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Product Matters!

SOCIETY OF ACTUARIES

PRODUCT DEVELOPMENT SECTION

Term Conversions: Pricing and Reserves

By Hezhong (Mark) Ma
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Product Matters!

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Chairperson's Corner

By Kelly Rabin

SPRING FORWARD INTO PBR

I spend a lot of time thinking about PBR lately; to the dismay of my Facebook friends, I don't usually mean Professional Bull Riders or Pabst Blue Ribbon. It's hard to avoid principles-based reserves these days, with the effective date of the new valuation manual being Jan. 1, 2017. I have been proud to serve on the Project Oversight Group for the SOA-sponsored research study *Impact of VM-20 on Life Insurance Product Development*, sponsored by the Product Development, Reinsurance, and Small Company sections. The industry has been talking about how to compute principles-based reserves for several years, but only recently have actuaries turned their attention to how to price products under this regime. Our hope is that this research will highlight key considerations you should be thinking about as you price and design your products under a PBR framework, in addition to providing indicative profitability impacts for hypothetical products. Caveat emptor, as the specific product design can have a big impact on the level of reserves needed! The report from the first phase of this project can be found here: *https://www.soa.org/Research/Research-Projects/Life-Insurance/2016-impact-of-vm20-product-development.aspx*.

As part of preparing for PBR, I think we will see a shift in how companies structure their product development processes. Gone are the days of pulling in the valuation and reinsurance teams for a rubber stamp at the end of the pricing process. This shift had started to occur under Actuarial Guidelines 38 and 48 already, with increasingly complex reserving and financing structures, but it will be more important than ever going forward. The Life and Annuity Symposium in May (held in my amazing home city of Seattle) will offer several sessions on PBR, as well as a post-symposium seminar on "The New Valuation Manual and the Life Product Development Actuary." We recognize that this is a hot topic for many of our U.S. members and want to make sure to offer lots of different ways for you to get up to speed on this topic.

At this point, our non-U.S. members are probably tuning me out—oh great, another article on PBR. We hear you! 11 percent of section members live in Canada and 10 percent live outside the U.S. and Canada. We recognize that the content we offer can sometimes seem overly focused on the U.S., and are taking baby steps to address it by adding a Global Content Coordinator volunteer role. This role will plug into the various Product Development Section efforts and ensure that global perspectives are included where appropriate. We hope that putting increased focus on this will improve the Product Development section experience, not just for our non-U.S. members, but also for our U.S. members, as everyone can benefit from increased exposure to ideas from other markets. We hope to broaden our volunteer base as well in order to support these initiatives, so please reach out to me if you have ideas to share! ■

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Life Insurance Product Development Innovation and Optimization

By Farron Blanc

Editor's Note: Companies are often looking to understand and potentially improve their product development processes. A few studies have been produced related to this such as LIMRA's report in 2007, "Individual Life Product Development Process: The Need for Speed," and RGA's global product development survey. Because of these two efforts, and because of the great interest in the product development process, the SOA's Product Development, Smaller Insurance Company and International sections, and the Committee for Life Insurance Research engaged RGA and LIMRA to survey individual life and annuity companies in the U.S. and Canada, while also adding some international perspectives, on the product development process. The results of that analysis will be available in the first quarter of 2017. Since the report is not available at the time of this writing, please enjoy this summary of the RGA global product development survey results, results of which will also be further discussed in the SOA report.

INTRODUCTION/BACKGROUND

Life insurance new product development generally suffers from two major issues:

1. The long lead times required to generate a new product idea and subsequently bring that idea to market.

2. The widespread dissatisfaction with the quality of innovation in the current crop of new product ideas.

To assess these issues more closely, RGA conducted its first global survey of life insurers in mid-2014 to determine and quantify possible root causes. Responses were received from more than 100 product development leaders in 12 countries in Europe, Asia and the Americas.

Answers addressing the insurance product development cycle indicate clearly that speed-to-market remains an ongoing issue. The average time needed for a company to take a new product idea through development to launch currently ranges from six to nine months. Variations depend, for the most part, on two factors: whether the product is savings, risk or living benefits, and the geographic region in which the product is being developed. Insurers in the Europe, Middle East and South Africa (EMEA) region, for example, bring more products to market and do so more quickly than do insurers in the Asia Pacific (APAC) region and in the Americas.

As for quality of innovation, it was surprising to discover that life insurers in most countries do not actively solicit market input from consumer focus groups, market surveys or informed external experts such as reinsurers, actuarial consulting firms or their company's head offices. Instead, they continue to rely primarily upon competitive intelligence and existing market practices.

The selection of results presented herein reflect several stark implications for today's executives managing life insurance product development. The benchmarks that will be established will represent opportunities to improve the new product development process as well as enhance innovation for life, living benefits and savings products.

If you have any questions, or wish to discuss any aspect of this report, please feel free to contact me.

Best regards,
Farron Blanc
Director, Global Product Development, *fblanc@rgare.com*

ISSUE ONE: SLOW PRODUCT DEVELOPMENT CYCLES

Average idea to launch time

Around the world, the average time needed to launch a new product from concept to sale ranges from six to twelve months. Risk products (individual mortality products without cash values, such as term life) take, on average, 7.1 months, and living benefits products such as a critical illness or long-term care, which provide payouts triggered by a health-related event, take approximately nine months. (Please see Figure 1.)

Differences do exist, both from region to region and within product lines. Insurers in the Europe, Middle East and Africa (EMEA) region, for example, have the shortest cycle time length for creating and launching savings and risk products—about 20% faster than other regions. The idea-to-launch cycle for insurers in the Americas, on the other hand, averages about two to three months longer.

For companies in the Americas, the living benefits product development cycle averages nearly a year, while EMEA insurers need slightly more than seven months and APAC insurers about eight months. The longer development times for Americas respondents are indicative of greater challenges experienced in product design, pricing benefits, and in the design and implementation of administration systems than exist for either APAC or EMEA insurers.

The vast majority of life insurance companies develop between one to three new products per year in each of the three product categories. (See Figure 2.) APAC life insurers, the most active product developers, create and launch significantly more new products in an average year in all product categories than do insurers in EMEA and the Americas.

Fewer living benefits products, however, are launched by insurers in all regions, highlighting this product line's potentially significant design and implementation challenges.

Bottlenecks

The major bottlenecks—that is, pain points in the product development cycle—are in administration, distribution, marketing, and illustration system development.

Figure 1
Average Time from Idea to Launch by Region

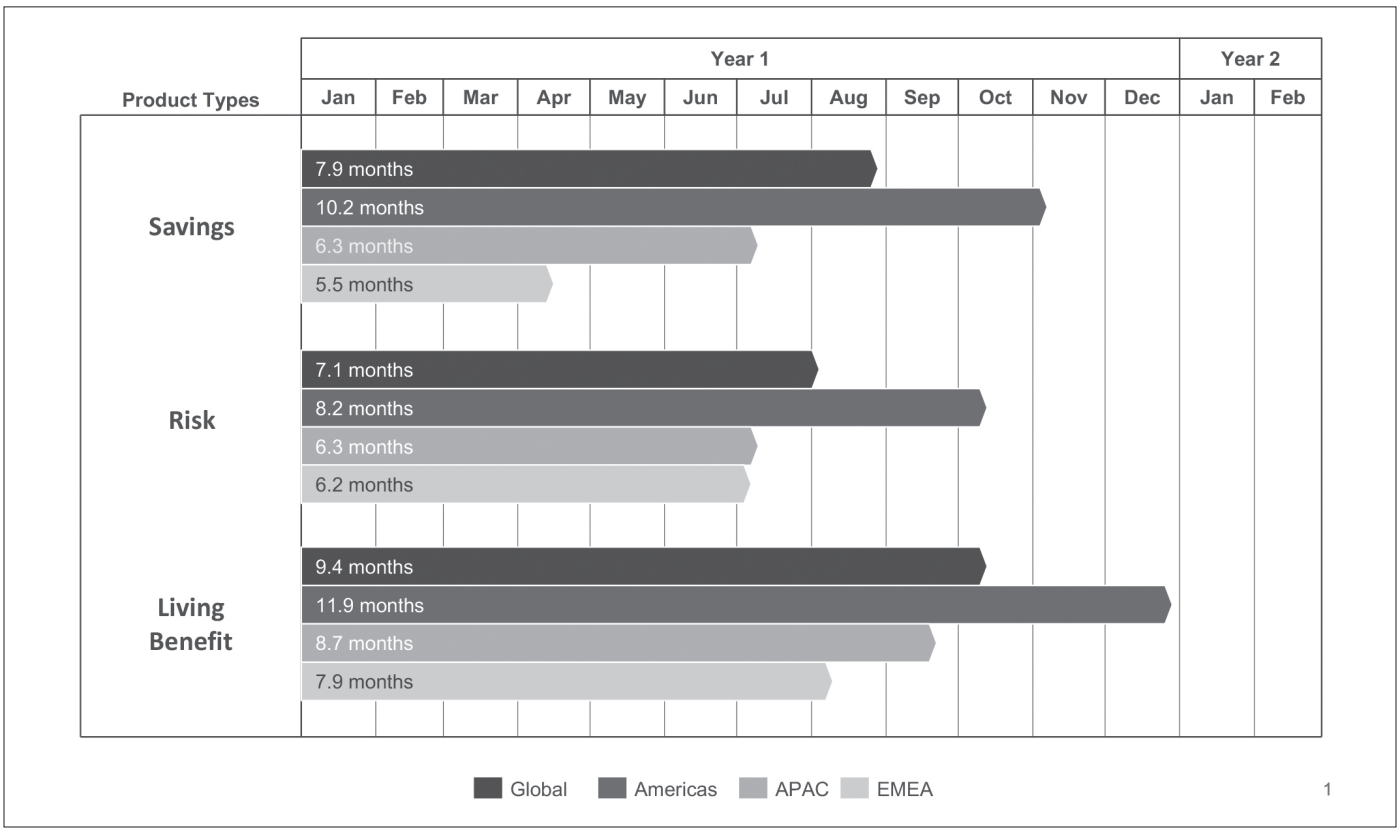


Figure 2
Average Number of New Product Launches Per Year by Region

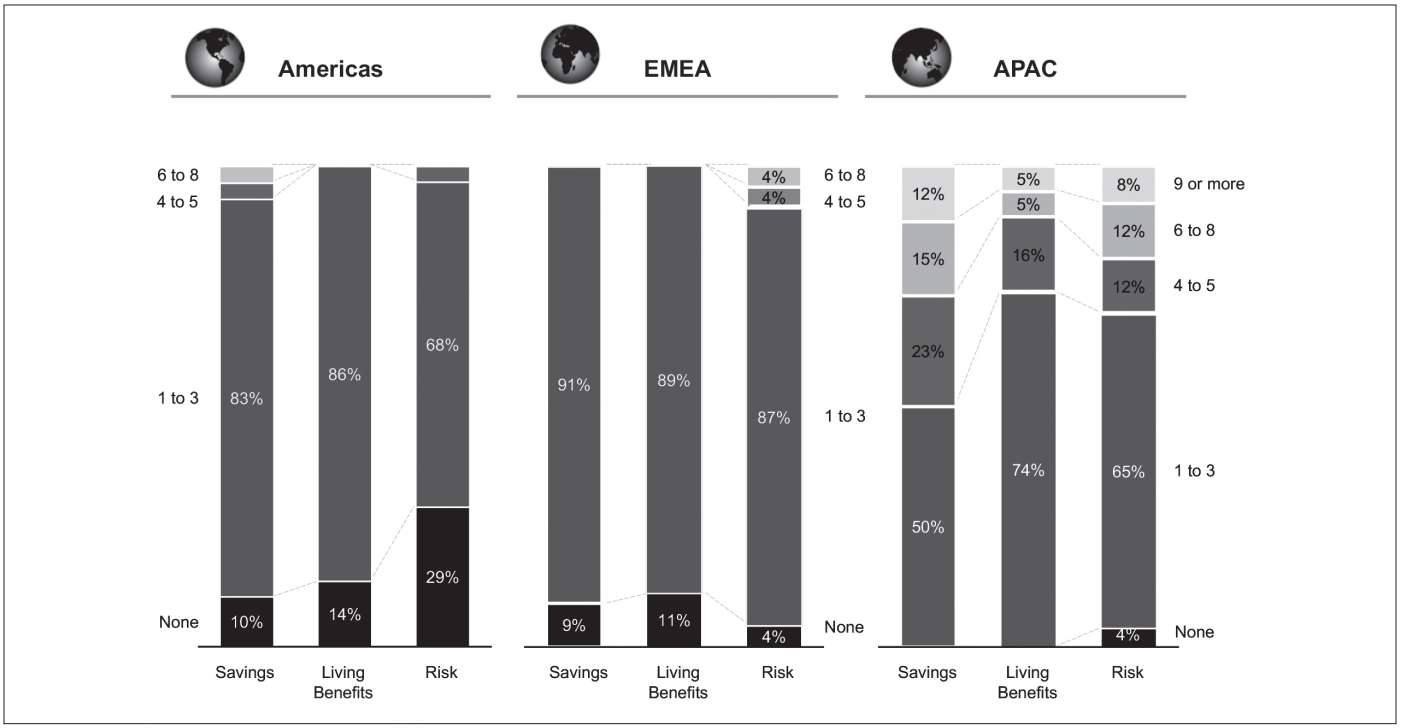
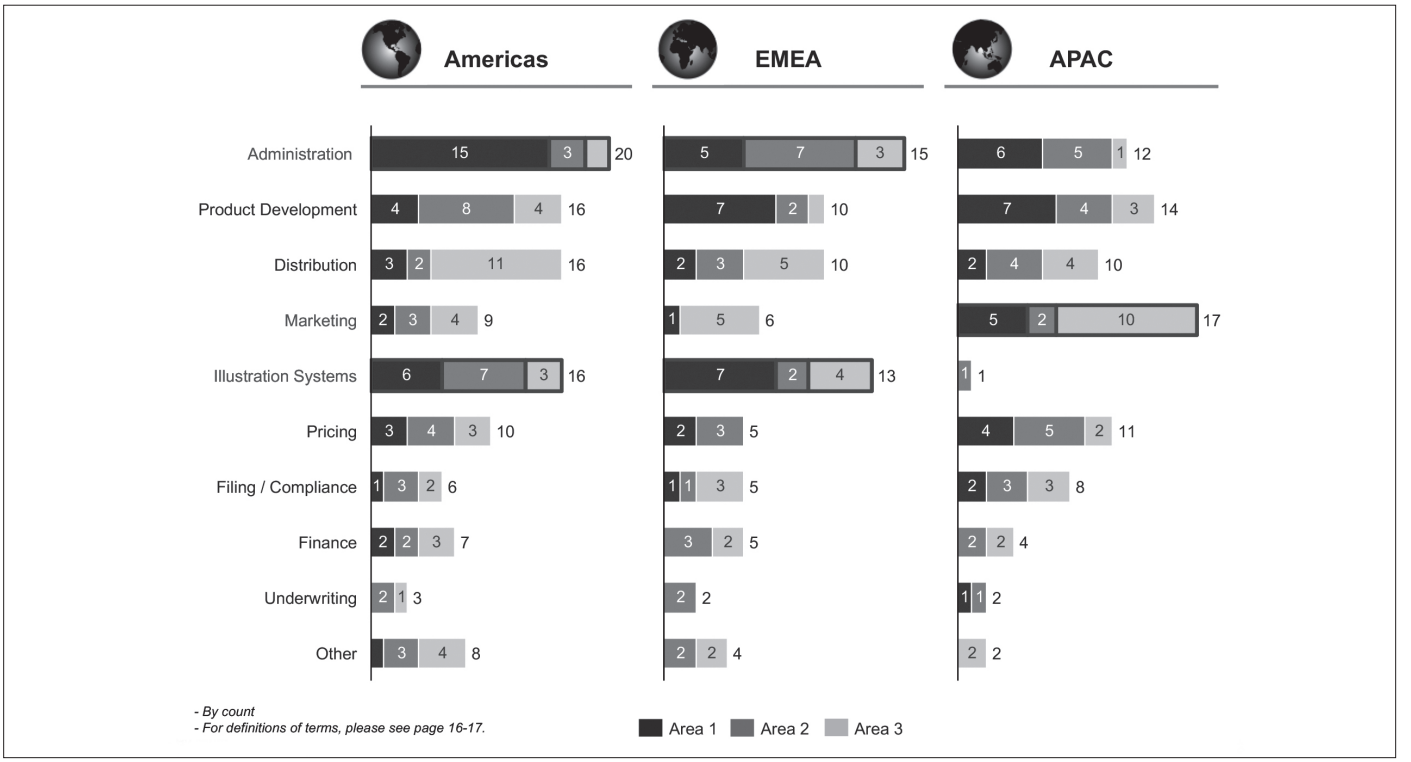


Figure 3
Top Bottlenecks by Region



Insurers in EMEA and the Americas named administration and illustration systems as the top two areas needing improvement. Strengthening PD-related IT system development and capabilities could significantly reduce the time it takes to bring a product to market.

APAC insurer responses indicate they face a different set of functional challenges. They often experienced difficulties in designing benefits and marketing the products. This could be due to the fact that more than 25% of APAC insurers launch six or more products a year.

Although APAC insurers reported coping effectively with IT illustration system development, follow-up interviews with respondents in Australia, Indonesia, Singapore and Malaysia found that many companies in this region were more reliant upon manual processes than were their Americas counterparts. While APAC insurers can develop and launch many products quickly, they are not currently reaping economies of scale due to the lack of IT systems for administration and new business that can handle high volumes.

Use of incentives

Another area of investigation was whether providing incentives to key members of PD teams can reduce development times. More than twice as many APAC insurers (59%) were found to use incentives for their product development teams than insurers in the Americas (27%). (Please refer to Figure 4.) Carefully designed performance-based compensation for these core employees may help motivate teams.

Steering committees

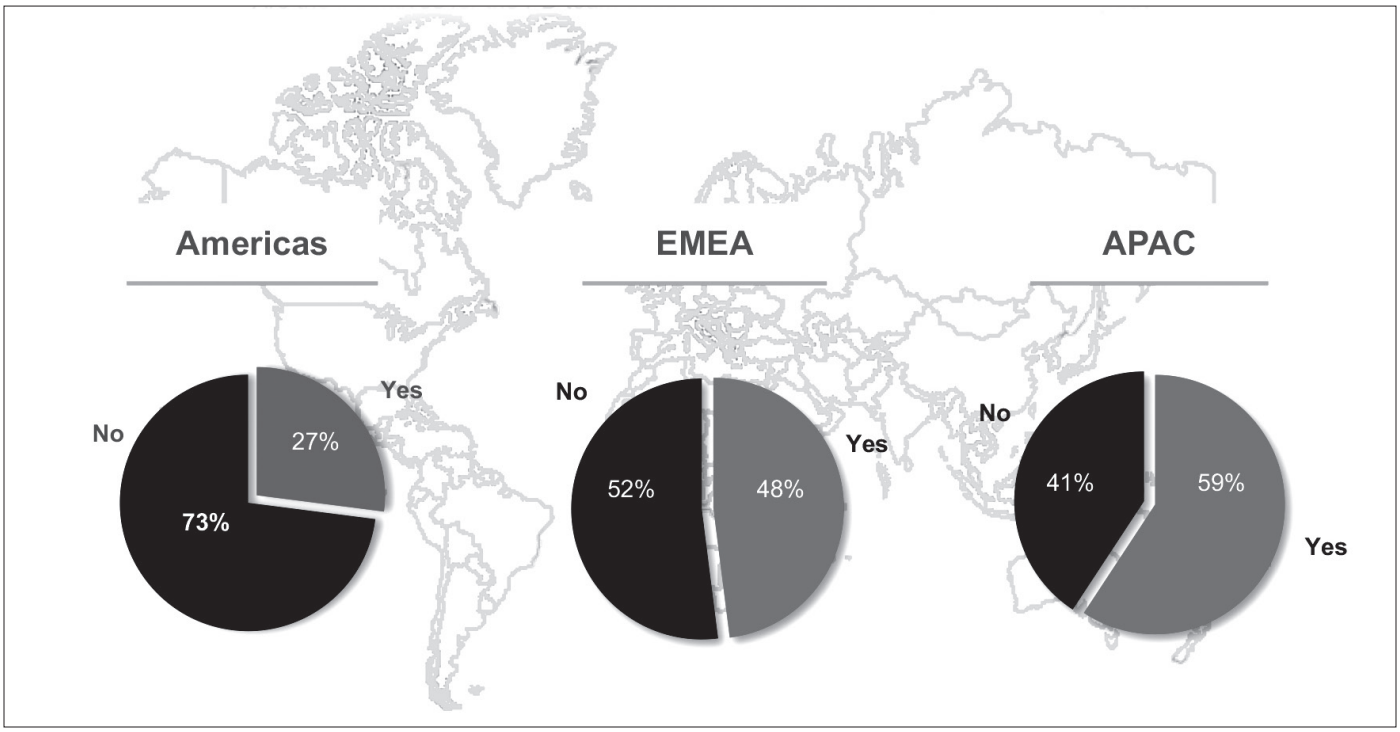
Dedicated product development steering committees typically set their company's PD strategy, manage the ongoing book of work, and provide formal governance. In RGA's view, a well-structured PD steering committee can ensure sufficient internal support to enable efficient, effective product development.

Currently, 85% of APAC insurers have formal product development steering committees in place. APAC insurer committees meet monthly, which is necessary given the growth of that market and the number of new products being launched. In comparison, about 65% of insurers in the EMEA and Americas regions have established and are using these committees.

Headcount allocation

The survey also sought to examine and compare how insurers allocate functional resources (headcount) from region to region, whether there are regional differences in allocation breakdowns,

Figure 4
Use of Incentives by Region



and whether these differences might have any impact on new product development.

Generally, insurers allocate functional resources to the bottlenecks identified in Figure 3. Insurers in the Americas and EMEA share similar headcount allocation patterns, with most resources allocated to IT administration system development. (It should be noted that IT system development was cited as a major area for improvement by many respondents in the Americas and EMEA.)

APAC insurers reported slightly lower headcount allocations than their Americas and EMEA counterparts to IT administration systems. APAC insurers also devote fewer functional

Figure 5
Product Development Steering Committees by Region

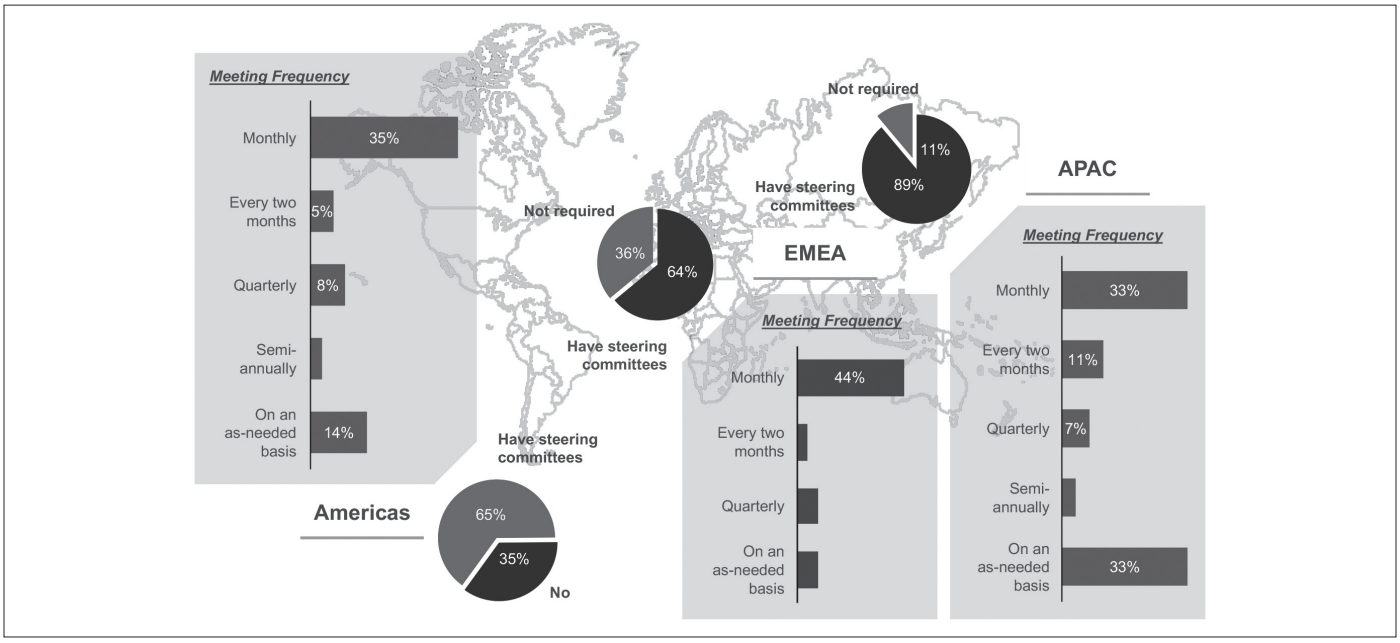
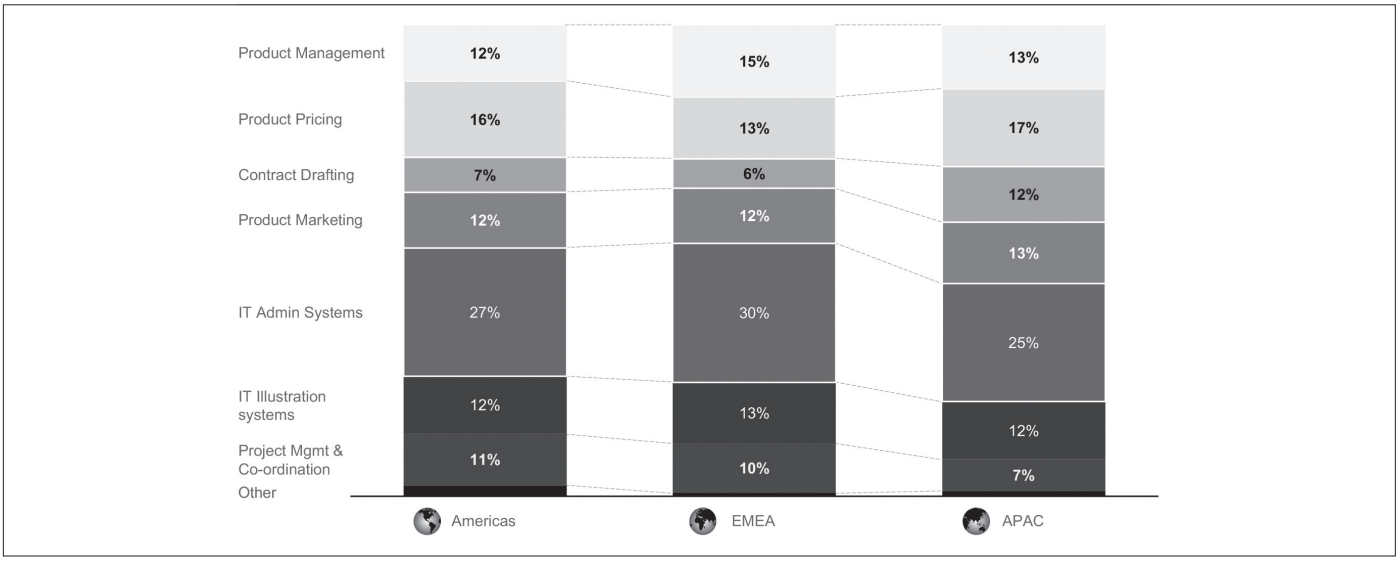


Figure 6
Headcount Allocation by Region



resources to project management. This could imply that even though many of the processes in this region are manual, the administrative and support systems of APAC insurers may produce greater efficiencies.

In terms of drafting of policy contracts, APAC insurers devote significantly more functional resources to this need than do other regions. This might be related in part to the regulatory requirements for receiving approval prior to launching a new product.

ISSUE TWO: INFORMATION SOURCES THAT SUPPORT INNOVATION

Satisfaction with output levels

When asked to assess the level of perceived satisfaction with new products launched into markets, all respondents in every location indicated their companies viewed their new products more positively than might their distributors and end-consumers. (See Figure 7.)

On average, APAC insurers are more satisfied with the new products they develop and launch, whereas insurers in the Americas are the least satisfied. More than 25% of Americas respondents reported their distributors hold below-market-average perceptions of their new products. In addition, 12% of EMEA respondents indicated they do not have clear insight into the views of their core competitors and end-consumers.

A lack of perspective from those who are the potential buyers and marketers of the products could lead to less innovation and product suitability, and might impact the acceptance of new products introduced into a market.

Figure 7
Ratings of Product Development Results by Region

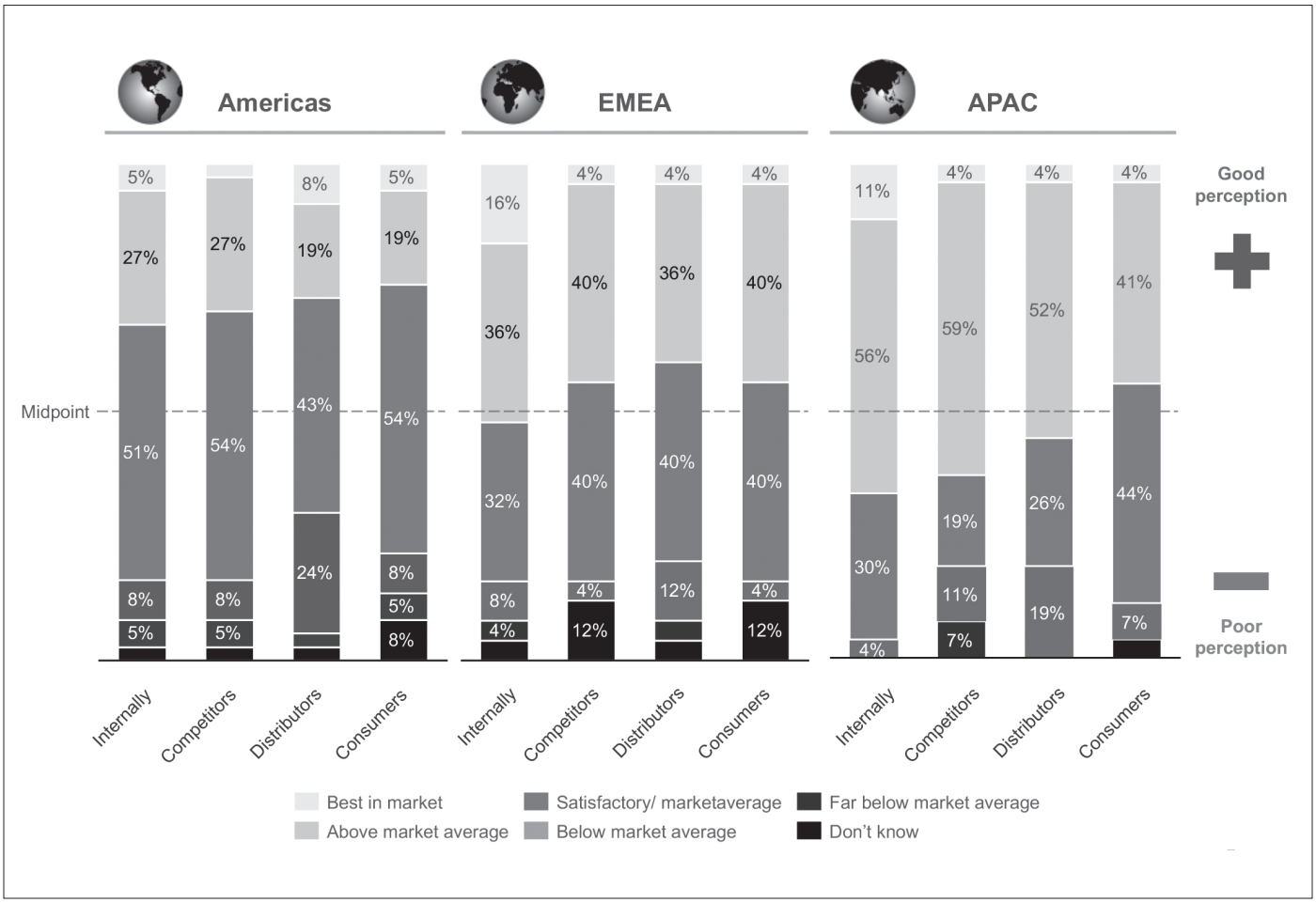


Figure 8
Sources of Product Development Information – Savings Products

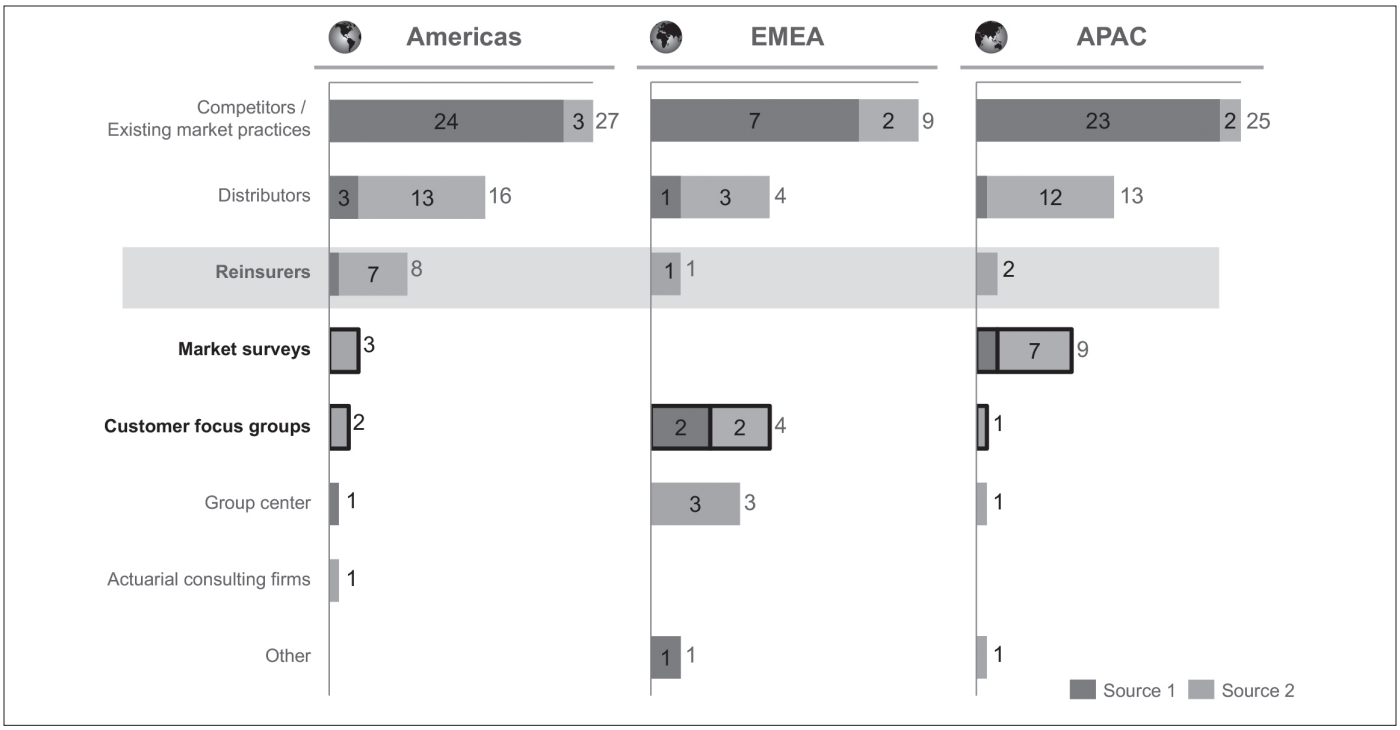


Figure 9
Sources of Product Development Information – Living Benefits Products

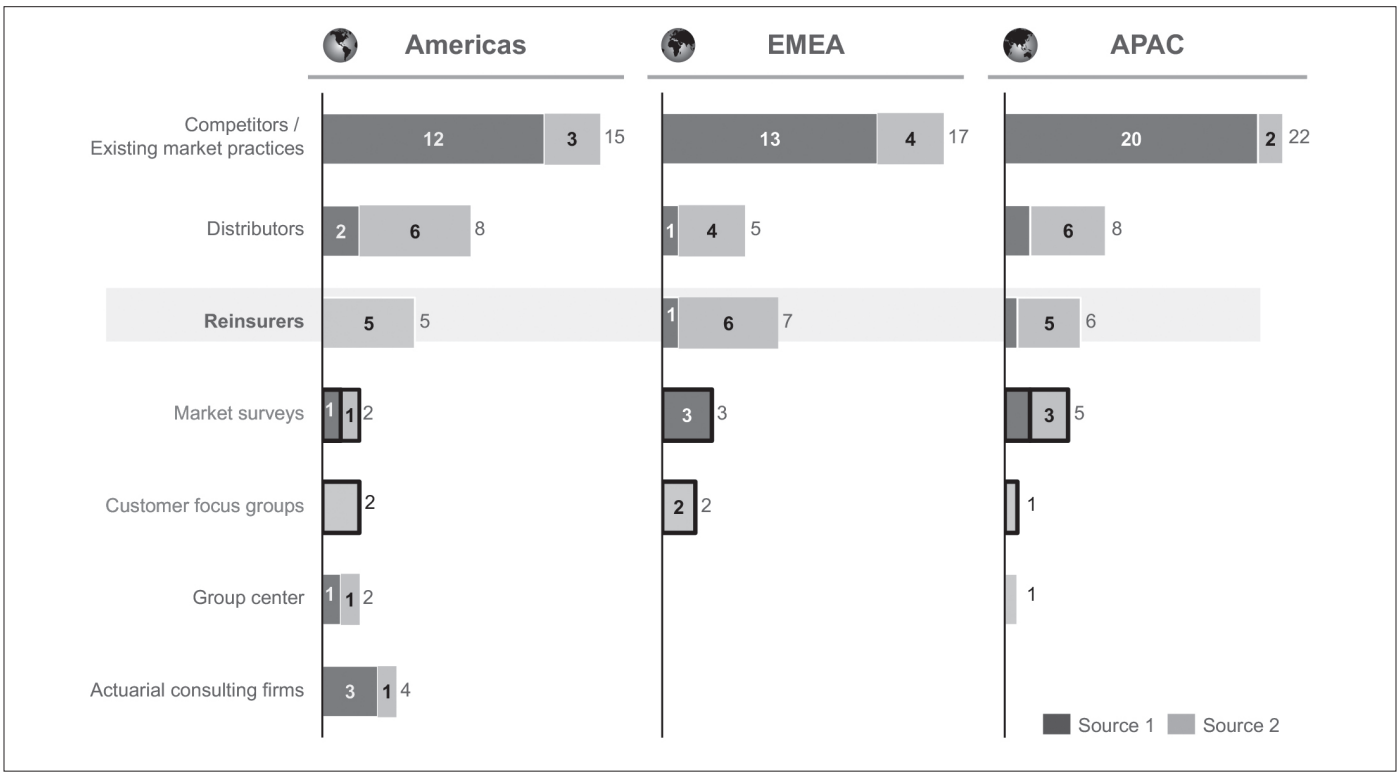
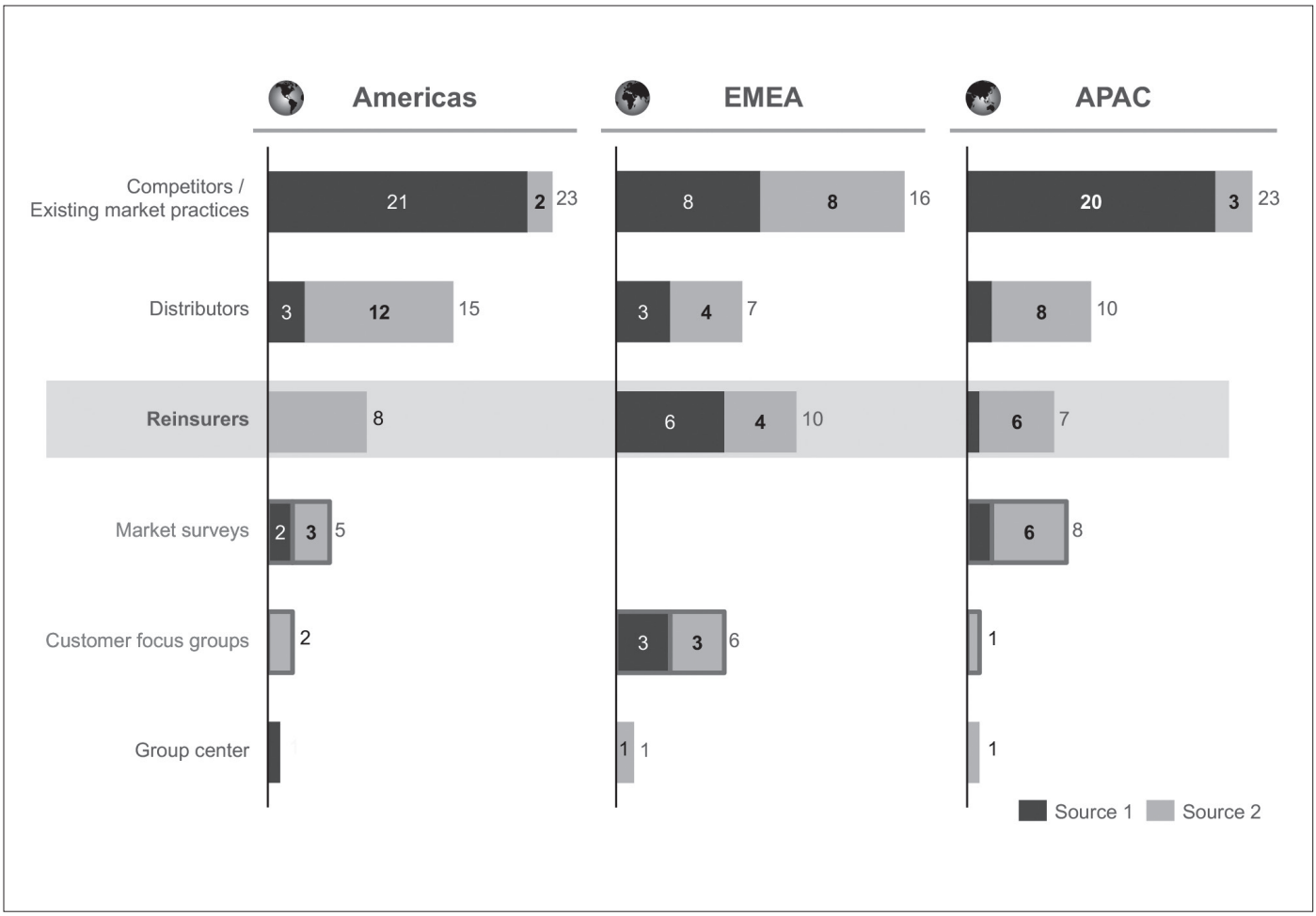


Figure 10
Sources of Product Development Information – Risk Products



Information sources that support innovation

Around the world, life insurers make limited use of end-consumers to inform their PD efforts, whether via focus groups or market surveys. Instead, they rely strongly on existing products and trends in the market as their primary information sources when designing new products. This could be a root cause for the overall lack of innovation and poor consumer satisfaction. (See Figure 7.)

Distributors are commonly secondary sources of competitive intelligence about products and trends for primary insurers. This highlights a second possible factor: insurers continue to treat distributors instead of end-consumers as their clients, and are therefore more likely to optimize new product designs around what distributors want to sell instead of what consumers want to buy.

Partnering with external expert advisors such reinsurers and actuarial consultants can provide primary insurers with significant insights that can lead to market innovations. In addition, better utilization of consumer inputs might provide better targeting of consumer needs and therefore more innovative product solutions.

SUMMARY

The selected survey findings presented here indicate clearly that significant opportunities exist to shorten and strengthen the product development cycle, increase the volume of new product issuance, and improve innovation by introducing and incorporating information from sources such as the current market and end-consumers. These will help companies develop and adapt products to meet real market needs.

If you would like more information, please contact your local RGA office or the regional representatives.

ACKNOWLEDGEMENTS

We would like to thank the following members of the Global Product Development team around the world for their key contributions to this report: Kathryn Cox, Jennifer Strong (U.S.); Lynn Grenier-Lew, Marc-André Melançon (Canada); Jesus Spinola (Mexico); Mick James, Mark Johnson (U.K.); Enrique Ruiz (Spain); Michael Porter (South Africa); Karunanidhi Muthuswamy (India); Amy Tsai (Taiwan); Ray Jeon (Korea); Yuko Oshima (Japan). Special thanks to Leigh Allen for survey design assistance, Erica Chen and Christine Okeefe for analytic support, Amy Friedman for editorial development support and Erika Bredée for design support.

Critical Illness Insurance in Canada

By Vera Ljucovic

Critical Illness insurance goes by many names: Dread Disease in some locales, Chronic Care, Trauma Care, and "Maladies Grave" for the French speaking. All sound very ominous, but the origins are much more positive. The product was first developed in 1983 by a South African heart surgeon, Dr. Marius Barnard who famously said "you need insurance not only because you're going to die but because you're going to live!"

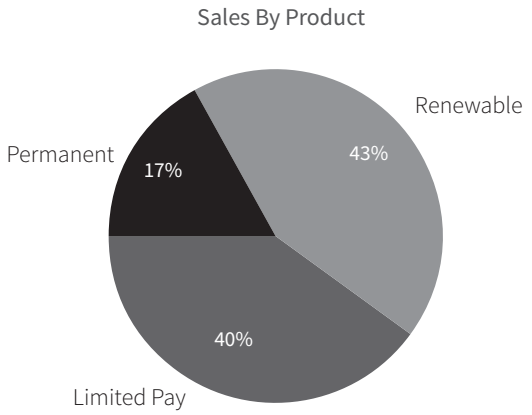
Dr. Barnard was a member of a team (led by his brother Christian Barnard) that performed the first heart transplant in 1967. Dr. Barnard, to his dismay, watched his patients suffer the subsequent stress of financial hardship during recovery rather than celebrate survival. He became passionate about the reality that medical advancements could not be meaningful unless the issue of financial security was also addressed. He looked to South African life insurers for a solution and in 1983, the first Critical Illness (CI) product was born.

The first product sold by Crusader Life covered 4 conditions—heart attack, cancer, stroke and coronary artery bypass graft. The product quickly gained popularity and expanded to the U.K. and Israel in 1986, followed by Australia and North America in the late 1980s, and the rest of the world in the 1990s. Critical Illness is now sold in more than 50 countries around the world. Figure 1 shows the magnitude of sales by country. More than half the CI premiums are from Asia, with a large proportion from Japan where cancer policies are still very popular.

The product has had success in different forms depending on the market and how the sales are positioned. In the U.K., acceleration products on mortgage insurance are by far the most popular. Acceleration products are also very popular in Australia but not necessarily tied to mortgages. Canada has had more success with the stand-alone version where it is marketed to cover medical expenses. Standalone cancer policies have been around for a long time and represent a large proportion of the U.S. market (inforce) as well as Japan. More comprehensive standalone products haven't really taken off in the U.S. where sales are mainly through worksite marketing and group plans. However, combination products with CI and LTC riders have become popular in recent years.

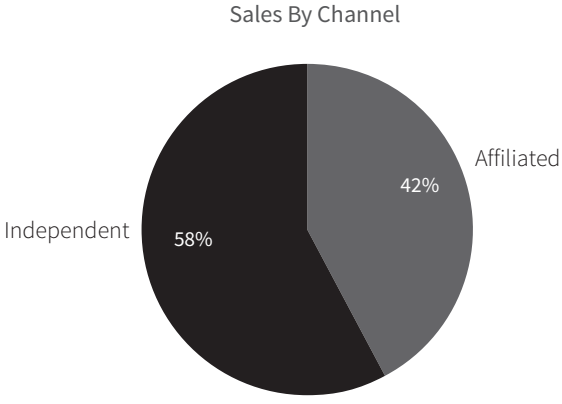
Figure 1
Critical Illness Sales around the World

Figure 2
Canadian CI Sales



Annual CI Sales vs Life - 2015

- Annualized premiums ('000): 119,698 vs 1,365,056
- Policies: 114,354 vs 719,832
- Average face amount: 77,705 vs 348,507



Inforce CI - Q3 2016

- Annualized premiums: 857,309,250
- Policies: 792,403

CANADIAN MARKET

Critical Illness products first emerged in Canada as accelerated benefit riders in the early 1990s. The accelerated design never really took off due to uncertain tax treatment. The stand-alone version quickly took over popularity by the mid-1990s. There is a substantial creditor market and a smaller group market for CI. Some companies have introduced simplified issue products with fewer conditions (four to five).

The product has been successful but still accounts for less than 10 percent of life premiums. The products are sold at the lower face amounts, with an average size of only $77,000. As of Q3-2016, there was $857 million critical illness insurance inforce on 792,403 policies (see Figure 2, excludes creditor and group). New sales in 2015 were $120 million by premium and $8.3 billion by face amount on 119,698 policies.

Figure 3 shows that sales grew about 8 percent per year from 2008 to 2011. There was a 16 percent spike in 2012 just prior to price increases to account for low interest rates and the lingering effects of the 2008 financial crisis. Sales growth as a result was negative in 2013, flat in 2014, but the momentum has started to pick up again with growth rates returning to 8 percent in the last couple of years. We've seen more price competition recently as the financial markets have recovered and companies reduce rates to maintain market share.

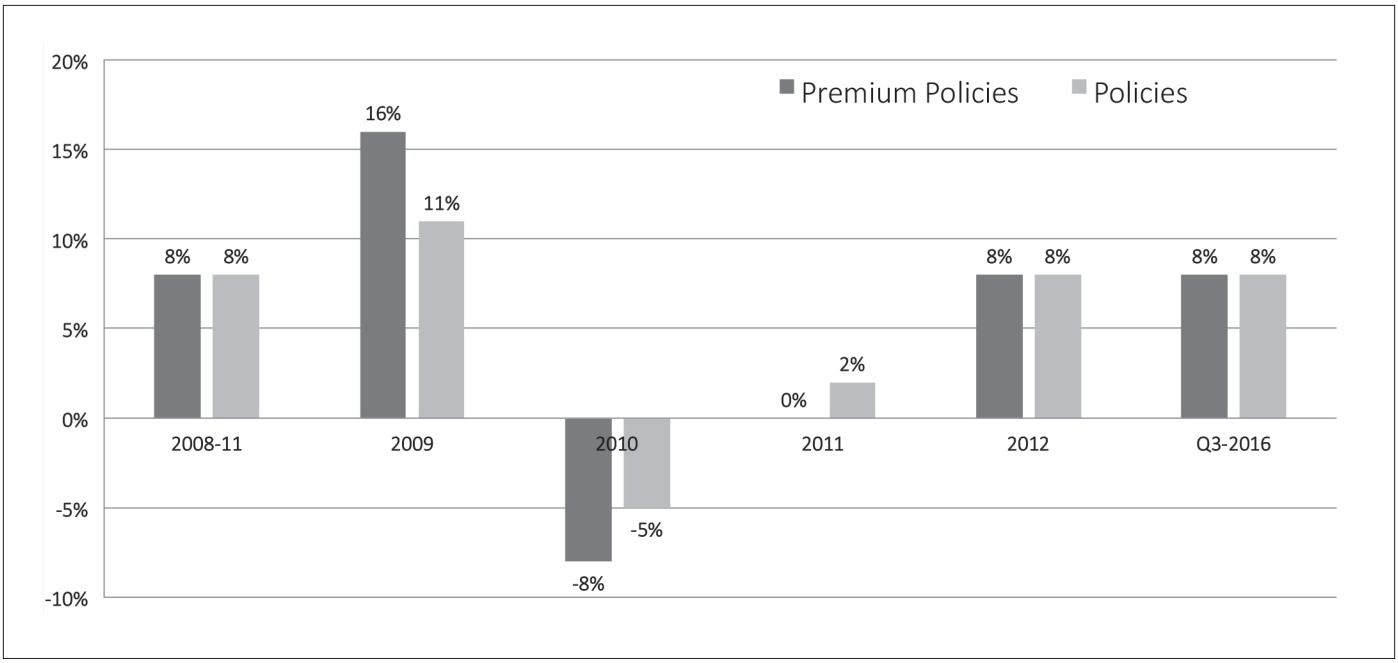
Most life insurers in Canada now have a CI product in their portfolio and about 15 companies are actively selling stand-alone CI. The top five writers account for 80 percent of total sales. The primary product platform in Canada is Level Term insurance. As shown in Figure 2, 43 percent of the products issued today are renewable Level Term (T10 and T20 are most common). After the initial level term these products renew to a higher renewable scale. Limited Term plans (Term to 65 and Term to 75) have become very popular now accounting for 40 percent of total sales, and Term to 100 plans account for the remaining 17 percent of sales.

COVERED CONDITIONS

CI insurance has evolved since the first product launched in South Africa with four conditions. There has been intense competition over the number of covered conditions with some countries including more than 100! Competition on the number of definitions stabilized in Canada about a decade ago to about 25 conditions. The original four conditions still cover the great majority of the claims and adding more remote conditions is sometimes more marketing than improved coverage.

As the number of conditions and the number of companies selling CI grew, so did the customer confusion as to what was actually being covered. This led to mistrust of advisors and

Figure 3
Critical Illness in Canada - Growth Rates



issues at claims time. This eventually led to an industry wide focus on the standardization of definitions.

The Canadian Life and Health Insurance Association (CLHIA) published standardized definitions for 26 covered conditions for the first time in 2007. Most companies have adopted the standardized wording and include between 23 and 26 of the benchmark conditions. This has created stability in the market and confidence in the product. This facilitates the comparison of products across companies and simplify the sales process. These definitions were updated late in 2013. A few companies have since adopted these updates.

PRODUCT FEATURES

There is very little variation across products in Canada in terms of design and features and this consistency has contributed to its success. Three product features in particular have contributed to positive sales trends—standardized definitions, return-of-premium (ROP) riders and guaranteed rates.

Most products include 23 to 26 of the CLHIA conditions and most follow the exact benchmark wording. Most standalone products are non-cancellable so the covered conditions and the premiums are guaranteed for the duration of the contract. Multiple coverage is not as prevalent in Canada as it is in other markets. At this time there is only one payout on diagnosis of a covered condition. The exception is the "early discovery benefit"

85% of Female claims are for cancer and 61% for Males.

which pays a small amount for conditions that are less critical. There is a fairly standard list of four to six conditions typically included (e.g., angioplasty and early prostate cancer). The benefit ranges from 10 to 25 percent of the base face amount up to a maximum of $25,000 or $50,000. The payout does not reduce the base face amount.

Most plans include a 30 day waiting period to receive benefits and most include an exclusion for claims during the first 90 days for cancers and benign brain tumors. The maximum face amount in the Canadian market is $2 million and the maximum issue age is 65. Most products terminate at attained age 75 with the exception of Term to 100 which provides coverage for life. Conversion to longer term plans is offered on the Renewable Level Term plans. Typical riders are WP, ADB, loss of independent existence, children's term rider, LTC conversion rider. ROP riders are by far the most popular with a very high take up rate of more than 70 percent.

The ROP feature is a key component of most plans and a significant driver of sales in Canada. There are three versions—ROP on Death (ROPD), on surrender (ROPS) and on expiry of the

policy (ROPX). ROPD is offered on most plans and is often included in the base plan. ROPS is an optional rider offered on the permanent plans (T65/75) but is not included on level term products. The most common structure is to refund less than 100 percent of the premiums for surrender at the end of the 10th (or later) policy anniversary and 100 percent by duration 15 or attained age 65/75, if the insured has not claimed for a critical illness. ROPS is very attractive to the consumer in a low interest rate environment since the policyholder gets a refund of past premiums including the rider and essentially receives CI protection for "free."

Juvenile plans are often issued as stand-alone coverage in Canada and include the base adult conditions plus five or more "child" conditions. The product is available to issue ages 30 days to 17 and the policy expires at age 25. The maximum face amount is $250,000. Canada has quite a robust juvenile market compared to other markets. The U.K. market, for example, does not recognize an insurable interest on juveniles and most sales are in the form of a rider for much lower amounts.

PRICING ISSUES

The CI market is quite stable in Canada but there are challenges. Consistently low interest rates have resulted in many

Figure 4
Canadian Industry CI Experience Studies (expected basis 2008 CANCI tables)

Study Date	Feb 2013	Dec 2014	Oct 2016
Obs Years	2002-2007	2003-2011	2005-2014
Expected Basis	2008 CANCI	2008 CANCI	2008 CANCI
# Claims	1800	5000	7489
# Contributing Co's	7	10	11
Total A/E	57.7%	54.2%	52.0%
Male	57.4%	51.4%	48.8%
Female	58.3%	58.2%	56.6%
Band:			
<50k	43.6%	58.9%	49.6%
50-99k	55.1%	52.0%	50.5%
100-249k	57.9%	54.3%	52.6%
250k+	64.5%	57.6%	52.7%
Total	57.7%	54.2%	52.0%
Duration:			
Year 1	32%	29%	25%
Year 2	52%	50%	46%
Years 3+	70%	60%	56%
Implied UW Selection Factors:			
Year 1	46%	48%	46%
Year 2	74%	83%	83%
Year 3+	100%	100%	100%

carriers raising premium rates around 2012–2013. Some of the smaller companies still have not repriced their CI products and will likely have to do so in the near future. There continues to be uncertainty regarding lapse rates and morbidity deterioration on selective lapsation on the renewable term plans and from the ROPS rider. There is still not enough data to accurately predict how this rider will impact experience. Two insurers recently dropped the ROPS rider from their product in response to these pricing challenges.

Locked-in definitions are exposed to developments in genetic testing, improvements in technology and treatments which can have a dramatic impact on what is covered. Trend assumptions are an important part of the incidence pricing assumptions and these are also subject to medical advancements.

Most products in Canada are noncancellable. This feature results in higher capital and reserve requirements. Reinsurance tends to be used extensively to relieve the strain associated with writing the business. Coinsurance is uncommon in Canada, particularly for ROP products, and reinsurance therefore tends to be Yearly-Renewable Term (YRT) with no coverage of the rider.

MORBIDITY EXPERIENCE

The Canadian Institute of Actuaries (CIA) developed a population based incidence table in July 2012 called the 2008 CANCI table. It is used as the expected basis for industry experience studies. The table is based on population incidence rates for each of the 26 CLHIA benchmark conditions. Data was taken from the Canadian Institute for Health Information, the Institute for Clinical and Evaluation Studies, Stats Canada and Canadian Cancer Statistics. The incidence tables are gender-distinct and have been adjusted for medical definitions and claims eligibility requirements such as first-event diagnosis and the 30-day waiting period.

The Canadian Institute of Actuaries has published three morbidity studies since then. The studies exclude acceleration riders as well as group and creditor plans.

- February 2013—study period 2002-2007 based on 1,800 claims
- December 2014—study period 2003-2011 based on 5,000 claims
- October 2016—study period 2005-2014 based on 7,500 claims

Figure 4 provides a summary of the experience over the 3 study periods. Morbidity has improved overall, with the exception of amounts below $50,000 where there has been some volatility. Results by band are counterintuitive relative to what we see in life. As the amount of underwriting increases at the higher bands, we expect the experience to improve. We see the opposite in the CI experience. Our U.K. colleagues have seen similar results in their industry data where results improve in the middle bands and increase again at the higher bands. This could be attributed

to anti-selection or smaller amounts that are riders on larger life policies which have more underwriting.

As in other markets, most claims are for cancer. In Canada, 85 percent of female claims are for cancer compared to 61 percent for males. A significant portion of the remainder for males is for heart attack. The CIA study also monitors average claims and there are clearly higher claims for Parkinson's and Multiple Sclerosis. The CLHIA is reviewing the wording of these definitions as a result.

The data suggests that underwriting selection lasts about two years but wears off quickly with a 50 percent selection discount in the first year and 15 percent in the second. Looking at the select period by condition shows some interesting results—the select period for cancer is only about one year and longer for heart disease. Recall there is a 90-day moratorium on cancer claims so only ¾ of the first duration is exposed, so the select period is even shorter than one year. Data is available for stroke and other conditions, but the results are not credible enough to make any conclusions. The one conclusion we can make is that cancer is very hard to medically underwrite!

The smoker vs. nonsmoker differential in the CI data appears to be considerably less than for life where it is two to three times on average. The CI data suggests a differential of only 150 percent. If we break this down further by cancer and heart disease categories, cancer would only have a 30 percent differential compared to numbers which are similar to life insurance for heart disease. The overall differential of 150 percent appears to be thus driven by the cancer experience.

It is important to keep in mind that these latest industry results are based on only 7,500 claims in total and the credibility reduces as we dissect the data. The studies are available on the CIA website www.cia-ica.ca for subscribing members or you may contact the CIA directly.

GENETIC TESTING

Bill S-210—the Genetic Non-Discrimination Act—is a bill that has been wading through government circles in Canada for a number of years. It looks very likely that this will pass as law sometime in early 2017. The precise wording of the bill makes any genetic testing results prohibited grounds for discrimination. There is tremendous industry concern in Canada regarding the impact it will have on preferred underwriting and critical illness.

The CIA published a report in January 2016 that evaluates the impact of genetic testing on incidence rates: "Genetic Testing Model for CI: If Underwriters of Individual CI had no Access to Known Results of Genetic Tests." The report estimates the morbidity impact to be +26 percent due to anti-selection, 16 percent for males and 41 percent for females.

Canada is obviously not the first country exposed to such legislation. The Genetic Information Nondiscrimination Act of 2008 (GINA) is the counterpart in the U.S. which prohibits genetic discrimination by employers or insurance companies. However, U.S. federal non-discrimination legislation does not currently apply to Life, DI and LTC insurance. The European countries sell more short term business than in Canada so it's less of an issue.

There will many discussions over the coming weeks/months amongst insurance companies, the CLHIA and the government bodies. We are hopeful for an outcome that protects the consumers and insurers alike. ■

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Term Conversions: Pricing and Reserves

By Hezhong (Mark) Ma

Most term products in the U.S. offer policyholders the option of conversion to a permanent policy, typically without additional underwriting. To some extent, convertibility of a term contract is similar to a swaption in that a policyholder has the option to swap premium for the death benefits of permanent life insurance. In a term conversion, the "moneyness" of the conversion option is not tied to any trading asset or index. The conversion decision is generally one of self-selection: based only on information known to the policyholder, of which none is known to the insurer. Insurers do not have a general consensus on how to account for the cost of convertibility.

Figure 1
Reproduction of Chart 19 in the SOA Report on the Survey of Conversion Assumptions and Product Features for Level Premium Term Plans 2015.

Conversion Philosophy	
Cost of Conversions	**Responses**
Implicitly built into the term policy	5
Explicitly built into the term policy	7
Implicitly built into the permanent policy	5
Explicitly built into the permanent policy	2
Not built into either term or permanent policy	1
Conversion has no cost	1

Per Figure 1, more than half of the companies surveyed (12 of 21) indicated they built their conversion costs, either explicitly or implicitly, into their term policies. Meanwhile, seven built it into their permanent products. Different companies are likely to have their own assumptions, histories, and conversion pricing philosophy. Let's first exam two hypothetical situations.

SITUATION 1: THE NET COST OF CONVERSION TO THE INSURER IS ZERO.

If at the point of time of a conversion, the slope of expected mortality matches that of the gross premium for a permanent policy through conversion, the converted policy is perfectly priced. For example: a reinsurance treaty could be structured so that yearly renewable term (YRT) rates follow point-in-scale mortality (PISM). Since there is no prefunding for conversions, there would be no need for an insurer to charge extra premium or to set up reserves for a convertibility option for the term product.

Although Situation 1, if exists, is a bit wishful thinking and not necessarily preferable. To avoid cross-subside, the rate scales for permanent policies from term conversions have to vary by many policy characteristics and it is highly likely that they will need to be separated from other permanent products. Direct companies insurers frequently push back on developing rate scales specifically for converted policies due to administrative concerns. According to *Report on the Conversion Experience Study for the Level Premium Term Plans* (SOA Conversion Experience Report), the mortality experience of converted permanent policies can vary significantly, depending on when in the term policy's duration it converted. To make the hypothetical situation real, an insurer might have to charge different premium rates for the converted policies that would depend on the timing of the conversions. Once the pricing and administrative challenges are carefully considered, this hypothetical situation might be less appealing.

SITUATION 2: AN INSURANCE COMPANY HAS SUBSTANTIAL EXPERIENCE WITH TERM-TO-PERMANENT POLICY CONVERSIONS. ITS EXPERIENCE IS MATURE AND NOT EXPECTED TO CHANGE.

For these companies, if the rate of conversion, and post-conversion mortality and lapse experience is mature and not expected to change, many think that there is no need to institute a separate charge for the conversion option, as the deterioration in mortality of the converted permanent policies would have been accounted for in the experience study of permanent products, assuming conversions have not been separated from the study. In other words, the premium for permanent products would already reflect the additional death experience due to conversions.

It is not entirely fair for the permanent product to include the converted policies' mortality experience. Since converted permanent products generally have higher mortality experience than permanent policies bought outright, blending the experience of the two might make overall mortality for a given product appear artificially high.

In addition, without knowing the motivation of the policyholders who exercise the conversion option, experience could change significantly in the future. For example, for a company new to the 10-year term market, the first nine years of experience would likely see very low conversion rates and therefore minimal impact on mortality experience in their permanent policies. However, year 10 could see an approximately 10-fold jump in conversion rates, making the mortality of permanent products suddenly spike.

None of those two hypothetical situations is as desirable as it first appears. Convertibility should cost both insurers and as a result, consumers. That being said, how should the charge occur? Should it be attached to the term or the converted permanent product? How much should the charge be, and how should insurers reserve for experience if the option is exercised?

The cost to insurers of exercising the convertibility option stems from the additional mortality experienced after conversion. The optionality of incurring such excess mortality, however, is built in the term policy. To align risk and revenue, it would make economic sense to charge only the term policies. It is the product on which the swaption exists. There should be an internal transfer pricing, from the term product into permanent product, when a policy converts. The amount transferred makes the permanent product indifferent to whether the policy was acquired through term conversions, or bought outright. The overall process is similar to how we price certain health products, such as long term care insurance, where an insurer charges active lives and build up active life reserves. There, when a policyholder disables, the active life reserve is released through incurred claim costs to cover the newly-setup disabled life reserves.

I propose a two-stage model to price term-to-permanent convertible policies. In the first stage of the calculation, we determine, at the time of conversion, how much the excess mortality due to a conversion might cost. We do this by calculating the present value of future benefits (PVFB) of a converted policy and, for the sake of comparison, the PVFB of an otherwise

Figure 2
Permanent Life Single Premium

Dur_ Since_ CV	Duration	Attained Age	$q_x^{(lapse)}$	Base Mortality	Mortality Multiple	Perm Mortality	$q_x^{(total)}$	p_x	Continuous Const. Force $a^{bar}_{x1}{}^{bar}$	Death Benefit per $1,000	EOY PVFB
			1	2	3	4	5	6	7	8	9
0								1	0.9760		261.56843
1	10	64	0.049798	0.005260	0.90	0.004734	0.0543	0.9457	0.9495	4.49	285.4250
2	11	65	0.046734	0.006060	0.90	0.005454	0.0519	0.9481	0.9506	5.18	310.3706
3	12	66	0.026846	0.006950	0.90	0.006255	0.0329	0.9671	0.9600	6.00	330.4677
4	13	67	0.015039	0.007940	0.90	0.007146	0.0221	0.9779	0.9653	6.90	347.4184
5	14	68	0.012947	0.009040	0.90	0.008136	0.0210	0.9790	0.9658	7.86	364.1780
6	15	69	0.012947	0.010280	0.90	0.009252	0.0221	0.9779	0.9653	8.93	381.4312
7	16	70	0.012947	0.011700	0.90	0.010530	0.0233	0.9767	0.9647	10.16	399.1534
8	17	71	0.012947	0.013330	0.90	0.011997	0.0248	0.9752	0.9639	11.56	417.3128
9	18	72	0.012947	0.015240	0.90	0.013716	0.0265	0.9735	0.9631	13.21	435.8513
10	19	73	0.010060	0.017470	0.90	0.015723	0.0256	0.9744	0.9635	15.15	453.3535
11	20	74	0.010000	0.020060	0.90	0.018054	0.0279	0.9721	0.9624	17.38	470.9022
12	21	75	0.010000	0.023050	0.90	0.020745	0.0305	0.9695	0.9611	19.94	488.4269
13	22	76	0.010000	0.026500	0.90	0.023850	0.0336	0.9664	0.9596	22.89	505.8179
14	23	77	0.010000	0.030430	0.90	0.027387	0.0371	0.9629	0.9579	26.23	522.9716
15	24	78	0.010000	0.034910	0.90	0.031419	0.0411	0.9589	0.9560	30.04	539.7703
16	25	79	0.010000	0.040010	0.90	0.036009	0.0456	0.9544	0.9537	34.34	556.0835
17	26	80	0.010000	0.045840	0.90	0.041256	0.0508	0.9492	0.9512	39.24	571.7540
18	27	81	0.010000	0.051120	0.90	0.046008	0.0555	0.9445	0.9489	43.65	587.1173
19	28	82	0.010000	0.056920	0.90	0.051228	0.0607	0.9393	0.9463	48.48	602.1312

identical non-converted permanent policy, again, at the time of conversion. The difference between the two PVFBs represents the severity of the excess mortality, and will be defined as "claim costs per conversion," by duration at conversion. The second stage looks at the term life side of the conversion. The aforementioned claim costs per conversion is multiplied by the conversion rate, to get a series of claim costs per policy in force by policy years. With those factors, we can price the cost of convertibility and establish reserving schedules.

Let's look at an example: a 10-year convertible term policy held by a male non-smoker, issue age 55, preferred class, and 5 percent discount rate. We want to calculate the cost of excess mortality if the policy were to convert to permanent in duration 10. Figure 2 shows how to calculate the single premium of a permanent policy issued at the same time as a converted term policy was originally issued. Note that at the time of conversion, the policyholder is age 64.

In Figure 2, the lapse assumptions in column 1 are from the SOA Conversion Experience Report, indexed by duration since conversion. The base mortality rates in column 2 are from the 2008 Valuation Base Tables' Select Ultimate Table, gender and smoking status distinct version. For this exercise, we arbitrarily assigned a 70 percent mortality multiple factor for a super preferred life, a 90 percent factor for a preferred life and a 110 percent factor for a standard life. Calculations after attained age 82 were omitted for presentation purposes, but continue to age 100. In this example, the single premium of a regular permanent policy that was issued at the same time as an equivalent convertible term policy would be $261.57 in duration 10.

Figure 3 uses a similar method to calculate the single premium of a term conversion.

The calculation is largely identical to that performed in Figure 2, with the addition of the conversion mortality multiples in column 1, which is the PISM in the SOA Conversion Experience Report.

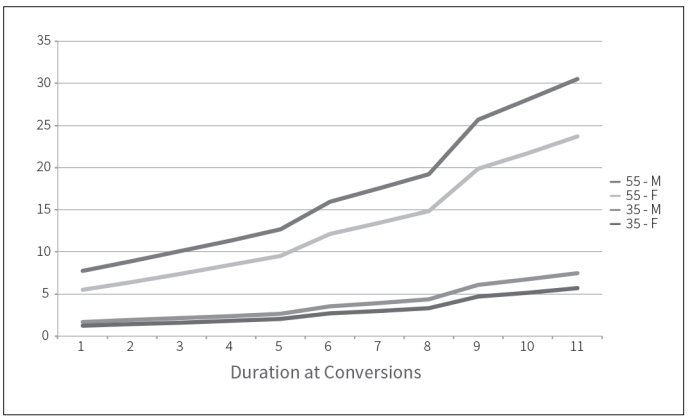
Figure 3
Conversion Single Premium

Dur_ Since_ CV	Duration	Attained Age	Conversion Multiple	Conversion Mortality	$q_x^{(lapse)}$	$q_x^{(total)}$	p_x	Continuous Conts. Force $a^{bar}_{x1}{}^{bar}$	Death Benefit per $1,000	EOY PVFB	Reserve per $1K @ CV
			1	2	3	4	5	6	7	8	9
0							1	0.9760		289.62536	28.0569
1	10	64	1.849387	0.008755	0.049798	0.0581	0.9419	0.9476	8.30	313.6227	28.1977
2	11	65	1.956586	0.010671	0.046734	0.0569	0.9431	0.9482	10.12	337.9087	27.5381
3	12	66	1.758423	0.010999	0.026846	0.0375	0.9625	0.9577	10.53	357.1548	26.6872
4	13	67	1.720997	0.012298	0.015039	0.0272	0.9728	0.9628	11.84	372.6994	25.2810
5	14	68	1.512863	0.012309	0.012947	0.0251	0.9749	0.9638	11.86	388.6312	24.4532
6	15	69	1.512863	0.013997	0.012947	0.0268	0.9732	0.9630	13.48	404.7417	23.3105
7	16	70	1.512863	0.015930	0.012947	0.0287	0.9713	0.9621	15.33	420.9557	21.8023
8	17	71	1.512863	0.018150	0.012947	0.0309	0.9691	0.9610	17.44	437.1818	19.8690
9	18	72	1.512863	0.020750	0.012947	0.0334	0.9666	0.9597	19.91	453.2830	17.4317
10	19	73	1.193468	0.018765	0.010060	0.0286	0.9714	0.9621	18.05	470.4634	17.1098
11	20	74	1.200000	0.021665	0.010000	0.0314	0.9686	0.9607	20.81	487.4625	16.5603
12	21	75	1.200000	0.024894	0.010000	0.0346	0.9654	0.9591	23.88	504.2344	15.8076
13	22	76	1.200000	0.028620	0.010000	0.0383	0.9617	0.9573	27.40	520.6357	14.8178
14	23	77	1.200000	0.032864	0.010000	0.0425	0.9575	0.9553	31.39	536.5253	13.5536
15	24	78	1.150000	0.036132	0.010000	0.0458	0.9542	0.9537	34.46	552.4571	12.6868
16	25	79	1.150000	0.041410	0.010000	0.0510	0.9490	0.9511	39.39	567.6748	11.5913
17	26	80	1.150000	0.047444	0.010000	0.0570	0.9430	0.9481	44.98	581.9803	10.2263
18	27	81	1.150000	0.052909	0.010000	0.0624	0.9376	0.9455	50.02	595.7144	8.5971
19	28	82	1.150000	0.058912	0.010000	0.0683	0.9317	0.9425	55.53	608.7916	6.6605

The conversion mortality in column 2 is the product of column 1 and the permanent mortality in column 4 of Figure 2. The single premium for a term conversion is $289.63. The difference between the PVFBs of the term conversion and the regular permanent policy issued at the same time is $28.06 (i.e., $289.63 – $261.57). This difference reflects the cost of excess mortality due to conversion if a term policy converts in policy year 10. Let's call it claim costs per conversion at duration at conversion 10. If this amount is transferred from the term policy into the permanent policy, it could cover the excessive mortality expected from the term conversion. In another words, the product manager of the permanent product becomes profit-neutral to the term conversion.

For a convertible term policy, we can look at different durations at conversion to generate a series of costs associated with the conversions. Figure 4 graphs four policies, two issued to males and two to females at issue ages 35 and 55, preferred non-smokers, and shows claim costs per $1,000 converted face amount by duration at conversion. Unsurprisingly, policies issued to older males who convert at a later stage of the level term period tend to have higher claims costs.

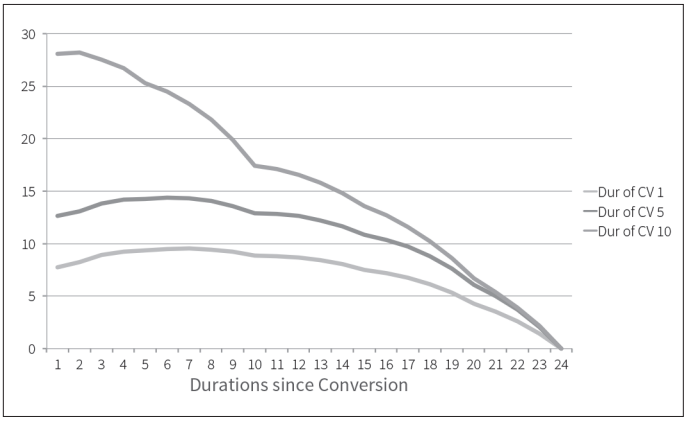
Figure 4
Claim Costs per $1,000 Converted Face Amount



With the projections of PVFBs post conversion, we can not only look at the claim cost at conversion, but also how the cost of excessive mortality is released. The last column of Figure 3 contains the projection of reserves once a term policy converts. It is the differences between the PVFBs of a converted policy and that of a regular permanent policy issued at the same time as the original term policy. This reserve, as mentioned earlier, is similar to disabled life reserves for some health products, and generally decreases throughout the life of a permanent policy.

Figure 5, below, shows the reserves for the same sample policy, (male non-smoker, issue age 55, preferred class), converting at durations 1, 5, and 10. Conversions that occur at later stages of the level term period have higher overall levels of reserves. PISM after duration since conversion 10 is low. As a result, the trajectories of the graphs appear to bend at year 10. For conversions that occur in the first few years, excess mortality is low. Reserves actually increased slightly due to interest earned.

Figure 5
Permanent Reserves for Conversions



Equipped with the claim costs per conversion from the permanent life model, we next switch our attention to the second stage model, the term life projection. Figures 6 and 7 project the sample policy during the term life stage. Most assumptions, including the arbitrary mortality multiple for different classes, are identical to what is being used for permanent life projection. The mortality select factors in column 33, term lapse rates in column 5 and term conversion rates in column 6 are from the SOA Conversion Experience Report.

Column 10 shows claim cost per policy converted, which were calculated in Figure 3. Note the number $28.06 we got from the Figure 3 is used in column 10 for duration 10. Claim costs per $1,000 face amount in force in column 11 are defined as conversion rate times column 10. Column 12 is the present values of claim costs per $1,000 face amount in force. In column 13, we chose $1 as the gross premium during the level term period and $5 for the premium in duration 11 and later. The beauty of setting those levels is for mathematical simplicity. The net level premium ratio works out to be the annual net premium for convertibility during the level term period. For the purpose of calculating convertibility costs, we did not use a full-length premium projection, but only of the segment of time when conversions would take place. It is conservative to shortened amortization period to avoid negative reserves after duration 11.

In the example above, the single premium for convertibility is $0.94 per $1,000 face amount (as seen in the column 12), and

Figure 6
Term Life Projection

Duration	Attained Age	Base Mortality	Mortality Multiple	Select Factor	Term Mortality	$q_x^{(lapse)}$	$q_x^{(conversion)}$	$q_x^{(total)}$	p_x	Const Force $a^{bar}_{x1}{}^{bar}$
		1	2	3	4	5	6	7	8	9
									1	
1	55	0.000830	0.90	0.907102	0.000678	0.093146	0.005792	0.0990	0.9010	0.9272
2	56	0.001340	0.90	0.860118	0.001037	0.074088	0.010196	0.0845	0.9155	0.9345
3	57	0.001770	0.90	0.850015	0.001354	0.064540	0.009203	0.0744	0.9256	0.9395
4	58	0.002160	0.90	0.842955	0.001639	0.059327	0.009098	0.0694	0.9306	0.9420
5	59	0.002530	0.90	0.824281	0.001877	0.057961	0.013708	0.0726	0.9274	0.9404
6	60	0.002940	0.90	0.823767	0.002180	0.054100	0.007172	0.0629	0.9371	0.9452
7	61	0.003390	0.90	0.805842	0.002459	0.051230	0.006971	0.0602	0.9398	0.9466
8	62	0.003930	0.90	0.862190	0.003050	0.052192	0.006977	0.0617	0.9383	0.9458
9	63	0.004550	0.90	0.804303	0.003294	0.058428	0.007702	0.0688	0.9312	0.9423
10	64	0.005260	0.90	0.863699	0.004089	0.603525	0.045495	0.6231	0.3769	0.6257
11	65	0.006060	0.90	1.700753	0.009276	0.267457	0.036784	0.3009	0.6991	0.8216
12	66	0.006950	0.90	1.700753	0.010638	0.267457	-	0.2753	0.7247	0.8356
13	67	0.007940	0.90	1.700753	0.012154	0.500000	-	0.5061	0.4939	0.7022
14	68	0.009040	0.90	1.700753	0.013837	0.750000	-	0.7535	0.2465	0.5281
15	69	0.010280	0.90	1.700753	0.015735	1.000000	-	1.0000	-	-

Figure 7
Term Life Projection—Continued

Duration	Attained Age	Single Prem Due to Conv.	per 1,000 Converted Undercrmted Claim Costs	EOY PVFB	Gross Prem to Amort CV BOY	EOY PVFP($1)	Net Lvl Prm Factor	Terminal Reserve
		10	11	12	13	14	15	16
				0.9389		6.5218	14.40%	
1	55	7.7271	0.0448	1.0459	1.00	6.4350	0.1440	0.1194
2	56	8.9215	0.0910	1.1020	1.0000	6.2333	0.1440	0.2046
3	57	10.1174	0.0931	1.1509	1.0000	5.9367	0.1440	0.2962
4	58	11.3556	0.1033	1.1887	1.0000	5.5702	0.1440	0.3868
5	59	12.6605	0.1735	1.1611	1.0000	5.1745	0.1440	0.4162
6	60	15.9503	0.1144	1.1799	1.0000	4.6776	0.1440	0.5065
7	61	17.5463	0.1223	1.1888	1.0000	4.1086	0.1440	0.5973
8	62	19.2347	0.1342	1.1883	1.0000	3.4786	0.1440	0.6875
9	63	25.7107	0.1980	1.1294	1.0000	2.7947	0.1440	0.7271
10	64	28.0569	1.2764	0.9216	1.0000	5.0000	0.1440	0.2018
11	65	30.4962	1.1218	-	5.0000	-	0.1440	-
12	66	-	-	-	-	-	0.1440	-
13	67	-	-	-	-	-	0.1440	-
14	68	-	-	-	-	-	0.1440	-
15	69	-	-	-	-	-	0.1440	-

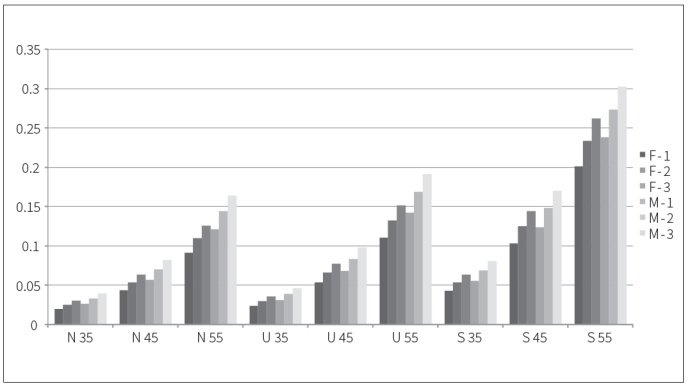
the annual charge for the conversion option is $0.14 per $1,000 face amount (column 15).

OBSERVATIONS

With those simplified assumptions, the higher the base mortality, the bigger the difference in PVFB between converted term policies and regular permanent policies; therefore, the higher the cost of convertibility.

Figure 8 summarizes the convertibility net premium for 54 sample policies, by gender, risk classes, smoker status and issue ages. Net premium ranges from $0.02 per $1,000 face amount for a female super-preferred nonsmoker at issue age 35 to $0.30 per $1,000 for a male standard class smoker at issue age 55.

Figure 8
Convertibility Net Premium

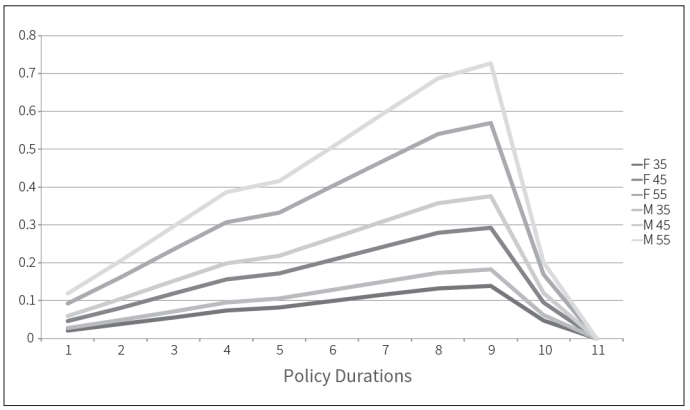


Note that the Figure 8 shows dollar amount of net premium. If converted to the percentage of gross premium of a term policy, the shape of the chart might look very different.

Figure 9 depicts reserve projections for six convertible term policy for preferred nonsmokers. The graph shows the projection for males and females, issue ages 35, 45 and 55. Reserves build slowly during the first nine years due to generally low conversion rates and relatively low PISMs. In duration 10, however, significant portions of the reserves are released due to both the high likelihood and potential severity of experience for the conversions. The male policyholders in each age group have the highest reserves throughout. Older issue ages, which are associated with higher net premium for convertibility, also require higher reserves.

Clearly, the cost of convertibility for these policies is rear-heaped. This reserving pattern for convertible term products makes it difficult to manage the profit in the term products. When we realize our base assumptions of conversion rates and PISM are inadequate, there is not much time to take actions.

Figure 9
Term Reserve for Conversions

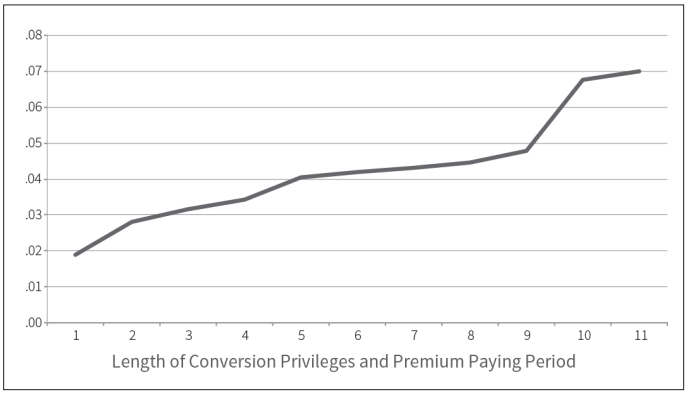


When that happens, it makes economic sense for the term product to absorb the shock, and transfer assets to what the revised assumptions suggest, instead of what is available from the built-in release of reserves. However, the actual accounting could still be tricky.

Shortening the conversion privileges for the term policies might provide some relief. We used the same method described in this article to test different length of conversion privileges. To be fair and to avoid negative reserves, the premium payment period was set to match the duration of the conversion privileges for the term policy.

Figure 10 shows the annual premium for a convertible term policy held by a male, standard class and issue age 45, by the length of conversion privileges and premium paying period. If there is no restriction on conversions, the annual premium for the convertibility will be $0.07, payable for the life of the term contract. If, however, conversion privileges are restricted to the first seven policy years, the additional premium cost for the convertibility decreases to $0.04 a year, payable for seven years.

Figure 10
Annual Premium by Conversion Privileges

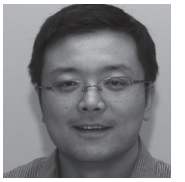


Generally speaking, we noticed that if conversions are disallowed in year 10 and beyond, annual premium for the convertible term product can be reduced by roughly 30 percent. The calculation is based on the assumptions that policyholders do not alter their behavior to adapt to the new policy feature. In reality, when conversion privileges are shortened, it would be reasonable to expect policyholders to accelerate their conversion decisions while they still have the option.

In the calculations above, it is assumed that conversions would occur throughout all policy years. Year 10, however, is clearly unique, as claim costs due to conversion as well as shock lapse levels are both high. Uniform distribution might not be prudent, especially during Year 10, when conversions are likely to occur around the end of the policy year. To quantify the impact of this timing assumption, we changed the timing of the conversions and lapses to the end of each policy years. Conversions were calculated after continuous death but before lapsation. The resulting net premium for convertibility rose by about 25 percent.

To sum up, revenue should match risks. An insurer should charge and establish reserves specifically for conversions at the issuance of a convertible term policy. With each term conversion, the company would calculate a claim cost to cover future excess mortality. That reserve becomes the asset that transfers from the term product to the permanent product.

The article is not intended to offer a valuation guideline. There are many questions companies still need evaluate. For example: should insurers follow Financial Accounting Standard 60 (FAS 60—Accounting and Reporting by Insurance Enterprises) to lock in assumptions related to conversions? Or, should Statement of Position 03.1 (SOP 03-1—Accounting and Reporting by Insurance Enterprises for Certain Nontraditional Long-Duration Contracts and for Separate Accounts) be followed for the release of deferred acquisition costs? How are conversions not explicitly charged for incorporated into the term reserve under principal based reserve framework? For policies already converted, when we update our PISM assumptions, should we unlock the reserves due to conversions? These, and other questions, would need careful analysis and discussions with valuation actuaries and auditors. ■



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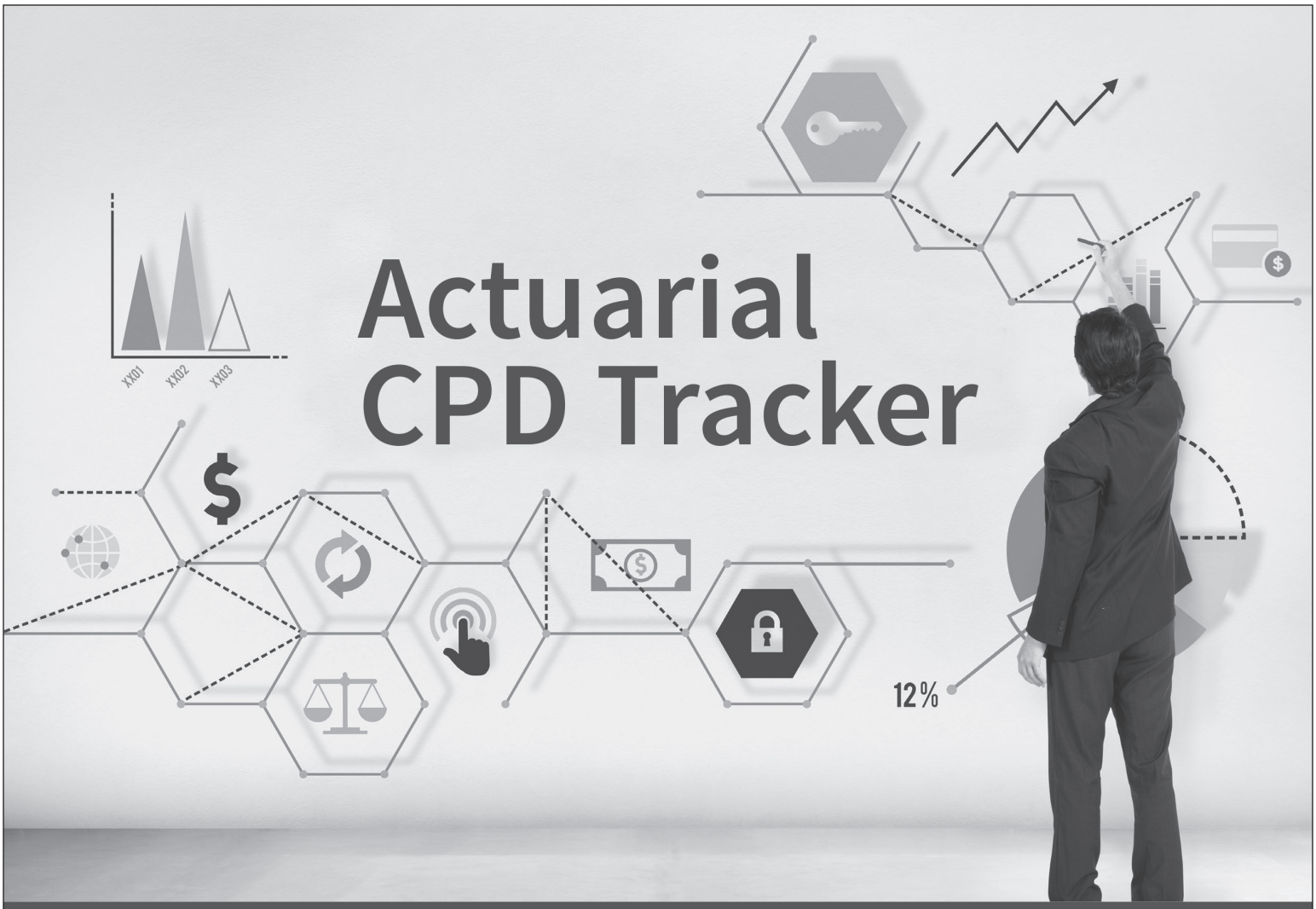

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Are Discounted Accelerated Benefits Cost Neutral?

By Jeffrey Dukes

Discounted accelerated benefits, where the accelerated benefit paid is a present value of expected claims less a present value of future premiums, are often believed to be cost neutral. But maybe that is not necessarily the case.

To see why, consider two level premium term products, A and B, which both provide coverage to age 100 and are also identical in every other respect, except that Product A includes a provision which gives the policyholder the option to receive a discounted benefit payment upon diagnosis of a critical illness.

Assume that the way Product A's discounted benefit works is:

- A policyholder is diagnosed with a covered critical illness;
- The policyholder then has the option to elect to receive a fraction, F, of the total face amount on a discounted basis, where F can range from, say, 5 percent to 90 percent;
- Based on evidence provided and, perhaps, a medical exam, the company makes an estimate of the insured's remaining life expectancy;
- Based on the estimated life expectancy and a specified mortality table, an impaired (or rated) age, y, is determined where the life expectancy for the impaired age equals the estimated life expectancy;
- The discounted benefit payable is then equal to BEN – PREM – EXP, where:
  - BEN = present value of projected claims from attained age y to the end of the coverage period (i.e., for 100 – y years) based on the specified mortality table and a discount rate determined by the policy's contractual language. The discount rate is subject to limits prescribed by regulations. For purposes of this exercise, assume that the discount rate is currently 4 percent.
  - PREM = present value of actual current gross premiums payable for the next 100 – y years. These will depend on the actual issue age and duration of the contract when the claim is made. In practice, companies may use current premiums, guaranteed maximum premiums or something in between.
  - EXP = an administrative expense charge, which we will take to be $300.

To illustrate how there might be a cost for such a benefit, suppose:

- A 20 year level premium term plan with a face amount of $100,000 was issued at age 50 to a male, nonsmoker, a critical illness was diagnosed at the end of policy year 15, and the estimated life expectancy after diagnosis is 7–8 years, which translates into an impaired age of 80 based on 2001 VBT, male, ALB, nonsmoker, ultimate mortality rates.
- Current premium rates per $1,000 are those shown in Table 1.
- Prospective company expenses are:
  - Commission. 2.0 percent of premium
  - Premium Tax. 2.5 percent of premium
  - Maintenance Expense. $59.38 per policy ($45 at issue with 14 years of inflation), inflated at 2 percent per year.
- Lapse rates after diagnosis of a critical illness for policyholders without the accelerated benefit (viz., those with Product B) are:
  - Alternative 1: 0 percent in all years; or

Table 1
Current Premium Rates per $1,000 (before reflecting a $30 policy fee)

Policy Year	Rate	Policy Year	Rate	Policy Year	Rate
16	5.40	28	103.20	40	450.90
17	5.40	29	115.10	41	572.60
18	5.40	30	128.50	42	632.10
19	5.40	31	143.40	43	641.40
20	5.40	32	159.70	44	683.40
21	47.90	33	176.80	45	728.20
22	56.00	34	195.60	46	788.60
23	62.30	35	216.50	47	844.60
24	69.00	36	239.70	48	904.10
25	76.20	37	299.20	49	960.00
26	84.10	38	379.20	50	960.00
27	92.90	39	402.90		

- Alternative 2: 0 percent for the remainder of the level premium period (policy years 16-20) and then 10 percent, 15 percent, 20 percent, 25 percent and 30 percent in policy years 21, 22, 23, 24 and 25+, respectively; or

- Alternative 3: 0 percent for the remainder of the level premium period (policy years 16-20) and then 10 percent per year, thereafter.

- Expected mortality after diagnosis is 2001 VBT, male, ALB, nonsmoker, ultimate for attained ages equal to the impaired (or rated) age and older.

Then Table 2 shows the present value (per $1,000 of insurance and using the assumed 4 percent discount rate), as of the end of policy year 15 when the diagnosis is made, of benefits and premiums for someone with Product A vs. someone with Product B.

Note that:

- The lapse rate pattern is not relevant for Product A because lapse rates are not reflected in the calculation of the accelerated benefit amount.

- If policyholders without the accelerated benefit provision would never lapse after diagnosis of a critical illness (Alternative 1), then offering the accelerated benefit is cost effective for the company because they don't incur future premium tax, commissions, or marginal maintenance expense. These illustrative calculations assume the maintenance expense factors are all marginal.

- On the other hand, if some policyholders with an otherwise identical policy but without an accelerated benefit provision are likely to lapse, then the benefit provided by the

Table 2

Lapses	PV Claims*		PV Premiums**		PV (Claims-Premiums)		A(t) – B(t)
	Product A	Product B	Product A	Product B	Product A (A(t))	Product B (B(t))	
Alternative 1	727.99	751.40	239.40	243.89	488.60	507.51	(18.91)
Alternative 2	727.99	536.37	239.40	128.01	488.60	408.36	80.24
Alternative 3	727.99	605.71	239.40	164.68	488.60	441.03	47.57

*The PV of Claims for Product B includes the present value of commissions, premium tax and maintenance expense for policy years 16-35. Those would not be incurred for Product A if the benefit is accelerated.
**The PV of Premiums for Product A includes the $300 administration charge ($3 per $1,000 for a $100,000 policy) assessed when the accelerated benefit amount is determined.

accelerated benefit provision is more generous than the actual expected cost of remaining coverage. Comparing the results for Alternatives 2 and 3 you can see that the assumed lapse rates impact the expected cost of Product B relative to Product A.

It is hard for me to believe that nobody diagnosed with a critical illness, but without an accelerated benefit provision in their policy, would lapse, particularly when there are large increases in premiums after the level premium period. But in the absence of experience, that is a judgement call on the part of the pricing actuary. As the results for Alternative 3 show, the lapse rates do not have to be extremely high for this cost differential to emerge.

More generally, to calculate the cost of the accelerated benefit, for a given combination of issue age, sex, risk class, face band, etc.:

1. Develop assumed Incidence Rates, I(t), for a (potential) claim in policy year *t* due to a contractual critical illness.

2. Let F1(t) = fraction of the total death benefit to be paid (before discounting), for those who have a claim and elect some payment in policy year *t*. There may be contractual limits on how large F1(t) can be and policyholders may be able to choose a value for F1(t) within certain limits.

3. Let F2(t) = fraction of people eligible for a (discounted) payment in policy year *t* who actually make a claim. Given how heavily discounted the accelerated benefit might be, some people who could make a claim might choose not to make a claim. Although not reflected in the formula here, the pricing actuary should at least consider the possibility that there is some effective anti-selection involved in that decision—i.e., the average remaining life expectancy of those opting not to make a claim is greater than what the company would estimate, particularly if the rated age is assigned without any underwriting at the time of the claim.

4. Cost = $\sum I(t)*F1(t)*F2(t)*(v^t)*({}_{t-1}p_x)*[A(t) - B(t)]$, where:

   a. ${}_{t-1}p_x$ is the probability of surviving/persisting to the beginning of policy year t and perhaps should treat the incidence rates, as well as lapse and mortality, as a decrement.

   b. A(t) = [PV (as of the beginning of policy year t) of Future Claims – Premiums] – 300 per policy.

      The PV is calculated using an assumed Accelerated Benefit discount rate and assumed impaired life mortality for 100 – (Impaired Age) years, but using premiums applicable to the policyholder's actual issue age/duration during that period.

      Note that for a given claim, the Impaired Age might vary from person to person depending on how severe the illness is, etc. So, it is necessary to make some sort of assumptions about that, as well.

      Also note that:

      - Mortality is the only decrement reflected in calculaing A(t)
      - The Product A difference of 488.60 in Table 2 is A(t) for the assumptions used in the numerical examples.

   c. B(t) = PV Claims + PV Expenses – PV Premium as of the beginning of year t where these PV's:

      - Use discount rates equal to anticipated earned rates.
      - Claims reflect assumed impaired life mortality.
      - All PV's reflect plausible lapse rates for someone diagnosed with a critical illness (but for a cohort of otherwise identical policies without a critical illness benefit).
      - Expenses would be those that the company would incur if this was an otherwise identical cohort of policies without the critical illness benefit, such as commissions, maintenance expense, and premium tax.
      - The PV's are calculated over the remaining actual coverage period, which is 100 – (Actual Attained Age at Claim) years under our assumptions.

Table 3
Rated Age = 70

Premiums per $1,000	Discount Rate	Lapses	A(t)	B(t)	A(t) – B(t)
Table 1	4 percent	Alternative 2	(119.05)	60.60	(179.65)
Level $15	4 percent	Level 5 percent	424.07	245.38	178.69
Level $70	4 percent	Level 5 percent	(157.92)	(158.26)	0.34
Level $70	6 percent	Level 5 percent	(186.79)	(168.09)	(18.70)

In this case:

- Both mortality and lapse rates are decrements when calculating B(t).
- The Product B differences of 507.51, 408.36 and 441.03 in Table 2 above are the values of B(t) for the alternative lapse assumptions in the numerical examples.

I tested the impact of changing the premium pattern and rated age to get some additional insight into what factors affect the cost:

1. In my illustrative example, where the impaired age is 80, costs (positive values of A(t) – B(t)) seem to emerge if lapse rates for Product B are non-zero even if gross premium rates are level. For example, if a level premium of $70 per $1,000 is assumed instead of the level premium of 5.40 followed by ART rates and Product B lapse rates are assumed to be 5 percent per year, then for the assumed product design, A(t) becomes 243.97 and B(t) is 178.08 with A(t) - B(t) = 65.89.
2. But, if the impaired (rated) age is changed from 80 to 70, with no change to other assumptions, then there are negative costs with the premium rates in Table 1. In other words, A(t) < B(t). However, level premiums and a 5 percent lapse rate can still result in positive costs, depending on the discount rate and how large the level premium is.

A few sample results illustrating these two points are shown in Table 3.

If this analysis is correct, then there is obviously a fair amount of work involved in developing assumptions and doing the calculations necessary to quantify the expected cost, if any, associated with offering a discounted accelerated benefit. An iterative approach might be necessary in order to set premium rates to meet profit objectives measured as either a ratio of present value of profit to present value of premium or as a desired IRR. ■

The views expressed in this article are those of the author and do not necessarily reflect the views of Milliman.

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