

SCM 651

Homework 3

Optimizing Product Pricing

Background

The Book Emporium wants to price books to optimize profits. The spreadsheet for this homework has sales data on Harry Potter book 7. For each week, the Book Emporium varied prices on Harry Potter 7 to determine a demand curve. The percent of customers who visited BookEmporium.com and purchased Harry Potter book 7 is shown in the spreadsheet. J.K. Rowling has announced a sequel to the Harry Potter series. Determine the price for the sequel.

Definitions

- Price: what you will charge each customer who purchases the new book
- Book: Cost what you must pay the publisher for each book
- % purchased in your pricing test: the percent of people who bought at that price
- Predicted %: your regression model estimate of the percent sold based on price
- Predicted sales: estimate of number of customers who buy the book from you
- Revenue: total revenue generated (price * predicted sales)
- Profit (price – book cost): * predicted sales

Assumptions

1. Assume that the demand for the book sequel will be similar to Harry Potter 7.
2. Assume that 100,000 customers will consider purchasing a book from you
3. The data is not an entirely accurate prediction of the demand, but a regression on the data using a power model will give a reasonable prediction
4. Assume that you pay the publisher \$5.00 for each book.

Assignment

What's due:

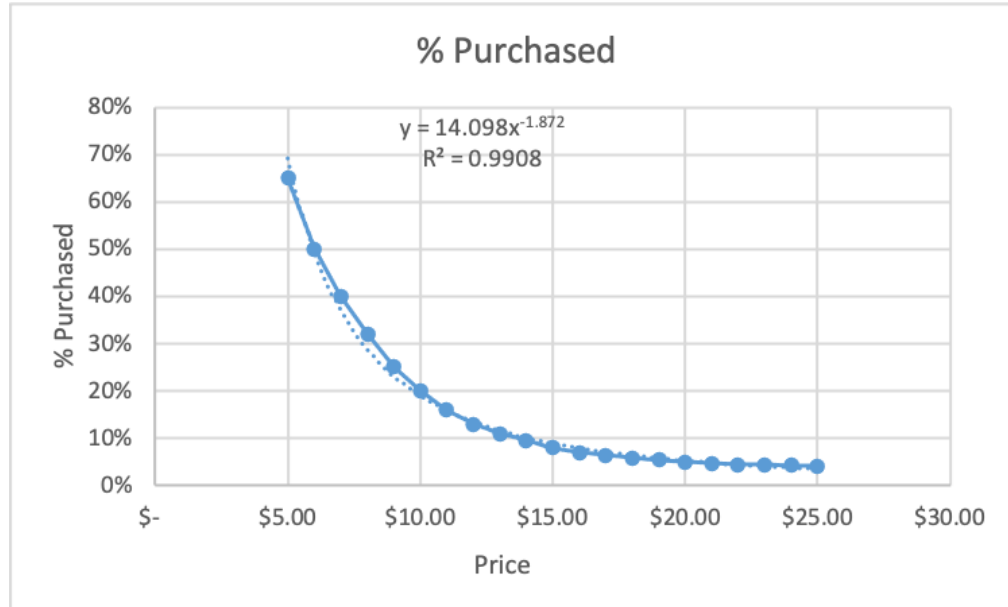
Submit an analysis **before the live class in week 8**. Suggested length is five pages, but should not exceed ten pages, single-spaced, 12-point font. Use Excel to analyze the data and document your results in a Word document.

This is a group assignment; each student should upload a copy of the assignment to the Learning Management System. The paper must be a Microsoft Word document. You should also submit the Excel spreadsheet with the regression and optimization analysis. **Submit both your Word and Excel files.** Name the files HW3_Team# where # is your team number. Be sure to include the names of everyone on the team on the first page of the paper. Late assignments will not be accepted. Failure to follow directions will be penalized.

Outline and grading criteria:

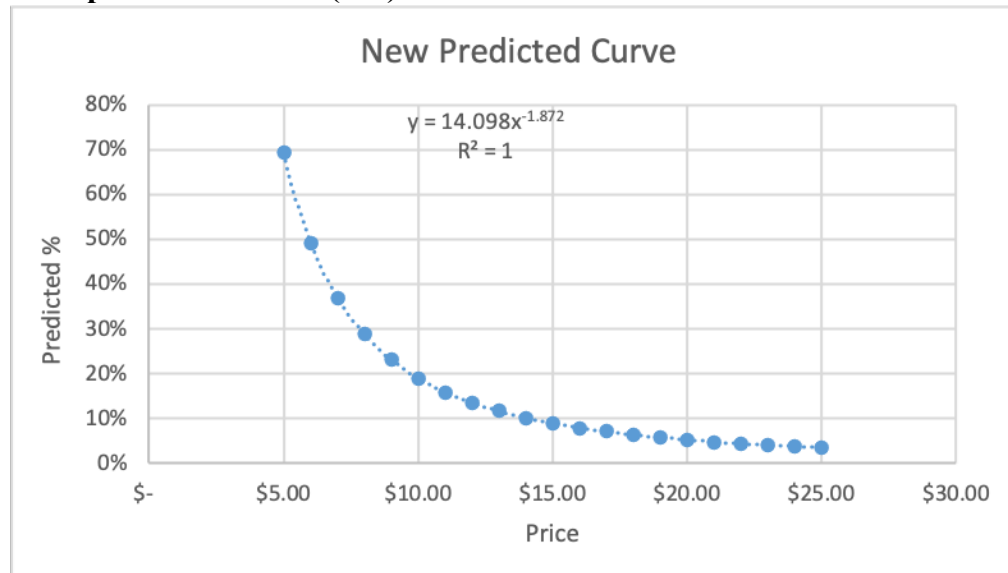
1. Regression analysis (40%)

a. Graph the percent purchased against price (5%)



b. Perform a regression using power regression to determine the predicted % column. See Excel file

i. Graph the new curve (5%)



ii. Estimate the equation of the line (5%)

$$y = 14.098x^{-1.872}$$

iii. What does the R2 mean? (5%)

The R2 in the new curve is 1. This means our model explains all the variability of the response data around its mean.

c. Assuming there are 100,000 customers who visit your website and the publisher cost is \$5.00, estimate the number of books sold (predicted sales column) (5%)

See Excel file

d. Calculate the revenue column (price * predicted sales) (5%)

See Excel file

e. Calculate the profit column ((price – book cost) * predicted sales) (5%)

See Excel file

f. Use conditional formatting to highlight the profit values for all prices (5%)

See Excel file

Price	% Purchased	Predicted %	Predicted Sales	Revenue	Profit
\$ 5.00	65%	69%	69,292	346,462	-
\$ 6.00	50%	49%	49,256	295,535	49,255.91
\$ 7.00	40%	37%	36,909	258,364	73,818.29
\$ 8.00	32%	29%	28,746	229,966	86,237.13
\$ 9.00	25%	23%	23,058	207,519	92,230.70
\$ 10.00	20%	19%	18,930	189,303	94,651.50
\$ 11.00	16%	16%	15,837	174,206	95,021.45
\$ 12.00	13%	13%	13,456	161,477	94,195.09
\$ 13.00	11%	12%	11,584	150,591	92,671.36
\$ 14.00	10%	10%	10,083	141,167	90,750.36
\$ 15.00	8%	9%	8,862	132,925	88,616.52
\$ 16.00	7%	8%	7,853	125,651	86,384.85
\$ 17.00	6%	7%	7,011	119,181	84,127.58
\$ 18.00	6%	6%	6,299	113,386	81,889.97
\$ 19.00	5%	6%	5,693	108,164	79,700.09
\$ 20.00	5%	5%	5,172	103,433	77,574.79
\$ 21.00	5%	5%	4,720	99,125	75,523.65
\$ 22.00	4%	4%	4,327	95,184	73,551.44
\$ 23.00	4%	4%	3,981	91,565	71,659.79
\$ 24.00	4%	4%	3,676	88,229	69,848.27
\$ 25.00	4%	3%	3,406	85,144	68,115.16
Book Cost \$	5.00				

2. Optimization analysis (with constraints) (30%)

H	I	J	K	L
Price	Cost	Pred %	pred Sales	Profit
\$ 10.73	\$ 5.00	17%	16,580	95,067
Price	Cost	Pred %	pred Sales	Profit
\$ 7.82	\$ 4.50	30%	30,000	99,587
Price	Cost	Pred %	pred Sales	Profit
\$ 5.95	\$ 4.00	50%	50,000	97,607

a. Calculate the price point for the highest profit possible

i. The publisher will sell the books to you at \$5.00 each with no minimum order (10%)

\$10.73 price for a profit of \$95,066.94

ii. The publisher has agreed to sell you the books at \$4.50 each if you sell at least 30,000 (10%)

\$7.82 price for a profit of \$99,586.53

iii. The publisher has agreed to sell you the books at \$4.00 each if you sell at least 50,000 (10%)

\$5.95 price for a profit of \$97,606.83

b. Run a constrained optimization for each of the above situations to determine which cost point (from the publisher) and price (to your customer) maximizes your profit. Which cost point should you accept from the publisher?

We should accept the \$4.50 price point from the publisher with the sale price of \$7.82 for each book which has a minimum predicted sale of 30,000 book copies because it gives us the maximum profit (\$99,586.53)

3. Discussion (30%)

a. What are the risks of using Harry Potter 7 data in predicting your new demand curve for the Harry Potter sequel? (15%)

- Customer perception of Harry Potter 7 may alter buying behavior for future book releases. If for instance, customers did not enjoy Harry Potter 7, it may reduce the likelihood that they would buy a sequel. Past buying behavior doesn't necessarily predict future buying behavior.

- Pricing the book too high or too low based on previous book analysis. Missing out on maximum profit as a result.

- Also, a lot of times the book sequels are not as enjoyable for people as the past release. Even though a buyer might have loved Harry Potter 7, the way that the story might be going in the sequel might not be as exciting for the reader to follow. Many of the people also get tired of reading the same story and rather invest their time on new stories.

- Having a clear idea of the economic and social environment as well as targeted customer buying habits.

- It would be helpful to include the historical context of the Harry Potter release to understand the dynamics of marketing campaigns and release at the time.

b. What other data would you like to have to perform your analysis? (15%)

- Marketing campaign data would be useful to get an idea whether marketing for the HP sequel reached more or less people, and to determine how effective the campaigns were. If the publisher beefed up their marketing efforts for the sequel, and we found that these campaigns reached more people, we could adjust our predicted sales figures accordingly.

- Sales figures of the different versions of the same book (editions, paperback vs. hardcover, online vs. in-store, etc.)

- It is also helpful to have sales data on previous Harry Potter book series to see how close the best price could be determined for the Harry Potter 7 depends on the sales data on the previous series. In that case if the previous analysis were successful we could predict the best price for the sequel with more confidence.