Basic Economics for Industrial Engineering

Economics of consumption

Basic Case studies[1]

In order to support discussion in the classroom, you will propose three slides about the case study you are assigned with. You will produce 3 slides, 1 for the survey of the case, 1 for the definition of the economic notion at stake, 1 slide for the graph or/and the model.

NOTE: We here assume that you have carefully read the chapters 3, 4 and 5 of the Varian's textbook. You may use the herein technical tools in the aforementioned case studies.

Part I are cases to be discussed in class. Part II are supplementary material.

Table des matières

[1] Sources: Brickley, Smith, Zimmerman, Managerial Economics and Organizational Architecture (2001), McGaw-Hill. And others…

Part I – Consumer Theory

CASE 1:
A Blogger Who Understands the Importance of Ignoring Sunk Costs

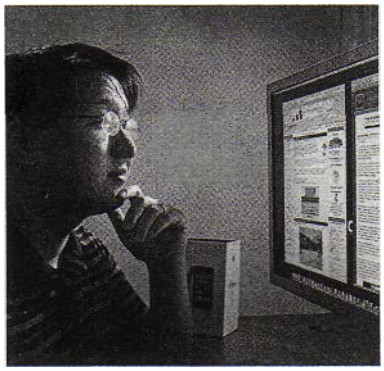
In recent years, many people have started blogs —or, "Web logs"— where they record their thoughts on politics, sports, their favorite hobbies, or anything else that interests them. Some bloggers can spend hours a day writing up their latest ideas and providing links to relevant material on the Web. A few blogs become so successful that they attract paid advertising and earn their owners a good income. Arnold Kim began blogging about Apple products in 2000, during his fourth year of medical school. He continued blogging on his site, MacRumors.com, over the next eight years while pursuing a medical career as a nephrologist —a doctor who treats kidney problems.

By 2008, Kim's site had become very successful, attracting 4.4 million people and more than 40 million page views each month. Kim was earning more than $100,000 per year from paid advertising by companies such as Verizon, Audible.com, and CDW. But compiling rumors about new Apple products, keeping an Apple buying guide up to date, and monitoring multiple discussion boards on the site became more than he could handle as a part-time job. Kim enjoyed working on the Web site and believed that ultimately it could earn him more than he was earning as a doctor. Still, he hesitated to abandon his medical career because he had invested nearly $200,000 in his education.

But the $200,000, as well as the years he had spent in medical school, completing a residency in internal medicine, and completing a fellowship in nephrology, were sunk costs. Kim realized he needed to ignore these sunk costs in order to make a rational decision about whether to continue in medicine or to become a full-time blogger. After calculating that he would make more from his Web site than from his medical career—and taking into account that by working from home he could spend more time with his young daughter— he decided to blog full time. He was quoted as saying, "on paper it was an easy decision."

Knowing that it is rational to ignore sunk costs can be important in making key decisions in life.

Source: Brian Stelter, "My Son, the Blogger: An M.D. Trades Medicine for Apple Rumors," *New York Times*, July 21, 2008; and Dan Frommer, "Nephrologist to Mac Blogger: The Unlikely Career Path of MacRumors' Arnold Kim," businessinsider.com, July 13,2008.



Would you give up being a surgeon to start your own blog?

Source: Hubbard & O'Brien, 2010, Microeconomics, Prentice Hall

CASE 2

Why Don't Students Study More?

Government statistics show that students who do well in college earn at least $10,000 more per year than students who fail to graduate or who graduate with low grades. So, over the course of a career of 40 years or more, students who do well in college will have earned upwards of $400,000 more than students who failed to graduate or who received low grades. Most colleges advise that students study at least two hours outside class for every hour they spend in class. Surveys show that students often ignore this advice.

If the opportunity cost of not studying is so high, why do many students choose to study relatively little? Some students have work or family commitments that limit the amount of time they can study. But many other students study less than they would if they were more realistic about their future behavior. On any given night, a student has to choose between studying and other activities—such as watching television, going to a movie, or going to a party—that may seem to provide higher utility in the short run. Many students choose one of these activities over studying because they expect to study tomorrow or the next day, but tomorrow they face the same choices and make similar decisions. As a result, they do not study enough to meet their long-run goal of graduating with high grades. If they were more realistic about their future behavior, they would not make the mistake of overvaluing the utility from activities such as watching television or partying because they would realize that those activities can endanger their long-run goal of graduating with honors.

If the payoff to studying is so high, why don't students study more?

CASE 3

The New Philanthropy

Charitable giving by U.S. citizen totals over *$200* billion annually—roughly 2 percent of national income[2]. Such altruism has been highlighted by some notable gifts (in real as well as nominal terms) from prominent business leaders. For example, as of 2004, Microsoft co-founder Bill Gates and his wife Melinda had given over *$25* billion to their philanthropic foundation. In real terms Bill and Melinda Gates have given money away faster and in greater amounts than any-one else in history. By comparison, the charitable contributions of early-twentieth-century oil tycoon and noted benefactor John D. Rockefeller total *$6* billion in 2005 dollars. Steel magnate and philanthropist Andrew Carnegie's giving amounts to *$5* billion in 2005 dollars.

Although significant in real terms, modern-day altruism is similar in three ways to the philanthropy of previous generations. First, U.S. citizens have consistently distinguished themselves by their willingness to give of their time and money. This was a cultural trait noted by Frenchman Alexis de Tocqueville in his classic *Democracy in America* after visiting the United States in the early 1800s. A recent Johns Hopkins survey indicates that 49 percent of U.S. respondents volunteered their time for civic activities in the previous year, versus 13 percent of Germans and 19 percent of French. The survey also indicated that 73 percent gave money to charity over the last year versus 44 percent of Germans and 43 percent of French.

Second, much like the federal food stamp program described in the preceding section, philanthropic gifts typically come with restrictions about who the intended beneficiaries will be, and in what particular dimensions those beneficiaries are meant, by the donor, to be better off: For example, one of the first big commitments made by Bill Gates was in 1997 and involved paying billions to help children specifically through wiring every library in the country to the internet. Many of the libraries wired through the Gates gift had been started earlier in the century through the munificence of Andrew Carnegie, who similarly wanted to provide opportunity to U.S. youth through a subsidy of a particular good (libraries) rather than an equivalent cash subsidy.

Finally, the intensity of preferences for giving to others differs, as it always has, across individuals. Unlike Gates, for instance, Larry Ellison, the founder of Oracle, is skeptical about the extent to which philanthropy can solve the world's problems. Worth about $19 billion of 2004, Ellison does not give as much—about $100 million per year—because he believes that the profit motive is the best tool for solving the world's problems.

Ellison asks, "Which did more for the world? The Ford Motor Company or the Ford Foundation?"

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[2] This application is based on "The New Philanthropy," *Time* (iuly 24, 2000), pp. 49-59.

Case 4
Using Price to Deter Youth Alcohol Abuse, Traffic Fatalities, and Campus Violence

Although economists ascribe an important role to price in determining the quantity demanded of a product, policymakers often do not. A case in point is the campaign waged by policymakers since the mid-1970s to discourage alcohol abuse and thereby decrease the number of traffic-related deaths. One of the main campaign objectives has been to raise the legal age of alcohol consumption to 21 years. The reason behind this is that while people under the age of 25 represent 20 percent of all licensed drivers, they account for 35 percent of all drivers involved in fatal accidents. Alcohol is involved in more than half the driving fatalities accounted .for by young drivers.

By raising the legal age for alcohol consumption to 21, policymakers hope to shift the demand curve for alcohol to the left (diminishing the portion of the population with access to alcohol) and thereby reduce both alcohol abuse and driving fatalities.

Shifting the demand curve for alcohol to the Ieft is one way to reduce alcohol abuse and traffic fatalities. However, economic research suggests that a more effective method, even among teenagers, would be to raise the price of alcohol through higher taxes, thereby producing a movement along the demand curve for alcohol.

The federal tax on alcohol was constant in nominal dollar terms between 1951 and 1.991 ($9 per barrel of beer, $10.50 per proof gallon of distilled spirits such as vodka, and so on) and has only been increased modestly since then. In real terms, consequently, the federal tax on alcohol has decreased since 1951. For examples, the real federal tax on beer has declined by 70 percent since 1951 while the real tax on distilled spirits has decreased by 81 percent. The decline, in real terms, of the federal tax on alcohol is a major factor behind the substantial decrease in the real price of alcohol since 1951— 40 percent in the case of beer and 70 percent for hard liquor.

A national survey of teenagers finds that, holding constant other factors such as a state's minimum drinking age, religious affiliation, and proximity to bordering states with lower minimum drinking ages, the amount of alcohol consumed by the average teenager in a state is significantly influenced by the price of alcohol there[3].

The survey findings suggest that raising taxes on alcohol offers a potent mechanism for deterring alcohol abuse and traffic fatalities among teenagers. Specifically, based on the survey's results, had federal taxes on alcohol remained constant since 1951 in real purchasing power terms rather than in dollar terms, teenage drinking would have fallen more than if the minimum drinking age had been raised to 21 in all states. Raising the price of drinking and moving along the demand curve for alcohol thus promises to be more effective in reducing teenage drinking than the policy pursued by most policymakers—shifting the demand curve for alcohol to the Ieft by imposing age restrictions.

According to another study, the decline in the real price of alcohol also appears to have resulted in an increase in campus violence over the last decade[4]. Currently, a third of the college student population of 14.5 million in the United States is expected to be involved, in any given year, in some kind of campus violence (arguments, fights, run-ins with police or college authorities, sexual misconduct, and so on). Because alcoholic consumption is positively correlated with violence, the study examined the relationship between prices of six-packs of beer and levels of violence at colleges around the country. The study found that a 10 percent increase in the price of beer would be sufficient to decrease campus violence by 4 percent, other factors held constant. However, since the real price of beer has actually fallen by 10 percent since 1991—largely due to the decline, in real items, of the federal tax on alcohol—the converse result has occurred. Namely, the study concludes that campus violence has increased by 4 percent (200,000 incidents) since 1991 on account of the decline in the real price of beer.

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[3] According to Douglas Coate and Michael Crossman, "Effects of Alcoholic Beverage Prices and Legal Drinking Ages on Youth Alcohol *Use," Journal of Law and Economies,* 31 No. 1 (April 1988), pp. 145-172, the estimated price elasticity of demand for teenage drinking ranges from 0.5 to 1.2.

[4] How to Calm the Campus," *Business Week,* November 1, 1999, p. 32

Case 5

Do Rats Have Downward-Sloping Demand Curves?

Logical reasoning and empirical evidence support the proposition that humans have downward-sloping demand curves. The inquiring reader may wonder whether the law of demand also applies to the behavior of animals. Experimental evidence suggests that it does. Consider the results of a study on rats done by researchers at Texas A&M University[5]. The rats were found to have downward-sloping demand curves for root beer and Tom Collins mix.

Researchers confronted each rat with a budget line relating root beer and Collins-mix. They charged a "price" by requiring the rats to press a lever to receive 0.05 milliliter of each beverage. The "incomes" of the rats were determined by allocating each rat a certain number of lever presses per day. With an income of 300 lever presses and equal prices for root beer and Collins mix, rats expressed a decided preference for root beer and spent most of their incomes on it. Then, the price of Collins mix was cut in half (half as many lever presses required per unit of Collins mix) and the price of root beer doubled, with income set so that each rat could still consume its previously chosen market basket if it wished. Economic theory predicts that consumption of Collins mix will rise and root beer fall given the new "prices". The theory proved correct: the rats chose to consume more than four times as much Collins mix as before and less root beer.

In a more recent study, researchers attempted to create a situation in which the rats would consume less at a lower price (and, conversely, more at a higher price)— the Giffen good case[6]. Economic theory suggests that this can occur only when the good is strongly inferior and occupies a large portion of the budget (so .the income effect is large). When consumption of fluids was restricted to root beer and quinine water, the researchers found that quinine water was an inferior good for the rats. They then lowered the rats' "incomes" to the point where most of their budget was devoted to quinine water; a change in the price of quinine water would then have a large income effect. Next came the crucial experiment: the price of quinine water was reduced. The rats consumed less quinine at the lower price and used their increased real income to increase their root beer consumption. A Giffen good case finally had been found. : What is particularly interesting about the experimental results is that .the Giffen good case was demonstrated in exactly the circumstances that theory emphasizes .are necessary—a strongly inferior good, with most of the budget devoted to purchases of that good.

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[5] John Kagel et al., "Experimental Studies of Consumer[1] Demand Behavior Using Laboratory Animals," *Economic Inquiry,* 13 No. 1 (March 1975), pp. 22-38.

[6] Raymond C. Battalio, John H. Kagel, and Cari Kogut, "Experimental Confirmation of the Existence of a Giffen Good," *American Economic Review,* 81 No. 3 (September 1991), pp. 961-970

Case 6

The Consumer Surplus Associated with Free TV

Until the advent of cable, television was not sold directly to viewers. The price of viewing broadcast - programming was zero (apart from the opportunity cost of the viewer's time and the electricity necessary to power the set) for a household with a television and clear reception of the signal. Most of the costs of operating over-the-air networks and stations were, and still are, covered by sales of broadcast time to advertisers.

ln the heyday of free television, viewing options were limited but the consumer surplus accruing to viewers was not. In 1968, for example, the average U.S. household had access to three network stations and one independent station. The estimated annual consumer surplus garnered by viewers was $32 billion ($176 billion in 2005 dollars) due to a price of zero for broadcast television[7]. The estimated consumer surplus vastly exceeded the $3.5 billion in advertising revenues earned by all television stations in 1968.

A prominent economic study published in 1973 indicated that an expansion in viewing options, in terms of the consumer surplus generated through such an expansion, would be highly valued. According to the study, a fourth network would add $4.2 billion in consumer surplus as of 1968 ($23 billion in 2005 dollars). Expansion, however, was precluded by regulations as well as by the fact that it was not technologically feasible to charge viewers for the additional programming.

The study's results suggest why cable television has grown so rapidly over the past 40 years. Namely, by figuring out a way to exclude nonpayers and charge subscribers for their service, cable operators have been able to capture some of the television consumer surplus from either existing or newly developed programming and convert it into cable company profits. Television owners have found subscribing to cable attractive because it allows them to expand their viewing options (experiments involving cable Systems with up to 500 channels of programming have recently been undertaken), enhanced options that generate consumer surplus. Currently, 67 percent of U.S. households subscribe to cable, and the average subscribing household spends approximately $40 per month on cable. In comparison, the amount of advertising revenues earned by broadcast stations averages roughly $35 per month per household.

[7] Roger G. Noll, Merton j. Peck, and John J. McGowan, *Economic Aspects of Television Regulation* (Washington, D.C.: Brookings Institution, 1973).

Case 7

Network Effects and the Diffusion of Communications Technologies and Computer Hardware and Software

Communications technologies are prime examples of products characterized by positive network effects[8]. As the established user base of telephones, fax machines, the Internet, and e-mail grows, increasingly more individuals find adoption worthwhile. Consequently, such products tend to be characterized by relatively long developmental periods followed by rapid diffusion. Take the case of fax machines, a product that AT&T first introduced in 1925. The technology, however, was little used until the mid-1980s, when demand for and supply of fax machines exploded. While ownership of fax machines was negligible prior to 1982, over half of American businesses had at least one fax machine by 1987.

Internet usage has followed a similar pattern. While the first e-mail message was sent in 1969, Internet traffic did not begin to grow substantially until the late 1980s. Once it began to grow, however, it doubled annually in virtually every year after 1989.

Positive network effects are not limited to communications technologies. They are also at the heart of explaining the diffusion of computer software and hardware, where popular systems enjoy a significant competitive advantage over less popular systems. Personal computers provide a telling example. A study of 110,000 American households in 1997 suggests that the rate of adoption of personal computers may have been almost doubled on account of network effects. Moreover, the observed network effects are strongly related to usage of the Internet and e-mail.

Positive network effects also likely have played an important role in the rapid spread of popular computer software programs such as Microsoft Windows operating system and Office (a combination of word processing, spreadsheet, data base, and presentation programs). Both products quickly acquired shares of over 90 percent of their relevant markets.

Of course, the same positive network effects propelling a product's rapid diffusion can also have adverse legal consequences. For example, the Justice Department's antitrust case against Microsoft hinged critically on the positive network effects fueling Window's success.

The Justice Department alleged that a positive network effect allowed Microsoft to capture a dominant share of the personal computer operating system market. In turn, the built-in customer base gave Microsoft a significant edge in the browser market for its Internet Explorer product over rival Netscape Navigator, said the Justice Department, because, at no extra charge to consumers, Microsoft packaged Internet Explorer with its Windows operating system.

But one point that deserves mention here is that positive network effects can be a two-edged sword for suppliers. Although a bandwagon effect enhances the possibility that a supplier will capture a dominant market share, it simultaneously limits the supplier's ability to exploit that position through a price increase. The market demand curve is more price elastic when there are positive network effects present. In the case of Windows, this implies that Microsoft's ability to exploit, through a price increase, the dominant customer base that a bandwagon effect helped to build is limited by the same bandwagon effect. Should Microsoft attempt to raise Windows' price, customers would run toward alternative operating Systems more quickly than they would without the bandwagon effect being present.

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[8] This application is based on Cari Shapiro and Haï R. Varian, *Information Rules* (Boston: Harvard Business School Press, 1999); and Austan Goolsbee and Peter J. Klenow, "Evidence on Learning and Network Externalities in the Diffusion of Home Computers," *Journal of Law and Economies*, 45 No. 2 Pt 1 (October 2002), pp. 317-343.

Case 8
Income and substitution effects and home ownership

The likelihood of home ownership in the United States increases with income[9]. For example, 35 percent of families with an annual income of less than $10,000 own a home versus 68 percent of families with an annual income of between $25,000 and $49,999 and 93 percent of families with an annual income of $100,000 or more. This phenomenon is due partly to an income effect: home ownership is a normal good, and as income increases, so does the likelihood of home ownership. A substitution effect, however, is also at work. This is because mortgage interest payments on a home can be deducted from the personal income subject to federal taxation, and the tax rate increases with income. Since higher-income individuals can disproportionately reduce the amount they owe in taxes through the mortgage interest deduction, the relative price of home ownership is lower for them. The lower relative price, a substitution effect, thus also encourages a positive correlation between income and home ownership.

Case 9
Trash Pricing and Recycling

There have been numerous news stories in recent years concerning the problem of garbage disposal in the United States. Despite the many admonitions to moderate their trashy habits, Americans generate nearly 4 pounds of garbage per day, up from 2.6 pounds per day in 1960. In part, this behavior results from the fact that most communities use systems like the fixed annual fee to finance trash collections, so residents don't have to pay more when they discard more trash. The Perkasie experience shows that some pricing policies can give people an incentive to generate less trash. Starting from close to the national average in terms of the trash produced on a per-citizen basis. Perkasie was able to cut its trash collections in half by switching to a per-bag pricing scheme.

Charging by the bag not only can reduce a municipality's garbage collection costs and more fairly allocate expanses across households based on the amount of garbage generated, but it also encourages recycling, a substitute for trash generation. For example, the largest and oldest per-container billing system in the United States is in Seattle. Since the billing program's inception in 1981, the percentage of trash recycled in Seattle has risen from 5 to 42 percent.

The principal complaint regarding per-bag billing is that it provides an incentive for illegal dumping. Some Seattle homeowners, for example, routinely leave their garbage in apartment house dumpsters. In response, the owners of such dumpsters have begun padlocking them.

[9] Jeffrey M. Perloff, *Microeconomics*, 2nd ed. (Boston; Addison-Wesley Longman, 2001) and U.S. Census Bureau, *Statistical Abstract of the United States:* 2001 (Washington, DC: U.S. Government Print-ing Office, 2001)

Case 10
Risk Aversion While Standing in Line

Many airline ticket counters, department of motor vehicles offices, federal customs checkpoints, banks, postal branches, college financial aid departments, and fast-food restaurants have a single line feeding to multiple clerks as opposed to separate lines for each clerk. This is the case even though a single-line system is unlikely to alter the average time a customer must spend waiting to see a clerk. After all, the line is not likely to affect either the total number of clerks or the number of customers waiting to see them.

A single line, however, does reduce the variance of a customer's waiting time since a customer is less likely to get into a "slow" or "fast" line. Holding constant the expected waiting time, the reduction in the variance of the waiting time will be appealing to customers if they are risk averse to spending time in lines. If a sure wait of 5 minutes is preferred to the prospect of a 0.5 probability each of a 2-minute and an 8-minute wait, customers will be happier under the single-line system. According to operations researchers, at least part of the reason customers prefer less variance when waiting in line is their sense of social justice. Specifically, relative to an expected wait of 5 minutes, experiencing only a 2-minute wait because one is fortunate enough to get into a "fast" line appears to add less to total utility than experiencing an 8-minute wait in a "slow" line subtracts from total utility, since the longer wait brings with it the added aggravation of seeing more recent arrivals who get into a fast line receive service first[10].

Case 11
Geographic market segmentation

Fifty years ago, the markets served by each English football club were local: most spectators lived within walking distance or a short bus or train journey from the stadium. Today, the most successful clubs attract a national audience. Factors that have contributed to reduced geographic market segmentation have included:

- growth in private car ownership;
- improvements in the road transport System;
- demographic change (population is more mobile geographically);
- Increased media coverage of star players and leading teams.

[10] Richard C. Larson, "Perspectives on Queues: Social Justice and the Psychology of Queuing," *Operations Research,* 35 No. 6 (November-December 1987), pp. 895-905

Case 12
The Benefits and Costs of Rationing by Waiting

An equal allocation of ration coupons or a lottery is not the only nonprice ways of rationing a good that is in short supply at the existing price. Sometimes, a price-controlled good is allocated to buyers on a first-come, first-served basis. This rationing-by-waiting approach has the advantage that, if there are no costs to waiting, consumers placing the highest marginal value on a good have the greatest incentive to get in line to purchase the good. To the extent that consumers placing the highest marginal value on a good are at the head of the line, efficiency in the distribution of the good among consumers is promoted.

Rationing by waiting, however, has its costs if consumers have something else that they could be doing besides waiting in line. For example, a study examined the effects of a price ceiling applied to a Chevron station in Ventura, California, in 1980 versus two competing stations not subject to the same price ceiling[11]. (Stations owned and operated by integrated oil companies were subject to the price ceiling while those operated by independent or franchised dealers were not) The study found that the price at the Chevron station was $0.19 per gallon lower than at the competing stations. Because of the lower price, long lines formed at the Chevron station, and the average time a consumer spent waiting in line was 15 minutes. By contrast, there was no waiting at the competing stations.

The study surveyed customers at the various stations and estimated the customers' opportunity cost of time based on their employment and income characteristics. The study found that a significant percentage of the increase in consumer' surplus generated by the price ceiling was dissipated through the costs of having to wait in line to buy the low-priced Chevron gasoline. Specifically, once the costs of waiting were accounted for, consumers received only 49 percent of the increase in consumer surplus generated by the price ceiling at the Chevron station. Moreover, the study pointed out that there is no guarantee that if costs are associated with waiting, the consumers placing the highest marginal value on a good will also be the ones with the lowest opportunity cost of time. To the extent that high-marginal-value customers also have a high opportunity cost of time, they will be discouraged from waiting in line and a rationing-by-waiting scheme will not allocate the good across consumers in an efficient manner.

[11] Robert T. Deacon and Jon Sonstelie, "Rationing by Waiting and the Value of Time: Results from a Natural Experiment," *Journal of Political Economy,* 93 No. 4 (October 1985), pp. 627-647

Part II – Market Demand

Case 13
Price Elasticities

Economists have estimated the price elasticities of various products, such as

Sugar	=0.31
Potatoes	=0.31
Tires	=1.20
Electricity	=1.20
Haddock	=2.20
Movies	=3.70

These estimates indicate that sugar and potatoes have relatively low price elasticities. This might be expected given that these products represent a small portion of most people's budgets. Also, sugar has few close substitutes. Haddock and movies have high elasticities. Haddock is a narrowly defined product (as opposed to fish) and has many close substitutes. Movies are a luxury item for many people; higher prices cause individuals to consume other forms of entertainment.

Source: E. Mansfield (1988), Microeconomics (W.W. Norton: New York), 142.

Case 14
Demand Elasticities and Airline Pricing

Round-trip airfares are substantially lower if the traveler stays over a Saturday night. Airline companies offer this discount to increase revenues (and profits). The typical traveler who stays over a Saturday night is a tourist. Tourists have relatively high price elasticities for air travel. Lowering the price from the standard fare correspondingly increases revenue: The price decrease is more than offset by the increase in tickets sold. Airline companies do not offer comparable discounts to travelers who complete the round-trip midweek. These customers are primarily business travelers who have relatively inelastic demands. Lowering price would decrease revenue because the decrease in price would not be offset by an increase in tickets sold. Airline companies also offer fewer discounts during peak periods, such as the period around the Thanksgiving holiday. During these periods, demand is relatively inelastic and they can fill the planes without offering substantial discounts.

Case 15
Complementarity between Computer Hardware and Software

Over the past decade, there has been a dramatic decrease in the price of personal computers. Not only has the price of PCs decreased, but their quality and computing power have improved significantly as well. This decrease in the price of personal computers has increased the quantity of PCs demanded enormously. In addition, it also has increased the demand for software products. Today, some of the largest companies in the world (for example, the Microsoft Corporation) specialize in the production of software for PCs. Computer hardware and software are complements and thus have negative cross elasticities.

Case 16
Derived Demand

Some products are demanded, not because individuals receive pleasure from consuming them, but rather because they are useful in the consumption of other products. Demands for these products are derived from the demands from other products. Take motor oil, for example. Few people derive satisfaction from purchasing oil for their automobiles. Rather, this oil is a derived demand from consuming transportation services provided by your car. Procter & Gamble (P&G) discovered that spraying a bit of their Clean Shower bathroom cleaning product on a razor each day can extend the razor's life three or four times. They are formulating a product targeted to this use. Thus, this new products demand is derived from the demand for razor blades.

Case 17
Estimates of Cross Elasticities

All the pairs of commodities listed above are substitutes. Complements such as DVD players and DVD movies have negative cross elasticities. Natural gas apparently is not a very strong substitute for electricity. Although people can use either gas or electricity for heating, natural gas is not generally used for lighting. On the other hand, natural gas and fuel oil are closer substitutes (both tend to be used for heating). Margarine and butter are strong substitutes.

Source: E. Mansfield (1988), Microeconomics (W.W. Norton: New York), 143.

Case 18
Russian Cola Wars

In 1999, Crazy Cola had a 48 percent market share in Krasnoyarsk, Russia. Crazy Cola, produced locally by OAO Pikra, is headed by a 60-year-old former communist factory worker named Yevgeniya Kuznetsova. Ms. Kuznetsova formerly bottled Pepsi at a state-run plant.

A 1.5-liter bottle of Crazy Cola sold for about 39 cents, compared to 77 cents for a two-liter bottle of Coke or Pepsi. Krasnoyarsk is a poor community, and many residents are unwilling to pay a premium for brand-name colas. To quote one 25-year-old graduate student, Viktoria Pimenova, "Crazy Cola is fun, and it's our local product. But it is a drink for people who don’t have money. Coke and Pepsi taste better." This statement suggests that Crazy Cola is an inferior good, while Coke and Pepsi are normal goods. This implies that if the incomes of local residents increase, demand for Coke and Pepsi will increase, while the demand for Crazy Cola will decrease.

Source: B. McKay (1999), "Siberian Soft-Drink Queen Outmarkets Coke and Pepsi," The Wall Street Journal (August 23), Bl.

Case 19
Estimates of Income Elasticities

Economists have estimated the income elasticities for various products. Below are a few of these estimates:

Flour	=-0.36
Natural gas and fuel oil	=0.44
Margarine	=-0.20

Milk and cream	=0.07
Dentist services	=1.41
Restaurant consumption	=1.48

According to these estimates, flour and margarine are inferior goods. People spend less on these goods as their incomes rise. The other goods are normal goods (expenditures on the products rise with income). Dentist services and restaurant consumption are particularly sensitive to income changes.

Source: E. Mansfield (1988), Microeconomics (W. W. Norton: New York), 143.

Case 20
Store Layout Affects Demand

Paco Underhill calls himself a "retail anthropologist." His consulting firm video tapes consumers as they shop at his clients' stores such as Sears, The Gap, and McDonald's. He then offers recommendations for store layout. For example, most North Americans turn right after entering a store while most British and Australian customers turn left. Consumers tend to avoid narrow aisles; they apparently dislike being jostled from behind (what he calls the "butt-brush factor"). Junk food should be placed on low or middle shelves so kids can reach them. After finding that women spend only half the time in the store when accompanied by a man, he recommends placing numerous chairs around stores so men can sit comfortably while the women shop.

Source: K. Labich (1999), "Attention Shoppers: This Man Is Watching You," Fortune (July 19), 131-133

Case 21
Demand Elasticity for Gasoline

The industry-level demand for gasoline is relatively inelastic: The price of gasoline can change substantially and have little effect on the overall quantity demanded. The demand elasticities facing individual gas stations are much larger. If several gas stations are located at the same intersection, an individual station can suffer a remarkable loss of business to its local competitors by raising its price.

Case 22
Understanding Consumer Demands at The GAP

Companies spend considerable resources trying to determine the specific preferences of their customers. One industry where knowledge of consumer preferences is particularly important is the apparel industry. Popular fashions change frequently, and successful firms must be "close to the customer." The importance of knowing customer demands is highlighted by the following statement made by The GAP president, Millard Drexler: "We just keep trying to figure out what people wear on a regular basis. Our business is reading signals from the customer day in and day out." The GAP's success in apparel retailing suggests that this activity can pay off.

Source: S. Caminti (1991), "The GAP Reading the Customer Right," Fortune (December 2), 106