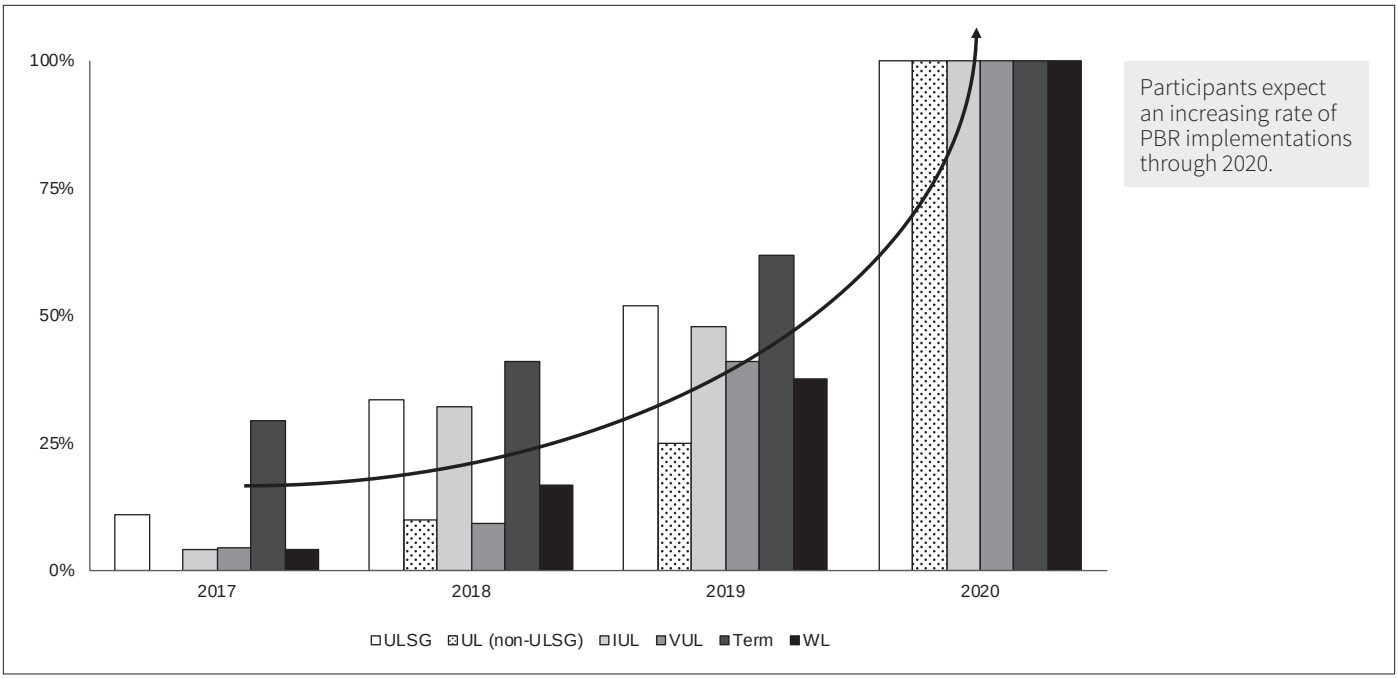
The Road Ahead

5. Significant work remains for the industry to be PBR ready by the end of the optional phase-in period
6. As PBR is deployed, the industry will need to manage through evolving reserving requirements with retrospective implications

(1, 2, 5): PBR implementations are surprisingly back-loaded, and achieving full readiness by 2020 will be arduous for most of the industry.

(3, 4, 6): Another potential challenge is additional regulatory prescription in areas where discretion is currently being applied.

Figure 2
Percentage of Participants With Products on PBR by Year-End



PBR READINESS IS HIGHEST FOR TERM, FOLLOWED BY ULSG

Table 1 summarizes the percentage of participants that have analyzed the impact of PBR across product types as of year-end 2017.

Table 1
Percentage of Participants That Have Analyzed the Impact of PBR by Product Type as of Dec. 31, 2017

Product Type	
Term	86%
Universal Life with Secondary Guarantee (ULSG)	62%
Indexed Universal Life (IUL)	54%
Whole Life (WL)	33%
Universal Life without Secondary Guarantee (UL)	30%
Variable Universal Life (VUL)	27%

Most term writers and almost two-thirds of ULSG writers have analyzed the impact of PBR on these products. Other products are behind, with half of IUL writers and less than a third of WL, UL and VUL writers having performed analyses for these products. We believe these results are driven by the following:

- Reserve relief is expected on protection-oriented products due to elimination of deficiency reserves and increase in the valuation interest rate (100 basis points) for the revised formulaic reserve floor (NPR).
- A portion of the IUL market is protection oriented,[2] making the impact of PBR similar to ULSG.
- Accumulation-oriented products (WL, UL, and certain IUL and VUL) are structured to pass mortality, investment and other margins to the policyholder, making it likely for the NPR to dominate. The NPR defaults to pre-PBR methodology for these products, and PBR has little impact on reserves.

THE INDUSTRY IS EXPOSED TO AREAS WHERE DISCRETION CAN BE APPLIED

The continuous evolution of PBR requirements was listed as a driver of delayed implementation in the previous section. Regulators are actively discussing changes to the *Valuation Manual*, with a goal of making substantial revisions for inclusion in the 2020 requirements.

Two key areas where changes could emerge are 1) mortality experience and 2) the treatment of nonguaranteed yearly renewable term (YRT) rates.

Mortality Experience

The mortality assumption used in the calculation of the modeled reserve under PBR is developed using a blend of company and industry experience, with prescribed margins based on the credibility of the underlying experience. Discretion can be applied when setting the aggregation level used to determine credibility.

Survey participants were asked if they aggregate their experience across any of the following four attributes when determining their credibility for PBR: product, tobacco usage, risk class, face amount (band).

Seventy percent of participants aggregate across all four attributes, and 90 percent of participants aggregate across three or more, which produces higher (favorable) credibility levels. As most participants view the prescribed mortality margin as being excessive, they are unlikely to adopt a position on credibility, which further increases this margin.

Regulatory discussion on this topic has focused on the potential for vastly different results depending on the level of aggregation used. Additional guidance is expected on the approach to determining what experience can be aggregated together and on the additional supporting analysis and demonstrations that may be required.

Treatment of Nonguaranteed YRT Rates

PBR requires that insurers calculate their reserves with and without reinsurance, with the reinsurance reserve credit equal to the difference in these two amounts.

For nonguaranteed YRT reinsurance, the current scale of rates is typically based on best-estimate mortality rates with future improvement and insurers must make an assumption about how reinsurers will react to the adverse mortality required under PBR.

VM-20 provides general guidance on the modeling of reinsurance cash flows, stating, "The company shall assume that the counterparties to a reinsurance agreement are knowledgeable about the contingencies involved in the agreement and likely to exercise the terms of the agreement to their respective advantage, taking into account the context of the agreement in the entire economic relationship between the parties."

Survey participants were asked about the approach they use to model nonguaranteed YRT rates. Two-thirds of participants responded that they assume less than 100 percent reaction from the reinsurer to the adverse mortality, and one-third assumed no change to the current scale of rates.

This issue was discussed by regulators at the Summer 2018 NAIC meeting, with a white paper from the American Academy of Actuaries and several comment letters on the issue discussed by the Life Actuarial Task Force (LATF). While no definitive guidance was given at this meeting, a desire for a common approach to modeling nonguaranteed YRT rates was shared among the regulators who reacted to the discussion. The chair of LATF said it will be a priority to reach consensus on additional requirements for inclusion in the 2020 version of the *Valuation Manual*.

THE ROAD AHEAD WILL BE CHALLENGING FOR MOST

Life PBR is upon us, with less than a year before the optional phase-in period ends and implementation is mandatory. Significant work remains as PBR implementations are back-loaded for all but a handful in the industry.

Requirements will continue to evolve, and the expectation is that changes will be retroactive, making it important to understand the range of subjectivity in decisions made and to stay close to emerging discussions.

With all this activity, it will be important to step back and skillfully manage all areas impacted. This includes creating optionality in the product cycle, modeling and assumption setting, which can be effectively and rapidly acted upon as regulations and practices converge. ■

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ENDNOTES

1 Based on 2016 individual life insurance sales, adjusted to reflect any market exits, mergers and acquisitions that occurred between 2016 and 2018.

2 *Wink Sales & Market Report*, second quarter 2018, shows IUL sales with a primary pricing objective of death benefit, guaranteed death benefit or no lapse guarantee account for nearly 12 percent of the market as of 2Q 2018 and nearly 17 percent of the market as of 2Q 2017.

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Please submit an abstract or outline of your proposed paper by Aug. 30, 2018. Abstracts should include a brief description of the topic, data sources and methods to be used, key items to be covered, and how your paper will contribute to current knowledge, theory and/or methodology. A brief curriculum vitae or resume is also required.

Submit the information by email to Jan Schuh, Sr. Research Administrator, at *jschuh@soa.org*.

Learn more about the call for papers, including the complete topic list, by going to ***Livingto100.SOA.org***.

Questions may be directed to Ronora Stryker, ASA, MAAA, SOA Research Actuary, at ***rstryker@soa.org***.

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Research on Waiver of Premium Riders

By Jennifer Fleck

The Product Development Section has recently sponsored research on waiver of premium and waiver of charges riders. Waiver riders are commonly offered as optional benefits or included automatically on individual life insurance policies as integrated benefits. In the event of disability, a waiver rider may waive future life insurance premium due or contribute an amount to a flexible account, such as the average premium paid over the past year or the cost of insurance charges. Despite the prevalence of these riders, the current valuation standard is still the 1952 Society of Actuaries (SOA) Disability Table.

Research is being carried out in two phases. Phase 1, which is now complete, was a survey of the current practices and assumptions used for waiver riders. This phase was completed in March 2018, and the report is available on the SOA website. This article will summarize the results found in that report.

Phase 2 is an industry experience study with the intention of requesting a new valuation standard table if the results are significantly different from the 1952 SOA Disability Table.

SURVEY OF CURRENT PRACTICES

Fourteen companies responded to a survey of practices regarding waiver of premium benefits on life insurance products. The survey was sent to approximately 50 carriers doing business in the United States. The survey covered products sold in 2016 and was conducted in late 2017.

The survey covered waiver of premium riders attached to universal life, whole life and term life policies. It asked insurance carriers about plan design features, claim management procedures, pricing and reserving methodologies, and company willingness to participate in an updated experience study.

The survey participants collectively sold 1.1 million individual life policies for approximately $2.5 billion of annualized premium in 2016. Of those policies sold, 37 percent included disability waiver benefits. Broken down by underlying policy type, 26 percent of universal life, 50 percent of whole life and 33 percent of term life policies were sold with disability waiver riders among survey participants in 2016.

According to LIMRA retail industry estimates, the total individual life insurance sales in 2016 generated $13.7 billion of annualized premium. Therefore, this survey represents approximately 18 percent of the U.S. individual life market as a whole as measured by premium.

Broadly speaking, the waiver of premium rider designs that were reviewed in the survey were similar among respondents. All policies defined disability as the inability to perform the insured's own occupation for some period of time, followed by the inability to perform any occupation thereafter. The benefit periods were mostly lifetime benefits, with some benefits paid until retirement, and a few that varied based on the age at disablement. Elimination periods (the time that the insured must remain disabled to receive benefits) were primarily six months, with a few that are shorter than that. Most term policies convert (either automatically or optionally) to permanent policies while the insured is disabled.

The survey asked respondents when their waiver riders were last repriced. The majority of the responses were in the "more than 10 years ago" category. Based on the responses, we do not believe that this rider gets much attention when repricing a life insurance policy.

The survey also asked about US Statutory and GAAP reserving practices. Most of the responding companies calculate active life reserves for waiver riders as the present value of the expected waiver benefits less the present value of the waiver benefit net premiums. The waiver benefits are either payment of future base policy premiums or, in the case of a flexible premium

product, charges being applied to the underlying life insurance policy. Disability incidence rates used in the active life reserve calculations are primarily determined by using 100 percent of the 1952 Disability Table. Claim reserves on disabled lives are typically based on a seriatim calculation of the present value of expected future benefits, with termination rates set at 100 percent of the 1952 Disability Table. No respondents indicated that they were assuming any mortality improvements. Some responding companies address reserve adequacy by including the rider in the company's cash flow testing analysis. For other companies, the active and disabled reserves fall below their materiality thresholds and are not included in the cash flow testing analysis.

COMPARISON OF CURRENT DISABILITY TABLES

Phase 1 of this research also included a comparison of the 1952 Disability Table with other tables that have since been created for disability-driven products. The 1952 Disability Table incidence rates are based on experience from 1935 to 1939, and termination rates are based on 1930 to 1950 experience; therefore, a comparison of the 1952 Disability Table with more recent industry sources provided context to the issue of using an outdated table for pricing and reserving. For example, the 1952 Disability Table does not vary by gender, which has been consistently shown to be a major variable in disability incidence and termination rates.

Waiver riders provide a form of disability benefit. In order to understand how disability experience has changed over time, it is helpful to consider valuation tables used for other disability benefits, including individual disability income, group disability income and group term life waiver of premium.

It is important to remember that even though the tables used in the comparisons below are based on disability experience, the underlying products are different. They vary in underwriting styles and in terms of the reasons the insured is buying the policy, both of which can produce different experience results. Care should be taken when using any industry experience table, particularly one that was created for a different product. Nevertheless, we believe that these comparisons give a meaningful view of how disability incidence and termination rates have changed over time.

A summary follows of the different valuation tables used since 1964 for computing statutory minimum reserves for group life waiver of premium benefits and for group and individual disability income benefits:

- The 1985 Commissioner's Individual Disability Table A (1985 CIDA Table) is an update to the 1964 Commissioner's Disability Table (1964 CDT Table), which was designed to be used for individual disability income policies. In addition to using updated experience, this table expands on the 1964 CIDA Table by providing separate results by gender and occupation class.

- The 2005 Group Term Life Waiver Reserve Table (2005 GTLW Table) was the first update for group waiver since the 1970 Krieger Table. This was the first group waiver table to include claim termination rates that vary by gender.

- The 2012 Group Long-Term Disability Valuation Table (2012 GLTD Table) is based on group disability experience from 1997 through 2006. It replaced the 1987 Commissioner's Group Disability Table as the claim termination basis for computing statutory reserves and added distinctions for gender, diagnosis, monthly benefit amount and definition of disability.

- The 2013 Individual Disability Income Valuation Table (2013 IDI Table) is based on individual disability income experience from 1990 through 2007. The 2013 IDI Table will become the new statutory valuation standard for IDI policies starting in 2020. This table contains distinctions for categories such as benefit period, market type, product type, diagnosis and tobacco use.

The report from Phase 1 compares initial claim reserves based on the termination rates included in each of these tables. Because the 1952 Disability Table has higher termination rates, it produces lower claim reserves at almost all ages when compared with the various tables that have been developed since then.

Disability claim incidence has also shifted over time. We compared the 1952 Disability Table incidence rates with the 1985 CIDA Table and 2013 IDI Table incidence rates. Note that the 2005 GTLW and 2012 GLTD tables did not include incidence rates. The shape of the 1952 SOA Table is steeper than the more recent tables after approximately age 50. More recent studies show that disability incidence rates have been flattening. Steeper curves produce higher active life reserves than flatter curves, so the 1952 Disability Table may be overstating reserves for older attained ages. It should also be noted that the 1952 Disability Table incidence rates end at attained age 59. This is problematic because benefits today are generally sold to retirement age.

Combining incidence and termination gives us a look at comparative active life reserves for waiver riders. When we calculated sample reserves using the different tables, the active life reserve produced by the 1952 Disability Table is between the male and female reserves produced by the 1985 CIDA and 2013 IDI tables until attained age 46. After that, the active life reserves produced by the 1952 Disability Table are higher than the reserves produced by either of the newer tables. In addition, the difference between male and female active life reserves has widened from the 1985 CIDA Table to the 2013 IDI Table, which points out the need for gender-specific rates.

All of these reserve comparisons are included in the March 2018 report, which can be found here: *https://www.soa.org/resources/research-reports/2018/survey-waiver-premium-monthly-deduction-rider/*.

UPDATED EXPERIENCE STUDY

Based on the results seen in Phase 1 of this research, the Product Development Section and the SOA have decided to move ahead with Phase 2. As of this writing, we are preparing to issue a data request to compare current experience from waiver riders on individual life insurance policies with the 1952 Disability Table. The due date for data submission is April 30, 2019. Be sure to look for the data call if your company sells these riders. The stronger the participation in the study, the better the end result. While we understand that company reporting systems may have some limitations, we are hoping to evaluate the experience with new variables, such as gender, that have shown significant variability in other disability studies. ■

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Why Indexed Universal Life Income Streams Need to Be Managed—Part 2

By Ben H Wolzenski and John S. McSwaney

Ben H Wolzenski, FSA, MAAA, has been a member of the Society of Actuaries since 1972 and has worked with individual life products his entire career. John S. McSwaney, CLU, ChFC, AEP, is a past president of AALU and the International Forum and has been a life agent since 1968. Their working affiliation extends over 40 years.

Part 1 of this article, published in the October 2018 edition of this newsletter, described the incidence of returns risk and gave examples of the problems it can create when a policyholder takes an income stream from indexed universal life (IUL). Testing sequences of returns based on historical S&P performance and a hypothetical 12.5 percent cap IUL policy showed a wide range of risk of lapse frequency for income streams that were not managed. There was just a 2 percent chance of lapse by age 85, with crediting rates from a favorable population of returns combined with a conservative method of taking income, but an 89 percent chance of lapse by age 90, with crediting rates taken from an unfavorable population of returns combined with an aggressive method of taking income.

Part 2 of this article continues with more results and a description of approaches to managing the income stream.

RESULTS FOR DIFFERENT MODELS, DIFFERENT WITHDRAWAL METHODS

Wolzenski: When we tested a product with a lower cap (11.5 percent) and crediting rate, the results were not quite as severe. For example, with participating loans to age 90 and a lower illustrated annual income, "only" 64 percent of the policies would lapse by age 90 with the 2000 through 2016 S&P data compared with 76 percent using the higher-cap product model. Using withdrawals to basis and fixed loans reduces the illustrated income and reduces risk somewhat, especially the risk of lapses before age 85. The use of international indexes in a product along with the S&P also produced less risk, as did the use of monthly allocations to indexed accounts and monthly income payments rather than annual.

McSwaney: We also found that having crediting rates based on participation rates, as well as a cap, reduced risk. In brief, we found a number of factors that reduced the risk, but the bottom line was still that the income stream must be managed to be sure of avoiding lapse and a resulting tax event. That leads to the question of how income streams should be planned and managed.

Wolzenski: One step many carriers have taken is to provide an "overloan" rider. If the policyholder activates the "overloan" rider, it will prevent the policy from lapsing, although the net cash value and death benefit may eventually be reduced to zero. But for that to work, the policyholder or agent must monitor and project the ratio of the net cash value to account value every year without fail through advanced attained ages. Our research showed that lapses are most likely to occur when the insured is in his or her 80s or 90s. Insureds are increasingly living to those ages, with or without full cognitive ability. We think relying on an insured or a servicing agent (if there is one) to provide the necessary monitoring is risky at those attained ages. A better approach to avoiding lapse and consequent phantom income is needed.

McSwaney: Starting with an income based on current assumptions, including the maximum permissible interest crediting rate that can be illustrated, increases the chances that the income stream will need to stop earlier than planned or be drastically reduced. This can be the case even if the income stream has been adjusted within limits along the way. A different strategy is to start the income stream at a level that is highly likely to be maintained based on historical index returns and to adjust that income with a management process. That approach greatly reduces the chances of needing to severely reduce or stop the income stream and makes it likely that the income stream can be adjusted upward in future years.

That's a high-level description. I know you want to provide additional details and data.

Our research showed that lapses are most likely to occur when the insured is in his or her 80s or 90s.

Wolzenski: We've discussed results for income to age 100, but often income is illustrated for a shorter period, such as to age 85. What happens then? The result is obvious if you think about it: Shorter income periods are even riskier. The shorter the income period, the less extra cash value there is to fund future income payments and the less safety margin there is to get through years of low crediting rates.

INCOME MANAGEMENT PROCESS—WHAT WE TESTED AND FOUND

Turning to the management process, we have seen that simply starting with the income that is the maximum permitted to be illustrated has significant risk. But what income amount is sufficiently less risky, and how do we manage whatever initial income is chosen?

The approach we took was to look at the level income stream that could be taken based on actual sequences of index returns—and, therefore, hypothetical crediting rates—for every different starting date within the historical periods of 1997 through 2016 and 2000 through 2016. For example, if we use sequences of the S&P one-year returns for every starting date from 2000 through 2016 and solve for the level income stream to age 100 using participating loans to age 90, the annual income ranges from $94,309 to $207,250, even though every sequence used returns from the same period of time.

What we found was that even with a well-developed management process, starting with the AG49 maximum income amount, there is a significant probability of needing to terminate income and invoke the "overloan" option—or at least reduce the income substantially to a level that is more likely, or even guaranteed, to be sustainable. However, if the initial income is no higher than 90 percent of the income streams calculated using every starting date in 2000 through 2016, it is extremely unlikely for the overloan option to be needed—or even for income to be precipitously reduced to a safe level.

Furthermore, it is not all given up by starting with a lower initial income. The management process can increase future income payments if returns are more favorable than needed.

McSwaney: We have referred to a process for managing the income stream several times. How would you describe it?

INCOME MANAGEMENT PROCESS DESCRIPTION

Wolzenski: First, as a result of testing different product models, it is clear that the management process should be customized for the product being managed. At a minimum, the parameters used in the management algorithm should be tested for the particular product. The process I developed is simply one example that worked for the product models I tested. Here is a general description of that process.

1. For the chosen initial income level, calculate the level interest crediting rate (not more than the AG49 maximum) for all future policy years that produces that income and the target cash value at a future age, such as 100 or 120.

2. After the next policy year has passed, actual indexed interest (and bonuses, if any) will have been credited. Recalculate a *tentative* new level annual income that produces the target cash value. Make an adjustment to future income *partially* reflecting this recalculated income.
    a. Adjusting income by the full amount of the recalculation makes the income vary more than is needed to produce a stable long-term result, hence the partial adjustment.
    b. As an example of parameters of an adjustment algorithm that could be used, 50 percent of any increase or decrease produced by the recalculation could be applied, and that increase or decrease could be limited to 5 percent of the previous income amount.
3. Once the next income amount has been determined, recalculate the level interest crediting rate (not more than the AG49 maximum) for all future policy years that produces that income and the target cash value at a future age, such as 100 or 120.
4. Repeat Steps 2 and 3 through the entire income period.

EXAMPLE

Consider a hypothetical policy with $1.77 million of cash value at age 65, for which the income stream to age 100 is $158,095 using participating loans to age 90 and an interest crediting rate of 7.14 percent, the maximum permitted under AG49 for this then-current cap of 12.5 percent.

1. If the maximum illustrated income of $158,095 is chosen, the initial level of interest crediting rate would be 7.14 percent. Had a lower income been chosen, a lower initial level rate would be calculated to produce the target cash value.
2. At the end of the first policy year, actual indexed interest is credited based on the S&P point-to-point return of 11.49 percent. Using the initial assumed level crediting rate of 7.14 percent and the new cash value, recalculation produces a *tentative* new level annual income of $165,775 to age 100.
    a. Assume that the adjustment algorithm chosen is to reflect 50 percent of the calculated change in annual income, with a further limit of 5 percent in the change in either direction in one year.
    b. The recalculated level annual income would be $161,635, an increase of 2.2 percent.
3. Using the new annual income of $161,635, the level of interest crediting rate for all future policy years that produces the target cash value is 7.05 percent. This is the level of assumed interest rate that will be used in Step 1 above after completion of the next policy year.

There are two refinements and a couple of special steps that I suggest be built into the process.

When participating loans are used, the recalculated income amounts (before adjustment) will vary more significantly, especially as the end of the income period or the end of the period for using participating loans approaches. Two refinements are indicated.

1. When recalculating income, in addition to meeting the target cash value, the new income amount should not be greater than an amount that meets one of the following two tests:
    a. The net cash value at the end of each year, prior to crediting of annual interest, is sufficient to exercise the "overloan" option.
    b. The policy will not lapse in any future year with the guaranteed interest crediting rate. (This may be a more lenient test in the last few years of the income period.)
2. In the last several years before the end of participating loans or income payments (whichever is sooner), a single zero percent crediting rate can create a drastically reduced recalculation of income. A safer approach is to switch from participating to fixed loans after a high crediting rate within five years or so of when income would end or when the switch to fixed loans would have occurred.

The two special steps occur when the policy is in danger of lapsing.

1. If at the beginning of any policy year the guaranteed interest crediting rate would produce a cash value at the end of that year insufficient to exercise the overloan rider (and insufficient to prevent a lapse in all future policy years with reduced income), then the overloan rider should be automatically exercised after withdrawing an income amount that leaves just enough net cash value to exercise the rider.

2. If at the beginning of any policy year the guaranteed interest crediting rate would produce a cash value at the end of that year insufficient to exercise the overloan rider (but is sufficient to prevent a lapse in all future policy years with some reduced level income), then the income amount should be reduced to that amount and future recalculated income should be made at the guaranteed interest rate.

RECOMMENDED TO INSURERS

McSwaney: A management process like this cannot be forced on policyholders, but if it is available to be elected, it can prevent a lot of problems in the future. The availability of such a "fail-safe" system would provide assurance to agents and policyholders as well as to conscientious company personnel.

Wolzenski: Other modeling approaches and assumptions could be used to assess the income management issue, and I welcome feedback on these results or other results that readers may have obtained. Furthermore, I am happy to provide more detailed results of our research without charge upon request. ■

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The Future Is Now: Wearables for Insurance Risk Assessment

By June Quah

Wearable technology refers to smart electronic devices with sensors that collect and deliver information about their surroundings. Currently, most devices are worn on the wrist, although the technology is available in other forms, such as jewelry, glasses, clothing, shoes and implanted devices. The main category of wearables in the market is fitness trackers and smartwatches, which gather metrics associated with physical activity: step count, activity minutes, distance, floors climbed and calories burned. More sophisticated models can capture heart rate and sleep patterns.

Wearables introduce a multitude of ways to monitor health. The quality and quantity of information supplied by wearables will transform how we manage our lives. There is a huge opportunity for life insurance companies to change the way we interact with our customers and improve how we manage risk.

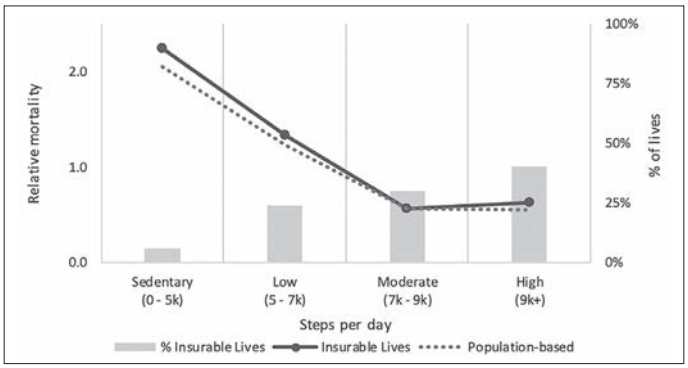
EVIDENCE-BASED RISK DETERMINATION

Insurance companies have traditionally relied on protective value studies and medical research to quantify mortality risk. Munich Re evaluated the effectiveness of physical activity as measured by wearable sensors in stratifying the mortality risk profile of a U.S. population-based data set from a collection of clinical research studies.[1] Each of the clinical studies was conducted to understand the relationship between lifestyle behaviors (e.g., physical activity, nutrition, sleep) and health. The common characteristic among the studies was the focus on physical activity measurement using research-grade accelerometers alongside the measurement of key health outcomes, including clinically measured parameters, such as cholesterol, blood pressure, body mass index and presence of disease. The data set included the vital status (dead or alive) of each participant, with an average follow-up of 20 years, allowing for a deep dive into the relationship between physical activity and mortality outcomes.

Various methods were used for the analysis, including classical actuarial mortality analysis, survival analysis and machine learning techniques. The key finding that steps per day stratifies mortality risk even after controlling for age, gender, smoking status and various health indicators was consistent across methods. We also learned that steps per day provides additional segmentation of mortality even after considering traditional underwriting attributes, such as smoking status; BMI; cholesterol; blood pressure; and health history of diabetes, cardiovascular disease and cancer.

Figure 1 illustrates that individuals with sedentary and low steps per day have much higher mortality risk, while moderate and high steps per day correspond with lower risk. Steps per day is especially effective in identifying high mortality risk for sedentary behavior. This analysis provides robust support for incorporating wearables to augment the current underwriting paradigm, manage risk and promote active lifestyles.

Figure 1
Relative A/E Mortality by Average Steps per Day



Public health officials have long promoted active lifestyles to improve health and quality of life and to minimize risk of premature death, chronic disease and disability. Prior to wearable devices, there was no way for insurance companies to reliably measure physical activity for our customers. Few insurers ask for self-reported physical activity in the application, and if they did, it would be difficult to confirm or control for the inherent subjectivity in applicant responses. With wearable technology, insurers can use activity data directly once a customer provides consent.

I see the following approaches to wearables-based programs within reach:

- Accelerated underwriting: Triage cases to allow applicants with favorable activity data to qualify for the best risk classes, mitigating mortality risk.
- Traditional full underwriting: Use wearable data as additional underwriting criteria, improving mortality experience.

- Continuous engagement: Promote healthy lifestyles, improving persistency and health.

- Expanding insurability: Improve offers to individuals who would otherwise have been declined or rated substandard, expanding insurability and better matching risks to premiums.

Consumers are accustomed to using mobile apps to share and obtain information, connect with people, shop and facilitate payments. We do this because it streamlines tasks and connects us with others. Customers now expect to have a similar experience when interacting with a life insurance company. Wearables can help insurers improve the customer journey by providing a faster, less invasive process for purchasing life insurance and continuously engaging customers throughout the policy lifetime.

ACCELERATED UNDERWRITING

The life insurance industry has experienced incremental innovation, from the introduction of fluid testing and preferred classes to the use of data sources that better assess mortality risk: motor vehicle records, prescription history, and mortality scores based on public records and credit attributes. Insurers have implemented various approaches to accelerate underwriting for individuals applying to fully underwritten products who may qualify to have their medical exams and fluid testing waived. When fluids are removed from underwriting, it becomes important to optimize the use of available information and incorporate new information to accurately classify risk. Physical activity data can be added to the toolkit alongside other data sources and predictive models to enable high straight-through processing while mitigating the additional mortality risk.

With an applicant's consent, insurers can tap in to historical wearable data at the time of application and utilize a triage approach to quickly determine whether the data indicates a healthy lifestyle. Customers with favorable wearable data can be accelerated to the best risk classes, while those with less favorable attributes would require additional underwriting or could qualify for standard rates only. When used in combination with a predictive model and/or underwriting rules engine, this approach can reduce time to issue from 30 days to mere minutes. Healthy consumers who are unwilling to deal with the inconvenience of the fully underwritten process or the higher price of simplified-issue products will now have access to life insurance simply by providing their wearable data.

TRADITIONAL FULL UNDERWRITING

Another evolution is to use wearable data as additional underwriting criteria, improving mortality experience. Fluidless underwriting may not be an option for all applicants, especially those at older ages or with higher face amounts or medical conditions that require careful review. Wearable data can supplement existing information and provide insight into the risk factors that can further segment risk.

In addition to step counts, research indicates that resting heart rate and duration and quality of sleep are associated with health and mortality outcomes.[2] These attributes can be used to segment risks in the same ways that BMI, blood pressure, cholesterol, and personal and family history are used for preferred risk classification.

Algorithmic underwriting using sophisticated predictive models is already underway. As experience emerges, wearable data will be incorporated in these models to predict mortality risk for insured lives. Over time, the availability of rich wearable data coupled with artificial intelligence systems will help us uncover new insights on mortality risk and tailor life insurance premiums to the risk and behavior of each individual.

CONTINUOUS ENGAGEMENT

Wearables might have the largest appeal to millennials who are connected with one another via their devices and seek more personalized experiences. The technology serves as platform to raise awareness and encourage healthy lifestyles. Wearables provide a means for life insurers to continually engage with their policyholders, moving from infrequent touch points to daily interactions. This cultivates a relationship where the policyholder and life insurer are partners in health, and it challenges the insurer to communicate with its policyholders more effectively. This is a new way of thinking for both insurer and customer and can fundamentally change life insurance.

One likely impact is improved "stickiness" of the life insurance relationship, including improved persistency. Another is potentially improved health outcomes, as insurers can help our customers make better choices. Some early adopters have begun health- and fitness-based rewards programs that incentivize customers to make healthy lifestyle choices by awarding them prizes or points that can be redeemed for prizes, coupons or even reduced premiums.

Personalized messages on wearable devices can assist individuals in staying on track with their health goals and alert customers and insurers if there are potential adverse signs. With wearables, insurers can play a pivotal role in motivating and nudging their policyholders in the right direction. The insurer's and the policyholder's interests are aligned: Healthy behavior leads to improved longevity for the policyholder and improved outcomes and profitability for the insurer.

EXPAND INSURABILITY

Last but not least, wearables can make a difference in expanding insurability by improving offers to individuals who would

otherwise have been declined or rated substandard while better matching risk to premiums. Today, most programs are geared toward individuals who are already very healthy—in effect, cherry-picking the best risk. As the basic reason for protection insurance is for social good, there is a strong argument for underwriting to be more inclusive. Some individuals who are substandard risks or currently uninsurable may, in fact, lead healthy lifestyles that differentiate them from others with similar medical conditions.

For example, with all else being equal, highly obese individuals today may at best qualify for a substandard class. Wearable devices can identify those who lead healthier lifestyles or those who are achieving positive changes. These individuals should be eligible for better premiums. This can also incentivize substandard individuals to improve their health by empowering them to make small but meaningful changes and linking insurance pricing to behavior that they have control over. Wearables can provide real-time feedback and motivation, turning small changes into new habits that control illness and improve outcomes.

CHALLENGES

As with all things new, bringing wearables into life insurance is not without challenges.

Insurers adopting a wearables-based program should be transparent about privacy, including what information is captured, stored and shared, and how the data is used. It goes without saying that insurers must obtain consent and appropriate authorization from their customers before accessing their personal information.

Consumers understand the value of their data and may be more apprehensive of sharing personal information. Wearable technology provides biometric data akin to an individual's medical history. Insurers have a long history of using sensitive personal medical information while maintaining the highest standards for confidentiality and security. We must demonstrate the value of wearable data using sound actuarial principles and expected experience in order to keep consumers' trust.

It's also important to note concerns around discrimination, equity and regulatory requirements, as these programs could penalize individuals without the ability to devote adequate time to daily physical activity. At the start, wearables programs will rely on voluntary participation until there is wider adoption. Insurers need to carefully design the program to protect against anti-selection or fraud, as there will be individuals who modify behavior for a short period to appear to be more active than they are. It would be prudent to require several months of historical data when used for underwriting or pricing.

On the technology front, insurers need to monitor the consistency and reliability of data from various wearable devices. Device manufacturers are working to improve measurements to prevent incorrect readings, such as vigorous hand movements being misinterpreted as steps. Insurers must also ensure that they have the infrastructure to ingest the massive volumes of data that will accompany wearable data. Cross-function teams, including underwriters, actuaries and data scientists, will need to collaborate to make sense of this information and drive actionable insights. These insights will enable the industry to create standards for wearable data and reach a convergence of opinion similar to where we stand with conventional underwriting.

WHAT'S NEXT

In today's environment of rapid innovation, life insurance companies are competing not only with peers but also with startups, third-party solution providers and groups outside the industry who recognize the potential for disruption. Despite this, life insurance has remained relatively unchanged.

Imagine a world where wearable devices are as ubiquitous as mobile phones are today: They would be embedded in our daily lives, be unobtrusive, provide us with meaningful instantaneous feedback and connect with other devices as well as service providers, including our insurance companies. We would all have affordable life insurance, underwritten without hassle, with a personalized policy linked to our lifestyle.

Wearables present the perfect opportunity for the incumbent insurers to innovate, transforming the management of preventable and chronic disease while offering better prices and improved risk segmentation. ■

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The No App, App

By Chris Stehno and Priyanka Srivastava

One could argue that almost every part of our daily lives has been made easier by technology, especially mobile technology. In the financial services industry, there is relatively no need to step into a bank anymore, as depositing a check is as easy as taking a picture. And who even needs to write a check when you can send money to almost anyone through Venmo, PayPal or most banks' websites? Borrowing money has become increasingly simple as well. Rocket Mortgage will give you a home loan, SoFi will refinance your student loans, and new-tech auto dealers such as Carvana and DriveTime will process your auto loan. All of which can be accomplished in real time with data pulled directly from your financial institutions. There is no need for you to laboriously input data that is readily available through a multitude of sources.

Even most insurance products are using technology to simplify the buying and claims processes. Auto insurance can similarly be purchased with a few clicks, and a claim can be submitted using just the camera on your phone. Google Maps has allowed most home insurance policies to be written in real time without the need for an on-site appraisal. And if having your financial services products spread across many providers is an issue, apps like *Mint.com* will consolidate all your financial products into one spot.

You will notice above that we used the words *most* and *almost* several times when talking about the financial services industry. Why? Let's look at the life insurance industry's use of technology to simplify the application process. Where do we stand today in dramatically simplifying this process to the point of the 'No Application, Application' (or "No App, App" for short)? When will buying life insurance be as easy as giving your name and address?

We have seen some areas of progress over the last five years, especially in accelerated underwriting. This process allows for a quick one-day or even real-time turnaround of a fully underwritten application. This process still requires you to fill out a complete application, but it does wave the paramedical exam, labs and attending physician statement (APS). However, the biggest drawback is that it works for only a select portion of the applicants—generally only the young and healthy with face-amount restrictions generally at or below $1 million. Most companies get somewhere between 15 and 35 percent of their applicants through this expedited process.[1]

How close are we to the no-app app for the rest of the population? We could evaluate this from a visionary view of the world, where we start from a clean slate and consider all predictive modeling and analytics and artificial intelligence services as standard within the new business process. However, this assumes that we would likely throw away much of our historical practices, which unless you are a Silicon Valley startup are probably not very relevant to you. Instead, let's evaluate how close we are to the No App, App if most of our underwriting processes stay the same as they exist today.

Let's start with the application itself. Most companies generally split the application into two parts: A and B or 1 and 2. Either way, the first part covers nonmedical elements, usually consisting of basic demographic and financial information, plus specific application details. The second part focuses on the medical history of the individual.

So, our first question is, how much of the application (written or electronic) really needs to be input by, or directly asked of, the applicant? Let's take a closer look at the conventional information collected during the application process.

BASIC DEMOGRAPHIC INFORMATION

Items such as your full name, address, date of birth, citizenship and driver's license can be obtained and/or verified through a variety of data providers. You might need to get permission to collect this data, but verifying that individuals are who they claim to be is getting to be a standard process for most activities involving any financial or health-related data or needs.

As an example, if you have been to a hospital or outpatient clinic recently, you might have noticed that the number of forms you fill out has decreased. Coverage verification is nearly all completed in real time using your driver's license and insurance ID card. Why can't we replicate this process for life insurance verification?

FINANCIAL INFORMATION

Many mortgage providers now verify all financial information, such as income, employment status and assets, directly through banking and investment statements. Much of this information can be pulled in real time with the applicant's permission and a couple of clicks on their financial institution's website.

This time of year, I am reminded of how easy pulling financial data can be as I start to work on my tax returns. For those of you who use TurboTax, TaxAct or H&R Block's software, you should know what I mean. With a few clicks, you can give your tax software access to pull and consolidate your mortgage statements, your investment statements and even your employer's W-2s. And if you own or have ownership in your own company, pulling data right from QuickBooks or your corporate tax returns is just as simple. Within the last couple of years, the use of external data to prepopulate tax returns has made it so simple that TurboTax and most other systems now allow you to file your returns using your phone!

> How close are we to the no-app app for the rest of the population?

Beyond the tax software packages, there are quite a few financial institutions that have gone almost completely paperless and, hence, frictionless. This started more than five years ago, with some of the major banking institutions offering home equity and car loans with minimal data input requirements. Today, it has expanded to home origination loans, where the more tech-savvy institutions allow for a very simplified point-and-click loan process. Many home appraisals have become greatly simplified with the use of Google Maps and real estate pictures and videos to avoid the need for on-site visits.

PERSONAL NONMEDICAL INFORMATION

This section of the application generally highlights hobbies and activities that put you more at risk of death than the average Joe. Activities such as scuba diving, racing, single-engine piloting, parachuting, whitewater rafting and heli-skiing require an extra mortality component. Travel to various high-risk foreign countries also goes in this section. And, in some applications, the various tobacco and alcohol questions are contained here. For now, I will hold off on those until we get to the next section on medical information.

As for these dangerous hobbies, much of this information can be obtained just by knowing the applicant's name and address. The giant database marketing companies directly track many of these individuals to market-specific goods and services. As an example, PADI, NAUI, British Sub-Aqua Club, World Underwater Federation and Scuba Schools International all sell their scuba certification lists to third-party data providers. Although the use of this data might not be allowed directly for underwriting decisioning, it can be used as a tool to decide who you need follow up with and who you do not!

MEDICAL INFORMATION

Gaining an understanding of the applicant's medical history and current health is almost always the most time-consuming, invasive and expensive part of the entire application process. This typically involves a lengthy personal history completed by the applicant either on paper, online, through a tele-interview or sometimes during the medical exam. The most invasive part of the process is the paramedical exam, which involves both blood and urine samples. Finally, for anyone who does have past medical events, an APS is often ordered from each attending physician.

All in all, the above collection of medical evidence is the most time-consuming part of the application process, which now averages 28 calendar days[2] to close, with hard-dollar expenses averaging $150 per applicant.[3] The cost is likely twice that amount when you consider all the human effort to request, collect, monitor and review what has been collected, and in most cases follow up multiple times with both the applicant and the providers of the data to get the complete set.

Although replacing all this historical medical evidence with a simpler process sounds daunting, this is the one area where new technology and data provide the quickest gains to the No App, App. The American Reinvestment & Recovery Act was enacted Feb. 17, 2009, with the primary intent to modernize our nation's infrastructure, including the modernization of our health IT infrastructure. One part of the act, which is referred to as the Health Information Technology for Economic and Clinical Health (HITECH) Act, gives us significant reason to stand up and cheer, as it drove today's electronic health records (EHR) environment.

Early in 2010, the Office of the National Coordinator for Health Information Technology (ONC), released its recommendations to the Centers for Medicare & Medicaid Services concerning meaningful use of EHRs and defined the 25 criteria (15 core and

10 menu) that are required for EHRs to become certified. As of the start of 2016, the ONC reported that more than 99 percent of hospitals (critical and small rural) and more than 70 percent of all office-based physicians have demonstrated meaningful use and/or adopted, implemented or upgraded EHRs.[4] These adoption rates are excellent news for a wide variety of patient and business applications, including this article on application for underwriting.

When you consider the above EHR environment, along with the 1996 Health Insurance Portability and Accountability Act (HIPAA), which granted individuals access to their own EHRs and defined the providers' obligations to allow them to do so, you have the makings of something very powerful. Individuals now have the power to access their medical records in a real-time setting and pass them on to whomever they wish.

There are multiple providers in the marketplace today that have made obtaining your EHR a simple two-click process, in which you authorize the provider to download everything in your patient portal on your behalf. We have worked with several of these providers, and the results are better than expected. In reviewing the results from several insurance companies, we have found that EHRs deliver medical information as good as, or better than, what is obtained through traditional underwriting (paramedical, lab work and APSs) for more than 90 percent of the applicants. The 10 percent that are not as good are generally very complicated cases with a considerable amount of past medical history or are individuals currently seeking treatment for serious medical conditions. However, by looking at these individuals' EHRs, we can define from whom we need to get additional medical data.

An added benefit of the EHRs is the self-reporting of tobacco and alcohol consumption to medical providers. It feels like every time I see my doctor, I am asked if I smoke. During annual exams, we also discuss my alcohol consumption and any illegal drug use. The average insurance company categorizes approximately 7 to 10 percent of its applicants as smokers (either reported by the applicant or found in the urine sample). However, we are finding a history of smoking reported at about twice that rate in the EHRs themselves.

THE NO APP, APP

In conclusion, how close are we to the No App, App? Hopefully the above has suggested to you that we are darn close to realizing it. In fact, we know of several insurance companies working to be there by 2020.

But why should you care? Is this a cost-savings play, a technology play, a customer satisfaction play, or what? We would strongly suggest that this is table stakes, as evidenced by the declining numbers of new policies sold over the last five years.

We now live in a world of one-click purchases. Just a couple of years ago, we thought that two-day Amazon Prime was incredible. Nowadays, we think that two-day delivery is the norm and same-day delivery is a plus. Our sense of instantaneous gratification has heightened. We are potentially one click away from almost anything we want: dinner delivered to our home, a driver to pick us up exactly where we are standing and drive us anywhere we want, a movie on our TV, buying a car, insuring that car, a home equity loan to pay for that car, finding true love, and so on.

Well, that is, except for buying life insurance, which still takes more than 30 days and requires answering hundreds of questions (many of which are often repeated), peeing in a cup and getting stuck with a needle. And, truth be told, true love probably takes more than a single click. I would venture to guess at least 10 or 20 clicks! ■

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Happy First Birthday, In-force Management Subgroup!

By Jennie McGinnis

It's been one year since the Product Development Section Council approved the formation of a subgroup on in-force management. As outlined at the time, the purpose of the group is to advance the practice of in-force management through the fostering and promotion of networking among professionals, facilitation of continuing education and support of research opportunities.

So, one year in, how are things going?

FOSTER AND PROMOTE NETWORKING AMONG PROFESSIONALS

Our main channel of communication is a Listserv,[1] which nearly 300 individuals have joined. This has not been leveraged as much as originally anticipated, so we enter 2019 with a new approach in mind. Stay tuned!

In August, we hosted an open discussion with the theme of "What does it take to manage in-force?" While leveraging a similar platform as that used for webcasts, the intent of these sessions is to be much more interactive. As such, attendance was limited and we saw registration fill within 24 hours!

Three presenters of varied backgrounds shared their thoughts on the theme based on each presenter's extensive experience related to in-force management. Discussion ensued around topics that included how and where in-force teams should be placed within an organization, metrics used to measure success (both financial and nonfinancial), and considerations when managing nonguaranteed elements.

Our other key networking event during the year was a luncheon at the SOA Annual Meeting & Exhibit, co-sponsored with the Joint Risk Management Section. This was a truly active and participatory session, with the nearly 50 attendees regrouping with each new discussion topic to maximize mingle opportunity! After introductions while eating, participants grouped by practice area to discuss shared obstacles and experiences in overcoming them. The meeting app was leveraged to share findings across tables, which allowed us to soon see that the challenges faced are quite agnostic to line of business. The attendees then shifted both their seats and their thinking to consider the possibility of one day offering an In-Force Management Symposium. While it's not clear if or when this may become a reality, this exercise provided much food for thought regarding how we might focus our continuing education offerings in the new year.

FACILITATE CONTINUING EDUCATION

A number of sessions related to in-force management were held throughout 2018.

As highlighted in a previous article,[2] two sessions with topics related to in-force management were offered at both the Life Insurance Conference and the Life & Annuity Symposium.

The subgroup coordinated one session at the Valuation Actuary Symposium ("Valuation and Reporting of Nonguaranteed

Elements") and four sessions at the SOA Annual Meeting & Exhibit. Three of these four were held on Monday to align with the luncheon, creating an unofficial in-force management day. Topics included "In-Force Management," "Managing In-Force Blocks From a Risk Manager's Perspective" and "May the In-Force Be With You: Transactions for Life and Annuity Business." The fourth, held on Wednesday, revisited the topic from the Valuation Actuary Symposium but with a different panel and, therefore, a different take on the subject.

> My sincere thanks to all who have turned the idea of a subgroup into a reality.

Planning is well underway for a webcast in February, with hopes for two additional offerings throughout 2019. We are also well aligned with SOA meeting planning committees to ensure in-force management content is made available at the logical flagship meetings.

SUPPORT RESEARCH OPPORTUNITIES

While it wasn't anticipated that the subgroup would have involvement in research within its first few years, an opportunity presented itself and work is now jointly underway with the Reinsurance Section on a project related to recapture provisions. While not a topic that all in-force managers address, retention management and the recapture option are well within the scope of in-force management opportunities. A report is expected in the first half of 2019.

We otherwise anticipate contributing to the sharing of knowledge on in-force-related topics through the continued publication of content in *Product Matters!*

ONGOING SUPPORT

My sincere thanks to all who have turned the idea of a subgroup into a reality. From signing up for the Listserv to helping deliver any of the activities noted above, you have not only provided a year's worth of support but have helped lay the groundwork for many years to come! If you are interested in participating in a new or different way, please don't hesitate to contact me. Here's to another successful year ahead! ■

Jennie McGinnis, FSA, CERA, MAAA, is the leader of the In-Force Management Subgroup and senior vice president and in-force portfolio manager at Swiss Re. She can be reached at *Jennifer_McGinnis@swissre.com*.

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