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Determining VM-20 Mortality for Accelerated Underwriting Programs

By Matt Monson, Mark Sayre and Ben Slutsker

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Chairperson's Corner

The Green Jacket and the Terminator

By Bob Leach

It's hard to believe, but my three years on the Financial Reporting Section Council are already drawing to a close. It seems like my first council meeting with a number of other actuaries, most of whom I'd never met before, was just months ago. Now it's time for David Ruiz, Ashwini Vaidya and me to leave the council, to be replaced by three newly elected members. Over the next year, the section will be ably led by Simpa Baiye, to whom I will hand over the green jacket (yes, our section does own a green jacket) at the October Annual Meeting in Nashville.

The experience has been rewarding, informative and yes, at times, stressful. Here are some learnings:

- Our profession is blessed with a lot of dedicated, intelligent, hard-working people. This includes council members as well as numerous others who have helped the section by presenting at meetings and webcasts, conducting research, writing newsletter articles and generally taking an interest in the work of our section. Among these are the talented SOA staff in Schaumburg, Ill., who have helped this council out every step of the way. Our section's staff, Jim Miles and Jessica Schuh, deserve special mention for having kept us on track throughout my tenure.
- It's great when you can get the learnings from an avocation to align with the requirements of your vocation. In my case, the avocation (participation in the Financial Reporting Section Council) led to a great deal of involvement with matters related to principle-based reserves and the Valuation Manual—precisely at a time when these concepts were being implemented through my day job.
- Despite our best efforts, not everything works out. A good example is the 2017 Valuation Actuary Symposium, which was cancelled when Hurricane Harvey made landfall in Texas on the eve of the meeting in San Antonio. Our section demonstrated resourcefulness by quickly planning and

executing a down-sized version of the ValAct for presentation as a one-day session after the close of the October 2017 Annual Meeting in Boston.

- As with most things in life, what you get out of an experience like this is proportional to what you put into it. Here are a few of the tasks I found most rewarding during my tenure:

Year 1: Council secretary. Not everyone would go for this because it involves documentation and holding people accountable for the work to which they've committed. But I enjoy writing—a core responsibility of the secretary—and through this role I learned better listening and engagement skills.

Year 2: The Regulatory Web Resource project (see <https://www.soa.org/resources/regulatory-resource/life-annuity/>). This was a great opportunity to improve my understanding of information sources on the web. It also allowed me to connect with other actuaries who are believers in this project and who have devoted significant time and effort to getting it off the ground. Among them, Cindy Barnard, the current chair of the Regulatory Web Resource working group, deserves special recognition for her dedication and mastery of regulatory topics of relevance to the actuary.

Year 3: Launch of the section eNewsletter. The eNewsletter is a great way to make section members aware of the many resources that are available to them through the section website, including research, podcasts, webcasts and the print newsletter (in pdf format). The SOA staff has all the supporting infrastructure in place, making publication of eNewsletters very easy.

Would I do it again? I'll admit that I'm looking forward to using some of the hours spent on Financial Reporting Section Council work for other things. That said, there is something about the volunteering bug—once it gets into your system, it doesn't seem to leave. We've all seen this in our field, as many actuaries have served the profession in numerous different capacities. While some have developed an immunity to this infection, I am not among them. We are fortunate to be members of a profession that is rewarding and highly respected, but its continued success requires the support of its members. So, like the Terminator, at some future point and probably in some other format, "I'll be back!" ■



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Determining VM-20 Mortality for Accelerated Underwriting Programs

By Matt Monson, Mark Sayre and Ben Slutsker

As companies begin implementing principle-based reserving (PBR) for life insurance, several questions emerge around how valuation requirements apply to accelerated underwriting programs. This article outlines challenges regarding the treatment of these programs under VM-20, in addition to discussing considerations for statutory reserving in light of future innovation.

EMERGENCE OF ACCELERATED UNDERWRITING

Accelerated underwriting (AUW) is one of the new buzz words in life insurance. As a generation of digital consumers comes of age, life insurance companies are forced to confront a rapidly changing landscape of buyer expectations. The traditional months-long application and underwriting process is being challenged by companies looking to meet these new expectations with accelerated underwriting programs that drive faster decisions and a less invasive underwriting experience for consumers.

Companies often position these programs as combining the ease of simplified underwriting with the rigor of traditional underwriting methods, and correspondingly target premiums that align more closely to traditionally underwritten products. One common theme among these programs is the concept of **triage**, which treats underwriting requirements as dynamic and adds them as needed through a linear customer journey (application, tele-interview, real-time data such as prescription history or motor vehicle records, medical exam, physician records).

Another way to think about the triage concept is as an expansion of the familiar age/amount grid where, in addition to the dimensions of policy size and issue age, there is also a dimension for risk. This risk dimension of the grid could be determined using the requirements gathered earlier in the accelerated underwriting process to determine when additional requirements, including a medical exam, are needed.

In order to maintain premiums in line with traditionally underwritten products, companies often enhance their programs with new data sets, such as credit data and public records data, which can provide risk selection benefits expected to complement those used today.

Programs vary greatly, which complicates the job of the valuation actuary. However, it is likely that significant convergence will emerge in the coming years, as established third-party vendors enter the space, and as carriers and reinsurers begin to understand which designs are most effective at balancing risk selection with speed, customer experience and cost. This convergence may result in standard tools or approaches that can aid in identifying risks for valuation purposes.

CHALLENGES FOR PBR VALUATION

The adoption of accelerated underwriting programs is happening at the same time as companies are implementing PBR, providing an early test for valuation actuaries as they interpret VM-20. At issue is how VM-20 directs companies to measure and deal with change.

Under VM-20, the deterministic reserve (DR) and stochastic reserve (SR) calculations entail considerable new work for company actuaries. While DR and SR methods are prescribed in VM-20, each company determines and discloses assumptions specific to its book of business, within limits, to model and calculate the reserves.¹

Mortality assumptions are at the heart of the DR and SR calculations. A company determines how to divide its book into mortality segments. These segments are subsets of policies expected to have different mortality experience than other groups of policies based on certain characteristics (e.g., gender, underwriting class, etc.). Separate prudent estimate mortality assumptions are set for each mortality segment.

Valuation and pricing actuaries have always had to consider how changes in underwriting techniques, standards or data sources will impact future experience. The advent of PBR and rapid spread of AUW programs presents a unique but not insurmountable challenge. In particular, there are several open questions related to the treatment of mortality margins and credibility, appropriateness of industry mortality tables, VM-31 disclosures, and VM-51 data collection.

Mortality Margins And Credibility

The mortality margin added to company experience data varies by the level of credibility, and directly impacts the level of the DR and SR.² In addition, margins may be further increased, if appropriate, to reflect uncertainty, including any uncertainty that may be due to changes to underwriting methods.

Changes to life underwriting methods can range from relatively minor elements, such as adjustments for starting to screen a particular condition, to start-from-scratch programs for new products and markets. AUW programs can fit anywhere in that range. When a company changes its underwriting program to use AUW methods, does VM-20 require a fresh mortality assumption or the use of a margined-up industry table assuming zero credibility? It depends.

If a company decides to use a new mortality segment to reflect the change, direct experience data may be limited. In that case, VM-20 (Section 9.C.2.b) allows use of experience from “other books of business within the company with similar underwriting” and other sources with “underwriting and expected mortality experience characteristics that are similar” to those within the new segment.

If an underwriting change is minor, incremental or designed to produce mortality experience similar to another segment, then experience data may need to be adjusted. VM-20 (Section 9.C.2.f) and VM-31 (Section 3.C.3.e) require specific documentation criteria. In addition, the actuary may consider whether an additional mortality margin is warranted on policies affected by the underwriting change. VM-20 also allows experience across different mortality segments, including genders and risk classes, to be combined to determine credibility at an aggregate level, provided mortality for the segments “was determined using an aggregate level of mortality experience.”

VM-20 (Section 9.C.2.d) provides requirements for acceptable mortality aggregation techniques. Recently, the American Academy of Actuaries’ Life Reserves Work Group proposed an amendment to VM-20 to the NAIC’s Life Actuarial (A) Task

Force on this topic. It provides additional guidance to companies for determining when experience from different mortality segments may be considered similar and aggregated based on supporting studies, analyses and demonstrations.

Clearly, the degree to which a company can demonstrate how a new AUW program relates to its company experience data is critical for setting its DR and SR mortality assumptions.

Industry Mortality Tables

Currently, there is no prescribed valuation mortality table for AUW. Without clear guidance, there may be potential inconsistencies between the statutory reserve and the mortality risk that the statutory reserve is intending to capture.

Under PBR, the Net Premium Reserve (NPR) calculation must currently use the 2017 Commissioners’ Standard Ordinary (CSO) mortality table for medically underwritten policies. Without a clear alternative available, companies may interpret that the CSO should be used for AUW, subject to the presence of substandard mortality risk in excess of the CSO.³ In addition, VM-20 does not clarify whether an industry table distinct from prescribed traditional underwriting tables should be used when grading from company experience data. VM-20 refers to Section VM-M, which points to the 2015 Valuation Basic Table (VBT) and 2008 SOA Limited Underwriting Table—companies may consider how an AUW program relates to medical underwriting programs in deciding whether to use the VBT. In addition, the SOA Relative Risk tool is not applicable to AUW, as some traditional underwriting criteria required for the tool’s input is not applicable. Therefore, the company may need to use actuarial judgment to map to an applicable industry table and then clearly disclose its rationale in the VM-31 PBR Actuarial Report.

Figure 1
Example Decision-making Considerations for Determining AUW PBR Mortality

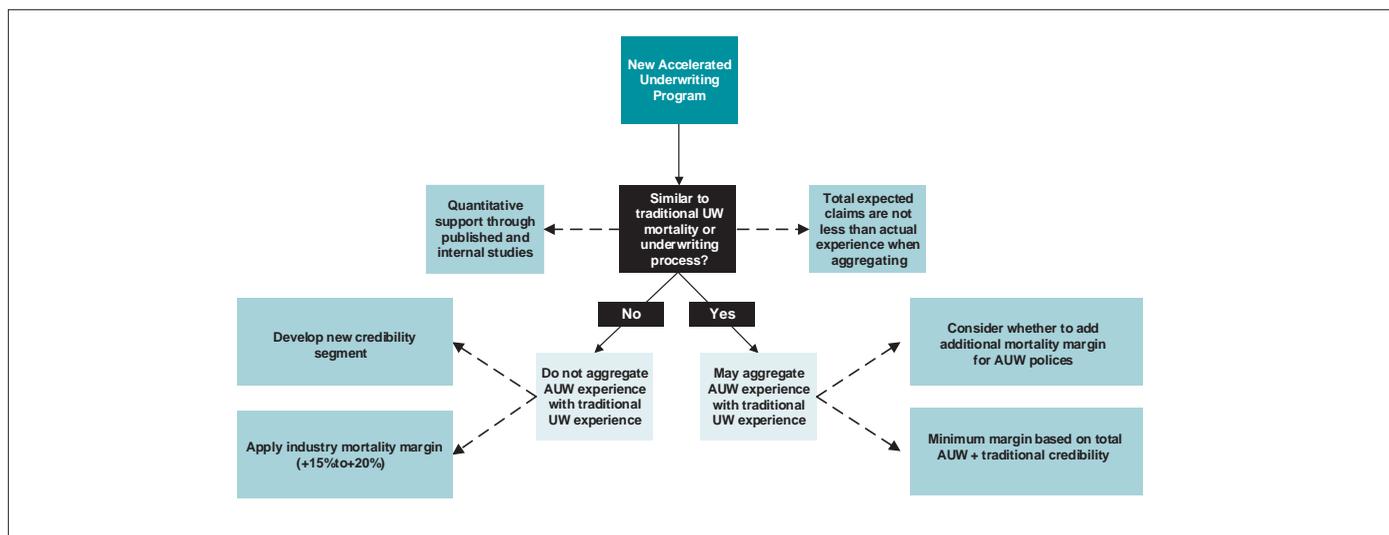


Figure 1 (Pg. 5) shows an example thought process and associated steps for deciding whether or not to aggregate accelerated underwriting experience with traditional underwriting experience for determining the VM-20 credibility calculation. Note that determining whether or not to aggregate with traditional underwriting experience affects the minimum margin required for the VM-20 modeled reserve.

The SOA has gathered data from past accelerated underwriting surveys. One challenge is determining a common definition of “accelerated underwriting,” and ensuring that such a definition is broad enough to address emerging techniques used to select risk. In August 2018, the SOA published a Delphi Study on AUW practices across the life insurance industry, including information on data elements, risk selection methods and mortality expectations. Due to the range of practices, this study does not suggest a common definition for AUW. Therefore, companies are encouraged to interpret and disclose their own AUW valuation assumptions, subject to any guidance.

AUW programs are expected to continually evolve, which potentially includes new types of underwriting programs that are not currently envisioned. As a result, it’s likely that these ever-changing programs cannot be feasibly embodied in the development of a single mortality table, and actuaries will need to capture underwriting changes without relying on the adoption of a single table.

VM-31 PBR Disclosures

VM-31 (Section 3.D) requires AUW disclosures for mortality segments (3.a), mortality subdivisions (3.b), industry table mapping (3.c), alternative data sources (3.d) and credibility methods (3.f). In particular, companies that choose to aggregate accelerated underwriting experience with traditional underwriting must disclose accompanying underwriting adjustments (3.e) and additional margins (3.l). This consists of providing external published studies (e.g., medical, clinical or other studies) and “mathematics” used to arrive at such adjustments.

For companies that decide to aggregate traditionally underwritten mortality experience with AUW to determine credibil-



ity, these VM-31 requirements will be especially important in providing justification and rationale that doing so still results in a prudent estimate for the modeled reserve. Company analytics and disclosure of any additional margins applied to AUW groups of policies are an important component of a VM-31 PBR Actuarial Report.

VM-51 Data Collection

VM-51 contains specific data elements that companies must disclose to the NAIC⁴, which introduces a host of implementation, technology and data security issues for companies with AUW programs. A currently exposed VM amendment proposes including disclosures of several predictive modeling data elements if used, such as credit data, facial imaging technology and wearable technology.

Adding these additional elements for AUW and predictive analytics poses potential pain points for fast-evolving programs. VM-51 presents challenges for AUW in establishing the logistical process to gather and catalogue new elements, leveraging the appropriate data warehouses, and achieving reasonable timing to satisfy the data request.

In addition, there are potential challenges related to the structure of gathering such data. For instance, drafts of VM-51 amendment proposals have asked for binary “yes” or “no” responses to whether facial aging technology is used, but this does not indicate the type of technology or level of involvement it has in the risk selection process.

AUW programs are expected to continually evolve, which potentially includes new types of underwriting programs that are not currently envisioned.

INNOVATION AND PBR

While this article focuses on AUW programs, this certainly isn't the only type of innovation emerging in mortality risk selection today that impacts life insurance valuation. Many companies have launched or are developing wellness programs that engage policyholders during the duration of a contract to exercise, diet and better manage specific chronic conditions such as diabetes. In addition to the costs required to run these programs, some companies may even offer rewards to policyholders based on their achievements in the form of reduced premiums or increased coverage, with the goals of reducing policyholder mortality risk and increasing persistency. Depending on each specific case, it may not be clear whether benefits of such a program can be reflected as underwriting adjustments to future anticipated mortality within VM-20 or can only be reflected through the valuation date, similar to mortality improvement.

ENDNOTES

- 1 See Section 14.1 of the Academy Practice Note on Life Principle-Based Reserves Under VM-20 for guidance on determining appropriate margins when setting assumptions that are neither stochastically determined nor prescribed.
- 2 The process for using company experience data to set a prudent estimate mortality assumption for deterministic and stochastic reserves is outlined in Section 9.C of VM-20. A company starts with experience data and an industry table for each mortality segment and adds a prescribed minimum margin based on credibility to each, plus additional margins as deemed necessary. The company experience mortality plus margin is then graded to an industry table plus industry prescribed margins. The starting year and speed of grading depends on the credibility of the company's experience data.
- 3 The 2017 version of the VM-20 Practice Note exposure draft addresses this topic in Q4.26, suggesting that some actuaries may reserve for additional substandard risk in excess of the CSO table by using $1/2c(x)$ of the additional mortality, and some actuaries may also add this reserve on to the NPR when comparing to the DR. Note that pre-PBR Commissioners' Reserve Valuation Method (CRVM) requires substandard mortality to be reflected in the statutory reserve.
- 4 Recent proposals indicate that the NAIC will be the experience data statistical agent for VM-50 and VM-51 requirements. Therefore, companies will be providing data to the NAIC. Several details related to data confidentiality and implementation of this proposal are still being sorted out at the time of this article.

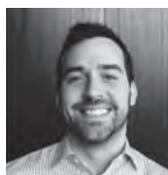
The introduction of PBR is intended to balance minimizing solvency risk with the desire to provide companies the room to innovate and keep the life insurance industry relevant in the age of digital consumers. In fact, this dual mandate is imperative, as innovation may add short-term risks to the balance sheet but also helps to ensure the long-term viability and solvency of a company in a rapidly changing world.

PBR can be adapted to reflect the reality of accelerated underwriting. Further innovation will only highlight more opportunities to expand the NAIC Valuation Manual's framework to achieve the appropriate long-term/short-term and innovation/solvency balance. It is incumbent on valuation actuaries to understand any limitations and both apply the framework according to emerging practice and suggest future guidance to address them. ■

The views expressed in this article are those of the authors and do not necessarily reflect the views of their employers.



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Case Study—Impact of Tax Cuts and Jobs Act

By Dylan Strother and Chris Zuiker

The Tax Cuts and Jobs Act of 2017 (TCJA) slashed the corporate tax rate by 40 percent, from 35 percent to 21 percent. If you follow the news through social media (or other outlets, but particularly Twitter), you may have heard that many corporations, including some insurance companies, used the reduction to the tax rate to pay bonuses to their employees. Entities paying less taxes to the Internal Revenue Service (IRS) obviously retain more income, and for many companies, including some insurance companies, this can result in more take-home pay for employees. But are the implications of the new tax law all positive? Is this an act of generosity by the federal government to corporations, including insurance companies?

Not exactly. While TCJA contains certain provisions beneficial for corporate entities as well as individual tax payers, Part IV of the law is titled “Provisions Related to Specific Entities and Industries,” and Subpart B of Part IV is labeled “Insurance Reforms.” This section of the law contains adjustments to insurance regulation that offset much of the increase to profitability realized from the decrease in the corporate tax rate.

The offsets come in the form of changes to the methodology used to calculate tax reserves and changes to components of Tax DAC. In addition, while not part of TCJA nor revenue to the IRS, changing the corporate tax rate generally increases target capital, due to how the corporate tax rate is incorporated to risk-based capital (RBC) calculations, and is another opposing force to gains in profitability.¹

We examined the impact of the major changes to insurance tax law within TCJA for two types of recently issued contracts, a term life insurance policy and a whole life insurance policy. For these product types, we started with a baseline model and profitability results consistent with pre-TCJA tax law. We then stepped through each implication of TCJA and attributed a change in profitability to each component. Table 1 lists the steps of our attribution, each of which are described in detail within the article. Results included are displayed after each incremental step and compared to the prior step.

We examined two types of policies—a 20-year level term policy and a whole life policy. Both policies were issued to a 40-year-old male preferred non-smoker with a face amount of \$250,000. We assumed that these contracts were issued after TCJA was effective. The primary metrics used to measure profitability were profit margin, defined as the present value of distributable earnings divided by present value of premium, and the internal rate of return (IRR). Throughout the analysis, we note that differences to profitability between the two types of products are primarily due to the duration of the products as well as product features. Whole life has a much longer duration as compared to term, as well as a cash value feature.

Baseline—Pre-TCJA	Profitability calculated based on Pre-TCJA basis
Corporate Tax Rate	Reduced corporate tax rate to 21 percent
Tax Reserve Method	Implemented TCJA tax reserve methodology
Tax DAC	Increase Tax DAC capitalization rates and amortization length
RBC Factors—Post-TCJA	Updated corporate tax rate to 21 percent in capital calculations

Table 2
Reduced Corporate Tax Rate

	FIT Corporate Rate	Tax to Stat Reserve Ratio	DAC Tax	RBC	20-Year Level Term		Whole Life	
					<i>Profit Margin</i>	<i>IRR</i>	<i>Profit Margin</i>	<i>IRR</i>
Before	35%	100%	Pre-TCJA	Pre-TCJA	5.7%	14.7%	5.2%	15.0%
After	21%	100%	Pre-TCJA	Pre-TCJA	9.1%	17.2%	7.5%	16.6%
Impact	14%	-	-	-	3.4%	2.5%	2.3%	1.6%

CORPORATE TAX RATE

As noted, TCJA reduced the corporate tax rate from 35 percent to 21 percent. Generally, for an entity making a profit, a lower corporate tax rate will decrease the amount of taxes owed and paid. From the base case, the change in corporate tax is as advertised, an increase to both profit margin and IRR for both contract types, as shown in Table 2.

INSURANCE REFORM

We next analyzed the update to the tax reserves calculation. TCJA revises the methodology used to calculate tax reserves to be the maximum of 92.81 percent of the NAIC prescribed reserve method² (CRVM for life insurance contracts) and the net surrender value. Some call this the “haircut methodology” and it is a change to the previous federally prescribed tax reserve methodology, which was similar to the current statutory basis, but substituted federally prescribed assumptions, generally resulting in tax reserves being lower than statutory reserves.

Tax reserves were, and still are, capped at the statutory reserves. It is beneficial for insurance companies to minimize the difference between statutory and tax reserves, thereby maximizing the tax reserve. You can think about tax reserves as a tax deduction, which reduces taxable income.

Therefore, setting tax reserves as a percentage of statutory reserves (92.81 percent to be exact) results in decreased profitability for most life insurance contracts issued since 2009. This is because during that time many of the methodologies and assumptions (mortality and discount rate) used to calculate tax reserves have been the same as statutory, meaning the tax and statutory reserves have been equal.

Explicitly, before TCJA, for many life insurance contracts, a company could account for 100 percent of the change in statutory reserves when calculating taxable income, whereas now only 92.81 percent can be accounted for. For our analysis, since we were looking at recently issued products, we realized a decrease to profitability, both for the IRR and the Profit Margin, as shown in Table 3.

Table 3
Update Tax Reserve Methodology

	FIT Corporate Rate	Tax to Stat Reserve Ratio	DAC Tax	RBC	20-Year Level Term		Whole Life	
					<i>Profit Margin</i>	<i>IRR</i>	<i>Profit Margin</i>	<i>IRR</i>
Before	21%	100.00%	Pre-TCJA	Pre-TCJA	9.1%	17.2%	7.5%	16.6%
After	21%	92.81%	Pre-TCJA	Pre-TCJA	8.9%	16.9%	6.4%	15.4%
Impact	✓	7.19%	-	-	-0.3%	-0.3%	-1.2%	-1.2%

Table 4
Increase Tax DAC Capitalization & Amortization Length

	FIT Corporate Rate	Tax to Stat Reserve Ratio	DAC Tax	RBC	20-Year Level Term		Whole Life	
					Profit Margin	IRR	Profit Margin	IRR
Before	21%	93%	Pre-TCJA	Pre-TCJA	8.9%	16.9%	6.4%	15.4%
After	21%	93%	Post-TCJA	Pre-TCJA	8.5%	16.6%	6.0%	15.0%
Impact	✓	✓	✓	-	-0.3%	-0.3%	-0.3%	-0.4%

Table 5
Increase RBC Components

	FIT Corporate Rate	Tax to Stat Reserve Ratio	DAC Tax	RBC	20-Year Level Term		Whole Life	
					Profit Margin	IRR	Profit Margin	IRR
Before	21%	93%	Post-TCJA	Pre-TCJA	8.5%	16.6%	6.0%	15.0%
After	21%	93%	Post-TCJA	Post-TCJA	7.6%	15.2%	5.7%	14.5%
Impact	✓	✓	✓	✓	-1.0%	-1.4%	-0.3%	-0.5%

Another significant update is the change to Tax DAC. For those unfamiliar with this concept, let’s start with some basics. Tax DAC is the tax accounting treatment of deferred acquisition costs, similar in concept to the treatment of GAAP DAC but simplified. The IRS prescribes a level percentage of capitalization, based on product type, which is intended to be a proxy estimate of first year commissions. Like GAAP DAC, the capitalized amount is then amortized and expensed over time, but unlike GAAP DAC, the amortization is in a straight-line manner over a defined period. The result is that a company generally pays more tax to the IRS upfront (due to costs being capitalized) but pays less tax in future periods due to amortization of the acquisition costs. This mechanism may be thought of as an interest-free loan to the IRS.

TCJA increases the capitalization percentage for each of our products from 7.7 percent to 9.2 percent and increases the amortization period from 10 years to 15 years. Both items result in a decrease to profitability, as the higher capitalization percentage results in more capitalization (or in terms of a loan, a larger loan) and the amortization is extended five years, which increases the time period for capitalized costs to be expensed (or in terms of a loan, extends the time to repayment). The profitability results are displayed in Table 4.

MORE BAD NEWS ... CAPITAL

The corporate tax rate reduction has tangential impacts and reduces profitability through decreased tax effects on required capital. Required capital is a key consideration of product profitability. In the United States, required capital is often referred to as risk-based capital and it is the minimum amount of capital required by the company. To obtain and maintain a high financial strength rating, companies generally need to hold more capital than the minimum, and this target capital is often a multiple of RBC. The RBC calculation is mostly formulaic and the components of the calculation, sometimes referred to as risk factors C0 through C4, are reduced for taxes. Depending on which part of RBC is being calculated, the post-tax C-values are roughly equal to pre-tax C-values multiplied by (1-Tax Rate Percentage). So, if the tax rates decrease from 35 percent to 21 percent and all else is equal, a smaller tax effect is applied to risk-based capital and the formula indicates that more capital is needed, which hurts profitability. Table 5 contains the results on profitability, which show this change has a higher impact on the 20-year level term contract compared to whole life.

TAX RESERVE EFFICIENCY

As noted, maximizing tax reserves is beneficial for insurance companies and that generally means having tax reserves as close as possible to statutory reserves. We were curious if there were certain contracts where the new tax reserve methodology might shrink a gap between tax and statutory reserves. The question we wanted to answer ended up being simple: Are there situations where the tax reserves are currently less than 92.81 percent of the statutory reserve? In these situations, we would expect the new tax reserve methodology to increase efficiency and profitability. One of the main drivers of differences in statutory and tax reserves under the old tax law is where the applicable federal interest rate (AFIR)—which is the discount rate used to compute tax reserves—is greater than the prescribed statutory discount rate. This is the situation that we examined to answer our question (however, we think there are other situations, so email us your examples to play along).

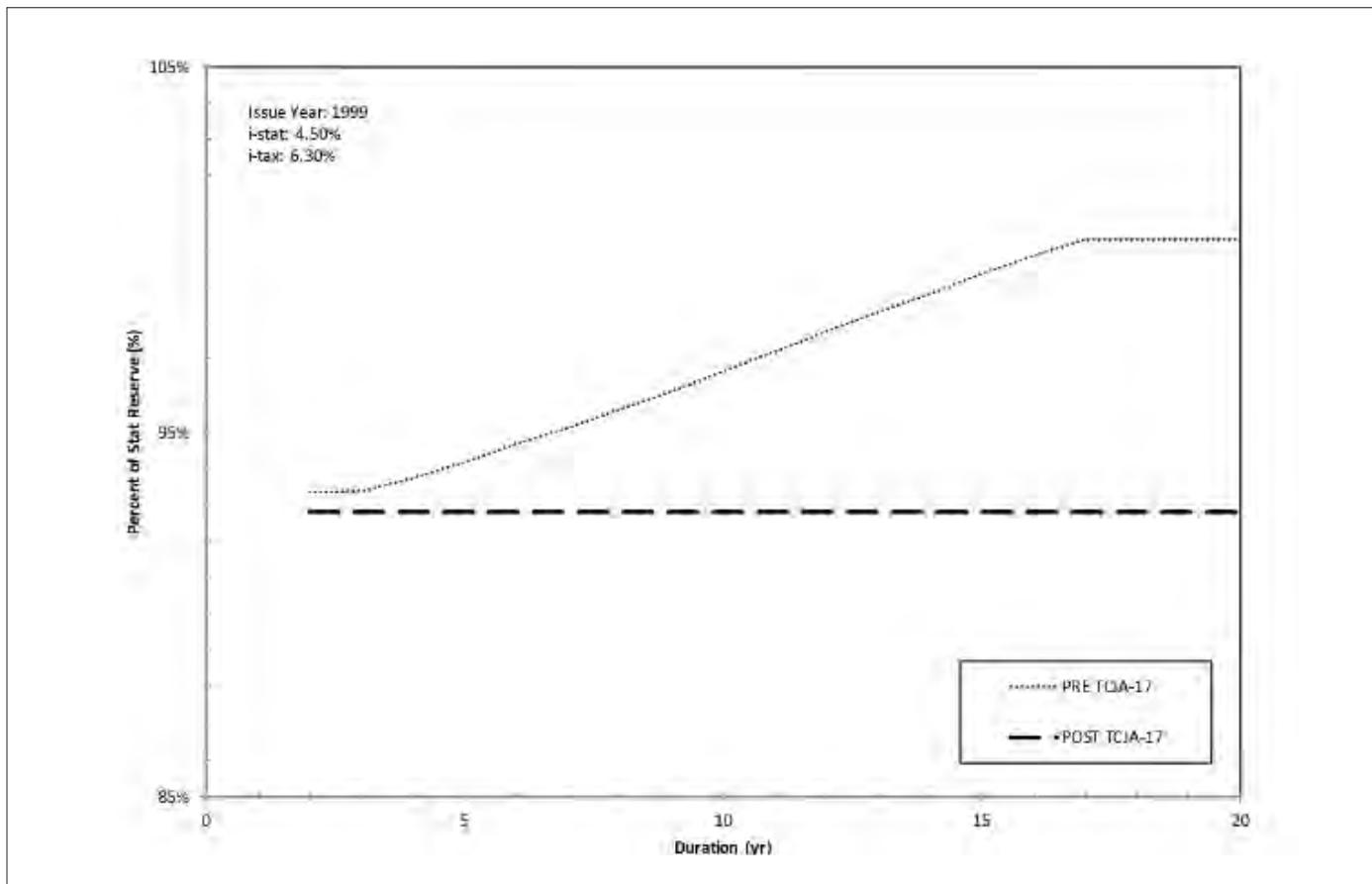
Table 6 contains the AFIR, the prescribed statutory discount rate from years 1992–2004. There are large differences between the appropriate discount rates across accounting bases, and tax discount rates are higher, leading to lower reserves on a tax basis, all else being equal.

YEAR	AFIR	STAT	AFIR - STAT
1988	7.77%	5.50%	2.27%
1989	8.16%	5.50%	2.66%
1990	8.37%	5.50%	2.87%
1991	8.42%	5.50%	2.92%
1992	8.40%	5.50%	2.90%
1993	8.10%	5.00%	3.10%
1994	7.45%	5.00%	2.45%
1995	6.99%	4.50%	2.49%
1996	6.63%	4.50%	2.13%
1997	6.33%	4.50%	1.83%
1998	6.31%	4.50%	1.81%
1999	6.30%	4.50%	1.80%
2000	6.09%	4.50%	1.59%
2001	6.00%	4.50%	1.50%
2002	5.71%	4.50%	1.21%
2003	5.27%	4.50%	0.77%
2004	4.82%	4.50%	0.32%



We first tested our question for the same 20-year level term plan from our profitability analysis but assuming an issue date of 1999. In 1999, the difference in the discount rate between the two reserve methodologies was 1.80 percent. In Figure 1, we examined the ratio of the pre-TCJA tax reserves to statutory reserves and the ratio of post-TCJA tax reserves to statutory reserves.³ The pre-TCJA tax to statutory ratio is always higher, with the ratio grading to 100 percent near the end of the term, while the TCJA-2017 to statutory reserves is a level percentage (92.81 percent) of statutory reserves. So even if we hopped in our DeLorean and turned back time to 1999, the pre-TCJA method was still more tax efficient from the insurance company’s perspective. This contract would be in the 18th duration when TCJA became effective, so we did not find our post-TCJA winner in this term contract. In general, it appears that there might be some opportunity for increased efficiency in years preceding 1999; however, that would also likely imply a level term period of longer than 20 years. Even if a 30-year level term product was issued in the early 90s, where the difference between tax and statutory discount rates are largest, the contract would be near the end of its level term period, and we can see from Figure 1 that the tax to statutory ratio is increasing to 100 percent in later durations of the contract.

Figure 1
Tax to Statutory Ratio (20yr Term)



We then examined a whole life plan with an issue date of 1993. The contract was issued to a 40-year old, making them 65 in 2018, with the contract being in the 25th duration. In Figure 2, we display the ratio of both pre- and post-TCJA tax reserves, as well as the ratio of net surrender value to statutory reserves. Under both pre- and post-TCJA, the floor to the reserve is the net surrender value, and under post-TCJA, the comparison to the net surrender value is done after the haircut percentage is applied. We can see that the tax to statutory ratio of pre-TCJA and the net surrender value is lower than the post-TCJA until about the 35th duration. At the 35th duration, under both methodologies, the tax reserve is floored at the net surrender value.

So, we found an answer to our question, at least for an individual product type. The cash value ratio is less than the post-TCJA ratio at the current duration and for the next 10 durations, and in this case the new tax reserve methodology increases tax reserve efficiency and profitability compared to the old methodology. One caveat is that part of TCJA instructs companies that differences in tax reserves between the old and new methods are to be recognized evenly over eight years. So, while this situation increases profitability overall, the increased profit is spread over time.

Figure 2
Tax to Stat Ratio (Whole Life)

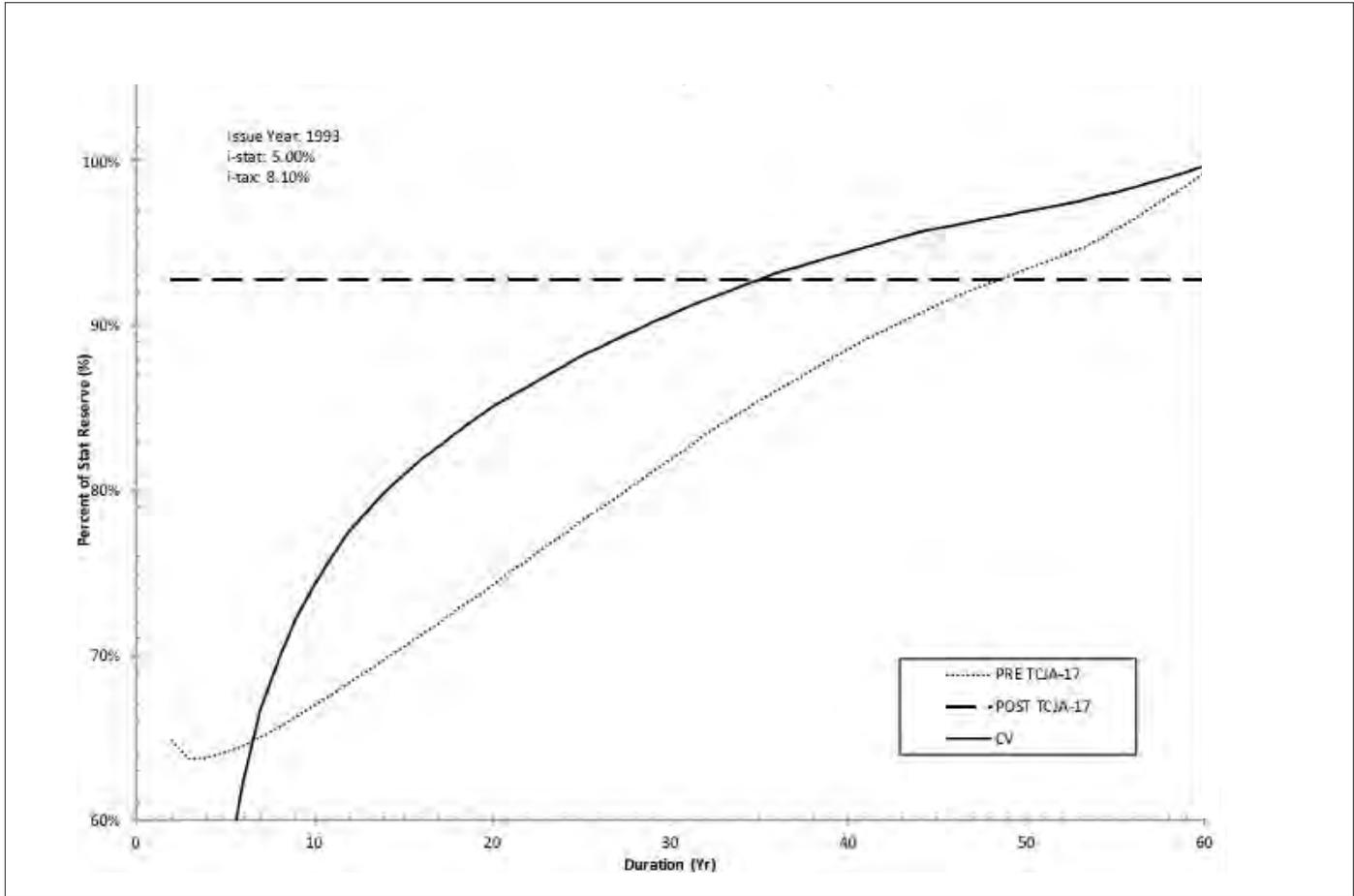


Table 7
Attribution of TCJA Net Impact

	20-Year Level Term		Whole Life	
	<i>Profit Margin</i>	<i>IRR</i>	<i>Profit Margin</i>	<i>IRR</i>
Baseline— Pre-TCJA	5.7%	14.7%	5.2%	15.0%
Corporate Tax Rate	9.1%	17.2%	7.5%	16.6%
Tax Reserve Method	8.9%	16.9%	6.4%	15.4%
Tax DAC	8.5%	16.6%	6.0%	15.0%
RBC Factors— Post-TCJA	7.6%	15.2%	5.7%	14.5%
Net Impact	1.9%	0.5%	0.5%	-0.5%

CONCLUSION

The various directional impacts of the components of TCJA to profitability are mostly intuitive and offset. While there appear to be situations where the impact of the tax reserve haircut methodology may not be directionally clear, the provisions contained in the insurance reform section and the resulting increase to capital amounts offset much of the increase to profitability realized by decreasing the corporate tax rate.

As can be seen by the attribution analysis shown in Table 7, the largest offset for the term plan was due to the impact on risk-based capital, while the largest offset for whole life was due to the haircut reserve methodology. The net impact of TCJA was close to neutral for both product types. The magnitude of the impact of TCJA on profitability may vary depending on the product design, reserve methodology and cash flow model assumptions, among many other things. ■

ENDNOTES

- 1 Our analysis is based on calculating capital with current RBC factors and updated tax adjustments using the new corporate tax rate. We note that the Academy of Actuaries and the NAIC Life Risk-Based Capital Working Group are analyzing how RBC factors should be updated due to the change in the corporate tax rate.
- 2 In this article, we assume the NAIC prescribed reserve method is equal to the statutory reserve, though this may not always be the case.
- 3 Please note that all graphs in this article reflect terminal reserves.



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Work Group Welcomes Input on PBA Projections for Future Practice Note

The American Academy of Actuaries' PBA Projections Practice Note Work Group is seeking input from practitioners on questions encountered when projecting future VM-20 reserve calculations. Issues may be related to inner/outer loops, simplification techniques, asset assumptions, VM-21/AG 43 and economic capital frameworks.

If you have questions relating to projecting future PBA (principle-based approach) calculations, the work group would like to hear from you. Please contact Academy life policy analyst Ian Trepanier (trepanier@actuary.org) to submit questions and comments, which will help in the development of a future practice note on PBA projections.

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Using Predictive Modeling for UL Premium Assumptions

By Emily Cassidy and Frankie Logan

Life insurers face many challenges when valuing universal life (UL) business on a US GAAP basis due to the product's flexible nature to suit individual policyholder's needs. One common challenge is setting premium persistency assumptions on the in-force block of business. The presence of a secondary guarantee or a rider can greatly affect policyholders' future premium payment behavior. Additional factors like the insurer's methods for notifying policyholders of potential for their contract to lapse can also have an effect on payment behaviors. While the base US GAAP reserve on a UL contract is the account value, the deferred acquisition cost (DAC) asset will be influenced by the premium persistency assumption. Premiums are not a revenue item under ASC 944 (previously FAS 97), but other elements such as percent of premium loads and commission expense are dependent on the assumption and will flow through to the cash flows.

Insurers have historically struggled to perform experience studies on their premium persistency and to set a best estimate assumption with some degree of confidence. The difficulty of capturing some of these effects causes insurers' best estimate assumptions to be inaccurate which leads to earnings surprises and risk management problems. Predictive analytics is starting to gain traction as a solution for this challenge. Techniques such as generalized linear modeling (GLM), deep learning, Markov modeling, random forests, and clustering can help analyze insurers' data about policyholders and their prior behavior to better project short-term and long-term premium payments for each policyholder. Using predictive analytics, the premium assumption can vary by duration and be assigned at a seriatim level, providing a more accurate depiction of payment behavior.

We present in this article a case study in which machine learning was used to develop the premium persistency assumption for an in-force block of UL business.



DATA CONSIDERATIONS

Like all other modeling techniques, the results of a predictive analysis model are only as good as the underlying data. Selecting the data that will ultimately be used to create a model is crucial to building a good model. In addition, accuracy, ease of annual update, ease of implementation, and applicability are also key considerations when using predictive analytics.

Gathering, scrubbing and structuring the data to build a predictive model has a cost. Predictive power, availability, IT cost and implementation are some of the key factors to consider when collecting data. Internal data such as historical premium payments, product type and characteristics, funding intentions, funding level, historical grace letter/funding notices and payment methods (e.g., automatic withdrawal) are all good information to use when setting premium persistency assumptions. An insurer might also consider using external data such as interest rates and unemployment levels to supplement the internal data. Lastly, demographic and other personal information about the policyholder can be used to create a richer model. Once the data is gathered, a data model would need to be created to begin analysis. Documentation and validation are extremely important as the process will need to be repeated during the annual unlocking process.

The data model is often split into a training set, which is used for building the model, and a holdout set, which is used for validating the model. The purpose of splitting the data model is to avoid overfitting, i.e., matching the model parameters too

closely to the data. Overfitting the model will cause the model to perform poorly as new data is introduced. For example, a 60-40 split can be applied—60 percent of the data is the training set and 40 percent is the holdout set. This ratio can be adjusted to find the best balance.

When splitting premium behavior data, users can consider splitting the data model by number of policies (e.g., 60 percent of the policies will be used as the training set and 40 percent will be used as the holdout set) or by calendar year (e.g., 2000–2014 as the training set and anything after as the holdout set). Both methods have advantages and disadvantages. Splitting the data model by number of policies can give the model an opportunity to learn the entirety of the policyholder’s behavior to date. However, it can be difficult to apply economic factors into the model as economic factors might not affect every policy in the training set the same way (e.g., policies ended before the financial crisis versus policies during or after the financial crisis). Splitting the data model by calendar year makes it easier for the user to apply economic factors and cycles into the model. It is also a good way to validate the model since the goal is to predict future payment behavior. A disadvantage is that the mix of new and existing policies in a calendar year can influence the payment behavior, though this effect can be lessened by adding policy duration into the model.

Other data considerations include how to track the response variable in comparison to future experience, handling of “early” or “late” payments, segmentation of the model, deployment of assumptions for use in valuation, and IT infrastructure.

MODELING APPROACH

One of the first steps in modeling is defining a response variable. A response variable is something we want to predict, or measure, with the model. For this case study, the ratio of paid premium to target premium is selected as the response variable. Performing an exploratory analysis such as a one-way analysis can create a distribution profile for each of the potential variables and can serve as an indicator of which variables are strong predictors.

The historical premium payment information showed that large proportions of policyholders were either paying their target premium or making no payments so a two-part model can address the different behaviors in policyholder. A two-part model includes one part to indicate whether an event has occurred and the second part to indicate the size of the event. The advantages of taking a two-part approach are having the option to include predictive variables in either the first or second component, it is easier to communicate, and it provides a greater understanding of the business.

In this case study, the two-part model includes the policyholders’ payment pattern (i.e., how policyholders behave in a given policy year) and their new planned premium.

We established four options for premium payment: paying target, steady payment not equal to target, change in payment and no payment. Paying target means the target premium is paid. Steady payment not equal to target means the premium paid is equal to the prior duration and is non-zero. Change in payment means premium paid in the current duration is not equal to the prior duration and is non-zero. No payment means zero premium is paid in the current duration. In this case study, the data showed over two-thirds of policies have no change in premium pattern. Most policies tend to stay in either the “paying target” or “steady payments” state for several durations. Less than 15 percent of policies showed zero payments in the previous duration and over half of those policies continue to pay no premium. Around 10 percent of the policies showed a change in payment amount.

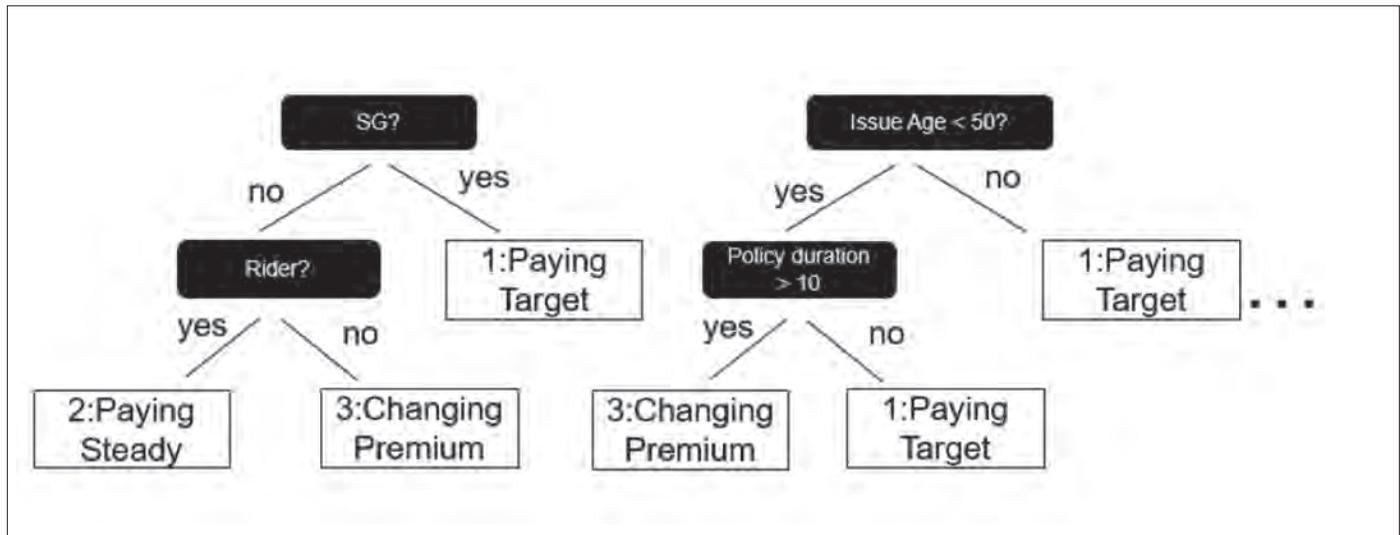
The planned premium is the assumption for premium paid in the current year for policies that have made a change. This is expressed as a percentage of target. There are several ways to decide this amount. For example, the average and median of the policies’ payment change in the different state transitions can be used in determining the percentage of target. Using median, and reducing the effect of large outliers, we see that those paying target will pay slightly less than target in the next period; steady, but not target, will pay about 15 percent over target in the next payment; changing in payment will pay around 5 percent over target in the next payment; and no payment will pay very close to target in the next period.

MODELING PROCESS

Now that the dataset was built and predictive variables were selected, we used a random forest to model premium behavior.

A random forest is a classification and an ensemble learning model. An average is taken from a number of decision trees. One property of random forests that users should be aware of is that the random forest decreases **variance** in the results but it doesn’t decrease the **bias**. Using a random forest, we can directly predict which state a policyholder is in and which state they will move to in the next period. One of the challenges surrounding random forest modeling is that numeric variables like issue age need to be grouped into a range. Exhibit 1 shows an example of how individual decision trees work. Shaded boxes represent a policy characteristic while non-shaded boxes represent a classification.

Exhibit 1
Decision Trees Example



To create the model, we use the training set of the data model. Once the initial model is created, we can input our holdout data set to test how well the model is performing. There are many model performance matrices that we can use to check the performance of the model such as gains/lift chart, logloss chart, and receiver operating characteristic curve (ROC curve). Additional matrices such as confusion matrix and area under the curve (AUC) can be produced based on the ROC curve. A gains/lift chart measures the effectiveness of the predictive model compared to not using a model at all. Logloss is a metric that penalizes the model for having the wrong classification. An ROC chart is a graph that uses the true positive rate and false positive rate to test performance of classification models. We can then adjust the hyper-parameters (the number of decision trees in the forest and the number of features considered by each tree when splitting a node) of the random forest and/or the predictive variables to include in the model.

ASSUMPTION SETTING AND IMPLEMENTATION

Based on the information we gathered, a new premium assumption can be set for each of the states (paying target, paying steady, changing payment and no payment). Now that we have our model and assumptions, we can input seriatim policy data into our model and the output will be a seriatim assumption for future premium payments. With our model, we were typically able to predict future premium payments within 2 percent of the actual payments.

All of this work would be wasted if there was not an efficient way to implement the assumption. Some of the implementation options include deploying the premium assumption methodology dynamically within the valuation software or calculating the premium “upstream” (in a statistical software like R) and passing them to the valuation model. The first option allows the use of more sophisticated and up-to-date premium predictors while the second option provides more flexibility in analytical methods.

Additional considerations when using predictive analytics include the model capabilities and limitations, model size and processing time, the use of dynamic variables in the predictive model, the frequency of updates, and the assumption validation and quantification of financial impacts. ■



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FASB COMPLETES DELIBERATIONS ON TARGETED IMPROVEMENTS

By Leonard Reback

On June 6, 2018, the Financial Accounting Standards Board (FASB) held what they expect to be their last meeting on targeted improvements to US GAAP accounting for long-duration insurance contracts. This meeting was the culmination of a long process that took more than 10 years. For much of that time FASB was working with the International Account Standards Board (IASB) in an effort to achieve a converged international insurance accounting standard, but since 2014 FASB has been working on its own to effect targeted improvements to US GAAP accounting.

The most important result of the June 6 meeting was that FASB decided to proceed to issue a final accounting standards update (ASU) codifying the targeted improvements into US GAAP. The final standard is expected to be published during the third quarter of 2018.

Perhaps the most surprising result of the June 6 meeting was FASB's decision on the effective date. FASB decided that the **effective date will be Jan. 1, 2021**, for public companies whose fiscal year coincides with the calendar year, with early adoption permitted. This means less than two-and-a-half years between publishing the final standard and the effective date. Many insurers were hoping for, and expecting, a 2022 effective date, given the extensive and complex system updates that will be required. However, FASB board members believed that some of the decisions they made in 2017 to simplify transition and ease some of the burden of retrospectively unlocking assumptions obviated the need for that much implementation time.

INTEREST RATE AT TRANSITION

FASB did make one change at the June 6 meeting that will ease the transition burden somewhat. As already determined previously by FASB, companies will have the ability to apply either prospective or retrospective transition for DAC and traditional contract reserves (assuming the company had the data available

for retrospective transition). Under a prospective transition, the initial DAC and reserve balance under the new accounting standard on the transition date would generally equal the DAC and reserve balance under current US GAAP on that date. There would be adjustments to back out shadow loss recognition and shadow DAC and any other amounts that had been reported through other comprehensive income (OCI). If the net premium ratio on the transition date was over 100 percent, the ratio would be capped at 100 percent with a resulting increase to reserves. The transition date would presumably be year-end 2018, assuming three years of historical information would be shown as of the Jan. 1, 2021, effective date.

Insurers had been concerned about the interest accretion rate that would be used to determine the initial net premium ratio and the ongoing split between net income and OCI under prospective transition. Under FASB's original approach, the interest accretion rate would be the rate on the transition date, i.e., year-end 2018. If this rate was significantly lower than the rate when the business was originally sold, this could cause the net premium ratio to reach the 100 percent cap, causing a reserve increase. Also, locking in an interest accretion rate at year-end 2018 for liabilities would cause a mismatch with the yield on assets which may have been purchased when the insurance contracts were sold, creating a mismatch in OCI.

A possible solution to this situation would have been to permit companies to use the single-A discount rate as of the date the contract was issued, even for contracts using prospective transition. This would also be the discount rate used for contracts using retrospective transition. FASB's solution was simpler. Under the solution FASB adopted, companies applying prospective transition would retain the locked-in discount rate used under current GAAP, i.e., FAS 60, as the locked-in interest accretion rate to determine the net premium ratio and net income/OCI splits. This should relieve pressure on insurance companies to try to apply the more complicated retrospective transition approach.

MARKET RISK BENEFIT DEFINITION

FASB made one other substantive change at the June 6 meeting. This was a further clarification of the definition of market risk benefits. Under FASB's targeted improvements, market risk benefits would be accounted for at fair value, with changes in fair value reported in net income, except for changes relating to changes in own credit, which would be reported in OCI. The definition of a market risk benefit has been refined a few times during the course of the project.

Under the latest definition, "a contract or contract feature that both provides protection to the contract holder from capital market risk and exposes the insurance entity to other-than-nominal

capital market risk should be recognized as a market risk benefit.” The final standard should include additional paragraphs clarifying the meaning of the terms “protection” and “other-than-nominal capital market risk,” and explicitly scoping out the death benefit component of life insurance contracts (but not of annuity or investment contracts). The intention is to define as market risk benefits most GMxBs (such as guaranteed minimum income, death, withdrawal and accumulation benefits) on variable, fixed and equity indexed annuities. These would be defined as market risk benefits whether or not they are considered embedded derivatives under current US GAAP. GMABs, GMWBs or similar living benefits on a variable life insurance contract may also be scoped into the market risk benefit definition. Other types of features, such as stable value features, may also be considered market risk benefits under the new definition. Certain other types of benefits that had been scoped in under previous definitions, such as variable life no-lapse guarantees and equity indexing features, would generally not be considered market risk benefits under the new definition.

SUMMARY

Assuming no unexpected issues arise, FASB has completed its deliberations on targeted improvements with these decisions. For a more complete discussion of previous decisions see “FASB Long-Duration Contracts Redeliberations” in the March 2018 edition of *Financial Reporter*. As a brief summary of the main changes:

- Traditional contracts: Assumptions and discount rates on traditional non-participating contracts, including limited payment contracts, would be updated. Net premium ratios would be subject to a 100 percent cap and updated retrospectively for changes in cash flow assumptions and for deviations between assumptions and actual experience. The discount rate would be a current upper-medium grade (low credit risk) fixed-income instrument yield (generally interpreted as single-A credit quality). Changes in discount rates would be reflected in OCI. Premium deficiency testing for these contracts and provisions for adverse deviations would be eliminated. There would be some refinements to the definition of maintenance expenses to be included in the reserve calculation.
- DAC: For all contracts except investment contracts using an effective yield approach, DAC (and related items such as unearned revenue liabilities) would be amortized on a constant level basis or straight line, accounting for expected terminations. DAC would be written down for actual terminations in excess of assumed. Changes to expected termination assumptions would be reflected prospectively.

Interest accretion would be eliminated. Amortization ratios would exclude the effect of future expected deferred expenses that have not yet been incurred. DAC would not be subject to recoverability testing or premium deficiency testing.

- Market risk benefits: Contract features that both provide protection to the contract holder from capital market risk and expose the insurance entity to other-than-nominal capital market risk would be defined as market risk benefits. Variable life no-lapse guarantees would generally be scoped out of the definition. Market risk benefits would be accounted for at fair value, with changes in fair value reported in net income except for changes relating to changes in own credit, which would be reported in OCI.
- Other valuation changes: There would be some other conforming valuation changes, such as changes to how terminal dividend liabilities on participating contracts are accrued, and use of an upper-medium grade fixed-income instrument yield for discounting annuitization benefits reported under SOP 03-1
- Disclosures: Many new footnote disclosures would be required, including rollforwards of most reserve and DAC balances and increased supplemental information.
- Transition: For DAC and traditional non-participating reserves, companies could apply either prospective or retrospective transition, although if retrospective unlocking is elected it must be elected for all contracts in a given issue year and later. If prospective unlocking is elected, the discount rate for traditional non-par reserves would be the locked-in rate under current GAAP. For market risk benefits companies would be required to apply a retrospective transition, but the use of “hindsight” would be permitted.

Although this project is defined as “targeted improvements,” the required changes are significant and will require substantial resources to implement. Based on FASB’s June 6 decisions, we will have less than two-and-a-half years to get this done once the final standard is issued. It is imperative for actuaries and others involved in the financial reporting process to begin working on this as quickly as possible. ■



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IFRS 17 Risk Adjustment—Insights from a Practical Example

By Darryl Wagner, Hui Shan and Ryan Kiefer

Since the publication of IFRS 17 by the IASB in May 2017, companies that are impacted by the new accounting standard have been working through both practical and technical considerations. In this article, we will examine potential approaches to the calculation of the risk adjustment component, with a focus on a case study related to a universal life insurance product. This case study highlights the inherent characteristics and potential tradeoffs of calculating the risk adjustment under two different approaches.

GUIDANCE

The IFRS 17 general measurement model has three key components: the present value of future contract cash flows (which we'll refer to as the best estimate liability, or BEL), the risk adjustment and the contractual service margin.

The BEL represents the probability-weighted present value of insurance cash flows such as premiums, claims, benefits and expenses. The contractual service margin is a deferred profit mechanism that is solved for at issue to avoid time-zero gains after taking into account the initial BEL and the risk adjustment. This margin is then amortized into income over the life of the contract. While the actuary must demonstrate considerable judgment to derive both of these components, the risk adjustment component requires perhaps the most interpretation and judgment. IFRS 17 states that “An entity shall apply judgment when determining an appropriate estimation technique for the risk adjustment for non-financial risk.” The company should “provide concise and informative disclosure so that users of financial statements can benchmark the entity's performance against the performance of other entities.”¹ In addition, IFRS 17 requires the risk adjustment to meet qualitative characteristics as defined in paragraph B91.

IFRS 17 requires an explicit recognition of the risk adjustment in the financial statements to account for the compensation required by the entity due to the variability of potential

outcomes of future cash flows. In many parts of the world, it has been common to include risk as a key component in financial reporting. Financial reporting professionals are familiar with the “risk adjustment” concept, whether through setting assumptions that include specific provisions for risk, or explicitly computing a provision following prescribed approaches. However, the principle-based requirements under IFRS 17, along with associated disclosures on confidence level, current period changes in the risk adjustment, the nature and extent of risks, etc., demand a greater level of overall effort and professional judgment, as well as resultant scrutiny from auditors.

SUMMARY OF RISK ADJUSTMENT CALCULATION TECHNIQUES

IFRS 17 does not specify the technique to be used for determining the risk adjustment, nor does it provide specific examples of possible techniques to be considered. Intended to be educational material, the 2018 IAA publication on IFRS 17 risk adjustments² introduces some common techniques that have been employed in relevant accounting and regulatory frameworks, out of which the application of quantile techniques and the cost of capital (CoC) approach are discussed in detail.

The Value at Risk (VaR) approach is a common statistical measure whereby a desired confidence level is chosen. The confidence level represents that probability that the actual outcome will be less than the expected value. This approach, along with the conditional tail expectation (CTE) approach, are sometimes referred to as quantile techniques. These techniques are useful to the risk adjustment determination as they are rooted in statistical theory and can be graphically represented and easily communicated to non-technical audiences. While it may be easier to meet the confidence level disclosure requirement under the quantile techniques, careful consideration needs to be given for an appropriate quantile level when quantiles are also used to measure tail risk in the case of capital adequacy and/or solvency.

The CoC approach aligns a company's selection of a capital amount to the risks that are covered in the IFRS 17 measurement model. The cost to the company of holding this capital is measured as the required return on shareholder capital in excess of the earnings to that capital. This technique requires several inputs, including a risk level acceptable to ensure the proper capital level, a cost of capital rate, and a discount rate. For purposes of IFRS 17, the capital amount covers only non-financial risks to the insurance cash flows.

Additional techniques being considered range from the simplistic (adding a flat percentage to future cash flows) to the highly technical (advanced statistical techniques such as Wang transform or copulas). There are tradeoffs to each of these approaches, as discussed in the 2018 IAA publication and

other educational literature. To further compare the potential differences between the quantile (in particular, VaR) and CoC techniques, we conducted a case study.

CASE STUDY

Our case study focused on a level death benefit universal life product. Key assumptions for our case study are summarized below:

- 15-year surrender charge schedule.
- Level annual premium assumed to be paid for the life of the projection, regardless of the interest rate scenario.
- 30-year projection period.
- Lapse and mortality assumptions were set based on an insurance company's best estimate experience.
- 200 interest rate scenarios were generated using the American Academy of Actuaries interest generator tool.
- Asset earned rate set at 200 basis points above the 10-year Treasury rate at each duration for each scenario.

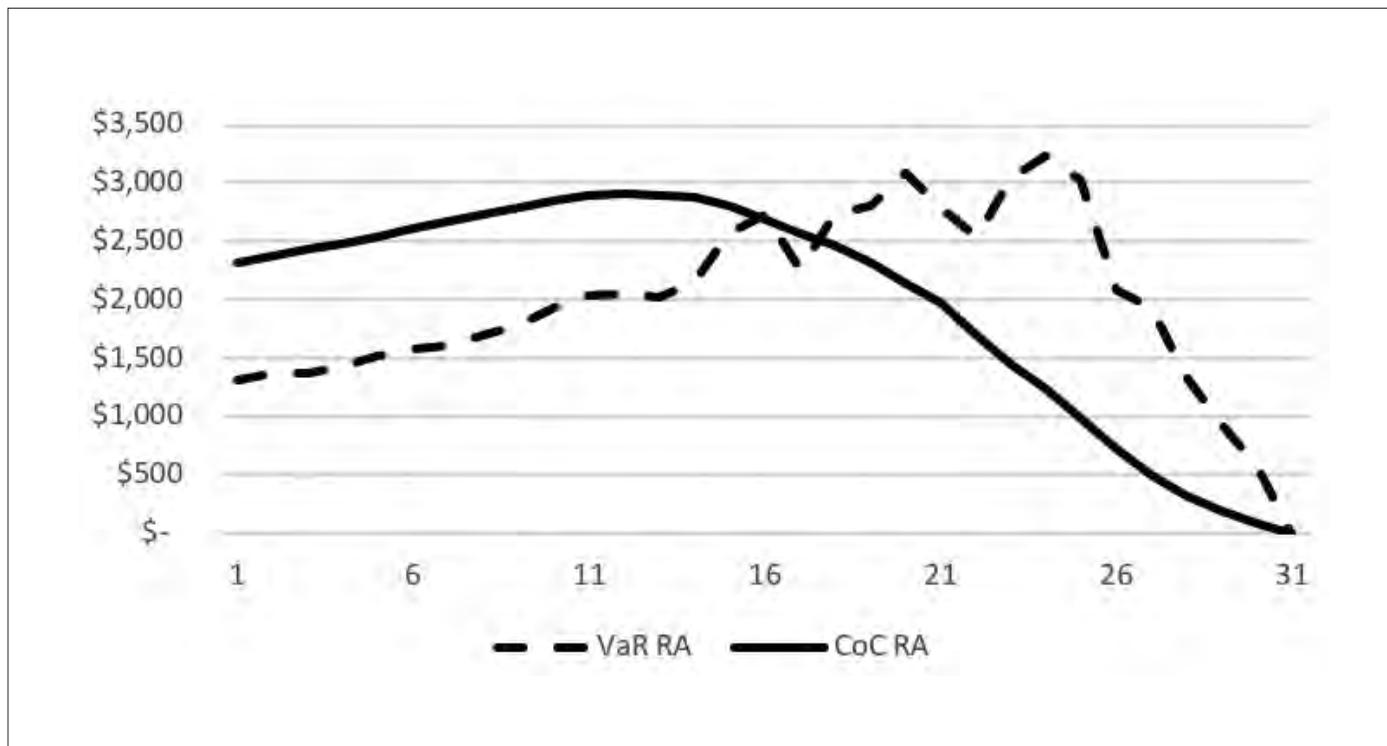
- Policyholder crediting rate set to 100 basis points less than the earned rate, subject to a 2 percent minimum crediting rate.
- The BEL discount rate is established using the “bottom-up” approach and derived by adding a 250-basis points illiquidity premium to the 10-year Treasury rate at each duration for each scenario.

We generated stochastic cash flows and selected the 95 percent quantile to determine the level of capital required at each time step. CoC risk adjustments were then calculated based on a 6 percent cost of capital rate and an 8 percent discount rate. Risk adjustments under the VaR approach were also calculated. In order to bring the results together for comparison, the quantile level under the VaR approach was calibrated such that, on average, the risk adjustment for the CoC approach equals the risk adjustment for VaR.

RESULTS & OBSERVATIONS

The resulting risk adjustment at each time step, under both the VaR and CoC approaches is shown in Figure 1. Our key take-aways from this example are as follows:

Figure 1
Risk Adjustment Baseline Case



- **VaR estimates start off lower, build up over time and reach their peak later than the CoC estimates.** Consider that the VaR is simply the excess over the mean of the BEL, which itself is the present value of the sum of future cash flows. The very nature of this measurement will tend to focus on the variability in the potential future outcomes as of a given point in time. The CoC also takes the BEL variability into account, but has a second dimension as well, namely the anticipated future capital needs due to adverse outcomes in the future, which can be seen from a typical CoC formula:

$$\text{Cost of Capital Amount} = \sum_{t=1}^n \frac{\text{CoC Rate}_t * \text{Capital}_t}{(1 + \text{discount rate}_t)^t}$$

where the capital amount in this case is determined based on the 95th percentile of the BEL distribution.

This phenomenon can be seen when examining the two measurements at issue. The variability in the BEL is minimal as extreme outcomes resulting from divergent interest rate scenarios are muted by the effects of decrements and discounting. The CoC, on the other hand, starts off as a higher amount to account for the strain on capital cost due to future variability in the BEL, inclusive of that which is experienced at issue. As a result, it is reasonable that the CoC estimate exceeds the VaR estimate at issue.

When the projection reaches its final years (consider years 20–25 in the case study example), interest rate paths have had time to diverge and therefore generate maximum variability in the underlying cash flows. Material business remains in these periods and the effect of discounting is minimized as there are relatively few years remaining in the projection. As such, the highest value of the risk adjustment under the VaR approach occurs in these periods, which also aligns with the maximum values of the BEL and further indicates that VaR is a point in time estimate.

A direct implication of the observation above is that the CoC approach over time produces risk adjustments corresponding to declining confidence levels, for an in-force block. While the CoC approach is relatively easy to implement, especially for those entities that already report under Solvency II, additional consideration should be given to this approach if the entity plans to target a certain confidence level.

- **The CoC approach demonstrates a smoother overall pattern relative to the VaR approach, which leads to a smoother earnings pattern.** The previous example demonstrates a smooth, humpback pattern for the CoC

The CoC approach demonstrates a smoother overall pattern relative to the VaR approach, which leads to a smoother earnings pattern.

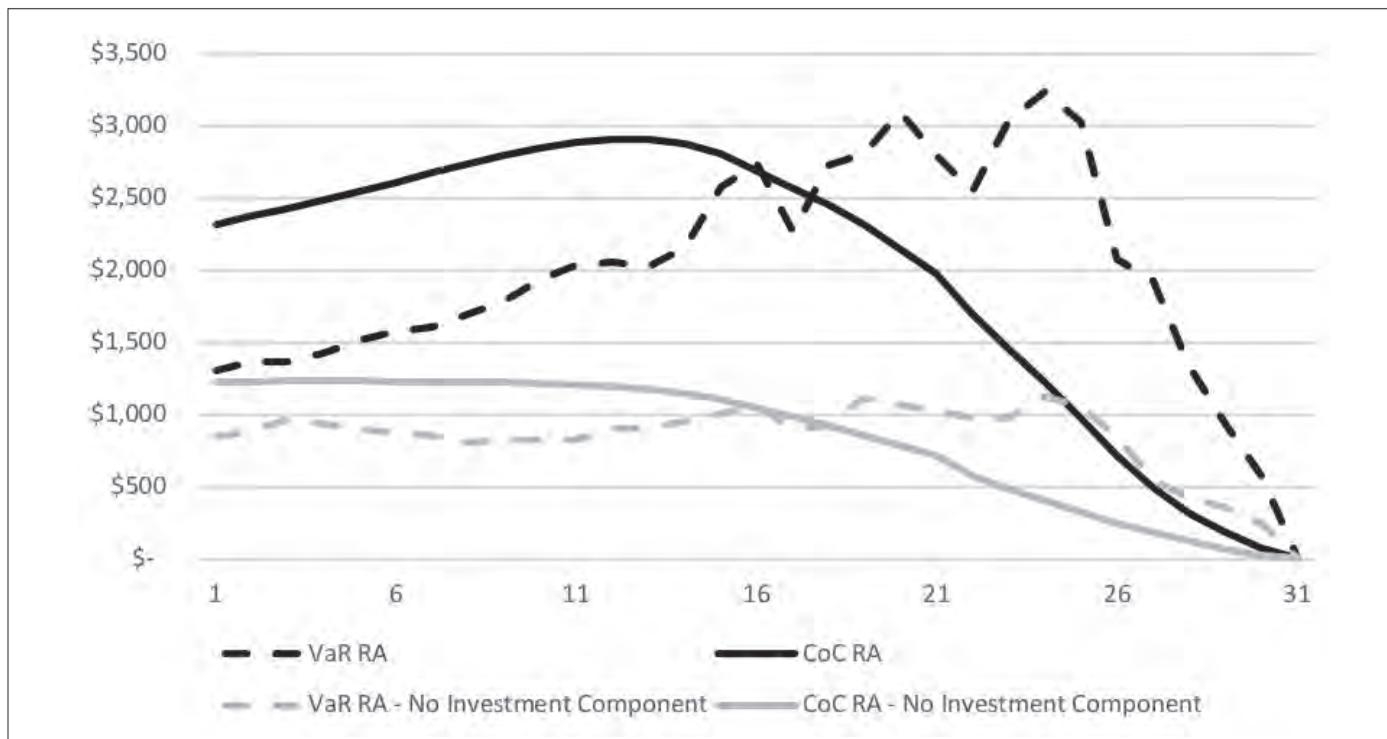
approach and a jagged, more volatile pattern for VaR. This pattern is again attributable to the nature of the calculation. As time passes and we observe more volatility in the BEL, the VaR captures the discrete changes in volatility from period to period. In comparison, the spikes in volatility from period 15 to 25 in the example are accounted for in the CoC calculation starting from issue.

In addition to a smoother overall pattern, the CoC calculation reacts sooner for future cash flow variability. In the above example, the highest standard deviation for the BEL is in the 25th duration, which is when the VaR risk adjustment reaches its peak. In contrast, the accrual of the CoC risk adjustment begins immediately and steadily increases over time.

Considered in tandem, the accrual and release pattern along with the earlier recognition of cash flow variability has a direct impact on earnings. Since the release of the IFRS liability, and more specifically the risk adjustment component, is a source of income, the CoC approach contributes to a smoother overall earnings pattern and earlier recognition of income. The VaR approach holds back the earnings until later in the projection when risk adjustment decreases sharply as the cash flow variability decreases.

Our baseline example above considered the full-face amount as the benefit to be paid upon death in the calculation of the BEL. This construct implicitly includes the “investment component”³ of the universal life product, which is essentially the cash surrender value. Strictly speaking, this isn’t an insurance cash flow as the cash surrender value will ultimately be paid out to the policyholder, either as a portion of the death benefit or as a benefit upon surrender. Thus, it can be argued that this component should be excluded from the liability cash flows in the risk adjustment calculation, even though it remains part of the IFRS 17 insurance liability. However, a counter-argument is that the timing of when such benefit is paid out is driven by insurance risks (e.g., lapse or death). To study the effect of the investment component, we performed a secondary analysis where the investment component is removed from benefit payouts. Key observations from this secondary example are shown in Figure 2 and summarized in the next paragraph.

Figure 2
Risk Adjustment (No Investment Component)



- The removal of the investment component leads to overall lower risk adjustments in both magnitude and volatility, under the VaR and CoC approaches.** Removing the investment component reduces the cash outflow from the insurer's perspective. This directly reduces the expected value of the BEL, as well as the variability of the BEL (except when the investment component stays constant over time which is rarely the case). Since both the VaR and CoC depend on the BEL, a reduction in the risk adjustment across time periods is the intuitive result. An examination of the results reveals a secondary impact, namely that the sharp peaks that were present in the base case for the VaR approach are not nearly as severe. This result is a reflection of not only the overall reduction in the BEL previously discussed, but also an overall reduction in the BEL's variability at any given point in time. The overall pattern and release of the risk adjustment are similar for both the VaR and CoC approaches relative to the base case, but the differences between the two approaches are minimized when the investment component is removed.

Clearly, the removal of the investment component changes the overall results and relationship between the VaR and CoC approaches. These differences will tend to be magnified for products with significant investment components (e.g., fixed

deferred annuity) and minimized when there is little or no investment component (e.g., traditional whole life, term life).

CONCLUSIONS

The observations comparing the two approaches considered in our case study have similar limitations as those of any actuarial model, especially one analyzing a single policy. In particular, the results shown above are sensitive to model assumptions and input parameters and may not be representative for a larger block of business. In addition, the capital calculation is greatly simplified in the example. In reality, a company's risk appetite and capital philosophy will need to be taken into account and calibrated appropriately for purposes of the IFRS 17 risk adjustment calculation.

The case study highlights the fundamental mathematical constructs and inherent differences of both the VaR and CoC calculation approaches. These constructs drive fundamentally different risk adjustment patterns and income recognition. The inclusion or exclusion of an investment component in the analysis adds an additional layer of complexity.

As each company continues through their IFRS 17 transition journey, their actuaries and finance professionals will need to carefully consider the various IFRS risk adjustment calculation

techniques, and ensure the chosen method and the resultant outcome meet the requirements set out in IFRS 17 such as the five qualitative characteristics in paragraph B91. It is important that the produced risk adjustments are understood and explainable, meet internal risk tolerance requirements, align with the underlying risk profile, and are carefully documented and supported by management. ■

The views reflected in this article are the views of the authors and do not necessarily reflect the views of Deloitte.

ENDNOTES

- 1 IFRS 17, Appendix B, paragraph B92
- 2 International Actuarial Association. Risk Adjustments for Insurance Contracts under IFRS 17. 2018. See more information at https://www.actuaries.org/IAA/Documents/Publications/News_Releases/2018/News_Release_Risk_Adjustment_Monograph_EN.pdf
- 3 Defined in IFRS 17, Appendix A



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Defining the Details: Intricacies and Evolution of PBR Disclosures

By Ben Slutsker, Rachel Hemphill, Kevin Piotrowski and Hugues Fontaine

As companies transition to the next phase of their principle-based reserve (PBR or VM-20) implementation, their focus shifts from modeling and assumption setting toward financial reporting. A key step of financial reporting is developing the PBR Actuarial Report (VM-31). In September 2017, The Financial Reporter published an article titled “Reporting and Disclosure Requirements under VM-31” that summarized these reporting requirements. This article builds on that by covering the evolution of the VM-31 requirements and discussing lessons learned from PBR Actuarial Reports submitted by companies that reported reserves under PBR at Dec. 31, 2017.

EVOLUTION OF VM-31

The first section of this article describes the 2018 updates, 2019 updates and potential future updates to VM-31—Figure 1 provides a condensed summary. In addition, this section includes considerations for handling changes to VM-20 and selecting which Life Actuarial Task Force (LATF) approved VM-31 version to follow for each reporting year.

2018 VM-31 Revisions

During the National Association of Insurance Commissioners (NAIC) PBR Pilot Project¹, regulators and companies found that the 2017 version of VM-31 included redundant sections that left both regulators and companies unsure where in the report to provide key information. However, regulators found that most PBR Pilot Project participants used very similar formats for the PBR Actuarial Report and that a standard format facilitated a more complete review. In response to the feedback from the PBR Pilot Project, LATF formed a VM-31 Drafting Group to address these concerns by revamping the structure of VM-31. The revisions to VM-31 for 2018 (referred to as Phase 1 and 2) included important changes that:

- (1) Minimized redundancies between the overview section and the main report by reducing the overview section to an executive summary, and

- (2) required standardization of the report layout, with the addition of section headers for uniformity.

2019 VM-31 Revisions

There were additional proposed changes identified during the PBR Pilot Project that were not adopted into the 2018 Valuation Manual due to time constraints. These became Phase 3 of the VM-31 changes, which are planned to be adopted in the 2019 Valuation Manual.² These revisions are not as significant as the 2018 Valuation Manual changes to VM-31. The most notable changes are clarifications of how to handle reports covering only VM-21 contracts (i.e., variable annuities) or VM-20 insurance policies that pass both exclusion tests. The mortality reporting section also includes some restructuring and clarification.

Which Version Should I Use?

In general, the applicable version of VM-31 for year-end reporting will be the Jan. 1 edition for that year. However, since the 2018 revisions to VM-31 included improvements from both the company and the regulator perspective, some regulators suggested that companies could use the 2018 format for 2017 year-end reporting. This approach has the additional advantage of keeping the formats consistent for reporting in 2017 and 2018. Regulators may find it acceptable for companies to reflect the 2019 Valuation Manual revisions for the 2018 PBR Actuarial Report, but companies should first consult with their domestic regulator.

VM-31 Planned Revisions

For variable annuities (VM-21), the Variable Annuities Issues Working Group has agreed to make substantial changes, including changes to the standard scenario, prescribed policyholder behavior assumptions, economic scenario generation, modeling of hedges and revenue-sharing income. Regulators and interested parties agreed that disclosures must be revised to reflect these changes, as well as generally refined to allow regulators to better assess the reasonableness of the more complex aspects of VM-21 modeling. Efforts to update the disclosures are ongoing. In addition, the lessons learned from revising VM-20 disclosures can be applied to VM-21 reporting requirements. Current reporting requirements are scattered throughout VM-21, including some redundancies and ambiguous sections. LATF has formed a VM-21 Reporting Drafting Group that will propose improvements to VM-21 reporting. Improvements are expected to include clarifications, consolidations, and additional structural updates.

Since VM-31 currently refers the reader to VM-21 for disclosure requirements on applicable business, any revisions to VM-21 may impact VM-31 and the PBR Actuarial Reports. Beyond this, there are currently no planned restructurings to VM-31. However, all regulators and interested parties may

Figure 1
Key Changes To VM-31 Reporting Requirements

Report element	2018 updates	2019 updates
New sections	Adds a requirement to summarize changes in reserve amounts in the executive summary	Adds requirements to disclose consistency between sub-reports, additional assumption considerations, Deterministic Reserve (DR) method (VM-20 4.A vs. 4.B), pre-reinsurance assumptions, interest bonuses, and DR allocations to product groups
Old section updates	Deletes or moves requirements related to assets, disclosures, and others from the overview to the main report, and re-labels overview as executive summary	1) Clarifies that descriptions of modeling systems are required for both assets and liabilities, and that non-medical/clinical published reports may support mortality adjustments 2) Adds non-guaranteed element (NGE) disclosure clarification for past practices and policies
Structure	1) Adds requirements for standard report format and section headers for each requirement 2) Consolidates reliances, signatures, certifications 3) Moves some asset and risk management requirements to the main body of the report	Moves the experience studies and industry table descriptions to earlier within the mortality subsection of the report
VM-21	Adds guidance note directing that for variable annuity contracts, after completing the first two sections of the executive summary, the reader may skip directly to Section 3.E, which directs them to VM-21 for variable annuity reporting requirements	Clarifies that the closing section of the executive summary must be completed for VM-21 business
Other	The executive summary of the VM-31 Report must now be submitted to the domestic commissioner each year; the executive summary and the entire PBR Actuarial Report must, upon request, be submitted to the commissioner of any state in which the company is licensed	Clarifies in the general requirements section that products passing exclusion tests must still have a PBR Actuarial Report prepared

submit amendment proposals for LATF to consider revisions to VM-31, in addition to other sections of the Valuation Manual. As PBR requirements for other products evolve, further changes to VM-31 may be needed.

VM-31 Considerations For Amendments To VM-20

The reporting requirements in VM-31 for life insurance policies are intended to document that the company has followed the valuation requirements of VM-20. Thus, amendments to VM-20 may impact how companies construct the VM-31 PBR Actuarial Report. Examples are:

- ULSG lapse rates—VM-20 Section 9.D.5 requires that *Lapse Experience Under Term-to-100 Insurance Policies* published by the Canadian Institute of Actuaries in October 2007 be used for ULSG policies with zero or minimal cash surrender value. In 2018, an amendment proposal was passed by LATF that will change the requirement to an updated, September

2015 study starting with year-end 2019 reporting. Thus, companies must monitor changes not only to VM-31 but also changes to VM-20 that affect valuation disclosures.

- Credibility aggregation—A VM-20 amendment proposed in 2018 provides more guidance around whether a company can determine credibility at an aggregate level across mortality segments. The proposal includes several references to allowing flexibility in aggregation if support is provided in the PBR Actuarial Report. While regulators have tried to keep valuation requirements in VM-20 and reporting requirements in VM-31, this is an ongoing process, and the dividing line is not always clear.
- Term shock lapse—The reader should carefully distinguish between a prescribed method and a prescribed safeguard. For example, VM-20 Section 9.D.6 states that, for the deterministic reserve, the company cannot reflect post-level term

profits. This does not state that a company must always use a 100 percent shock lapse, as the company must use a prudent estimate shock lapse assumption if expecting losses after the level period. Therefore, the company should support a 100 percent shock lapse assumption, when applied, based on materiality and an analysis of whether profits or losses are expected after the level period that is documented in the PBR Actuarial Report. Without noticing this nuance, the company may fail to provide appropriate support in its PBR Actuarial Report.

- Reinvestment strategy guardrail—The “alternative reinvestment strategy” of VM-20 section 7.E.1.g is not always required to be used; instead, the company should demonstrate in the VM-31 PBR Actuarial Report whether the company assumption is less conservative than the guardrail, and only use the guardrail if constraining.

PRACTICAL CONSIDERATIONS OF VM-31 REPORTING

The second section of this article provides practical insights on the reporting process of VM-31. In addition to providing tips for a company to create its VM-31 PBR Actuarial Report, this section also gives perspective on the characteristics of the 2017 reports submitted in 2018.

VM-31 Reporting Process

Creating the PBR Actuarial Report can be a daunting task for a company as the report is meant to capture all the details of the PBR valuation. However, if started early and the qualified actuary is able to leverage documentation from other areas of the company, this initiative becomes much more manageable. Below, we have laid out tips for a company to complete its PBR Actuarial Report in an accurately and timely manner:

1. Read the requirements of VM-31 before starting your PBR implementation, as there are downstream implementation requirements that will be much easier to address during the early stages of implementation (e.g., coding sensitivity tests or setting up a model for PBR safeguards)
2. Leverage as much as possible from other parts of the company. (See Table 1 for examples.)

Creating the PBR Actuarial Report can be a daunting task for a company as the report is meant to capture all the details of the PBR valuation.

Table 1
Examples Of Items That Can Be Leveraged From Other Sources

Source	Section(s) leveraged
Asset Adequacy Testing reports	Product descriptions and assumptions
AG43, AG48 and AG38 8D reports	Modeling systems and characteristics
Own risk and solvency assessment (ORSA) documentation	Company risk management
Investment policy statements	Reinvestment strategy

3. Create a VM-31 “shell” and then assign each section to a “section owner.” Many of these sections are mutually exclusive and will be handled by different areas of the company at various times of the calendar year.
4. Create a “mock report” using prior period data and target getting this through corporate governance before the rush of year-end reporting work.
5. Make use of a SharePoint site or other tools to prevent version control issues and to facilitate quicker review.

VM-31 Characteristics For 2017

Twenty-three companies moved at least one product to PBR in 2017. These companies sold over 278,000 PBR policies and held net VM-20 reserves just below \$300 million.³

The general structure of VM-31 PBR Actuarial Reports was often consistent across companies. As discussed above, many companies used the 2018 version of the VM-31 requirements rather than the 2017 version. However, the content of individual sections differed across reports, sometimes dramatically. Some companies provided extensive detail in the body of the report, others provided brief descriptions with references to appendices, and still others submitted brief reports with generic statements. This was seen in several sections, including assumptions related to mortality, policyholder behavior, assets, modeling and reinsurance. For example, when disclosing lapse rates, one company may have shown detailed actual/expected analyses, lapse rate tables and sensitivities, whereas another company may have included a more general description. Because of this variability in disclosure granularity, as well as differences in products covered and the application of exclusion tests, report lengths varied from 30 pages to hundreds of pages. Shorter reports may result in a longer follow-up dialogue with regulators, and longer reports often contain tables of information better suited for spreadsheet format. Companies are encouraged to discuss with their domestic regulator what format best facilitates review.

Additionally, some companies used the argument that a calculation element was “immaterial” to explain why no analysis was disclosed. This was more common with margin assumptions shown in a simplified manner with little or no additional information. For example, some companies used alternate data sources when data was not credible without adding margin to reflect the level of uncertainty. Regulators are likely to request either clear support that the item is immaterial or clear justification for the assumption and margin, including the level of additional margin when there is increased uncertainty.

In addition, sensitivity tests and analyses used to determine margins were not always clearly documented in the report. Companies may have been able to mitigate this lack of detail by adding more background in appendices. Yet some appendices were fairly brief and did not add significant detail. After the NAIC PBR Pilot Project, LATF issued a report⁴, which included major findings and observations including that “no single report was fully complete; however, some reports provided significantly more detail than other reports.” Regulatory review of the 2017 reports, including the focus of the Valuation Analysis Working Group (VAWG), will assist in establishing the level of disclosure required for a regulatory actuary to assess the reasonableness of a company’s PBR valuation.

CONCLUSION

Since the article “Reporting and Disclosure Requirements under VM-31” was published (*The Financial Reporter*, September 2017), the industry remains at various levels of preparedness; some companies are still establishing processes while other companies are now refining processes after their first Life PBR valuation. However, the industry as a whole is moving along the preparedness curve, with some leading the way toward well-prepared and well-formulated principle-based valuations. Because the Valuation Manual is a living document, the numerous changes to VM-20 and VM-31 reporting requirements and the addition of more business under PBR (new products, new legal entities) introduce challenges that companies and regulators are still addressing. It is recommended that companies be aware of impending changes to VM-20 and VM-31 and effectively document and communicate the analyses performed, as this will enhance the company PBR reporting process and facilitate communication with auditors and regulators. ■

The view and opinions expressed in this article are those of the authors, Benjamin Slutsker, Rachel Hemphill, Kevin Piotrowski and Hugues Fontaine, and do not necessarily reflect the official view of their employers.



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ENDNOTES

- 1 In 2015, the NAIC PBR Implementation (EX) Task Force voted to charge the PBR Review (EX) Working Group to work with the NAIC and state insurance departments on reviewing mock VM-31 reports provided by volunteer companies. This initiative was named the NAIC PBR Pilot Project.
- 2 Phase 3 VM-31 changes were adopted by LATF in April 2018 and NAIC (A) Committee in July 2018. They are currently pending Exec/Plenary Adoption as of the date this article.
- 3 2017 annual statements from individual companies, S&P Global Market Intelligence Platform, 4 April 2018.
- 4 http://naic.org/documents/cmte_ex_pbr_implementation_tf_related_company_pilot_project_report.doc

PBR Developments: What's Going on With the Valuation Manual?

By Leonard Mangini and Arnold Dicke

More than 40 amendment proposal forms (APFs) have been adopted by the NAIC's Life Actuarial Task Force (LATF) which would alter the 2018 edition of the Valuation Manual (VM). If ultimately adopted by the NAIC in plenary session these would impact 2019 valuations. Additional APFs may be adopted later in 2018 but would not take effect until 2020 valuations. This article covers some of the adopted APFs and one proposed APF that seem to the authors likely to be of interest to life insurance actuaries. The reader should consult the LATF website at http://www.naic.org/cmte_a_latf.htm after the Summer (August) Meeting of the NAIC.

MORTALITY GRADING

APF 2017-77 alters the grading of company mortality into industry mortality to make it a more continuous function of credibility.

In the 2018 edition of the VM, VM-20 Section 9.C.6.b.iii includes a look-up table with wide credibility bands to determine: a) the maximum number of years data can be considered sufficient, b) the maximum number of years to begin grading to industry experience after sufficient data no longer exists, and c) the maximum number of years in which mortality must grade to 100 percent industry experience from the duration where sufficient data no longer exists. APF 2017-77 introduces a new look-up table, mandatory for valuations performed on or after Jan. 1, 2020 and optional for 2019 valuations, with narrower credibility bands.

This is a significant change since it could impact a company's valuation software and its product pricing. The current wide buckets and sharp mortality grading cliffs have been smoothed out, so grading will likely change more frequently. Systems will need more frequent updating, but there will be fewer spikes and a company will not have to wait as long in order to get credit for improved credibility. Mandatory adoption of the new table

was delayed until 2020 in recognition of the potential impact on valuation, pricing and the associated processes.

DISCRETION TO REDUCE EXPLICIT MARGINS

APF 2017-85 was adopted to make clear that the implicit margin referred to in VM-31, Section 3.C.11.c.i (i.e., ignoring mortality improvement past the valuation date), which can be reflected in estimating the impact of margins in the PBR Actuarial Report, cannot be taken into account in determining assumptions for use in calculating the VM-20 modeled reserves. The change also clarifies that prescribed margins for one risk factor cannot be taken into account when setting the margin for another risk factor, even if the prescribed margin is excessive.

DEFINITION OF ACTUARIAL OPINION

APF 2018-36 replaces the definition of "actuarial opinion" with a definition consistent with that in the Academy's qualification standard and thus requires compliance only with the General Qualification Standard, and not with the Special Qualification Standard that applies to an actuary signing the reserve opinion in the annual statement. Since the term "actuarial opinion" as used in VM-30 does mean the appointed actuary's opinion on reserve adequacy, the APF introduces the following language in VM-30 Scope Section 1.A: "For purposes of these VM-30 requirements, the words "actuarial opinion" means the opinion of an appointed actuary regarding the adequacy of reserves and related actuarial items pursuant to these AOM requirements."

CLARIFYING THE DATE OF THE 2015 VBT TABLE FOR MORTALITY IMPROVEMENT

APF 2018-10 clarifies that the date of the 2015 VBT table is July 1, 2015 for purposes of incorporating permissible historical mortality improvement through the valuation date.

CLARIFYING LANGUAGE REGARDING ULSG LAPSE RATES

APF 2018-30 clarifies that the secondary guarantee fund values (i.e., shadow account values) used in the lapse rate formulas of VM-20 Section 3.C.3.c.i that determine lapse rates applicable to the net premium reserve (NPR) component (applicable to the calculation of the NPR for ULSG policies during the secondary guarantee period) are the fund values on the valuation date and don't vary by duration.

GUARANTEED ISSUE CONSIDERATIONS

APF 2018-01 was adopted to introduce a more detailed and complete definition of guaranteed issue (GI) business in Section VM-01. It reiterates that inclusion of any of the following disqualifies a policy from being classified as GI: an "actively-at-work" criteria; employer groups; acceptance based on any health questions or criteria; waiving selection criteria based

on participation levels for worksite-marketed products; COLI or BOLI business; credit life and pre-need insurance; juvenile business (issued to insureds under aged 15); or policies issued as a result of exercising a guaranteed insurability option.

This APF also stipulates that for minimum non-forfeiture requirements (and thus for reserve requirements) for GI issued before Jan. 1, 2020, the company must use the ultimate 2001 CSO table unless the company elects to use the non-preferred 2017 CSO for policies issued between Jan. 1, 2017 and Dec. 31, 2019. However, after Dec. 31, 2019 the new 2017 Commissioner's Standard Guaranteed Issue (2017 CSGI) tables in VM-M must be used. The company may elect to early adopt the 2017 CSGI for 2019 issues but this is not required, effectively providing companies with a grace period to reprice GI products and set up their systems and other processes and controls in order to handle this new CSGI table.

In addition, VM-M defines the 2017 CSGI as the 2017 GI Basic Ultimate table with a 75 percent loading. Some commenters noted that a 75 percent load might cause some pricing cells to face challenges complying with Section 7702.

REVISION OF VM-31

APF 2017-94 substantially restructures VM-31, primarily to rationalize the organization of the PBR Actuarial Report, but also to incorporate certain substantive changes in required documentation. The general requirements have not changed. For example, the report must still be prepared under the direction of one or more qualified actuaries assigned by the company under VM-G. Additionally, the criteria triggering whether a report must be submitted, the deadlines for its submission, and who may request the executive summary or full report are all the same. However, a paragraph was added to emphasize that a company that does not calculate a deterministic or stochastic reserve due to passing an exclusion test must still file a PBR Actuarial Report covering all relevant documentation, such as for the assumptions used in the exclusion test. It's anticipated that non-domiciliary jurisdictions will request to review the full report from companies licensed in their state.

The executive summary now covers both life insurance and variable annuities in a combined manner, so that materiality, for example, is defined similarly for both product lines. A new section on consistency between sub-reports, added by the APF, would require disclosure of material differences in methods, assumptions, or risk management practices between groups of policies or contracts (which would include differences between variable annuities and life insurance) unless these differences can be explained by variation in product features. There has been push-back on this requirement from the variable annuity community.

Section 3.C.1.c now requires that the life report include a catch-all documentation clause with "description of any considerations helpful in or necessary to understanding the rationale behind the development of assumptions and margins, even if such considerations are not explicitly mentioned in the Valuation Manual."

Section 3.C.2.a now requires that if more than one modeling system is used to develop cash flows, the report must describe how the modeling systems interact and Section 3.C.2.h requires that the deterministic reserve method applied to each model segment (the gross premium valuation method or the direct iteration method) be identified.

For non-guaranteed elements, the APF clarifies that a discussion of the impact of interest rates or other market factors on past and projected premium scales, cost of insurance scales and other non-guaranteed elements is now required, as is a description of any interest bonus included in the model.

For deterministic reserves that are allocated per VM-20 Section 4.C, details of the allocation must now be reported. Also, material risk offsets within a product group when calculating the stochastic reserve must be disclosed.

The other parts of Section 3 have essentially been re-ordered and have slightly different titles or numbering of their sub-sections but require similar documentation as the 2018 VM, although in some cases, the requirements have been more fully described, so the reader may wish to carefully review Section 3 in detail.

REVISION OF VM-50 AND VM-51

APFs 2017-81 and 2017-19 set forth substantial edits of VM-50 and VM-51 which are too detailed to describe here. Many of the changes concern the "experience reporting agent," the exact form that reports must take and legal concerns, such as ownership and confidentiality of data. A key technical change is that VM-50 now explicitly prohibits coding in any data other than what's known; that is, incomplete records should be marked as such and not filled in with placeholders.

AGGREGATION OF MORTALITY SEGMENTS FOR CREDIBILITY PURPOSES

APF 2018-17, if adopted, would clarify the conditions under which mortality segments may be aggregated in determining credibility and the sufficient data period. This APF includes new required reporting in VM-31 Sections 3.C.3.b and 3.C.3.m (the numbering reflects the changes introduced by the adopted APF 2017-94 discussed above).

If APF 2018-17 is adopted, companies would be able, with proper documentation and justification in the PBR Actuarial Report, to aggregate the mortality experience of different types of life insurance products (such as term, whole life, universal life) and different underwriting and risk classes within these products for purposes of determining credibility, provided that the underlying underwriting processes, including any impact on risk selection attributable to differences in distribution systems or target markets, are “similar.” However, the intent is not to allow broad aggregation of disparate underwriting methods such as simplified issue and full underwriting. The APF clarifies that for assumed policies, “underwriting processes” are the processes by which reinsurers determine which risks to accept, and does not require looking through the treaty into their client’s underwriting processes.

Under the APF, mortality segments may be aggregated if (1) they are subject to “similar underwriting” and (2) the aggregate mortality does, or potentially could, have an impact on the segment level mortality. Thus, the company cannot just determine mortality for segments independently and use the aggregated mortality only to determine the credibility. A company would have to demonstrate that a new underwriting process is expected to produce similar mortality to an existing underwriting process, or that any difference in mortality can be justified by external or internal studies to allow them to be considered similar for credibility purposes. Finally, the proposal requires applying a margin for uncertainty to expected mortality reflecting the degree of uncertainty inherent in the “innovative underwriting process.”

Thus, if the APF is adopted, introducing new underwriting processes, such as accelerated underwriting, would not automatically cause the mortality segments to be “disaggregated,” with low or even zero credibility (and correspondingly large prescribed mortality margins).

SUMMARY

As noted above, there are several dozen other APFs that have been adopted and due to space limitations we have to leave it to you to read and digest these for yourself. If you want to be more engaged with monitoring changes in the VM in real-time we suggest registering for and dialing-in as an interested party to regular LATF conference calls. If you’re interested in actively shaping the direction of future changes to the VM we encourage you to become Academy of Actuaries volunteers. ■



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Financial Reporting Research Update

By David Armstrong and Ronora Stryker

Research is a primary mission of the Financial Reporting Section and a significant use of our section dues revenue. Here is an update, as of June 2018, on projects in process and those recently completed.

CURRENTLY IN PROCESS ...

The 2015 research report on Earnings Emergence Under Multiple Financial Reporting Bases is being expanded to examine an additional product and upcoming accounting changes. The original report looked at deferred annuities and term life insurance under US SAP, US GAAP, IFRS, CALM, and market-consistent balance sheet approaches. The expanded report will add universal life and make updates for principle-based U.S. statutory reserves, target changes to US GAAP, and the new IFRS for insurance products. The Financial Reporting Section is co-sponsoring this initiative with the Reinsurance Section. Work is in the late project stage.

“Simplified Methods for Principle-based Reserve Calculations”—this project is in the late stages, and the Project Oversight Group expects to review a draft report later this summer.

“The Application of Credibility Theory in the Canadian Life Insurance Industry”—this survey of credibility practices of Canadian life insurers will compare and contrast credibility methods used by the companies. The Financial Reporting Section contributed to the funding for this project. Work is in the middle project stage.

“The Use of Predictive Analytics in the Canadian Life Insurance Industry”—this project will survey Canadian life insurers on the use of predictive analytics in practice. The Financial Reporting Section contributed to the funding for this project. Work is in the middle project stage.

COMPLETED IN 2018 ...

“Survey of Waiver of Premium/Monthly Deduction Rider Assumptions and Experience”—this report summarizes the practices and

assumptions used by different companies for waiver of premium and waiver of monthly deduction benefits. Survey topics included mortality, valuation, and pricing, and may be valuable to companies as they prepare for a principle-based framework. The results were published in March. <https://www.soa.org/research-reports/2018/survey-waiver-premium-monthly-deduction-rider/>

COMPLETED IN 2017 ...

“PBA Change Attribution Analysis”—this project studies the drivers of change in principle-based reserves. This project was published in August. An SOA webcast was also done at that time and the report was summarized in the December 2017 issue of this newsletter. <https://www.soa.org/research-reports/2017/2017-understand-vm-20-results/>

“Modern Deterministic Scenarios”—a review of possible deterministic scenario sets which could be useful to company management, regulators and rating agencies under PBA. This project was published in September and the report was summarized in the December 2017 issue of this newsletter. <https://www.soa.org/research-reports/2017/2017-modern-deterministic-scenarios/>

“Actuarial Model Governance: A Survey of Actuarial Modeling Governance and the Industry Evolution Report”—this is an update to the original 2012 report co-sponsored by the Financial Reporting and Modeling Sections. <https://www.soa.org/Research-Reports/2017/2017-01-actuarial-model-governance/>

REQUEST FOR RESEARCH PROPOSALS

Do you have an idea for a research topic you would like to see the Financial Reporting Section consider for funding? If so, we want to hear from you! For more information, please contact Dave Armstrong or Ronora Stryker. ■



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