Chapter 2

Fundamental Economic Concepts

Solutions to Exercises

1. Equation [2.1] is the demand function: $Q_D = f(P, P_S, P_C, Y, A, A_C, N, C_P, P_E, T_A, T/S)$. If the quantity demanded is that of Toyota Priuses, P is the price of the car, and as the price rises, we would expect a decline in the quantity demanded and the equilibrium price to remain the same. P_S is the price of substitutes, and as the price of the Chevy Volt, Nissan Leaf, or plug-in hybrids rises, we would expect the demand for Priuses to rise and the equilibrium price to increase. P_C is the price of complements, and as the price of things like gasoline or lithium ion laptop computer batteries rises, we would see a decline in the demand for Priuses and a decrease in the equilibrium price. Y is income, and as income rises, we'd expect the demand for Priuses to rise as they are normal goods and an increase in the equilibrium price. A is advertising, and we'd expect greater demand for Priuses and an increase in the equilibrium price as advertising and promotional expenditures rise. A_C is competitors' advertising, and we'd expect a negative impact on the demand for Priuses and the equilibrium price as A_C rises. N is the size of the target market or population, and we'd expect larger demand for Priuses in larger markets and a higher equilibrium price. C_P is consumer preferences for greener forms of transportation, and as it increases, we'd expect greater demand and a higher equilibrium price for Priuses as they are seen as a green form of transportation. P_E is the expected future price of hybrid cars, and we'd expect that the greater the resale price of the car, the more people would wish to buy it. Hence, the equilibrium price would also be higher. T_A is the purchase adjustment time period that shows that more Priuses are sold if the time period permitted for analysis is longer. Hence, the equilibrium price would be higher in this case. T/S is taxes on or subsidies for hybrid cars, and as taxes on them decrease or subsidies on them increase, we'd expect the car sales of hybrids to rise and their equilibrium price to increase. Equation [2.2] is the supply function: $Q_S = f(P, P_I, P_{UI}, T, EE, F, RC, P_E, T/S)$. P is the price of the car, and as it rises, the quantity supplied of Priuses would rise with the equilibrium price remaining the same. P_I is the price of inputs like metal, and as it rises, we would expect a decrease in the supply of Priuses and an increase in their equilibrium price. P_{UI} is the price of unused substitute inputs like fiberglass, and as it increases, we'd expect a decrease in supply and an increase in the equilibrium price. T is a technological improvement like robots, and when such

improvements take place, we'd expect the supply of Priuses to increase and the equilibrium price to decrease. EE is exit or entry of other automakers, and as more sellers enter the market, we'd expect the supply of hybrid cars to increase and the equilibrium price of Priuses to decrease in due time. RC is the regulatory cost of compliance, and as they rise, we'd expect a decrease in supply and a higher equilibrium price. P_E is the expected future price of the Prius, and as it increases, we'd expect a decrease in supply and a higher equilibrium price. T_A and T/S are as already mentioned. As T_A increases, we'd expect an increase in supply and a lower equilibrium price. As taxes on Priuses increase or subsidies on them decrease, we'd expect a decrease in supply and a higher equilibrium price.

2. When the price of gasoline rises, the full cost of renting an SUV with the gas purchase rises more than the full cost of renting the more fuel efficient subcompacts does. Renters who are concerned about expenditure would prefer fuel efficiency. To continue to rent out the SUVs, Enterprise Rental discounts the daily rental on these cars so that they don't sit idle in their parking lots.

3. Projects A, C, G, and B require a total of $875 million in investment. Project B, the lowest return project of this group is expected to generate an 18 percent rate of return. Ajax can raise up to $1,050 million, with the highest marginal cost being 18 percent for the last $200 million. If Ajax were to choose any project beyond A, C, G, and B—such as project D (the next best project after B)—that project would generate a marginal rate of return (16 percent), which is less than the marginal cost of the funds needed to finance it. In this case, it will be 18 percent for the last $200 million up to a total of $1,050. Thus, the optimal capital budget is to invest in projects A, C, G, and B for a total of $875 million.

4. Table A.4 (p. A-8) shows that Disney's eight year annuity at a 9% discount rate is worth 5.5348 per dollar and so, $6,088,280,000 in total. Assuming a 9% discount rate again, Fox's offer was worth $3,193,960,800. CBS's offer was worth $2,790,229,800, assuming a 9% discount rate again.

5. This question examines expected values, standard deviations, and risk measures for MICHTEC's products with probabilities of .2, .3, and .5 for a boom, a recession, and normal growth, respectively.

    a. Expected annual revenues = $90(.2) + $75(.3) + $85(.5) = $83, or as this is expressed in millions of dollars, the expected annual revenues are $83,000,000.

b. Standard deviation of annual revenues = $[(90 - 83)^2(.2) + (75 - 83)^2(.3) + (85 - 83)^2(.5)]^{1/2} = 6.557439$, but as this is in millions, it is \$6,557,439.

c. Coefficient of variation = $v = 6.557439/83 = 0.079$

6. Comparing the two projects, Project B appears riskier because it has a larger standard deviation (\$125,000) than Project A has, but the relative risk needs to be considered. Actually, Project A is riskier because it has a larger coefficient of variation than Project B does.

$$CV_A = v_A = \$40{,}000/\$50{,}000 = 0.80$$
$$CV_B = v_B = \$125{,}000/\$250{,}000 = 0.50$$

Because the two projects are significantly different in size, the coefficient of variation (a relative measure of risk) is more appropriate.

7. General Aeronautics question involving distributions.

a. As the price distribution is normal, the expected price is halfway between the most optimistic price and the most pessimistic price. It is \$1.5 million.

b. From Table C.1, the z value corresponding to leaving 10 percent in the lower tail of a normal distribution is approximately −1.28. Therefore, −1.28 multiplied by the standard deviation is equal to a distance of \$500,000 below the mean (\$1 million minus \$1.5 million). Hence, standard deviation can be calculated as follows:

$$-1.28\sigma = -\$500{,}000, \text{ or } \sigma = \$390{,}625.$$

c. z = (\$1.2 million – \$1.5 million) / \$390,625 = –0.77
From Table C.1, we can find that p(z < –0.77) = 22.06%

Solution to Case Exercise: Revenue Management at American Airlines

1. American Airlines must learn from the past the probability of filling seats days in advance of the flight, for different times of the day, different days of the week, for both business class and coach seats, and for different destinations. If too few seats in a certain class have been sold, then the airlines may need to "sell" them to discounters like Priceline at lower prices to fill seats. This creates price differentiation among customers in the same class of seats. Although most customers are aware that this occurs, American Airlines need not be afraid of "no shows."

2. Trucking, health care, and hotel stays are all services. As so much of health care is paid for by third parties (HMOs, BlueCross, or Medicare), pricing is often obscure to the patients so that giving a discount for a hernia surgery on Tuesdays makes little sense. Trucking, on the other hand, is primarily Business to Business and faces a great deal of competitive buying power (after deregulation of the trucking industry in July 1980, with the Motor Carrier Regulatory Reform and Modernization Act, reduced the power of the Interstate Commerce Commission to set trucking rates). A firm that does significant shipping will search extensively to find the lowest price. In this environment, competitive rates would tend to occur. But in hotel stays, we have small buyers of services as well as large buyers. This is why there is a wide range of prices found in hotels that we also find in airlines.

3. There is an art to finding out what a customer is willing to pay. The objective of the seller is to charge the most that the customer is willing to pay. If reservation clerks or travel agents find that customers are willing to pay more for certain upgrades, they will allocate fewer “cheap seats” and have more “preferred seating.”