SL Advisor 3.0

Stop-Loss Optimization and Decision Support Tool

Risk analysis is part of every decision we make. We are constantly faced with uncertainty, ambiguity, and variability. And even though we have unprecedented access to information, we can't accurately predict the future. Monte Carlo simulation (also known as the Monte Carlo Method) lets you see all the possible outcomes of your decisions and assess the impact of risk, allowing for better decision making under uncertainty.

What is Monte Carlo simulation?

Monte Carlo simulation is a computerized mathematical technique that allows people to account for risk in quantitative analysis and decision making. The technique is used by professionals in such widely disparate fields as finance, project management, energy, manufacturing, engineering, research and development, insurance, oil & gas, transportation, and the environment.

Monte Carlo simulation furnishes the decision-maker with a range of possible outcomes and the probabilities they will occur for any choice of action.. It shows the extreme possibilities—the outcomes of going for broke and for the most conservative decision—along with all possible consequences for middle-of-the-road decisions.

How does Strategic Benefit Resources utilize Monte Carlo simulations to make decisions relating to medical stop-loss insurance?

Strategic Benefit Resources has developed a proprietary stop-loss optimization and decision support tool called SL Advisor 3.0. This tool utilizes Monte Carlo simulation technology and proprietary algorithms to help companies better understand self-funded health plan risk and determine optimal levels of risk retention and risk transfer.

"Stop-loss insurance has always been a challenge for us. While we see the cost of risk transfer premiums from the various insurance companies, we haven't been able to understand the risk we are insuring. SL Advisor helps us to better understand the risk and select the optimal level of risk transfer based on where the stop-loss insurance markets are pricing out risk transfer premiums.

- Chief Financial Officer

SBR Strategic Benefit Resources

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Whether it is Aggregate Stop-Loss (ASL) or Individual Stop-Loss (ISL) insurance, we provide companies with a decision support tool to help select the optimal level of risk transfer based on where the stop-loss insurance markets are pricing risk transfer premium. We also are able to help answer the following questions pertaining to self-funded health plan risk retention and risk transfer:

Individual Stop-Loss Analysis

- Which individual stop-loss deductible level is optimal?
- Should a separate aggregating deductible be used?
- Which contract basis is right?
- How many claimants are expected to have claims in excess of the ISL deductible?
- What are the expected claims in excess of the ISL deductible?
- How does this compare to the markets pricing of risk transfer premiums?

Aggregate Stop-Loss Analysis

- What is the probability of having an aggregate claim?
- Should aggregate stop-loss insurance be purchased?
- What is the probability of claims falling within certain ranges between the expected claims and maximum claims liability under the ASL coverage?

How Monte Carlo Simulation Works

Monte Carlo simulation performs risk analysis by building models of possible results by substituting a range of values—a probability distribution—for any factor that has inherent uncertainty. It then calculates results over and over, each time using a different set of random values from the probability functions. Depending upon the number of uncertainties and the ranges specified for them, a Monte Carlo simulation could involve thousands or tens of thousands of recalculations before it is complete. Monte Carlo simulation produces distributions of possible outcome values.

Sample Input Page

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Inputs

Client Name	ABC Company	Employee Count	341	Plan Annual Maximum	None
Contract Start Date	1/1/2016	Member Count	621	Projected Plan PEPY (Mature)	$6,623
Contract End Date	12/31/2016	# of Simulations	10,000	Aggregate Claim Factor	125%

Run Simulation

		Individual Stop-Loss (ISL)				Aggregate Stop-Loss (ASL)		
Options	**Contract Basis ISL**	**Deductible**	**Quoted Premium (PEPM)** Enter Renewal Premiums Only	**Aggregating Deductible**	**Maximum Reimbursement**	**Aggregate Attachment Point (PEPM)**	**Quoted Premium (PEPM)** Enter Renewal Premiums Only	**Maximum Reimbursement**
Option 1	12/24	$85,000	$90.02	$0	Unlimited	$590.84	$4.21	$1,000,000
Option 2	12/24	$85,000	$77.77	$50,000	Unlimited	$590.84	$4.21	$1,000,000
Option 3	12/24	$100,000	$80.52	$0	Unlimited	$600.48	$4.63	$1,000,000
Option 4	12/24	$100,000	$68.27	$50,000	Unlimited	$600.48	$4.63	$1,000,000
Option 5	12/24	$125,000	$68.69	$0	Unlimited	$616.54	$5.28	$1,000,000
Option 6	12/24	$125,000	$56.44	$50,000	Unlimited	$616.54	$5.28	$1,000,000
Option 7	12/24	$150,000	$58.77	$0	Unlimited	$632.01	$5.91	$1,000,000
Option 8	12/24	$150,000	$46.52	$50,000	Unlimited	$632.01	$5.91	$1,000,000
Option 9								
Option 10								

Sample Output—Individual Stop-Loss (ISL) Insurance Analysis

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Individual Stop-Loss (ISL) Analysis

Client Name	ABC Company	Employee Count	341
Contract Start Date	1/1/2016	Member Count	524
Contract End Date	12/31/2016	Projected Plan PEPY (Mature)	$6,623
Aggregate Claim Factor	125%		

		Without Stop-Loss	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8
			$85,000 12/24	**$85,000 12/24**	**$100,000 12/24**	**$100,000 12/24**	**$125,000 12/24**	**$125,000 12/24**	**$150,000 12/24**	**$150,000 12/24**
Expected Costs	Average Expected Claims (<ISL Specific)	$2,212,686	$1,945,013	$1,989,451	$1,988,185	$2,028,183	$2,033,713	$2,068,165	$2,066,542	$2,095,778
	Median Expected Claims (<ISL Specific)	$2,147,759	$1,936,496	$1,982,636	$1,979,012	$2,020,616	$2,021,924	$2,056,118	$2,052,661	$2,081,948
	ISL Premium	$0	$368,362	$318,235	$329,488	$279,361	$281,079	$230,952	$240,487	$190,360
	ASL Premium	$0	$17,227	$17,227	$18,946	$18,946	$21,606	$21,606	$24,184	$24,184
	Total Expected Costs (Excluding Administration)	$2,147,759	$2,322,085	$2,318,098	$2,327,446	$2,318,922	$2,324,609	$2,308,677	$2,317,332	$2,296,492
Optimal Solution	Probability of Win		0.00%	36.00%	0.00%	3.70%	0.00%	0.00%	0.00%	60.30%
	Probability of Reimbursements > Premium		23%	23%	22%	22%	20%	20%	18%	18%
	Premium (Savings)/Increase		$0	($50,127)	($38,874)	($89,001)	($87,282)	($137,409)	($127,875)	($178,002)
	Expected Claims Above Deductible Level		$0	$46,140	$42,516	$84,120	$85,428	$119,622	$116,165	$145,452
Number of Claims Exceeding Specific Deductible	50th Percentile		3.0	3.0	2.0	2.0	1.0	1.0	1.0	1.0
	Minimum		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	25th Percentile		2.0	2.0	1.0	1.0	1.0	1.0	0.0	0.0
	75th Percentile		4.0	4.0	3.0	3.0	2.0	2.0	2.0	2.0
	Maximum in 10000 trials		12.0	12.0	9.0	9.0	8.0	8.0	7.0	7.0
Total Dollar Amount of Claims Exceeding Specific Deductible & Aggregating Specific Deductible	50th Percentile		$175,458	$125,458	$131,015	$81,015	$83,190	$33,190	$49,848	$0
	Minimum		$0	$0	$0	$0	$0	$0	$0	$0
	25th Percentile		$72,172	$22,172	$40,261	$0	$10,117	$0	$0	$0
	75th Percentile		$353,914	$303,914	$295,561	$245,561	$233,687	$183,687	$182,680	$132,680
	Maximum in 10000 trials		$3,261,797	$3,211,797	$3,186,797	$3,136,797	$3,089,363	$3,039,363	$3,014,363	$2,964,363

Methodology

Strategic Benefit Resources used a Monte Carlo simulation model to project 10000 scenarios of paid claims both in aggregate as well as claims above the specific. The average of those 10000 trials and the min/max and percentiles are shown above. This methodology allows a plan sponsor to see the variance around the mean in analyzing the quotes

The simulation starts with a claim probability distribution that represents annual claims for over 1 million members.

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Aggregate Stop-Loss (ASL) Analysis

Strategic Benefit Resources

Client Name	ABC Company	**Employee Count**	341
Contract Start Date	1/1/2016	**Member Count**	524
Contract End Date	12/31/2016	**Projected Plan PEPY (Mature)**	$6,623
Aggregate Claim Factor	125%		

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8
		$85,000	**$85,000**	**$100,000**	**$100,000**	**$125,000**	**$125,000**	**$150,000**	**$150,000**
Annual Expected Claims (Per Underwriter)		$1,934,174	$1,934,174	$1,965,731	$1,965,731	$2,018,305	$2,018,305	$2,068,948	$2,068,948
Annual Maximum Liability		$2,417,717	$2,417,717	$2,457,164	$2,457,164	$2,522,882	$2,522,882	$2,586,185	$2,586,185
Percentiles (x% of the time claims are less than maximum liability)	10%	$1,635,572	$1,674,097	$1,662,864	$1,693,620	$1,686,255	$1,711,386	$1,701,302	$1,716,928
	25%	$1,773,398	$1,815,062	$1,804,250	$1,841,595	$1,836,870	$1,864,195	$1,856,352	$1,881,091
	50%	$1,936,496	$1,982,636	$1,979,012	$2,020,616	$2,021,924	$2,056,118	$2,052,661	$2,081,948
	75%	$2,105,415	$2,153,406	$2,158,598	$2,205,813	$2,214,368	$2,256,672	$2,256,252	$2,291,593
	90%	$2,262,472	$2,312,328	$2,326,581	$2,373,289	$2,394,525	$2,437,928	$2,446,470	$2,489,267
	100%	$2,417,717	$2,417,717	$2,457,164	$2,457,164	$2,522,882	$2,522,882	$2,586,185	$2,586,185
Aggregate Attachment Point (PEPM)		$590.84	$590.84	$600.48	$600.48	$616.54	$616.54	$632.01	$632.01
Probability of an Aggregate Claim		3.34%	5.09%	4.44%	6.11%	5.04%	6.51%	4.91%	6.09%