SOCIETY OF ACTUARIES Health Section

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Health Watch

Implications of Individual Subsidies in the Affordable Care Act—What Stakeholders Need to Understand

By Greg Fann

"If you are one of the 30 million Americans who don't yet have health insurance, starting in 2014 this law will offer you an array of quality, affordable, private health insurance plans to choose from." This statement and others like it on the White House website suggest that an abundance of low-cost health plans with relatively generous benefits are now available nationwide in the commercial non-group (individual) market due to provisions in the Affordable Care Act (ACA) and that the number of uninsured Americans should rapidly decline. The success of the ACA in accomplishing the stated goal of ensuring that every American has access to affordable health care has been unremittingly questioned, and will continue to be debated long after the administrative implementation struggles are resolved, and likely long after the market stabilizes and all individual and small group enrollees have transitioned to ACA-compliant plans.

Embedded in all of these messages is the nebulous title of the law and the term "affordable," which lacks consensus of determination and remains largely undefined. "Affordable" is

CONTINUED ON PAGE 5

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Letter from the Editor

By Kurt Wrobel

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As I think about the change in the health care industry, I can't help but think of the old saying: "May you live in interesting times." With all the changes, we are seeing in real time the evolution of the most far-reaching domestic legislation in our lifetimes. By almost any measure, the Affordable Care Act (ACA) has created a very interesting time for actuaries as we try to account for the changes and unforeseen impact of this legislation.

This edition of *Health Watch* highlights this change and implications associated with the ACA. As outlined in many of the articles, the changes have the potential to produce unintended results that could have an impact on all stakeholders—including insurers and consumers.

Greg Fann begins this edition with a very detailed description of the subsidy provisions in the ACA. This detailed description of the ACA provisions is important to fully understand the implications associated with the subsidy program and highlights a topic where actuaries can add expertise to the public discussion. As Fann notes with specific examples, the subsidy provisions produce surprising results that seem contrary to the goals of the program—particularly provisions that could make the program relatively unattractive to younger enrollees.

Daniel Pribe, Richard Tash and David Tuomala continue the discussion of the ACA implications by highlighting the impact of enrollment and financial risk on an insurer's risk-based capital (RBC). As they note, the RBC requirements become more difficult to meet when considering the ACA changes and their associated risk protection measures (the so-called 3R's).

As we all know, the risk scores inherent in many of the programs and predictive modeling will become more important in determining the financial success of insurers and estimating future financial results. In her article, Christine Hofbeck highlights the nuts-and-bolts operation issues that should be considered when deploying a predictive model program.

While the preceding articles focus on the ACA and its implications, Andie Christopherson and Jed Linfield discuss a comprehensive framework for determining the true value of medical technology. This article also highlights how the SOA can partner with academics to produce applied research to help in our everyday work.

Chairperson's Corner

By Donna Kalin

You are probably aware of the Health Section Council's mission statement, which identifies three prime objectives: providing continuing education, developing research, and expanding marketplace relevance for health actuaries. For this issue of Chairperson's Corner we will focus on some of our strategic activities regarding continuing education (CE).

We have taken on a long-range planning effort to identify and prioritize over a dozen emerging subject areas for CE development. Volunteer "champions" for each topic create specific plans to develop CE material for our members. Recognizing that our members have different educational needs, our plans include ideas for CE delivery ranging from providing basic awareness of an issue, to moderate and advanced levels of knowledge. Members should be able to access CE at a level and via a delivery mechanism that are appropriate to their own circumstances. Delivery mechanisms include meetings and seminars, publications, webcasts and podcasts.

Some of the most exciting opportunities available to you include the following.

Canadian Health Actuary Seminar

For our Canadian members, the debut of this one-day seminar will take place in Toronto, Canada on May 5. Canadian health topics to be discussed include:

- The current body of research on the sustainability of the Canadian health care system
- Pharmacy benefit design and strategy
- Drug adherence interventions
- Recent Canadian case law and legislation.

Health Meeting

This year's health meeting will take place June 23 to 25 in San Francisco. This is the largest CE event for the section. This meeting will feature almost 100 topical sessions to provide you with the latest updates on important health issues. There will be excellent speakers, plenty of networking events, and the opportunity to earn lots of CE credits. I would like to mention our three keynote speakers.

Mark McClellan, M.D., is senior fellow, director of the Initiative on Innovation and Value in Health Care in the Engelberg Center for Health Care Reform in the Brookings Institution. Within Brookings, his work focuses on promoting quality and value in patient-centered health care. A doctor and economist by training, he has a highly distinguished record in public service and academic research. He is a former administrator of the Centers for Medicare & Medicaid Services (CMS) and former commissioner of the Food and Drug Administration (FDA). He also served as a member of the President's Council of Economic Advisers and senior director for health care policy at the White House. In these positions he developed and implemented major reforms in health policy. He will be speaking at the opening general session on topics regarding the future of health care in America.

Mike Abrashoff is a former naval commander and author of *It's Your Ship*. He established a system of management techniques that he calls GrassRoots Leadership—a process of replacing command and control with commitment and cohesion, by engaging the hearts, minds and loyalties of workers with conviction and humility. He is the founder of GLS Worldwide, a consulting firm that works with and supports leaders as they address leadership, talent and business challenges within their organization. He will be speaking at the general luncheon.

John M. Bertko, FSA, MAAA, is currently an independent actuarial consultant working with Covered California (California's insurance marketplace) and was the director of Special Initiatives and Pricing in the Center for Consumer Information and Insurance Oversight (CCIIO) at CMS. He has extensive experience

CONTINUED ON **PAGE 4**

ISSUE 75 MAY 2014

Health **Watch**

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This newsletter is free to section members. Current issues are available on the SOA website *(www.soa.org)*.

To join the section, SOA members and non-members can locate a membership form on the Health Section Web page at http://www.soa.org/health/

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with risk adjustment and has served in several public policy roles. At the networking luncheon, he will be interviewed by Geoff Sandler.

Valuation Actuary Symposium

Valuation actuaries, save the date! The symposium will be held Aug. 25 to 26 in New York City. This year the Health Section Council will be coordinating eight sessions, which means one health-focused session for every session time slot.

Volunteers Needed

We expect to have a busy year, with more ideas for projects than the available resources and time will permit us to do. As you know, our efforts rely on volunteers, and we never seem to have as many volunteers as we need. I encourage you to contribute in whatever way interests you. If you would like to get involved with the work of the Health Section (running for the Health Section Council, presenting at a meeting/seminar, coordinating meeting/seminar sessions, writing a *Health Watch* article, being a "champion" for a specific subject area for CE development, etc.) or you just want to learn about these opportunities, please fill out the volunteer interest form found on the SOA Health Section website (*http://www.soa.org/professional-interests/health/hlth-detail.aspx*) or contact me at *donna.kalin@milliman.com*, or contact any member of the Health Section Council.

On The Research Front

SOA PARTNERS WITH HEALTH CARE COST INSTITUTE (HCCI)

The Society of Actuaries (SOA) has signed a letter of intent to enter into a partnership with the Health Care Cost Institute (HCCI), an independent, nonpartisan, nonprofit research organization. One of the primary activities of HCCI is to create and maintain a first-of-its-kind database of up-to-date information about public and private sector health care costs and utilization with data contributions from many U.S. insurers. The agreement will enable the SOA to access this database at HCCI and produce several major research projects per year responding to the growing need for informative, qualitative and unbiased health care research.

REC STREAMLINES EVALUATION PROCESS FOR REX POOL FUNDING

The Research Executive Committee (REC) recently undertook a thorough review of the application and evaluation processes for the SOA's "Research Expanding Boundaries Pool" (REX Pool) with the goal of better addressing the needs of its stakeholders. Several important changes have been implemented to the REX Pool that will become effective in March 2014. The changes include moving to a continuous cycle of accepting and reviewing applications, streamlining the funding decision process, and expanding the eligibility of topics submitted for REX Pool funding. Full details can be found in the updated guidelines.

frequently cited without explanation and with little communicated understanding of the net financial consequences for different groups of consumers for 2014 and beyond, nor in terms of the change compared to 2013. This lack of understanding is highlighted in a March 2014 McKinsey study[1] that suggests that uninsured Americans have been slow to enroll and primarily cites "perceived affordability challenges" as the most common reason. While 80 percent of the McKinsey respondents were eligible for a federal premium subsidy, 66 percent were not aware of their subsidy eligibility or the applicable amount.

This article discusses the details of the ACA provisions of federal subsidies that affect consumers' cost of coverage in the individual market, and breaks down how the net effect of these provisions will shape consumers' decisions to buy a new level of coverage, retain current coverage, or elect to be uninsured (or underinsured according to the ACA definition) despite new tax penalties. Prior to diving into the consumer-directed affordability mechanisms crafted in the ACA, it is worthwhile to review other new market impacts that will also affect affordability.

Gross Premiums and Risk Mitigation Programs in the New Market

Numerous articles and studies have been published regarding the ACA's overall effect on underlying claim costs and premiums in the individual market, including a major undertaking by the Society of Actuaries released in March 2013.[2] While the conclusions have varied across studies, there is unanimous agreement that actuaries faced great uncertainty in the development of premiums for 2014, and that they will continue to face similar uncertainty for several years to come. Contributing to this uncertainty is the health risk of those who will enroll in individual plans who are now currently uninsured. The composition of the expanded individual market is unknown; the individual market will grow significantly and may be older and less healthy than anticipated. The degree of change will differ by market; each state is starting from a different point and has a different demographic profile. To manage the financial consequences of these risks, premium stabilization processes were put in place by the ACA that will smooth the transition to the new market environment and will partially protect issuers from losses (and partially limit gains). These temporary protections and the potential of an increased market size could enhance competition and might attract new issuers who see a limited-time opportunity to enter the market with lower risk implications.

Similar to the abundance of premium impact research, many of the technical aspects of the ACA that will find their way into actuaries' daily routines have been thoroughly presented in numerous formats. This includes topics such as the risk corridor program, the risk adjustment program, the reinsurance subsidy, the cost-sharing reduction subsidy, and minimum loss ratio regulations.

In general, the gross premium implications (including related assumptions such as the effect of guarantee issue, pent-up demand and induced utilization) and the technical aspects of premium stabilization are mostly understood. That said, it is my observation that there is a wide gap in understanding what lies between these two areas. Specifically, the risk mitigation program calculations are dependent upon the enrollment in the individual market, which is predicated on the expected *net* costs to consumers after adjusting gross costs for federal subsidies.

While some advanced analytical models have presumably accounted for subsidies in projecting individual behavior, the technical nature of the mechanics has been overlooked in public forums, and the impact of these subsidies is frequently generalized and misrepresented. A methodological understanding of how the subsidies work is required to understand the transition from gross premium to net premium, which is needed in order to model consumer behavior and develop reasonable enrollment and financial projections. This understanding can

CONTINUED ON **PAGE 6**

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provide an opportunity for actuaries to correct common misconceptions and facilitate the construction of thoroughly vetted analytic models that will add clarity and confidence for stakeholders assessing the market impact.

ACA Impact on Individual Rates

The ACA includes several provisions that impact gross premium rates, rate relativities, and net costs paid by individuals. Moreover, access to insurance is guaranteed and health status can no longer be used as a rating variable. No longer can issuers exclude coverage for pre-existing conditions. Comprehensive coverage with guarantee issue, along with new industry taxes, obviously increases underlying costs and associated premiums. The ACA offsets some of this upward force on premiums by creating penalties for those not retaining adequate insurance, as well as through encouraging healthier people to enroll by providing generous premium and benefit subsidies to some based on income levels. A description of the major items affecting rates is included below.

Affordability does not take into account accumulated savings and assets, nor the notion that older people generally budget a higher percentage of spending for health care services. Income is the only affordability measure.

RATE REVIEW

While rate review oversight remains at the state level, exchange-qualified plans also must be reviewed at the federal level. Some states received federal grants to increase the scope of reviews. As will be discussed later in this article, the net impact of rate review will have a different, and likely surprising, impact on individuals when viewed separately by age and income level.

MINIMUM LOSS RATIO

After allowing for quality improvement costs as well as taxes and assessments, an 80 percent minimum loss ratio must be met in the individual and small group markets (separately, unless the state has merged the two markets into one pool, as has Vermont). A result below 80 percent results in refunds to policyholders. This calculation will be performed on results that will include proceeds to or from the risk adjustment, transitional reinsurance, and risk corridor programs. It is important to note that the risk corridor program transfer payments occur prior to the calculation of minimum loss ratio rebates.

INDIVIDUAL MANDATE

The guarantee issue provision and the age rating compression (discussed below) increase the premium rates for younger individuals. To entice healthier uninsured individuals to enroll, and thus subsidize higher-cost individuals, a tax penalty will apply to individuals who do not enroll in "minimum essential coverage." The penalty is the greater of $95 or 1 percent of income in 2014. These amounts increase significantly in 2015 ($325 and 2 percent) and 2016 ($695 and 2.5 percent). There are several qualifying exemptions to the tax penalty, but generally it will ultimately be a significant financial consideration for consumers who are hesitant about purchasing coverage.

METAL TIERS

The ACA attempts to standardize health care coverage by requiring that plans sold in the individual and small group market meet an actuarial value (AV) criterion, which is the average value of the plan benefits relative to the total allowed costs. This allows consumers to compare benefit values across issuers and is intended to increase price transparency. Bronze plans have an AV of 60 percent. Silver plans have an AV of 70 percent. Gold plans have an AV of 80 percent. Platinum plans have an AV of 90 percent. A +/-2 percent variation in AV is allowed to meet the metal level criterion. Issuers have flexibility in designing benefits packages to meet the AV criterion, but must meet some specific minimum requirements such as maximum out-of-pocket limits.

RISK ADJUSTMENT

A critical permanent balancing item in the new framework is risk adjustment. Risk adjustment is "a zero-sum game" across each market in each state, and is intended to have issuers compete on their ability to provide quality affordable care and an efficient administrative system, rather than their ability to attract a less risky membership. Risk adjustment fosters market stability and overall competition. While new to the commercial market, risk adjustment programs are prevalent in Medicare Advantage and various state Medicaid programs.

PREMIUM SUBSIDIES

Each of the above items is intended to decrease the level of gross premium rates. Similar regulatory ideas have been implemented in various states in the last 30 years and have generally not succeeded in reducing premiums, largely due to issuer withdrawal from the market and higher claim costs due to lower participation of young and healthy enrollees. The authors of the ACA were familiar with states' histories and believed that a successful regulatory system could be developed with the addition of the aforementioned mandate, a few balancing items, and a large financial commitment from the federal government, mainly in the form of benefit and premium subsidies. It is recognized that adequate participation from young and healthy individuals is required for success, so targeted promotional efforts and outreach are also necessary in addition to the framework of financial incentives.

The large financial commitment in the ACA, the crown jewel of the law, is the allocation of premium subsidies directly to some individuals, which is intended to lower the net cost of insurance for those specific purchasers. The subsidies are intended to lower the purchasers' costs to a more affordable rate. How is affordability determined? Who is eligible to receive subsidies? How are the subsidies calculated? How do the subsidies facilitate more affordable coverage? These are the right questions to ask, and they are listed in sequential order with each subsequent answer being more complex. To be eligible for a premium subsidy, an individual must have an income level between 100 and 400 percent of the Federal Poverty Level (FPL), purchase a plan in an individual exchange, and generally not be eligible for other coverage.

Affordability is determined based on a graded scale as a percentage of income; specifically, as income rises, individuals are deemed to be able to afford to spend a larger share of their income on health care services. Affordability does not take into account accumulated savings and assets, nor the notion that older people generally budget a higher percentage of spending for health care services. Income is the only affordability measure. Individuals who have incomes above 400 percent of FPL are not eligible for subsidies and thus are technically presumed to be able to afford health coverage, regardless of the cost relative to income. This is particularly significant given the wide difference in premium levels throughout the country.

The affordability definition is applied to a benchmark plan in the individual's geographic region. The benchmark plan is the second-lowest-priced silver plan option available. If the gross premium for this plan is higher than the affordability measure, the individual only pays the "affordable" amount, and the federal government subsidizes the remainder of the premium cost. If the individual selects a more expensive or lower-cost plan, that plan can be purchased for a lower rate by carrying over the calculated subsidy to the selected plan.

The resulting impact of the premium subsidies on net premium rates is not intuitive, and generally not well understood. While a technical analysis is required to understand the different impacts to different people, the natural inclination is to generalize and believe that the premium subsidies will have uniform and directionally appropriate effects across the eligible population, as most government entitlement programs are intended to do. However, the following sections will illustrate that the subsidies will primarily benefit older people, as premium rates for younger people are more likely to be considered "affordable" before a subsidy adjustment. This reality is either unknown or overlooked when reliance on premium subsidies is the automatic explanation of why there is no reason to be concerned that young people may choose not to enroll in the individual exchanges.

The concern that young people will not enroll in enough levels to support the sustainability of the individual market is further strained by the widely known ACA provision requiring employers to allow children under the age of 26 to enroll or remain on their parents' plans, as well as age compression of the individual market premiums that will discourage younger members from enrolling compared to premiums they would pay if age rating were on an actuarially appropriate basis. A detailed illustration of the premium subsidy calculation and resulting

CONTINUED ON **PAGE 8**

net premiums by age and income level is provided below.

COST-SHARING SUBSIDIES

Cost-sharing subsidies are available only for individuals with incomes below 250 percent of the FPL who select a silver plan in the exchange. Individuals select a standard silver plan from the exchange and the benefits are adjusted to gross up the AV from 70 percent to 73 percent (200 to 250 percent FPL), 87 percent (150 to 200 percent FPL) or 94 percent (100 to 150 percent FPL). The premium rate for these eligible individuals remains at the 70 percent level, and the federal government subsidizes the difference between 70 percent and the grossed-up AV through reimbursing the issuers for the enriched plan design. Effectively, the enhancements change the expected cost-sharing percentage from 30 percent to 27 percent (200 to 250 percent FPL), 13 percent (150 to 200 percent FPL) or 6 percent (100 to 150 percent FPL). While there is benefit design flexibility in adjusting the benefits to achieve the right cost share level, a minimum requirement is adjusting the maximum out-of-pocket limit (MOOP) to $2,250 for individuals at 100 to 200 percent FPL and to $5,200 for individuals at 200 to 250 percent FPL. The 2014 maximum before the required reduction is $6,350 for individuals and $12,700 for families.

It should be noted that all cost sharing is zero for Native Americans below 300 percent FPL for all metal level plans. For simplicity, applicable scenarios for qualifying Native Americans are not included in the illustrations below as the financial implications related to plan selection for these individuals are straightforward.

AGE RATING COMPRESSION AND GENDER NEUTRALITY

The allowable rating relationship of costs by age and gender varies across states, but the cost curve is generally thought to be in the 5:1 or 7:1 range.[3] The ACA prescribes a 3:1 age rating limit, which is intended to lower the premium costs to older people. The ACA also prohibits rating differently based on gender starting in 2014. The ACA prescribes a common rate slope across issuers in each state, with the federal default slope adopted in most states. The rate impact will obviously vary by age and gender, and create a market that is less attractive to young people, all else being equal.

President Obama's announcements that allow for further extension of pre-ACA benefits presumably preserve the pre-ACA age and gender rating structure for individuals and groups in states and with issuers that elect this extension option. Hence, it is likely that younger people currently rated on a steeper age curve will have a greater propensity to keep their current plan than older people.

PREMIUM SUBSIDY ILLUSTRATIONS

A simplified and transparent numerical example is

Figure 1: Per Member per Month Claim Cost of 2nd Lowest Plan

Age	Allowed Cost	Current	Bronze	Silver	Gold	Platinum
24	150.00	75.00	90.00	105.00	120.00	135.00
44	375.00	187.50	225.00	262.50	300.00	337.50
64	900.00	450.00	540.00	630.00	720.00	810.00

Figure 2: Per Member per Month Claim Cost of Lowest Plan

Age	Allowed Cost	Current	Bronze	Silver	Gold	Platinum
24	135.00	67.50	81.00	94.50	108.00	121.50
44	337.50	168.75	202.50	236.25	270.00	303.75
64	810.00	405.00	486.00	567.00	648.00	729.00

Figure 3: Monthly Premium of 2nd Lowest Plan						
Age	Allowed Cost	Current	Bronze	Silver	Gold	Platinum
24	150.00	93.75	198.03	231.03	264.04	297.04
44	375.00	234.38	276.64	322.75	368.86	414.96
64	900.00	562.50	594.08	693.09	792.11	891.12

Figure 4: Monthly Premium of Lowest Plan						
Age	Allowed Cost	Current	Bronze	Silver	Gold	Platinum
24	135.00	84.38	178.22	207.93	237.63	267.34
44	337.50	210.94	248.98	290.48	331.97	373.47
64	810.00	506.25	534.67	623.78	712.90	802.01

constructed that will be used throughout the remainder of this article. Three individuals of different ages are assumed to represent a sampling of the population for respective issuers. Varying income levels for each individual are modeled to allow comparisons by age, benefit plan and income level.

Allowed cost for a representative issuer with the second-lowest silver plan is assumed for the three individuals in Figure 1 on page 8. Also shown in Figure 1 are the expected issuer-paid share of the allowed cost paid by the individuals' current plan and four ACA-compliant metal plan options available to the individuals.[4] Allowed cost represents claims cost, prior to attribution between the member (through deductibles, copays and coinsurance), the issuer, and the federal government through cost-sharing subsidies. A very simplistic scenario is assumed, including single coverage (that is, no family coverage), with no induced utilization reflected in cost (in reality, richer plan designs tend to drive up the allowed cost expected for the individual), and the underlying claim cost relationship is assumed to be gender-neutral, with a 6:1 age relativity.[5] A hypothetical lowest-cost plan was arbitrarily set at 10 percent below the second-lowest plan premium and is displayed in Figure 2. For both plans, a current non-ACA compliant plan design with 50 percent actuarial value is assumed to be in place for these three individuals.

Figures 3 and 4 above illustrate the gross premium structure before premium subsidy reductions for both plans assuming an 80 percent pricing loss ratio. The current plan is priced to an 80 percent pricing loss ratio specific to age (the product is assumed to be offered in a state that prior to the ACA allowed actuarially justified age ratios), while the metallic plans are priced to 80 percent in aggregate for the three individuals and compliant with the federal age curve. While the illustration reflects different rates for the current plan due to benefits and age slope, it does not reflect that rates may also be relatively lower due to preferred underwriting status at the time the policy was issued prior to 2014.

Figure 5 below displays the first input to the premium subsidy calculation. Depending on income relative to the FPL, an individual's contribution (that is, net premium) is capped based on the benchmark plan (the second-lowest silver plan) offered in the individual's geographic region. As mentioned earlier, premium subsidies are not available to individuals with incomes below 100 percent of FPL or above 400 percent of FPL; applicable percentages are linearly interpolated in between the data points in Figure 5.

Figure 5: Maximum Premium Contribution	
FPL Level	Maximum % of Income
100–133%	2.00%
133%	3.00%
150%	4.00%
200%	6.30%
250%	8.05%
300–400%	9.50%

CONTINUED ON **PAGE 10**

Some savvy young individuals may be disillusioned to learn that the mandated coverage that they are strongly being encouraged to purchase is not only more expensive due to age rating compression, but that the premium subsidies are allocated in such a way that the net premium costs for older people is actually lower than the net premiums for younger people for the lowest-cost plan options.

Figure 6: Premium Subsidy Calculation

Age	FPL Amount*	FPL Level	Maximum % of Income	Benchmark Plan	Maximum Contribution	Calculated Subsidy
24	11,490	275%	8.78%	231.03	231.06	0.00
44	11,490	275%	8.78%	322.75	231.06	91.69
64	11,490	275%	8.78%	693.09	231.06	462.04

*2013 Amount

Figure 7: 2nd Lowest Plan Net Premium Calculations (275% FPL)

Age	Allowed Cost	Current	Bronze	Silver	Gold	Platinum
24	150.00	93.75	198.03	231.03	264.04	297.04
44	375.00	234.38	184.95	231.06	277.16	323.27
64	900.00	562.50	132.04	231.06	330.07	429.08

Figure 8: Lowest Plan Net Premium Calculations (275% FPL)

Age	Allowed Cost	Current	Bronze	Silver	Gold	Platinum
24	135.00	84.38	178.22	207.93	237.63	267.34
44	337.50	210.94	157.29	198.78	240.28	281.77
64	810.00	506.25	72.64	161.75	250.86	339.97

Figure 6 illustrates the premium subsidy calculation for each individual age. For an income level of 275 percent FPL, the monthly contribution is capped at $231.06 ($11,490 * 275% * 8.78% / 12). As the benchmark plan (second-lowest silver plan) rate is lower than the maximum contribution, the 24-year-old is not eligible for a premium subsidy. The older individuals can purchase the second-lowest silver plan for the maximum contribution or transfer the calculated subsidy to another lower or higher cost plan in the exchange. While this is only one example, and not an exhaustive study, this example demonstrates that the calculation results in subsidy dollars that are heavily distributed toward older people.

Figures 7 and 8 illustrate the net premiums available to an individual at the 275 percent FPL level after accounting for the premium subsidy calculation. A few things should be noted from the resulting net premiums. First, the rates for the current plans have not changed from Figures 3 and 4, as these plans are not ACA-compliant and therefore not eligible for federal subsidies. Second, the rates for the 24-year-old also did not change as no subsidy was calculated in Figure 6, since the gross premium is below the affordability measure. Third, the net premium for the second-lowest silver plan is the same for the older individuals since the affordability threshold depends only on income and not on age.

Finally, perhaps most enlightening and not at all intuitive, is the finding that at a given income level, plans with lower costs than the second-lowest silver plan (second-lowest bronze, lowest bronze, lowest silver) have net premium relationships that are inverted due to the leveraging of the premium subsidies (that is, the age-64 individual will pay *less* than the age-44 individual who will pay *less* than the age-24 individual). A direct comparison of the current and bronze plans illustrates why it is expected that more young people will remain on current plans while older people will more quickly move to the subsidized exchange plans. Some savvy young individuals may be disillusioned to learn that the mandated coverage that they are strongly being encouraged to purchase is not only more expensive due to age rating compression, but that the premium

Figure 9: Lowest Plan Net Premium Calculations (175% FPL)						
Age	Allowed Cost	Current	Bronze	Silver	Gold	Platinum
24	135.00	84.38	33.49	63.19	92.90	122.60
44	337.50	210.94	12.52	54.02	95.52	137.01
64	810.00	506.25	-	16.99	106.10	195.21

Figure 10: Lowest Plan Cost Sharing (275% FPL)						
Age	Allowed Cost	Current	Bronze	Silver	Gold	Platinum
24	135.00	67.50	54.00	40.50	27.00	13.50
44	337.50	168.75	135.00	101.25	67.50	33.75
64	810.00	405.00	324.00	243.00	162.00	81.00

Figure 11: Lowest Plan Cost Sharing (175% FPL)						
Age	Allowed Cost	Current	Bronze	Silver	Gold	Platinum
24	135.00	67.50	54.00	17.55	27.00	13.50
44	337.50	168.75	135.00	43.88	67.50	33.75
64	810.00	405.00	187.50	105.30	162.00	81.00

subsidies are allocated in such a way that the net premium costs for older people is actually lower than the net premiums for younger people for the lowest-cost plan options.

Expected Total Cost (ETC) Illustrations

The premiums represented in the figures above do not present the total consumer cost, as individuals will still have a cost-sharing responsibility in the form of deductibles, copays and coinsurance. An individual's ETC for health care can be thought of as the net premium, calculated in the figures above, plus the expected net cost sharing, plus the applicable tax penalty if qualifying minimum essential coverage[6] is not obtained. For purposes of simplicity, it is assumed that costs at each age are homogeneous, and individuals have a good understanding of their expected cost sharing and make price-sensitive decisions.

In order to illustrate the cost-sharing subsidy impact and the ETC for different income levels, Figure 8 is replicated in Figure 9 above with a lower income level (175 percent FPL) eligible for a cost-sharing subsidy; and Figures 10 and 11, respectively, display the expected cost sharing for individuals at 275 percent of FPL and 175 percent of FPL. Two observations should be noted with regard to Figure 9 relative to Figure 8: Net premiums are significantly lower due to the more generous premium subsidies and the age-64 individual has a subsidy large enough to fund the entire cost of the bronze plan. Two differences should be noted moving from Figure 10 to Figure 11. The silver plan cost sharing is lower for each age as the applicable cost sharing is 13 percent in the 175 percent FPL scenario rather than 30 percent, and the bronze plan cost sharing for the age-64 enrollee is capped by the reduced MOOP amount allocated on a monthly basis ($2,250 / 12) as discussed above.

CONTINUED ON **PAGE 12**

To calculate the ETC in Figures 12 and 13, the net premiums are added to the expected cost sharing. For completeness, a no-coverage-cost option is included, which is the sum of the allowed cost plus the tax penalty. This is a simplistic assumption, since the same individual lacking coverage would not have prearranged network discount savings and may tend not to seek similar levels of services.

Continuing with this example, expected cost sharing is added to the net premium for each age at various income levels. As one might expect, the value of the cost-sharing subsidy (17 percent of allowed costs) makes the silver plan attractive for the 175 percent FPL individual. For the 275 percent FPL individual, the current plan is clearly the most attractive option for the 24-year-old.

Without consideration of the cost-sharing subsidies and the MOOP impact, the ETC of the metal plans is relatively close in value for older individuals. Risk-averse and higher-cost individuals may prefer richer plans. Figure 14 shows the percentage change in ETC for increasing through each metal level (i.e., "Silver" column is the ETC percentage increase from bronze to silver) for an average costing individual at the 275 percent FPL. For older individuals, the higher administrative costs built into the premium for richer plans are partially offset, due to the age-compressed rate range. Stated another way, older individuals may elect to "buy as much benefit as possible" through opting for the platinum plan, and will have roughly 90 percent of their increased financial outlay partially subsidized because of the 3:1 age compression. This should be understood as you review the conclusions offered in the next section.

ETC Analysis

Using the same method discussed above, an ETC is developed for each age, income level and plan type. Figures 15, 16 and 17, respectively, illustrate the ETC for age 24, 44 and 64 utilizing the example's lowest issuer premiums for various income levels and plans.

While it should be noted that some of the results in Figures 15 through 17 are relatively close across plan design, the optimal plan decision based on ETC methodology varies by age and income level. These optimal plan choices are displayed in Figure 18 on page 14 to highlight some generalities by age and income. Figure 18 is replicated in Figures 19 and 20 to model the impact of the significantly increasing tax penalty and how that might impact coverage decisions by age and income in 2015 and 2016. The tax penalty relative to the lowest bronze premium is also displayed in Figures 18 through 20 to highlight the proportional penalty of not having coverage relative to purchasing a low-cost plan. In some cases, the net bronze premium is zero (indicated by "n/a") or less than the tax penalty. It is assumed here that the current plan is no longer an option after 2015 as that is the most recent guidance from the administration. The elimination of the current plan as a viable option is reflected in Figure 20.

While issuers' experience and models will differ, several general comments can be made about likely decisions based on age and income:

- Individuals with low incomes (below 200 percent FPL) will overwhelmingly select silver plans to take advantage of the cost-sharing subsidy. The 3 percent cost-sharing subsidy in the 200 to 250 percent FPL range does not have much impact compared to the 17 percent and 24 percent subsidies for incomes below 200 percent FPL.
- To avoid the rate change due to age compression, many high income young people will elect to stay on their current plan for as long as possible. A similar outcome is expected for grandfathered plans.
- Middle to high income young people are the most likely to go without coverage, particularly in 2014 and 2015. As the penalty is a percentage of income, at high income levels, the penalty will exceed the gross premiums (which do not vary based on income) and high income individuals will likely purchase at least the minimum required coverage.
- For higher income levels, the tax penalty as a percentage of the lowest bronze premium is significantly higher for younger people. This might provide greater incentive for young uninsured individuals to obtain coverage; this incentive will increase in 2015 and again in 2016.
- The tax penalty for the low income older individuals relative to the lowest bronze premium

Figure 12: Expected Total Cost (275% FPL)						
Age	Allowed Cost	Current	Bronze	Silver	Gold	Platinum
24	161.33	151.88	232.22	248.43	264.63	280.84
44	363.83	379.69	292.29	300.03	307.78	315.52
64	836.33	911.25	396.64	404.75	412.86	420.97

Figure 13: Expected Total Cost (175% FPL)						
Age	Allowed Cost	Current	Bronze	Silver	Gold	Platinum
24	151.76	151.88	87.49	80.74	119.90	136.10
44	354.26	379.69	147.52	97.89	163.02	170.76
64	826.76	911.25	187.50	122.29	268.10	276.21

Figure 14: Expected Total Cost Metal Level Buy-Up (275% FPL)			
Age	Silver	Gold	Platinum
24	7.0%	6.5%	6.1%
44	2.7%	2.6%	2.5%
64	2.0%	2.0%	2.0%

Figure 15: Age 24 Expected Total Cost						
FPL	No Coverage	Current	Bronze	Silver	Gold	Platinum
116.5%	146.15	151.88	54.00	8.10	55.91	72.11
141.5%	148.55	151.88	54.00	32.42	81.02	97.23
175.0%	151.76	151.88	87.49	80.74	119.90	136.10
225.0%	156.54	151.88	155.77	167.92	188.18	204.38
275.0%	161.33	151.88	232.22	248.43	264.63	280.84
325.0%	166.12	151.88	232.22	248.43	264.63	280.84
375.0%	170.91	151.88	232.22	248.43	264.63	280.84
425.0%	175.69	151.88	232.22	248.43	264.63	280.84

Figure 16: Age 44 Expected Total Cost						
FPL	No Coverage	Current	Bronze	Silver	Gold	Platinum
116.5%	348.65	379.69	135.00	20.25	99.03	106.78
141.5%	351.05	379.69	135.00	35.40	124.14	131.89
175.0%	354.26	379.69	147.52	97.89	163.02	170.76
225.0%	359.04	379.69	215.80	213.43	231.30	239.04
275.0%	363.83	379.69	292.29	300.03	307.78	315.52
325.0%	368.62	379.69	356.86	364.60	372.35	380.10
375.0%	373.41	379.69	383.98	391.73	399.47	407.22
425.0%	378.19	379.69	383.98	391.73	399.47	407.22

Figure 17: Age 64 Expected Total Cost						
FPL	No Coverage	Current	Bronze	Silver	Gold	Platinum
116.5%	821.15	911.25	187.50	48.60	204.11	212.22
141.5%	823.55	911.25	187.50	48.60	229.22	237.33
175.0%	826.76	911.25	187.50	122.29	268.10	276.21
225.0%	831.54	911.25	264.58	303.97	336.38	344.49
275.0%	836.33	911.25	396.64	404.75	412.86	420.97
325.0%	841.12	911.25	461.21	469.32	477.43	485.54
375.0%	845.91	911.25	506.69	514.80	522.91	531.02
425.0%	850.69	911.25	858.67	866.78	874.90	883.01

CONTINUED ON **PAGE 14**

Figure 18: Optimal Plan Selection for 2014

	Expected Lowest Cost Option			Penalty as % of Bronze Premium		
FPL	24	44	64	24	44	64
116.5%	Silver	Silver	Silver	n/a	n/a	n/a
141.5%	Silver	Silver	Silver	n/a	n/a	n/a
175.0%	Silver	Silver	Silver	50.0%	133.8%	n/a
225.0%	Current Plan	Silver	Silver	21.2%	26.7%	n/a
275.0%	Current Plan	Bronze	Bronze	14.8%	16.7%	36.3%
325.0%	Current Plan	Bronze	Bronze	17.5%	14.0%	22.7%
375.0%	Current Plan	No Coverage	Bronze	20.1%	14.4%	19.7%
425.0%	Current Plan	No Coverage	No Coverage	22.8%	12.1%	5.0%

Figure 19: Optimal Plan Selection for 2015

	Expected Lowest Cost Option			Penalty as % of Bronze Premium		
FPL	24	44	64	24	44	64
116.5%	Silver	Silver	Silver	n/a	n/a	n/a
141.5%	Silver	Silver	Silver	n/a	n/a	n/a
175.0%	Silver	Silver	Silver	100.1%	267.6%	n/a
225.0%	Current Plan	Silver	Silver	42.3%	53.3%	n/a
275.0%	Current Plan	Bronze	Bronze	29.5%	33.5%	72.5%
325.0%	Current Plan	Bronze	Bronze	34.9%	28.1%	45.4%
375.0%	Current Plan	Current Plan	Bronze	40.3%	28.8%	39.3%
425.0%	Current Plan	Current Plan	Bronze	45.7%	24.1%	10.0%

Figure 20: Optimal Plan Selection for 2016

	Expected Lowest Cost Option			Penalty as % of Bronze Premium		
FPL	24	44	64	24	44	64
116.5%	Silver	Silver	Silver	n/a	n/a	n/a
141.5%	Silver	Silver	Silver	n/a	n/a	n/a
175.0%	Silver	Silver	Silver	125.1%	334.5%	n/a
225.0%	Bronze	Silver	Silver	52.9%	66.7%	n/a
275.0%	No Coverage	Bronze	Bronze	36.9%	41.9%	90.6%
325.0%	No Coverage	Bronze	Bronze	43.7%	35.1%	56.7%
375.0%	No Coverage	Bronze	Bronze	50.4%	36.1%	49.1%
425.0%	Bronze	Bronze	Bronze	57.1%	30.1%	12.6%

also illustrates why these individuals are the most likely to enroll in subsidized exchange coverage.

Limitations of Example Calculation and Advanced Modeling

This example analysis is intended to be simplistic for purposes of illustrating the subsidy mechanics and does not consider many non-financial variables. For example, market competiveness and pressure from state regulators for lower rates led to some state exchanges having more narrow networks than the off-exchange market. Many individuals will likely pay more to keep their current plan, or buy an off-exchange plan if their exchange subsidy is small, particularly if their doctor is not in the exchange plan's network. Also, as contentious as the rollout of the ACA has been, some consumers will undoubtedly view exchange enrollment as a statement of support of the ACA and may make a political decision to either enroll or not enroll in an exchange product. President Obama himself noted his perceived foolishness of this rationale on March 6, 2014 stating, "The main point that I have for everybody watching right now is, you don't punish me by not signing up for health care. You're punishing yourself or your family if in fact there's affordable health care to be had." Similarly, some consumers will not labor through all the math and network options and will ultimately view exchanges as "government products" and may make purchasing decisions based on their respective trust level of government versus private insurance companies.

For simplicity, these illustrations ignore conditions that would exempt individuals from the tax penalty for not enrolling in compliant plans. Examples include individuals who do not meet an affordability threshold (cannot purchase coverage for less than 8 percent of income) or who join a health care sharing ministry and are exempted from the penalty. These individuals could make similar decisions, but with the exclusion of the penalty from the equation. Also, catastrophic plans are excluded from this analysis but represent another option for some individuals, particularly young high income individuals weighing the premium costs versus the tax penalty. An undertaking of a robust model should incorporate as many material variables as possible.

The illustrative examples provided above attempt to model individuals making optimal financial decisions. They do not take into account family or employment situations that will further complicate the decision options. Also, everyone is perceived in the illustrations as having similar morbidity characteristics for each age. In reality, health care costs are skewed at every age and consumers have a sense of their medical care usage and this will influence their decisions. Despite these simplifications, the examples illustrate that the relationship of age and income is critical and interrelated. Further, the examples uncover common misconceptions regarding the role that federal subsidies will have in recruiting the young and healthy to enroll in exchanges and brings to light the importance of modeling.

Advanced analytical models can readily be constructed to project enrollment based on the ETC concept illustrated in this article. While Figures 18 through 20 represent an optimal decision for an assumed homogeneous population with simplistic assumptions, advanced models should extend this analysis to include probabilities for different plan selections based on relative optimal values and simulate the results. A simulation model should consider the magnitude of the cost differences when assigning probabilities. Various provider reimbursement rates, utility research, network breadth, and heterogeneous populations should also be considered. The simplistic demographic assumptions applied in the example should become much more complex based on the data available to the model developer and after a comprehensive analysis of the market. To the extent that historical or current data is available, models should be tested against actual experience and refined as necessary.

Stakeholder Concerns

Numerous stakeholders will have an interest in the subsidy impacts. While their goals and interests will vary, they should each understand the underlying mechanics and start with a framework of modeling individual purchasing decisions. A sampling of

The availability of exchange subsidies has changed the equation of comparing costs between individual plans and group plan options for employees and their dependents.

CONTINUED ON PAGE 16

With the 2014 exchange rates, some states took a more aggressive approach to rate review and approved rates at considerably lower levels than what was originally requested by issuers.

stakeholders and some of their interests are listed below.

Issuers. Commercial health insurer issuers are joining their government program counterparts in a less comfortable place of developing rates far in advance without the opportunity for mid-year corrections. The 2014 rate development is now history, and 2015 preparations have begun at the time this article was written. There is still not very much traditional actuarial data to rely on for 2015 pricing, as the ACA plan experience will take several years to develop. A few items that issuers should consider reviewing are 2014 enrollment statistics (own company and industry, as detailed as possible), emerging pharmacy claims experience, and the market landscape of premium rates. Issuers can replicate the calculations shown in the example using actual market rates in each state. These results can be used to develop simulation models that can be tested and revised based on actual enrollment data.

As the individual market subsidies will attract an older and lower income demographic, issuers with government program contracts will have opportunities to offer gap coverage when Medicaid eligibility ceases and provide a bridge product to Medicare Advantage enrollees before they become eligible for Medicare.

Employers. The availability of exchange subsidies has changed the equation of comparing costs between individual plans and group plan options for employees and their dependents. Some employers may drop employee coverage and still more will drop dependent coverage. An understanding of how employees will make purchasing decisions will help employers with their health care cost budgeting and facilitate the estimation of potential penalties that may be incurred by employees joining the individual exchanges.

Many employers, including the cities of Chicago and Detroit, are now seeking to transition retirees under the age of 65 from group coverage to individual exchanges. To avoid disruption in coverage, these employers are being proactive and planning a soft landing for their retirees by explaining options and the additional potential value of enrolling in an exchange. Subsidies are what will make this decision attractive to employers and their retirees. An understanding of the subsidy mechanics can help employers understand the resulting net costs and develop tools that can be used to explain financial options to retirees.

Labor unions. Unions are appropriately concerned that they may be left out of the health benefits procurement process for some older, low income workers if more attractive options are available directly on the exchanges. Some employers who participate in multiemployer plans, particularly those with fewer than 50 employees, are finding the option of allowing employees to join exchanges attractive. Unions have argued that their benefits are generally richer than exchange plans, but many have not engaged in an analytical ETC analysis to project individual behavior. An understanding of the net premium by age and income of the workforce can help unions model their members' benefits and financial decisions. An ETC model can be developed that could be used to test the attractiveness of benefit packages against available exchange offerings.

Figure 21: Baltimore, Maryland Exchange Rates								
Carrier	Bronze Plan: Age 25		Silver Plan: Age 25		Bronze Plan: Age 50		Silver Plan: Age 50	
	Requested	Approved	Requested	Approved	Requested	Approved	Requested	Approved
Aetna	$286	$203	$331	$234	$509	$361	$588	$417
All Savers	$350	$237	$391	$264	$623	$422	$696	$470
BlueChoice	$136	$124	$184	$168	$242	$221	$328	$298
CFMI	$149	$144	$196	$188	$265	$256	$348	$335
Coventry L&H	$192	$152	$222	$186	$342	$270	$395	$331
Coventry DE	$180	$131	$205	$150	$320	$233	$364	$267
Evergreen	$218	$191	$260	$228	$388	$340	$462	$405
GHMSI	$149	$144	$196	$188	$265	$256	$348	$335
Kaiser	$179	$177	$216	$214	$318	$315	$385	$381

States. State insurance departments have historically balanced their responsibility to guard against insurer solvency with rate review processes focused on consumer protection assuring that premium rates are not excessive or changing too much from one year to the next. With the federal government subsidies affecting net premiums, states should understand the new complexities of the subsidy mechanics and the impact of the rate review process across the population. Ironically, some of the states that were first in line to announce that they would accept federal funds for Medicaid expansion have also reduced the federal liability for exchange subsidies through the rate review process, which likely increased the net cost for some low income exchange enrollees in the process. An example that illustrates this surprising conclusion is provided below.

With the 2014 exchange rates, some states took a more aggressive approach to rate review and approved rates at considerably lower levels than what was originally requested by issuers. This led to some issuers withdrawing from exchange participation and an expansion of narrow networks, with lower provider reimbursements facilitating lower rates relative to off-exchange plans with more expansive provider networks in the same area.

Some states, notably Maryland, received attention for an aggressive rate review process when a large issuer withdrew its exchange application and cited rate levels as a primary reason. Fortunately, requested rates and approved rates were published so actual ramifications of the consequences of lower exchange rates can be illustrated. Figure 21 shows the requested and approved non-smoker rates in Baltimore. The bronze age-25 rate and the silver age-50 rate were provided; the other rates were calculated using the federal age curve.

CONTINUED ON **PAGE 18**

Figure 22: Baltimore, Maryland Subsidy with Requested Rates

Age	Benchmark	FPL Amount	FPL Level	Maximum %	Annual	Monthly	Subsidy
25	$196	11,490	150%	4.00%	689.40	57.45	138.18
25	$196	11,490	200%	6.30%	1447.74	120.65	74.98
25	$196	11,490	250%	8.05%	2312.36	192.70	2.93
25	$196	11,490	300%	9.50%	3274.65	272.89	0.00
25	$196	11,490	350%	9.50%	3820.43	318.37	0.00
25	$196	11,490	400%	9.50%	4366.20	363.85	0.00
50	$348	11,490	150%	4.00%	689.40	57.45	290.55
50	$348	11,490	200%	6.30%	1447.74	120.65	227.36
50	$348	11,490	250%	8.05%	2312.36	192.70	155.30
50	$348	11,490	300%	9.50%	3274.65	272.89	75.11
50	$348	11,490	350%	9.50%	3820.43	318.37	29.63
50	$348	11,490	400%	9.50%	4366.20	363.85	0.00

Figure 23: Baltimore, Maryland Subsidy with Approved Rates

Age	Benchmark	FPL Amount	FPL Level	Maximum %	Annual	Monthly	Subsidy
25	$168	11,490	150%	4.00%	689.40	57.45	110.07
25	$168	11,490	200%	6.30%	1447.74	120.65	46.88
25	$168	11,490	250%	8.05%	2312.36	192.70	0.00
25	$168	11,490	300%	9.50%	3274.65	272.89	0.00
25	$168	11,490	350%	9.50%	3820.43	318.37	0.00
25	$168	11,490	400%	9.50%	4366.20	363.85	0.00
50	$298	11,490	150%	4.00%	689.40	57.45	240.55
50	$298	11,490	200%	6.30%	1447.74	120.65	177.36
50	$298	11,490	250%	8.05%	2312.36	192.70	105.30
50	$298	11,490	300%	9.50%	3274.65	272.89	25.11
50	$298	11,490	350%	9.50%	3820.43	318.37	0.00
50	$298	11,490	400%	9.50%	4366.20	363.85	0.00

The results show that the rate review process benefits higher income individuals but actually increases net rates on low income individuals. This anomaly might alarm regulators who view the rate review process primarily as a consumer protection function with a focus on representing low income residents.

Figures 22 and 23 respectively illustrate the premium subsidy calculations with the requested and approved rates. The approved lower rates result in lower revenue for issuers and lower outlays for the federal government. The impact of lower rates to issuers and the federal government may be partially offset by the rate change impact to risk corridor settlements, which will eventually compensate issuers if they significantly underpriced products. While the rate review impact consistently reduces premiums for issuers and lightens the taxpayer burden, the impact on subsidy-eligible consumers' net premium is mixed as both the subsidy and the gross premium are reduced. The net premium rates are extremely relevant, as the majority of exchange enrollees will be eligible for premium subsidies. Emerging results indicate that 83 percent of individuals who have selected an exchange plan are subsidy-eligible.[7]

Figure 24 explores the impact on net rates of the lowest bronze plan in the market. As the lowest plan, it has a higher degree of premium inversion, due to the subsidy leverage. Having said that, the individual market is very price sensitive; the lowest-priced plan is likely to be very popular, particularly amongst people seeking the minimum coverage needed to avoid the tax penalty. The results show that the rate review process benefits higher income individuals but actually increases net rates on low income individuals. This anomaly might alarm regulators who view the rate review process primarily as a consumer protection function with a focus on

Figure 24: Baltimore, Maryland Bronze Premium Net Rates									
		Requested Rates			Approved Rates			Review Impact	
Age	FPL Level	Gross Premium	Subsidy	Net Premium	Gross Premium	Subsidy	Net Premium	$ Impact	% Impact
25	150%	$136	138.18	-	$124	110.07	13.93	13.93	Infinite
25	200%	$136	74.98	61.02	$124	46.88	77.12	16.11	26%
25	250%	$136	2.93	133.07	$124	0.00	124.00	-9.07	-7%
25	300%	$136	-	136.00	$124	0.00	124.00	-12.00	-9%
25	350%	$136	-	136.00	$124	0.00	124.00	-12.00	-9%
25	400%	$136	-	136.00	$124	0.00	124.00	-12.00	-9%
50	150%	$242	290.55	-	$221	240.55	-	0.00	Infinite
50	200%	$242	227.36	14.57	$221	177.36	43.23	28.65	197%
50	250%	$242	155.30	86.63	$221	105.30	115.28	28.65	33%
50	300%	$242	75.11	166.82	$221	25.11	195.47	28.65	17%
50	350%	$242	29.63	212.30	$221	0.00	220.58	8.28	4%
50	400%	$242	-	241.93	$221	0.00	220.58	-21.35	-9%

Figure 25: Baltimore, Maryland Silver Premium Net Rates									
		Requested Rates			Approved Rates			Review Impact	
Age	FPL Level	Gross Premium	Subsidy	Net Premium	Gross Premium	Subsidy	Net Premium	$ Impact	% Impact
25	150%	$184	138.18	46.21	$150	110.07	40.02	-6.18	-13%
25	200%	$184	74.98	109.40	$150	46.88	103.22	-6.18	-6%
25	250%	$184	2.93	181.45	$150	0.00	150.09	-31.36	-17%
25	300%	$184	-	184.39	$150	0.00	150.09	-34.29	-19%
25	350%	$184	-	184.39	$150	0.00	150.09	-34.29	-19%
25	400%	$184	-	184.39	$150	0.00	150.09	-34.29	-19%
50	150%	$328	290.55	37.45	$267	240.55	26.45	-11.00	-29%
50	200%	$328	227.36	100.65	$267	177.36	89.65	-11.00	-11%
50	250%	$328	155.30	172.70	$267	105.30	161.70	-11.00	-6%
50	300%	$328	75.11	252.89	$267	25.11	241.89	-11.00	-4%
50	350%	$328	29.63	298.37	$267	0.00	267.00	-31.37	-11%
50	400%	$328	-	328.00	$267	0.00	267.00	-61.00	-19%

representing low income residents. Early results for premium-subsidy-eligible individuals in states with federally run exchanges indicate that 74 percent will select a silver plan and 13 percent will select a bronze plan.[8] Preliminary results for cost-sharing-subsidy individuals have not been published as of the time of this article, but it is likely that the high silver plan concentration is partially due to the availability of the cost-sharing subsidy benefit.

As discussed earlier, individuals with incomes below 250 percent FPL are also eligible for cost-sharing subsidies if a silver plan is selected. Figure 25 is similar to Figure 24, but illustrates the impact of rate review on the lowest silver plan in the market. The rate review impact lowers the net premium for each income category, but has a larger impact on higher income individuals where the subsidy is less material. In summary, states should understand how rate review will impact insurer revenues, federal subsidies flowing into the exchanges, the impact of net

CONTINUED ON **PAGE 20**

rates on the exchanges, and how this may differ by age, income level, family status and plan selection.

States that are considering a basic health plan (BHP) for low income enrollees (below 200 percent FPL) should also understand and model the impact of the benchmark plan's approved rates on federal funding and BHP premiums. For each BHP enrollee, the state receives premium and cost-sharing subsidies that may be predicated on the prior year or current year exchange rates. The enrollee can be charged a premium up to the *net* premium that would have been charged on the exchange. States should consider the consequences of the income-biased enrollment shift that will occur in the exchange when a BHP option is available. BHP planning should consider a multi-year scenario analysis that models the expected potential impacts of both the BHP and exchange market.

Federal government. The subsidies available in the individual exchanges represent the largest and perhaps most volatile expense of the ACA. The resulting amount is obviously dependent on how many subsidy-eligible individuals enroll, who enrolls as the subsidies vary considerably by income level, the gross premiums offered in the marketplace, ACA awareness, unemployment rates, and overall economic conditions. Obviously, the level of issuers' gross premiums was not known when the original federal outlay estimates were developed. Now that initial premium level and distribution information is available, the overall premium and cost-sharing liability estimate to the federal government can be better estimated. Simulation models can take the vast amount of data available to the federal government and replicate a model that mirrors 2014 experience. Federal outlays for 2015 can then be modeled by taking into account projected material enrollment and premium changes, incorporating important factors such as the likely distribution of rate changes in the market (which should reflect the role that previously unavailable competitive 2014 information will have for carriers in 2015), an increased tax penalty, and the cancellation of existing policies.

Conclusion

It is common knowledge throughout the health insurance industry and among lawmakers and other policy experts that the ACA commits the federal government to a significant financial contribution intended to reduce the uninsured rate by providing partial or full premium and cost-sharing assistance to low income Americans. These large

financial outlays primarily expand two markets: 1) Medicaid in states that elect to expand coverage through expanding eligibility, as well as indirectly in all states through increased awareness driving up enrollment significantly under prior Medicaid eligibility policy; and 2) the exchange segment of the non-group (individual) commercial market. The federal Medicaid contribution is well understood; it is a direct contribution and is like the current program, except with a larger population and a larger federal contribution percentage for the newly eligible enrollees benefiting from the expansion. The exchange subsidy calculations, on the other hand, are quite complicated and not well understood. The repeated mantra that "young people will enroll in exchanges due to generous subsidies" illustrates this misunderstanding and presents an opportunity for actuaries to bring clarification to various stakeholders. An understanding of the subsidy mechanics presented in this article will equip actuaries to explain the disproportionate distribution of subsidy dollars to older Americans.

The financial examples in this article are illustrative and only scratch the surface of inputs that should be considered in predicting consumer behavior. The examples used throughout this article are intended to provide an understanding of the subsidy mechanics and illustrate relationships and implications that will be true across various issuers and state markets, although magnitudes will vary. Understanding these mechanics is step one. Step two is modeling the impact for a given population. With an understanding of the mechanics, the right data and well-thought-out assumptions, straightforward simulation processes can be developed, tested and revised. From both a micro and a macro perspective, it is important for stakeholders to understand the subsidy mechanics and how the details might impact enrollment by age, plan design and income level. A proper understanding with sufficient modeling will provide stakeholders with clarity of the projected enrollment and help facilitate more accurate pricing and projection of other dependent mechanisms in the ACA.

END NOTES

[1] Source: McKinsey Center for U.S. Health System Reform, Individual Market Enrollment: Updated View p. 2 (March 2014).

[2] Source: Society of Actuaries, Cost of the Future Newly Insured under the ACA Research Report (March 2013).

[3] Source: Yamamoto, Dale, Health Care Costs—From Birth to Death, Part of the Health Care Cost Institute's Independent Report Series—Report 2013-1 (June 2013).

[4] For simplicity, catastrophic plans, which represent only 1 percent of exchange plan selections through January 2014, are ignored. Source: ASPE Issue Brief, HEALTH INSURANCE MARKETPLACE: FEBRUARY ENROLLMENT REPORT for the period: Oct. 1, 2013 to Feb. 1, 2014, p. 4. (Feb. 12, 2014).

[5] Some states had age compression rating limits prior to the ACA. The "current plan" illustration assumes an age compression limit of less than 6:1 is not applicable.

[6] Grandfathered plans and "transitional" plans fulfill the coverage requirements to be exempted from the tax penalty.

[7] Source: ASPE Issue Brief, HEALTH INSURANCE MARKETPLACE: MARCH ENROLLMENT REPORT for the period: Oct. 1, 2013 to Mar. 1, 2014, p. 6. (Mar. 11, 2014).

[8] Source: ASPE Issue Brief, HEALTH INSURANCE MARKETPLACE: MARCH ENROLLMENT REPORT for the period: Oct. 1, 2013 to Mar. 1, 2014, p. 12. (Mar. 11, 2014).

Considerations for Surplus Determination under ACA

By Daniel Pribe, Richard Tash and David Tuomala

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In March 2010, the Patient Protection and Affordable Care Act (ACA) was passed into law which introduced significant changes into the health insurance marketplace, including:

- The individual and employer mandates
- The federal premium and cost-sharing subsidies
- The potential expansion of Medicaid
- The "3R's"—risk adjustment, reinsurance and risk corridors
- Minimum loss ratio (MLR) requirements.

The changes brought on by the ACA increase the difficulty for companies to assess and understand the profitability of a product and hence the impact to surplus. The ACA also plays havoc with accounting procedures that have to accrue for the 3R's and possibly medical loss ratio rebates. How should a company or regulator evaluate the surplus and risk-based capital (RBC) level with unknown values to be determined after the end of the policy year? This article discusses the variability caused by the ACA, and considerations in addressing the issues. The focus will be on the commercial plans, although Medicare, Medicaid and ancillary products contribute to the overall surplus needs. The ultimate approach to modeling surplus and surplus needs is company specific.

Measuring Surplus

Companies need surplus for many reasons, including support for the companies' loss reserves, protection from adverse cash flow shocks, and funding future capital investments (e.g., administrative systems, buildings) and growth. The primary method currently used in the United States to measure surplus is RBC.

RBC was developed in the 1990s as an early warning metric of financial distress and provides regulatory authority to governing bodies. The calculation is designed to provide varying levels of authoritative action depending on the ratio of the total adjusted capital (TAC) and the authorized control level (ACL). The state is then notified of the result as part of the annual financial statement filing process. Once the state is notified, the governing regulatory body may determine the process to help rectify the financial condition of the organization.

There are five separate actionable outcomes (see Table 1). For a health care insurer that is between 200 percent and 300 percent, an additional test is performed to compare the plan's recent RBC trends. The additional test compares the ratio of the insurer's underwriting deductions to revenue and 105 percent. Failure of the trend test triggers a Company Action Level event.

The challenge is that once a health care insurer experiences financial distress, a downward spiral may ensue. For example, here are a number of decisions that ultimately make recovery more challenging:

- Forgo basic operation items (e.g., software updates, new computer hardware, salary increases).
- Delay improvements that would reduce long-term costs because the short-term investment is too costly (e.g., automation of a process).
- Replacement cost associated with the loss of critical employees (e.g., knowledge loss and difficult to hire replacement).

As a health care insurer deals with insolvency, the organization is forced to make difficult decisions in order to manage its cash flows. For example, a health care insurer may have to decide the priority of vendors to pay. Note that the state does not directly take control until well below 100 percent. The difficult decisions probably occur earlier than that, say at 200 percent, when the state only requires a business plan.

Table 1: Risk-Based Capital Authoritative Action Outcomes

RBC Ratio (= TAC/ACL)	Outcome
>200%; No Action Leve	No action is required.
150% to 200%; Company Action Level	The health care insurer is required to submit a business plan to improve financial strength.
100% to 150%; Regulatory Action Level	The health care insurer is required to submit a business plan to improve financial strength. Also, the regulator is authorized to perform a review of practices.
70% to 100%; Authorized Control Level	The regulator is authorized to take actionable steps to improve the financial strength of the health care insurer.
<70%; Mandatory Control Level	The regulator is required to take actionable steps to control the health care insurer.

Once the situation is dire and risk of insolvency is material, the state will appoint a receiver. The receiver is responsible for the operational running of the insurer. The receiver's duties may include, but are not limited to the following:

- Develop an operational shut-down plan.
- Sell members and/or assets to another health care insurer.
- Examine corporate holdings for previously unidentified assets.
- Prioritize providers and vendors for payment adjudication.
- Determine the payment amount for each provider and vendor.
- Draw on state funding to support care transitions for affected members.

The financial strength of a state's health care insurers is essential for market, member and financial stability. As a result of this, states strive to maintain a strong financial health care market to prevent insurer insolvency.

State Considerations to Limit Surplus

The RBC calculation provides a point-in-time estimate that is intended to offer an early warning of financial distress to regulators. Therefore, minimum levels have been established to provide regulators with actionable outcomes in the event that authorized control of the insurer is needed.

However, the RBC calculation does not offer an opinion regarding the maximum surplus level. Given that each health care insurer faces its own unique set of risks, a maximum surplus level is a difficult value to regulate. Despite this, some states have enacted, or are considering legislation to establish, a maximum surplus level. The following discuss the approach of two states:

COMMONWEALTH OF PENNSYLVANIA

In February 2005, the commonwealth was concerned with the level of surplus retained by a couple of large health care insurers. In response to the concern, the commonwealth's Department of Insurance issued a determination and order stating a sufficient

range of surplus for the four not-for-profit Blue Cross companies:

- Highmark Blue Cross & Blue Shield
- Independence Blue Cross
- Blue Cross of Northeastern Pennsylvania
- Capital Blue Cross of Harrisburg.

For Highmark Blue Cross & Blue Shield and Independence Blue Cross, the established RBC limit was 550 to 750 percent. For the other two carriers—Blue Cross of Northeastern Pennsylvania and Capital Blue Cross of Harrisburg—the established RBC limit was 750 to 950 percent. The varying limits of surplus are attributed to each health care insurer's size (that is, smaller carriers are subject to greater risk of volatility, and therefore need higher surplus limits).

STATE OF MICHIGAN

Similar to the commonwealth of Pennsylvania, the state of Michigan enacted a limit on the state's largest carrier by market share, Blue Cross and Blue Shield of Michigan (BCBSMI). As part of the agreement with the state, BCBSMI cannot file financial statements with RBC levels greater than 1,000 percent for two consecutive years. If BCBSMI does not

CONTINUED ON **PAGE 24**

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Table 2: Risk-Based Capital Review by Parent Organization								
Risk-Based Capital Ratio[1]	Member Months (in Millions) for All Lines of Business							
	Under 1.0	1.0 - 2.5	2.5 - 5.0	5.0 - 10.0	10.0 - 20.0	20.0 - 30.0	30.0+	Total
0% to 250%	10%	7%	0%	5%	0%	0%	0%	4%
250% to 400%	24%	33%	19%	16%	7%	18%	0%	19%
400% to 600%	33%	26%	38%	21%	27%	18%	54%	31%
600% +	33%	33%	43%	58%	67%	64%	46%	46%
Average RBC	**573%**	**523%**	**541%**	**697%**	**776%**	**709%**	**641%**	**668%**

[1]The data in Table 2 reflects 2012 NAIC financial reports.

Smaller plans entering the individual market for the first time have the additional risk of highly uncertain enrollment and significant mispricing risk in the early years.

meet the criteria, the insurer must submit to the governing body a plan to draw down the surplus below the 1,000 percent RBC threshold. The spending down of surplus to meet the imposed criteria potentially destabilizes the marketplace and increases the risk of financial insolvency for both the health care insurers being asked to draw down their surplus and other health care insurers having to compete against the resulting reduced premium.

Risk-Based Capital Considerations by Organization Size and Structure

Each insurer has a different surplus risk exposure and tolerance. As discussed in the previous section, the ratio of a health care insurer's TAC and the ACL is an early warning metric that may trigger regulatory action. The formula to calculate both the TAC and ACL is complicated and complex, with the RBC ratio varying by enrollment level (see Table 2).

As Table 2 illustrates, health care insurers with smaller enrollment numbers tend to have lower RBC levels. These insurers are more susceptible to the risk of prolonged adverse financial results.

Complicating matters is the introduction of the health benefit exchanges (HBEs) and the "churn" in the individual market caused by health-care-reform-related issues such as the expected enrollment of the uninsured and states eliminating their high-risk pools. A previous report commissioned by the Society of Actuaries in 2013 indicates that there are about 386,000 members currently enrolled in high-risk pools nationally, with allowed costs estimated at an average of $1,614 per member per month (PMPM) in 2014. This cost is nearly four times the expected cost of $405 PMPM for this population included in the same report. If the expected enrollment in the individual exchanges produces a risk of even a fraction of this level, the losses experienced by some plans could be dramatic.

Adding to this complexity were the challenges faced in the rollout of the HBEs and the introduction of "transitional policies" (e.g., 'grandmothered plans') possibly creating lower than expected exchange enrollment for some issuers. This lower than expected enrollment, along with relatively fewer than expected younger members (not in itself a worrisome situation but an indicator of the attraction of healthy members to the HBEs), creates additional pricing risks for plans competing in that market. This lower than expected early enrollment, along with relatively fewer than expected younger members (not in itself a worrisome situation but an indicator of the attraction of healthy members to the HBEs), creates additional pricing risks for plans competing in that market. Later enrollment will allow for less time to gauge the risk of the population, and may prolong losses in 2015 and later that could have been corrected had more enrollment materialized in January 2014. Smaller plans entering the individual market for the first time have the additional risk of highly uncertain enrollment and significant mispricing risk in the early years. Because the federal subsidies favor the lowest-cost plan in a market, small plans may be surprised by the number of enrollees they obtain. Even without a significant pricing miss, some small plans may find surplus impaired simply by the volume of business they enroll compared to their current membership.

Exhibit 1

Income Statement

	Per Member Per Month (PMPM)	Annual Dollars (in 000s)
Premium Revenue	$ 400	$ 480,000
Claims Expense	320	384,000
Administrative Expense	48	57,600
Net Income	$ 32	$ 38,400

Balance Sheet

	Year 0	Year 1
Assets (all in Cash and Class 01 Bonds)	$ 100,000	$ 138,400
Liability and Shareholder Equity (SE)		
Liabilities (all claims unpaid)	$ -	$ 48,000
Common Stock	100,000	90,400
Total Liability and SE	$ 100,000	$ 138,400
Surplus as % of ACL		5.030

Exhibit 2

Income Statement

Enrollment	Annual Dollar Amounts (in 000s) 100,000	50,000	200,000
Premium Revenue	$ 480,000	$ 240,000	$ 960,000
Claims Expense	384,000	192,000	768,000
Administrative Expense	57,600	28,800	115,200
Net Income	$ 38,400	$ 19,200	$ 76,800

Balance Sheet

	Annual Dollar Amounts (in 000s) 100,000	50,000	200,000
Assets (all in Cash and Class 01 Bonds)	$ 138,400	$ 119,200	$ 176,800
Liability and Shareholder Equity (SE)			
Liabilities (all claims unpaid)	$ 48,000	$ 24,000	$ 96,000
Common Stock	90,400	95,200	80,800
Total Liability and SE	$ 138,400	$ 119,200	$ 176,800
Surplus as % of ACL	5.030	8.461	2.421

Those plans that are positioned as the lowest price in any given market may also have mispriced the anticipated risk mix, which would exacerbate this problem.

In addition to size, organization structures can affect the level of surplus required as well as the availability of capital. Not-for-profit plans have more limited sources of capital than for-profit plans that are able to access the equity markets. Not-for-profit plans can only generate surplus through operating margins and investment income or by borrowing. The ACA included funding for a number of new CO-OP plans that are funded by start-up and surplus loans provided by the federal government. As start-up plans, CO-OPs face operational risks of enrolling insufficient membership volumes to cover fixed costs, as well as considerable underwriting risks for the newly insured populations that are likely to enroll.

Simple RBC Model

With this understanding of RBC, let's consider the following example. Say we have a health insurance organization that operates exclusively in the individual and small group markets. Now say that this organization assumes enrollment in Year 1 of 100,000 and projects the following financials (see Exhibit 1). For simplicity, it's assumed the impact of health care reform items such as the 3R's and other impacts of the ACA (for example, MLRs and rebates) are implicitly included in the results shown. This projection results in a ratio of TAC to ACL (RBC ratio) of 5.03 for Year 1—a fairly reasonable value.

Now let's take a look at where differences may occur. First let's examine enrollment. Exhibit 2 above summarizes the financials, including the RBC ratio, assuming the actual enrollment is either half or double the expected enrollment.

CONTINUED ON **PAGE 26**

Exhibit 3

Income Statement

Enrollment	Annual Dollar Amounts (in 000s) Baseline	+10%	-10%
Premium Revenue	$ 480,000	$ 528,000	$ 432,000
Claims Expense	384,000	384,000	384,000
Administrative Expense	57,600	63,360	51,840
Net Income	$ 38,400	$ 80,640	$ (3,840)

Balance Sheet

	Annual Dollar Amounts (in 000s) Baseline	+10%	-10%
Assets (all in Cash and Class 01 Bonds)	$ 138,400	$ 180,640	$ 96,160
Liability and Shareholder Equity (SE)			
Liabilities (all claims unpaid)	$ 48,000	$ 48,000	$ 48,000
Common Stock	90,400	132,640	48,160
Total Liability and SE	$ 138,400	$ 180,640	$ 96,160
Surplus as % of ACL	5.030	6.816	2.837

Exhibit 4

Income Statement

Enrollment	Annual Dollar Amounts (in 000s) Baseline	-10%	+10
Premium Revenue	$ 480,000	$ 480,000	$ 480,000
Claims Expense	384,000	345,600	422,400
Administrative Expense	57,600	57,600	57,600
Net Income	$ 38,400	$ 76,800	$ -

Balance Sheet

	Annual Dollar Amounts (in 000s) Baseline	-10%	+10
Assets (all in Cash and Class 01 Bonds)	$ 138,400	$ 176,800	$ 100,000
Liability and Shareholder Equity (SE)			
Liabilities (all claims unpaid)	$ 48,000	$ 43,200	$ 52,800
Common Stock	90,400	133,600	47,200
Total Liability and SE	$ 138,400	$ 176,800	$ 100,000
Surplus as % of ACL	5.030	7.375	2.541

This analysis shows misestimated enrollment, up or down, could have a dramatic impact on RBC. If the enrollment is half of that expected, obviously the revenue is down. However, the RBC ratio increases to 8.461. In this context, the value of its equity has increased and the RBC level has also improved. However, the insurer is not meeting its goal of 100,000 members enrolled.

On the other hand, if the membership doubles to 200,000, then its revenue and net income increase. However, it is in a much more tenuous financial position. Its equity has decreased, resulting in a lower RBC level of 2.421.

It is important to note here that for the purpose of simplicity, administrative expenses are not broken down into fixed and variable costs. This breakdown would decrease the RBC ratio for the lower enrollment scenario.

Now let's move to premium and look at scenarios where the actual premium was +/- 10 percent off of the projected premium (with no changes to claims). Exhibit 3 summarizes these results.

The general results are not surprising—higher premium, with all else being equal, results in higher margin and a healthier financial position. The reverse is also true—lower premium results in lower margin and a decreased RBC level.

Finally, let's vary the claims, again using the +/- 10 percent, and assuming no change in enrollment or premium. The results are summarized in Exhibit 4.

The results again are not surprising. However, it's interesting to focus on the "negative" scenarios in each of these situations, which result in an organization that is very close to being "impaired."

Now, let's consider the impact of the ACA in a little more detail. The purpose of the 3R's is to reduce the variability in the individual and small group markets. The reinsurance and risk corridor programs are temporary while the risk adjustment program is permanent. However, even with these programs, there is still a considerable amount of uncertainty. Causes include:

- The morbidity risk could be significantly different than expected.
- The risk transfer payment may not completely reflect the entire morbidity risk.
- The enrollment could be significantly different than originally anticipated (for example, a plan

Exhibit 5

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Enrollment		100,000	100,000	100,000	100,000	100,000
Income Statement						
PMPM						
Premium Revenue		$ 400.00	$ 424.00	$ 449.44	$ 476.41	$ 504.99
Claims		320.00	339.20	359.55	381.13	403.99
Admin		48.00	50.88	53.93	57.17	60.60
Net Income		$ 32.00	$ 33.92	$ 35.96	$ 38.11	$ 40.40
$$$ (in 000s)						
Premium Revenue		$ 480,000	$ 508,800	$ 539,328	$ 571,688	$ 605,989
Claims		384,000	407,040	431,462	457,350	484,791
Admin		57,600	61,056	64,719	68,603	72,719
Net Income		$ 38,400	$ 40,704	$ 43,146	$ 45,735	$ 48,479

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Balance Sheet (in 000s)						
Assets		100,000	138,400	179,104	222,250	267,985
Liability and SE						
Liabilities (all claims unpaid)		-	48,000	50,880	53,933	57,169
Common Stock		100,000	90,400	128,224	168,317	210,816
Total Liability and SE		100,000	138,400	179,104	222,250	267,985
Surplus as % of ACL		5.030	3.395	2.800	2.479	2.293

that is the lowest-priced plan may be surprised by the number of enrollees, resulting in surplus strain).

- The make-up of that enrollment could also be significantly different than expected.
- Administrative expenses could be much higher than expected.
- Fixed vs. variable expenses could create strain if the enrollment is significantly different than expected.

The impact of these unknowns will not be independent. Additionally, one needs to consider the longer-term horizon past 2014.

A Longer-Term View

One of the disadvantages of RBC is that it doesn't take a longer-term view. Ignoring a multiyear time horizon may mask some issues and doesn't consider variability seen year over year. As an example, let's extend the baseline example shown above and assume that enrollment remains stable at 100,000, premium and claims both increase by 6 percent a year, and administrative expenses remain at 12 percent of premium. Exhibit 5 summarizes these results.

This simple model illustrates that even with modest trends and margins, the RBC ratio will decrease over time. If this projection were extended a few years, it would show that this company would fall below the 200 percent threshold. Barring some form of capital infusion, this company would be placed under one of the authoritative action levels.

So far, the analyses presented have not taken into consideration variability of the results. So, let's add in a Monte Carlo simulation using assumptions in Table 3 on page 28. The assumptions used are meant to be reasonable, but do not reflect any market in particular. Also, note that the standard deviation decreases over time due to an underlying assumption that the market variability will decrease as the individual and small group markets mature.

Exhibit 6 on page 28 illustrates results for Year 1 and Year 5 using the assumptions above. For Year 1, the RBC ratio will fall below 81 percent about 5 percent of the time. Examining the graph a little further shows that this company would fall below 200 percent of the RBC ratio a little over 10 percent of the time. Stated differently, 1 in 10 similarly situated carriers may be in trouble. Year 5 is worse. This

CONTINUED ON PAGE 28

Table 3

	Year 1	Year 2	Year 3	Year 4	Year 5
Enrollment					
Mean	100,000		Previous Year's Value		
Standard Deviation	20,000	10,000	5,000	2,500	1,250
Premium					
Starting Premium (1)	400	424	based on claims		
Claims					
Starting Claims (2), (3), (4)	320		based on previous year's value		
Variability factor (4)					
Mean	1.00	1.00	1.00	1.00	1.00
Standard Deviation	0.10	0.05	0.03	0.01	0.01

Notes

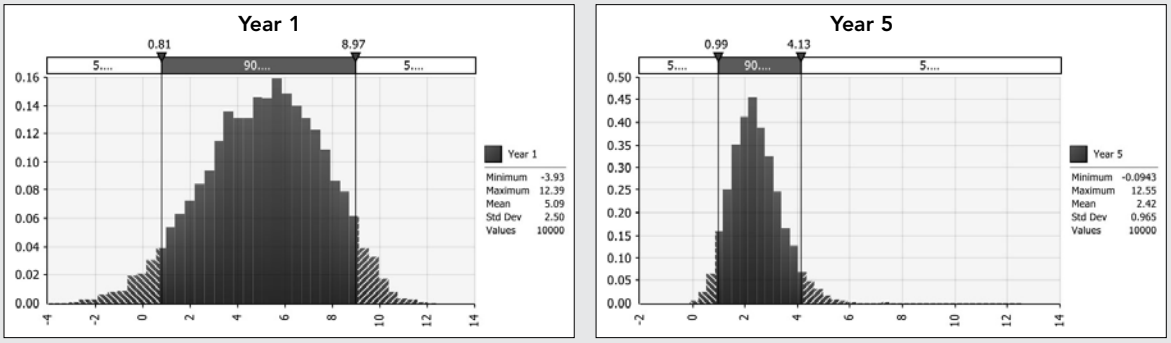
(1) Year 2 premium is based on Year 1 plus 6% trend. Subsequent years are based on the previous year's claims plus 6% trend and an MLR of 80%

(2) Year 1 claims are assumed to be 80% of starting premium, plus simulation variability

(3) Claims subsequent to year 1 are based on the previous year's claims plus 6% plus simulation variability

(4) These factors represents, collectively, several unknowns including selection, the impact of health care reform, trend variability, etc. and are assumed to be normally distributed

Exhibit 6



company would reach the 200 percent level almost one-third of the time.

Now let's pose a little different question—what would the surplus level need to be if we wanted the RBC ratio to be at 200 percent or below no more than 5 percent of the time over the course of the next five years? Rerunning the Monte Carlo simulation indicates that this company would need to increase its beginning RBC ratio from 503 percent to a little under 1,000 percent in order to avoid dipping below an RBC ratio of 200 percent less than 5 percent of the time.

Concluding Comments

A healthy surplus position helps fund for future growth and capital investments, to support loss reserves, prepare for future regulatory changes (e.g., ICD-10), and possibly most importantly, protect companies and their policyholders from adverse cash flow shocks.

Because of the unknowns, including those resulting from health care reform, a company will need to understand the potential strain new market conditions may place on surplus and plan accordingly.

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Evaluating Approaches for Adoption of Medical Technologies

A Recently Released SOA Research Report

By Andie Christopherson and Jed Linfield

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A new expensive prescription drug comes on the market. A new expensive radiology procedure is heavily advertised. As an actuary for a health insurance company, how should you evaluate these new technologies?

Robert Lieberthal, Tony Amos and Jessica Lopatto from the Jefferson School of Public Health provide a framework for how actuaries can tackle valuing such new technologies in their recently completed research sponsored by the Society of Actuaries' (SOA's) Health Section. While this sort of evaluation may seem very actuarial in nature (classic cost benefit analysis), actuaries historically have done such analysis based largely on quantitative costs and benefits ($$). The move within managed care to reimbursement based on value brings an enormous base of evidence actuaries historically haven't dealt with—the clinical kind.

Evaluating benefits and costs using clinical evidence is the sweet spot of Health Economics and Outcomes Research (HEOR). The report defines HEOR as the discipline "concerned with determining the value of medical technologies. The methods, findings, and literature of this field allow for the determination of the value of a medical technology." The authors define medical technology in an inclusive way, covering drugs, devices, tests, protocols or procedures. Therefore, as actuaries are increasingly asked to incorporate value into pricing and other core areas, it is advantageous to piggyback off of the substantial body of evidence that HEOR presents.

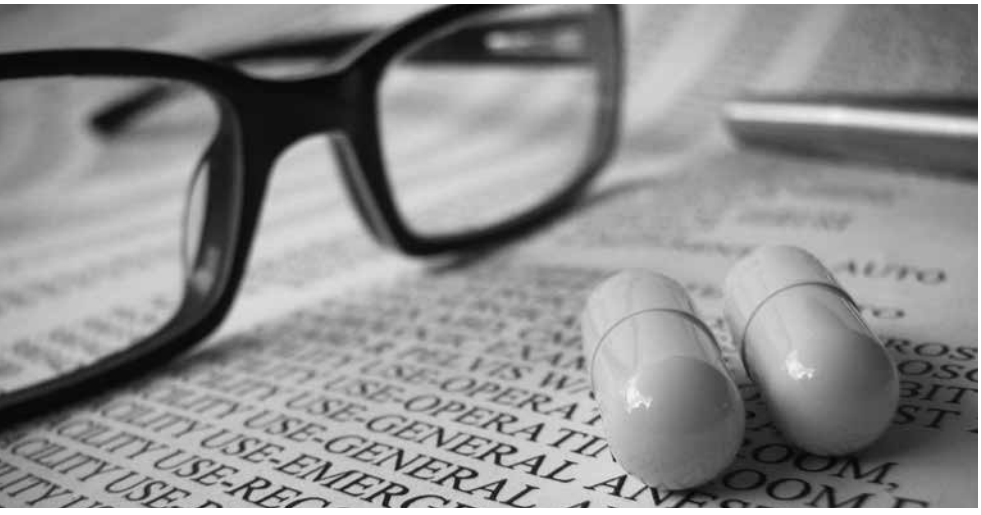
In addition to the background and overview material on the field of HEOR, a key output from this research is a structured assessment tool that actuaries can use in evaluating new technologies. The four sections of this assessment tool are as follows:

- Classifying the technology—What is the purpose of this new technology? What are the restrictions involved?
- Evidence base—What evidence do we have on the effectiveness of the new technology?
- Applying the evidence—What is the effect on stakeholders? Insurers might be primarily interested in cost while government might be interested in a healthier population.
- Feedback loop—What is the consensus among stakeholders within the company?

Without this framework, knowing how to evaluate a new technology can be a very daunting task. Once you see it, the process to assess value becomes simple and very straightforward. The framework allows an actuary to bring together all of the evidence for a new technology, clinical or otherwise, to more objectively assess value. One noteworthy aspect of the evidence base evaluation is that in gathering the data, the tool prompts one to assess the source, validity and possible bias of the data presented—a very actuarial perspective on data analysis.

This easy-to-read research report gives actuaries an introduction to HEOR and a state-of-the-art evaluation tool, allowing us to adapt HEOR's key measuring systems as we move forward with value-based actuarial work.

The report can be found online at *www.soa.org/research.*



Operational Considerations in Predictive Modeling

By Christine Hofbeck

The advent of "big data" and predictive analytics has led to a deluge of information on how to model. We are taught how to select the appropriate distribution, methods and steps in univariate and multivariate analyses, discovery of interactions, refinement of splines and bins, and validation techniques using appropriate statistical tests. Modeling teams are developed and nurtured, and optimal predictive models are created.

But building the perfect predictive model does not necessarily guarantee a successful outcome (and often it's the modelers who are blamed for a fail, even if they've built something great). There are operational considerations that must be addressed to optimize the results of any predictive model. These considerations are sometimes obvious, but often overlooked.

Some considerations are described below—but there may be many more based on your particular project, company, staff, knowledge and philosophy. The important thing to remember is that the project starts long before the modeling starts, and the project ends long after the modeling ends. If you ignore the before and after, and don't strategically manage the middle, you could be setting yourself up for disappointment.

1) EXECUTIVE AND CROSS-FUNCTIONAL SUPPORT

Top management has funded the modeling project, so you're all set, right? Wrong. The directive to build a predictive model may not mean that all parties will support the final product. And if the target users don't support the model, they likely will resist using it. It is business critical to gain both executive and cross-functional support for a modeling project prior to model build. This step can be difficult for several reasons:

- Resistance to change
- Concern that model results will highlight current deficiencies
- Lack of understanding of predictive models.

Consider the following examples (see chart on page 32) of typical concerns and possible response.

2) TIME/VALUE CORRELATION

The process of building and implementing a model can typically be quite lengthy—longer than most people expect. If management is looking for a quick fix (i.e., three to 12 months to execution), then they must understand that the study will be simpler and the results more conservative. A more comprehensive and thorough exploration may provide a greater payoff, but will require additional time and development cost. What, exactly, takes so long?

- **Data**—Internal data is often stored in multiple systems, and it is almost never fully accurate and complete. Extracting and combining datasets is a challenge. There will be multiple discussions with data stewards to ensure that the data is properly understood and utilized. Are the data stewards available whenever we need them? Do any data fields include randomly input values whenever the actual values are unknown? Missing data must be imputed. Inaccurate data must be corrected. All data must be converted to the appropriate exposure unit and matched together by a primary key.

Now let's add external data. It could take a month or two or more to simply finalize a contract with an external data provider. Then it could take two to four months to receive the external data. Sometimes external data must be secured in consecutive steps (versus all at once). For example, credit data must be scrambled due to regulatory constraints; that data must be collected after all other internal and external data has been compiled, appended and scrubbed.

Now let's consider how we should bin (or group) the data. For example, will we consider each age separately, or group together everyone over the age of 80? 85? 90? What other variables should be binned? Do we group zero values with missing values? Why or why not? Remember that if we are working with hundreds of variables, this seemingly simple step can take weeks.

Or … do we simply use whatever data we can easily access and assume it is "mostly correct" in order to accelerate the modeling process and minimize development costs?

CONTINUED ON **PAGE 32**

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Function	Concern	Possible Response
Underwriting	My position will be eliminated if a model is now used to select risks. My expertise must not be important to the company.	The model will make decisions for the simpler risks, which will allow our highly skilled UWs more time to address the most complex cases.
Underwriting	You call it an outlier, but I call it wrong. If the model is calculating the wrong result for one risk, it is useless.	No model is correct 100 percent of the time. It is not a crystal ball; there will always be outliers. However, xx percent of the time the model provides an accurate result. "All models are wrong; some are useful."
Underwriting	The model could be contrary to anecdotal evidence, so I won't believe it.	An UW leader will be engaged throughout the model build to ensure the results make sense. Sometimes results can be surprisingly informative
Actuarial Pricing	The model will highlight areas in which my current pricing algorithm is incorrect, which will reflect poorly on my performance/reputation. Therefore I will not support the initiative.	Our current pricing algorithms are the best solutions based on tools available until now. New tools are now available to refine current practice. We will always continue to improve.
Marketing	I already have an established marketing plan. I know who our target customer is.	A model will help us refine targets. Marketing reps will be engaged throughout the model build to provide valuable insight and feedback, to ensure the target customers identified by the model are appropriate.
Marketing	I don't know how to explain this to a broker or agent so I don't want to use it.	Thorough training will be provided so you fully understand how to interpret the results and can explain and support anything counterintuitive.
IT	I don't have enough staff to implement scoring engines and user interface in the allotted time. My workflow will double (triple).	IT resources will be fully addressed at project scope. IT will be engaged throughout the model build to ensure the proposed solution is possible from an IT perspective.
All functions	We've always done it this way, and it's worked. I don't see a reason to change anything.	We will strive to continue to improve and refine results based on cutting-edge technologies. This new technology will allow us higher profitability, improved operational efficiencies, and the ability to stay ahead of the competition. A transparent model will be built so results are easy to understand and convey. Thorough training will be provided for all users.

- **Model Build**—To develop a model thoroughly, we may investigate different modeling techniques and software. We will consider many different combinations of variables. We will develop and refine splines to smooth results. We will examine interactions in-depth. We will use multiple statistical tests to optimize results. We will continually review results with the ultimate model users to ensure our proposed formula makes intuitive sense. We may go back and revise data more than once.

  Or … do we simply run our data through the available modeling software, skip or minimize interactions, and allow for generous binning? Simplicity in model structure is necessary if we have minimal time for implementation, and may be desired if the goal is simply to develop a better general sense of our customer, pricing accuracy, marketing technique, or long-term strategies.

- **Implementation**—Now that our model is built, how will we use it to improve results? IT will need to build a scoring engine. Multiple variables, variable conversions, bins and assumptions in a model will complicate implementation. If individual external data will be requested at time of calculation, then a delivery pipeline must be created. Once the model output is calculated for a given risk, how is this information delivered to the user? Such interface will be required. In order to track the impact of the model, reporting packages for various audiences must be developed.

  Or … perhaps we will calculate simple results in an Excel worksheet and track results on an ad hoc basis?

Ultimately, management will need to understand that you get what you pay for. A basic, swift model build is certainly possible and is definitely appropriate in some situations. However, a simple study probably will not deliver the same impact as a more thorough exploration. The appropriate combination of time, value (cost and return), and comprehensiveness must be understood and approved prior to build to ensure an expected result.

3) STRATEGIC MODELING PROCESS

To optimize usage and impact, it is important for the modeling process to be executed strategically, while allowing flexibility. Consider the following:

- **Target Prediction and Use**—It is critical to define the target prediction clearly, and ensure that it is appropriate for your intended use of the results. In health insurance, are you modeling the individual risk, or the family as a whole? Are you

CONTINUED ON **PAGE 34**

modeling what will happen in the next year, or expected outcome in a lifetime? If you are modeling medical providers, are you interested in the doctor, the doctor group, or the associated hospital? There is no right or wrong answer to these questions. Just make sure that your target prediction and intended model usage are compatible.

There are many interesting topics to investigate and ideas to prove—when developing the target prediction, try to focus on that which is actionable and will impact the company's profitability, operations, or overall strategy and goals. For example, you could predict how many people of a certain region, age, or insurance coverage have Disease X. However, a more impactful strategy might be to predict the onset of Disease X for an individual based on particular characteristics. (Researchers from the Johns Hopkins University School of Medicine in Baltimore, Md. have recently developed a model to detect early-onset dementia, allowing for possible improvements in the treatment and progression of Alzheimer's disease.)

Modeling is not just for modelers. Building a model collaboratively and cross-functionally is critical for optimal usage and results.

- **Statistical Significance vs. Ultimate Impact—** Similarly, the most statistically significant model may not be the most impactful. Often the value to the company hinges on a model's ease of implementation (distribution) and repeatability. While an intricate, multifaceted or unique model may be ideal in certain situations, parsimonious models that allow for easier implementation and automatic or straightforward updates may be deemed more useful, less costly to maintain, and ultimately more powerful to the business.

It seems an oxymoron that delivering the less complex (parsimonious, distributable, repeatable) model could be a greater challenge. However, it is not uncommon for health actuaries to build unique models that are not repeatable through time. We are capable of highly intellectual, creative, in-depth solutions, and may become frustrated by our company's failure to understand our insights. For some actuaries, identifying when "less is more" to deliver a more usable solution could be an ideal area of targeted personal growth.

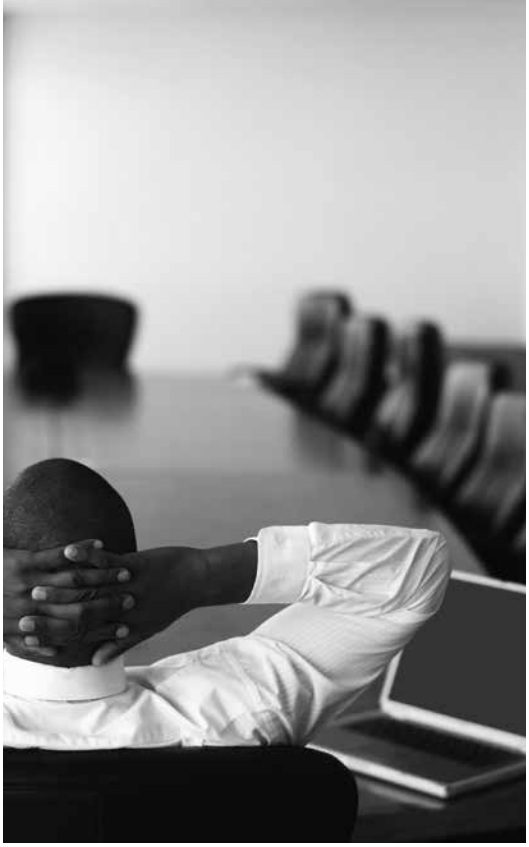
- **Flexibility—**Although a specific goal may be targeted, significant unexpected insights could occur during the modeling process as a result of the fresh review of data, leading to unanticipated business-critical changes in strategy or process. Flexibility is key—in some cases it may make better business sense to modify the target mid-stream. Consider the development of penicillin, which Sir Alexander Fleming found by accident while studying Staphylococcus, or iodine, which Bernard Courtois discovered while processing seaweed ash for gunpowder, or Viagra, which was originally studied for its cardiovascular benefits. In these cases, insights gained from the journey ultimately proved more important than the planned goal.

4) CROSS-FUNCTIONAL INVOLVEMENT THROUGHOUT MODEL BUILD

Modeling is not just for modelers. Building a model collaboratively and cross-functionally is critical for optimal usage and results. Modelers should not disappear into the back room and emerge weeks or months later with the final product. They shouldn't want to, and they shouldn't be expected to. This is an especially important consideration if a model build is outsourced. There must be continuous involvement by company data, product and IT experts, legal advisers and model users. Why?

- The modelers are (hopefully) experts in building models, but they may not be experts in all other functions. Underwriters, marketing teams, adjusters and IT can provide valuable insight. Perhaps there is a variable that must be (or must not be) included for some reason. Let's not wait until the model is fully built to figure this out. For example, if we are building a stop loss model, we must include the attachment points that the company is willing to sell. If the availability of aggregate stop loss attachment points has certain business rules surrounding it, then those rules should be reflected as well.

- The modelers may discover interesting and important information during a model build that should be shared with other function areas. For example, perhaps the modelers are surprised to learn that



sold-versus-needed rate ratios for one broker's customers are consistently lower than others. If a marketing representative is included in the project, then the representative can look into potential marketing differences. If an actuarial rep is included, then potential pricing issues can be further investigated.

- Besides improving the model, collaboration by stakeholders eases training and implementation. Leaders in each function will support the model to their respective teams.

- Modelers may not be aware of planned changes in company strategy that would affect model usage or data availability. Conversely, the model could suggest expansion to an area that runs counter to existing or proposed philosophy.

- Legal considerations for particular internal or external variables could exist. For example, variables may be deemed as unacceptable or create a risk of breaching individuals' private health information, and may be discouraged for use in a model. Even if a particular variable may be includable under the law, the legal team may wish to exclude it to avoid potential future litigation that could lead to poor company reputation or perception. Please note that different variable decisions may be made by a given company's legal team based on the particular line of business or risk being modeled.

5) THOROUGH TRAINING

The model isn't done when it's done. The users must understand exactly how to interpret and correctly apply the model results, to ensure full functionality. Often overlooked is the question, "Who will provide the training?" Or perhaps, "Who is most appropriate to provide the training?"

The modeling team may not be your best choice to provide training, as training may not be their specialty. However, internal teams dedicated to generic employee training may not fully understand a predictive model—why it is built this way and how to interpret and handle the results. You could consider including a member of the training team throughout the model build for maximum payoff.

If outsourcing a model build, the consultants are generally hired to build the model only. But then who (internally) fully understands it, and can provide training? And are the model formula and results proprietary, or may they be shared/distributed? You could consider expanding the scope of the consulting project to include full training (by the consulting team) of all users.

Training in marketing applications is especially difficult. We want to be able to express to brokers and agents the characteristics of our target customers, without revealing the proprietary modeling formula. How will we do that?

There is never one clear answer on how to train and who should perform the training. What is clear is that this step must be thoughtfully considered and appropriately executed in order to reap the full benefit of the model you just built.

6) REPORTING

Let's remember that the modeling project was initiated to improve something. Perhaps we wanted to improve customer retention, increase quote volume, improve risk selection based on profitability, or optimize pricing. We won't know how close we come to our goals (or how far we exceed them!) unless

CONTINUED ON **PAGE 36**

we develop comprehensive reporting packages to convey the results over time. Multiple reporting options should be developed to address the different needs of various users:

- Executives may wish to see the highlights in aggregate, by location, business unit or product.
- The marketing team may wish to see results broken down by broker/agent, or by location.
- Actuaries may wish to see more detailed results by predictive variable, by region, or by rate group.
- Underwriting leaders may wish to see results by underwriter, as a performance measure.
- Will each of these reports update weekly? Monthly? Quarterly? Annually?

You will also need to consider whether the reporting package will be pre-programmed for automatic generation of results, or if they will be individually calculated each month/quarter/year or as needed.

7) MODEL UPDATES

There must be a plan in place for updating the model. Will modelers rebuild every 18 months? Three years? Five years? Does an "update" mean recalibrating coefficients for the current variables, or rebuilding the model from the ground up? It sounds almost ridiculous to think about V2 when V1 hasn't yet started. But this is a necessary conversation, as management may not support a two-year build for a model that may only last for 18 months. Remember, too, that the model update schedule must mesh with your existing product or business strategy.

Conclusion

Modeling exercises require a deep commitment of staff, time and dollars. To avoid wasting these resources and to fully optimize the results of the project, a comprehensive range of operational considerations must be addressed. Only when "modeling" is accepted as a complete business strategy (versus simply a mathematical process) will it be as successful, profitable, efficient and impactful as possible.

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