Health Care Cost Trends

Medicaid Managed Care Underwriting Margin Model

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Medicaid Managed Care Underwriting Margin Model

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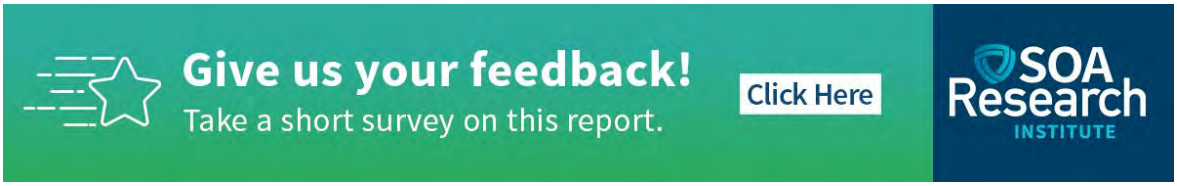

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Disclosures and Limitations

The opinions expressed and conclusions reached by the authors are their own and do not represent any official position or opinion of the Society of Actuaries (SOA) or its members. The Society of Actuaries makes no representation or warranty to the accuracy of the information.

This report and the accompanying Excel model are intended to be used in their entirety by qualified actuaries setting rates or evaluating rates for Medicaid managed care programs to develop the underwriting margin component of the capitation rates. It should not be relied on for any other purpose. The methodologies and assumptions discussed in this paper as well as the calculations in the Excel model are not intended to account for all possible scenarios. Users should use actuarial judgment to determine if model results are appropriate for the specific circumstances of the program being evaluated. Actual underwriting margin results will vary from the model estimates.

The model relies upon historical Medicaid managed care organization statutory financial filings with the National Association of Insurance Commissioners (NAIC). The authors reviewed the data for reasonableness but did not perform an audit of the data.

Medicaid Managed Care Underwriting Margin Model

Executive Summary

Since the publication by the Center for Medicare and Medicaid Services (CMS) of the 2016 Final Rule that memorialized the ASOP 49 standard for the inclusion of a margin, most rate certifications for Medicaid managed care (MMC) have included an explicit provision for margin, whether described as a risk margin, profit margin, underwriting gain or underwriting margin. Across the 411 data books reviewed for the period between 2016 and 2024, up to 91% included an explicit provision for a margin that ranged from 0.35% to 3.15%, excluding programs with per-member-per-months (PMPM) less than $100 (i.e., for limited benefits, such as family planning only or dental only). Actual financial performance over the past few years by Medicaid plans has varied more widely, both within and across states; but, overall, the average underwriting ratio before taxes has ranged from −0.25% in 2019 to 3.43% in 2022.

The research presented in this report and reflected in the accompanying Excel workbook is an update to the study completed by the same authors and published by the Society of Actuaries (SOA) in 2022[1] and defines an empirically supported, methodologically sound and actuarially grounded model, the Underwriting Margin Model, for transparently developing an underwriting margin within the context of MMC rate certification (a summary of the changes from the 2022 report and model is delineated in a separate section of this executive summary below.) The authors define the underwriting margin to include financing related to the following:

1. The cost of capital or the opportunity cost associated with, primarily, risk-based capital requirements and
2. A margin for risk and/or a contingency against general losses or a net income target.

Given existing regulations around MMC rate setting, this report maintains that the inclusion of an adequate and transparent underwriting margin is necessary for maintaining a competitive and fair MMC market.

This research project offers guidance and a model for actuaries to use when performing their professional services related to Medicaid (Title XIX) and the Children's Health Insurance Program (CHIP or Title XXI) managed care capitation rate setting, including, but not limited to, their certification on behalf of a state in accordance with the requirements for actuarial soundness as set forth in law,[2] federal regulation[3] and CMS guidance,[4] as well as the actuary's professional obligations under the Actuarial Standard of Practice (ASOP)

[1] M. Atoyan, T. Donlon and G. Porter, *Medicaid Managed Care Underwriting Margin Model* (Schaumburg, IL: Society of Actuaries, 2022), accessed Apr. 23, 2024, https://www.soa.org/resources/research-reports/2022/medicaid-underwriting-margin-model/.
[2] 42 USC § 1396b(m)(2)(A)(iii).
[3] 42 CFR § 438.4.
[4] Centers for Medicaid & Medicare Services, "2021–2022 Medicaid Managed Care Rate Development Guide," June 2021, accessed Apr. 26, 2024, https://www.medicaid.gov/media/130761.

49 issued by the Actuarial Standards Board.[5] The authors intend for this model to be used in the development of comprehensive medical rates for MMC. Additional considerations may be necessary in its application to limited benefit plans, such as dental-only products, or for Medicare/Medicaid product lines, such as dual eligible special needs plans.

This model, as well as the 2022 version published by the SOA, follows on the 2017 study by Teppema, Goldman, Smith and Tutewohl, sponsored by the SOA,[6] and the 2019 model developed by Gibson, Piekut and Simons and published by the Medicaid Health Plans of America (MHPA).[7]

This report proceeds over four sections. The first section offers background on MMC and rate setting in the context of Medicaid. It also introduces the authors' definition of underwriting margin in greater detail and a justification for its explicit consideration in the context of MMC. The authors then offer an overview of the model and its parameters. This is followed by a detailed review of its results and various sensitivity analyses that arise from changing certain parameters. The last section includes technical instructions for the model that are separately contained within the accompanying Excel workbook. The latest version of the Excel workbook is available for download from the Society of Actuaries at http://www.soa.org/. An appendix to this report includes all the base data referenced in this report and used in the model.

Some readers may contend that the market volatility of the past three to four years offers a critique of the relevancy of the use of backward-looking benchmarks and the use of a formula that is dependent upon the historical performance of the S&P 500 as a proxy for the equity premium. They may also note how the implications of COVID-19 on utilization, the role of the public health emergency on MMC enrollment, or the impact that inflation may have on both benefit costs and administrative costs, including wages and rent, could challenge MMC's historical performance.

To these concerns, the model's authors are optimistic that their model is sufficiently robust to allow the user to make necessary adjustments and substitute user-defined assumptions for each of the specified parameters. However, such changes should be made cautiously. For example, the model offers users the flexibility to set their own equity premiums, with users able to adjust for the recent volatility among certain health insurers by selecting the overall performance of the S&P 500 or using an alternative time period. Additionally, the user should recognize that higher Treasury yields (i.e., the risk-free rate) serve to moderate the impact of any decline in the equity return on the overall cost of capital.[8] Although a specific rate certification is likely to be for a 12-month period, most MMC contracts span multiple years, and so the long-term historical returns remain relevant for the purpose of rate stability. (A similar rationale for stability applies to user considerations around the use of risk margin or net income targets.)

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[5] Actuarial Standards Board, "Actuarial Standard of Practice No. 49: Medicaid Managed Care Capitation Rate Development and Certification, 2015," accessed June 13, 2021, http://www.actuarialstandardsboard.org/asops/medicaid-managed-care-capitation-rate-development-and-certification/.

[6] S. Teppema, J. Goldman, L. Smith and S. Tutewohl, *Medicaid Managed Care Organizations: Considerations for Calculating Margin in Rate Setting* (Schaumburg, IL: Society of Actuaries, 2017), accessed Mar. 12, 2022, https://www.soa.org/globalassets/assets/files/research/medicaid-managed-report.pdf.

[7] S. H. Gibson, J. R. Piekut and J. Simons, *Underwriting Gain Development for Managed Medicaid Capitation Rates* (Medicaid Health Plans of America, Washington, DC, 2019), accessed Mar. 12, 2022, https://medicaidplans.org/wp-content/uploads/2020/07/MHPA-Underwriting-Gain-Development-Report_June-2019_FINAL.pdf. See also S. H. Gibson, J. R. Piekut and J. Simons, "Underwriting Gain in Managed Medicaid: Starting the Conversation," *Health Watch* (Society of Actuaries), Oct. 31, 2019.

[8] Although the Capital Asset Pricing Model (CAPM) is an accepted methodology for supporting investment decisions and therefore was selected by the authors as the default methodology for calculating the Cost of Capital in the Underwriting Margin Model, the general reliance on it as a tool for calculating what is a required rate of returns is not without its significant detractors. A discussion of this debate is beyond the scope of this Report, but an alternative metric for the equity premium that comports with the authors' own preferences is briefly discussed in the Report and included in the Model.

The reader and user of the accompanying Underwriting Margin Model should note that all assumptions used in developing an underwriting margin should be reviewed individually, in their totality and in the context of their application. This model is open by design because it is intended to be used as a tool to derive an underwriting margin. The authors' intent is not to dictate a policy position. To that end, however, unreasonable assumptions will yield unreasonable and questionable results, and the user should be aware of the limitations imposed by the flexibility of this model.

SUMMARY OF CHANGES FROM THE 2022 REPORT AND MODEL

The core concepts discussed in this report and the accompanying model generally remain the same as the report and model published in 2022. The discussions, methodology and references are inclusive of this update and do not explicitly compare or contrast to the 2022 report and model. Any specific references to the 2022 work products are made simply to provide clarity and distinction where applicable. To this end, the following are the key changes from the 2022 report.

Margin Curve Development

1. Added 2020, 2021 and 2022 NAIC data to supplement the existing dataset of 2013 through 2019.
2. Developed 15 curves of various combinations including and excluding 2020 to 2022, termed the pandemic period, whereas the 2022 model presented a selection of eight curves.
3. Updated managed care organization (MCO) size curve to reflect supplemented dataset through 2022 and updated MCO size curve through 2019.

Cost of Capital Development

1. Updated all metrics to include data through March 31, 2024.
2. Replaced the use of Compounded Annual Growth Rate (CAGR) with Trailing 12 Month (T12m) as default metric used in Capital Asset Pricing Model (CAPM) and defining equity premium.
3. Revised formula for calculating Betas to use daily—as opposed to monthly—returns.
4. Included one-year and six-month averages for Treasury yields and bond rates and revised default to for risk-free rate of capital to be the one-year average for 10-year Treasury and one-year average for Aaa/AAA bonds, respectively.

Model Operation and Functionality

1. Provided users with the option to select curves that include or exclude the pandemic period data of 2020 through 2022 for the development of the underwriting margin.
2. Provided users with the option to select from the percentile quadrants of historical risk-based capital (RBC) thresholds for the maximum RBC threshold selection.
3. Introduced an option to select the historical periods for risk-free rates of return benchmarks separately from historical periods for equity rates of return benchmarks.
4. Changed the choices for the MCO revenue lag cash flow adjustment to the risk-free rate and the interest rate for debt.
5. Modified the calculation methodology for the probability of ruin goal-seek to increase and test the risk margin in 0.01% increments until the result yields a risk margin that satisfies the probability of ruin target by reaching zero or near zero in the difference between the stated target and the model-calculated probability of ruin.
6. Added a new statistic on the results dashboard to display the Cost of Capital funding as a percentage of Target RBC Reserves. This statistic includes the effects of MCO cash flow considerations on the Weighted Average Cost of Capital (WACC) used to fund the cost of capital.
7. Removed the premium development pie chart from the results page (it is still on the Graphs sheet).
8. Added a landing page that is triggered whenever the model is started, from which a user can navigate to the core components of the model via navigation buttons.

9. Added additional navigation buttons to assist the user with the following:
    a. Save a session as a pdf file.
    b. Navigate between the Instructions, User Parameters, Results Dashboard and Interpretation sheets.
    c. Exit the model without closing the Excel application.

Introduction

MEDICAID AND MEDICAID MANAGED CARE

The growth of Medicaid managed care (MMC) over the past several decades represents a "remarkable evolution of the provision of US public health insurance."[9] The number of Medicaid beneficiaries enrolled in managed care increased from just 10% of all Medicaid beneficiaries in the mid-1980s through the early 1990s to more than 75% of Medicaid members being currently enrolled in a comprehensive risk-based managed care plan. Managed care is now the dominant delivery system in 39 states, including nine of 10 states with the largest total Medicaid enrollment.

Although a few states that previously maintained MMC contracts have reverted to fee-for-service (FFS), and Alaska halted reforms to implement MMC in 2018, the overall trend in managed care enrollment remains positive. Significantly, on July 1, 2021, 1.6 million Medicaid members in North Carolina began to receive their Medicaid benefits through MMC, and on April 1, 2024, nearly 800,000 Medicaid members in Oklahoma began enrolling in MMC. Finally, six of the 10 states that as of April 2024 had not yet implemented Medicaid expansion to all nonelderly adults up to 138% of the federal poverty level primarily rely upon MMC. Were these six states to implement Medicaid expansion, another 2.6 million Americans could gain insurance coverage through MMC.[10,11]

Overall, some 56 million persons were enrolled in comprehensive managed care in federal fiscal year (FFY) 2021 with total premium revenue exceeding $280 billion.[12] With the onset of COVID-19 and the public health emergency, the federal government required states to provide continuous coverage to members who met Medicaid eligibility criteria. The resulting moratorium on closures resulted in significant increases in the number of persons eligible for Medicaid and resulting number of persons enrolled in comprehensive managed care. By FFY 2021, the number enrolled in MMC had increased to 68 million members, and total premium revenue exceeded $420 billion.[13] Medicaid eligibility is estimated to have increased by another 8.4% in FFY 2022 and 6.5% in FFY 2023 with total Medicaid spending increasing 9.8% and 8.3% across those

[9] J. Gruber, "Delivering Public Health Insurance through Private Plan Choice in the United States," *Journal of Economic Perspectives* 31, no. 4 (2017): 3–22, accessed July 12, 2021, https://dspace.mit.edu/handle/1721.1/114041.
[10] The 10 states that have not expanded Medicaid as of April 2024 are Alabama, Florida, Georgia, Kansas, Mississippi, South Carolina, Tennessee, Texas, Wisconsin, and Wyoming. Both South Dakota and North Carolina, two states that have expanded coverage since 2023, deliver Medicaid services to their newly eligible residents through MMC.
[11] K. Braham, C. Peters and B. Sommers, "Estimates of Uninsured Adults Newly Eligible for Medicaid if Remaining Non-Expansion States Expand," Assistant Secretary of Planning and Evaluation, Office of Health Policy, May 28, 2021, accessed Mar. 12, 2022, https://aspe.hhs.gov/sites/default/files/migrated_legacy_files//200641/aspe-data-point-medicaid-expansion-new-eligible.pdf.
[12] Centers for Medicaid & Medicare Services, "Enrollment Report," accessed April 1, 2024, https://www.medicaid.gov/medicaid/managed-care/enrollment-report/index.html.
[13] Centers for Medicaid & Medicare Services, "Expenditure Reports from MBES/CBES," accessed Apr. 1, 2024, https://www.medicaid.gov/medicaid/financial-management/state-expenditure-reporting-for-medicaid-chip/expenditure-reports-mbescbes/index.html. Total includes Medicaid ($404.4 million) and CHIP/MCHIP ($15.1 million) expenditures for managed care.

years.[14] Although comprehensive data from CMS are not yet available for these later years, it is reasonable to assume that the number of members enrolled in MMC had increased by at least those same percentages.

Such trends, however, abruptly reversed in April 2023. Through the process known as unwinding, all state Medicaid programs began reviewing eligibility of all Medicaid members and for the first time in more than three years began to disenroll members from Medicaid who no longer met certain eligibility criteria. Given the introduction of a federal requirement, effective January 2024, providing for a minimum of 12 months of continuous coverage for newly eligible children, and additional flexibilities offered by CMS to pause renewals for children during the unwinding or waiver amendments to provide multiyear and new opportunities for eligibility continuity under waiver authority , the authors believe that Medicaid eligibility and thereby enrollments in MMC will likely remain above their pre-COVID-19 levels, but with significant uncertainty around MMC caseloads, revenues and acuity-related expenditures.[15]

RATE SETTING IN THE CONTEXT OF PUBLIC INSURANCE

The 40 states that have nearly 80% of their Medicaid beneficiaries covered in managed care have accepted that competition by private managed care organizations (MCOs) can lead to either lower costs for taxpayers, better outcomes for the beneficiaries or ideally both. Whether or not it was a state's primary motivation for implementing managed care, the desire to rein in Medicaid spending growth remains a persuasive part of the political rhetoric that state leaders use to support such financial arrangements over traditional Medicaid FFS. Yet various state and federal regulations and statutes may limit if not outright prohibit MMC plans from implementing some of the very practices by which private health insurers successfully control health care costs: specifically, the ability to manage networks and negotiate lower provider reimbursement rates and/or influence their member utilization by adjusting cost-sharing arrangements.[16,17,18,19,20]

As the steward of their public's revenues, the desire by policymakers to control Medicaid spending and/or mitigate the influence of health care inflation on a state's budget is laudable. It is this desire that may account, in part, for the narrow tolerances afforded by the rate setting in the context of MMC. Overall, the average net underwriting ratio (net underwriting gain/[loss] divided by total revenue) before income taxes of a Medicaid plan was 0.84% between 2013 and 2019, ranging from 2.19% in 2015 to an average loss of 0.25% in 2019, less than half the expected returns of a large commercial insurer in the U.S.[21] During this

[14] E. Williams, E. Hinton, R. Rudowitz and A. Mudumala, "Medicaid Enrollment and Spending Growth amid the Unwinding of the Continuous Enrollment Provision: FY 2023 & 2024," Kaiser Family Foundation, Nov. 14, 2023, accessed Apr. 1, 2024, https://www.kff.org/medicaid/issue-brief/medicaid-enrollment-and-spending-growth-amid-the-unwinding-of-the-continuous-enrollment-provision-fy-2023-2024/.
[15] Center on Budget and Policy Priorities, "Unwinding Watch: Tracking Medicaid Coverage as Pandemic Protections End," accessed May 12, 2024, https://www.cbpp.org/research/health/unwinding-watch-tracking-medicaid-coverage-as-pandemic-protections-end?item=28664.
[16] M. Duggan and T. Hayford, "Has the Shift to Managed Care Reduced Medicaid Expenditures? Evidence from State and Local-Level Mandates," *Journal of Policy Analysis and Management* 32, no. 3 (2013): 505–535, accessed Apr. 26, 2024, http://dx.doi.org/10.1002/pam.21693.
[17] D. Cutler, M. McClellan and J. Newhouse, "How Does Managed Care Do It"? *RAND Journal of Economics* 31, no. 3 (2000): 526–548.
[18] A. Dor, M. Grossman and S. Koroukian, "Transaction Prices and Managed Care Discounting for Selected Medical Technologies: A Bargaining Approach," NBER Working Paper 10377, 2004, accessed Apr. 26, 2024, https://www.nber.org/system/files/working_papers/w10377/w10377.pdf.
[19] Y. Shen and G. Melnick "Is Managed Care Still an Effective Cost Containment Device?" *Forum for Health Economics & Policy (Frontiers in Health Policy Research)* 9, no. 1 (2006): Article 3.
[20] B. Garrett and S. Zuckerman, "National Estimates of the Effects of Mandatory Medicaid Managed Care Programs on Health Care Access and Use, 1997–1999," *Medical Care* 43, no. 7 (2005): 649–657.
[21] See also J. Palmer, C. Pettit and I. McCulla, *Medicaid Managed Care Financial Results for 2018* (New York: Milliman, 2019), accessed Mar. 12, 2022, https://assets.milliman.com/ektron/Medicaid_managed_care_financial_results_for_2018.pdf.

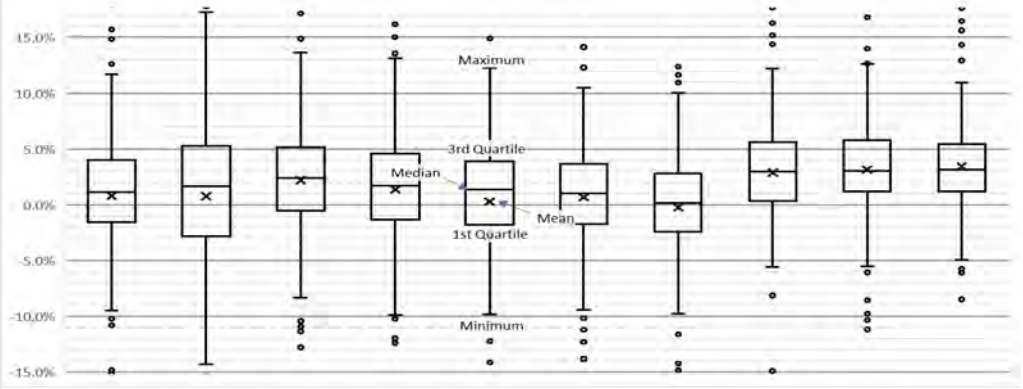
period, just over one in three of all MMC insurers in the authors' dataset reported annual underwriting loss. And in 2019, across the 181 observations it was a coin toss as to whether the insurer was likely to break even.

The fiscal fortunes of MMCs improved significantly during the public health emergency, with fewer than one in five plans losing money between 2020 and 2022 as caseloads and resulting revenues swelled. During this period the average underwriting ratio more than tripled compared to the earlier period, from 0.83% during the selected pre-COVID-19 era to 3.15% during the three years overlapping the public health emergency.[22] Figure 1 summarizes data from the National Association of Insurance Commissioners (NAIC) filings reviewed by the research group's actuary.

Figure 1.

MEDICAID MANAGED CARE UNDERWRITING RATIO BEFORE INCOME TAXES FROM NAIC FILINGS, BY YEAR

Box chart specifying Minimum, Maximum, Interquartile Range, Median and Mean of Underwriting Ratio where minimum/maximum exclude outliers defined as 1.5 times the interquartile range (i.e., the difference between first and third quartiles).



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Observations (i.e., MCOs)	179	187	196	191	189	185	181	199	197	195
Average Underwriting Ratio	0.78%	0.77%	2.19%	1.36%	0.27%	0.66%	-0.25%	2.89%	3.13%	3.43%
% of MCOs Profitable	63.13%	59.36%	70.92%	66.49%	62.43%	63.24%	51.93%	76.88%	81.73%	86.15%

These margins are less than the weighted average margin (before taxes) of 3.7% as earned among the largest commercial insurers between 2013 and 2020, ranging from a low of 3.1% (for 2016) to a high of 4.3% (for 2017).[23] And, although performance of the average MMC improved during the public health emergency, their improved margins still lagged the overall performance of their major for-profit counterparts: with a weighted average net income before taxes of UnitedHealth Group (UHC), Elevance Health (ELV), Humana (HUM), and Cigna Group (CI) ranging from 6.9% in 2020, 5.9% in 2021, and 6.1% in 2022, before falling to 5.4% in 2023

Such a variance in overall financial performance is not necessarily wrong or undesired. Even in those scenarios where the underwriting ratios are minimal, the returns in absolute terms can be substantial.

[22] For their Underwriting Margin Model, the authors created separate curves for the 2013–2019 period and the 2020–2022 period.
[23] Here the authors define the largest commercial health insurers as Anthem/Elevance, UnitedHealth Group, Cigna and Humana. CVS Health is excluded because of the inclusion of its retail pharmacy division in its overall financials.

Given the transactional nature of premium payments from the states to the insurer, it may be appropriate also to consider an insurer's returns in relation to their invested capital or equity requirements.[24] Fundamentally, Medicaid is a highly regulated industry that is funded by taxpayers through a combination of state and federal revenues, and it is this public financing of MMC that may warrant a distinct value propositions by both the insurers that are assessing the adequacy of their expected earnings and the states and their certifying actuaries that are charged with ensuring appropriate stewardship of the public purse.

Nevertheless, as a monopsony—that is, a sector in which there is only one buyer of services such as a state buying insurance for its Medicaid population—a state should recognize how its assumptions and therefore subtle influence on market prices can lead to unintended market distortions.

As the authors of the 2019 MHPA study noted,

> One significant way that Medicaid managed care is unique from other health insurance is that the entity setting the capitation rates (price) is not usually the entity bearing the mispricing risk. Since the rate setting actuaries do not bear the financial risk of mispricing, they do not have the same economic incentive to include margin for deviation as does a pricing actuary working in other lines of health insurance.[25]

In addition to this potential to misprice benefits and therefore inadequately finance some contingency for adverse risk, a state may also underestimate the insurer's general hurdle rate or opportunity cost to operate in the state's MMC sector. Specifically, because the state does not need to raise capital from the equity market to finance its own operations, the state may discount the cost of capital associated with financing an insurer's MMC operations including but not strictly limited to its regulatory-required reserve requirements.[26] Overall, given the comparatively lower net income margins in MMC and what—at least prior to the most recent experience under the public health emergency with its unprecedented enrollments and revenues—is a relatively high probability of loss, actuaries and their client state should give serious consideration to the adequacy of the underwriting margin and its implications for both the general viability and overall solvency of insurers participating in the state's Medicaid market. Without properly considering the underwriting margin, a state could endanger the general solvency of certain insurers and therefore the competitiveness of the MMC market.

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[24] Even a MMC insurer operating with a low profit margin (see Figure 1) may still offer the potential for significant returns on equity and/or capital. For example, the average MMC insurer with $1.5 billion in annual revenues might reasonably expect an underwriting margin of 1.25% for net income of $18.75 million. If the MMC plan requires $180 million in reserves to meets its capitalization requirements (i.e., an approximately 350% RBC where the ACL is equivalent to 3.5% of premium), the plan's return on capital may be as high as 10%. And if one-fifth of the required capital were raised through debt financing, the return on equity (or invested capital) of the MMC plan would be approximately 13%. For further discussion of returns in the health care sector, see T. Leste, Y. Siegal and M. Shukla, *Deloitte Insights* (2019), accessed May 9, 2024, https://www2.deloitte.com/content/dam/insights/us/articles/4919_investments-veiw-of-health-care-market/DI_Investment-view-of-health-care-market.pdf .

[25] S. Gibson et al. note that state actuaries generally community-rate for the overall membership using a combined dataset rather than separately rating for each specific MCO. This approach "further increases the risk that the rates for any one MCO within the program may not be adequate. Not only will actual results vary from expected results for the entire Medicaid program, but results will vary by each individual MCO." See Gibson et al., supra note 7, p. 5, accessed Mar. 12, 2022, https://medicaidplans.org/wp-content/uploads/2020/07/MHPA-Underwriting-Gain-Development-Report_June-2019_FINAL.pdf.

[26] For purposes of the Underwriting Margin Model, the authors are interested in explicitly pricing the cost of capital necessary for maintaining the reserves sufficient to meet the state's risk-based capital requirements. The more general financing of specific net income target to align with the broader opportunity cost incurred by the insurer for participating in MMC, including, for example, the recoupment of any start-up costs not subject to amortization or the perceived risk of the investment, may be considered as part of the risk margin component of the Underwriting Margin.

At minimum, the proposed Underwriting Margin Model makes transparent to the insurer (and the public) the state and its actuary's assumptions around the contingency for risk and the implicit opportunity cost of participating in the market.

MEDICAID RATE DEVELOPMENT—ASOP 49 AND THE FINAL RULE(S)

The specificity of the federal statute, regulation and legal precedent mitigate any inadvertent or overt abuse by the state of its purchasing power. Most recently, the Fifth Circuit in *State of Texas v. Retting*,[27] in upholding the Affordable Care Act, noted that the provisions for "actuarially sound capitation rates have consistently required that all reasonable, appropriate, and attainable costs be covered by rates." The Fifth Circuit also affirmed the constitutionality of the "Certification Rule" that requires Medicaid rates to be certified as actuarially sound "by actuaries who meet the qualification standards established by the American Academy of Actuaries and follow the practice standards established by the Actuarial Standards Board [ASB]."[28]

The ASB's standard for Medicaid capitation rates was formerly outlined in 2015 with Actuarial Standard of Practice (ASOP) No. 49 defining Medicaid capitation rates as being "actuarially sound" if "projected capitation rates and other revenue sources provide for all reasonable, appropriate, and attainable costs." Such costs include the projected expenses for the following:

1. Claim and non-claims-based medical treatment.
2. General administration and operations.
3. Taxes, fees and assessments and
4. Underwriting margin.

The most significant costs incurred by the insurers are their projected medical expenses followed by their projected administrative overhead charges. For each of these components, the ASOP's and Center for Medicare and Medicaid Services' (CMS) guidance provides specific standards for the data and the data quality acceptable for Medicaid capitation rate development, Medicaid certifications and Medicaid statements of actuarial opinion. Additionally, the required financing necessary to meet the costs imposed on the insurer by any taxes, assessments and fees is typically defined in statute or regulation and generally not controversial from a pricing perspective (e.g., an all-payer assessment for vaccinations or an insurer tax levied in a state or, in the case of the former Affordable Care Act's Health Insurer Fee, established by the IRS). Accurately accounting for these expenses is necessary to ensure the solvency of a reasonably efficient insurer but may be insufficient to ensure that they will continue to operate within the MMC market.

Underwriting margin, when compared to the other components, however, is the least well defined and most opaque in its calculation. At minimum, the authors argue that the underwriting margin should explicitly account for[29,30]

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[27] *Texas v. Rettig*, 987 F.3d 518 (5th Cir. 2021), accessed May 12, 2024, https://www.ca5.uscourts.gov/opinions/pub/18/18-10545-CV0.pdf.
[28] 28 See also 67 FR 41000, which implemented the 2002 Final Rule, redefining "actuarial soundness" given the changing market where "there [was] an increasing number of States that lack[ed] recent [fee-for-service] data to use for rate setting."
[29] From ASOP 49 Section 3.2.12(b). The underwriting gain provision provides compensation for the risks assumed by the MCO. These risks may include insurance, investment, inflation and regulatory risks, as well as risks associated with social, economic and legal environments.
[30] ASOP 49 also requires that the actuary take into consideration the impact of income taxes on the actuarial soundness of the rates. However, these taxes are framed only in their relationship to investment income earned by the MCO and the cost of capital, and so the consideration of such taxes is done exclusively in the context of how they might influence the derivation of the underwriting gain.

1. The cost of capital and
2. A risk margin.

The cost of capital relates primarily to the opportunity cost that an insurer incurs for maintaining sufficient reserves to meet its state's risk-based capital requirements. However, the cost of capital may also apply to considerations related to cash flow, transfer payments and the infusion of cash to replenish reserves. The risk margin reflects uncertainty inherent in an actuary's best estimate of benefit spend and is used to capture margin needed to avoid some specified probability of loss or ruin, or to obtain a specified net income target.

DEFINITION OF UNDERWRITING MARGIN

Although the CMS and the Actuarial Standards Board (ASB) have previously published standards and guidance for MMC rate development that include reference for the necessary consideration of underwriting margin[31] and its components, such guidance neither offers a specific target nor establishes a consensus around the data and financial models appropriate for deriving such a metric.

On April 26, 2016, CMS published its Medicaid and CHIP (Children's Health Insurance Program) Managed Care Final Rule (2016 Final Rule)—the first major revision to its 2002 Final Rule that established the initial parameters around MMC contracts. The 2016 Final Rule affirmed the guidance set forth in ASOP no. 49 and the necessary inclusion of an underwriting margin in Medicaid rate development.[32] Specifically, the 2016 Final Rule clarified that in addition to the "reasonable, appropriate, and attainable expenses related" to administration, taxes and fees, the non-benefit component of the rate must include financing of margin that accounts for the "contribution to reserves, risk margin, cost of capital."[33]

Nonetheless, the 2017 Society of Actuaries (SOA) study by Teppema, Goldman, Smith and Tutewohl found that there is "no pre-determined formula for developing margin" and therefore "given this lack of a defined formula, actuaries must use their own knowledge and judgment to develop margin in Medicaid capitation rates."[34] This emphasis on an actuary's own judgement can lead to inconsistency in the approaches that members of the Academy use to provide for the margin when developing rates. This contrasts with the generally accepted development methodologies for the other components of the rate, namely, medical expenses, administration and taxes, which are comparatively more transparent and less dependent on actuarial judgment.

Given the general lack of guidance around what the underwriting margin should be, it is worthwhile reviewing CMS's responses to the public's comments to their initial draft of the 2016 Final Rule and CMS's resulting revisions to the regulation. Such changes to the rule clarify the intent of CMS with respect to what should be included in the component of the rate that this report colloquially refers to as the "underwriting margin." Although the underwriting margin and profit margin may be correlated, the underwriting margin is not synonymous with an insurer's profit.

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[31] The authors prefer the term "underwriting margin" to "underwriting gain" for two reasons. First, the connotation of "margin" was deemed to be comparatively neutral. Second, the "underwriting margin" is an amount applied to the capitation payment *prospectively* and should not be equated with any guarantee of an underwriting gain or operating profit (before taxes). However, in general, the two terms can be treated synonymously.

[32] 81 Fed. Reg. 27,497, 27,497–27,901 (May 6, 2016), accessed Mar. 13, 2022, https://www.govinfo.gov/content/pkg/FR-2016-05-06/pdf/2016-09581.pdf.

[33] 42 C.F.R. § 438.5(e).

[34] Teppema et al., supra note 6.

Specifically, although CMS agreed with a commenter's suggestion "that 'risk margin' is a more appropriate term than 'profit margin'," CMS noted that such semantics do not preclude the inclusion of an explicit provision for profit as an allowable non-benefit expense in Medicaid rate setting. Nor is the inclusion of a provision for the cost of capital the same as a company's expected return on capital or its return on invested capital (see footnote 24).

Further, CMS clarified that "contribution to reserves, risk margin, [and] cost of capital" were to be treated as necessary prerequisites, as opposed to optional considerations, for the development of actuarially sound rates. To summarize its changes to the regulation, CMS explained,

> After consideration of public comments, we are finalizing §438.5(b)(3) with modifications. The revisions are: (1) To use "risk margin" rather than "profit margin"; and (2) to use "and other operational costs" [rather than "or other operational costs"] to clarify that all listed categories of non-benefit costs must be included in the development of actuarially sound capitation rates.[35]

The 2020 Final Rule and CMS's Medicaid managed care rate development guide for the 2024–2025[36] rating period(s) reaffirmed that the inclusion of underwriting margin inclusive of a risk margin and cost of capital, among other categories of costs, is a necessary component of the non-benefit cost incurred by the MCO that must be included in actuarially sound rates.

AN UNDERWRITING MARGIN IS NOT A PROFIT MARGIN

It is worth reiterating that despite the clarification by CMS that risk margin and profit margin are not the same, there may be a tendency by some, including legislators looking for budgetary savings or journalists reporting on government spending, to conflate the proposed underwriting margin with a health plan's profit margin. Although the two may be correlated, the underwriting margin is not synonymous with an insurer's profit. Nor, for clarification purposes, is the inclusion of a provision for the cost of capital the same as a company's expected return on capital or its return on invested capital (see footnote 24).

For purposes of this report, the underwriting margin is being narrowly defined as the amount, required by federal law and actuarial soundness guidelines, to adequately finance a health plan's operational costs related to its cost of capital applied to its reserve requirements and, potentially, cash flow considerations imposed on the insurer by the state, as well as to provide a risk margin for other contingencies including, but not limited to, benefit expenditures. The accompanying model calculates the underwriting margin as a percentage of the per-member-per-month (PMPM) capitation rate inclusive of all nonmedical expenditures and other non-benefit expenses, but before application of taxes and fees.

Overview of the Underwriting Margin Model

For purposes of this report, the underwriting margin is being narrowly defined as the amount, required by federal law and actuarial soundness guidelines, to adequately finance a health plan's operational costs related to its cost of capital applied to its reserve requirements and, potentially, cash flow considerations

[35] 81 Fed. Reg. 27,573, accessed March 14, 2022, https://www.federalregister.gov/d/2016-09581/page-27573.
[36] Center for Medicare and Medicaid Services, "2024–2025 Medicaid Managed Care Rate Development Guide," Jan. 2024, accessed May 12, 2024, https://www.medicaid.gov/media/169711. (See section 5(A)(i) on p. 47.)

imposed on the insurer by the state, as well as to provide a risk margin for other contingencies including, but not limited to, benefit expenditures. The accompanying model calculates the underwriting margin as a percentage of the per-member-per-month (PMPM) capitation rate inclusive of all nonmedical expenditures and other non-benefit expenses, but before application of taxes and fees.

This section provides additional details about the construction of the two major components to the underwriting margin calculated by the model: the cost of capital and risk margin. This section also explains the three different targets that the user can define for determining the necessary cost of capital and risk margin to apply to the rate.

COST OF CAPITAL

DEFINING THE COST OF CAPITAL

As noted above, both the ASOP 49[37] and CMS's current MMC rate setting guide[38] require state actuaries to incorporate the "cost of capital" into their rating. Neither document, however, explicitly defines the term, and CMS separately lists "contributions to reserves" and "cost of capital" without clarifying the distinction. As such the authors narrowly define the cost of capital as the required return calculated using the weighted average cost of capital (WACC) formula that the insurer needs to finance (a) contributions to its risk-based capital (RBC) reserve requirements as well as (b) the maintenance of an adequate cash flow to preserve this reserve.

In defining the cost of capital in such a limited manner, it is important to acknowledge that the term is often applied more broadly to mean a company's opportunity cost or hurdle rate, that is, a calculation of the minimum return needed for an entity to justify an investment in some capital project. In the insurance sector, this could be the expected return needed to convince the CFO to approve an upgrade to a claims-processing system or the implementation of a new care management program. However, the expense associated with the investment should appear on an amortization schedule or be financed with regular interest payments, and so the operating cost of the investment should already be incorporated into the administrative component of the rate. Such expenses are not included in the underwriting margin.

However, whereas the interest expense or amortized charges may adequately incorporate the direct expense associated with an investment needed for efficient operations, any return exceeding this actual expense that was necessary to justify the original investment is unlikely to be reflected in the administrative component of the rate. This is also true of the expected return associated with any start-up costs that may have been incurred by the insurer before entering a new MMC market.

Although such broad applications of the cost of capital to investments are legitimate considerations for actuaries setting the underwriting margin, they are not treated as part of what the authors have defined here as the "cost of capital" component of the underwriting margin. The Underwriting Margin Model subsumes broader consideration of the minimum return needed to encourage innovation and continued participation by MMC insurers as part of an overall net income target. As such, an actuary has the flexibility

[37] ASOP 49 3.2.12(b), p. 9, accessed Mar. 20, 2022, http://www.actuarialstandardsboard.org/wp-content/uploads/2015/03/asop049_179.pdf.
[38] CMS, "2024–2025 Medicaid Managed Care Rate Development Guide," Jan. 2024, pp. 47, 48, accessed Apr. 26, 2024, https://www.medicaid.gov/media/169711.

to include any necessary returns associated with, for example, start-up costs or other non-benefit expenses not reflected in the administrative component of the rate as part of the Net Income before Taxes target, albeit with the understanding that such inclusions may require additional justification.

RISK-BASED CAPITAL AND CONTRIBUTIONS TO RESERVE

All insurers regulated by state insurance departments are subject to some form of RBC requirements. RBC standards, created by the NAIC and adopted in the 1990s in response to insurance crises of the prior decade, established standards around the minimum amount of surplus capital that an insurer must hold to "support its overall business operations in consideration of its size and risk profile."[39,40] The requirement that insurers maintain adequate capital creates a safety net against the risk of liquidation and therefore should give beneficiaries confidence that their insurance will deliver its intended benefits.

Considerable policy and academic debate surrounds the appropriate RBC level.[41] For those states that have adopted the NAIC's model law, as is the norm across all the states providing MMC products, the effective minimum amount of surplus capital—that is, its net worth—that an insurer must have to avoid regulatory action is equivalent to 200% of their authorized control level (ACL), also referred to as a RBC ratio of 200%. Although the amount of capital needed to meet this threshold is an elastic figure, both in absolute terms and as a percentage of premium, dependent upon the insurer's risk profile and performance, an RBC ratio of 200% is generally equivalent to about 7.0% of the insurer's annual premiums.

If RBC falls below this threshold, the state insurance department will begin to impose additional requirements on the insurer. As such, the standard practice is for insurers to hold RBC amounts significantly higher than this minimum threshold. Figure 2 summarizes the ACL and RBC reserves held by the MMC entities in the NAIC dataset used in the Underwriting Margin Model. Prior to 2020, the amount of RBC held by insurers averaged 445% with a mean of 398% of the ACL, with the interquartile range of the RBC ranging from 300% to about 550%. From 2020 to 2022, insurer reserves have increased with the median RBC rising to 454% and the average RBC increasing to 671%.

The 2019 MHPA study recommended that the level of reserves to be financed in the MMC rates "should be based on all capital investments of the MCO, not just the minimum required by statute."[42] The authors agree with this perspective in principle. However, in practice, guaranteeing the financing of too much in terms of reserves, especially if funding with a generous equity premium, could lead to an inefficient allocation of reserves and inflated cost of capital that represents an otherwise unattainable return on invested capital. For example, in 2016 the average ACL was $50.8 million. With an RBC of 433%, the average surplus maintained by insurers would have been equivalent to $220.0 million. Comparatively, in 2022, the average ACL and RBC increased to $79.4 million and 671%, respectively, increasing the surplus reserves to $532.8 million. Although financing higher levels of reserves may be justified during, for example, periods of growth or when introducing a new product, at higher levels of reserves, it would be prudent to consider the necessity of financing such reserves given any risk share protections or, if financing

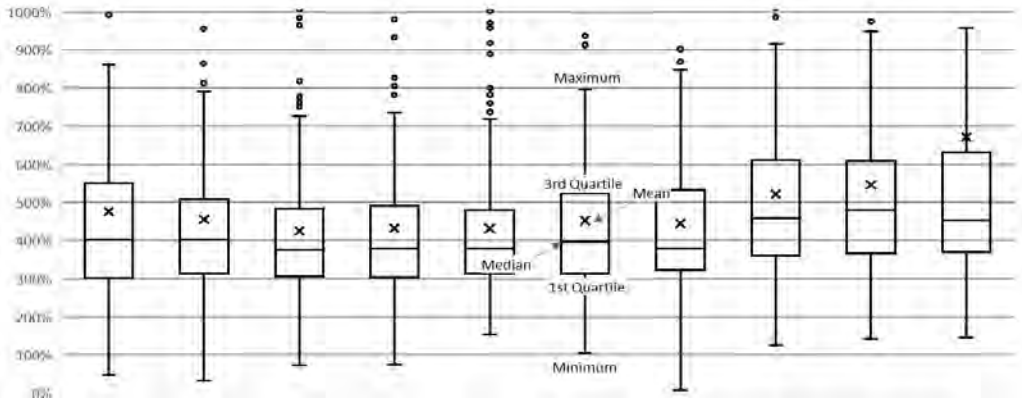
[39] NAIC, "Risk-Based Capital," 2021, accessed July 2, 2021, https://content.naic.org/cipr_topics/topic_riskbased_capital.htm.
[40] Most, but not all, states use the NAIC's Risk Based Capital (RBC) for Health Organizations Model Act. Accessed July 3, 2021, https://content.naic.org/sites/default/files/inline-files/MDL-315.pdf.
[41] See also ASOP 55, effective Nov. 1, 2019, which considers capital adequacy assessment. Actuaries should review the procedures outlined in the standards in assessing the appropriateness of the underwriting margin as it relates to cost of capital and maintaining adequate reserves for the insurer.
[42] Supra note 7, p. 5.

such high levels, give additional consideration to expected returns on such levels of invested capital or how debt may be leveraged to raise capital at a reduced cost.

Figure 2.

MEDICAID MANAGED CARE RISK-BASED CAPITAL AS A PERCENTAGE OF AUTHORIZED CONTROL LEVEL FROM NAIC FILINGS, BY YEAR

Box chart specifying Minimum, Maximum, Interquartile Range, Median and Mean of Underwriting Ratio where minimum/maximum exclude outliers defined as 1.5 times the interquartile range (i.e., the difference between first and third quartiles).



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Observations (i.e., MCOs)	179	187	196	191	189	185	181	199	197	195
Median RBC (% of ACL)	476%	402%	375%	380%	379%	398%	379%	460%	479%	454%
Mean RBC (% of ACL)	476%	455%	425%	433%	432%	452%	445%	521%	547%	671%

In general, the RBC calculation considers different categories of risk in relationship to various assets, underwriting and reserve items. In recognizing that it is "extremely unlikely" that the risks of financial losses will occur simultaneously, the derivation of an insurer's RBC applies a covariance function to the different categories so that the combination of risk factors is less than the sum of the parts. A 3.0% factor is applied to the result to account for potential operational risk. The insurer's ACL is then equivalent to half of the resulting "RBC after Covariance Including Operational Risk."

The NAIC formula for the Authorized Control Level RBC is

$$\text{Authorized Control Level (ACL) RBC} = \frac{1.03 \times \left(H0 + \sqrt{H1^2 + H2^2 + H3^2 + H4^2}\right)}{2}$$

where

$H0 \rightarrow$ Affiliate asset risk
$H1 \rightarrow$ Asset risk
$H2 \rightarrow$ Underwriting risk
$H3 \rightarrow$ Credit risk
$H4 \rightarrow$ Business risk

Table 1 summarizes the average weights of the different types of risk included in the RBC calculation for all health insurers filing with the NAIC as well as a select list of Medicaid-dominant plans. The data are based on NAIC filings for 2016 through 2021 and 2019 through 2020, respectively. Among the Medicaid-dominant plans, the average ACL (i.e., 100% RBC) as a percentage of revenue was 3.38%.

Without going into complex derivation of each component, it is important to note that for each category of risk, the risk factor is higher for items with a greater underlying risk and lower for less risky items. For

example, the financing needed to fund an insurer's underwriting risk (*H2*) is higher for comprehensive medical plans than it is for a limited-benefits product such as a dental plan and is lower for expenditures paid on a more predictable capitated basis than those paid on a fee-for-service basis. Similarly, the likelihood of a financial loss, and therefore the magnitude of the asset risk (*H1*), is typically less if the insurer's capital is held in guaranteed savings bonds than when invested in common stocks, which are more likely to sustain losses in a volatile market. The model includes an average ACL level.

RISK-BASED CAPITAL COMPONENTS INCLUDED IN MODEL

The Underwriting Margin Model allows the user to calculate an ACL based on the anticipated underwriting risk using the product's overall claims expenditures and application of any managed care discount factor derived from the user's input and application of NAIC factors, if applicable. The business risk is based on the user-defined administrative component and the implied weight of the *H4* risk factor taken from the NAIC filing data. Alternatively, the user can enter their own predefined ACL, measured as a percentage of premium.

Having established the ACL, the user must set the RBC threshold(s) to finance. The model establishes the median RBC level—calculated over the past five years included in the model's underlying dataset (see Figure 2)—as the default; however, the user may choose to finance any amount between 200% and 1,000%.

Further, the user may elect to apply a discount to the cost of capital applied to the value of the RBC reserves held by the insurer that are between the state's minimum threshold and some threshold either maintained in practice or desired by the state. For example, the user may elect to fully finance the insurer's cost of capital for the minimum RBC requirements (i.e., 200%) but discount by 50% any amount exceeding this threshold up to, say, the typical reserves held by the insurers in the user's state. When considering the minimum to finance, the actuary should consider the expectations of the market and state regulators as they pertain to reserves and weigh the practical need for insurers to fund some amount above the state-required minimum to avoid falling below the minimum at any point in time.

Table 1.
NAIC RISK-BASED CAPITAL DATA, MULTIYEAR AVERAGE FOR ALL HEALTH INSURANCE FILINGS AND MEDICAID-DOMINANT FILINGS

	All Filings		Medicaid Dominant Filings
	CY 2020 – 2021 Average	CY 2016 – 2019 Average	CY 2020 – 2021 Average
H0: Asset Risk: Affiliates with RBC	5.64 B	4.52 B	0.35 B
H1: Asset Risk: Other	13.15 B	8.64 B	1.23 B
H2: Underwriting Risk	49.08 B	40.19 B	13.65 B
H3: Credit Risk	4.48 B	3.29 B	0.81 B
H4: Business Risk	7.68 B	6.18 B	1.10 B
Total RBC before Covariance	80.04 B	62.83 B	17.15 B
Weights of Risks Relative to (H2) Underwriting Risk			
H0: Asset Risk: Affiliates with RBC	11.5%	11.3%	2.5%
H1: Asset Risk: Other	26.8%	21.5%	9.0%
H2: Underwriting Risk	100.0%	100.0%	100.0%
H3: Credit Risk	9.1%	8.2%	5.9%
H4: Business Risk	15.7%	15.4%	8.1%
Relative Contribution to ACL			
H0	9.6%	9.5%	2.4%
H1 squared	5.8%	3.9%	0.8%
H2 squared	81.9%	84.0%	95.9%
H3 squared	0.7%	0.6%	0.3%
H4 squared	2.0%	2.0%	0.6%
Average Revenue	847.68 B	670.76 B	234.55 B
Authorized Control Level	25.80 B	23.78 B	7.27 B
ACL % of Revenue	3.48%	3.55%	3.10%
Aggregate RBC %	653.5%	566.3%	466.3%
Medicaid RBC %	**669.5%**	**625.8%**	**457.0%**

CASH FLOW

Consistent with CMS's guidance that recognizes how temporary shortfalls in revenue may have non-benefit costs that an actuary may want to consider in their rate development,[43] the Underwriting Margin Model includes multiple parameters for factoring either (a) the costs associated with a delay in premium payments or a withhold of reimbursement from the state to the MMC, (b) the savings accrued from claims payment delays from the MMC to its providers or (c) both.

In each scenario, if there is an interruption to the timeliness of payments to the insurer, the insurer may need to seek an alternative funding source to maintain its reserves if the user assumes the insurer's costs are constant and the rates accurately captured the benefit and non-benefit spend to be incurred in the rating period.

With respect to a lag in revenues—either the monthly premium payments or the reimbursement of any earned withhold—it is important to reiterate how the insurer's expected benefit and administrative expenses not only determine the overall premium but also influence the plan's RBC requirements. Any

[43] Section 4.B.ii(a)(vi) of *Medicaid Rate Development Guide 2024–2025*, p. 30, accessed May 12, 2024, https://www.medicaid.gov/media/169711.

shortfall in this revenue therefore could lead to a hypothetical deficit by the insurer against its RBC target. Where there is a lag in revenues for any reason, the insurer will need to pay for its ongoing operation costs either using its existing equity, thereby reducing its surplus reserves relative to its desired RBC thresholds, or by acquiring new debt and with it the associated interest expense that is unlikely to be reflected in the rate development unless explicitly addressed.

For example, using the value for the cost of debt (based on the average Aaa/AAA corporate bond rate of 4.8% between 2021 and 2023), the cost of a payment lag that is equivalent to one month's premium would be 0.40% of the overall premium (prior to any tax consideration that would effectively reduce the cost of this debt). Related to this, a 2.0% withhold that the actuary did not anticipate the state reimbursing until 12 months after the close of the contract period would have a financing cost equivalent to 0.19% of the overall premium.[44]

The same logic used for pricing into the rates the cost of any lag in revenues may also be applied to any savings accrued by the insurer from its own routine lag for provider reimbursements. Holding all else equal, were the state to prospectively pay the insurer in a timely fashion, which in turn consistently pays its providers on a lag of 45 days, the MMC would have a favorable cash flow equivalent to 1.5 months of the proportion of premium effected by the lag. This in turn would inflate the MMC reserves, allowing it to earn greater investment earnings.

This last cash flow parameter, however, should be used with discretion and understanding of its implications. First, such a lag is likely to be inconsistent period over period, and applicable to only a portion of the claim's expenditures. The expenditures also may differ by the insurers for whom the actuary is collectively rating, so adding an adjustment for lag could penalize the insurer that pays its providers more quickly than others. Second, any lag may already be factored into the insurer's targeted RBC threshold, and with that the investment earnings discount to the RBC threshold being financed.

By default, the model does not include any cost associated with either favorable or unfavorable interruptions to the insurers' cash flow.

[44] The cash flow parameters included in the Underwriting Margin Model may be manipulated to proxy the implications of other potential payment lags not directly addressed in the model. For example, as the authors of the 2017 SOA study noted, and consistent with this study's authors' own anecdotal experience, "in some cases, states simply fall behind in their payments to the MCOs, and the MCOs are subject to carrying costs that can affect margins." Supra note 6, p. 27. For example, one scenario may see a state continuing to pay the prior rates for several months into the new rating period. If the expected change to the rates is a 5.0% increase over the prior period and this change is not expected to be effectuated until midway through the current rating period, at which time that amount owed in arrears to the MMC will be paid in full, the actuary may want to proxy the impact by modeling a 2.5% withhold with the value for the user-defined parameter "Months after Rating Period before Withhold Paid" set to 0. Although the result, in this scenario, would be just 0.04% or $100,000 for every $250 million in annual premium, the important thing for the actuary to recognize is that there is a nonzero cost to such a payment lag that may be appropriately redressed in the underwriting margin.

APPLICATION OF WEIGHTED AVERAGE COST OF CAPITAL TO RBC AND CASH FLOW

For purposes of the Underwriting Margin Model the cost of capital is derived by solving for the Weighted Average Cost of Capital (WACC) formula and applying the resulting percentage to the RBC amount that the actuary deems sufficient. Additionally, certain components of the WACC are applied to cash flow considerations as well as to transfer payments and gains or losses included in the risk margin; the latter will be discussed in more detail below.

The formula for the WACC is

$$\text{Weighted Average Cost of Capital (WACC)} = \left(\frac{D}{V} \times Rd \times (1 - Tc)\right) + \left(\frac{E}{V} \times Re\right)$$

where
$D \rightarrow$ Market value of firm's debt
$E \rightarrow$ Market value of firm's equity
$V \rightarrow E + D$
$Rd \rightarrow$ Cost of debt
$Tc \rightarrow$ Corporate tax rate
$Re \rightarrow$ Cost of equity

The formula is a simple means for calculating the blended after-tax cost of a company's various sources of capital, where the firm's equity may include its common or preferred stock and the firm's debt may encompass the cost of issuing bonds and acquiring any other long-term debt. Because most of the elements of the formula are estimates themselves, and neither constant nor consistent estimates at that, the formula appears to calculate results that are more definitive than they really are. That the reader may see the cost of capital variably described as an opportunity cost, a discount rate, a cost of financing or a hurdle rate for investments demonstrates, at least superficially, the nuance of the formula. Potential investors and different analysts are likely to have different metrics and measures of these various costs.

COST OF DEBT

For the most part, determining the cost of debt (*Rd*) is more straightforward to calculate than the cost of equity (*Re*). For a small firm, the amount of debt available may be severely limited, minimizing the $\frac{D}{V}$ ratio, and its cost might vary significantly depending on the source of capital and purpose of its use; but it is likely to be best estimated using the insurer's average cost of acquiring a loan or line of credit with its bank. For a large private firm, the company's credit rating as reported by an entity such as Moody's is helpful for determining the cost of debt. Finally, a publicly traded company generally must report its debt obligations and the terms thereof. Because of this, the firm's SEC filings can be used for the purpose of discerning both its overall debt load and the associated cost of this debt.

Interest payments on debt are deductible expenses. Because of this, the net cost of a company's debt, however defined, should be discounted by the amount saved in taxes. The total discount will vary by state with the effective cost of debt being comparatively higher in a low-tax state versus a high-tax state.

The model includes estimates for the cost of debt based on the average of Moody's Aaa/AAA and Baa/BAA corporate bond yield as reported by the Economic Research Division by the Federal Reserve Bank of St. Louis. The former yield is likely to be a sufficient proxy for publicly traded insurers, whereas the higher rate of the latter, the riskier Baa/BAA-graded corporate bond, may reflect a rate that is more likely to be available for financing a loan by a larger nonprofit insurer. Alternatively, the user can enter its own cost of debt based on the actual interest payments of the insurers operating within the MMC market.

Table 2 summarizes the latest one-, three- and five-year average yields (based on month-end observation data) available in the model as a proxy for the cost of debt (*Rd*). Although not included in the model, the average reported rate over the six months between November 2023 and March 2024 is also included to demonstrate how cost of debt has increased over the past periods.

The suggested default value is the one-year Aaa/AAA corporate bond yield of 4.92% and an assumption of 20% debt financing.

Table 2.
PARAMETER SELECTION FOR COST OF DEBT ()

Selected Time Period:	1-Year	
Most Recent Period:	Mar. 2024	
	Corporate Aaa	**Corporate Baa**
Selected:	4.92%	5.89%
10-Year	3.70%	4.63%
5-Year	3.55%	4.50%
3-Year	4.05%	4.96%
1-Year	4.92%	5.89%
Last 6-Month (Aug-Jan)	5.09%	5.96%

Source: Monthly observational data from Moody's Seasoned Corporate Bond Yield (Not Seasonally

Source: Monthly observational data from Moody's Seasoned Corporate Bond Yield (Not Seasonally Adjusted) from Federal Reserve Bank of St. Louis, Economic Research Division ALFRED (Archival Federal Reserve Economic Data). Accessed April 19, 2024, https://alfred.stlouisfed.org.

COST OF EQUITY

Cost of equity is the expected return that a firm requires to make an investment in some capital project. A common formula used to calculate the cost of equity is the capital asset pricing model (CAPM), a formula that describes the relationship between the expected return of an investment and its relative risk. It presents the expected return on equity as being equal to the risk-free return plus a risk premium, the latter based on the beta of the security relative to the average market return.

The CAPM formula is

$$\bar{R}_a = r_f + \beta \times (\bar{r}_m - r_f)$$

where
$\bar{R}_a$ → Expected rate of return (i.e., *Re* → cost of equity)
r_f → Risk-free rate of return
$\bar{r}_m$ → Expected rate of market return
β → Beta (of industry)
$(\bar{r}_m - r_f)$ → Risk premium
$\beta \times (\bar{r}_m - r_f)$ → Equity risk premium

RISK-FREE RATE OF RETURN r_f

The risk-free rate of return is generally set based on the annual expected yield of a U.S. Treasury bond. Table 3 presents the average annual yields of three-month and 10- and 20-year U.S. Treasury bonds. For the purposes of the CAPM it is appropriate to select the total yield of the Treasury bond matching the investment's duration. Most Medicaid contracts are for three to five years, but most insurers would expect to maintain operations across multiple contract periods, and so using the 10- or 20-year bond is appropriate.

In terms of selecting a periodization for estimating its value, it is worth noting that the 10-year Treasury rate has changed significantly over the past few years, steadily increasing since 2020 when it was at a low of 0.52% in August 2020 to having an average daily rate of 4.21% in March 2024.[45]

In contrast to predicting the expected return for a specific equity or even overall market, changes in treasury yields are less volatile and generally changes are foreseen. For this reason, in deriving a basis for the risk-free rate used in the calculation of the cost of capital it is worth using a shortened time horizon. The suggested default on the risk-free rate is the expected return on the 10-year Treasury based on average yield over the past 12 months. However, the user should consider how current expectations around treasury yields during the rating year compare to the selected benchmark.

Table 3.
PARAMETER SELECTION FOR RISK-FREE RATE OF RETURN (r_f)

Selected Time Period:	1-Year		
Most Recent Period:	Mar. 2024		
	3-Month Treasury	**10-Year Treasury**	**20-Year Treasury**
Selected:	5.22%	4.03%	4.33%
10-Year	1.41%	2.33%	2.69%
5-Year	2.05%	2.32%	2.70%
3-Year	2.81%	2.96%	3.33%
1-Year	5.22%	4.03%	4.33%
Last 6-Month (Aug-Jan)	5.26%	4.27%	4.56%

Source: Monthly observational data for Market Yield on U.S Treasury Securities at Constant Maturity (Not Seasonally Adjusted) from Federal Reserve Bank of St. Louis, Economic Research Division ALFRED (Archival Federal Reserve Economic Data). Accessed April 19, 2024, https://alfred.stlouisfed.org.

Expected rate of market return $\bar{r}_m$

Less conclusively defined is what metrics one should use for determining equity risk premium (i.e., $\beta \times (\bar{r}_m - r_f)$) associated with the investment. The lack of consensus around the appropriate equity premium means that the selection of the expected rate of market return and the beta can have a significant and variable impact on the overall CAPM and by extension the WACC and thereby the selected underwriting margin.

[45] Board of Governors of the Federal Reserve System (US), "Market Yield on U.S. Treasury Securities at 10-Year Constant Maturity, quoted on an Investment Basis [DGS10]," accessed Apr. 19, 2024, from FRED, Federal Reserve Bank of St. Louis, https://fred.stlouisfed.org/series/DGS10.

As such the Underwriting Margin Model includes several options for calibrating the cost of equity and thereby the CAPM and, ultimately, the WACC to apply to the RBC reserves. The model also defers to the user and allows for the inclusion of a user-defined parameter for the cost of equity.

For the equity risk premium $\beta \times (\bar{r}_m - r_f)$, the model presents the option of determining it using the CAPM model noted above or by using the Implied Equity Risk Premium proposed by Aswath Damodaran, a professor of corporate finance and valuation at Stern School of Business at New York University. In Damodaran's words,

> The problem with any historical [risk] premium approach, even with substantial modifications, is that it is backward looking. Given that our objective is to estimate an updated, forward-looking premium, it seems foolhardy to put your faith in mean reversion and past data.[46]

Instead of the CAPM model for assessing the risk premium, Damodaran argues that his measure of the implied equity risk premium (ERP), which incorporates stock buybacks and dividend yields as well as additional considerations around market volatility, better reflects the actual risk premium in the U.S. market. In general, Damodaran's implied ERP is lower and less variable than results of the CAPM.

Both Damodaran's implied equity risk premium and the CAPM-derived equity risk premium reflect the user-selected reference periods for 10-year, five-year, three-year or 12-month averages.

The model includes current benchmarks for the expected rate of the of market returns ($\bar{r}_m$) by calculating the average trailing 12-month rate of return over the selected period and associated equity beta (β) as the slope of a regression of daily return of the selected sector and the S&P 500. Metrics for the following sectors are provided: health insurers, utilities and the S&P 500 itself; see Table 4. The expected rate of return or cost of equity ($\bar{R}_a$), then, is the risk-free rate plus the equity risk premium.

Although no scenario would justify the use of a benchmark with a negative return on equity, the volatility in the returns suggests that it is appropriate to incorporate a longer time horizon and/or heed Damodaran's observation around the limitations of the CAPM when selecting a benchmark for expected return on equity. Although using a trailing 12-month average and extending the period will smooth out the results, the user should still consider the relevancy of the historical data for the prospective rating period and be cognizant of the inherent volatility reflected in shorter time horizons.

[46] A. Damodaran, "Equity Risk Premiums (ERP): Determinants, Estimation, and Implications—The 2019 Edition" (NYU Stern School of Business, April 14, 2019), accessed March 20, 2022, https://ssrn.com/abstract=3378246.

Table 4.

PARAMETER SELECTION FOR EXPECTED RATE OF MARKET RETURN AND BETA

Selected Time Period	3-Year			
Total Return (i.e., include Dividends)	No			
Data Period	Apr. 2013 through Mar. 2024			
	S&P 500 (Index ETF)	**Select Insurers[5] (Stocks)**	**Select Utilities[5] (Stocks)**	**Implied Equity Risk Premium[6]**
Selected Return	11.81%	14.92%	2.06%	4.90%
Selected Beta	1.00	0.53	0.53	1.00
Trailing 12-Month (T12m) Return[1,2]				
10-Year	10.89%	18.49%	7.24%	5.33%
5-Year	11.68%	11.95%	6.08%	5.11%
3-Year	11.81%	14.92%	2.06%	4.90%
1-Year	13.50%	-5.24%	-11.90%	5.17%
Annual Dividend Yield[3]				
10-Year	1.73%	1.29%	3.29%	0.00%
5-Year	1.50%	1.29%	3.10%	0.00%
3-Year	1.42%	1.26%	3.02%	0.00%
1-Year	1.40%	1.38%	3.36%	0.00%
Beta[4]				
10-Year	1.00	0.87	0.63	1.00
5-Year	1.00	0.85	0.74	1.00
3-Year	1.00	0.53	0.53	1.00
1-Year	1.00	0.33	0.48	1.00
Tickers	SPY	CI, CVS, CNC, ELV, HUM, UNH *excl. CNC from 10-year due to stock split*	NEE, DUK, SO, D, AEP, SRE, EXC, XEL, IDU	n/a

Financial market information is provided "as-is" and not for professional or trading purposes or advice. The SOA does not guarantee the accuracy of the data provided and accepts no responsibility for any action taken based upon the specific data.

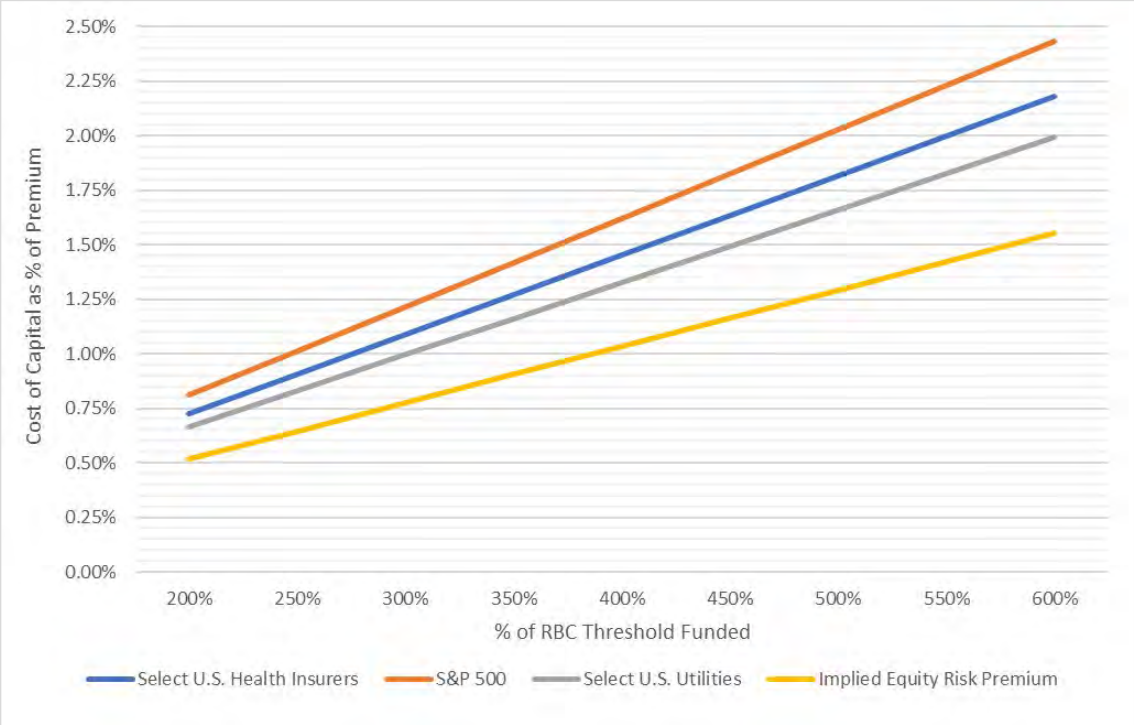
1. For "Equity Risk Premium," the Annual Return reflects the average Trailing 12-Month Return.
2. The Annual Return is derived from daily-close market activity using STOCKHISTORY() function in Excel 365.
3. Dividends reflect annual dividends paid during year divided by annual closing price. Dividend information from "Historical Data" at Yahoo! Finance. For example, dividend information for Humana Inc. (HUM) is available at https://finance.yahoo.com/quote/HUM/history. (Accessed April 19, 2024).
4. Beta calculated by authors using daily-close market activity of the equity stock compared to SPDR S&P 500 ETF Trust (SPY) by adapting model developed by "The Footnote Analyst: Analytical Insights for Investors," available at https://www.footnotesanalyst.com/analysing-the-drivers-of-equity-beta/. (Accessed April 19, 2024).
5. The results for "Select Insurers" and "Select Utilities" reflects the composite of individual listed stocks weighted by their market capitalization as of March 29, 2024.
6. "Implied Equity Risk Premium" reflects the "Equity Risk Premium Trailing 12 Month Average" (i.e., ERP T12m field), using COVID-19 adjustment where applicable. Data available from "Damodaran Online," https://pages.stern.nyu.edu/~adamodar/New_Home_Page/pc/implprem/ERPbymonth.xls. (Accessed April 19, 2024).

Figure 3 presents a sensitivity test of how the cost of capital—calculated on an after-tax basis and measured as a percentage of PMPM—can change based on the application of different equity premiums to financing requirements for varying amounts of risk-based capital as a percentage of the ACL. In each of these scenarios, the $\bar{r}_m$ reflects the average 12-month trailing return of the S&P 500 (ticker: NYSE.SPY) and the beta, if applicable, of the selected benchmark over the past five years, with the following assumptions held constant:

Authorized Control Level as % of PMPM	3.22% (Medicaid Dominant)
Revenue PMPM	$450
Risk Free Rate of Return	4.03% (10-Year Treasury; 1-Year Average)
% Debt	20%
Cost of Debt	4.92% (Moody's Aaa Corporate Yield; 1-Year Average)
Investment Discount	n/a
Federal Corporate Tax Rate	21.0%
State Corporate Income Tax	6.00% (Michigan)

Figure 3.

SENSITIVITY TEST: AFTER-TAX COST OF CAPITAL AS PERCENTAGE OF PREMIUM AS DETERMINED BY CHANGES IN EQUITY PREMIUM ($\bar{r}_m$) AND RBC THRESHOLD



TREATMENT OF INVESTMENT INCOME

The application of the WACC and CAPM formulas to the entirety of an insurer's reserves implies that the MMC will incur substantial opportunity costs to meet its state regulatory requirements around RBC. Unlike a commercial plan, because the MMC lacks the ability to directly price this non-benefit cost into its capitation rates, this cost of capital should be directly financed by the state.

However, if the reality is that insurers generally earn something on these reserves, the justification for fully financing the costs maintaining the MMC's reserves may be challenged. Although the realized return on maintaining the reserves will likely be less than the return required to justify the overall investment by the insurer in the MMC market, the existence of some earnings may reduce what is needed in the capitation rates to incentivize participation by the insurer in the MMC program.

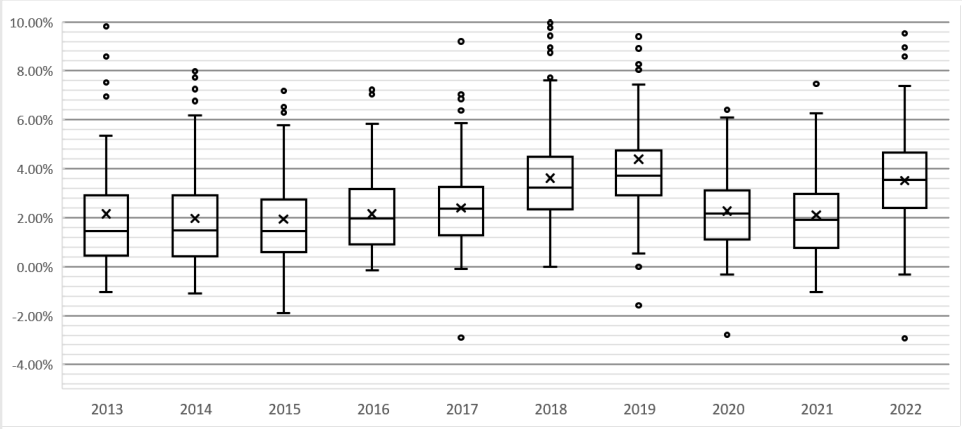
For example, if an insurer expects a return of 10% on its capital investments and must maintain reserves of $100 million to operate within a state's MMC market, it will need to earn a return of at least $10 million to justify the investment. Otherwise, the insurer would pursue some alternative investment that would earn them this prerequisite amount. If the insurer cannot directly earn this return, it may be the state's

responsibility to finance it. However, if the insurer can earn $3 million on the $100 million in reserves while still meeting its RBC targets, the cost of capital amount needed to be financed in the rates might reasonably be reduced to $7 million.

The 2019 MHPA model purposefully excluded the consideration of investment income as a component to its underwriting gain model. This approach was consistent with ASOP 49, which allows, but does not require, the inclusion of investment income. In contrast, this Underwriting Margin Model includes a parameter that serves as a discount factor to the calculated cost of capital needed to finance an insurer's reserves.

Figure 4 summarizes the returns on investments across the insurers by year. This metric was calculated by the authors, across the Medicaid insurers included in their NAIC dataset, as the net investment income earned divided by the insurer's calculated risk-based capital.

Figure 4.
NET INVESTMENT INCOME AS A PERCENTAGE OF RISK-BASED CAPITAL



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Observations (i.e., MCOs)	179	187	196	191	189	185	181	199	197	195
Median Investment Return as % of RBC	2.2%	2.2%	2.3%	2.5%	2.7%	3.4%	3.6%	2.5%	2.7%	3.7%

Consistent with ASOP 49, which allows, but does not require, the inclusion of investment income, the Underwriting Margin Model includes an optional parameter that serves as a discount factor to the calculated cost of capital needed to finance an insurer's reserves. The reviewed data suggest that the earnings range between 2.0% and 4.5% can be reasonably expected, and so the model includes options to allow the user to select the author-derived discount factor of 3.2% (i.e., the average net investment income earned as percentage of the insurer's risk-based capital over the most recent five years) or a user-defined discount factor. Additionally, the model includes a proxy for discounting the needed cost of capital by eliminating the risk-free rate. This latter approach effectively finances only the equity risk premium (i.e., the difference between the risk-free rate and expected market rate of return, multiplied by the beta) on the assumption that that even if the MMC are making conservative investment choices with their reserves, they could expect to minimally achieve a return equivalent to the risk-free rate.

TREATMENT OF INCOME TAX

The CAPM can be applied on a before- or after-tax basis. Generally, the CAPM assumes that capital gains are zero for all investors. However, taken from the perspective of an outside investor that is seeking a return equivalent to the result of the CAPM, the insurer would need a return that exceeds the targeted cost of capital because any profit that could be redistributed to investors would be initially subject to the firm's marginal tax rate. Therefore, selecting the Pre-Tax calculation of the Cost of Equity will "gross up" the calculation to factor in the marginal impact of the federal corporate tax rate.

In contrast, by selecting After-Tax to calculate the Cost of Equity the model will use the face value of the selected benchmark for the equity premium using CAPM, the Implied Risk Premium or the User-Defined Equity Risk Premium.

The suggested default is the after-tax basis.

RISK MARGIN

In addition to estimating the cost of capital component, the Underwriting Margin Model calculates a risk margin that considers the following:

1. The historical distributions of underwriting ratios (i.e., net gains and losses divided by revenues) as reported by the MCO industry to the NAIC for 2013 through 2022,
2. A detailed description of the user's program scenario identifying claims, administrative charges and cost of capital parameters, and
3. A user-defined target for probability of ruin, net income or risk margin.

DEVELOPMENT OF UNDERWRITING RATIO DISTRIBUTIONS

Historical data are used to develop a statistical model that defines a probability distribution for the variation of the underwriting ratios (UWRs). NAIC annual report data for all Medicaid Managed Care Organization plans in the U.S. for 2013 through 2022 were retrieved from the S&P Global Insights database. This database yielded 2,126 plan-year reporting entries. The authors excluded what they considered questionable plan-year reporting entries, using the following criteria:

1. Fewer than 50,000 member months.
2. An UWR greater than 150% or less than 50%.
3. Premium per member per month of less than $100.

This screening criteria eliminated 227 entries, leaving 1,899 entries as the basis for the analysis. The following steps were used to calculate the UWRs for each plan-year entry.

1. A set of 141 UWR bins was constructed from −35% to +35% with increments of 0.5% for each bin:
    1. Less than −35.0%.
    2. −35.0% to −34.5%.
    …
    …
    …
    140. +34.0% to +34.50%.
    141. More than +34.5.0%.

2. The frequency of UWRs was calculated for each bin.

3. This set of frequencies was compared to what is predicted for each bin using a normal curve defined by the median and standard deviation for all the UWR data.

4. The *R*-squared was calculated by comparing the bin frequencies to predicted normal curve frequencies.

5. While maintaining the same median, the standard deviation was adjusted by small amounts until the *R*-squared was maximized.

6. The distribution of positive and negative bin residuals was checked to be sure that the count of positive residuals moved closer to 50% when using the adjusted standard deviation.

The resulting normal curve, as defined by the median UWR and the adjusted standard deviation, was the curve used to model the variation of underwriting ratios.

The user can select different curves based on segments of the available data. The 1,899 UWR plan-year entries are partitioned into various groups depending on the calendar year, size of MCO based on member months, profit/not-for-profit status of the MCO, and whether the MCO was in a state offering Medicaid expansion plans. Each of these groupings are referred to as curves. The process described above was applied to determine the adjusted standard deviation to each of these groupings, resulting in different medians and adjusted standard deviations for each grouping. These measures were used to define a set of different normal curves.

A different approach was used to calibrate the two size curves, one using all data and the other using just non-pandemic data as follows:

1. The UWR plan-year entries were allocated into 10 deciles using the size of the MCO based on member months.

2. The standard deviation was calculated for each decile, and all of them were multiplied by the composite adjustment factor determined by the fit improvement process described above.

3. A trendline was fitted to the deciles showing how the adjusted standard deviation of the UWR for each decile group varies with the average number of member months in each decile.

The trend lines, where "x" is the number of member months and "y" is the standard deviation, are

MCO size curve (2013–2022): $y = 1.8703x^{-0.287}$

MCO size curve (2013–2019): $y = 1.7860x^{-0.284}$

When using size curves, the model calculates a tailor-made standard deviation for the user by using the exact number of user-provided member months and the trendline formula.

Table 5 summarizes all the predefined normal curves available to the user for purposes of defining the distribution of UWR frequencies. The model also allows the user to select an alternative curve by entering a standard deviation for the UWR.

Table 5.

PREDEFINED NORMAL CURVES INCLUDED IN UNDERWRITING MARGIN MODEL

Curve Number[1]	Description
1	Composite 2013 to 2022 Curve
2*	Composite 2013 to 2019 Curve
3*	Composite 2013 to 2015 Curve
4*	Composite 2016 to 2019 Curve
5	Composite 2020 to 2022 Curve
6	MCO Size Curve (2013–2022)
7*	MCO Size Curve (2013–2019)
8	For-Profit Curve (2013–2022)
9	Not-for-Profit Curve (2013–2022)
10*	For-Profit Curve (2013–2019)
11*	Not-for-Profit Curve (2013–2019)
12	Expansion (ACA) Curve (2013–2022)
13	Non-Expansion (non-ACA) Curve (2013–2022)
14*	Expansion (ACA) Curve (2013–2019)
15*	Non-Expansion (non-ACA) Curve (2013–2019)

1. The exclusion of pandemic-affected curves in the Underwriting Margin Model will restrict the list of available curves to only those with an asterisk (*).

Also, the model allows the user to change the menu of curves to either include or exclude curves that include data from 2020 through 2022, the years considered to be influenced by the COVID-19 pandemic. Choosing this screen to exclude the pandemic-affected curves will restrict the list of available curves to only those asterisked (*) in Table 5. Otherwise, only the non-asterisked curves are available. The pandemic period data exhibited lower variability in the UW ratios, which were reflected in lower standard deviations. The data books for this period also indicated greater use of risk corridors, which may have contributed to improved stability of plan performances more generally. An actuary may consider these factors when deciding whether to use curve data including or excluding the pandemic period years of 2020 through 2022.

The variations in UWRs are due to the variations in two components of the rate: claims and administrative costs. Since the available data do not offer enough details to delineate the variations in claims versus administrative costs, the model treats the UWR variation as solely the variation in claims because the variation in claims is likely to be more significant than the variation in administrative costs. For purposes of the modeling, the authors assume that the administrative cost will be fixed and not contribute to the variation of outcomes. This approach provides a reasonable distribution of expected claim outcomes, each associated with a UWR-driven distribution probability, which allows the model to calculate the implications of risk-sharing corridors and minimum/maximum medical loss ratio (MLR) requirements.

SELECTING AN UNDERWRITING MARGIN TARGET

The Underwriting Margin Model allows the user to select one of three different target types and sets the target level for the type selected.

The user of the model should analyze the results provided on the dashboard. Although the model will present a solution that is based on the target selected, the user should understand the implications of selecting that target. For example, the user may select a probability of ruin target, but the solution offered by the model could generate a negative net income. The authors suggest carefully analyzing the implications of the target selection by examining the probability of ruin, net income, distribution of gains and losses, and competitiveness of the premium rate and understand that the model's outputs represent

"on average" results across all MCOs, and it is possible that individual MCOs may achieve better or worse results. Reaching an acceptable result may involve testing various target types and target levels.

NET INCOME (BEFORE TAXES)

When the user selects the net income (before taxes) target, the model will find the risk margin that satisfies the target for the user's program scenario after accounting for the necessary cost of capital to meet reserve requirements. The net income is the sum of expected revenues less the sum of expected expenses. Revenues include premiums adjusted for unachieved withholds and net transfer payments to the insurer as well as the cost of capital paid to the insurer to fund its reserves and any cash flow considerations financed in the rate. Expenses include claims, administrative expenses, premium taxes, adjustments for gains returned to the state and short-term earnings on gains. Each of these components of net income is calculated for the set of claim outcomes that are weighted by the probabilities defined by the best-fit statistical model.

RISK MARGIN

The user can select the risk margin as the target type. For this selection, the model will return that same risk margin as a result. Although this may appear to be a simple exercise of just returning the user-provided entry as a result, the authors included this option because situations may come up where the user would like to use the model to calculate the cost of capital while setting a specific risk margin. Such a situation may arise when the certifying actuary wants to recognize a degree of uncertainty in their state- or product-specific experience that is not fully captured by the historical data that are normally distributed around a mean specified as the break-even point used in the model.

PROBABILITY OF RUIN

The user can also select the probability of ruin as its target type. The probability of ruin is the likelihood that the user's program will generate a net income loss that exceeds the target RBC amount. For example, if the user selects a probability of ruin of 0.5% and a target RBC of 525% of the ACL, the model will calculate a margin such that the cumulative probability of net income losses more than 525% of the RBC level is less than 0.5%. With the help of the model, the actuary can determine implications of the tradeoff between increasing the margin and reducing the probability of ruin.

The probability of ruin summary table in the Results Dashboard tab provides additional information about the probability of ruin including the following:

1. The probability that the RBC equity will fall below the user-defined minimum RBC level, as measured from the implied target RBC level.
2. The probability that the RBC equity will fall below the 200% of ACL RBC level, as measured from the implied target RBC level.

The Underwriting Margin Model

At a summary level, the user of the Underwriting Margin Model provides underwriting/rating information, including the anticipated claim assumption for the rating period and the risk-sharing arrangement, selects the adjusted normal curve for the model to use to generate a set of probabilistic outcomes based on the cumulative density function of the selected curve, and selects the goal-seek parameter of the model as either net income, ruin probability or risk margin. Using this information, the model calculates the underwriting margin necessary to satisfy the user-specified goal-seek target. The Underwriting Margin Model employs the adjusted normal curve of the UWRs chosen by the user to simulate the variation of underwriting gains and losses, the variation of which is based on the selected curve's standard deviation.

The model uses an iterative calculation process that begins by setting the risk margin at zero and calculating a premium amount as the sum of the claims, administrative fees and underwriting margin. Then, using the calculated premium, net income before taxes and ruin probability is determined. This is done for a series of expected outcomes in a series of possible claims bins based on the user-selected adjusted normal curve/standard deviation, with the midpoint of the distribution being the user-provided anticipated claim assumption, and the variation around the claim midpoint dictated by the user-selected adjusted normal curve and its standard deviation. The model assumes that the variation in underwriting gains and losses is due to the variation in claims. A composite net income and ruin probability is then calculated to represent the results of the iteration under consideration. This composite is the weighted average of all the varied net income and ruin probabilities in the bin results, with the weights represented by the probability of each occurrence reflected in the selected curve.

In this iterative process, the risk margin is gradually increased, causing the premium to increase and the bin results to change to yield a different set of outcomes until the user-specified goal-seek target is achieved, be it net income, probability of ruin or risk margin. At the end of the process, the model provides the risk margin that satisfies the user-stated target.

The model assumes that the claims and administrative cost PMPM assumptions are projections that are as accurate as that for the typical MCO. The model uses a normal distribution for the expected claims outcomes that assumes that the claim PMPM assumption is the median outcome and expected claim losses will be perfectly offset by expected gains, excluding risk sharing, loss ratio limits, cash flow adjustments and withhold recoupment. If the user's estimate of expected claims is expected to be more variable than typical, such as claim estimates for a new program, a new market or an LTC program, the actuary may consider a provision for additional or reduced risk margin beyond that which is determined by the model. Further, the cost of capital is treated as the minimum underwriting margin that eliminates the possibility of negative risk margin that the authors view as being impermissible per CMS guidelines.

Development of the Underwriting Margin Model

NAIC ANNUAL HEALTH STATEMENTS AND MCO DATA BOOKS

For the development of the Underwriting Margin Model, the authors sought to understand the historical variation of Medicaid underwriting margins for MCOs throughout the country and to determine whether MCO performance over time would support a statistical model that can estimate future performance of MCOs, given a set of user-provided parameters that shape the probabilities of outcomes. For this evaluation, the authors relied on the SOA Research Institute's subscription to S&P Capital IQ Pro to review and analyze S&P's database of NAIC Annual Health Statements for health plans from CY 2013 through

2023. The years 2013 through 2020 were examined for the 2021 research report, and these were supplemented with a review of 2021 through 2024 for this 2023 report update.

MCO data books for rate periods ending from 2016 through 2024 were also reviewed to ascertain the prevailing practice of including underwriting margin, as well as the range of included margins, in MMC rate development. The purpose of this review was to inform the design of the Underwriting Margin Model and, if possible, incorporate it into the development of the model. Project Oversight Group members assisted the authors with obtaining a total of 411 rate books covering rate periods ending in 2016 through 2024 for up to 33 states.

REVIEW AND ANALYSIS OF THE MCO DATA BOOKS

The authors of these two reports reviewed 411 rate books covering rate periods ending in 2016 through 2024. The 2022 study included 280 rate books for the rate periods ending in 2016 through 2021, and this 2024 study update included 131 rate books for the rate periods ending in 2022 through 2024. Because of the timing of the requests for the two study periods relative to the availability of rate books, 2021 and 2024 were presented with fewer rate books than the adjacent years. For this reason, 2021 and 2024 are excluded from multiperiod analyses in Table 6; however, they are included in the period-specific observations, and they appear to remain consistent with their respective adjacent periods.

The survey and analysis of the data books yield useful insights on the practice of including an explicit margin in rate development; however, its incorporation into the Underwriting Margin Model was determined to be of limited use because of the mismatched characteristics of the rate books vis-à-vis the NAIC financial statements, from which retrospective performance statistics were obtained and incorporated in the model curve development. The rate books generally provide benefit- or population-specific rates with a prospective look at a particular rate period that may not adhere to a calendar year, and they are prepared by the entity setting the rates, that is, states. This contrasts with the NAIC financial statements of Medicaid MCOs, which provide a retrospective view of the performance of the MCOs' Medicaid line of business on a calendar year basis, in the aggregate, with no discernment of the benefit plans or subpopulations served.

As exhibited in Table 6,

1. Up to 91% of the rate developments in the rate books for rate periods ending in 2016 through 2024 included an explicit provision for an underwriting margin in rate development.
2. The non-weighted average of the reported underwriting margins, excluding 0%, Dental-only and Chiropractic Services–only plans, range from 1.15% in 2020, at the lower end of the mean, to 1.65% in 2024, at the upper end of the mean.
3. Excluding 2021 and 2024 for consideration of notably fewer sets of data books for these periods, because of the timing of the authors' requests, the non-weighted average of the reported underwriting margins range from 1.15% in 2020, at the lower end of the mean, to 1.61% in 2022, at the upper end of the mean.
4. The range of minimums and maximums for the 2016 to 2024 period are as follows:
    a. Minimums range from a low of 0.35% in 2017 to a high of 1.00% in 2016, 2022, 2023 and 2024.
    b. Maximums range from a low of 2.00% to a high of 3.15%.
5. Although no apparent trends are apparent in the minimum and maximum margins, they do appear to have "settled" at about 1% at a minimum and 2% at a maximum for the 2022 to 2024 rate periods, when excluding California. California included a 3% margin for 2022 and 2023 (the

2024 data book was not available during the review) and may be considered an outlier state for those points in time for the purposes of inferring the range of most reported margins.

6. Excluding 2021 and 2024 for the reasons noted in observation no. 3 above, the following are observed for 2016 through 2023:
    a. The authors reviewed 366 data books.
    b. Eighty-six percent reported inclusion of underwriting margin in rate development.
    c. The average of the margins was 1.34%.
    d. The maximum reported margin was 3.15%, in 2017. Excluding the one instance of this margin as an outlier, the maximum reported margin was 2.38% in 2017.
    e. The minimum reported margin was 0.35%, also in 2017. Although only one instance is seen of a margin at this level, excluding it would not have a meaningful impact on the minimum reported margin, and so the 0.35% observation is retained as the minimum reported margin for the reviewed periods.
    f. The year 2017 presented the widest range between the minimum and maximum margins included in rate development. Excluding 2017 data results creates a slightly narrower range between the minimum and the maximum margins, ranging from a minimum of 0.64% to a maximum of 2.38%.

Table 6.
SURVEY OF MEDICAID DATA BOOKS, 2016–2024

	2016	2017	2018	2019	2020	*2021*	2022	2023	*2024*	2016–2023 (Excl. 2021)
Count of state data books/files reviewed	40	46	52	58	60	*27*	58	52	*18*	**366**
Percent of rate developments reporting UW margin	83%	86%	85%	81%	91%	*100%*	86%	87%	*100%*	**86%**
Non-weighted average of UW margin	1.30%	1.29%	1.29%	1.18%	1.15%	*1.16%*	1.61%	1.54%	*1.65%*	**1.34%**
Minimum UW margin	1.00	0.35	0.75	0.66	0.64	*0.65*	1.00	1.00	*1.00*	**0.35**
Maximum UW margin	2.05	3.15	2.38	2.38	2.26	*2.44*	3.00	3.00	*2.00*	**3.15**
Maximum UW margin, excluding outliers	**2.05**	**2.38**	**2.38**	**2.38**	**2.26**	*2.44*	**2.00**	**2.00**	*2.00*	**2.38**

REVIEW AND ANALYSIS OF NAIC DATA WITH S&P CAPITAL IQ PRO

After reviewing key sets of data fields and metrics, such as those used in the 2017 SOA study and the 2019 MHPA study, as well as Milliman's annual report titled *Medicaid Managed Care Financial Results*, a hybrid dataset was developed that includes the financial metrics as defined by Milliman in Appendix 2 of its 2020 report (see Table 7) and additional fields delineating for-profit or not-for-profit status and indicating state participation in Medicaid Expansion. This dataset covers 10 calendar years, from 2013 through 2022, and is included in the Excel workbook. The references and descriptions for the key fields used in the calculation of ratios and statistics employed are listed in Table 7.

Table 7.
NAIC FINANCIAL METRICS

NAIC Reference	Column Name	Line Item	S&P Capital IQ Pro Report Name
Pg. 7, Row 7, Col. 8	Title XIX–Medicaid	Total Revenue	Analysis of Operations by LOB
Pg. 7, Row 17, Col. 8	Title XIX–Medicaid	Total Hospital and Medical Expenses	Analysis of Operations by LOB
Pg. 7, Row 19, Col. 8	Title XIX–Medicaid	Claims Adjustment Expenses	Analysis of Operations by LOB
Pg. 7, Row 20, Col. 8	Title XIX–Medicaid	General Administrative Expenses	Analysis of Operations by LOB
Pg. 7, Row 21, Col. 8	Title XIX–Medicaid	Increase in Reserves for A&H Contracts	Analysis of Operations by LOB
Pg. 7, Row 24, Col. 8	Title XIX–Medicaid	Net Underwriting Gain or (Loss)	Analysis of Operations by LOB
Pg, 28, Row 14, Col. 1	Total Adjusted Capital–Current Year	Total Adjusted Capital	SNL Highlight Pages (S&P database)
Pg. 28, Row 15, Col. 1	Authorized Control Level–Current Year	Authorized Control Level	SNL Highlight Pages (S&P database)
Pg. 30, Row 6, Col. 9	Title XIX–Medicaid	Current Year Member Months	Exhibit of Premiums, Enrollment and Utilization

The delineation field for-profit/not-for-profit status were determined in several steps starting with the NAIC Ownership Structure field in the S&P database, then the status identified in the 2017 SOA dataset, and finally an individual company search when information was not available in the other two sources. The Medicaid Expansion state designation was based on information obtained from Kaiser Family Foundation as of December 2023.[47]

Ratios and statistics were calculated on the following: the underwriting ratio (UWR), medical loss ratio (MLR) and average per member per month (PMPM) for each of the MCO/year entries. The UWR was calculated by dividing the Net Underwriting Gain/(Loss) by the Total Revenue. The MLR was calculated as the sum of Total Hospital and Medical Expenses and Increase in Reserves, divided by Total Revenue. The PMPM Revenue was calculated by dividing the Total Revenue by the Total Member Months.

The resulting dataset for 2013 through 2022 contained 2,135 MCO/year entries with nonzero Medicaid member months. After reviewing the data in detail, the authors applied filters to exclude potential outliers, resulting in a net of 1,899 MCO/year entries.

[47] Kaiser Family Foundation, "Status of State Action on the Medicaid Expansion Decision," Jan. 1, 2023, accessed Dec. 1, 2023, https://www.kff.org/health-reform/state-indicator/state-activity-around-expanding-medicaid-under-the-affordable-care-act/.

The 1,899 entries make up the final dataset for the Underwriting Margin Model. The details of the data filters, their justification and impact are listed in Table 8.

Table 8.
OUTLIER EXCLUSIONS FROM MCO/YEAR DATA ENTRIES

Initial MCO Data Entries	2,135
Less entries with no or fewer than 50,000 member months *Elimination of small and new plans whose results could skew the data*	−98
Less entries with revenue PMPM less than $100 PMPM *Elimination of plans with limited benefits, such as dental- or chiropractic-only plans*	−126
Less entries with UWRs less than −50% or greater than 50%. *Elimination of plans exhibiting extreme variability in their results*	−6
Less six entries with UWRs equal to zero that were all reported by the same entity for six consecutive years and assumed to be erroneous	−6
Filtered MCO Data Entries	**1,899**

Table 9 presents the by-year summary and statistics the authors reviewed for the development of the underwriting margin curve selections in the model.

Table 9.
SUMMARY OF THE DATASET, 2013–2022, BY YEAR

Year	Number of MCOs	Member Months	Revenue PMPM	Mean Underwriting Ratio (UWR)	Std. Dev. of UWR	Mean Medical Loss Ratio (MLR)	Std. Dev. of MLR
2013	179	1,537,917	$365.43	0.78%	0.0686	87.89%	0.0768
2014	187	1,758,402	401.56	0.77	0.0797	86.79	0.0808
2015	196	2,120,449	419.19	2.19	0.0692	85.68	0.0736
2016	191	2,308,526	460.82	1.36	0.0618	86.65	0.0706
2017	189	2,365,097	478.02	0.27	0.0719	88.68	0.0745
2018	185	2,431,497	532.69	0.66	0.0607	86.67	0.0725
2019	181	2,426,229	580.34	−0.25	0.0563	88.20	0.0631
2020	199	2,451,700	616.81	2.88	0.0508	84.25	0.0618
2021	197	2,876,063	578.01	3.13	0.0491	85.43	0.0555
2022	*195*	*3,200,370*	*596.76*	*3.43*	*0.0508*	*85.37*	*0.0561*
Total/Average	**1899**	**2,356,591**	**504.27**	**1.56**	**0.0636**	**86.52**	**0.0700**

CURVE DEVELOPMENT

Starting with the composite of the 2013 through 2022 data, the 1,899 data entries were sorted from the smallest UWR to the largest, and then the median and the standard deviation were calculated for the dataset. Using the median and the standard deviation a normal curve was developed and compared to the data entries and the *R*-squared was calculated to determine how well the normal curve represented the data. The *R*-squared was then maximized by adjusting the standard deviation to improve the fit of the normal curve.

The results of this process for the composite 2013–2019 period and 2013–2022 period are shown in Table 10.

Table 10.
RESULTS FOR DATASET

	2013–2019 Filings	2013–2022 Filings
Number of Entries	**1,308**	**1,899**
Median UWR	0.0144	0.0202
Standard Deviation of UWR	0.0675	0.0636
R-squared	0.8302	0.8530
Adjusted Standard Deviation of UWR	**0.0371**	**0.0362**
Adjusted *R*-squared	0.9595	0.9760

Upon further consideration of the dataset, additional flexibility in the curve selection options was added for the user to meet varying rating considerations and preferences, including the option for the user to select a user-defined curve to accommodate such things as new populations or new benefits that may increase or decrease the variability reflected in the standard deviations in the existing curves. The composite data of 2013 to 2022 were subsequently delineated into various subsets from which unique UWR curves were developed using a similar process.

Table 11 provides the statistics for the model's various predefined curves, excluding the variable curves representing MCO size. The methodology behind the calculation of MCO size curves is discussed below.

Table 11.
RESULTS FOR ALL AVAILABLE CURVES, EXCLUDING MCO SIZE CURVES

	CY 2013 to CY 2022	CY 2013 to CY 2019	CY 2013 to CY 2015	CY 2016 to CY 2019	CY 2020 to CY 2022	For-Profit 2013 to 2022	Not-for-Profit 2013 to 2022
Number of Entries	1,899	1,308	562	746	591	1,190	709
Median UWR	0.0202	0.0144	0.0202	0.0123	0.0311	0.0251	0.0128
Standard Deviation–UWR	0.0636	0.0675	0.0728	0.0631	0.0502	0.0598	0.0677
R-squared	0.8530	0.8302	0.7629	0.8052	0.8859	0.8857	0.7519
Adjusted Std. Deviation–UWR	**0.0362**	**0.0371**	**0.0389**	**0.0353**	**0.0323**	**0.0375**	**0.0325**
Adjusted *R*-squared	0.9760	0.9595	0.8825	0.9267	0.9678	0.9760	0.9327

	For-Profit 2013 to 2019	Not-for-Profit 2013 to 2019	Expansion States 2013 to 2022	Non-Expansion States 2013 to 2022	Expansion States 2013 to 2019	Non-Expansion States 2013 to 2019
Number of Entries	816	492	1,289	610	875	433
Median UWR	0.0195	0.0041	0.0190	0.0233	0.0151	0.0138
Standard Deviation–UWR	0.0635	0.0713	0.0620	0.0666	0.0669	0.0687
R-squared	0.8637	0.7133	0.8397	0.8426	0.8138	0.7737
Adjusted Std. Dev.–UWR	**0.0398**	**0.0338**	**0.0346**	**0.0402**	**0.0362**	**0.0389**
Adjusted *R*-squared	0.9482	0.9019	0.9714	0.9380	0.9492	0.8784

MCO Size Curve Selection

For the "MCO Size" curve selection, the model provides an option to develop a curve including 2020 to 2022 (the pandemic period) or a curve with the 2013 to 2019 data. The resultant curve will have a standard deviation that varies by the number of member months number that the user provides in the user parameters. To develop a relative factor, the 2013 to 2022 and 2013 to 2019 data sets were allocated into deciles (i.e., 10% ranges) based on member month size with the standard deviation decreasing for each

decile of increasing member months. The member month and standard deviation pairs for each decile were plotted, and the curves were fitted to the plotted points, maximizing the *R*-squared statistic; see Figure 5.

Figure 5a.
STANDARD DEVIATION OF UW RATIO, BY MCO SIZE (2013 TO 2022)

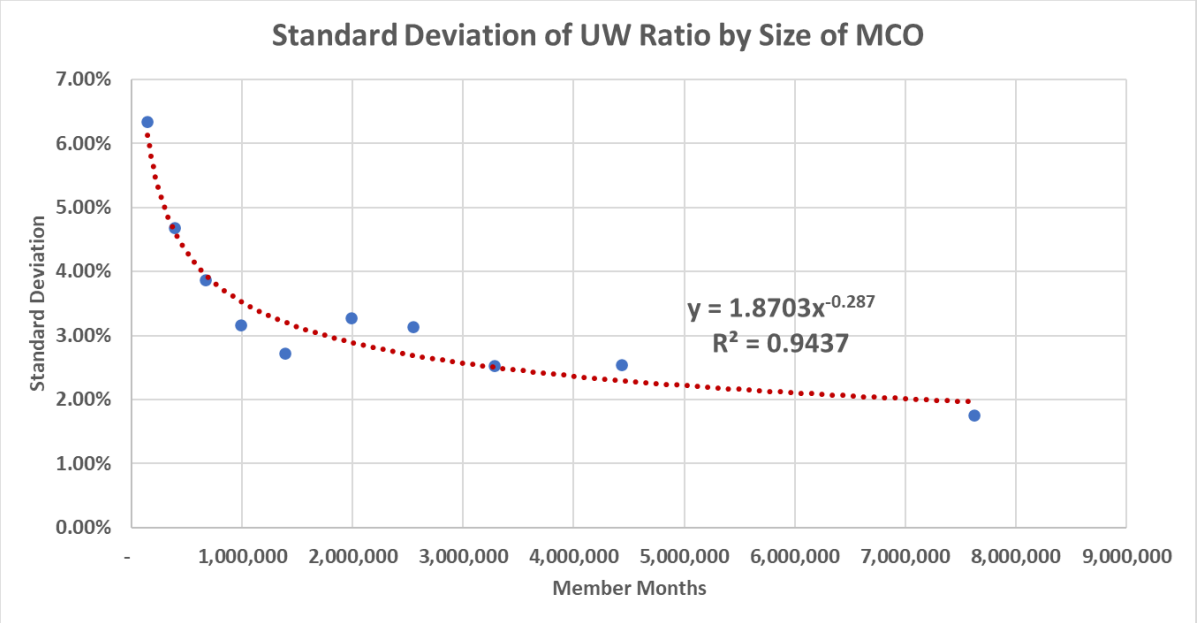
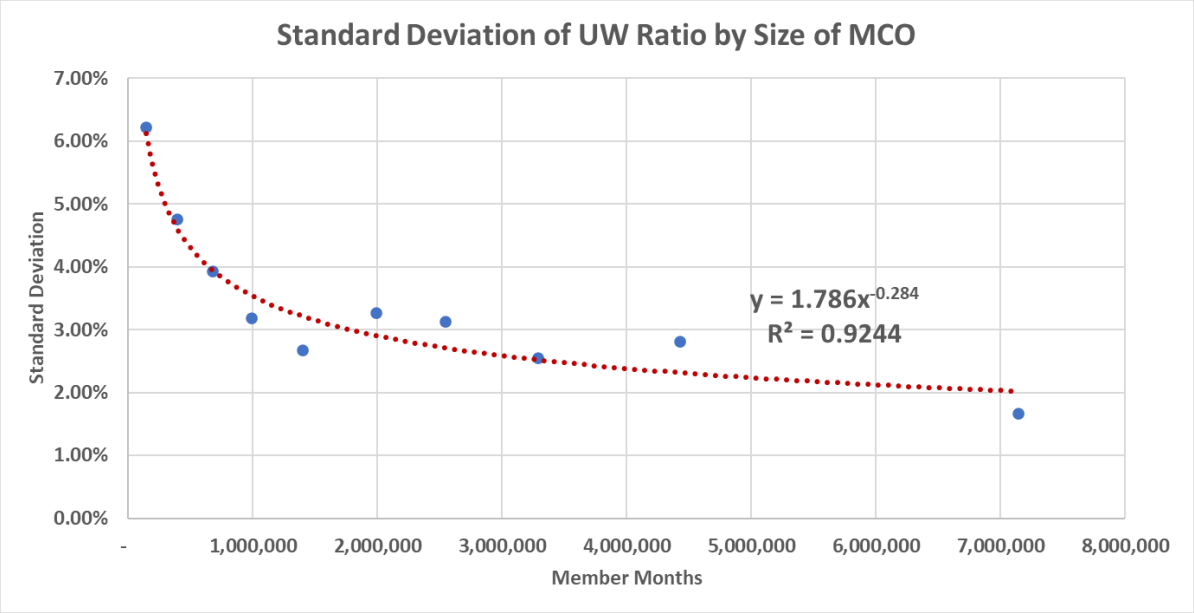


Figure 5b.
STANDARD DEVIATION OF UW RATIO, BY MCO SIZE (2013 TO 2019)



The 2013 to 2022 MCO size curve function, hence, is expressed as $Y = 1.8703x^{-0.287}$ and $R^2 = 0.9437$, whereas the 2013 to 2019 MCO size curve function is expressed as $Y = 1.786x^{-0.284}$ and $R^2 = 0.9244$. For both curve functions, x is the member months number, and Y is the standard deviation.

The model uses this curve function to assign a standard deviation to the user-provided member months number when the MCO size curve is selected. The standard deviations for each of the deciles were adjusted proportionally using the standard deviation adjustment made to the appropriate period's composite curve.

Note that these formulas do not adjust explicitly for plans delivering long-term services and supports (LTSS)—only the entire filing of a MMC that may be included in the dataset. LTSS plans tend to be smaller and may be subject to more variation. The user should be aware of this limitation when using this formula.

Conclusion

The authors of this report have presented the case for incorporating an underwriting margin, also referred to as risk margin, profit margin, underwriting gain or, simply, margin, in actuarially sound Medicaid Managed Care (MMC) capitation rates, drawing on and referring to federal regulation,[48] CMS guidance,[49] Actuarial Standards of Practice[50] issued by the ASB, health plan financial data and MMC rate book submissions.

This research project follows on previous work on the subject, first initiated in a study titled *Medicaid Managed Care Organizations: Considerations in Calculating Margin in Rate Setting*,[51] published in 2017 by the Society of Actuaries (SOA 2017 study), then followed by a study with an accompanying Excel-based model titled *Underwriting Gain Development for Managed Medicaid Capitation Rates*,[52] published in 2019 by the MHPA (MHPA 2019 study). The SOA 2017 study drew on experience and financial data from 2013 through 2015, rate book information, and comprehensive surveys of health plan actuaries and executives to present the prevailing practice and level of margin incorporated in MMC capitation rates, whereas the MHPA 2019 study utilized the SOA 2017 dataset and presented additional research on defining the components of a margin and presented a model to assist the rate-setting actuary in developing a margin. This report is an update to a study published by the SOA in 2022 titled *Medicaid Managed Care Underwriting Margin Model*[53] (SOA 2022 study) that largely maintains the theory, approach, methodologies and functionality of the model introduced in the SOA 2022 study, as discussed in the next paragraph, incorporating calendar years 2020 through 2022 NAIC data for the model's curve development, colloquially termed the pandemic period, and it includes review of MCO data books through 2024.

In the SOA 2022 study and this 2024 update, the authors propose "underwriting margin" as the unifying term for the different monikers by which margin has been referred to in previous reports, guidance and discussions, and they present the considerations for the components that should make up an underwriting margin, those being cost of capital and a margin for risk. The accompanying Excel-based model draws on health plan experience data from 2013 through 2022 and publicly available financial data through March 31, 2024. The model presents the user with a flexible model that incorporates several parameters and considerations for MMC capitation rate setting, with user overrides on some parameters. It gives the user the flexibility of choosing how to deploy the model's underlying historical reference data and offers the user three goal-seek options for the development of the underwriting margin.

The authors believe that this report, the research and the accompanying model provide a basis for developing an underwriting margin that is transparent in its development, empirically supported, methodologically sound and actuarially grounded—all of which are characteristics that the authors deem necessary for maintaining a competitive and fair MMC market.

It is worth noting that current events as they relate to the impact of the recent volatility in the U.S. equity markets on equity premium development (for cost of capital calculation), the implications of COVID-19 and changes in Medicaid eligibility (on utilization and revenues), as well as inflation weighing on benefit and administrative costs present questions for which the authors are cautiously optimistic their model is

[48] 42 C.F.R. § 438.4.
[49] Supra note 4.
[50] Supra note 5.
[51] Supra note 6.
[52] Supra note 7. See also Gibson et al., *Health Watch*, supra note 7.
[53] Supra note 1.

sufficiently robust to allow the user to make necessary adjustments and substitute user-defined assumptions for specified parameters.

To the actuary using this model, all assumptions used in developing an underwriting margin should be reviewed individually, in their totality and in the context of their application. This model is open by design because it is intended to be used as a tool to derive an underwriting margin. Unreasonable assumptions will yield unreasonable and questionable results, and the user should be aware of the limitations imposed by the flexibility of this Underwriting Margin Model.

Acknowledgments

We are thankful to the dedicated professionals from the Society of Actuaries Project Oversight Group (POG) who similarly recognize that establishing an adequate underwriting margin is paramount for maintaining the financial viability of the sector while being mindful of its potential implications for state and federal taxpayers. The final project benefited from the varied subject-matter expertise, general commentary and specific feedback provided by members of the POG, including a member representing the Center for Medicare and Medicaid Services, an economist, a risk specialist, health plan actuaries and state Medicaid capitation-rate–certifying actuaries. The POG membership included the following persons:

Chair: Sabrina Gibson, FSA, MAAA

Bryan Bjork, FSA, MAAA
Tristan Cope, ASA
Elizabeth Gould, FSA, MAAA
George Mansour, MBA
Ian McCulla, FSA, MAAA
Jaredd Simons, ASA, MAAA
Mathew Stahl, ASA, MAAA, CERA
Steve Wander, FSA, MAAA, FCA
David Wierz

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Appendix A

FILES FOR DOWNLOAD

Accompanying this report are two Excel workbooks:

1. SOA 2024 Underwriting Margin Model-v0.95.2.xlsx. This workbook is the model the reader can use to generate an underwriting margin for the purposes of Medicaid Managed Care capitation rate setting. Additional discussion on the use of the model is presented below. The model will be available for download from the SOA website.

2. SOA 2024 UW Margin Model Data Backup-v0.50.xlsx. This workbook contains the historical NAIC dataset referenced in the report, the development of the underwriting margin curves used in the model, and the charts and graphs used in the report. Refer to the "Descriptions" tab/worksheet in the workbook for information on the contents of the workbook. The workbook will be available for download from the SOA website.

Appendix B

A GUIDE TO USING THE SOA 2024 UNDERWRITING MARGIN MODEL

The SOA 2024 Underwriting Margin Model is an Excel-based workbook model with eight visible tabs/worksheets that can be categorized into three major themes:

1. Information
2. Input and
3. Output

INFORMATION

The Information category includes the following tabs/worksheets:

Landing Page–The UWM model is programmed to always open to this tab. This tab contains SOA disclosures and author information. It also contains navigation buttons to easily access the other sections of the model, that is, Instructions and Interpretation tabs, as well as to begin the UWM Magin calculation in the User Parameters tab. It also presents the user the option to exit the model without closing the Excel application.

Instructions–This tab contains descriptions of the user parameter fields included in the User Parameters tab and suggested defaults for some of them.

Interpretation–This tab provides a brief guide on interpreting the different sections of output results on the Results Dashboard.

INPUT

The Input category includes the User Parameters tab/worksheet. Here the user is presented with a series of cells where the user will either input values directly or select from a drop-down list. Most of the input cells will have an information symbol ⓘ next to them, clicking on which will display explanatory information and, where appropriate, suggest a default value for the user to consider. The full list of user parameters and descriptions can be found in the Instructions tab of the SOA 2024 Underwriting Model workbook. The User Parameters are grouped into four broad categories:

4. General Parameters—In this section, the user selects the goal-seek orientation for the model as either probability of ruin, net profit before taxes or risk margin, and provides the calculation target for the model. The user then selects the underwriting margin curve to be used in the analysis and provides basic information about the program being rated, such as enrollment, claims, administrative expense or withhold percent.

5. Cost of Capital Parameters—In this section, the user either selects from a drop-down list or provides the values needed to develop the cost of capital component of the underwriting margin. Parameters include risk-based capital (RBC) thresholds, methods and the variables needed for developing the weighted average cost of capital (WACC), consideration for investment income, and considerations for the impact of cash flow interruptions on the cost of capital. See the report for a detailed discussion of the topic of the cost of capital, its consideration and its development. Note that the managed care discount factor, parameter no. 17, has a corresponding section for the user to provide additional information related to the calculation of the managed care discount factor as

per NAIC guidelines. This parameter and its corresponding section are visible only when "NAIC Filings + User Parameters" is selected for parameter no. 15.

6. MLR Provisions and Risk Share Parameters—In these sections the user will have the opportunity to indicate whether minimum and/or maximum MLR provisions apply, and whether the program will have risk-sharing provisions. For the risk share provisions, the user can indicate whether the risk share is around the medical baseline or an MLR. Upon selection of either type of risk share, the user can also specify the corridors for the risk share arrangement.

7. User-Defined Parameter Inputs—This section contains all the parameters for which there is a user-defined option. Whenever "user-defined" is selected in an applicable parameter a corresponding line in this section will become visible and highlighted in green for the user to input their own value to be considered in the corresponding field in one of the other categories.

OUTPUT

The Output category includes the following tabs/worksheets:

A. Results Dashboard
B. Graphs
C. COC (cost of capital) Calculation
D. Net Income Matrix

The **Results Dashboard** is divided into multiple tables and output results. Below are descriptions of select tables; the full list of tables and their descriptions can be found in the Interpretations tab of the SOA 2022 Underwriting Margin Model workbook.

Underwriting Margin—This table provides the user with the basic components of the underwriting margin, the risk margin and the cost of capital as determined by the model.

Probability of Ruin by RBC Level—This table shows the probability of ruin, the likelihood of spending all of the RBC reserve on losses for various RBC levels. The RBC amount is shown as a dollar amount, PMPM and a percent of premium. The value of excess losses is the expected value of net income losses in excess of the RBC level. The last column shows, assuming a loss in excess of the RBC level, the average loss amount ($M [millions]) weighted by the relative probability of occurrence.

Gain and Loss Distribution—This table shows the likelihood of a gain or a loss for various percentage intervals. It also totals how often a gain, or a loss, will occur for all intervals and what the average gain is given that a gain occurs, and what the average loss is given that a loss occurs. This table is accompanied by a graphical representation of the gain/loss intervals and the likelihood of gains and losses.

Premium Development and Cost of Capital Detail—This table shows the components used to build the premium. The premium includes the user-provided assumptions for claims, administrative expenses and premium taxes and the model-generated cost of capital and risk margin. The results are shown as $M[millions], PMPM and percent of premium.

Graphs—This tab contains graphical representations of the following tables from the Results Dashboard:

Probability of Ruin by RBC Level

Income Statement
Premium Development

COC (cost of capital) Calculation—This worksheet presents a detailed, step-by-step development of the cost of capital, with considerations for investment income on reserves, as well as considerations for time value of money on cash-flow considerations related to delays in premium payments, withhold recoveries, claims payment delays, and gains and losses on the income matrix.

Net Income Matrix—This worksheet presents detailed premium, net income and probability of ruin development based on the information in the User Parameters section and the cost of capital development, to calculate gain/(loss) scenarios with considerations for risk share provisions, MLR provisions, transfer payments and unachieved withholds. Gain/(loss) calculations are made for a total of 160 observations (bins) around the median, where the median is defined by the user-provided information for claims expense PMPM, administrative expenses PMPM, state premium tax and the model-generated underwriting margin. The 160 bins are laid at 80 intervals of loss ratios spaced at 0.5% above the median and 80 intervals of loss ratios spaced at 0.5% below the median. These 160 bins represent the normal curve around the median at +40% and −40% loss ratios, distributed based on the standard deviation of the underwriting margin curve selected in the User Parameters tab, and its probability density function. The results of each bin are totaled as the weighted average based on the probability associated with each bin. Information from the worksheet is relayed to the Results Dashboard.

The workbook also contains hidden worksheets that include backup data used in the drop-down selections in the User Parameters tab. The user may unhide these worksheets for review and/or update.

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