This exercise draws upon a real case of a branded product to help you practice pricing. Key concepts from this exercise are valuable in your analysis of quantitative cases such as New York Times Paywall. We break down the pricing decision into a series of simple questions to help you navigate the actual decision process. Make your answers informative but succinct.

We will schedule an optional recitation session for anyone who had difficulty with the questions or wishes to explore how these simple questions and answers generalize.

**Background**

You are the product manager of an innovation called the Personalized Pie Oven (PPO). In an analogy to Keurig K-Cups for coffee, tea, hot-chocolate, and now soda, the PPOs allow you to produce single-serve pies using Personalized Pie Kits (PPKs) that your company also sells.

Your company has decided to charge $1 for every PPK. Your mission is to price the PPOs.

**Expected Value in Use for PPOs**

From extensive market research, you know that consumers in your target segment really like pies and would eat pies from two PPKs per week over 50 weeks a year. For this project, ignore the time value of money to consumers.

**EVIU1.** How much does a consumer in your target segment have to spend on PPKs in order to enjoy a year of these flavorful and trendy personalized pies?

**EVIU2.** Your culinary expert informs you that consumers can make pies themselves without using PPOs or PPKs. The cost of ingredients necessary to make one PPK’s worth of pie is about $0.40. It takes about half an hour to make one pie from scratch. A homemade pie is equivalent to 4 PPKs. For a target consumer whose value of time is about $10 per hour, what is the consumer’s annual cost of making pies from scratch? Hint: The EVIU to the consumer is the cost of raw materials and the value of time.

**EVIU3.** If this consumer plans to use the PPO for a year, what is the consumer’s EVIU for a PPO?¹

Remark: Consumers vary in their EVIUs. Because a consumer will pay at most his/her EVIU for a PPO, you can plot the EVIUs. This is one way to obtain a demand curve for the market.
Expected Value to the Channel for PPOs

You will sell PPOs in specialized culinary stores, department stores, and appliance stores. These channels want to maximize the return per square foot of shelf space. These channels use a simple formula of \( \frac{\text{margin} \times \text{turn}}{\text{shelf space}} \), where margin is the profit margin they earn for each sale (in this example, retail price minus what they pay the manufacturer [you] for a PPO), turn is the number of items they sell in a reporting period, and shelf space is the amount of shelf space devoted to each item.

**EVCh1.** You’ve chosen packaging that shows people enjoying their personalized pies as well as images of how easy it is to make a personalized pie. You plan on offering a margin to the retailer of about $4. A typical retailer is expected to sell about 20 PPOs per week. How much does a typical retailer make per week per square foot of shelf space devoted to PPOs?

**EVCh2.** Retail shelf space is a scarce resource. A coffee-maker manufacturer is aggressive. The competitor offers the retailer a margin to the retailer of $5 and designs its packaging so that its product takes up 1.5 square feet of shelf space. But the coffee maker does not have your innovator advantage and can only promise the retailer sales of about 15 PPO-like items per week. How much does a typical retailer make per week per square foot of shelf space devoted to the competitor’s items?

**EVCh3.** If the retailer profits more from the competitor’s PPO-like items, it might drop your PPOs altogether. What is the minimum margin you have to offer to the retailer to retain the account?

Cost Information

PPOs cost you $12 to produce and deliver to the retailer, and you have to give the retailer the margin computed above for it to carry your PPOs (see question EVCh3).

PPKs will be sold through supermarkets. The supermarket needs a margin too, and you have to pay to deliver PPKs to the supermarket. The total of that margin and delivery cost is about $0.50 per PPK. Your cost of ingredients is about the same as the consumer, that is, $0.40 per PPK. (You can purchase the ingredients in bulk but you have to pay for packaging).

Calibrating the Demand Curve

There are many methods to calibrate the demand curve. These methods 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.”

In a simulated store, consumers are exposed to new products in a situation that approximates retail outlets. Prices and other marketing elements, such as advertising, are also simulated, often following an experimental design. Simulated-store test markets were developed at MIT.
Management and transformed consumer-goods marketing. They were also used recently (1) to determine how many people would switch their cable-TV provider if the Turner Networks were withheld in a negotiation for fees and (2) how many people would purchase add-on services from their cable provider.

The spreadsheet “S17s Pricing Exercise Spring 2020.xlsx,” posted on Canvas, summarizes the results of a simulated-store test market. The test market experimented with eight levels of price (anchored around your EVIU calculation), and two levels of advertising. This yields 16 scenarios, and two demand curves, each corresponding to an advertising level. If you were to plot the demand curve(s), they would look like the following.

![Demand Curve Graph]

**Pricing PPOs**

Based on cost information and the spreadsheet, you are ready to find the optimal price for your company’s PPOs. Feel free to add columns to the spreadsheet as part of your computation.

**P1.** How much profit do you make for each PPO that you sell at $50? How much profit do you make for each PPK that you sell?

**P2.** First assume that consumers will use your PPOs and buy your PPKs for just a year. What is your profit on a year’s worth of PPKs for every PPO sold? For each level of advertising, what PPO price (among the eight prices you tested) gives you the most total profits (considering both PPOs and PPKs)? Assuming you charge the best price for each level of advertising, what level of advertising gives the most profit?

**Previewing Customer Lifetime Value (CLV)**

You need to plan for growth. You may be in the market for many years, and you may earn a stream of revenue from selling PPKs. Indeed, personalized pies are really scrumptious as a timeless food, although some consumers move onto other choices as time goes by. Every year, about 20% of the consumers who have bought a PPO are estimated to stop buying PPKs. Your time value of money (interest rate on your money) is 5%.
We cover the concept of “customer lifetime value” (CLV) in detail in the marketing analytics session. In short, CLV refers to the net present value of profits a customer brings to you over his/her lifespan as your customer. For this exercise, we’d like you to experience how the consideration of CLV affects pricing decisions. Please use the following CLV formula.

This formula is a short-hand way to add up the expected profit that you obtain for selling PPKs when you retain “retention rate” of your customers each year.\(^4\) The interest rate enables you to compute the net present value (in today’s dollars) of that profit.\(^5\)

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CLV = \frac{\text{profit per period}}{1 - \text{retention rate} + \text{interest rate}}
\]

**P3.** What is the CLV from PPK sales associated with one PPO purchase?

**P4.** You (correctly) consider CLV in your pricing decisions. What is the new best price and best level of advertising that gives the most profit? Explain briefly why the best PPO price differs from the value obtained in question P2.

**Taking Cannibalization Into Account**

Your company also makes Personalized Cake Ovens (PCOs) and Personalized Cake Kits (PCKs). From the simulated-store test market you learn that for every PPO that you sell, you sell fewer PCOs.

**Optional extra credit. P5.** Suppose that the combined loss of CLV (for PCOs and PCKs) for every PPO that you sell is $4. Expand the spreadsheet to take cannibalization into account. What is the new best price and best advertising expenditure?

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\(^1\) That is, the value the consumer derives from PPKs minus the price of the PPKs.

\(^2\) Simulated-store test markets were developed by Profs. Glen Urban and Al Silk. 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 John Hauser (and Glen) extended the concepts to consumer durables, B2B goods, services, and “really new” products such as electric vehicles. Prof. Hauser also developed methods to use simulated-store test markets to help firms defend their markets.

\(^3\) Don’t forget to subtract the cost of advertising when computing your profit.

\(^4\) If you lose 20% of your customers each year, you retain 80%. Enter the retention rate as 0.80 and the interest rate as 0.05.

\(^5\) If you wish to understand the formula better, create a spreadsheet and compute the net present value of profits for twenty periods. The resulting net present value of profits will be very close to that obtained with the formula. Entering the interest rate and the retention rate into the spreadsheet can be tricky; see the teaching team for help if you do not get a value that is very close to the formula. If you want to work ahead, try the CLV simulator that we will use in Session 18, “S18 CLV Simulator Spring 2020.xlsx.”