

Frameworks for Pricing Pre-case Exercise

15.814 Fall 2018, Due October 12

In the session on pricing we introduced a number of frameworks to help you with pricing. These are:

- Expected Value in Use (EVIU)
- Expected Value to the Channel (EVCh)
- Customer Lifetime Value (CLV)
- Break-even Analysis (B/E)
- Forecasting with Purchase Intention Scales
- Other issues such as cannibalization or subsidies.

For those students comfortable with analytic reasoning and spreadsheets, these methods are relatively simple and easy to implement. For students seeing these concepts for the first time, this pre-case exercise provides practice with the concepts. We plan to rely on these methods in the case discussions for the New York Times Paywall and for Aqualisa. This pre-case exercise seeks to give you simple examples for each of the methods so that you can choose the appropriate methods for the New York Times case and for the Aqualisa case. Both cases require simple marketing analytics to unlock the marketing insight. Without analytics to guide you, the cases have “red herrings” that can be tricky.

We recommend you create a spreadsheet to address the various sections of this pre-case exercise. To save you time, we have pre-filled rows and columns with the data given below. The pre-filled spreadsheet will save you from needing to enter the data. The spreadsheet is available on Canvas: “S11 Pricing Pre-case Exercise Fall 2018.xlsx.” There is a worksheet for the initial questions and another worksheet for the simulated-store test market.

Much of the data for the simulated-store test market comes from a real application for a branded product,¹ although we modified the data slightly to illustrate important issues.

Basic Managerial Challenge

You are the brand manager for an innovative company that has developed Personalized Pie Ovens (PPOs). In an analogy to Keurig K-Cups for coffee, tea, and hot-chocolate (and now soda), the PPOs allow you to produce a single-serve piece of pie. The PPOs use Personalized Pie Kits (PPKs) that your company also sells.

PPOs are the second product line introduced by your company. You are already the primary producer of Personalized Cake Ovens (PCOs) and Personalized Cake Kits (PCKs). You introduced PPOs because pies are becoming popular and are likely to be the “go-to” dessert over the next year or two.

¹ Deighton J (2002). The Brita Products Company. Harvard Business School Case 9-500-024. January.

PPOs are a major investment. You have to invest in factories (and suppliers) for both the ovens and the kits. Although the channel of distribution for PCOs can be used for PPOs, it, too, will require investment and management. Finally, you must make consumers aware of PPOs and get them to try PPOs. You will need to invest in advertising, free samples, and coupons. If the brand does not succeed, these are ephemeral investments for which there is no salvage value.

Expected Value in Use for PPOs

Suppose that PPOs are so innovative that there is not yet a competitor for PPOs. Your initial plan is to charge \$24 for PPOs and \$1 for every PPK. From extensive market research, you know that consumers in your target segment really like pies and would eat pies from two PPKs per week, about 100 per year. For this question, ignore the time value of money to consumers.

EVIU1. What would be the cost to a consumer in your target segment for a year of these flavorful and trendy personalized pies? For now, consider only PPKs and ignore the fixed cost of the PPO.

EVIU2. Your culinary expert informs you that consumers can make pies less expensively than using PPKs. She estimates that the cost of ingredients necessary for a personalized pie (PPK) would be about \$0.40 if the ingredients were bought at retail by the consumer. Consumers in your target market don't eat out much, but do value their time at about \$10 per hour. It takes about one hour to make from-scratch two pies, each of which is equivalent to 4 personalized pies (4 PPKs). What is the effective cost to your target consumer for a year's worth of pies, assuming the target consumer will eat the equivalent of two PPK pies per week for 50 weeks per year?

EVIU3. If the consumer only considers a year's worth of pies when contemplating the purchase of a PPO, what is the EVIU of a PPO? Does it justify to the consumer the \$24 price?

Expected Value to the Channel for PPOs

We'll focus on PPOs for now and assume that PPKs are sold through a different channel. Assume that PPOs are sold in specialized culinary stores, department stores, and appliance stores. These channels have a goal of maximizing the return per square foot of shelf space. They use a simple formula of $(\text{margin} \times \text{turn}) / (\text{shelf space})$, where margin is the margin they earn for each sale, turn is the number of items they sell in a reporting period, and shelf space is the amount of shelf space devoted to a PPO.

EVCh1. You are the innovator in PPOs, so you've chosen packaging that highlights the advantages of personalized pies. This packaging shows people enjoying their pies as well as images of how easy it is to make a personalized pie. Because the packaging communicates so much, it takes up about two square feet of shelf space. You plan on offering a margin to the retailer of about \$4 as part of your marketing plan. For a typical retailer, you estimate that the retailer will sell about 20 PPOs per week. Using the

retailer's formula, how much does a typical retailer make per week per square foot of shelf space devoted to PPOs.

EVCh2. After you are successful, a competitor enters the market. Like most followers, the competitor expands the market slightly, but cannibalizes your sales when the competitor's product and your product are on the same shelf. If the retailer profits substantially more from your competitor's ovens, then the retailer might drop your ovens altogether. The competitor is aggressive and offers the retailer a margin of \$5 and redesigns its packaging so it only takes up 1.5 square feet of shelf space. But the competitor does not have your marketing advantage, so the competitor can only promise the retailer sales of about 15 ovens per week. Using the retailer's formula, how much does a typical retailer make per week per square foot of shelf space devoted to the competitor's PPOs.

EVCh3. Will the retailers switch to the competitors? Assume no switching costs. What margin do you have to offer to the retailer to retain the account? Assume that if the returns per square foot are the same, the retailer will stock your product.

Customer Lifetime Value for PPOs

Not surprisingly, the real money in this market is in selling the PPKs. One of the reasons you decided to price the PPOs at \$24 was the recognition of the revenue stream from PPKs. PPOs cost you \$12 to produce and deliver to the retailer, and you have to give the channel the margin computed above in order for the retailer to carry the PPOs. (The exact number depends on your answer to EVCh3.) PPKs will be sold through supermarkets. The supermarket needs a margin and you have to pay to deliver PPKs to the supermarket. This total marginal cost of that margin and of delivery costs is approximately \$0.50 per PPK. Your cost of materials for a PPK is about the same as the consumer, that is \$0.40 per PPK. (You can purchase the ingredients in bulk and save money there, but you have to pay for packaging – together the ingredients and package cost \$0.40 per PPK).

CLV1. What is your margin on PPOs? What is your margin on PPKs?

Personalized pies are really scrumptious, but consumers move onto other things. Every year, about 20% of the consumers who have bought a PPO, stop buying PPKs. The time value of money (interest rate on your revenues) is 5%.

We have not yet covered CLV in 15.814, but we would like you to approximate CLV for PPKs as follows. Set up a spreadsheet and use the data given above to calculate the value to you of selling PPKs to one customer for one year. For simplicity, assume all the revenue comes at the end of the year. That revenue is worth less to you at the end of the year than it is now, so discount it by 5%. We have entered some of these data in "S11 Pricing Pre-case Exercise Fall 2018.xlsx," available on Canvas.

Next year you will sell more PPKs, but not everyone will remain a customer. You will lose 20% of your customers. Again you get revenue from PPKs at the end of the second year. Discount that revenue back

to the present at 5% per annum. Continue for ten years. This is not the entire CLV, but it is a good approximation. (It is not exact because you also expect revenue after year 10.) Set up a spreadsheet to calculate the CLV of PPKs in this way. (The margin from the PPO is paid to you immediately upon a sale.)

For those students who prefer algebra or have experience with CLV, we introduce a formula for CLV in the session on Marketing Analytics. The formula is also explained in the assigned reading, “Customer Profitability, and Lifetime Value.” The reading is required for the Marketing Analytics session. For your convenience, we repeat that formula here. This formula will give you a more exact estimate of the CLV for PPKs.

$$CLV = \frac{\text{margins}}{1 - \text{retention rate} + \text{interest rate}}$$

For every PPO sold, what is the CLV of PPOs? Of PPKs? Of PPOs and PPKs together?

Break-even Analysis

PPOs and PPKs are wonderful products. If a consumer understands their benefits, the consumer should want to purchase them if the EVIU for the target segment is much better for a PPO than for baking pies from scratch. But not everyone in the target segment will be aware of PPOs and PPKs, nor will everyone appreciate the fantastic benefits, or be able to calculate the EVIU. Thus, you must invest in advertising, sampling, and couponing to bring consumers into the retail store to look at PPOs. You can assume your retail margins are sufficient for the store to invest in good selling practices. The retailer will make the sale if the consumer actually comes to the store. You can also assume that, once a consumer purchases a PPO, the consumer purchases PPKs as described earlier in this pre-case exercise.

BE1. Suppose that you estimate that you will spend \$20 million on advertising, \$10 million on providing free samples to leading edge users, and \$8 million on coupons, and that your fixed costs will be \$30 million for administrative costs, non-marginal supply-chain costs, and factory tooling. How many PPOs do you have to sell in order to break even in the first year? (Use the CLV to calculate revenue. CLV comes from PPOs and PPKs.)

The Best Marketing Tactics for Personalized Pie Ovens

Fortunately, you don’t have to guess at the sales that come from various levels of marketing expenditures. In the session on pricing, we introduce the ability to use purchase intention scales to forecast sales. (See also appendix to this pre-case exercise.) Purchase intention scales are quite accurate if used carefully. They are accurate if the customer is put into a realistic purchase environment. For consumer package goods, that purchase environment is often a simulated-store test market.

Simulated-store test markets pervade the consumer packaged goods markets. In a simulated store, consumers are exposed to new products in a situation that approximates retail outlets. Advertising, sampling, couponing, and other marketing elements are also simulated, often in an experimental design. Post-purchase behavior is tracked so that the simulated store test market can provide predictions of sales at different levels of marketing and (assumed) competitive behavior. Simulated-stores test markets are extremely accurate if executed correctly.² Simulated-store test markets were developed at MIT Management in the 1980s and transformed consumer goods marketing. However, they are not just “old hat.” They were used recently (March 2018) to determine how many people would switch their cable-TV provider if the Turner Networks were withheld in a negotiation for fees. Our focus is on the use of simulated test markets to set price and other marketing expenditures.

To mitigate your risk and to set your price, you must identify the best allocation of marketing investment to advertising, sampling, and coupons. The following table summarizes the results of a simulated-store test market. (These data are already entered in the companion spreadsheet, second worksheet.) For example, if you price PPOs at \$22, spend \$10 million on advertising, \$10 million on sampling, and \$4 million on coupons, you will sell 2.64 million PPOs over your planning horizon if competition is low. You will sell 2.30 million PPOs over your planning horizon if competition is high. (These estimates take into account that, even with the margin set earlier in this exercise [EVCh3], competition will manage to get their product into some retail outlets. For simplicity in this pre-case exercise, suppose that you decide to have the same retail margin whether or not competition is low or high.)

Scenario	Price	Advertising (\$millions)	Sampling (\$millions)	Coupons (\$millions)	Assumed Competition	Forecast (millions of PPOs)
1	\$22	\$10	\$5	\$4	low	2.64
2	\$22	\$10	\$5	\$8	low	2.83
3	\$22	\$10	\$10	\$4	low	3.03
4	\$22	\$10	\$10	\$8	low	3.25
5	\$22	\$20	\$5	\$4	low	3.36
6	\$22	\$20	\$5	\$8	low	3.61
7	\$22	\$20	\$10	\$4	low	3.86
8	\$22	\$20	\$10	\$8	low	3.98
9	\$24	\$10	\$5	\$4	low	2.57
10	\$24	\$10	\$5	\$8	low	2.75
11	\$24	\$10	\$10	\$4	low	2.95

² Simulated-store test markets (stores) were developed at MIT Management by Profs. Glen Urban and Al Silk, both now retired. Glen is a former Dean of the MIT Sloan School. Our current Dean, Dave Schmittlein, developed analysis tools for forecasting purchase intentions within simulated-store test markets. Professor Hauser (and Glen) extended the concepts to consumer durables, B2B goods, services, and “really new” products. For example, the early forecasts of elective vehicle adoption were done at MIT with simulated-store test markets. Prof. Hauser also developed methods to use simulated-store test markets to help firms defend their markets. See also the descriptions in Deighton (2002) cited in footnote 1.

12	\$24	\$10	\$10	\$8	low	3.16
13	\$24	\$20	\$5	\$4	low	3.27
14	\$24	\$20	\$5	\$8	low	3.51
15	\$24	\$20	\$10	\$4	low	3.76
16	\$24	\$20	\$10	\$8	low	4.03

Scenario	Price	Advertising (\$millions)	Sampling (\$millions)	Coupons (\$millions)	Assumed Competition	Forecast (millions of PPOs)
17	\$22	\$10	\$5	\$4	high	2.30
18	\$22	\$10	\$5	\$8	high	2.55
19	\$22	\$10	\$10	\$4	high	2.47
20	\$22	\$10	\$10	\$8	high	3.03
21	\$22	\$20	\$5	\$4	high	2.64
22	\$22	\$20	\$5	\$8	high	3.09
23	\$22	\$20	\$10	\$4	high	3.04
24	\$22	\$20	\$10	\$8	high	3.11
25	\$24	\$10	\$5	\$4	high	2.07
26	\$24	\$10	\$5	\$8	high	2.47
27	\$24	\$10	\$10	\$4	high	2.38
28	\$24	\$10	\$10	\$8	high	2.83
29	\$24	\$20	\$5	\$4	high	2.55
30	\$24	\$20	\$5	\$8	high	3.04
31	\$24	\$20	\$10	\$4	high	2.93
32	\$24	\$20	\$10	\$8	high	3.00

Using the companion spreadsheet, compute the net profit for each of the 32 scenarios. Recall that you profit from selling PPOs and PPKs. The net value is the CLV of PPOs plus the CLV of PPKs minus marketing costs and fixed costs. Use the values you computed in CLV1 for a price of \$24.

STM1. What is the CLV of PPOs and PPKs for a price of \$22?

STM2. If competition is low, what is the best marketing expenditure and price? What is the value of that strategy?

STM3. If competition is high, what is the best marketing expenditure and price? What is the value of that strategy?

The Best Price (and Marketing Tactics) for Personalized Pie Ovens and Pie Kits, but with the Potential for Cannibalization of the Sales of our Cash Cow – Personalized Cake Ovens

Although you are the brand manager of PPOs, your company also cares about the sales of Personalized Cake Ovens (PCOs). They are the brand upon which your company was built. Pies substitute for cakes and PPOs substitute for PCOs. You know from the simulated store that, for every four PPOs that you sell, your company will sell two fewer PCOs. Assume that the CLV on PCOs and PCKs is \$48 for every PCO that is sold.

You can answer these questions by adding columns to your spreadsheet.

STM4. If competition is low, does the best price and marketing strategy change? What is the best marketing expenditure and price when there is cannibalization of PCKs?

STM5. If competition is high, does the best price and marketing strategy change? What is the best marketing expenditure and price when there is cannibalization of PCKs?

Creating Advertising

This section is qualitative. We hope you have fun with it.

CA1. Image PPOs and PPKs. What schema would you want to associate with any advertising or packaging?

CA2. Suggest a brand name for PPOs that is consistent with the schema you suggest in CA1.

CA3. Describe in words, or include a sketch (optional), the packaging that you would use that is consistent with the schema you suggest in CA1.

Hints for New York Times and Aqualisa Cases

Expected Value in Use (EVIU)

New York Times: Print subscribers are given digital subscriptions free. They get benefits versus the cost of subscriptions. Write and discuss a conceptual relationship so that the EVIU is higher for digital than for print plus digital.

Aqualisa: What are the comparative costs to consumers of the Aqualisa Quartz and the Aqualisa Aquavalve 609?

Expected Value to the Channel (Ch)

Aqualisa: Would the plumbers be more profitable if they installed the Aqualisa Quartz rather than a traditional shower?

Customer Lifetime Value (CLV)

Aqualisa: If a consumer switches to the Aqualisa Quartz, what is the CLV to Aqualisa? What is the CLV if a plumber switches?

Break-even Analysis (B/E)

New York Times: What are the net profits for different scenarios of print/digital mix? You will have to make assumptions.

Aqualisa: How many Quartz shower systems per year must Aqualisa sell in order to breakeven on their R&D investment?

Other Issues Such As Cannibalization Or Subsidies.

New York Times: Revenue comes from subscriptions and advertising. (You can ignore single issue sales.)

New York Times: Why did the NYT choose 20 free articles for the leaky paywall? Is this the right number?

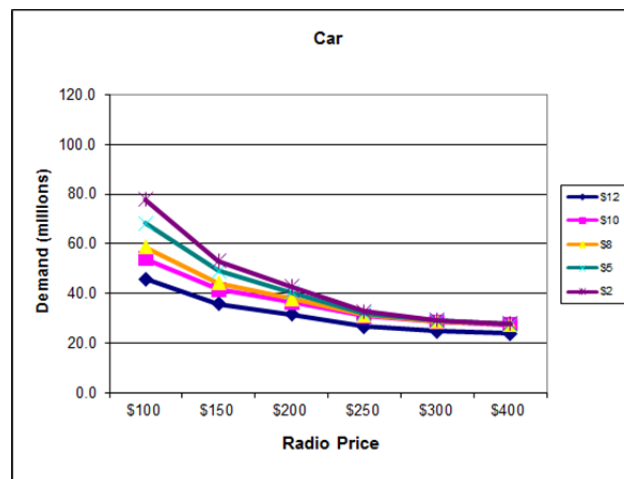
New York Times: As subscribers move to digital (if they move), do they cannibalize print subscriptions? As advertising moves to digital (if it moves), does digital advertising cannibalize print advertising?

Appendix: Purchase Intentions

We provide an example of forecasting sales of SiriusXM subscriptions using purchase intention scales in the session on pricing. An example of a purchase intention scale is shown below.

Taking everything into account, how likely are you to subscribe to XM radio at \$8 per month.	
Certain, practically certain (99 in 100)	_____
Almost sure (9 in 10)	_____
Very probable (8 in 10)	_____
Probable (7 in 10)	_____
Good possibility (6 in 10)	_____
Fairly good possibility (5 in 10)	_____
Fair possibility (4 in 10)	_____
Some possibility (3 in 10)	_____
Slight possibility (2 in 10)	_____
Very slight possibility (1 in 10)	_____
No chance, almost no chance (1 in 100)	_____

Based on the answers provided by potential customers of SiriusXM (after the service had been described to them), SiriusXM obtained the following forecasts of demand.³ Each curve represents a different value of the subsidy that was provided to the customer. The subsidy was provided in order to encourage the customer to purchase a satellite radio. (Recall that, like PPOs and PCOs, the real money is in the ongoing revenue stream from subscriptions.)



³ Data from Godes DE, Ofek E (2004) XM Satellite Radio (A). Harvard Business School Case, 9-504-009, March.