

DSC5211C Week 11 Workshop

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Task 1 Risk Neutral

Optimal number of wetsuits to order and corresponding expected profit under different number of scenarios.

No. of Scenarios	Orders	Expected Profit	Expected Sales	Expected Loss of Sales	Expected Leftover	Stockout Probability
100	4090.59	215929.85	2977.42	98.30	1113.17	0.19
200	4048.97	217987.18	2989.67	108.96	1059.30	0.20
1000	4091.27	219833.87	3016.59	120.58	1074.68	0.20
10000	4188.37	222367.67	3061.35	131.30	1127.02	0.20

Task 1

It can be observed that the expected sales, lost sales, and leftover inventory all increase with larger number of scenarios. The stockout probability increases and stay constant with sufficient number of scenarios.

Task 2

Maximizing CVaR under different betas gives the following results.

Beta	Scenario #	Orders	Exp_profit	Exp_sales	Exp_lost_sales	Exp_left over	Stockout_prob	CVaR
0.9	1000	1612.68	124385.13	1566.39	1570.79	46.29	0.92	82725.06
0.99	1000	166.55	13241.81	165.73	2971.45	0.82	0.99	5095.5
0.999	1000	0	0	0	3137.18	0	1	0

From the results above, it can be observed that the higher the beta, the lower the optimal order amount is. In the extreme case, optimal policy is to not order at all. As when beta increases, it is more risk-averse. When risk-aversion level increase, the profits is traded off for reduction in profit variation (risk).

Task 3 - General Model

Results obtained with wider range of betas

Beta	No. of Scenarios	Orders	Exp_profit	Exp_sales	Exp_lost_sales	Exp_leftover	Stockout_prob	CVaR
0	1000	4090.59	219833.87	3016.46	120.72	1074.13	0.2	219833.9
0.25	1000	3460.04	213636.38	2828.37	308.81	631.67	0.4	192580.8
0.5	1000	2815.84	194521.63	2508.39	628.79	307.46	0.6	163775.7
0.75	1000	2184.2	162559.11	2062.43	1074.75	121.77	0.8	126027.5
0.95	1000	1155.39	90369.65	1134.77	2002.4	20.62	0.96	51197.7
0.99999	1000	0	0	0	3137.18	0	1	0

Task 3 - General Model

C. Relationship between CVaR, Worst Case Profit and Expected Profit in the risk-neutral profit.

When $\text{Beta} = 0$, it gives the same result as risk-neutral expected profit.

When $\text{Beta} = 0.99999$, it gives the same result as worst case profit.