

**STATE OF VERMONT
DEPARTMENT OF FINANCIAL REGULATION**

IN THE MATTER OF:)	
)	
Blue Cross and Blue Shield of Vermont)	No. 19-007-I
Risk-Based Capital Range Study)	

ORDER

WHEREAS, the Commissioner of the Department (the “Commissioner”) is responsible for administering and enforcing the insurance laws of the State of Vermont, including 8 V.S.A. §§ 10, 11, 12, 15, 3304, and 8302; and

WHEREAS, the Department has consulted with its actuaries and, with them, reviewed materials submitted by Blue Cross and Blue Shield of Vermont relating to its risk-based capital range; and

WHEREAS, the Company cooperated with the Department in its inquiry and review by responding to inquiries and providing documentary evidence and other materials;

NOW THEREFORE, the Commissioner makes findings and conclusions as follows:

FINDINGS OF FACT

1. Blue Cross and Blue Shield of Vermont (BCBSVT) is a nonprofit licensee of Blue Cross Blue Shield Association, conducting health-insurance business in the State of Vermont.
2. Risk Based Capital (RBC) is a method of measuring the amount of capital appropriate for an insurance entity to support its overall business operations in consideration of its size and risk profile.

3. RBC, properly applied, requires companies with differing risk profiles to hold different amounts of capital, and for companies and regulators to modify RBC for a given company over time, as the company's risk profile and size change.

4. Since 2011, BCBSVT has targeted an RBC ratio range of 500% to 700%.

5. Since 2013, BCBSVT's RBC ratio has been between 558% and 666%, and has been more stable than the ratios for most other similar entities.

6. As a not-for-profit health insurer, BCBSVT, like other such entities, is generally limited to raising capital from its own operations, while a for-profit entity may have other capital sources.

7. BCBSVT is a member of the national Blue Cross Blue Shield Association (BCBSA), and therefore is subject to the terms of a BCBSA license.

8. BCBSVT would face monitoring by BCBSA if its RBC ratio were to fall beneath 375%; BCBSVT has stated that its risk tolerance is for no greater than a 10% chance of a drop to that level over a five-year time horizon, and no greater than a 1% chance of a drop to 200% over that time horizon.

9. BCBSVT's stated risk tolerance is reasonable and appropriate in light of the above facts.

10. BCBSVT's actuarial consultant recommends, and BCBSVT requests, that the Department approve an RBC ratio target of 590% to 745%.

11. BCBSVT's request is based on a recommendation from an actuarial firm that is qualified to complete the actuarial analysis and give such a recommendation, and the firm used reasonable assumptions, considered appropriate risks, and produced a reasonable and appropriate recommendation for the surplus range.

12. The Commissioner's retained actuaries are qualified to evaluate the BCBSVT actuarial analysis and have done so employing accepted actuarial methods.

13. BCBSVT's requested range is reasonable and appropriate in light of the risk-based capital factors in 8 V.S.A. § 8302(c).

ORDER

NOW, THEREFORE, based on the Commissioner's Findings of Fact, the Commissioner orders as follows:

1. The Commissioner approves BCBSVT's proposed RBC ratio of 590% to 745%.
2. BCBSVT shall not, in any regulatory proceeding, state or imply that its RBC ratio target is other than 590% to 745%.
3. If BCBSVT's RBC ratio falls below or increases above the approved range, BCBSVT shall promptly develop a plan to move within the range within a reasonable time and shall submit such plan to the Commissioner.
4. BCBSVT shall review its RBC range at least once every five years, and more frequently if there is a material change affecting the appropriate range.
5. This Order shall be governed by and construed under the laws of the State of Vermont.

Entered at Montpelier, Vermont this 7th day of February, 2019.



Michael S. Pieciak, Commissioner
Department of Financial Regulation

EVALUATION OF BCBSVT OPTIMAL SURPLUS RANGE RECOMMENDATION

VERMONT DEPARTMENT OF FINANCIAL REGULATION

January 25, 2019

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Executive Summary

The Vermont Department of Financial Regulation (the Department) retained Oliver Wyman Actuarial Consulting (Oliver Wyman) to undertake a study to evaluate Blue Cross Blue Shield of Vermont's (BCBSVT's) optimal surplus range recommendation. Our analysis included:

- A review of BCBSVT's statutory financial statements,
- Benchmarking BCBSVT's Risk Based Capital (RBC) ratio to comparable companies,
- A comprehensive review of the report titled "Blue Cross and Blue Shield of Vermont Optimal Surplus Range Recommendation" (the AHP report) included in Appendix 1, which was commissioned by BCBSVT and performed by Axene Health Partners (AHP) which was used to develop the optimal surplus range recommendation, and
- A review of other surplus determinations in other jurisdictions.

Since July 2011, and until this most recent optimal surplus evaluation, BCBSVT targeted an RBC ratio range of 500% to 700%. Considering the numerous changes in the health insurance market since 2011, BCBSVT determined that a re-examination of the company's target RBC ratio was prudent. BCBSVT is proposing that its optimal surplus range be revised to 590% to 745% based on their risk tolerance, own specific risks, and a quantitative analysis performed by AHP.

Our report contains this Executive Summary (Section 1), six additional sections, and an appendix:

- **Section 2- BCBSVT Historical Financial Results and Capitalization** which includes a historical summary of BCBSVT's financial performance and capitalization,
- **Section 3- Benchmarking- BCBSVT's RBC Ratio and Proposed Range** which includes an analysis of the surplus levels at the end of 2017 of companies with similar characteristics to BCBSVT,
- **Section 4- Review of BCBSVT Risks and Risk Modeling** which explains AHP's methodology and our testing of that methodology used to develop BCBSVT's proposed optimal surplus range recommendation,
- **Section 5- Similar RBC Range Evaluations in Other Jurisdictions** which summarizes state regulatory/legislative findings regarding target capital levels of other companies in other jurisdictions,
- **Section 6- Conclusion Regarding Proposed Optimal Surplus Range** where we discuss our overall conclusions with respect to the proposed optimal surplus range,
- **Section 7- Qualifications, Limitations, Distribution and Use**, and
- **Appendix 1- Blue Cross and Blue Shield of Vermont Optimal Surplus Range Recommendation report (the AHP report)** which is the report that includes the quantitative analysis underlying BCBSVT's proposed optimal surplus range of 590% to 745% of ACL RBC.

BCBSVT is holding capital to the low-end of similarly-sized, single-state, not-for-profit licensees of the BCBSA. This benchmarking indicates that the BCBSVT current surplus, and surplus range as a percentage of ACL RBC, is at the low-end, and not excessive relative to industry practices of similar companies.

The risk tolerance used to develop the optimal surplus range appears reasonable relative to industry standards when considering BCBSVT's restrictions regarding their ability to raise capital and limited growth potential. In our comprehensive evaluation of AHP's modeling approach and assumptions, we determined that their professionals were qualified to complete the actuarial analysis, and that the modeling approach considered appropriate risks, used reasonable assumptions, and produced a reasonable optimal surplus range recommendation.

Other Blue Cross Blue Shield (Blue) Plans have been subject to regulatory or legislative requirements related to RBC ratios. The proposed BCBSVT optimal surplus range is comparable to, and at the low-end of RBC range requirements of other insurers in other jurisdictions. While the other insurers are not identical to BCBSVT, the insurers subject to other jurisdictional RBC ratio requirements have similarities to BCBSVT, and these other RBC ratio requirements should be considered in assessing the proposed BCBSVT optimal surplus range.

After analyzing RBC ratios of comparable health plans, BCBSVT's risk and surplus modeling, and other determinations related to Blue entities' surplus ranges, we believe that the BCBSVT determined optimal surplus range of 590% to 745% of ACL RBC is reasonable based on the risks associated with its ongoing operations.

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BCBSVT Historical Financial Results and Capitalization

Historical Financial Results

BCBSVT's statutory financial reports reflect the value of its three subsidiaries: the regulated insurance subsidiary The Vermont Health Plan, LLC (TVHP) which is subject to its own RBC requirements, along with Catamount Insurance Services, Inc. and Health & Wellness Partners Incorporated, which are not regulated insurance companies, so therefore, are not subject to RBC requirements. Capital and Surplus held by BCBSVT includes the statutorily admitted assets recorded for these three 100% owned subsidiaries. The subsidiary asset values fluctuate year-to-year based on their respective financial results and statutory valuation requirements.

A summary of BCBSVT's reported statutory results for 2013 to 2017 is shown below.

Table 1
2013-2017 BCBSVT Statutory Financials (in Millions)

	2013	2014	2015	2016	2017
Total Revenue	\$420.8	\$470.6	\$539.9	\$547.3	\$578.3
Total Claims Expense	387.3	421.3	478.0	509.5	533.6
Administrative Expenses	38.7	44.2	53.0	56.0	46.1
Net Underwriting Gain/Loss	(5.2)	5.1	8.8	(18.2)	(1.5)
Change in Value of Affiliates	1.2	3.7	0.9	5.1	3.7
Other Investment Income	3.2	0.9	3.3	(0.9)	1.7
Total Investment Income Gain/(Loss)	4.4	4.6	4.2	4.2	5.4
Other Income	2.9	3.2	2.6	2.6	2.7
Pre-Tax Income	2.1	13.0	15.6	(11.4)	6.7
Federal Income Tax	(1.8)	3.1	3.4	(1.7)	(0.9)
Net Income/Loss	3.8	9.9	12.2	(9.7)	7.6

BCBSVT's revenues grew roughly 8% per year, on average, from 2013 to 2017, which generally tracks with medical trend. Underwriting gain/loss has been near break-even, with the exception of 2016, when the company experienced ACA related losses.

Investments, including those in affiliates, have contributed on average about 1% to annual profit margins, and ITS Host and CBA Blue Access Fee income for members of other Blue Plans accessing BCBSVT's provider network has contributed about 0.5%, to annual profit margins. Overall, BCBSVT seeks to maintain a 1.5% profit margin in its pricing to allow for modest earnings and capital growth in order to maintain capital ratios relative to its calculated RBC.

Risk Based Capital Framework and Requirements

Risk Based Capital is explained by the NAIC¹ as follows:

Risk-Based Capital (RBC) is a method of measuring the minimum amount of capital appropriate for a reporting entity to support its overall business operations in consideration of its size and risk profile. RBC limits the amount of risk a company can take. It requires a company with a higher amount of risk to hold a higher amount of capital. Capital provides a cushion to a company against insolvency. RBC is intended to be a minimum regulatory capital standard and not necessarily the full amount of capital that an insurer would want to hold to meet its safety and competitive objectives. In addition, RBC is not designed to be used as a stand-alone tool in determining financial solvency of an insurance company; rather it is one of the tools that give regulators legal authority to take control of an insurance company.

A Health insurer's RBC is calculated annually using the publicly available NAIC form. The calculation applies standard factors to the insurer's annual statement entries to calculate a 200% or Company Action Level (CAL) RBC amount. The RBC formula includes calculated amounts to reflect the following risks:

H0 - Asset Risk – Affiliates, is associated with risks due to investments in affiliated companies. Since BCBSVT sits above TVHP in its corporate structure, and TVHP is subject to its own RBC requirements, the calculated RBC for TVHP is also required for BCBSVT, and TVHP's calculated RBC is added to the RBC amount calculated for BCBSVT. Based on the standard calculation factors, BCBSVT is required to include a provision for its other affiliates as part of its RBC calculation.

H1 - Asset Risk – Other, is associated with the assets held in BCBSVT's investment portfolio. This risk reflects the quantity and risk of portfolio assets in different classes, with larger RBC factors applied to riskier classes of assets.

H2 – Underwriting Risk, provides for potential losses associated with claims in excess of those expected; where the excess claims could result from both random fluctuations, and from inaccurate pricing for future level of claims due to any number of causes.

The predominant risk faced by Health companies is that medical expenses will exceed the premiums collected. The Health formula recognizes that larger blocks of business will have relatively less fluctuation; therefore, tiered factors are used to recognize the increased stability that comes with higher expected incurred claims. The Health formula also includes an adjustment to recognize the beneficial effect of managed care arrangements in decreasing the fluctuations in medical expenses.

H3 - Credit Risk, is associated with outstanding receivables that may not be paid; this should not be a significant risk for BCBSVT.

H4 – Business Risk, is associated with poorly managed administrative costs, including costs for non-underwritten and limited risk business, and other, generally operational, business risks.

¹ https://www.naic.org/cipr_topics/topic_risk_based_capital.htm. Accessed 12/20/2018.

The RBC calculation also includes a covariance element to recognize that the H1 to H4 risks should not be additive and a diversification effect needs be included.

Within the RBC framework, there are various levels of Total Adjusted Capital (TAC) relative to 100% or Authorized Control Level (ACL) RBC, where certain regulatory actions may be considered. These RBC ratios (usually shown as a percentages) are often cited when communicating the level of insurer capitalization.

If the company TAC is at or above the 200% RBC level, no action would necessarily be taken by the regulator, though declining RBC levels may garner regulator attention.

If TAC is 150% to 200% RBC, regulatory action is triggered, and this is called the Company Action Level or CAL RBC.

If TAC drops below 100% RBC, it breaches the ACL RBC, and a regulator may take control of the company.

In addition to regulatory RBC requirements, the Blue Cross and Blue Shield Association (BCBSA) requires its member plans to maintain TAC at 375% RBC in order to remain in good standing with, and not subject to BCBSA scrutiny or sanction, at least from a capitalization perspective.

Historical Capitalization and RBC Ratios

Table 2 below shows BCBSVT's net premiums earned, member months, TAC, and RBC ratios for years ending December 31, 2013 to December 31, 2017. BCBSVT's RBC ratio has been in decline since 2014. BCBSVT's net premiums earned and member months have grown 37.4% and 36.6% percent since 2013, respectively, meaning BCBSVT's risk exposure has experienced a considerable increase over the past years, but its corresponding surplus safety net has remained stagnant.

Table 2
2013-2017 BCBSVT premiums, members, capital,
and RBC ratio summary (\$ amounts in Millions)²

	2013	2014	2015	2016	2017
Net Premiums Earned	\$420.8	\$470.6	\$539.9	\$547.3	\$578.3
Member Months (millions)	1.9	2.4	2.5	2.5	2.6
Total Adjusted Capital	\$132.4	\$138.4	\$148.4	\$135.3	\$134.1
Authorized Control Level RBC	\$23.0	\$20.8	\$22.4	\$22.9	\$24.0
RBC Ratio	575%	666%	663%	591%	558%

Over the same 2013 to 2017 period, BCBSVT's TAC increased by \$1.7 million while the RBC ratio dropped by 17% of ACL RBC, and BCBSVT had net income of \$23.8 million. One reason for the overall 2013 to 2017 RBC percentage reduction was the reduction in RBC from 2016 to 2017, both in dollar amount and ratio, despite BCBSVT earning \$7.6 million. This reduction in 2017 was due to tax law changes and their impact on certain statutory asset values.

² 2013-2017 Statutory Annual Statements

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Benchmarking - BCBSVT's RBC Ratio and Proposed Range

Comparative Companies

We used two criteria to identify a peer group of comparative companies at the ultimate parent level when benchmarking RBC ratios. The ultimate parent level is defined as all companies under common ownership, as an insurance organization may have multiple insurance and non-insurance legal entities. The characteristics we used to identify ultimate parents similar to BCBSVT are:

1. At least 35% of ultimate parent revenue from BCBS license entities, and
2. 2017 Accidental and Health Policy Experience Exhibit (AHPEE) premium between \$0.3 and \$4 billion.

The criteria above were chosen due to the financial uniqueness of the BCBS licensees. They are often independent and operate only in a single state, as not-for-profit health insurers. Unfavorable financial results can quickly decrease their RBC levels, and their options available for raising capital are generally limited to their own operations. Other health insurers may have other capital sources available to them including owners, private/public equity infusions, and affiliates. Based on the selection criteria, we narrowed the list to fourteen ultimate parent companies and BCBSVT. We summarize certain 2017 statutory financial amounts and company metrics in Table 3, below.

Table 3
Comparative Companies – 2017 Financial Information³

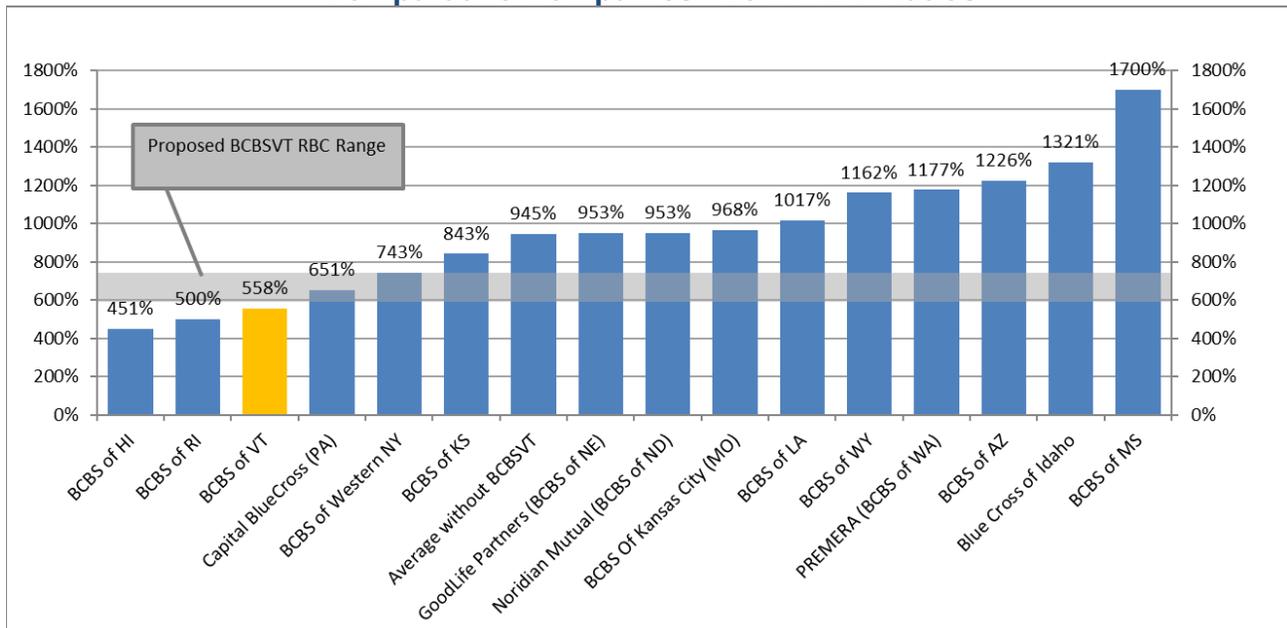
Ultimate Parent Company	AHPEE Premium (in Billions)	Adjusted Capital (in Billions)	Blue Licensee Revenue Share
BCBS of WY	\$0.49	\$0.32	100%
BCBS of VT	\$0.61	\$0.13	95%
Noridian Mutual Ins. Co. (BCBS of ND)	\$1.10	\$0.54	100%
BCBS of MS	\$1.36	\$0.69	100%
Blue Cross of Idaho	\$1.37	\$0.64	100%
GoodLife Partners, Inc. (BCBS of NE)	\$1.68	\$0.41	100%
BCBS of RI	\$1.72	\$0.29	100%
BCBS of AZ	\$2.11	\$1.34	100%
BCBS of KS	\$2.13	\$0.92	100%
BCBS of Kansas City (MO)	\$2.13	\$0.71	95%
Capital BlueCross (PA)	\$2.43	\$0.69	98%
HealthNow Systems, Inc. (BCBS of Western NY)	\$2.48	\$0.61	100%
Louisiana Health Service & Indemnity Company (BCBS of LA)	\$3.36	\$1.27	100%
Hawaii Medical Service Association (BCBS of HI)	\$3.36	\$0.48	100%
PREMERA (BCBS of WA)	\$3.71	\$2.07	91%
Average with BCBSVT	\$2.00	\$0.74	98%
Average without BCBSVT	\$2.10	\$0.78	98%

³ 2017 Statutory Annual Statements

Benchmarking Comparative Companies' RBC Ratios

The following graph shows the RBC ratios for comparative companies as of year-end 2017, including the proposed 590% to 745% optimal surplus range for BCBSVT. As evident in Graph 1 below, BCBSVT's year-end 2017 RBC ratio is one of the lowest among the comparative companies, roughly 400% below the average excluding BCBSVT, and slightly below the low-end of its proposed optimal range.

Graph 1
Comparative Companies - 2017 RBC Ratios⁴



For the five-year period from 2013 to 2017, BCBSVT's year-end RBC ratios were relatively consistent, while a number of comparative companies had RBC ratio changes of at least 100% of ACL RBC (positive or negative). These changes were largely the result of early, significant losses in the ACA individual market. These losses were reduced, and in some cases reversed, by gains in later years as that market stabilized. In Table 4 that follows, large year-to-year RBC ratio variances are shown with red shading (significant decreases) and green shading (significant increases).

⁴ 2017 Statutory Annual Statements

Table 4
Comparative Companies – 2013-2017 RBC Ratios⁵

Ultimate Parent Company	2013	2014	2015	2016	2017
BCBS of WY	1430%	1402%	1426%	1142%	1162%
BCBS of VT	575%	666%	663%	591%	558%
Noridian Mutual Ins. Co. (BCBS of ND)	356%	388%	549%	793%	953%
BCBS of MS	1662%	1735%	1687%	1618%	1700%
Blue Cross of Idaho	1167%	938%	886%	1013%	1321%
GoodLife Partners, Inc. (BCBS of NE)	1290%	1312%	1080%	811%	953%
BCBS of RI	508%	466%	540%	459%	500%
BCBS of AZ	1226%	1114%	1028%	1047%	1226%
BCBS of KS	1000%	896%	848%	867%	843%
BCBS Of Kansas City (MO)	975%	780%	828%	836%	968%
Capital BlueCross (PA)	749%	837%	775%	725%	651%
HealthNow Systems, Inc. (BCBS of Western NY)	666%	556%	719%	678%	743%
Louisiana Health Service & Indemnity Company (BCBS of LA)	1210%	1119%	953%	968%	1017%
Hawaii Medical Service Association (BCBS of HI)	410%	398%	376%	421%	451%
PREMERA (BCBS of WA)	1113%	1015%	915%	887%	1177%
Average with BCBSVT	914%	863%	840%	838%	937%
Average without BCBSVT	922%	866%	844%	843%	945%

⁵ 2013-2017 Statutory Annual Statements

4

Review of BCBSVT Risks and Risk Modeling

BCBSVT is proposing that its target surplus range be revised to 590% to 745% based on their risk tolerance, own specific risks, and a quantitative analysis performed by AHP. In this section, we discuss the modeling approach and assumptions used to determine the proposed range considering BCBSVT's stated risk appetite and risk tolerance.

Risk Appetite and Risk Tolerance

BCBSVT's risk appetite is that of a conservative company. Their non-profit mission is to serve the residents of Vermont, and to achieve that goal they do not aggressively pursue new lines of business or take on undue operational or business risks. The company pursues a pricing strategy that targets a 1.5% of premium annual contribution to surplus, which is intended to maintain surplus levels as premiums and claims increase with underlying medical trends, resulting in increased RBC requirements.

BCBSVT's stated risk tolerance:

1. No greater than a 10% chance of a drop in RBC ratio to below 375% over a five-year time horizon, and
2. No greater than a 1% chance of a drop in RBC ratio to below 200% over a five-year time horizon.

The 375% level is significant for BCBSA licensees, as BCBSVT will face monitoring by BCBSA should its RBC ratio fall below 375%. The 200% level is consistent with CAL RBC, which will result in increased monitoring and potentially specific actions required from its regulator. Falling below the 200% level would also result in the loss of BCBSVT's Blue trademarks which the company believes would put them out of business.

This risk appetite and tolerance is reasonable based on the capital requirements of the BCBSA and the Department. BCBSVT's Blue Cross Blue Shield license is an essential element in its continuing operation and corporate mission.

Review of Specific Risks

Following our review of the AHP report, and discussions between the Department, BCBSVT, AHP, and Oliver Wyman, we confirmed that the following specific risks were considered in BCBSVT's capital modeling. The following list includes both stochastic risks, which are relatively easy to model and quantify due to the availability of data to develop risk distributions, and deterministic risks, which are more difficult to model and quantify due to the lack of readily available risk distributions.

Not all of the following risks were ultimately included in the capital model, but it is helpful to understand the risks that AHP believes could impact health insurers that were considered in modeling, in general, and when determining which risks to model for BCBSVT.

The stochastic risks considered in AHP's modeling included:

- **Claims fluctuation risk** is modeled using a member-level commercial claims database, calibrated to BCBSVT experience to develop claims distributions, and incorporates reinsurance and risk-sharing arrangements to develop model results. This is an appropriate approach to model claims fluctuation risk.
- **Trend variance risk** represents the difference between expected and actual trend and is applied after the claims fluctuation risk. The trend variance is simulated as a normal distribution with a mean of zero (representing no variance to expectations) and a variance based on the trend variance experienced from 2015 to 2017.

The deterministic risks considered in AHP's modeling included:

- **Reserving Process-** the risk that BCBSVT will underestimate the incurred but not paid reserves, including margin. BCBSVT holds an explicit margin of 15% on top of their best estimate, which is conservative. As a result, from 2007 to 2016, BCBSVT's reserve with margin has never been deficient, with the lowest reserve sufficiency being 13.6%, and the highest being 24.9%. AHP did not include an additional charge for reserving process risk.
- **Care Management Effectiveness-** an internal metric developed by AHP that uses key utilization metrics that assess how strong and effective a health plan is at managing care. AHP's conclusion was that BCBSVT has some room for improvement in some of the utilization measures developed but did not include an additional risk charge for care management effectiveness in its modeling.
- **Corporate Structure-** corporate structure risk considers that BCBSVT is a small, not-for-profit company, operating in a small geographic area. Because of this, BCBSVT has very limited availability to raise capital or diversify its business. AHP included an additional charge due to BCBSVT's corporate structure, which added about 55% of ACL RBC to the optimal surplus range.
- **Regulatory Environment-** regulatory environment risk considers the regulatory environment facing BCBSVT, which is more restrictive than most other states. AHP included an additional charge due to BCBSVT's regulatory environment, which added about 73% of ACL RBC to the optimal surplus range.
- **Competitive Environment-** competitive environment considers the threat of new entrants into the Vermont market. AHP did not include an additional charge for competitive environment risk.
- **Provider Reimbursement-** provider reimbursement considers the potential that BCBSVT will need to increase provider reimbursement to maintain provider relations. AHP did not include an additional charge for provider reimbursement risk, noting that BCBSVT's reimbursement levels are on par with its competitors and better in some markets.
- **Underwriting Policy-** underwriting policy risk considers the risk that BCBSVT will fail to appropriately underwrite risk. BCBSVT has large group underwritten business and a small amount of "slice" business where employees can select coverage from BCBSVT or another insurer. AHP did not include a charge for underwriting policy risk.
- **Growth Potential-** growth risks consider the risk that BCBSVT will grow too quickly or will grow into markets they do not fully understand, both of which could incur losses. AHP did not include a charge for growth risks.

We found the stochastic and deterministic risks considered, and ultimately modeled, reasonable and comprehensive for a company like BCBSVT. We note that the inclusion or exclusion of the risks from modeling, along with specific modeling assumptions, are subject to considerable actuarial judgment.

In order to gain a comfort level with the risks considered and risk assumptions employed in modeling, we asked for AHP to respond to specific questions, provide additional documentation and stress test assumptions and results as discussed in the remainder of this section.

Risk Modeling- Conceptual

A surplus range model intends to simulate business results under both normal and stressed operating conditions and compare those results to the stated risk tolerance. The analysis and range recommendation is ultimately driven by lower-frequency, higher-severity events that will result in larger modeled losses and stressed capital levels.

AHP's model develops losses and probabilities and identifies results that will breach the risk tolerance levels to ultimately develop a target RBC range that will sufficiently protect against adverse outcomes based on BCBSVT's stated risk tolerance.

Risk Modeling- Mechanical

Per the Department's direction, our testing of the model mechanics was focused on assessing the reasonableness of the model design, modeled risks, and specific risk assumptions. Our testing of the modeling included the following:

1. Discussion of the rationale behind the model's mechanics with AHP and BCBSVT,
2. Review of a step-by-step simulation for a sample line of business,
3. Evaluation of supporting data for assumptions for both stochastically and deterministically modeled risks, and
4. Requests for and the evaluation of stress-tests of key assumptions.

AHP's model uses Monte Carlo simulation to develop the surplus range and considers both stochastic and deterministic risks. The stochastic risks represent easily quantifiable and simulated risks, while the deterministic risks are harder to quantify, and represent additional adverse events. These risks were modeled over a five-year timeframe and simulated 1,000 times.

Each simulated year is correlated with the prior year's results. Conceptually, this makes sense because the pricing process for the following year is completed mid-way through the current year. However, the precise correlation between two years cannot be known and is largely based on informed actuarial judgment. Because of the judgment involved, we asked AHP to produce stress test results showing the sensitivity of model results to correlation assumptions, which are shown as resulting model minimum surplus percentages per the correlation assumptions shown in Table 5 following.

Table 5
Sensitivity of Auto-Correlation Factor

Factor	Minimum Surplus
0.0%	549%
25.0%	557%
50.0%	576%
62.5%	592%
75.0%	605%
100.0%	652%

As mentioned, the deterministic risk input requires considerable actuarial judgment. We asked AHP to stress-test this assumption to determine how sensitive the calculated RBC range is to the deterministic risk input. That sensitivity is shown in Table 6 below.

Table 6
Sensitivity of Deterministic Risk Input

Factor	Minimum Surplus	Maximum Surplus
2.00%	530%	645%
4.00%	565%	700%
5.55%	590%	745%
7.00%	620%	785%

While the results of the more significant judgmental inputs do impact the model output of recommended surplus levels, the sensitivity is fairly limited within the range of inputs that would be reasonably expected based on AHP’s modeling approach that considers significant experience in modeling similar insurers.

Risk Modeling - Results

Each simulation result produces a modeled contribution to or decreases in surplus, and the new surplus is then compared to the 2016 ACL RBC to calculate an RBC ratio for each simulation. When setting 590% as the low-end of the optimal surplus range, the resulting RBC ratio is below 375% in roughly 10% of the scenarios, consistent with the risk tolerance stipulation of “no greater than a 10% chance of a drop in RBC ratio below 375% over a five-year time horizon.” Additionally, the resulting RBC ratio is below 200% in roughly 0.6% of scenarios, consistent with the risk tolerance stipulation of “no greater than a 1% chance of a drop in RBC ratio below 200% over a five-year time horizon.” A more detailed explanation of the model’s mechanics and output is included in Appendix B of AHP’s report.

The high-end of the optimal surplus range was developed starting from the 590% low-end of the range. When setting 745% as the high-end of the optimal surplus range, there is no more than a 5% chance of falling out of the range from a 690% starting RBC ratio, which is the starting point that maximizes the probability of staying within the range.

The resulting proposed optimal surplus range of 590% to 745% of ACL RBC has a width of 155% of ACL RBC, which is relatively narrow, but consistent with BCBSVT having a stable block of business and their record of being able to manage cost trends and price effectively.

5

Similar RBC Range Evaluations in Other Jurisdictions

Similar evaluations of other Blue Cross and/or Blue Shield Plans' surplus ranges have been completed in other states. While not identical to BCBSVT, the other plans evaluated face similar risks due to their limited geographical operations, and corporate structures. A review of the developed surplus ranges, and the analyses underlying the ranges is an informative benchmarking exercise when assessing BCBSVT's proposed optimal surplus range

The entities discussed below are all much larger than BCBSVT. Generally, the optimal surplus range for a larger company will be lower than that of a smaller company. When discussing the specific companies below, we show 2017 net earned premiums. For context, BCBSVT's 2017 net earned premium was \$0.6 billion.

Pennsylvania – Highmark, Independence Blue Cross, and Capital Blue Cross

On February 9, 2005, the Pennsylvania Insurance Department issued a determination identifying target surplus levels for the four not-for-profit Blue Cross Blue Shield licensees that were operating in the state at that time (currently three). The state classified RBC ratios into three buckets:

1. "An economically 'efficient' level of surplus is the level at which a Blue Plan does not face solvency issues from routine fluctuations in factors such as underwriting results and returns on its investments."
2. A "'sufficient' surplus level is the level at which a Blue Plan has adequate surplus for its operations. A Blue Plan with a sufficient surplus level may not include risk and contingency factors (a cushion in the event actual losses exceed the projected cost of paying for claims) in its filed premium rates."
3. An "'inefficient' and could be potentially excessive" range is one which is above the sufficient range. Insurers falling in the inefficient range "must file a report with the Commissioner justifying the current level of surplus, or file a plan explaining how the Blue Plan will divest itself of surplus in a way that benefits its policyholders."

Result: For the larger plans, Highmark (2017 net earned premium = \$12.0 billion) and Independence Blue Cross (2017 net earned premium = \$15.9 billion), their sufficient RBC range is from 550% to 750%. For the smaller Capital Blue Cross (2017 net earned premium = \$2.4 billion) plan, its sufficient RBC range is from 750% to 950%.⁶

New Jersey – Horizon Blue Cross Blue Shield of New Jersey

As part of the Fiscal Year 2017-2018 budget process, New Jersey lawmakers agreed with Horizon Blue Cross Blue Shield of New Jersey that Horizon will maintain an RBC ratio of between 550% and 725%. Should Horizon have an RBC ratio over 725%, they will be required to submit a plan to the New Jersey insurance commissioner to reduce the ratio, "which may include but not be limited to

⁶ <https://www.insurance.pa.gov/Companies/IndustryActivity/BCBS%20Surplus/Statement%20of%202018%20Surplus%20Levels%20for%20Blue%20Cross%20and%20Blue%20Shield%20Plans.pdf>. Accessed 12/20/2018.

proposals to lessen potential rate increases in the future.”⁷ The department will annually audit the financial statements and surplus of the health service corporation to verify risk-based capital.

Result: Horizon Blue Cross Blue Shield of New Jersey (2017 net earned premium = \$12.9 billion) will maintain a RBC ratio of between 550% and 725%.

Maryland – CareFirst, Inc. (Group of 3)

The CareFirst Inc. (CFI) group consists of the following three legal entities:

1. CareFirst of Maryland, Inc. (CFMI) – nonprofit health service plan
2. Group Hospitalization and Medical Services, Inc. (GHMSI) – nonprofit health service plan
3. CareFirst BlueChoice (BlueChoice) – for-profit health service plan

CFI, CFMI, and GHMSI are all licensed nonprofit health service plans in Maryland. CFI and CFMI are domiciled in Maryland, GHMSI is domiciled in the District of Columbia, and BlueChoice is a for-profit health maintenance organization (HMO) domiciled in the District of Columbia.

In January 2010, the Maryland Insurance Administration (MIA) issued a report regarding the premium and surplus review of the CFI group. The MIA engaged the Invotex firm to review the CFI group’s surplus which resulted in a recommended, and later adopted by the MIA, targeted surplus range of 825% to 1075% ACL RBC for CFMI. The recommended targeted surplus range for GHMSI is 700% to 950% of ACL RBC.

The MIA recommended the General Assembly consider legislation requiring that CFMI and GHMSI establish updated targeted surplus ranges at least every 5 years and annually report to the MIA the status of each company’s surplus.

Result: Maryland Insurance Administration stated that the targeted surplus range for CFMI (2017 net earned premium = \$1.9 billion) is 825% to 1075% of ACL RBC and for GHMSI (2017 net earned premium = \$3.3 billion) is 700% to 950% of ACL RBC.⁸

Washington D.C.⁹ – Group Hospitalization and Medical Services, Inc.

GHMSI is a nonprofit health service plan domiciled in the District of Columbia (D.C.) and a part of the CareFirst Inc. group which is domiciled in Maryland. Approximately 15% of GHMSI subscribers live in D.C. with almost all others living in Maryland or Virginia. In financial matters, the Insurance Commissioner of the jurisdiction where the insurer is domiciled is primarily responsible for monitoring the insurer’s financial condition, however, since GHMSI also operates in Maryland and most of its enrollment is in Maryland, the MIA is interested in premium and surplus reviews as well as independently review GHMSI’s targeted surplus range.

Applicable law in D.C. states that the Commissioner must periodically review the portion of GHMSI’s surplus attributable to D.C. to determine whether it is “excessive.” GHMSI’s surplus is considered

⁷ https://www.njleg.state.nj.us/2016/Bills/S0500/2_11.HTM. Accessed 12/20/2018.

⁸ <https://insurance.maryland.gov/Consumer/Documents/carefirstsurplusreport-final010610.pdf>. Accessed 12/20/2018.

⁹ <http://www.dcapleseed.com/wp-content/uploads/2014/12/FINALDCAAppleseedPetitionforReview.pdf>. Accessed 12/20/2018.

excessive only if the surplus is greater than the appropriate risk-based capital requirements as determined by the Commissioner for the immediately preceding calendar year; and after a hearing, the Commissioner determines that the surplus is unreasonably large and inconsistent with the corporation's obligation [to engage in community health reinvestment].

In December 2014, the Commissioner ordered that GHMSI's surplus attributable to D.C. as of year-end 2011 of 998% authorized control level risk-based capital (ACL RBC) was "excessive" as defined by the Act. The appropriate level of 721% ACL RBC was defined and thus 21% of GHMSI's 2011 surplus was attributable to D.C. On December 30, 2014 it was ordered that within 45 calendar days, GHMSI must submit a plan to the Commissioner for dedication of the excess surplus attributed to D.C. to community health reinvestment in a fair and equitable manner.

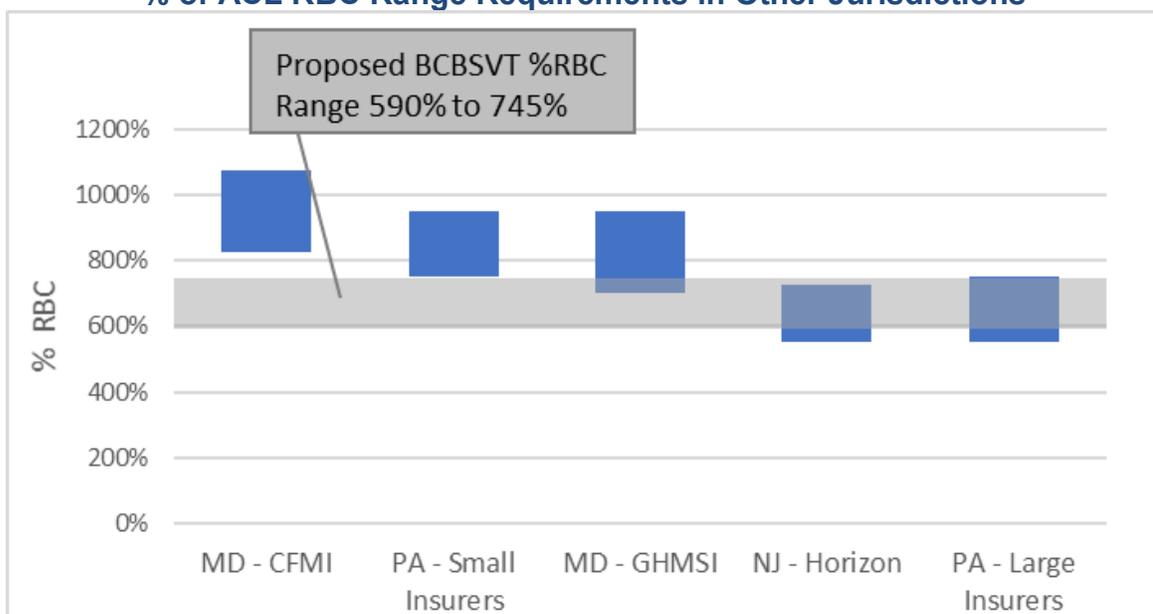
Result: GHMSI's (2017 net earned premium = \$3.4 billion) surplus above 721% ACL RBC is considered excessive and was ordered to remain at or below this level as of December 2014.

Summary of Similar RBC Range Evaluations by Other Regulators

As noted, the other Blue Plans subject to regulatory or legislative requirements related RBC ratios are not identical. The risks and developed surplus range will vary based on each specific insurer's circumstances (such as size and competitive environment), as well as the methodology employed in developing the specific surplus range.

The Graph 2 presents the results of these studies compared to BCBSVT's proposed optimal surplus range. The study ranges are ordered by the 2017 net earned premium for the entities subject to the studies, from low to high, noting that BCBSVT's 2017 net earned premium of \$0.6 billion was roughly one-third of than the next smallest entity, CFMI (\$1.9 billion net earned premium). The results of these studies suggest that the proposed BCBSVT RBC range is lower than the smallest entities in the sample, and comparable to RBC range requirements for much larger entities in other jurisdictions included in the sample.

Graph 2
% of ACL RBC Range Requirements in Other Jurisdictions



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Conclusion Regarding Proposed Optimal Surplus Range

Conclusion

After analyzing RBC ratios of comparable health plans, BCBSVT's risk and surplus modeling, and other determinations related to BCBS entities' surplus ranges, we believe that the BCBSVT determined optimal surplus range of 590% to 745% of ACL RBC is reasonable based on the risks associated with its ongoing operations.

Our findings related to each of these three analyses follows.

RBC Range Versus Comparable Companies

BCBSVT is holding capital to the low-end of similarly-sized, single-state, not-for-profit licensees of the BCBSA. This benchmarking indicates that the BCBSVT current surplus and optimal surplus range as a percentage of ACL RBC is at the low-end, and not excessive relative to industry practices of similar companies.

RBC Range Based on Quantitative Analysis and Modeling

The risk tolerance used to develop the optimal surplus range appears reasonable relative to industry standards when considering BCBSVT's restrictions regarding their ability to raise capital and limited growth potential. In our comprehensive evaluation of AHP's modeling approach and assumptions, we determined that their professionals were qualified to complete the actuarial analysis, and that the modeling approach considered appropriated risks, used reasonable assumptions, and produced a reasonable optimal surplus range recommendation.

RBC Range Relative to Other Regulatory or Legislative Determinations

Other Blue Plans have been subject to regulatory or legislative requirements related RBC ratios. The proposed BCBSVT optimal surplus range is comparable to, and at the low-end of, RBC range requirements of other insurers in other jurisdictions. While the other insurers are not identical to BCBSVT, the insurers subject to other jurisdictional RBC ratio requirements have similarities to BCBSVT and these other RBC ratio requirements should be considered in assessing the proposed BCBSVT optimal surplus range.

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Qualifications, Limitations, Distribution and Use

The report and the findings herein are subject to the reliances and limitations outlined. This report is considered a statement of actuarial opinion under the guidelines promulgated by the American Academy of Actuaries. Marc Lambright, FSA, MAAA of Oliver Wyman developed this report and meets the qualification requirements of the American Academy of Actuaries to render the opinion contained herein.

For our analysis, we relied on data and information as described throughout this report. Though we have reviewed the data for reasonableness and consistency, we have not independently audited or otherwise verified this data. Our review of the data may not reveal errors or imperfections. We have assumed that the data provided is both accurate and complete. The results of our analysis are dependent on this assumption. If this data or information is inaccurate or incomplete, our findings and conclusions may need to be revised.

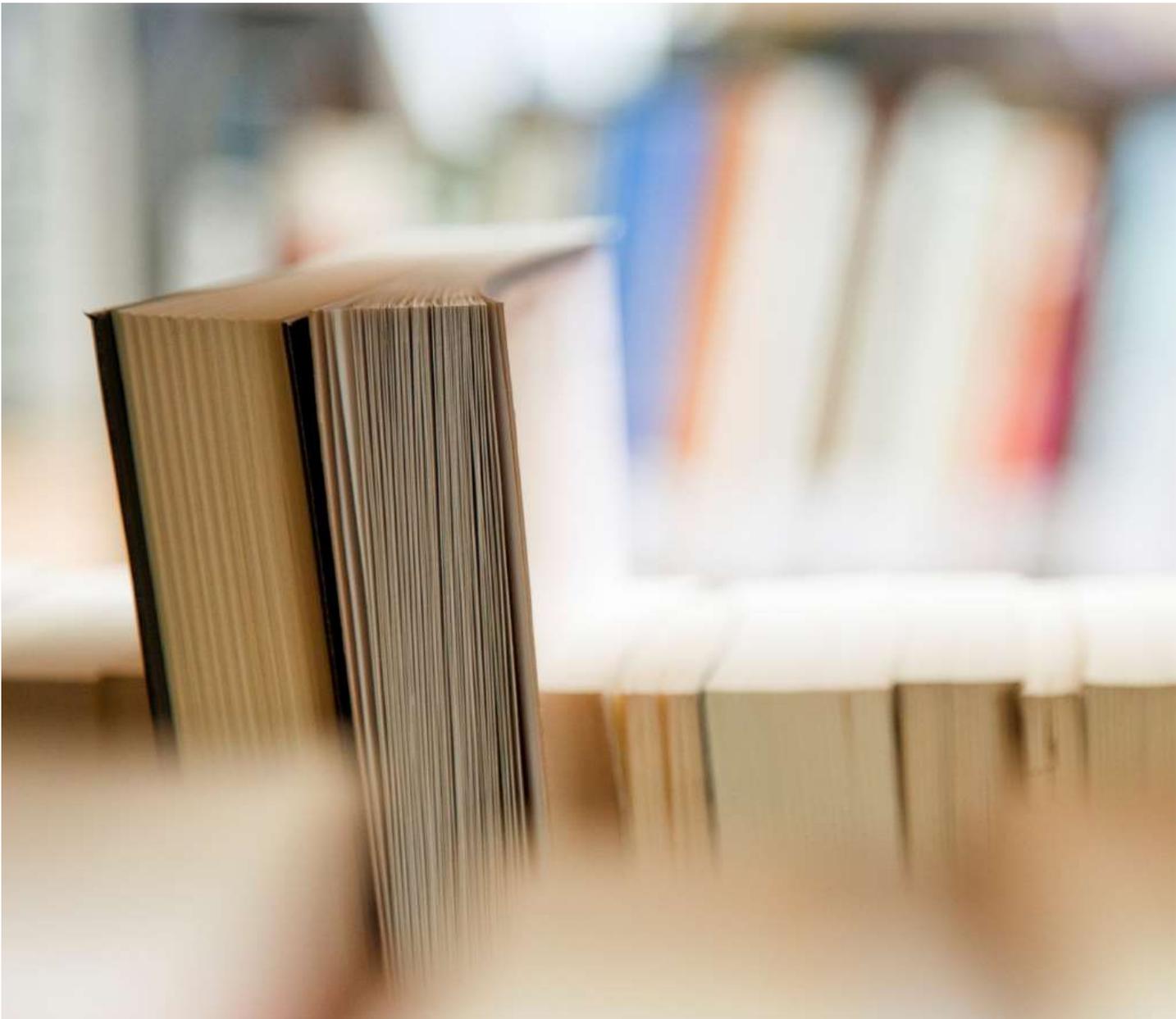
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Appendix 1

AHP Report



Blue Cross and Blue Shield of Vermont

Optimal Surplus Range Recommendation

Axene Health Partners, LLC

Gregory G. Fann, FSA, FCA, MAAA
David V. Axene, FSA, FCA, CERA, MAAA
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December 5, 2018

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Section 1: Executive Summary

Introduction

At the request of Paul Schultz, Chief Actuary, Blue Cross and Blue Shield of Vermont (BCBSVT), Axene Health Partners, LLC (AHP) has performed an analysis to recommend an optimal range of appropriate surplus (alternatively 'capital' or 'capital and surplus') for the organization. The purpose of this report is to document AHP's development and the resulting optimal surplus range that AHP believes should be established by BCBSVT.

Adequate capitalization is crucial for the sustainability and operating ability of insurance organizations. As organizations who are primarily in the business of accepting risk, insurance companies require a sufficient level of surplus funds to assure that obligations to consumers can be met and that such organizations have the financial strength to withstand volatility and fluctuation in a competitive market environment. As each insurance company is unique, determination of an optimal surplus range is specific to the unique circumstances of each organization. AHP's conclusions in this report are limited to determining an optimal surplus range for BCBSVT and are not necessarily representative of AHP's opinions regarding other entities.

This report is intended to communicate to BCBSVT the development of an optimal surplus range. It should not be used or relied upon for any other purposes. As recommendations were developed from stochastic modeling of a large population, subsequent runs of the same model would produce varying but not materially different results.

AHP understands that BCBSVT may desire to share this report with appropriate regulatory authorities. This is permissible only with expressed written permission and if the report is shared in its entirety. AHP does not intend to benefit third parties and assumes no duty or liability to other parties who receive this report. AHP recommends that such third parties not utilize or attempt to digest the content of this report without the aid of a credentialed health actuary or other qualified professional who fully understands the required assumptions and necessary limitations inherent in such an analysis.

Description of Scope of Work

The scope of work for this assignment as outlined in AHP's December 11, 2017 proposal is:

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- Review corporate history and financial management indicators
- Interview management regarding questions/clarifications
- Build member specific corporate model of business
- Develop appropriate deterministic and stochastic inputs to model risk
- Utilize claims probability distributions to model variances contributing to underwriting/pricing risk
- Model the risk for the various categories using simulation techniques
- Perform Monte Carlo modeling adjusted to reflect distribution of lines of business over appropriate time horizon
- Determine aggregate risk for the enterprise (inclusive of subsidiary TVHP) and optimal surplus range

AHP has completed the requested analysis and this report presents the development, results and recommendations. AHP applauds both BCBSVT's mission of providing affordable quality health care coverage to the residents of Vermont and the company's initiative to optimize surplus levels with the aim of providing the best premium value and assurance of financial security to its customers. Any questions regarding this report should be directed to Gregory G. Fann at 951 239 3022 or greg.fann@axenehp.com.

Key Findings and Observations

The key findings and observations from this analysis are:

- As a localized non-profit plan in a small market, BCBSVT is faced with unique challenges and has fewer opportunities than its competitors to raise capital. BCBSVT is also somewhat at a disadvantage in terms of not being able to spread the cost of technological advances across a large scale.
- BCBSVT operates in a more challenging than average regulatory environment. This increases the probability that BCBSVT may have inadequate premium rates even when claim levels are accurately projected.
- BCBSVT has developed strong traditional actuarial capabilities to effectively manage its business. Projections of IBNR, trend, etc. appropriately inform BCBSVT's pricing decisions.

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- BCBSVT's efficiency is reasonably comparable to its current competitors in terms of contracting with providers and care management. BCBSVT is not on the leading edge of structuring arrangements that shift risk to providers, but the company is relatively well-positioned as the market is not very mature in this regard. BCBSVT's risk of being competitively disadvantaged in the care management realm is mitigated by the regulatory environment in Vermont limiting aggressive care management practices.
- Risk levels vary significantly by line of business. If a riskier line of business has a higher growth rate than other lines of business, a company's surplus will need to grow at a faster rate. It is generally common for insurers to have varying contribution to surplus requirements determined by individual line of business risk levels. BCBSVT applies the same contribution to surplus across all of its fully insured business. Accordingly, BCBSVT's contribution to surplus does not adjust its surplus requirements as the mix of business changes. BCBSVT allocates overhead expenses based on contribution to surplus requirements; this process dampens the risk associated with having a flat contribution to surplus requirement across lines of business with varying risk levels.
- Based upon AHP's analysis, BCBSVT should target an optimal Health Risk-Based Capital range of 590% to 745% of the Authorized Control Level (ACL) to provide an appropriate level of protection and have efficient use for its surplus.
- The public interest is well served by BCBSVT continuously monitoring its surplus level and maintaining surplus levels within an optimal range.

These findings and observations are described in more detail in the rest of this report.

Section 2 provides organizational backgrounds and the requirements for determining adequate capitalization levels.

Section 3 summarizes the key risk items that were considered in this analysis.

Section 4 presents the stochastic modeling approach.

Section 5 presents the model development and results.

Section 6 provides concluding remarks.

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Appendix A to this report illustrates surplus levels under alternate risk tolerances.

Appendix B to this report provides technical documentation and statistical observations.

AHP appreciates the valuable insights provided by Paul Schultz and the BCBSVT team. This assistance allowed AHP's consultants to better understand BCBSVT's business model and provided tremendous value in facilitating completion of this analysis and report.

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Section 2: Background

Blue Cross and Blue Shield of Vermont

BCBSVT was founded in 1944 as part of Blue Cross and Blue Shield of Vermont and New Hampshire. The Vermont plan separated from New Hampshire in 1981. BCBSVT is incorporated as a not-for-profit hospital/medical service corporation. BCBSVT is a licensee of the Blue Cross Blue Shield Association (BCBSA or the Association) and holds the Blue Cross® and Blue Shield® (collectively 'BLUE') trademarks for the geographic territory which comprises the State of Vermont.

Operating as a regional not-for-profit company, BCBSVT provides fully insured and self-insured health benefits to residents of Vermont. BCBSVT offers both group and individual policies. BCBSVT's primary competitors are MVP Health Care (MVP) and Cigna Healthcare. MVP primarily competes with BCBSVT in the individual and small group markets. Cigna Healthcare has a larger presence in the self-insured market.

BCBSVT has several subsidiary companies, notably The Vermont Health Plan (TVHP) which is licensed to offer the company's health maintenance organization (HMO) products.

In addition to commonplace insurance regulation administered by the Vermont Department of Financial Regulation, BCBSVT is also subject to oversight by the Green Mountain Care Board (GMCB), which regulates hospital budgets and premium rates for health insurance in Vermont.

Blue Cross Blue Shield Association

The BCBSA owns and manages the BLUE trademarks; while used internationally in 170 countries, the trademarks are primarily associated domestically with licensure granted to independent companies offering health insurance and employee health benefits in exclusive geographic territories. The association of thirty-six independent and locally operated Blue Cross Blue Shield companies provides health insurance to over 100 million people in the United States. BCBSVT owns the license for the state of Vermont. This allows BCBSVT, and only BCBSVT, to use the BLUE brands to conduct business in Vermont.

Each licensee has formal requirements that it must meet to maintain good standing within the Association. This includes submission of quarterly financial reports and semi-annual Health Risk-Based Capital (HRBC) reports to the

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Association. The Association uses these reports to assess and monitor the financial condition of its member companies. The Association relies on many metrics that can be tabulated from these reports in its analysis. The most notable measure from the HRBC reports is each licensee's HRBC ratio, which is a comparison of a plan's actual capital level (aka Total Adjusted Capital) divided by a calculated benchmark known as the Authorized Control Level (ACL).

Each licensee must maintain HRBC ratios greater than 200% to retain licensure of the BLUE trademarks. The 200% ratio is intentionally set at the highest of four threshold levels in the National Association of Commissioners' (NAIC) Risk-Based Capital Model Act. Maintenance of a higher minimum level of capital helps BCBSA licensed companies communicate a higher level of brand integrity and financial strength to stakeholders.

While the BCBSA regards a 200% HRBC ratio as an unacceptable level, it also begins formally monitoring BCBSA licensed companies whose HRBC ratio falls below 375% as an early warning mechanism and facilitation of a process to establish corrective measures.

Health Risk-Based Capital

The business of insurance involves a collection of various risks. Insurance companies are particularly vulnerable to risks that not only take time to recognize, but require more time to respond and implement corrections. As sustained periods of adverse conditions can cause significant losses, insurance companies need surplus levels to withstand difficult times, protect consumers and ultimately prevent corporate insolvency.

As insurance regulation is primarily intended to prevent insolvency, various standards have been developed as required minimum surplus levels. There are several methods to determine and measure target surplus. An early method was simply a fixed dollar surplus requirement. As this standard doesn't appropriately adjust to an insurance company's size, it was replaced in many jurisdictions by a ratio of surplus to annual revenue. A consideration of "surplus as a percentage of revenue" is commonly known as SAPOR and offers a transparent calculation with surplus requirements varying by insurer size. Unfortunately, the SAPOR statistic is overly simplistic and doesn't consider an individual insurer's risk profile.

Insurance company insolvencies in the late 1980s and early 1990s led the NAIC to establish a working group to consider a more rigorous calculation reflecting the inherent risk of an insurer's business to determine a minimum capital level; specifically, companies with greater risks should be expected to hold higher

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amounts of capital. The group studied companies that had failed or exhibited weak financial condition to better understand indicators of potential financial trouble. The resulting Risk-Based Capital (RBC) construct was developed to be an early warning system for insurance regulators and to require a provision of capital adequacy determined formulaically by insurer risk levels. RBC is more refined than earlier assessments of capital adequacy, which were purely based on fixed amounts or simple comparisons of surplus levels to annual premiums. RBC takes into account not only an insurer's size, but also its growth rate and various risk exposures.

Broadly, risk-based capital represents any method that bases a company's minimum capital level on risk exposures of the company. However, the common usage of RBC is quite specific; RBC usually refers to the formula-driven generic methods developed by the NAIC to measure the minimum amount of capital that an insurance company needs to support its overall business operations. In this report, RBC and HRBC represent the common specific usage referencing the NAIC formulas.

The NAIC standard RBC methodology provides a formulaic calculation of a reference value. Multiples of the reference value are used to establish standards for external monitoring and intervention by regulatory authorities. As results are tracked and reported, the process leads to RBC being a conveniently used internally tracking measure as well. As discussed in this report, generic RBC models provide early warning indicators of financial challenges but do not provide a comparative indication of capital adequacy of well-performing companies. Accordingly, developing an appropriate RBC range as a company target is highly dependent on unique internal and external factors.

Health insurance was a bit of an afterthought in the initial RBC models. The NAIC initially adopted different formulas for life insurers and property & casualty (P&C) insurers; depending on organizational structure and mix of business, health insurers were differentially categorized with life or P&C insurers. As both life and P&C insurers are more subject to long-term risks and asset/investment risks (distinct from the primary health insurance risk of "underwriting"), a new model specific to health insurance, Health Risk-Based Capital (HRBC), was adopted in 1998.

HRBC Uses and Limitations

Health insurance companies require surplus for many reasons, including support for the companies' reserves, protection from adverse events, and funding of future capital investments and growth. HRBC (and other RBC models) provides a

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measure for a minimum regulatory capital standard, but that measure is not the full amount of capital/surplus that an insurer needs to hold to meet its objectives and maintain an appropriate level of risk exposure. It should be noted that the RBC formulas were developed utilizing experience of poorly performing companies to identify weak insurers and alert both insurers and regulators of potential trouble, not as a metric to rank the financial adequacy of well-capitalized insurers. In addition, HRBC is not designed to be used as a stand-alone tool in determining financial solvency of an insurance company; rather, it is one of the tools that acts as an early warning indicator of financial distress.

The HRBC calculation does not offer an opinion regarding an ideal or an excessive surplus level. Given that each health care insurer faces its own unique set of risks, challenges, and goals, such measures are difficult to objectively calculate. Despite this, regulatory considerations around maximum HRBC ratio surplus levels have been a discussion topic since the measure was adopted.

In 2005, the Commonwealth of Pennsylvania became concerned with the level of surplus retained by large health care insurers. In response, the commonwealth's Department of Insurance developed an analysis of the reserve and surplus applications for the four not-for-profit Blue Cross Blue Shield health-insurance plans in the commonwealth and prescribed appropriate surplus ranges. Notably, the commonwealth recognized a need for higher HRBC ratios for smaller insurers, which are subject to greater volatility risks. For Highmark Blue Cross & Blue Shield and Independence Blue Cross, the established HRBC ratio range was 550 to 750 percent. For the other two carriers—Blue Cross of Northeastern Pennsylvania and Capital Blue Cross of Harrisburg—the established HRBC ratio range was 750 to 950 percent.

The HRBC ratio is a retrospective calculation based upon historical enrollment, premiums, and other measures. It does not appropriately capture changing dynamics in the marketplace, such as existing business becoming subject to new market rules or minimum loss ratio requirements.

Axene Health Partners, LLC

AHP is a trusted and well-respected actuarial consulting firm focused at the intersection of actuarial science, analytical capacity, and appropriate medical care. AHP serves clients throughout the United States including Alaska and Hawaii. Established in 2003, AHP has served more than 400 individual clients, primarily health plans, health systems and medical groups. In 2017, AHP completed a strategic merger with technology firm Dynamic Vision, Inc.,

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expanding its use of highly specialized systems engineering and information technology experience to enhance client service capabilities. The multi-disciplinary consulting team includes actuaries, physicians and information technology professionals.

AHP has extensive experience in completing health care analytics for all aspects of the healthcare system. In addition to traditional actuarial modeling, AHP develops innovative solutions on behalf of both payers and providers related to the development, implementation, and evaluation of alternate payment methodologies with a focus on efficient, high quality medical care.

AHP has performed multiple HRBC and Own Risk and Solvency (ORSA) assessments for organizations of various sizes and for-profit status. Each corporation is inherently different, and AHP recognizes that capital needs are determined by each insurer's unique circumstances, business requirements, and management objectives.

BCBSVT HRBC Policy

While BCBSVT does not have an explicit HRBC policy, the company has long endeavored to promote an efficient, affordable premium structure while maintaining an appropriate surplus level necessary to ensure the solvency and financial strength of the company.

BCBSVT engaged an actuarial firm to prepare a detailed study on an appropriate surplus level in 2003. At the time, the company was below the 375% HRBC threshold and in monitoring status by the BCBSA. The actuarial firm concluded that an optimal surplus range for the company would be a ratio in the range of 728% – 1019%. This roughly equated to a surplus as a percentage of annual statutory revenue (SAPOR) statistic of 25% – 35% of its annual statutory basis premium revenue, a simpler calculation and a more transparent statistic. It was noted that BCBSVT was among the smallest BCBSA-licensed companies and subject to greater volatility and a higher degree of risk.

BCBSVT shared the actuarial firm's report with the Vermont Department of Banking, Insurance, Securities and Health Care Administration (BISHCA). In June of 2006, the Commissioner of BISHCA issued an order that BCBSVT's surplus could not exceed 25% of SAPOR, the minimum of the range developed in 2003. While the SAPOR calculation has a linear relationship to revenue, the HRBC calculation is more rigorous and is not linear. Over time, 25% of SAPOR equated to a lower

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level of HRBC, below the minimum of the recommended optimal range. BCBSVT managed its business under the SAPOR plan requirements for several years.

In 2009, BCBSVT decided to re-examine its target surplus range utilizing internal resources. Noting that HRBC ratios generally remained in the 500-700% range, BCBSVT endeavored to examine whether that range was appropriate. BCBSVT concluded that a HRBC range of 500% – 700% would be adequate to provide solvency protection. This internal target HRBC range was communicated to regulators. In July of 2011, the SAPOR limits were removed by the Commissioner of BISHCA, with a determination that the HRBC ratio rather than SAPOR would be used in measuring the optimal capital adequacy of BCBSVT.

BCBSVT has continued to target a HRBC range of 500% – 700%, but notable internal and external environmental occurrences have motivated the company to re-examine the optimal HRBC range. Changes in health insurance regulation at the state and federal levels have elevated the need for an extensive review. In particular, the concentration of pricing risk for all individual and small group business into a single annual rate filing inflates Vermont companies' surplus loss exposure and lengthens the time of corrective response. In late 2016 and early 2017, BCBSVT conducted another analysis to review the adequacy of its target RBC range. Five scenarios were developed with only the most severe scenario producing a result close to the BCBSA monitoring level. In late 2017, BCBSVT determined that the current internal and external environment warranted an independent reexamination of its optimal surplus range. AHP was engaged to perform this analysis on January 11, 2018. This report presents the results of that analysis.

The Public Interest

It should be stressed that BCBSVT maintaining a strong capital level is of beneficial interest to all stakeholders in Vermont. As BCBSVT is a local non-profit company, it lacks the capital raising ability of large national care companies. The difficulty of BCBSVT recovering from a diminished surplus level should not be underappreciated.

In ordinary circumstances, surplus requirements generally increase with growth in enrollment and health care expenditures. A continuous contribution to surplus is required to maintain a constant HRBC ratio. A diminished surplus level would require BCBSVT to develop premium rates with higher and potentially uncompetitive targeted contribution to surplus levels. Premium rates that are developed with higher contribution to surplus requirements (for surplus recovery purposes) may also be subject to regulatory challenges.

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Section 3: Summary of Key Risk Items

Introduction

AHP reviewed and assessed a range of key risk items that may impact BCBSVT's financial condition. The assessment of each item was modeled using proprietary, multivariate Monte Carlo methodologies or deterministically developed based on comparative risk assessments utilizing AHP's industry benchmarks.

Claims Fluctuation

AHP delineated BCBSVT's lines of business based on risk associated with premium adequacy and claim prediction accuracy. This process is discussed in detail in Section 4.

Trend Estimates

AHP reviewed limited actual/expected trend results from publicly available rate filings. BCBSVT's experience confirms comments from BCBSVT's management that well-established trend processes are fairly accurate. AHP's stochastic modeling simulates annual trend fluctuations simultaneously with claims fluctuation. Trend experience is modeled using a stochastic process that symmetrically allows trend variances (actual minus expected) around a mean of zero.

Reserving Process and Accuracy

AHP discussed BCBSVT's reserving process with its certifying actuary Paul Schultz. It was confirmed that reserve estimates are calculated with the benefit of one month of paid runout and that an explicit provision for adverse deviation of 15% is usually held in the year-end reserve estimate.

AHP also reviewed BCBSVT's reserve estimates and associated restatements. BCBSVT has a history of establishing accurate projections with conservative provisions for adverse deviations. BCBSVT also processes and pays claims on a consistently rapid basis. These practices contribute to BCBSVT having minimal risk with respect to misstatements of Incurred but Not Reported (IBNR) claims. Furthermore, BCBSVT has additional claims runout available in the pricing process and has very little risk of material IBNR inaccuracy adversely impacting BCBSVT's developed premium rates.

BCBSVT's practice of retaining an explicit provision for adverse deviation in its reserve calculations is prudent, expected by financial regulators, and such

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provision for adverse deviation is required to be considered in Actuarial Standard of Practice #5. As HRBC calculations are based on results in Statutory Financial Statements, the best estimate surplus level may be higher than what is reflected in the HRBC calculation. While AHP did not perform a rigorous review of paid claims history to determine an appropriate level of provisions for adverse deviations, AHP consultants believe that BCBSVT could potentially lower its explicit level of provisions for adverse deviations, which would result in both a higher surplus level and higher HRBC ratio.

Based on BCBSVT's claims payment pattern, reserving practices and pricing methodology, the company is subject to minimal risk of surplus deterioration due to IBNR estimate inaccuracy. Accordingly, no additional risk factor was included in AHP's model due to BCBSVT's reserving process.

Care Management Effectiveness

Care Management Effectiveness™ (CME) is a measure developed and used by AHP to describe the effectiveness of a health care entity's care management processes. CME is an important variable to consider when establishing surplus targets since it potentially helps to identify the potential for competitive threats in the marketplace. For example, a lower CME level might signal a higher than expected opportunity for a competitor to enter the market and create market chaos, additional selection bias, etc. In this situation, AHP's proprietary modeling would calculate an appropriately higher surplus requirement. A higher CME level provides the opportunity for the health plan to maintain highly competitive rates and reduce the competitive threat.

AHP conducted an abbreviated analysis of BCBSVT's CME based upon a few key utilization metrics from each of its lines of business. AHP focused on inpatient days/1,000, ER Utilization/1,000, office visits/1,000, and scripts/1,000. Typically, such an assessment is much more intense and reviews both similar metrics as described above (more of a statistical or data analysis) in addition to a clinical review of actual care management practices and measured outcomes. For this analysis, the abbreviated and less intense review provides adequate information for determining an optimal surplus level.

Based on a review of BCBSVT's utilization statistics and assembled analytical reports, AHP noted opportunities for improved measures but did not include an additional risk factor to account for BCBSVT's reported utilization levels.

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Corporate Structure

As a not-for-profit company, BCBSVT lacks the ability to raise capital from financial markets. BCBSVT also operates in a small, limited geographic territory and lacks the scope and scale of large, national carriers. BCBSVT is also not able to diversify its risk portfolio over a large geographic area. The size limitation also requires BCBSVT to enhance its technological capacity with administrative expenses (both initial investments and ongoing activities) spread over a smaller population. Because of its relatively small scale of operations and its geographic concentration, BCBSVT has less opportunity to spread fixed investments as effectively as large carriers, requiring relatively higher capital levels. AHP included a risk factor to account for BCBSVT's corporate structure.

Regulatory Environment

The regulatory environment is generally more challenging in Vermont than many other states. Market rating rules are more restrictive and allow less use of actuarially-based factors. Vermont is one of two states that does not allow rates to vary by age in the individual and small group markets.

Health insurers in Vermont also face more regulatory challenges in having adequate, actuarially-developed rates approved. The GMCB notes that its rate review enforcement is not “bound solely to a review of the actuarial analysis when deciding whether or not to approve a requested rate change.”¹ This includes a review of “whether a policy or rate is affordable, promotes quality care, promotes access to health care, and is not unjust, unfair, inequitable, misleading, or contrary to the laws of this state.”² The GMCB also has the authority to adjust BCBSVT's trend projections, some of which is duly based on its other regulatory function of prescribing hospital budgets. The elevated regulatory challenges in Vermont do not suggest that health insurers cannot fulfill their mission and viably operate, but that an optimal surplus range should appropriately reflect the higher degree of risk present. Accordingly, a higher than average risk factor was included in AHP's model due to BCBSVT's regulatory environment.

Competitive Environment

As Vermont is a small, mostly rural state, health insurers are not subject to a hypercompetitive environment. BCBSVT is marginally tax-disadvantaged relative to its competitors but has a strong reputation and stable presence. AHP does

¹ <http://ratereview.vermont.gov/sites/dfv/files/2016/BCBSVT/008-16rr%20BCBSVT%20Reconsideration.pdf>

² <https://law.justia.com/codes/vermont/2012/title08/chapter107/section4062>

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not believe that the competitive environment in Vermont warrants an additional risk factor.

Provider Reimbursement

BCBSVT believes its provider reimbursement levels are roughly on par with its competitors and better in some markets. AHP believes that this assessment is generally reasonable and BCBSVT has no additional appreciable risk due to its contracts with providers.

Underwriting Policy

AHP reviewed BCBSVT's 'Underwriting Rules Document'. BCBSVT allows "slice business" where employer groups allow their employees to select from multiple insurers. This practice can sometimes invite anti-selection risk. BCBSVT does not believe that this practice is widely used. No risk factors were added due to BCBSVT's underwriting policy.

Risk Appetite

BCBSVT is a financially conservative company. Its non-profit mission is to serve residents of Vermont. The company periodically evaluates additional opportunities to serve more Vermont residents, but does not have a particularly strong appetite to aggressively pursue new lines of business and additional risk. The company does not have access to outside capital and seeks to retain prudent surplus levels to be able to manage a multi-year period of sustained losses.

BCBSVT's management has an average tolerance of its surplus level being subject to risky levels. It is theoretically impossible to have sufficient surplus to prevent falling below a chosen surplus level with 100% certainty. BCBSVT is exposed to similar surplus risks as other insurers, and would have more difficulty than other insurers in rebuilding its surplus from a diminished level. This necessitates a healthy surplus requirement. More aggressive companies with access to outside capital may have a lower optimal surplus range and utilize surplus to aggressively pursue new opportunities.

The selection of an optimal surplus range is ultimately a management decision. AHP's recommendation is based on an understanding of BCBSVT's tolerance of risk and uncertainties in its business environment, the company's expansion and growth goals, and capital investment requirements. BCBSVT's risk appetite is calibrated in AHP's optimal surplus range by reflecting management's risk tolerance as probabilities of falling below the BCBSA thresholds.

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Growth Potential

Each of the RBC models retroactively includes an adjustment for growth risk. AHP reviewed BCBSVT's 2018 enrollment forecast. BCBSVT's forecast and the long-term outlook allow for modest growth that would not significantly expose the company to additional material risk.

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Section 4: Modeling Approach

Introduction

AHP's approach of determining a minimum surplus level includes use of a stochastic modeling process associated with risk tolerances of falling below certain prescribed thresholds. An optimal surplus range is constructed using similar methodology and allowing a combined risk tolerance of falling below the minimum of the range or surplus growth causing the maximum of the range to be exceeded.

Time Horizon

Historically, insurers have generally been subject to an “underwriting cycle” of roughly six years. From the late 1960s to the early 1990s, market-level financial results in the insurance industry demonstrated a regular pattern of alternating periods of underwriting gains and losses. A repeating pattern of six-year cycles with three years of gains followed by three years of losses emerged. The basic theory of the underwriting cycle is that insurers cyclically adjust price levels in light of competing goals of growth and profitability. The common explanation is that as market profitability rises, insurers begin pricing more aggressively to gain market share, and competitors follow suit to protect their own market share. Lower prices ultimately lead to losses, prompting insurers to raise prices again to profitable levels. The entire cycle process lasts about six years, and then the cycle repeats itself.

While there is less notable consistency of a six-year cycle recently relative to prior years, the fundamental timing challenges of health insurance remain. Insurers develop premium rates for policies several years before they know how the underlying claims will materialize. Premium rates are developed months before they take effect, sometimes earlier to allow for a regulatory approval process, and generally guaranteed on an annual basis. After the coverage period expires, it is usually about a year before all claims are paid. As future premiums are predicated on prior claim levels, there is a significant lag time to account for unexpected (either positive or negative) changes in health care costs. Accordingly, required pricing adjustments take time to recognize and implement and periods of sustained gains or losses can last multiple years.

In AHP's review of BCBSVT's history of financial performance, it was noted that sustained losses were realized for a maximum of five years. Either through corrective action or external environmental changes, BCBSVT has been able to return to periods of contributing to surplus after a five-year period. BCBSVT's

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management is in agreement with AHP's approach to utilize a five-year time horizon as a maximum period to model potential reductions in surplus levels. AHP's stochastic modeling was adapted to provide one-year, three-year, and five-year projections for BCBSVT's fully insured business.

Risk Tolerance

As insurance is the business of risk, it would be impractical for an insurance company to obtain and maintain a level of surplus that would result in absolute immunity of financial danger. At the same time, insurance companies should have surplus levels that minimize the possibility of ever falling below minimum levels of necessary capitalization.

For purposes of AHP's modeling, AHP discussed certain surplus thresholds with BCBSVT's management and the level of risk that would be acceptable. AHP and BCBSVT agreed that the logical benchmarks are the same levels prescribed by the BCBSA, 200% and 375% of HRBC. Falling below the "Early Warning" level of 375% of HRBC is an undesirable scenario, but one that may occur on rare occasions when mutually adverse conditions simultaneously occur. The likelihood of falling below the 200% HRBC level, which could be fatal to the company and a danger to the continued health coverage of Vermont residents, should be avoided with very high probability.

AHP's discussions with BCBSVT's management led to mutual agreement that a minimum surplus level would:

1. Allow no greater than a 10% chance of a drop of HRBC ratio below 375% over a five-year time horizon.
2. Allow no greater than a 1% chance of a drop of HRBC ratio below 200% over a five-year time horizon.³

AHP's recommended HRBC minimum is determined by meeting each of these objectives.

Additionally, the optimal surplus range is developed on a one-year time horizon. The surplus range allows a probability around 5% of falling outside of the range from a point in the higher end of the range in any given year.

³ This level of certainty is between Standard and Poor's 'BBB' and 'A' confidence levels.
<http://www.standardandpoors.com/ratings/articles/en/eu/?articleType=PDF&assetID=1245271186733>

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Section 5: Model Development and Results

Introduction

AHP's stochastic process for this analysis was constructed to independently model the risk of BCBSVT's major lines of risk business using proprietary multivariate Monte Carlo simulation methodology. Monte Carlo simulation uses random sampling from a probability distribution to compute the likelihood of various outcomes. The key to such simulation methodologies is the underlying distribution, the population being modeled, and the predictive accuracy of future claim levels.

Data Selection

Before constructing the model to BCBSVT's specifications, AHP analyzed the company's various lines of business as listed on the supplied 2011-2017 *Underwriting Exhibit* spreadsheets. Lines of Business were segmented into three distinct categories:

- Fully Insured (Stochastically Modeled)
- Fully Insured (Other)
- Self-Insured and Lines of Business without Claims Fluctuation Risk

Almost all of BCBSVT's claim fluctuation risk is in the first of the three categories. The various lines of business (2011-2017) were categorized accordingly:

Fully Insured (Stochastically Modeled)

1. Individual
 - a. QHP⁴/Exchange - (2014-2017)
 - b. Non-Group - (2011-2014)
 - c. Safety Net (Non-QHP & Non-GRP) – (2011-2014)
 - d. Catamount Health (Non-QHP)- (2011-2014)
2. Small Group
 - a. QHP/Exchange - (2014-2017)
 - b. Non-QHP, Incl. SN GRP - (2011-2014)
3. Large Group – “BCBS Insured Group” - (2011-2017)
4. TVHP
 - a. Large Group – (2011-2017)
 - b. Small Group (Non-QHP) – 2011-2014

⁴ QHP refers to “Qualified Health Plans” in the merged individual and small group marketplace.
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Fully Insured (Other)

1. Medicare Supplement (BCBSVT)
2. Medicare Supplement (TVHP)
3. Blue MedicareRx
4. HWP

Self-Insured and Lines of Business without Claims Fluctuation Risk

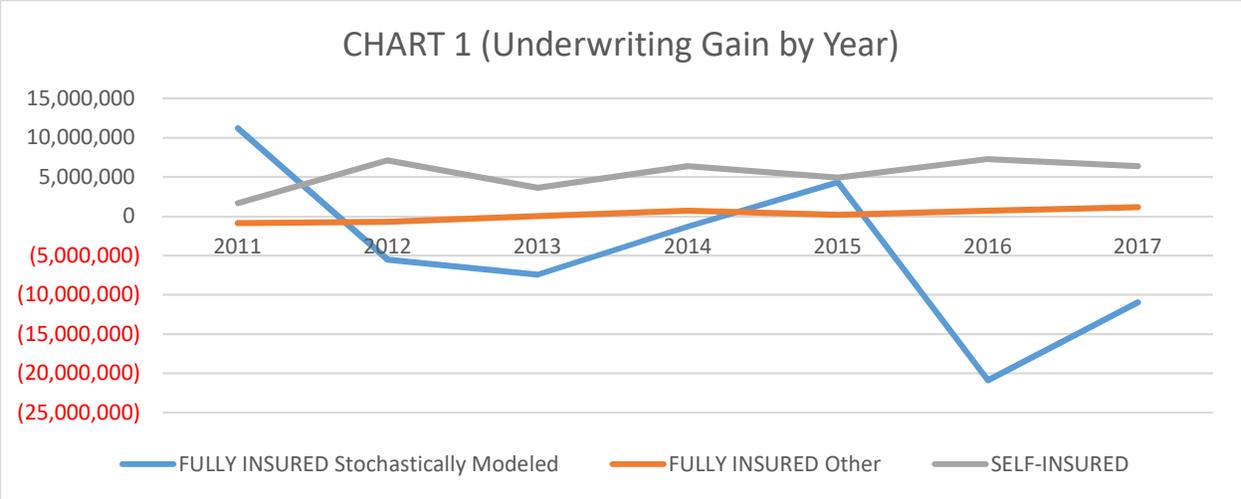
1. BCBS Self-Funded Group
 - a. Cost Plus
 - b. ASO
2. FEP
3. CBA
4. TVHP
5. Host

Table 1 illustrates the variability of the three segments by reviewing the Standard Deviation in the Underwriting Gain from 2011-2017. The seven years are also split into two distinct time periods to recognize the different market rules effective in 2014 due to the new Affordable Care Act (ACA) markets and regulations. Notably, the “Stochastically Modeled” segment has larger variability than the Total which suggests that the selection appropriately captures the stochastic risk variability of BCBSVT’s aggregate business.

Table 1			
Standard Deviation of Underwriting Gain	2011-2013	2014-2017	2011-2017
FULLY INSURED (Stochastically Modeled)	10,254,841	11,086,914	10,442,220
FULLY INSURED (Other)	465,701	552,559	834,651
SELF-INSURED and Lines of Business without Claims Fluctuation Risk	2,742,816	1,005,453	2,046,679
Total	8,169,114	10,013,800	8,708,148

Chart 1 also illustrates that stochastic claims risk lies primarily in the lines of business incorporated in AHP’s modeling. Fluctuation is relatively minimal in the Fully Insured (Other) and Self-Insured and Lines of Business without Claims Fluctuation Risk lines of business.

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The key to producing a reasonable projection is running a significant number of simulations so that a broad spectrum of results can be generated. AHP's model was run with 1,000 simulations for each of the various scenarios produced.

Description of Approach

The Monte Carlo simulation begins by calibrating AHP's member-level commercial claims database to the enrollment and cost levels in BCBSVT's lines of business listed in Table 2. BCBSVT enrollment and claim metrics were developed from 2017 Year-End Underwriting results for the four stochastically modeled Fully Insured Lines of Business.

Line of Business	Member Months	Incurred Claims	Average Members	Claim PMPY
Individual	326,581	161,410,806	27,215	\$5,931
Small Group	493,575	213,407,811	41,131	\$5,188
Large Group	164,724	70,083,273	13,727	\$5,106
TVHP (LG)	33,230	16,369,168	2,769	\$5,911

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In addition to the Monte Carlo claims simulation, additional features of the model were applied.

- 1) Claims risk was reduced in the individual and small group markets to reflect the risk-sharing agreement between BCBSVT and OneCare Vermont, an Accountable Care Organization.
- 2) The model accounted for BCBSVT's reinsurance arrangement of ceding 90% of claims above \$800,000 for an individual within a year.
- 3) Simulations were performed for a single year and simultaneously over multiple years.
- 4) Trend fluctuation was modeled independent of the member-level claims simulation. Using a Monte Carlo methodology and a normal distribution, a separate trend fluctuation factor is simulated with each year and for each line of business. As a sensitivity test, AHP developed a range of trend scenarios with three levels of standard deviations: 1.00%, 1.25%, 1.50%. In AHP's experience, trend variance levels generally range from 1.00% to 3.50%. Due to the higher hospital unit cost predictability reflective of the GMCB hospital budgeting process, a narrower modeling range of 1.00% to 1.50% was selected. An actual/expected sampling review of QHP experience from 2015 to 2017 indicated that standard deviation results were near the midpoint of the 1.00% to 1.50% range. Accordingly, a standard deviation assumption of 1.25% was selected as the trend variance to develop the optimal surplus range.

For a two-year simulation, the projection period for a typical rate filing, the model standard deviation converts to a lower annualized result⁵. Table 3 illustrates the relationship between the model standard deviation and annual results.

Table 3 - Trend Variance			
Model Standard Deviation	1.00%	1.25%	1.50%
Annual Results	0.70%	0.88%	1.06%

⁵ The model simulates trend fluctuation each year where the distribution is a random variable (X) that is normally distributed with a mean of 0.00% and standard deviation of 1.25%. A two year simulation yields X₁ and X₂ and the results in (1+X₁)*(1+X₂)-1 are distributed with a mean of 0.00% and a standard deviation of 1.77% [Sqrt(2*1.25%^2+1.25%^4)]. On an annualized basis, this distribution equates a standard deviation of 0.88% [Sqrt(1+1.77%)-1] compared to the sampling result of 0.87%.

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- 5) The model includes a scalable auto-correlation factor for multi-year simulations, reflecting dependence between expected surplus losses in successive years within each line of business. An input of a factor ranging from 0% to 100% is allowed to reflect the degree of auto-correlation. A 0% input implies no auto-correlation (100% regression to the mean) while 100% implies full auto-correlation. A 62.5% auto-correlation factor was selected as appropriate for a five-year study of simulating a two to four-year period to recognize changes to claim patterns, receive regulatory approval, and implement rate corrections. A 50% auto-correlation estimate is typically reasonable for a five-year scenario; a challenging regulatory environment generally lengthens the correction period and suggests need for a higher factor.

The stochastic process also accepts deterministic variables to be incorporated in the model. Risks that are not stochastic in nature (e.g. corporate structure) are appropriately reflected here and included in the model results.

After each of the inputs is selected, the model simulates annual claim costs for each member across all selected lines of business and selected years, and then calculates the surplus impact, taking into account BCBSVT's 1.5% projected contribution to surplus.

This simulation process is repeated 1,000 times, and the total claims level of each of the 1,000 processes is ranked from highest losses to highest gains to form a normal distribution of possible gains/losses. The 100th worst case scenario of the 1,000 simulations represents the 10th percentile and provides the surplus loss associated with a 10% probability.

Summary of Results

AHP then developed an optimal surplus range by assigning BCBSVT's risk tolerances to the simulated results. Table 4 displays the results of the three trend scenarios. In the middle scenario, the results suggest that BCBSVT has a 10% probability of falling below 375% of ACL in a 5-year period with a starting surplus of 590% of ACL. The middle scenario results also illustrate that the second test (no more than 1% probability of falling below 200% of ACL) is met as the probability of falling below 200% of ACL from 590% of ACL is 0.6%.

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Table 4			
<i>Trend Variance (Standard Deviation):</i>	1.00%	1.25%	1.50%
BCBSVT 5-Yr Simulation Results	<u>1</u>	<u>2</u>	<u>3</u>
ACL:	\$22,842,640	\$22,842,640	\$22,842,640
200% ACL:	\$45,685,279	\$45,685,279	\$45,685,279
375% ACL:	\$85,659,898	\$85,659,898	\$85,659,898
Minimum Surplus (10% Probability below 375% of ACL):	\$132,948,967	\$135,157,186	\$136,954,842
Minimum Surplus as % of ACL (rounded to nearest 5%):	580%	590%	600%
Probability of Surplus below 200% of ACL:	0.3%	0.6%	0.6%

The resulting optimal surplus range is developed by constructing a range⁶ to meet BCBSVT's preferred 5% tolerance of maintaining surplus levels within the optimal range. Table 5 displays these results. With a HRBC ratio of 690% of ACL and a high end of the range at 745% of ACL, there is a 4.8% chance of falling outside of the optimal surplus range. AHP's model projects that maintaining a surplus within a HRBC range of 590%-745% provides the appropriate surplus adequacy to meet BCBSVT's risk tolerance levels.

Table 5					
Likelihood of Falling Outside Range after 1 Year					
HRBC Level	Maximum of HRBC Range				
	730%	735%	740%	745%	750%
590%	47.9%	47.9%	47.9%	47.9%	47.9%
600%	40.7%	40.7%	40.7%	40.7%	40.7%
610%	34.2%	34.2%	34.2%	34.2%	34.2%
620%	28.3%	28.3%	28.3%	28.3%	28.3%
630%	23.0%	23.0%	23.0%	23.0%	23.0%
640%	18.3%	18.3%	18.3%	18.3%	18.3%
650%	14.4%	14.3%	14.3%	14.3%	14.3%
660%	11.2%	11.1%	11.0%	10.9%	10.9%
670%	9.2%	8.9%	8.7%	8.6%	8.5%
680%	8.4%	7.5%	7.0%	6.7%	6.5%
690%	8.9%	7.2%	5.7%	4.8%	4.3%
700%	12.8%	8.7%	6.9%	5.2%	3.7%
710%	22.0%	16.9%	11.6%	7.5%	5.7%
720%	37.0%	28.5%	21.8%	16.7%	11.4%
730%	52.1%	45.5%	36.9%	28.4%	21.7%

⁶ The low end of the range is the minimum surplus level.
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Section 6: Conclusion

Health insurance companies require adequate capitalization to maintain operations, achieve their goals in competitive marketplaces, and ensure against insolvency risk. Adequate capitalization is primary to every company's viability and operations. It is required to ensure that promises and commitments to its members to offer financial protection from health care costs can be kept. Adequate capitalization is also needed to support membership growth, introduce new products, build and maintain technology and infrastructure, pursue new opportunities, and operate effectively as market conditions and the regulatory environment change over time.

HRBC provides a mechanism that acts as an early warning indicator to alert companies, regulators, and other stakeholders of financial troubles. The associated HRBC measures were developed based on an analysis of underperforming companies. While the HRBC ratio was designed to measure the danger level of undercapitalized companies, it is not equipped to measure the relative financial strength of well-performing companies. An organization with a HRBC ratio of 150% is in greater trouble than a comparable one with a 200% ratio; it is not necessarily true that a company with a 700% HRBC ratio is in a better capitalized position than a similar organization at 650%.

The HRBC formula is a standard approach that was designed to be formulaic and utilize fixed factors. While superior to prior simplistic capital requirements, it cannot capture each of the nuances and peculiarities of distinct companies.

While not originally intended for this purpose, there have been recent efforts by outside parties to use the HRBC formula to suggest that at some level, a HRBC ratio represents overcapitalization. This has been an effort more focused on nonprofit plans, as for-profit companies have greater access to outside capital, generally desire and require less surplus, have more uses for existing capital, and are subject to return on investment expectations. Some states, notably Pennsylvania, have developed HRBC ranges for certain nonprofit health insurers and have recognized a size distinction that suggests higher HRBC ratios and target ranges are appropriate for smaller health insurers.

Health insurers also have an interest in optimizing capital levels. As each company is unique in a multitude of ways, it is worthwhile to periodically assess an appropriate surplus range. BCBSVT has a history of analyzing optimal surplus

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levels since 2003. In the first full scale review since ACA inception, BCBSVT engaged AHP to conduct this analysis. AHP considered many factors specific to BCBSVT and developed an optimal surplus range based on the information supplied in conjunction with a proprietary stochastic model used to measure claims fluctuation and other risks.

AHP believes that the recommend surplus range is the optimal target range for BCBSVT and that maintenance of surplus levels in this range will provide the appropriate level of financial protection. AHP appreciates the opportunity to provide this report on an important topic that is fundamental to BCBSVT's mission and its ongoing ability to meet the promises and obligations to its customers.

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Appendix A

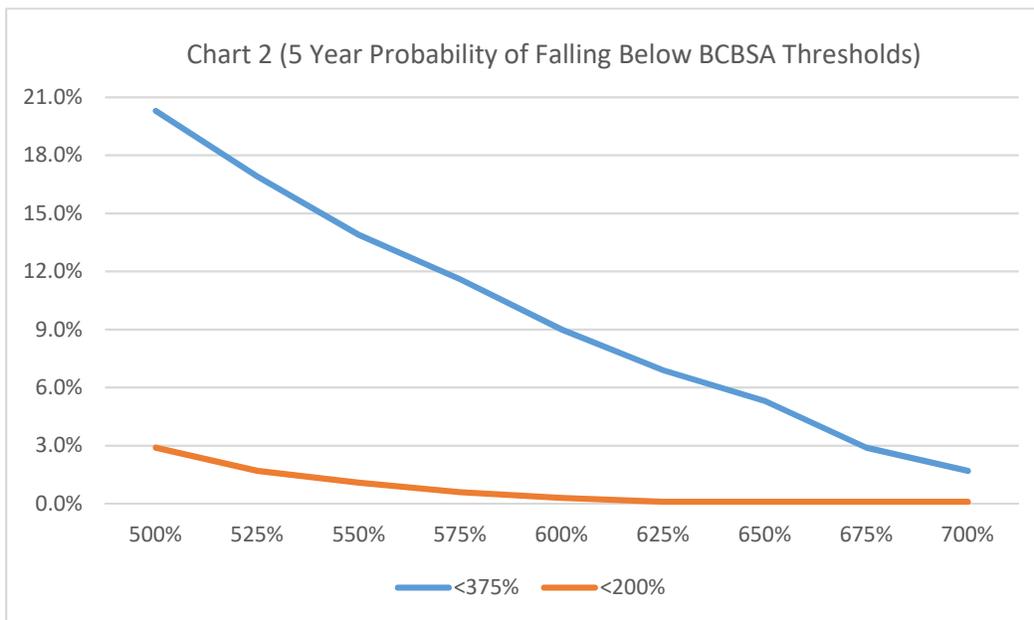
Alternate Risk Tolerances

The optimal surplus range (HRBC ratio of 590%-745%) was constructed based on BCBSVT's average risk tolerance level. In this Appendix, the probabilities of falling below the BCBSA thresholds at other HRBC ratios is explored. All probabilities are expressed as the likelihood of falling below these thresholds in a 5-year period.

A more conservative risk tolerance is requiring a 5% probability (rather than 10%) of falling below a HRBC ratio of 375%. This requirement would result in an appropriate HRBC ratio range of 655%-810%.

BCBSVT's current capital level is within its current HRBC target range of 500%-700%. This more aggressive range results in higher probabilities of falling below the BSBCA thresholds than the optimal surplus range. At a HRBC ratio of 500%, BCBSVT has a 20.3% probability of falling below 375% and a 2.9% probability of falling below 200% within a five-year period.

Chart 2 illustrates the probabilities of falling below the BCBSA thresholds at HRBC ratios between 500% and 700%.



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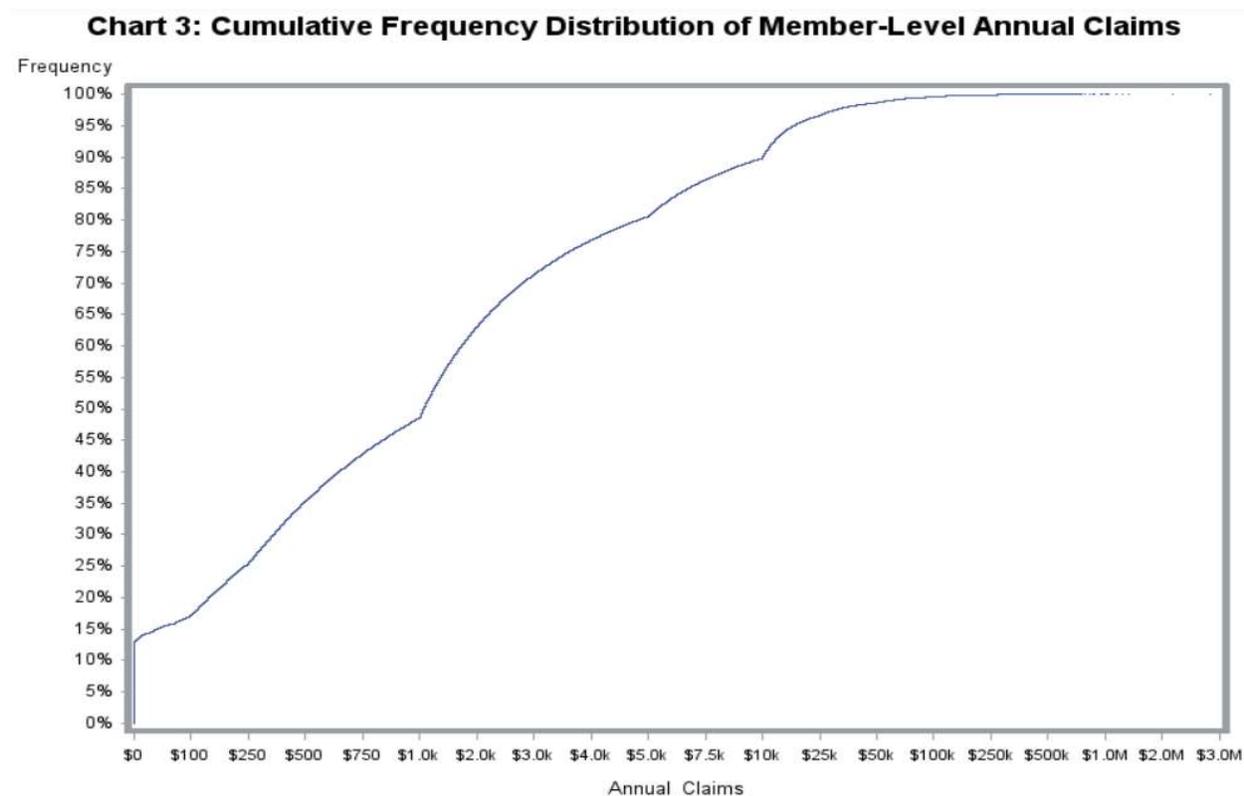
Appendix B

Technical Documentation and Statistical Observation

A technical description of the modeling mechanics and some statistical observations are presented in this Appendix. The stochastic and deterministic risk elements are separately discussed.

Stochastic Components

AHP's stochastic process was constructed to independently model the member-level claims fluctuation risk of BCBSVT's major lines of risk business using proprietary multivariate Monte Carlo simulation methodology. Monte Carlo simulation uses random sampling from a probability distribution to compute the likelihood of various outcomes. Prior to simulation, each line of business was calibrated to the appropriate claims level as detailed in Table 2. The non-indexed probability distribution is displayed below in Chart 3.



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Trend fluctuation is modeled independently of the member-level claims simulation. Using Monte Carlo methodology and a normal distribution, a separate trend fluctuation factor is simulated with each year and for each line of business. As a sensitivity test, AHP developed a range of trend scenarios with three levels of standard deviations: 1.00%, 1.25%, 1.50%⁷. Due to the higher hospital unit cost predictability reflective of the GMCB hospital budgeting process, a narrower modeling range of 1.00% to 1.50% was selected. An actual/expected sampling review of QHP experience from 2015 to 2017 indicated that standard deviation results were near the midpoint of the 1.00% to 1.50% range. Accordingly, a standard deviation assumption of 1.25% was selected as the trend variance to develop the optimal surplus range.

For a two-year simulation, the model standard deviation converts to a lower annualized result. Table 3 illustrates the relationship between the model standard deviation and annual results. The model simulates trend fluctuation each year where the distribution is a random variable (X) that is normally distributed with a mean of 0.00% and standard deviation of 1.25%. A two year simulation yields X₁ and X₂ and the results in (1+X₁)*(1+X₂)-1 are distributed with a mean of 0.00% and a standard deviation of 1.77% [$\sqrt{2*1.25\%^2+1.25\%^4}$].

On an annualized basis, this distribution equates a standard deviation of 0.88% [$\sqrt{1+1.77\%}-1$] compared to the sampling result of 0.87%. The sampling results and the standard deviation of the sampling results are shown in Table 6.

Table 6 - Standard Deviation of Trend Difference			
Pricing Year	Projected Trend	Actual Trend	Difference
2015	5.04%	4.24%	-0.79%
2016	7.01%	8.17%	1.16%
2017	4.87%	4.35%	-0.52%
Standard Deviation Sampling Result			0.87%

⁷ As discussed in this report, medical trend variance levels generally have a wider range but are compressed in Vermont due to higher unit cost predictability associated with the GMCB budgeting process.

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Applying the 1.25% standard deviation, a resulting distribution range of the trend variance modeling statistics is displayed in Table 7.

<u>Variance Range</u>	<u>Probability</u>
-0.5% to 0.5%	31.1%
-1.0% to 1.0%	57.6%
-1.5% to 1.5%	77.0%
-2.0% to 2.0%	89.0%
-2.5% to 2.5%	95.4%
-3.0% to 3.0%	98.4%

A five-year sample demonstration of the model mechanics is shown in Tables 8-12 for one line of business. Each table illustrates a random claim sampling of 50 members⁸ from the cumulative claim probability distribution.

- i. Trend Variance Factor: Use Monte Carlo simulation to generate trend variance from a normal distribution with 0.0% mean and 1.25% standard deviation.
- ii. Auto-Correlation Factor: Calculate the auto-correlation factor by giving 62.5% weight to the Actual-to-Expected (A/E) ratio from the prior year (the other 37.5% is assigned a weight of 1.0000). Year 1 has an auto-correlation factor of 1.0000 since there is no prior year A/E ratio. In the sample demonstration that follows, Year 1 has a A/E ratio of 1.0762. Therefore, Year 2 has a factor of 1.0476 (1.0762 Year 1 A/E ratio * 62.5% + 1.0000 * 37.5%).
- iii. Member-Level Claims: Monte Carlo simulation to generate annual claims costs for 50 unique members based on a cumulative probability distribution that is adjusted to reflect the average claim costs of this line of business.
- iv. Claim Aggregation: Aggregate the simulated claims for all 50 members.
- v. Apply Factors: Multiply the result from (iv) by the Trend Variance and Auto-Correlation Factors from (i) and (ii).
- vi. Calculate A/E Ratio: Divide the result from (v) by the expected claim costs (i.e., mean of the distribution x 50 members). This factor will be used for the auto-correlation in the subsequent year.
- vii. Repeat (i)-(vi) for Years 2 through 5.

⁸ A small sample was used for purposes of illustration and a one-page display. Accordingly, aggregate results exhibit significantly more variance than would be expected from a sample of 1,000 members.

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Table 8 - Year 1 (Individual LOB)

Trend Variance

Assumption:	1.25%
Random #:	0.246
Simulated %:	-0.86%
Factor:	0.9914

Auto-Correlation

Assumption:	62.50%
Prior Yr A/E:	1.0000
Weighted Avg:	1.0000

Results Summary

<u>Actual</u>	<u>Average</u>	<u>Aggregate</u>
Simulated:	\$6,429	\$321,438
w/Trend Variance:	\$6,373	\$318,671
w/Auto-Correlation:	\$6,373	\$318,671
<u>Expected</u>	<u>Average</u>	<u>Aggregate</u>
Expected:	\$5,922	\$296,110
A/E Ratio:	1.0762	

Member-Level Claim Simulation

<u>Member Number</u>	<u>Random Number</u>	<u>Simulated Annual Claims</u>	<u>Member Number</u>	<u>Random Number</u>	<u>Simulated Annual Claims</u>
1	0.097	\$0	26	0.941	\$24,405
2	0.536	\$1,943	27	0.030	\$0
3	0.211	\$212	28	0.383	\$877
4	0.590	\$2,297	29	0.671	\$3,361
5	0.386	\$877	30	0.393	\$877
6	0.353	\$635	31	0.990	\$97,230
7	0.786	\$6,010	32	0.650	\$3,006
8	0.379	\$877	33	0.057	\$0
9	0.361	\$877	34	0.510	\$1,587
10	0.050	\$0	35	0.194	\$212
11	0.386	\$877	36	0.404	\$877
12	0.240	\$352	37	0.648	\$3,006
13	0.178	\$212	38	0.871	\$12,273
14	0.878	\$12,273	39	0.796	\$6,717
15	0.930	\$17,232	40	0.417	\$877
16	0.790	\$6,717	41	0.439	\$1,232
17	0.005	\$0	42	0.228	\$212
18	0.263	\$352	43	0.967	\$38,725
19	0.398	\$877	44	0.817	\$7,430
20	0.070	\$0	45	0.687	\$3,714
21	0.039	\$0	46	0.907	\$17,232
22	0.608	\$2,652	47	0.905	\$17,232
23	0.344	\$635	48	0.273	\$352
24	0.935	\$17,232	49	0.324	\$635
25	0.771	\$6,010	50	0.192	\$212

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Table 9 - Year 2 (Individual LOB)

Trend Variance

Assumption:	1.25%
Random #:	0.457
Simulated %:	-0.13%
Factor:	0.9987

Auto-Correlation

Assumption:	62.50%
Prior Yr A/E:	1.0762
Weighted Avg:	1.0476

Results Summary

<u>Actual</u>	<u>Average</u>	<u>Aggregate</u>
Simulated:	\$8,405	\$420,273
w/Trend Variance:	\$8,394	\$419,706
w/Auto-Correlation:	\$8,794	\$439,692
<u>Expected</u>	<u>Average</u>	<u>Aggregate</u>
Expected:	\$5,922	\$296,110
A/E Ratio:	1.4849	

Member-Level Claim Simulation

<u>Member Number</u>	<u>Random Number</u>	<u>Simulated Annual Claims</u>	<u>Member Number</u>	<u>Random Number</u>	<u>Simulated Annual Claims</u>
1	0.235	\$352	26	0.977	\$45,852
2	0.977	\$45,852	27	0.876	\$12,273
3	0.830	\$8,136	28	0.087	\$0
4	0.301	\$495	29	0.271	\$352
5	0.348	\$635	30	0.958	\$31,613
6	0.196	\$212	31	0.150	\$67
7	0.592	\$2,297	32	0.830	\$8,136
8	0.637	\$3,006	33	0.123	\$0
9	0.040	\$0	34	0.020	\$0
10	0.404	\$877	35	0.900	\$17,232
11	0.459	\$1,232	36	0.785	\$6,010
12	0.838	\$8,844	37	0.061	\$0
13	0.622	\$2,652	38	0.884	\$12,273
14	0.984	\$60,052	39	0.213	\$212
15	0.386	\$877	40	0.098	\$0
16	0.088	\$0	41	0.981	\$52,972
17	0.523	\$1,587	42	0.262	\$352
18	0.653	\$3,006	43	0.402	\$877
19	0.985	\$67,098	44	0.513	\$1,587
20	0.040	\$0	45	0.738	\$4,593
21	0.349	\$635	46	0.353	\$635
22	0.831	\$8,136	47	0.125	\$0
23	0.615	\$2,652	48	0.298	\$495
24	0.719	\$4,593	49	0.109	\$0
25	0.419	\$877	50	0.349	\$635

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Table 10 - Year 3 (Individual LOB)

Trend Variance

Assumption:	1.25%
Random #:	0.705
Simulated %:	0.67%
Factor:	1.0067

Auto-Correlation

Assumption:	62.50%
Prior Yr A/E:	1.4849
Weighted Avg:	1.3031

Results Summary

<u>Actual</u>	<u>Average</u>	<u>Aggregate</u>
Simulated:	\$8,011	\$400,548
w/Trend Variance:	\$8,065	\$403,242
w/Auto-Correlation:	\$10,509	\$525,447
<u>Expected</u>	<u>Average</u>	<u>Aggregate</u>
Expected:	\$5,922	\$296,110
A/E Ratio:	1.7745	

Member-Level Claim Simulation

<u>Member Number</u>	<u>Random Number</u>	<u>Simulated Annual Claims</u>	<u>Member Number</u>	<u>Random Number</u>	<u>Simulated Annual Claims</u>
1	0.036	\$0	26	0.192	\$212
2	0.730	\$4,593	27	0.515	\$1,587
3	0.579	\$2,297	28	0.788	\$6,010
4	0.256	\$352	29	0.570	\$2,297
5	0.710	\$4,070	30	0.531	\$1,587
6	0.691	\$3,714	31	0.134	\$67
7	0.717	\$4,593	32	0.501	\$1,587
8	0.834	\$8,844	33	0.612	\$2,652
9	0.995	\$97,230	34	0.398	\$877
10	0.087	\$0	35	0.593	\$2,297
11	0.061	\$0	36	0.271	\$352
12	0.988	\$97,230	37	0.812	\$7,430
13	0.083	\$0	38	0.304	\$495
14	0.870	\$12,273	39	0.708	\$4,070
15	0.486	\$1,587	40	0.693	\$3,714
16	0.412	\$877	41	0.977	\$45,852
17	0.853	\$9,557	42	0.085	\$0
18	0.622	\$2,652	43	0.864	\$10,262
19	0.933	\$17,232	44	0.714	\$4,593
20	0.441	\$1,232	45	0.063	\$0
21	0.523	\$1,587	46	0.563	\$1,943
22	0.666	\$3,361	47	0.395	\$877
23	0.894	\$12,273	48	0.715	\$4,593
24	0.859	\$10,262	49	0.496	\$1,587
25	0.084	\$0	50	0.087	\$0

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Table 11 - Year 4 (Individual LOB)

Trend Variance

Assumption:	1.25%
Random #:	0.475
Simulated %:	-0.08%
Factor:	0.9992

Auto-Correlation

Assumption:	62.50%
Prior Yr A/E:	1.7745
Weighted Avg:	1.4841

Results Summary

<u>Actual</u>	<u>Average</u>	<u>Aggregate</u>
Simulated:	\$3,319	\$165,928
w/Trend Variance:	\$3,316	\$165,798
w/Auto-Correlation:	\$4,921	\$246,055
<u>Expected</u>	<u>Average</u>	<u>Aggregate</u>
Expected:	\$5,922	\$296,110
A/E Ratio:	0.8310	

Member-Level Claim Simulation

<u>Member Number</u>	<u>Random Number</u>	<u>Simulated Annual Claims</u>	<u>Member Number</u>	<u>Random Number</u>	<u>Simulated Annual Claims</u>
1	0.251	\$352	26	0.716	\$4,593
2	0.738	\$4,593	27	0.078	\$0
3	0.115	\$0	28	0.606	\$2,652
4	0.623	\$2,652	29	0.404	\$877
5	0.150	\$67	30	0.070	\$0
6	0.269	\$352	31	0.714	\$4,593
7	0.356	\$877	32	0.565	\$1,943
8	0.329	\$635	33	0.943	\$24,405
9	0.256	\$352	34	0.650	\$3,006
10	0.866	\$12,273	35	0.085	\$0
11	0.663	\$3,361	36	0.851	\$9,557
12	0.442	\$1,232	37	0.854	\$9,557
13	0.213	\$212	38	0.353	\$877
14	0.054	\$0	39	0.379	\$877
15	0.475	\$1,232	40	0.692	\$3,714
16	0.243	\$352	41	0.143	\$67
17	0.064	\$0	42	0.098	\$0
18	0.319	\$635	43	0.904	\$17,232
19	0.620	\$2,652	44	0.717	\$4,593
20	0.262	\$352	45	0.146	\$67
21	0.510	\$1,587	46	0.107	\$0
22	0.934	\$17,232	47	0.374	\$877
23	0.352	\$635	48	0.740	\$4,593
24	0.810	\$7,430	49	0.900	\$17,232
25	0.105	\$0	50	0.305	\$495

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Table 12 - Year 5 (Individual LOB)

Trend Variance

Assumption:	1.25%
Random #:	0.489
Simulated %:	-0.04%
Factor:	0.9996

Auto-Correlation

Assumption:	62.50%
Prior Yr A/E:	0.8310
Weighted Avg:	0.8943

Results Summary

<u>Actual</u>	<u>Average</u>	<u>Aggregate</u>
Simulated:	\$5,901	\$295,072
w/Trend Variance:	\$5,899	\$294,967
w/Auto-Correlation:	\$5,276	\$263,803
<u>Expected</u>	<u>Average</u>	<u>Aggregate</u>
Expected:	\$5,922	\$296,110
A/E Ratio:	0.8909	

Member-Level Claim Simulation

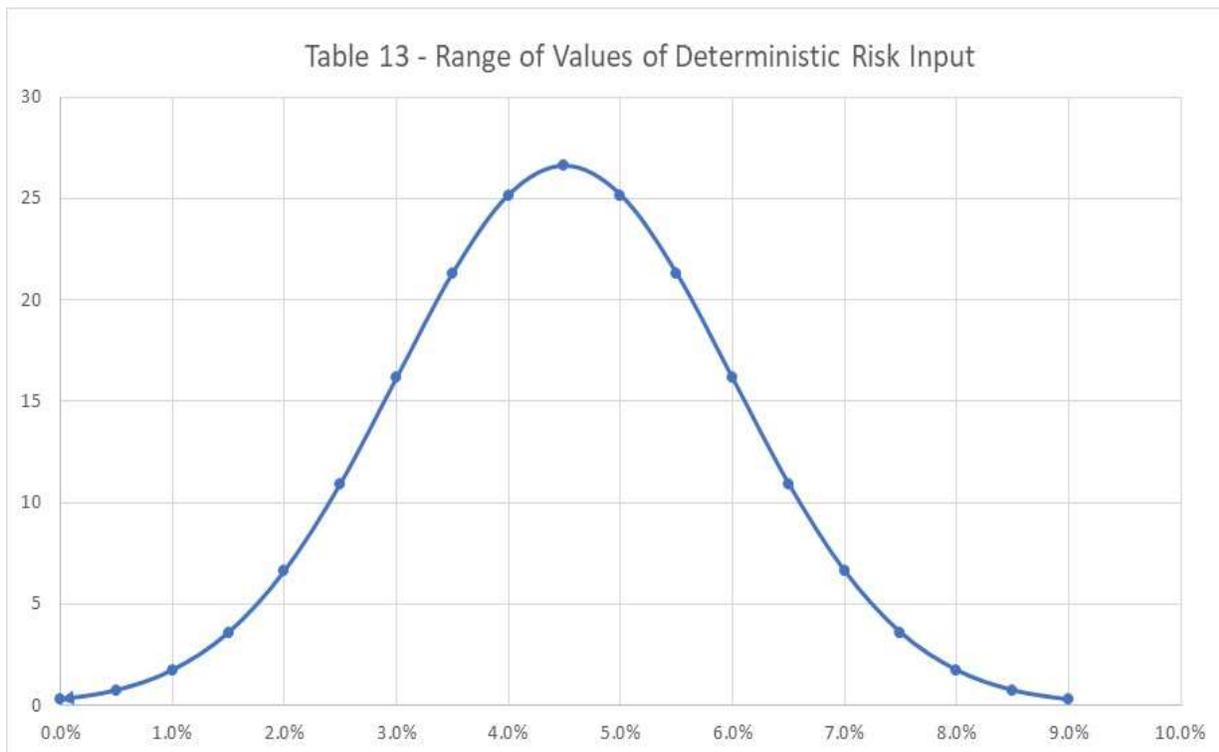
<u>Member Number</u>	<u>Random Number</u>	<u>Simulated Annual Claims</u>	<u>Member Number</u>	<u>Random Number</u>	<u>Simulated Annual Claims</u>
1	0.063	\$0	26	0.078	\$0
2	0.209	\$212	27	0.224	\$212
3	0.185	\$212	28	0.295	\$495
4	0.242	\$352	29	0.733	\$4,593
5	0.440	\$1,232	30	0.250	\$352
6	0.762	\$5,300	31	0.704	\$4,070
7	0.248	\$352	32	0.127	\$0
8	0.628	\$2,652	33	0.306	\$495
9	0.875	\$12,273	34	0.860	\$10,262
10	0.669	\$3,361	35	0.647	\$3,006
11	0.052	\$0	36	0.897	\$12,273
12	0.812	\$7,430	37	0.209	\$212
13	0.973	\$45,852	38	0.736	\$4,593
14	0.865	\$12,273	39	0.677	\$3,714
15	0.798	\$6,717	40	0.975	\$45,852
16	0.105	\$0	41	0.945	\$24,405
17	0.966	\$31,613	42	0.580	\$2,297
18	0.071	\$0	43	0.423	\$877
19	0.634	\$3,006	44	0.265	\$352
20	0.092	\$0	45	0.251	\$352
21	0.475	\$1,232	46	0.285	\$495
22	0.534	\$1,943	47	0.934	\$17,232
23	0.340	\$635	48	0.372	\$877
24	0.706	\$4,070	49	0.817	\$7,430
25	0.849	\$9,557	50	0.232	\$352

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Deterministic Components

AHP reviewed and assessed a range of key risk items that may impact BCBSVT's financial condition. Typical fluctuation associated with actual claim levels and accuracy of trend estimates were modeled using proprietary, multivariate Monte Carlo methodologies. AHP also holistically reviewed non-stochastic elements ("deterministic components") subject to insurance or business risk. The stochastic process directly incorporates deterministic risk inputs into the model calculations. The degree of risk associated with deterministic elements increases the likelihood and magnitude of a potential loss. For example, additional deterministic risk elements may magnify a 5% probability of a \$10 million loss to a 5% probability of a \$15 million loss or a 10% probability of a \$10 million loss.

Table 13 illustrates a range of inputs for the aggregate deterministic risk component. The input for BCBSVT was 5.55%; as a relatively small insurance company without access to outside capital in a highly regulated marketplace, BCBSVT is subject to greater risks than an average insurance company. The deterministic risk input equates to a percentage of the expected claims level in one year, and each percentage point has about a 15%-25% (additive as a percentage of ACL) impact on the minimum surplus requirement.



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A change in the aggregate deterministic risk would change the optimal surplus range. Table 14 illustrates the optimal surplus range for various inputs.

Table 14	
Deterministic Risk Input	Optimal Surplus Range
2.00%	530% - 645%
4.00%	565% - 700%
5.55%	590% - 745%
7.00%	620% - 785%

Loss Probabilities

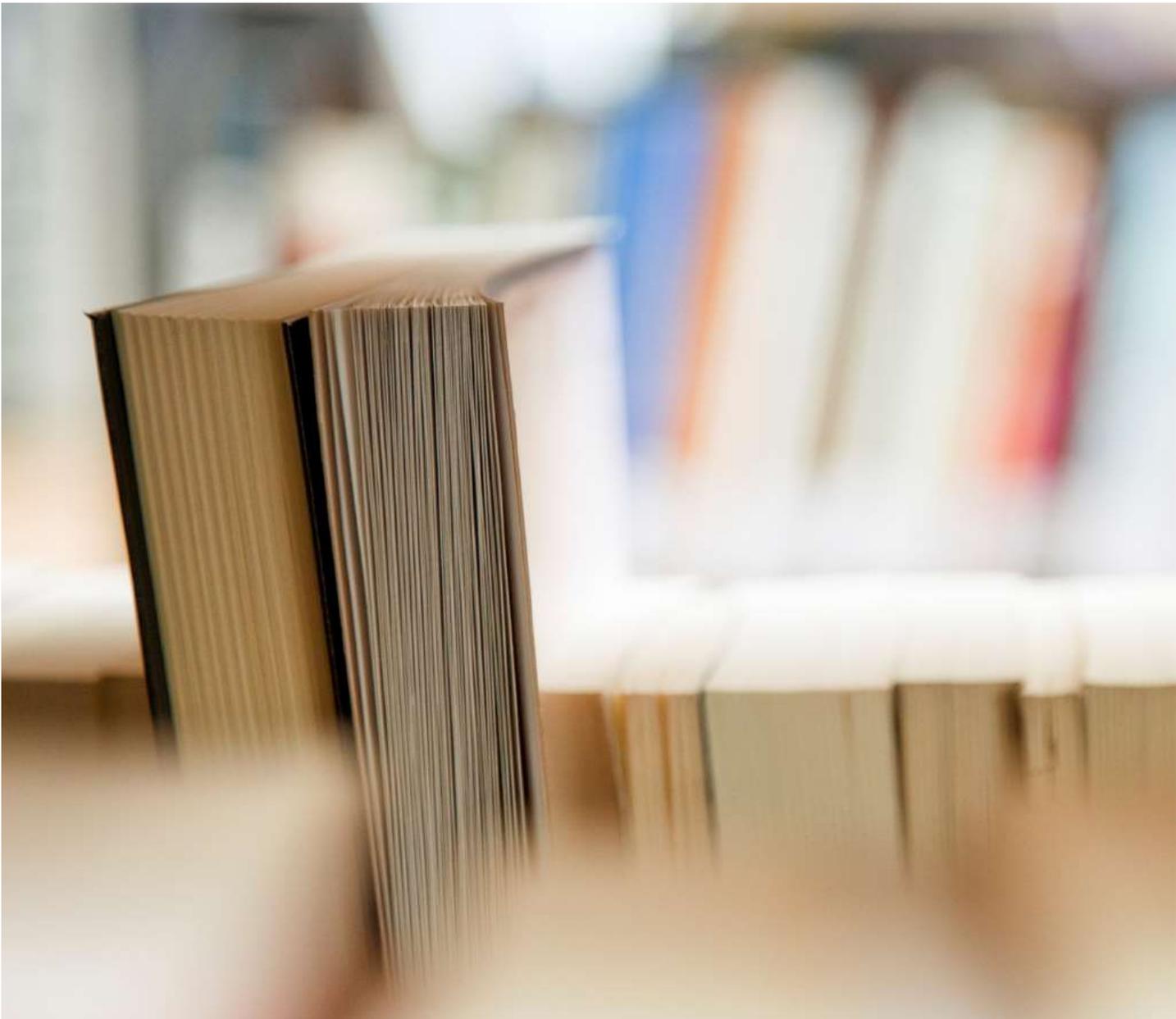
BCBSVT's minimum surplus level of 590% HRBC ratio is predicated on management's risk tolerance of a 10% chance of dropping below a HRBC ratio of 375% over a five-year time horizon. A more conservative or more aggressive risk tolerance would require a different minimum surplus level. The minimum surplus level (percent of ACL required) is shown in Table 15 below for a range of risk tolerances. For completeness, scenarios where the HRBC ratio would increase are also included. Required surplus levels are not shown for risk tolerances at or above 50% as it would be imprudent to target a profitability higher than 50% of remaining or dropping below the 375% level.

Table 15 - Loss Probability Distribution							
5 Year Loss Probability	Stochastic and Deterministic Loss				375% of ACL	Required Surplus	Percent of ACL Required
	100% of ACL	Stochastic	Deterministic	Total			
1%	\$22,842,640	\$53,034,641	\$28,556,825	\$81,591,466	\$85,659,898	\$167,251,364	730%
2%	\$22,842,640	\$44,753,546	\$28,556,825	\$73,310,370	\$85,659,898	\$158,970,269	695%
3%	\$22,842,640	\$39,511,888	\$28,556,825	\$68,068,713	\$85,659,898	\$153,728,611	675%
4%	\$22,842,640	\$36,510,803	\$28,556,825	\$65,067,628	\$85,659,898	\$150,727,526	660%
5%	\$22,842,640	\$35,196,153	\$28,556,825	\$63,752,978	\$85,659,898	\$149,412,876	655%
10%	\$22,842,640	\$27,247,865	\$22,249,423	\$49,497,288	\$85,659,898	\$135,157,186	590%
20%	\$22,842,640	\$14,614,506	\$14,611,653	\$29,226,159	\$85,659,898	\$114,886,057	505%
30%	\$22,842,640	\$7,230,658	\$9,104,283	\$16,334,942	\$85,659,898	\$101,994,840	445%
40%	\$22,842,640	\$1,574,933	\$4,398,439	\$5,973,372	\$85,659,898	\$91,633,270	400%
50%	\$22,842,640	(\$4,688,307)	\$0	(\$4,688,307)	\$85,659,898		
60%	\$22,842,640	(\$10,941,698)	\$0	(\$10,941,698)	\$85,659,898		
70%	\$22,842,640	(\$18,129,568)	\$0	(\$18,129,568)	\$85,659,898		
80%	\$22,842,640	(\$25,004,165)	\$0	(\$25,004,165)	\$85,659,898		
90%	\$22,842,640	(\$35,548,730)	\$0	(\$35,548,730)	\$85,659,898		
95%	\$22,842,640	(\$43,146,677)	\$0	(\$43,146,677)	\$85,659,898		
96%	\$22,842,640	(\$46,036,656)	\$0	(\$46,036,656)	\$85,659,898		
97%	\$22,842,640	(\$47,806,744)	\$0	(\$47,806,744)	\$85,659,898		
98%	\$22,842,640	(\$53,613,731)	\$0	(\$53,613,731)	\$85,659,898		
99%	\$22,842,640	(\$58,594,937)	\$0	(\$58,594,937)	\$85,659,898		

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Blue Cross and Blue Shield of Vermont

Optimal Surplus Range Recommendation

Axene Health Partners, LLC

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September 27, 2018

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Section 1: Executive Summary

Introduction

At the request of Paul Schultz, Chief Actuary, Blue Cross and Blue Shield of Vermont (BCBSVT), Axene Health Partners, LLC (AHP) has performed an analysis to recommend an optimal range of appropriate surplus (alternatively 'capital' or 'capital and surplus') for the organization. The purpose of this report is to document AHP's development and the resulting optimal surplus range that AHP believes should be established by BCBSVT.

Adequate capitalization is crucial for the sustainability and operating ability of insurance organizations. As organizations who are primarily in the business of accepting risk, insurance companies require a sufficient level of surplus funds to assure that obligations to consumers can be met and that such organizations have the financial strength to withstand volatility and fluctuation in a competitive market environment. As each insurance company is unique, determination of an optimal surplus range is specific to the unique circumstances of each organization. AHP's conclusions in this report are limited to determining an optimal surplus range for BCBSVT and are not necessarily representative of AHP's opinions regarding other entities.

This report is intended to communicate to BCBSVT the development of an optimal surplus range. It should not be used or relied upon for any other purposes. As recommendations were developed from stochastic modeling of a large population, subsequent runs of the same model would produce varying but not materially different results.

AHP understands that BCBSVT may desire to share this report with appropriate regulatory authorities. This is permissible only with expressed written permission and if the report is shared in its entirety. AHP does not intend to benefit third parties and assumes no duty or liability to other parties who receive this report. AHP recommends that such third parties not utilize or attempt to digest the content of this report without the aid of a credentialed health actuary or other qualified professional who fully understands the required assumptions and necessary limitations inherent in such an analysis.

Description of Scope of Work

The scope of work for this assignment as outlined in AHP's December 11, 2017 proposal is:

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- Review corporate history and financial management indicators
- Interview management regarding questions/clarifications
- Build member specific corporate model of business
- Develop appropriate deterministic and stochastic inputs to model risk
- Utilize claims probability distributions to model variances contributing to underwriting/pricing risk
- Model the risk for the various categories using simulation techniques
- Perform Monte Carlo modeling adjusted to reflect distribution of lines of business over appropriate time horizon
- Determine aggregate risk for the enterprise (inclusive of subsidiary TVHP) and optimal surplus range

AHP has completed the requested analysis and this report presents the development, results and recommendations. AHP applauds both BCBSVT's mission of providing affordable quality health care coverage to the residents of Vermont and the company's initiative to optimize surplus levels with the aim of providing the best premium value and assurance of financial security to its customers. Any questions regarding this report should be directed to Gregory G. Fann at 951 239 3022 or greg.fann@axenehp.com.

Key Findings and Observations

The key findings and observations from this analysis are:

- As a localized non-profit plan in a small market, BCBSVT is faced with unique challenges and has fewer opportunities than its competitors to raise capital. BCBSVT is also somewhat at a disadvantage in terms of not being able to spread the cost of technological advances across a large scale.
- BCBSVT operates in a more challenging than average regulatory environment. This increases the probability that BCBSVT may have inadequate premium rates even when claim levels are accurately projected.
- BCBSVT has developed strong traditional actuarial capabilities to effectively manage its business. Projections of IBNR, trend, etc. appropriately inform BCBSVT's pricing decisions.

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- BCBSVT's efficiency is reasonably comparable to its current competitors in terms of contracting with providers and care management. BCBSVT is not on the leading edge of structuring arrangements that shift risk to providers, but the company is relatively well-positioned as the market is not very mature in this regard. BCBSVT's risk of being competitively disadvantaged in the care management realm is mitigated by the regulatory environment in Vermont limiting aggressive care management practices.
- Risk levels vary significantly by line of business. If a riskier line of business has a higher growth rate than other lines of business, a company's surplus will need to grow at a faster rate. It is generally common for insurers to have varying contribution to surplus requirements determined by individual line of business risk levels. BCBSVT applies the same contribution to surplus across all of its fully insured business. Accordingly, BCBSVT's contribution to surplus does not adjust its surplus requirements as the mix of business changes. BCBSVT allocates overhead expenses based on contribution to surplus requirements; this process dampens the risk associated with having a flat contribution to surplus requirement across lines of business with varying risk levels.
- Based upon AHP's analysis, BCBSVT should target an optimal Health Risk-Based Capital range of 590% to 745% of the Authorized Control Level (ACL) to provide an appropriate level of protection and have efficient use for its surplus.
- The public interest is well served by BCBSVT continuously monitoring its surplus level and maintaining surplus levels within an optimal range.

These findings and observations are described in more detail in the rest of this report.

Section 2 provides organizational backgrounds and the requirements for determining adequate capitalization levels.

Section 3 summarizes the key risk items that were considered in this analysis.

Section 4 presents the stochastic modeling approach.

Section 5 presents the model development and results.

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Section 6 provides concluding remarks.

An Appendix to this report illustrates surplus levels under alternate risk tolerances.

AHP appreciates the valuable insights provided by Paul Schultz and the BCBSVT team. This assistance allowed AHP's consultants to better understand BCBSVT's business model and provided tremendous value in facilitating completion of this analysis and report.

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Section 2: Background

Blue Cross and Blue Shield of Vermont

BCBSVT was founded in 1944 as part of Blue Cross and Blue Shield of Vermont and New Hampshire. The Vermont plan separated from New Hampshire in 1981. BCBSVT is incorporated as a not-for-profit hospital/medical service corporation. BCBSVT is a licensee of the Blue Cross Blue Shield Association (BCBSA or the Association) and holds the Blue Cross® and Blue Shield® (collectively 'BLUE') trademarks for the geographic territory which comprises the State of Vermont.

Operating as a regional not-for-profit company, BCBSVT provides fully insured and self-insured health benefits to residents of Vermont. BCBSVT offers both group and individual policies. BCBSVT's primary competitors are MVP Health Care (MVP) and Cigna Healthcare. MVP primarily competes with BCBSVT in the individual and small group markets. Cigna Healthcare has a larger presence in the self-insured market.

BCBSVT has several subsidiary companies, notably The Vermont Health Plan (TVHP) which is licensed to offer the company's health maintenance organization (HMO) products.

In addition to commonplace insurance regulation administered by the Vermont Department of Financial Regulation, BCBSVT is also subject to oversight by the Green Mountain Care Board (GMCB), which regulates hospital budgets and premium rates for health insurance in Vermont.

Blue Cross Blue Shield Association

The BCBSA owns and manages the BLUE trademarks; while used internationally in 170 countries, the trademarks are primarily associated domestically with licensure granted to independent companies offering health insurance and employee health benefits in exclusive geographic territories. The association of thirty-six independent and locally operated Blue Cross Blue Shield companies provides health insurance to over 100 million people in the United States. BCBSVT owns the license for the state of Vermont. This allows BCBSVT, and only BCBSVT, to use the BLUE brands to conduct business in Vermont.

Each licensee has formal requirements that it must meet to maintain good standing within the Association. This includes submission of quarterly financial reports and semi-annual Health Risk-Based Capital (HRBC) reports to the

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Association. The Association uses these reports to assess and monitor the financial condition of its member companies. The Association relies on many metrics that can be tabulated from these reports in its analysis. The most notable measure from the HRBC reports is each licensee's HRBC ratio, which is a comparison of a plan's actual capital level (aka Total Adjusted Capital) divided by a calculated benchmark known as the Authorized Control Level (ACL).

Each licensee must maintain HRBC ratios greater than 200% to retain licensure of the BLUE trademarks. The 200% ratio is intentionally set at the highest of four threshold levels in the National Association of Commissioners' (NAIC) Risk-Based Capital Model Act. Maintenance of a higher minimum level of capital helps BCBSA licensed companies communicate a higher level of brand integrity and financial strength to stakeholders.

While the BCBSA regards a 200% HRBC ratio as an unacceptable level, it also begins formally monitoring BCBSA licensed companies whose HRBC ratio falls below 375% as an early warning mechanism and facilitation of a process to establish corrective measures.

Health Risk-Based Capital

The business of insurance involves a collection of various risks. Insurance companies are particularly vulnerable to risks that not only take time to recognize, but require more time to respond and implement corrections. As sustained periods of adverse conditions can cause significant losses, insurance companies need surplus levels to withstand difficult times, protect consumers and ultimately prevent corporate insolvency.

As insurance regulation is primarily intended to prevent insolvency, various standards have been developed as required minimum surplus levels. There are several methods to determine and measure target surplus. An early method was simply a fixed dollar surplus requirement. As this standard doesn't appropriately adjust to an insurance company's size, it was replaced in many jurisdictions by a ratio of surplus to annual revenue. A consideration of "surplus as a percentage of revenue" is commonly known as SAPOR and offers a transparent calculation with surplus requirements varying by insurer size. Unfortunately, the SAPOR statistic is overly simplistic and doesn't consider an individual insurer's risk profile.

Insurance company insolvencies in the late 1980s and early 1990s led the NAIC to establish a working group to consider a more rigorous calculation reflecting the inherent risk of an insurer's business to determine a minimum capital level;

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specifically, companies with greater risks should be expected to hold higher amounts of capital. The group studied companies that had failed or exhibited weak financial condition to better understand indicators of potential financial trouble. The resulting Risk-Based Capital (RBC) construct was developed to be an early warning system for insurance regulators and to require a provision of capital adequacy determined formulaically by insurer risk levels. RBC is more refined than earlier assessments of capital adequacy, which were purely based on fixed amounts or simple comparisons of surplus levels to annual premiums. RBC takes into account not only an insurer's size, but also its growth rate and various risk exposures.

Broadly, risk-based capital represents any method that bases a company's minimum capital level on risk exposures of the company. However, the common usage of RBC is quite specific; RBC usually refers to the formula-driven generic methods developed by the NAIC to measure the minimum amount of capital that an insurance company needs to support its overall business operations. In this report, RBC and HRBC represent the common specific usage referencing the NAIC formulas.

The NAIC standard RBC methodology provides a formulaic calculation of a reference value. Multiples of the reference value are used to establish standards for external monitoring and intervention by regulatory authorities. As results are tracked and reported, the process leads to RBC being a conveniently used internally tracking measure as well. As discussed in this report, generic RBC models provide early warning indicators of financial challenges but do not provide a comparative indication of capital adequacy of well-performing companies. Accordingly, developing an appropriate RBC range as a company target is highly dependent on unique internal and external factors.

Health insurance was a bit of an afterthought in the initial RBC models. The NAIC initially adopted different formulas for life insurers and property & casualty (P&C) insurers; depending on organizational structure and mix of business, health insurers were differentially categorized with life or P&C insurers. As both life and P&C insurers are more subject to long-term risks and asset/investment risks (distinct from the primary health insurance risk of "underwriting"), a new model specific to health insurance, Health Risk-Based Capital (HRBC), was adopted in 1998.

HRBC Uses and Limitations

Health insurance companies require surplus for many reasons, including support

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for the companies' reserves, protection from adverse events, and funding of future capital investments and growth. HRBC (and other RBC models) provides a measure for a minimum regulatory capital standard, but that measure is not the full amount of capital/surplus that an insurer needs to hold to meet its objectives and maintain an appropriate level of risk exposure. It should be noted that the RBC formulas were developed utilizing experience of poorly performing companies to identify weak insurers and alert both insurers and regulators of potential trouble, not as a metric to rank the financial adequacy of well-capitalized insurers. In addition, HRBC is not designed to be used as a stand-alone tool in determining financial solvency of an insurance company; rather, it is one of the tools that acts as an early warning indicator of financial distress.

The HRBC calculation does not offer an opinion regarding an ideal or an excessive surplus level. Given that each health care insurer faces its own unique set of risks, challenges, and goals, such measures are difficult to objectively calculate. Despite this, regulatory considerations around maximum HRBC ratio surplus levels have been a discussion topic since the measure was adopted.

In 2005, the Commonwealth of Pennsylvania became concerned with the level of surplus retained by large health care insurers. In response, the commonwealth's Department of Insurance developed an analysis of the reserve and surplus applications for the four not-for-profit Blue Cross Blue Shield health-insurance plans in the commonwealth and prescribed appropriate surplus ranges. Notably, the commonwealth recognized a need for higher HRBC ratios for smaller insurers, which are subject to greater volatility risks. For Highmark Blue Cross & Blue Shield and Independence Blue Cross, the established HRBC ratio range was 550 to 750 percent. For the other two carriers—Blue Cross of Northeastern Pennsylvania and Capital Blue Cross of Harrisburg—the established HRBC ratio range was 750 to 950 percent.

The HRBC ratio is a retrospective calculation based upon historical enrollment, premiums, and other measures. It does not appropriately capture changing dynamics in the marketplace, such as existing business becoming subject to new market rules or minimum loss ratio requirements.

Axene Health Partners, LLC

AHP is a trusted and well-respected actuarial consulting firm focused at the intersection of actuarial science, analytical capacity, and appropriate medical care. AHP serves clients throughout the United States including Alaska and Hawaii. Established in 2003, AHP has served more than 400 individual clients,

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primarily health plans, health systems and medical groups. In 2017, AHP completed a strategic merger with technology firm Dynamic Vision, Inc., expanding its use of highly specialized systems engineering and information technology experience to enhance client service capabilities. The multi-disciplinary consulting team includes actuaries, physicians and information technology professionals.

AHP has extensive experience in completing health care analytics for all aspects of the healthcare system. In addition to traditional actuarial modeling, AHP develops innovative solutions on behalf of both payers and providers related to the development, implementation, and evaluation of alternate payment methodologies with a focus on efficient, high quality medical care.

AHP has performed multiple HRBC and Own Risk and Solvency (ORSA) assessments for organizations of various sizes and for-profit status. Each corporation is inherently different, and AHP recognizes that capital needs are determined by each insurer's unique circumstances, business requirements, and management objectives.

BCBSVT HRBC Policy

While BCBSVT does not have an explicit HRBC policy, the company has long endeavored to promote an efficient, affordable premium structure while maintaining an appropriate surplus level necessary to ensure the solvency and financial strength of the company.

BCBSVT engaged an actuarial firm to prepare a detailed study on an appropriate surplus level in 2003. At the time, the company was below the 375% HRBC threshold and in monitoring status by the BCBSA. The actuarial firm concluded that an optimal surplus range for the company would be a ratio in the range of 728% – 1019%. This roughly equated to a surplus as a percentage of annual statutory revenue (SAPOR) statistic of 25% – 35% of its annual statutory basis premium revenue, a simpler calculation and a more transparent statistic. It was noted that BCBSVT was among the smallest BCBSA-licensed companies and subject to greater volatility and a higher degree of risk.

BCBSVT shared the actuarial firm's report with the Vermont Department of Banking, Insurance, Securities and Health Care Administration (BISHCA). In June of 2006, the Commissioner of BISHCA issued an order that BCBSVT's surplus could not exceed 25% of SAPOR, the minimum of the range developed in 2003. While the SAPOR calculation has a linear relationship to revenue, the HRBC calculation

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is more rigorous and is not linear. Over time, 25% of SAPOR equated to a lower level of HRBC, below the minimum of the recommended optimal range. BCBSVT managed its business under the SAPOR plan requirements for several years.

In 2009, BCBSVT decided to re-examine its target surplus range utilizing internal resources. Noting that HRBC ratios generally remained in the 500-700% range, BCBSVT endeavored to examine whether that range was appropriate. BCBSVT concluded that a HRBC range of 500% – 700% would be adequate to provide solvency protection. This internal target HRBC range was communicated to regulators. In July of 2011, the SAPOR limits were removed by the Commissioner of BISHCA, with a determination that the HRBC ratio rather than SAPOR would be used in measuring the optimal capital adequacy of BCBSVT.

BCBSVT has continued to target a HRBC range of 500% – 700%, but notable internal and external environmental occurrences have motivated the company to re-examine the optimal HRBC range. Changes in health insurance regulation at the state and federal levels have elevated the need for an extensive review. In particular, the concentration of pricing risk for all individual and small group business into a single annual rate filing inflates Vermont companies' surplus loss exposure and lengthens the time of corrective response. In late 2016 and early 2017, BCBSVT conducted another analysis to review the adequacy of its target RBC range. Five scenarios were developed with only the most severe scenario producing a result close to the BCBSA monitoring level. In late 2017, BCBSVT determined that the current internal and external environment warranted an independent reexamination of its optimal surplus range. AHP was engaged to perform this analysis on January 11, 2018. This report presents the results of that analysis.

The Public Interest

It should be stressed that BCBSVT maintaining a strong capital level is of beneficial interest to all stakeholders in Vermont. As BCBSVT is a local non-profit company, it lacks the capital raising ability of large national care companies. The difficulty of BCBSVT recovering from a diminished surplus level should not be underappreciated.

In ordinary circumstances, surplus requirements generally increase with growth in enrollment and health care expenditures. A continuous contribution to surplus is required to maintain a constant HRBC ratio. A diminished surplus level would require BCBSVT to develop premium rates with higher and potentially uncompetitive targeted contribution to surplus levels. Premium rates that are

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developed with higher contribution to surplus requirements (for surplus recovery purposes) may also be subject to regulatory challenges.

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Section 3: Summary of Key Risk Items

Introduction

AHP reviewed and assessed a range of key risk items that may impact BCBSVT's financial condition. The assessment of each item was modeled using proprietary, multivariate Monte Carlo methodologies or deterministically developed based on comparative risk assessments utilizing AHP's industry benchmarks.

Claims Fluctuation

AHP delineated BCBSVT's lines of business based on risk associated with premium adequacy and claim prediction accuracy. This process is discussed in detail in Section 4.

Trend Estimates

AHP reviewed limited actual/expected trend results from publicly available rate filings. BCBSVT's experience confirms comments from BCBSVT's management that well-established trend processes are fairly accurate. AHP's stochastic modeling simulates annual trend fluctuations simultaneously with claims fluctuation. Trend experience is modeled using a stochastic process that symmetrically allows trend variances (actual minus expected) around a mean of zero.

Reserving Process and Accuracy

AHP discussed BCBSVT's reserving process with its certifying actuary Paul Schultz. It was confirmed that reserve estimates are calculated with the benefit of one month of paid runout and that an explicit provision for adverse deviation of 15% is usually held in the year-end reserve estimate.

AHP also reviewed BCBSVT's reserve estimates and associated restatements. BCBSVT has a history of establishing accurate projections with conservative provisions for adverse deviations. BCBSVT also processes and pays claims on a consistently rapid basis. These practices contribute to BCBSVT having minimal risk with respect to misstatements of Incurred but Not Reported (IBNR) claims. Furthermore, BCBSVT has additional claims runout available in the pricing process and has very little risk of material IBNR inaccuracy adversely impacting BCBSVT's developed premium rates.

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BCBSVT's practice of retaining an explicit provision for adverse deviation in its reserve calculations is prudent, expected by financial regulators, and such provision for adverse deviation is required to be considered in Actuarial Standard of Practice #5. As HRBC calculations are based on results in Statutory Financial Statements, the best estimate surplus level may be higher than what is reflected in the HRBC calculation. While AHP did not perform a rigorous review of paid claims history to determine an appropriate level of provisions for adverse deviations, AHP consultants believe that BCBSVT could potentially lower its explicit level of provisions for adverse deviations, which would result in both a higher surplus level and higher HRBC ratio.

Based on BCBSVT's claims payment pattern, reserving practices and pricing methodology, the company is subject to minimal risk of surplus deterioration due to IBNR estimate inaccuracy. Accordingly, no additional risk factor was included in AHP's model due to BCBSVT's reserving process.

Care Management Effectiveness

Care Management Effectiveness™ (CME) is a measure developed and used by AHP to describe the effectiveness of a health care entity's care management processes. CME is an important variable to consider when establishing surplus targets since it potentially helps to identify the potential for competitive threats in the marketplace. For example, a lower CME level might signal a higher than expected opportunity for a competitor to enter the market and create market chaos, additional selection bias, etc. In this situation, AHP's proprietary modeling would calculate an appropriately higher surplus requirement. A higher CME level provides the opportunity for the health plan to maintain highly competitive rates and reduce the competitive threat.

AHP conducted an abbreviated analysis of BCBSVT's CME based upon a few key utilization metrics from each of its lines of business. AHP focused on inpatient days/1,000, ER Utilization/1,000, office visits/1,000, and scripts/1,000. Typically, such an assessment is much more intense and reviews both similar metrics as described above (more of a statistical or data analysis) in addition to a clinical review of actual care management practices and measured outcomes. For this analysis, the abbreviated and less intense review provides adequate information for determining an optimal surplus level.

Based on a review of BCBSVT's utilization statistics and assembled analytical reports, AHP noted opportunities for improved measures but did not include an additional risk factor to account for BCBSVT's reported utilization levels.

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Corporate Structure

As a not-for-profit company, BCBSVT lacks the ability to raise capital from financial markets. BCBSVT also operates in a small, limited geographic territory and lacks the scope and scale of large, national carriers. BCBSVT is also not able to diversify its risk portfolio over a large geographic area. The size limitation also requires BCBSVT to enhance its technological capacity with administrative expenses (both initial investments and ongoing activities) spread over a smaller population. Because of its relatively small scale of operations and its geographic concentration, BCBSVT has less opportunity to spread fixed investments as effectively as large carriers, requiring relatively higher capital levels. AHP included a risk factor to account for BCBSVT's corporate structure.

Regulatory Environment

The regulatory environment is generally more challenging in Vermont than many other states. Market rating rules are more restrictive and allow less use of actuarially-based factors. Vermont is one of two states that does not allow rates to vary by age in the individual and small group markets.

Health insurers in Vermont also face more regulatory challenges in having adequate, actuarially-developed rates approved. The GMCB notes that its rate review enforcement is not “bound solely to a review of the actuarial analysis when deciding whether or not to approve a requested rate change.”¹ This includes a review of “whether a policy or rate is affordable, promotes quality care, promotes access to health care, and is not unjust, unfair, inequitable, misleading, or contrary to the laws of this state.”² The GMCB also has the authority to adjust BCBSVT's trend projections, some of which is duly based on its other regulatory function of prescribing hospital budgets. The elevated regulatory challenges in Vermont do not suggest that health insurers cannot fulfill their mission and viably operate, but that an optimal surplus range should appropriately reflect the higher degree of risk present. Accordingly, a higher than average risk factor was included in AHP's model due to BCBSVT's regulatory environment.

Competitive Environment

As Vermont is a small, mostly rural state, health insurers are not subject to a hypercompetitive environment. BCBSVT is marginally tax-disadvantaged relative to its competitors but has a strong reputation and stable presence. AHP does

¹ <http://ratereview.vermont.gov/sites/dfir/files/2016/BCBSVT/008-16rr%20BCBSVT%20Reconsideration.pdf>

² <https://law.justia.com/codes/vermont/2012/title08/chapter107/section4062>

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not believe that the competitive environment in Vermont warrants an additional risk factor.

Provider Reimbursement

BCBSVT believes its provider reimbursement levels are roughly on par with its competitors and better in some markets. AHP believes that this assessment is generally reasonable and BCBSVT has no additional appreciable risk due to its contracts with providers.

Underwriting Policy

AHP reviewed BCBSVT's 'Underwriting Rules Document'. BCBSVT allows "slice business" where employer groups allow their employees to select from multiple insurers. This practice can sometimes invite anti-selection risk. BCBSVT does not believe that this practice is widely used. No risk factors were added due to BCBSVT's underwriting policy.

Risk Appetite

BCBSVT is a financially conservative company. Its non-profit mission is to serve residents of Vermont. The company periodically evaluates additional opportunities to serve more Vermont residents, but does not have a particularly strong appetite to aggressively pursue new lines of business and additional risk. The company does not have access to outside capital and seeks to retain prudent surplus levels to be able to manage a multi-year period of sustained losses.

BCBSVT's management has an average tolerance of its surplus level being subject to risky levels. It is theoretically impossible to have sufficient surplus to prevent falling below a chosen surplus level with 100% certainty. BCBSVT is exposed to similar surplus risks as other insurers, and would have more difficulty than other insurers in rebuilding its surplus from a diminished level. This necessitates a healthy surplus requirement. More aggressive companies with access to outside capital may have a lower optimal surplus range and utilize surplus to aggressively pursue new opportunities.

The selection of an optimal surplus range is ultimately a management decision. AHP's recommendation is based on an understanding of BCBSVT's tolerance of risk and uncertainties in its business environment, the company's expansion and growth goals, and capital investment requirements. BCBSVT's risk appetite is calibrated in AHP's optimal surplus range by reflecting management's risk tolerance as probabilities of falling below the BCBSA thresholds.

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Growth Potential

Each of the RBC models retroactively includes an adjustment for growth risk. AHP reviewed BCBSVT's 2018 enrollment forecast. BCBSVT's forecast and the long-term outlook allow for modest growth that would not significantly expose the company to additional material risk.

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Section 4: Modeling Approach

Introduction

AHP's approach of determining a minimum surplus level includes use of a stochastic modeling process associated with risk tolerances of falling below certain prescribed thresholds. An optimal surplus range is constructed using similar methodology and allowing a combined risk tolerance of falling below the minimum of the range or surplus growth causing the maximum of the range to be exceeded.

Time Horizon

Historically, insurers have generally been subject to an “underwriting cycle” of roughly six years. From the late 1960s to the early 1990s, market-level financial results in the insurance industry demonstrated a regular pattern of alternating periods of underwriting gains and losses. A repeating pattern of six-year cycles with three years of gains followed by three years of losses emerged. The basic theory of the underwriting cycle is that insurers cyclically adjust price levels in light of competing goals of growth and profitability. The common explanation is that as market profitability rises, insurers begin pricing more aggressively to gain market share, and competitors follow suit to protect their own market share. Lower prices ultimately lead to losses, prompting insurers to raise prices again to profitable levels. The entire cycle process lasts about six years, and then the cycle repeats itself.

While there is less notable consistency of a six-year cycle recently relative to prior years, the fundamental timing challenges of health insurance remain. Insurers develop premium rates for policies several years before they know how the underlying claims will materialize. Premium rates are developed months before they take effect, sometimes earlier to allow for a regulatory approval process, and generally guaranteed on an annual basis. After the coverage period expires, it is usually about a year before all claims are paid. As future premiums are predicated on prior claim levels, there is a significant lag time to account for unexpected (either positive or negative) changes in health care costs. Accordingly, required pricing adjustments take time to recognize and implement and periods of sustained gains or losses can last multiple years.

In AHP's review of BCBSVT's history of financial performance, it was noted that sustained losses were realized for a maximum of five years. Either through corrective action or external environmental changes, BCBSVT has been able to return to periods of contributing to surplus after a five-year period. BCBSVT's

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management is in agreement with AHP's approach to utilize a five-year time horizon as a maximum period to model potential reductions in surplus levels. AHP's stochastic modeling was adapted to provide one-year, three-year, and five-year projections for BCBSVT's fully insured business.

Risk Tolerance

As insurance is the business of risk, it would be impractical for an insurance company to obtain and maintain a level of surplus that would result in absolute immunity of financial danger. At the same time, insurance companies should have surplus levels that minimize the possibility of ever falling below minimum levels of necessary capitalization.

For purposes of AHP's modeling, AHP discussed certain surplus thresholds with BCBSVT's management and the level of risk that would be acceptable. AHP and BCBSVT agreed that the logical benchmarks are the same levels prescribed by the BCBSA, 200% and 375% of HRBC. Falling below the "Early Warning" level of 375% of HRBC is an undesirable scenario, but one that may occur on rare occasions when mutually adverse conditions simultaneously occur. The likelihood of falling below the 200% HRBC level, which could be fatal to the company and a danger to the continued health coverage of Vermont residents, should be avoided with very high probability.

AHP's discussions with BCBSVT's management led to mutual agreement that a minimum surplus level would:

1. Allow no greater than a 10% chance of a drop of HRBC ratio below 375% over a five-year time horizon.
2. Allow no greater than a 1% chance of a drop of HRBC ratio below 200% over a five-year time horizon.³

AHP's recommended HRBC minimum is determined by meeting each of these objectives.

Additionally, the optimal surplus range is developed on a one-year time horizon. The surplus range allows a probability around 5% of falling outside of the range from a point in the higher end of the range in any given year.

³ This level of certainty is between Standard and Poor's 'BBB' and 'A' confidence levels.
<http://www.standardandpoors.com/ratings/articles/en/eu/?articleType=PDF&assetID=1245271186733>

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Section 5: Model Development and Results

Introduction

AHP's stochastic process for this analysis was constructed to independently model the risk of BCBSVT's major lines of risk business using proprietary multivariate Monte Carlo simulation methodology. Monte Carlo simulation uses random sampling from a probability distribution to compute the likelihood of various outcomes. The key to such simulation methodologies is the underlying distribution, the population being modeled, and the predictive accuracy of future claim levels.

Data Selection

Before constructing the model to BCBSVT's specifications, AHP analyzed the company's various lines of business as listed on the supplied 2011-2017 *Underwriting Exhibit* spreadsheets. Lines of Business were segmented into three distinct categories:

- Fully Insured (Stochastically Modeled)
- Fully Insured (Other)
- Self-Insured and Lines of Business without Claims Fluctuation Risk

Almost all of BCBSVT's claim fluctuation risk is in the first of the three categories. The various lines of business (2011-2017) were categorized accordingly:

Fully Insured (Stochastically Modeled)

1. Individual
 - a. QHP⁴/Exchange - (2014-2017)
 - b. Non-Group - (2011-2014)
 - c. Safety Net (Non-QHP & Non-GRP) – (2011-2014)
 - d. Catamount Health (Non-QHP)- (2011-2014)
2. Small Group
 - a. QHP/Exchange - (2014-2017)
 - b. Non-QHP, Incl. SN GRP - (2011-2014)
3. Large Group – “BCBS Insured Group” - (2011-2017)
4. TVHP
 - a. Large Group – (2011-2017)
 - b. Small Group (Non-QHP) – 2011-2014

⁴ QHP refers to “Qualified Health Plans” in the merged individual and small group marketplace.

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Fully Insured (Other)

1. Medicare Supplement (BCBSVT)
2. Medicare Supplement (TVHP)
3. Blue MedicareRx
4. HWP

Self-Insured and Lines of Business without Claims Fluctuation Risk

1. BCBS Self-Funded Group
 - a. Cost Plus
 - b. ASO
2. FEP
3. CBA
4. TVHP
5. Host

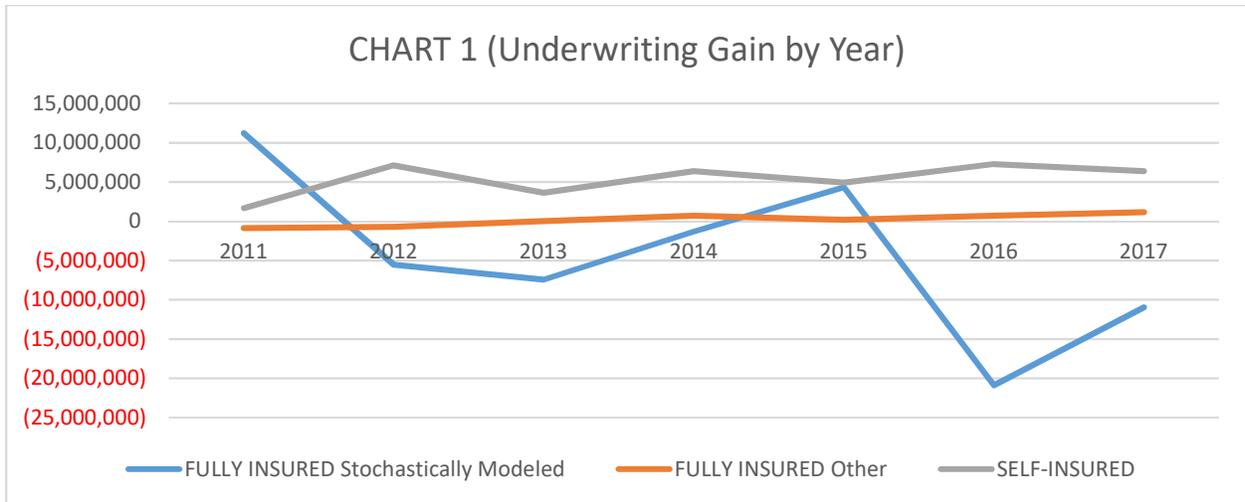
Table 1 illustrates the variability of the three segments by reviewing the Standard Deviation in the Underwriting Gain from 2011-2017. The seven years are also split into two distinct time periods to recognize the different market rules effective in 2014 due to the new Affordable Care Act (ACA) markets and regulations. Notably, the “Stochastically Modeled” segment has larger variability than the Total which suggests that the selection appropriately captures the stochastic risk variability of BCBSVT’s aggregate business.

Standard Deviation of Underwriting Gain	2011-2013	2014-2017	2011-2017
FULLY INSURED (Stochastically Modeled)	10,254,841	11,086,914	10,442,220
FULLY INSURED (Other)	465,701	552,559	834,651
SELF-INSURED and Lines of Business without Claims Fluctuation Risk	2,742,816	1,005,453	2,046,679
Total	8,169,114	10,013,800	8,708,148

Chart 1 also illustrates that stochastic claims risk lies primarily in the lines of business incorporated in AHP’s modeling. Fluctuation is relatively minimal in the Fully Insured (Other) and Self-Insured and Lines of Business without Claims Fluctuation Risk lines of business.

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The key to producing a reasonable projection is running a significant number of simulations so that a broad spectrum of results can be generated. AHP's model was run with 1,000 simulations for each of the various scenarios produced.

Description of Approach

The Monte Carlo simulation begins by calibrating AHP's member-level commercial claims database to the enrollment and cost levels in BCBSVT's lines of business listed in Table 2. BCBSVT enrollment and claim metrics were developed from 2017 Year-End Underwriting results for the four stochastically modeled Fully Insured Lines of Business.

Line of Business	Member Months	Incurred Claims	Average Members	Claim PMPY
Individual	326,581	161,410,806	27,215	\$5,931
Small Group	493,575	213,407,811	41,131	\$5,188
Large Group	164,724	70,083,273	13,727	\$5,106
TVHP (LG)	33,230	16,369,168	2,769	\$5,911

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In addition to the Monte Carlo claims simulation, additional features of the model were applied.

- 1) Claims risk was reduced in the individual and small group markets to reflect the risk-sharing agreement between BCBSVT and OneCare Vermont, an Accountable Care Organization.
- 2) The model accounted for BCBSVT's reinsurance arrangement of ceding 90% of claims above \$800,000 for an individual within a year.
- 3) Simulations were performed for a single year and simultaneously over multiple years.
- 4) Trend fluctuation was modeled independent of the member-level claims simulation. Using a Monte Carlo methodology and a normal distribution, a separate trend fluctuation factor is simulated with each year and for each line of business. As a sensitivity test, AHP developed a range of trend scenarios with three levels of standard deviations: 1.00%, 1.25%, 1.50%. In AHP's experience, trend variance levels generally range from 1.00% to 3.50%. Due to the higher hospital unit cost predictability reflective of the GMCB hospital budgeting process, a narrower modeling range of 1.00% to 1.50% was selected. An actual/expected sampling review of QHP experience from 2015 to 2017 indicated that standard deviation results were near the midpoint of the 1.00% to 1.50% range. Accordingly, a standard deviation assumption of 1.25% was selected as the trend variance to develop the optimal surplus range.

For a two-year simulation, the projection period for a typical rate filing, the model standard deviation converts to a lower annualized result⁵. Table 3 illustrates the relationship between the model standard deviation and annual results.

Table 3 - Trend Variance			
Model Standard Deviation	1.00%	1.25%	1.50%
Annual Results	0.70%	0.88%	1.06%

⁵ The model simulates trend fluctuation each year where the distribution is a random variable (X) that is normally distributed with a mean of 0.00% and standard deviation of 1.25%. A two year simulation yields X₁ and X₂ and the results in (1+X₁)*(1+X₂)-1 are distributed with a mean of 0.00% and a standard deviation of 1.77% [Sqrt(2*1.25%^2+1.25%^4)]. On an annualized basis, this distribution equates a standard deviation of 0.88% [Sqrt(1+1.77%)-1] compared to the sampling result of 0.85%.

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- 5) The model includes a scalable auto-correlation factor for multi-year simulations, reflecting dependence between expected surplus losses in successive years within each line of business. An input of a factor ranging from 0% to 100% is allowed to reflect the degree of auto-correlation. A 0% input implies no auto-correlation (100% regression to the mean) while 100% implies full auto-correlation. A 62.5% auto-correlation factor was selected as appropriate for a five-year study of simulating a two to four-year period to recognize changes to claim patterns, receive regulatory approval, and implement rate corrections. A 50% auto-correlation estimate is typically reasonable for a five-year scenario; a challenging regulatory environment generally lengthens the correction period and suggests need for a higher factor.

The stochastic process also accepts deterministic variables to be incorporated in the model. Risks that are not stochastic in nature (e.g. corporate structure) are appropriately reflected here and included in the model results.

After each of the inputs is selected, the model simulates annual claim costs for each member across all selected lines of business and selected years, and then calculates the surplus impact, taking into account BCBSVT's 1.5% projected contribution to surplus.

This simulation process is repeated 1,000 times, and the total claims level of each of the 1,000 processes is ranked from highest losses to highest gains to form a normal distribution of possible gains/losses. The 100th worst case scenario of the 1,000 simulations represents the 10th percentile and provides the surplus loss associated with a 10% probability.

Summary of Results

AHP then developed an optimal surplus range by assigning BCBSVT's risk tolerances to the simulated results. Table 4 displays the results of the three trend scenarios. In the middle scenario, the results suggest that BCBSVT has a 10% probability of falling below 375% of ACL in a 5-year period with a starting surplus of 590% of ACL. The middle scenario results also illustrate that the second test (no more than 1% probability of falling below 200% of ACL) is met as the probability of falling below 200% of ACL from 590% of ACL is 0.6%.

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Table 4			
<i>Trend Variance (Standard Deviation):</i>	1.00%	1.25%	1.50%
BCBSVT 5-Yr Simulation Results	<u>1</u>	<u>2</u>	<u>3</u>
ACL:	\$22,842,640	\$22,842,640	\$22,842,640
200% ACL:	\$45,685,279	\$45,685,279	\$45,685,279
375% ACL:	\$85,659,898	\$85,659,898	\$85,659,898
Minimum Surplus (10% Probability below 375% of ACL):	\$132,948,967	\$135,157,186	\$136,954,842
Minimum Surplus as % of ACL (rounded to nearest 5%):	580%	590%	600%
Probability of Surplus below 200% of ACL:	0.3%	0.6%	0.6%

The resulting optimal surplus range is developed by constructing a range⁶ to meet BCBSVT's preferred 5% tolerance of maintaining surplus levels within the optimal range. Table 5 displays these results. With a HRBC ratio of 690% of ACL and a high end of the range at 745% of ACL, there is a 4.8% chance of falling outside of the optimal surplus range. AHP's model projects that maintaining a surplus within a HRBC range of 590%-745% provides the appropriate surplus adequacy to meet BCBSVT's risk tolerance levels.

Table 5					
Likelihood of Falling Outside Range after 1 Year					
HRBC Level	Maximum of HRBC Range				
	730%	735%	740%	745%	750%
590%	47.9%	47.9%	47.9%	47.9%	47.9%
600%	40.7%	40.7%	40.7%	40.7%	40.7%
610%	34.2%	34.2%	34.2%	34.2%	34.2%
620%	28.3%	28.3%	28.3%	28.3%	28.3%
630%	23.0%	23.0%	23.0%	23.0%	23.0%
640%	18.3%	18.3%	18.3%	18.3%	18.3%
650%	14.4%	14.3%	14.3%	14.3%	14.3%
660%	11.2%	11.1%	11.0%	10.9%	10.9%
670%	9.2%	8.9%	8.7%	8.6%	8.5%
680%	8.4%	7.5%	7.0%	6.7%	6.5%
690%	8.9%	7.2%	5.7%	4.8%	4.3%
700%	12.8%	8.7%	6.9%	5.2%	3.7%
710%	22.0%	16.9%	11.6%	7.5%	5.7%
720%	37.0%	28.5%	21.8%	16.7%	11.4%
730%	52.1%	45.5%	36.9%	28.4%	21.7%

⁶ The low end of the range is the minimum surplus level.

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Section 6: Conclusion

Health insurance companies require adequate capitalization to maintain operations, achieve their goals in competitive marketplaces, and ensure against insolvency risk. Adequate capitalization is primary to every company's viability and operations. It is required to ensure that promises and commitments to its members to offer financial protection from health care costs can be kept. Adequate capitalization is also needed to support membership growth, introduce new products, build and maintain technology and infrastructure, pursue new opportunities, and operate effectively as market conditions and the regulatory environment change over time.

HRBC provides a mechanism that acts as an early warning indicator to alert companies, regulators, and other stakeholders of financial troubles. The associated HRBC measures were developed based on an analysis of underperforming companies. While the HRBC ratio was designed to measure the danger level of undercapitalized companies, it is not equipped to measure the relative financial strength of well-performing companies. An organization with a HRBC ratio of 150% is in greater trouble than a comparable one with a 200% ratio; it is not necessarily true that a company with a 700% HRBC ratio is in a better capitalized position than a similar organization at 650%.

The HRBC formula is a standard approach that was designed to be formulaic and utilize fixed factors. While superior to prior simplistic capital requirements, it cannot capture each of the nuances and peculiarities of distinct companies.

While not originally intended for this purpose, there have been recent efforts by outside parties to use the HRBC formula to suggest that at some level, a HRBC ratio represents overcapitalization. This has been an effort more focused on nonprofit plans, as for-profit companies have greater access to outside capital, generally desire and require less surplus, have more uses for existing capital, and are subject to return on investment expectations. Some states, notably Pennsylvania, have developed HRBC ranges for certain nonprofit health insurers and have recognized a size distinction that suggests higher HRBC ratios and target ranges are appropriate for smaller health insurers.

Health insurers also have an interest in optimizing capital levels. As each company is unique in a multitude of ways, it is worthwhile to periodically assess an appropriate surplus range. BCBSVT has a history of analyzing optimal surplus

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levels since 2003. In the first full scale review since ACA inception, BCBSVT engaged AHP to conduct this analysis. AHP considered many factors specific to BCBSVT and developed an optimal surplus range based on the information supplied in conjunction with a proprietary stochastic model used to measure claims fluctuation and other risks.

AHP believes that the recommend surplus range is the optimal target range for BCBSVT and that maintenance of surplus levels in this range will provide the appropriate level of financial protection. AHP appreciates the opportunity to provide this report on an important topic that is fundamental to BCBSVT's mission and its ongoing ability to meet the promises and obligations to its customers.

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Appendix

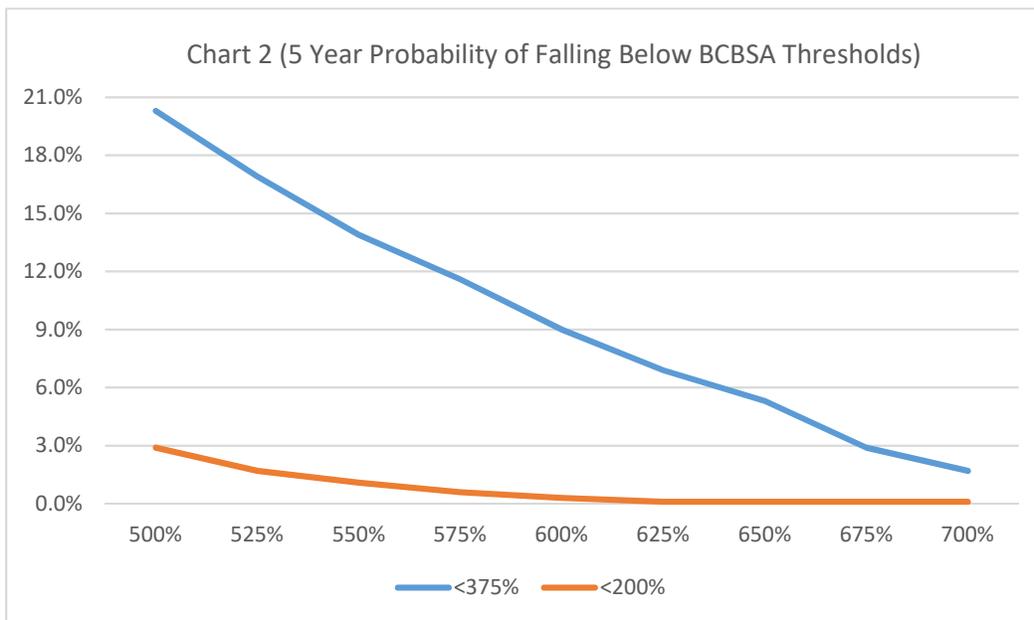
Alternate Risk Tolerances

The optimal surplus range (HRBC ratio of 590%-745%) was constructed based on BCBSVT's average risk tolerance level. In this Appendix, the probabilities of falling below the BCBSA thresholds at other HRBC ratios is explored. All probabilities are expressed as the likelihood of falling below these thresholds in a 5-year period.

A more conservative risk tolerance is requiring a 5% probability (rather than 10%) of falling below a HRBC ratio of 375%. This requirement would result in an appropriate HRBC ratio range of 655%-810%.

BCBSVT's current capital level is within its current HRBC target range of 500%-700%. This more aggressive range results in higher probabilities of falling below the BSBCA thresholds than the optimal surplus range. At a HRBC ratio of 500%, BCBSVT has a 20.3% probability of falling below 375% and a 2.9% probability of falling below 200% within a five-year period.

Chart 2 illustrates the probabilities of falling below the BCBSA thresholds at HRBC ratios between 500% and 700%.



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