SCORviews

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Keeping up with Regulatory Change

CSO 2017 Mortality Tables and more…

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Look at any industry meeting agenda or glance through an insurance news feed and you can feel the seismic shifts going on in life insurance regulation. Fundamental change is underway, placing huge demands on company resources. For example, right on the heels of AG 48 implementation comes the three-year implementation period for principles-based reserving and CSO 2017 mortality tables. At SCOR, we are following these changes closely, assessing the impact on direct and reinsured business and what we can do to support our clients.

In this issue of *SCORviews*, Mary Bahna-Nolan, head of Life R&D for SCOR, discusses the challenges of developing and implementing CSO 2017 in the midst of broader regulatory change. Mary co-chaired the joint task force responsible for overseeing CSO 2017 development. She has been involved in the development of numerous mortality tables during her career, and she explains why "it's different this time."

Also in this issue, Research Actuary David Wylde provides a close-up view of mortality experience related to motor vehicle records. His analysis illustrates how the severity of the motor vehicle record impacts mortality experience.

Katherine Warner, Experience Analysis Actuary, reports the findings of two recent cause of death mortality studies that SCOR conducted. The first examines cause of death trends, segmented by male and female experience as well as natural and non-natural causes of death. The second study compares mortality experience of fully underwritten against traditional simplified issue (questionnaire only, with no third-party data). While we expect significant differences in mortality experience, it's interesting to see how cause of death compares based on underwriting approach.

As the leading life reinsurer in the U.S., SCOR recognizes our duty to advance the understanding and management of mortality risk. Led by Mary Bahna-Nolan, our R&D team of actuaries, underwriters, statisticians and data analysts has a full slate of projects in progress. These include mortality experience studies based on our extensive database of reinsured lives.

Other major initiatives focus on accelerated underwriting, including the impact of removing exams and fluids from the underwriting process and effectiveness of new data sources. We are sharing our analyses with individual clients and will be covering outcomes of these initiatives in upcoming issues of *SCORviews*.

Inside this Issue

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SCOR Global Life

This Time, It's Different
Are You Ready for CSO 2017?

Executive Summary

The market is experiencing significant disruption, and companies need to understand what the adoption of the CSO mortality tables and other regulatory changes means. Now is the time for companies to look holistically at the environment. This is not just another mortality table update.

An Interview with
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Editor's Note: *Mary Bahna-Nolan, Executive Vice President and Head of SCOR's Research & Development team, co-chaired the joint task force responsible for overseeing the 2017 CSO development. Mary was also actively involved in the development of the tables themselves. Mary is a frequent speaker at industry meetings, author of several papers and articles and serves on committees of the ACLI, AAA and SOA. You can see her detailed article on CSO 2017 in the next issue of the SOA section newsletter,* Product Matters.

You've been involved in the development of many mortality tables during your career. What made CSO 2017 different?

Mortality tables get out of sync over time as underlying experience changes. What was different with this CSO effort was the tremendous amount of change since the last tables were developed in 2001.

Those tables were based on industry experience from 1990-1995. Since then a remarkable shift in underwriting occurred as the industry moved to preferred and multiple preferred risk classes. Also since that time, there has been a shift in mix of business in the industry, moving away from permanent products to term plans. Over the past 20 years, we have also seen a sizeable increase in the average face amounts and more business issued at older ages. Lastly, early estimates of mortality improvement at older ages were too low. The resulting impact of all these changes are reflected in a change in the slope of the table.

But more importantly, we are experiencing fundamental changes in industry regulation: principles-based reserving (PBR), Actuarial Guidelines 38 and 48, to name a few. The 2017 CSO is different because companies have all these moving parts to deal with. There has been industry and regulator recognition for some time that new CSO tables were needed to better reflect the improved mortality from what was in the 2001 CSO. As far back as 2008, the group looked at the need for new CSO tables, but because principles-based reserving was coming, the industry and regulators decided to wait until PBR to update the CSO tables.

How has the data used to develop tables changed?

There was significant increase in the number of contributing companies and claims and policy exposures underlying the 2017 CSO over what was in the 2001 CSO. The 2017 CSO contained data from 51 contributing companies versus 21 in the 2001 CSO.

In addition to the overall increase in exposures, there was significant increase in the exposures for smoker/non-smoker distinct issues, business issued under a preferred risk program and female risks than what was underlying the 2001 table.

As data submissions move from a voluntary basis

Figure 1 - Significantly more data underlies 2017 CSO

	1980 CSO	2001 CSO	2017 CSO
# companies experience included	19	21	51
# Companies Covered	10	17	36
Amount of data in underlying study			
Exposure by Amount	$0.77 trillion	$5.7 trillion	$30.7 trillion
Exposure by Count	Not provided in report	175 million	266 million
Actual # Claims	Not provided in report	1.25 million	2.5 million

to mandatory with the adoption of the Valuation Manual, we expect future data submissions will be even more complete and allow for further mortality analytics for future CSO tables.

Once you have the data, how do all the involved parties work together to develop new tables?

Throughout development of any new tables there is discussion and debate. Most of the discussion centers on the level of prudence or how much margin to be built in as well as the structure of the margin. Regulators at the NAIC set the level and give direction to the industry committee. Then debate begins: what percent is too high, what is too low and a lot of discussion around the slope of the mortality table and resulting impact on reserves and non-forfeiture values across various product types and age groups.

What will be most impacted by the new tables?

The impact of the new tables is company- and product-dependent. Not all companies will act on the new tables Day 1. The effect for each company depends on the path it chooses to take – when to implement the 2017 CSO, how many products to apply the new tables to, etc. The new tables can significantly lower the statutory reserves, but if a captive solution is already in place, the company may may not want to unwind that arrangement.

The 2017 CSO has a bigger reserve impact for certain ages, gender, risk classes, but the impact on each company depends on the company's product set, business mix, older vs. younger issue ages and so on. Because the change is policy form specific, companies may implement the new tables on some products and not others.

The biggest impact is on term reserves, but even the magnitude of the change depends on business mix. If a company has a lot of super preferred whole life business with 45-year-old males, the company may not realize a big change in reserve requirements under the 2017 CSO. If a company's term business has a large residual standard class and a lot of issues at younger ages, implementing the 2017 CSO 2017 may lower reserves considerably.

Who will be most impacted by implementation of the 2017 CSO?

Implementation of the 2017 CSO can create tremendous resource strain for a company, especially in light of other regulatory changes. The product development team, tax team, treasury, valuation, IT, financial reporting, compliance, contracting and others will be involved. For example, all products must be refiled with implementation of the 2017 CSO tables and may require new illustrations.

Companies need to look at implementation holistically as so many areas are impacted. It's not a low-cost effort to reprice and refile all products. Also, new product designs could come about due to PBR, so companies must evaluate how much to invest in refiling products due to the 2017 CSO now when new product designs may be on the horizon. The market disruption caused by the combination of the 2017 CSO and PBR could be significant. Companies will need to evaluate their capacity to navigate the disruption and competitive landscape throughout the implementation period against any reserve and capital considerations.

We expect to see an increase in reinsurance activity as well. A lot of new product pricing and re-pricing stalled with the introduction of AG48 and in anticipation of new mortality tables and pending changes to reserve requirements.

What is the most important consideration for companies preparing for CSO 2017 implementation?

Unlike the implementation of prior CSO tables, the timing of the 2017 CSO is tied to massive fundamental changes within the industry. Companies just finished with AG48. Quite a few companies – both large and small – are just now starting to focus on both the 2017 CSO tables and PBR and the various decision points around adoption/implementation of each. While some companies are testing the CSO tables, others simply do not have the resources right now to work on CSO or may just be asking, "What is this?"

It is very difficult to disassociate the new tables with other regulatory changes underway. The benefit is that with more updated reserving tables - all things being equal - reserves will go down, capital requirements or the cost to finance redundancy in reserves will be lower.

While companies may delay implementing both the 2017 CSO and PBR for up to three years, new GAAP rules may also go into effect in or shortly after 2020, so there will continue to be a lot of competition for resources. Companies do not want to be implementing GAAP, PBR and the 2017 CSO all at the same time. The biggest risk is underestimating the resources needed to implement all the changes, in underestimating the disruption likely to take place as these fundamental changes occur.∞

MV Records & All-Cause Mortality
An Analysis for Underwriters

Executive Summary

To maintain his expertise as a research actuary, David Wylde must stay abreast of industry research which may impact pricing assumptions and underwriting decisions. His analysis of all-cause mortality experience relating to motor vehicle records focuses on the correlation between MVR severity and mortality.

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Part of my job as a research actuary is to review insurance industry papers that may have an impact on current pricing assumptions or underwriting decisions. One such paper examined all-cause mortality experience relating to motor vehicle records.[1] This article explains my review of the paper and conversion of its information into practical knowledge for the line underwriter.

Reviewing the Paper

My first order of business was to review the background information and data sources to assure that the results would be appropriate for my purposes. The experience study had used exposures from 2007 through 2010 and contained approximately 73,000 deaths. The lives studied were from the general population (i.e., not necessarily "insured" lives), but this is not unusual for much of the mortality research I encounter.

The paper presented results in terms of actual-to-expected ratios with a recent U.S. Population Life Table as the expected basis. More importantly, however, the paper translated these AE ratios into relative mortalities for the various population segments that were analyzed. Thus, I could see how relative mortality experience differed by MVR severity and also in relation to attained age and gender.

For example, relative mortality for those lives with MVRs showing major violations was about 170% of all lives combined, compared to about 95% for those with clean records or only minor violations. The 170% was then further detailed to show males with about 160% relative mortality and females with about 200%. The paper also showed a high correlation between the number of violations (regardless of severity) and increasing mortality. However, for purposes of the article, I restricted analysis to major violations only.

Extracting Relevant Mortality Data

Having reviewed the paper's results in detail, my next task was to extract the relevant mortality experience and convert this into a practical guide for the line underwriter. Figure 1 shows the information from the paper for those lives with MVRs showing major violations. In underwriting terminology, relative mortalities can be thought of as permanent table ratings, where each table represents 25% additional mortality over and above the base mortality for a standard life. For example,150% relative mortality represents two tables of additional mortality (100% base + 2 times 25% additional = 150%).

The paper provided only combined male/female mortality information by attained age. I used the overall male/female mortality relationship to calculate gender specific figures by attained age.

Converting the Information

There was a minor problem with the way the mortality results were presented in the paper. Currently, some underwriters in the industry prefer not to view mortality arising from insureds with major motor vehicle violations as a percentage increase, which is what a table rating implies. Instead, they impose

Figure 1 - Relative Mortalities by Gender

Age	Male	Table	Female	Table
25	151%	2.0	188%	3.5
35	151%	2.0	188%	3.5
45	165%	2.6	206%	4.2
55	174%	3.0	218%	4.7
65	160%	2.4	200%	4.0
75	141%	1.6	176%	3.1
85	132%	1.3	165%	2.6

Figure 2 - Converting Table Ratings to Flat Extras

Gender (M/F):	M
Smoke (N/S):	N
Mortality Pct:	100%
Table:	0.00
Flat Extra:	$0.38
FE Period:	99
Lapse Rate:	0.06
Interest:	6.00%
Issue Age:	25
Term Horizon:	99

Present Value of BOY Claims Q(x)
$10.00

Attn Age	1000* Q(X)	Flat Extra	Lapse W(X)	Adjusted Mortality	Beg Yr Lives	Deaths Per 1000	PV BOY Claims
25	0.41	0.38	0.06	0.76890	1.00000	0.7689	0.7465
26	0.38	0.38	0.06	0.73980	0.93923	0.6948	0.6746
27	0.38	0.38	0.06	0.73980	0.88218	0.6526	0.6336
28	0.40	0.38	0.06	0.75920	0.82860	0.6291	0.6108
29	0.42	0.38	0.06	0.77860	0.77825	0.6060	0.5883
30	0.43	0.38	0.06	0.78830	0.73095	0.5762	0.5594
31	0.44	0.38	0.06	0.79800	0.68652	0.5478	0.5319
32	0.45	0.38	0.06	0.80770	0.64478	0.5208	0.5056
33	0.48	0.38	0.06	0.83680	0.60557	0.5067	0.4920
34	0.55	0.38	0.06	0.90470	0.56873	0.5145	0.4995

an additional permanent flat extra premium. As a consequence, the extra mortality is "front-loaded" in that it becomes a smaller and smaller percentage of total mortality as the insured ages.

To convert the attained age table ratings into permanent flat extras, I used a spreadsheet I created many years ago. The spreadsheet takes the present value of future mortality based upon the table rating and calculates an equivalent flat extra mortality. Figure 2 shows sample output from the spreadsheet. In this case, I had input Table 2 for a male age 25 and the spreadsheet calculated an equivalent permanent flat extra premium of $0.38 per 1000 of insurance.

The paper had provided a similar conversion example using the 2008 VBT as base mortality with a 6% lapse rate and a 6% discount rate. I followed suit with these assumptions to convert Table 1 figures into flat extras.

Final Results

Even though the study's mortality results differed by gender, underwriters do not typically take gender into consideration when determining flat extras for individuals showing MVRs with major violations. Thus, although I calculated separate flat extras for males and females, I combined the results when I presented my findings to the underwriters, using a gender distribution provided in the paper. Figure 3 expands the table rated results to show unisex flat extras by attained age, rounded to the nearest ten cents.

The last column clearly shows how very differently table ratings and flat extras express the occurrence of mortality. While the table ratings are fairly flat by attained age for both genders, the underlying mortality rates increase very rapidly by attained age and a much higher flat extra is needed to create an equivalent flat mortality load.

Being able to search for and review the innumerable industry papers that are published each year is a vital part of a research actuary's expertise. Analyzing sometimes ambiguous or anomalous results to extract appropriate nuggets of information and convert them into practical working knowledge can be as much of an art as a skill.

Figure 3 - Final Table Rated and Flat Extra Results

Age	M+F	Male	Table	Perm FE	Female	Table	Perm FE	M/F Avg Perm FE Rounded
25	160%	151%	2.0	$0.38	188%	3.5	$0.42	$0.40
35	160%	151%	2.0	$0.60	188%	3.5	$0.80	$0.70
45	175%	165%	2.6	$1.59	206%	4.2	$1.95	$1.70
55	185%	174%	3.0	$3.79	218%	4.7	$4.31	$3.90
65	170%	160%	2.4	$6.79	200%	4.0	$8.20	$7.20
75	150%	141%	1.6	$10.53	176%	3.1	$15.02	$11.90
85	140%	132%	1.3	$24.49	165%	2.6	$36.54	$28.10

References

[1] Rushing, Scott and Rozar, Tim. "An Analysis of Motor Vehicle Records and All-Cause Mortality." RGA Reinsurance Company and LexisNexis (2012).

Observations on Mortality Trends
Cause of Death & Underwriting Approach

Executive Summary

As the leading life reinsurer in the U.S., SCOR conducts mortality experience studies to advance understanding and management of biometric risks. Experience Analysis Actuary Katherine Warner shares the results of two such studies, a cause of death study and a comparison of mortality by underwriting approach.

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At a recent industry meeting, SCOR presented findings from two mortality experience studies. One study considered trends in cause of death (COD) and the other compared mortality experience between fully underwritten and "traditional" simplified issue business. This article recaps the findings.

Cause of Death Reliability

No conversation on COD is complete without a disclaimer - COD must be taken with a grain of salt (see "The Death Certificate Challenge" sidebar). The complexity of humans makes it difficult to capture the true cause of death. When should we capture the most direct problem and when is the underlying cause more meaningful? A person may have a pulmonary embolism listed as the immediate COD on their death certificate, but perhaps the fact that the individual was admitted to the hospital with advanced lung cancer is more valuable in understanding our risks.

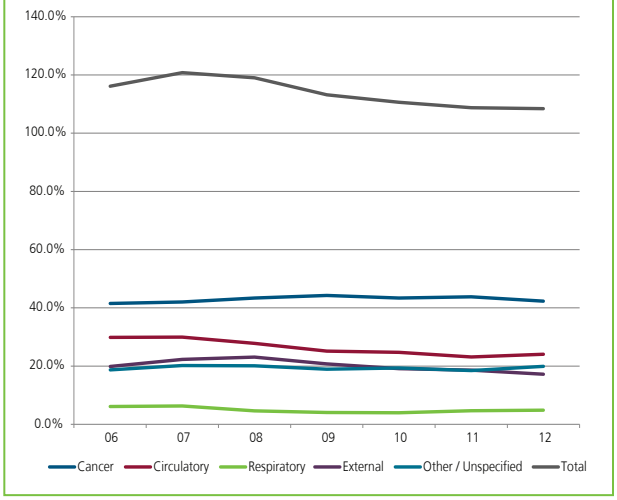
COD reliability varies with age and cause. Younger people and non-natural causes of death may receive further investigation or be more likely to have an autopsy – both good ways to capture an accurate COD.

Cause of Death Trends

The study covers claims between 2006 and 2012 with actual to expected ratios (A/E) based on the 2015 VBT. We excluded claims occurring within the first two years of issue to avoid skew from the contestability period.

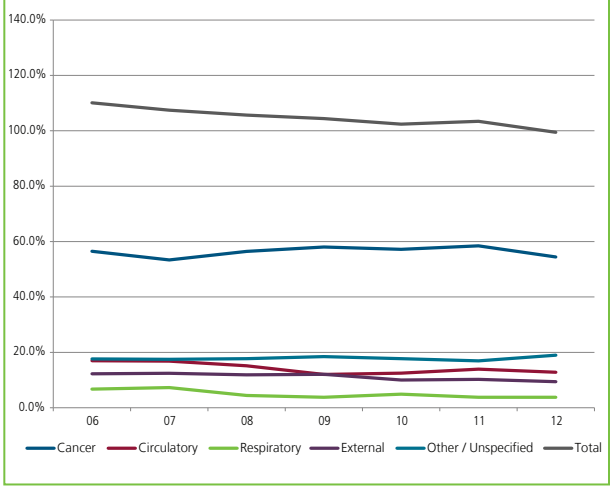
The results over the observed period indicate a decrease in all-cause mortality of 1.3% annually for both males and females (Figures 1 and 2). For males, circulatory and external CODs decreased, while cancer and respiratory impairment-related deaths remained more or less flat.

Figure 1 - Mortality Trends for Males by Calendar Year (Att Age 18-79)



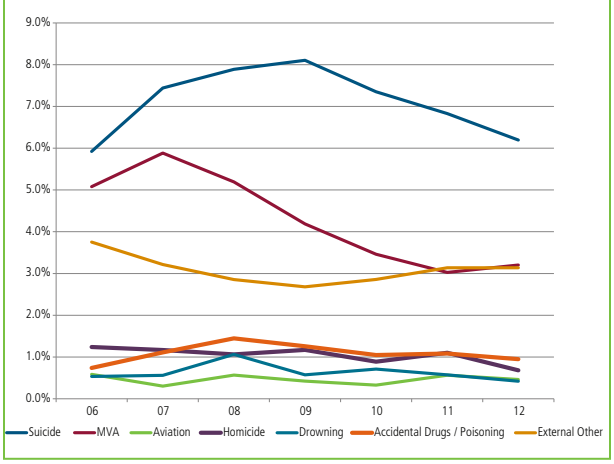
Circulatory and external CODs decreased, while cancer and respiratory impairment-related deaths remained more or less flat. While improving, A/E remains above 100% VBT.

Figure 2 - Mortality Trends for Females by Calendar Year (Att Age 18-79)



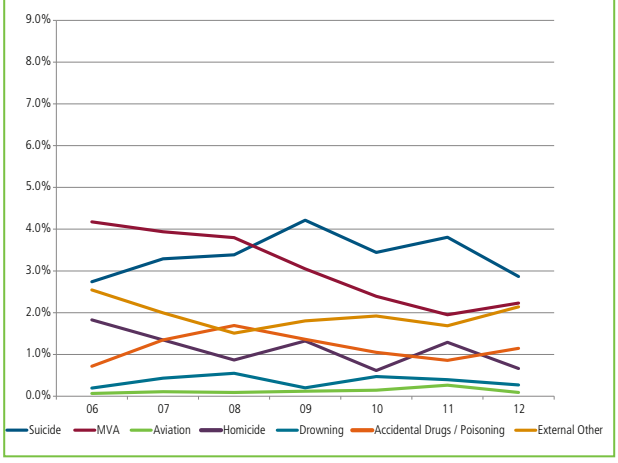
2006-2012 indicate a decrease in A/E related to cancer, circulatory, respiratory and external factors. "Other/Unspecified" increased slightly while Total A/E improved to just under 100% by 2012.

Figure 3 – Non-Natural COD A/E for Males by Calendar Year (Att Age 18-79)



A/E for vehicle accidents decreased sharply for males 2006-2012. Death from drugs or poisoning increased slightly, while A/Es for other causes remained relatively flat.

Figure 4 – Non-Natural COD A/E for Females by Calendar Year (Att Age 18-79)



A/Es for females in non-natural COD are much lower than the ratios for males in most categories. There was a noticeable decrease in MVA and homicide A/E for females 2006-2012.

CODs not related to natural causes among males varied over the timeframe. Motor vehicle accidents dropped significantly over the observed period. However, death from drug overdose or poisoning increased slightly. Suicide deaths increased from 2007 to 2009 but have since returned to their lower 2006 levels (Figure 3).

For females, non-natural CODs decreased most markedly in motor vehicle accidents, though this improvement deteriorated in the most recent years (Figure 4). Similarly, deaths caused by drugs or poisoning and "other" increased towards the end of the observed period.

Fully Underwritten vs. "Traditional" Simplified Issue

As carriers consider options in changing underwriting requirements, it is worth reviewing how mortality experience varies under fully underwritten and "traditional" simplified issue (questionnaire only, no e-data) business.

We considered claims experience on males who underwent full underwriting under four-class non-tobacco products (Figure 5). As expected, mortality worsens in line with the insured's risk class. In this example, the A/E for the worst class ranges from about 135%-145% of 2015 VBT.

To compare fully underwritten to simplified issue, we isolated males age 18-49 from both blocks. (Figure 6). All groups of business benefit from the contestable period. However, beginning in duration 3, the A/E for simplified issue policies increases significantly compared to fully underwritten groups.

Post-Contestable Causes of Death

Immediately following the contestable period, external factors (accidents, suicide, etc.) drive up mortality, especially in simplified issue business (Figure 7).

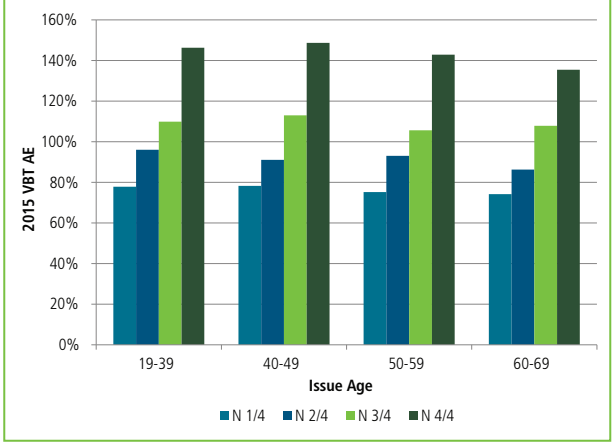
In later durations (6-10), simplified underwriting wears off more quickly and individual medical CODs begin to overtake external causes. COD patterns in fully underwritten business remain relatively stable. Full underwriting provided much more protective value across all non-external causes (Figure 8).

For more information on mortality reviews or other mortality-related R&D initiatives, please contact me at kwarner@scor.com or 913.901.4676.

The Death Certificate Challenge

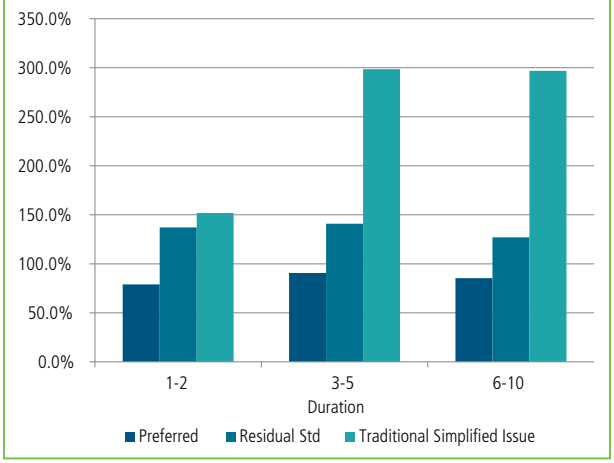
Life insurers are interested in both the timing and nature of death. Our primary source for such information is official death certificates. Historically, death certificates have been inconsistent, inaccurate or both in defining both the immediate cause of death and the method of death (i.e., the underlying factors that led to death). Recently death certificates have improved in quality, thanks in part to more uniform reporting standards. While autopsies are the best way to capture accurate cause of death very few are being performed today. The rate has declined from an estimated 40-60% prior to the 1970s to around 5% in 2014. The relative credibility of death certificates poses an ongoing challenge as carriers seek to streamline underwriting, without sacrificing pricing competitiveness and profitability.

Figure 5 – Fully Underwritten Risk Stratification: Males, Non-Tobacco



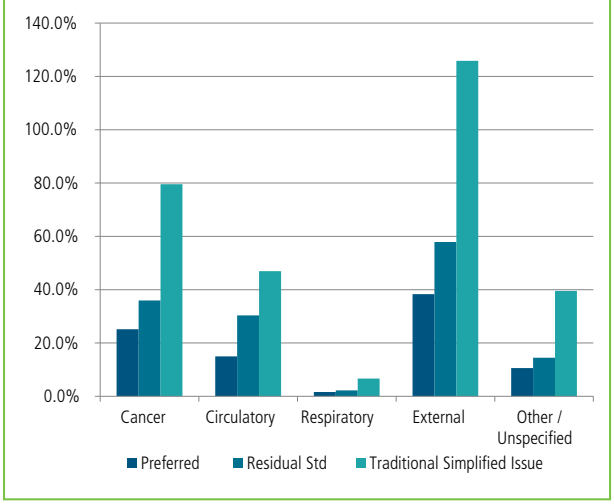
Claims experience as compared to the 2015 VBT follows the pattern one would expect, with the best classes demonstrating the most favorable mortality experience.

Figure 6 – Fully Underwritten Risk Stratification: Males, Non-Tobacco



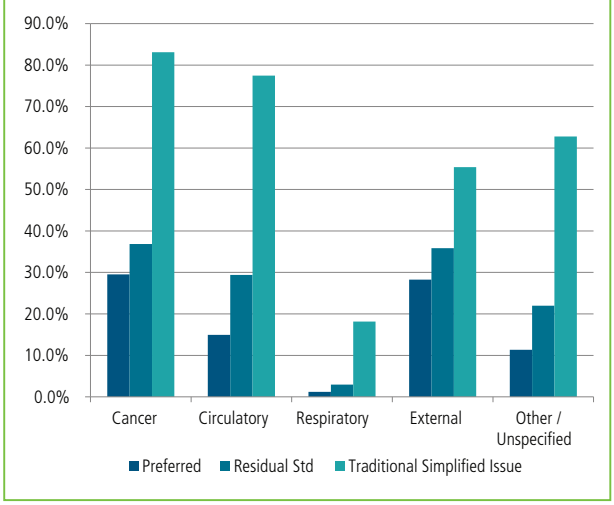
Following the contestable period (2 years), claims increase for all groups, but most significantly among those who underwent simplified underwriting.

Figure 7 – Fully Underwritten Risk Stratification: Males, Non-Tobacco



COD A/E for traditional simplified issued policies is higher than corresponding values for fully underwritten policies. This is more significant in cases with COD due to cancer or external factors.

Figure 8 – Fully Underwritten Risk Stratification: Males, Non-Tobacco



A/Es by duration 6-10 are all under 100%, though experience from traditional simplified issue policies remains quite adverse.

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