Price Optimization

Data Set

Original

Bid no	Units	Unit Price	Win(?)	Units Sold
1	12	16551	1	12
2	24	16272	0	0
3	16	21266	1	16
4	21	18805	0	0
5	27	15884	0	0
6	13	22168	0	0
7	15	15226	1	15
8	27	18850	0	0
9	29	18755	0	0
10	20	22003	0	0
11	11	22064	0	0
12	21	18016	1	21

Expanded

Bid no	Units	Unit Price	Win(?)	Units Sold	Unit Margin	Total Margin	Unit Price/MSRP	Police	Police x P	Size
1	12	16551	1	12	1551	18612	0.66204	1	0.66204	12
2	24	16272	0	0	1272	0	0.65088	1	0.65088	24
3	16	21266	1	16	6266	100256	0.85064	1	0.85064	16
4	21	18805	0	0	3805	0	0.7522	1	0.7522	21
5	27	15884	0	0	884	0	0.63536	1	0.63536	27
6	13	22168	0	0	7168	0	0.88672	1	0.88672	13
7	15	15226	1	15	226	3390	0.60904	1	0.60904	15
8	27	18850	0	0	3850	0	0.754	1	0.754	27
9	29	18755	0	0	3755	0	0.7502	1	0.7502	29
10	20	22003	0	0	7003	0	0.88012	1	0.88012	20
11	11	22064	0	0	7064	0	0.88256	1	0.88256	11
12	21	18016	1	21	3016	63336	0.72064	1	0.72064	21
13	26	15107	0	0	107	0	0.60428	1	0.60428	26

1

Optimal Price: Single price for all bids

Optimal Price

- First, I ran a logistic regression using Win(?) as my dependent variable and bid price as predictive variable
- Then, I estimated price as 0.5 in part two. Calculated Score, Probability of win, profits if win, and expected profits. I used solver to find the price that maximized expected profits.
- I used MSRP and the Price I found to find the optimal price
- I calculated expected profits with new optimal price
- Also calculated percent contribution improvement based on their previous model

MSRP	25,000			
Unit Cost	15,000			
Logitistic Regression				
Model parameters (Variable Win(?)):				
Source	Value	Standard error	Wald Chi-Square	Pr > Chi²
Intercept	7.756	0.351	487.024	<0.0001
Unit Price/MSRP	-9.164	0.452	411.432	<0.0001
1. a = 7.756, b = -9.164				
2. Optimal Price	$20,818.67			
Price	0.83274665	saying 0.83 of 25,000		
Score	0.124813589	Score = intercept + Pr/MSPbeta*price		
Prob of win	0.531162952	Prob = exp(score)/(1+exp(score))		
Profits if I win	$5,819	Profits = price x MSRP - cost		
Expected Profit	$3,090.66	Expected Profits = Prob of win x Profits if I win		
3. Expected Contribution				
Total Expected Profit	$241,083,838.33			
4. Comparison				
Existing Profit	$171,829,002	**% improvement**	40.30%	(new-old)/old

1

Optimal Prices: Police and Corporate Buyers

Let’s start with the first set of slides

New Information:

Selvage and Tobin continue their deliberations with Fjord sales team, they discovered that bids 1 through 2,000 were to various police departments, and that bids 2,001 through 4,000 were to corporate buyers

Optimal Price: Corporate

- I ran a logistic regressions using Win(?) as my dependent variable and bid price as predictive variable for corporate buyers
- I repeated the process from our last model to predict optimal price for corporate buyers

Model parameters (Variable Win(?)):

Source	Value	Standard error	Vald Chi-Squar	Pr > Chi²	Lower bound	Upper bound
Intercept	27.875	4.476	38.788	<0.0001	19.103	36.647
P	-28.812	5.182	30.912	<0.0001	-38.968	-18.655

Corporate Optimal Price	$22,431.46
Price	0.89725824
Score	2.02349544
Prob of win	0.88324196
Profits if I win	7431.45589
Expected Profits	6563.77368
Current Wins	0.984

Optimal Price: Police

- I ran a logistic regressions using Win(?) as my dependent variable and bid price as predictive variable for police buyers
- I repeated the process from our first model to predict optimal price for police buyers

Model parameters (Variable Win(?)):

Source	Value	Standard error	Vald Chi-Squar	Pr > Chi²	Lower bound	Upper bound
Intercept	14.224	0.637	498.199	<0.0001	12.975	15.473
P	-20.010	0.877	520.114	<0.0001	-21.730	-18.291

Police Optimal Price	$17,638.58
Price	0.70554301
Score	0.10608439
Prob of win	0.52649625
Profits if I win	2638.57523
Expected Profits	1389.19997
Current Wins	0.373

Improvements

- I calculated expected profits with new optimal prices
- Also calculated percent contribution improvement based on their previous model and our previous model
- 79% contribution improvement from original model and 28% contribution improvement from our last optimal price

3. Total Expected Contribution		$308,696,775.62
Police	54580277.6	
Corporate	254116498	
4. Improvement in total expected contribution		
Actual improvement	79.65%	
1A improvement	28.05%	

1

Optimal Prices: Different Buyers and Order Size

New Information:

Their discussions with the sales team reveal that order size is an important determinant for the buyers' price sensitivity with buyers ordering larger order fleet sizes being more sensitive to the prices.

Optimal Price

- I ran a logistic regressions using Win(?) as my dependent variable, bid price, Police, Police and Price interaction, and Size as predictive variables
  - Dummy variables for Police
- Using the same procedure, I calculated the optimal price for police and corporate buyers taking size into consideration
- Also calculated percent improvement based on our previous model
- The contribution improvement of the model decreased

Model parameters (Variable Win(?)):

Source	Value	Standard error	Vald Chi-Squar	Pr > Chi²	Lower bound	Upper bound
Intercept	28.887	4.500	41.212	<0.0001	20.068	37.707
P	-29.310	5.203	31.736	<0.0001	-39.507	-19.113
Police	-13.918	4.537	9.409	0.002	-22.811	-5.025
Police:P	9.077	5.275	2.961	0.085	-1.262	19.417
Size	-0.030	0.007	17.870	<0.0001	-0.044	-0.016

2. Optimal Prices					
Police (20 cars)	$17,619.93			**Corporate (20 cars)**	$22,393.61
Price	0.704797185			Price	0.8957446
Score	0.113604967			Score	2.0370864
Prob of win	0.528370735			Prob of win	0.8846363
Profits if I win	2619.929629			Profits if I win	7393.6144
Expected Profits	1384.294145			Expected Profits	6540.6593
Police (40 cars)	$17,258.03			**Corporate (40 cars)**	$21,945.80
Price	0.690321049			Price	0.8778321
Score	-0.189441731			Score	1.9661636
Prob of win	0.452780701			Prob of win	0.8771984
Profits if I win	2258.026215			Profits if I win	6945.8023
Expected Profits	1022.390692			Expected Profits	6092.847
3. Total Expected Contribution	$303,220,524.97	308696775.6	1B	% Improvement	-1.77%
Police	$52,404,942.81				
Corporate	$250,815,582.16				