

Basic Economics for Industrial Engineering

Economics of production

Basic Case studies¹

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 1, 2 of Coelli's textbook and/or the chapters 18 to 21 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.

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¹ Sources: Brickley, Smith, Zimmerman, Managerial Economics and Organizational Architecture (2001), McGraw-Hill.

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1 Part I: Production Economics

1.1 Increasing Returns to Scale at Volkswagen

In order to compete globally, VW and Volvo have long had a cooperative relationship whereby VW modifies or installs VW engines in certain Volvo cars. This allows VW to produce proportionally more engines with a proportionally smaller increase in inputs, thereby increasing VWs productivity. Some of these productivity gains can be passed through to Volvo in terms of lower engine costs. This is an example of increasing returns to scale. (Note, in 1999 Ford purchased Volvo's car division.)

Source: B. Mitchener, A. Latour, and S. Moore (1998), "VW-Volvo Talks Suggest Success Isn't Enough to Ensure Independence in Automotive Industry," The Wall Street Journal (July 2), A17.

1.2 Food Intake and Productivity: An Example of Diminishing Returns

Economist John Strauss analyzed data from a survey of farmers from Sierra Leone in West Africa. Through this analysis, he was able to estimate the relation between an individual's agricultural output and daily calorie intake. Between 0 and 5,200 calories per day, he found a positive association between output and calorie intake. The relation, however, was subject to diminishing marginal returns. For instance, for workers consuming about 1,500 calories per day, a 1 percent increase in calorie consumption increased agricultural output by about 0.5 percent. This impact of calorie consumption on output declined steadily with increases in calorie consumption. For workers consuming 4,500 calories per day, a 1 percent increase in calories increased output by only 0.12 percent. Beyond 5,200 calories per day, the estimated relation was negative—additional calorie intake *reduced output*. Apparently, beyond that point the marginal product of food intake was negative.

Source: J. Strauss (1986), "Does Better Nutrition Raise Productivity?" Journal of Political Economy 94, 297–320.

1.3 Economies of scale and hospitals in Scotland

The Scottish Office was asked by the Secretary of State for Scotland to recommend how resources in the National Health Service could be best allocated in Scotland. In 1999 the executive reported its findings. One of its chief concerns was to assess the costs of delivering health services to very different geographic areas, so as to ensure an equitable distribution of resources.

One aspect of this analysis was to analyze the implications of remoteness and rurality for the costs of providing hospital services and other medical services. The costs of running hospitals in rural areas were considered to be higher than those in urban areas because rural hospitals usually operated on a small scale.

The report noted that large scale hospitals had the following advantages:

- They could spread their fixed assets, such as operating theatres and diagnostic equipment, over a greater volume of patients, thereby reducing average costs.
- Specialist staff in larger hospitals could be used more efficiently.
- Large hospitals required a smaller margin for reserve capacity to cope with variability of demand. Small hospitals would require proportionately more reserve capacity to deal with unexpected variations in demand, such as a sudden increase in births.

- The report also noted that large hospitals provided more staff development, leading to efficiency gains.

The evidence showed that the average cost of providing health services was greater in small hospitals than in large ones. In the case of the large mental illness hospitals, the average cost of patient care was around £700 a week; in the smaller hospitals, the equivalent figure was £900 a week. Similar cost differences were found in acute hospitals, maternity units and institutions caring for the elderly.

Source: Pair Shares for All Technical Report. National review of resource allocation for the NHS in Scotland, Scottish Executive, July 1999. www.scotland.gov.uk/library2/doc02/fsat-00.htm

1.4 Baseball Averages

Marginal product is above average product when average product is rising and below average product when average product is falling. This relation is a general property of marginals and averages. A useful illustration is a baseball player's batting average. The batting average is defined as the number of hits divided by the number of times at bat. Suppose a player starts a game with an average of .300. If the player gets two hits out of four at bats, the marginal batting average for the day is .500 and the player's batting average must rise. If the player gets one hit out of four at bats, the marginal is .250 and the overall average must drop.

1.5 Economies of Scale and Learning Effects in the Chemical Processing Industry

Marvin Lieberman studied economies of scale and learning effects in the chemical processing industry. He found that for each doubling in plant size, average production costs fell by about 11 percent. For each doubling of cumulative volume, the average cost of production fell by about 27 percent. Thus, there is evidence of both economies of scale and learning effects in the chemical processing industry. The size of the estimates suggests that learning effects are more important than economies of scale in explaining the observed decline in costs within the industry from the 1950s to the 1970s.

Source: M. Lieberman (1984), "The Learning Curve and Pricing in the Chemical Processing Industries," Rand Journal 15, 213–288.

1.6 Economies of Scale and Scope in Apartment Management

Home Properties of New York is a real estate investment trust specializing in apartment communities in select Northeast, Midwest, and Mid-Atlantic markets. Board Chairman Norman Leenhouts noted: "Since the beginning of last year, we have more than doubled the size of our owned portfolio. By concentrating our growth in our core markets, we are realizing material scale economies—especially in advertising and personnel costs. Moreover, we exploit scope economies by identifying best practices in our different markets and exporting those practices to properties throughout our portfolio."

Source: "Home Properties Reports Record Second Quarter 1999 Results" (August 5, 1999), PR Newswire.

1.7 Economies of Scale and Scope in DSP Production

In 1999, Texas Instruments was the leading producer of DSPs (digital signal processors). Its DSPs powered roughly two of every three digital phones, most high-performance disk drives, and a third of all modems. They also are used in a myriad of other products including digital cameras, Internet audio, digital speakers, hand-held information appliances, printers, electric-motor controls, and wireless

networking equipment. DSPs are programmable. They are especially good at performing superfast real-time calculations, which come in handy when you want to compress, decompress, encrypt, or filter signals and images. Programmability helps keep DSPs inexpensive to produce. The major difference between a DSP in a cell phone and a DSP in a digital camera is the software that tells it what to do. Thus TI gains substantial *economies of scale* in DSP production even though the chips are used in a variety of products. It also enjoys *economies of scope*. For instance, it is able to leverage technological developments across its various products. While TI was notably slow in technology development a few years ago, it is now a world leader. For example, it makes a cell-phone chip whose circuits are just 0.18 micron (millionth of a meter) apart. This distance is similar to Intel's and IBM's most advanced chips.

Source: E. Schonefeld (1999), "Hotter than Intel" Fortune (October 11), 179-184.

1.8 Substitution of Inputs in Home Building

Builders in the Pacific Northwest use large quantities of wood in the construction of residential houses. For instance, wood is used for framing, siding, floors, roofs, and so on. Homebuilders in the Southwest (for example, Arizona) use much more stucco and tile in home construction. An important reason for this difference is that, in contrast to the Pacific Northwest, the Southwest does not have large nearby forests. This example suggests that homebuilders are able to substitute among inputs in building a home. Homebuilders in the Southwest, however, still use wood to frame the house: The substitution of other inputs for wood is not complete.

1.9 General Motors Is Shanghaied

In the late 1990s, General Motors participated in a \$1.5 billion joint venture with a state-owned enterprise in China. The Buicks produced at the resulting state-of-the-art Shanghai plant were considered to be the highest-quality cars of that model being produced anywhere in the world. Production costs, however, were extremely high. One important reason for the high costs was government regulation. The Chinese government dictated what products could be built, as well as how many, and at what price. The government also restricted the input mix. For instance, in 1999 GM was required to use locally made components equaling 40 percent in terms of value and 60 percent in 2000. Thus although GM has shared important technology with its Chinese partner, government constraints have precluded efficient production. High costs have limited the joint venture's ability to export cars to other countries.

Source: L Kraar (1999), "Chinas Car Guy," Fortune (October 11), 238-246

1.10 Job Seekers Use Internet

Posting résumés on the Internet is growing in popularity. In 1999, there were almost five million résumés on the Internet—200 times as many as 1994, according to Computer Economies. The number of job-related Web sites is expected to grow from about 200 in 1998 to 1,200 in 2002. This explosive growth is a response to the advantages of online job searches. Candidates can reach a larger audience with greater ease. And recruiters can reduce paperwork and travel. But this flood in job candidates sending online résumés has created unexpected headaches for employers. Some companies are getting thousands of résumés dumped into their e-mail boxes each day. Others, fed up with mass e-mailed résumés, yearn for a more personal touch. "You get tons of stuff from people who aren't qualified," says Michael Erbschloe of Computer Economies, a Carlsbad, CA, research firm. "The content of the e-mail is horrible. It bogs down your mailbox and your server." Thus in the production

of job offers, the reduced cost of distributing information about themselves using the Internet has resulted in huge volume of e-mail as job seekers substitute away from more expensive alternatives.

Source: S. Armour (1999), "Online Resumes Bogging Down Employers," Democrat and Chronicle (July 19), 1F.

1.11 DeLorean Automobiles

The difficulties of competing with plant sizes significantly below the minimum efficient scale are highlighted by the experience of the DeLorean Motor Company. John Z. DeLorean had been a high-ranking executive at General Motors. He left GM in 1979 to form his own automobile company, the DeLorean Motor Company. The strategy of the new company was to specialize in high-priced luxury sports cars. The company's first (and only) car was the stainless-steel DMC12 with a list price of \$29,000—quite a high car price in the early 1980s. Although the minimum efficient scale is relatively large in auto production, DeLorean felt he could compete by designing higher-quality sports cars than the large auto companies. Planned production for 1980 was 3,000 cars. The company soon ran into financial difficulties. In 1982, DeLorean was accused of conspiring to buy and distribute 220 pounds of cocaine valued at \$24 million. Federal officials asserted that DeLorean was entering the drug business to help save his ailing automobile company. Although DeLorean was later acquitted on these charges, the company still faced insurmountable financial difficulties and soon went out of business.

1.12 Public Utilities

The production of electric power typically is associated with large economies of scale: The average cost of producing electricity decreases with the quantity produced. This production characteristic implies that it is generally more efficient to have one large plant that produces power for an area than several smaller plants. A problem with having one producer of electric power in an area, however, is that the firm has the potential to overcharge consumers for electricity since there are limited alternative sources of supply. Concerns about this problem provide one motivation for the formation of public utility commissions that regulate the prices that utility companies can charge consumers.

1.13 Attention consumers: creativity never comes cheap

See Economic Viewpoint by R.J. Barro (last page of pdf)

1.14 Minimum Wage Laws

The minimum wage in the United States was increased to \$5.15 on September 1, 1997. President Clinton and other proponents of this action argued that the poor would be substantially better off as a result of this increase. The analysis in this chapter indicates why many economists and politicians are skeptical about this claim. Although it is true that the increase in minimum wage makes some workers better off by increasing their wages, other individuals would be made worse off. In particular, the increase in the wage rate is likely to motivate firms to substitute away from low-skilled workers toward more automation and additional high-skilled workers. Thus, the number of employees hired at the minimum wage is likely to decline with an increase in the wage. Estimates suggest that when the minimum wage was increased from \$3.35 to \$4.25, employment among teenage men fell by 7.29 percent, and employment among teenage women fell by 11.34 percent; employment among teenage blacks fell by 10 percent. Minimum wage workers who retain their jobs are better off; but individuals who want a job, yet cannot find one, are worse off.

Source: D. Deere, K. Murphy, and F. Welch (1995), "Employment and the 1990-1991 Minimum-Wage Hike," *American Economic Review* 85:2, 232-237.

1.15 Television and newspaper publicity

In most countries, professional sports such as football probably could not survive without the free publicity they receive through newspaper, television and radio coverage. Equally, sports coverage is essential for the ability of the print and broadcasting media to attract readers, viewers, listeners and, thereby, advertising revenue.

For a long time, it has been assumed by sports administrators and academies that if a sports fixture is the subject of live television coverage, spectator attendance may be adversely affected. However, the statistical evidence for a negative impact of television coverage on attendance is rather mixed: some studies find such an effect, while others find no effect.

Other relevant factors include the following:

- Even if attendance is affected, the loss of gate revenue might be compensated by direct income from the broadcaster, or indirect income from advertising or sponsorship within the stadium.
- The broadcasting rights might be more valuable if the stadium is full, due to the improved atmosphere created by a capacity crowd. Consequently, there might be a case for offering cheaper ticket prices to spectators attending televised matches.

1.16 City population and per capita income

There is a natural tendency for the strongest teams to be located in the cities with the largest population and/or largest *per capita* incomes. Teams with the largest potential or actual markets tend to generate the most income. In the long term this usually translates into playing success.

In the North American major league sports (baseball, American football, basketball and hockey), membership of the major leagues is closed: there is a fixed number of franchise-holding teams. In the longer term, franchises tend to gravitate towards the largest cities that can afford to pay the highest subsidies. In Europe, membership of the top divisions is regulated through the promotion and relegation System:

- If a small market team is promoted to the top division, its lack of spending power often ensures speedy relegation.
- If a big market team is relegated to a lower division, its high spending power will usually guarantee promotion back to the top division sooner or later.

1.17 Stadium facilities and hooliganism

In England, anecdotal evidence suggests that hooliganism and the antiquated, dilapidated physical condition of many football stadium made a major contribution to the long-term decline in football attendances between the late 1940s and mid-1980s. Aggregate attendances for English league football fell from 41.0m in the 1948-9 season to 16.5m in the 1985-6 season, before recovering to reach 29.9m in the 2007-8 season.

Since the mid-1980s, incidents of hooliganism affecting English football at club level have become much less frequent. Over the same period, the stadia of most leading clubs have been significantly upgraded or

completely rebuilt. Since the mid-1990s, Premiership clubs have been required to provide seated viewing accommodation only; many lower-division clubs have done so as well.

1.18 Uncertainty of outcome and competitive balance

It is widely assumed by sports economists that spectator interest in sport depends on uncertainty of outcome. There are three (related) types of uncertainty of outcome:

- Degree of uncertainty concerning the result of an individual match.
- Degree of uncertainty concerning the end-of-season outcome of a championship race or a battle to avoid relegation.
- Degree to which championship success is concentrated in the hands of a few teams, or spread among many teams, over a number of years.

In today's English Premiership, there is less of all three types of uncertainty of outcome than in the equivalent competition (the Football League) 20, 30 or 50 years ago. There has been extensive debate concerning the usefulness of policy measures designed to promote competitive balance and increase uncertainty of outcome:

- Capping of teams' total expenditure on players' wages or salaries.
- Sharing or pooling of gate or television revenues.
- The US draft pick System, whereby the weakest teams from the previous season get first choice of new players turning professional for the first time.

2 Part II: Production and markets

2.1 Gains from Trade: The Story of McDonald's

McDonald's Corporation, with over 24 000 restaurants in 114 countries, is the largest fast-food company in the world. Its worldwide sales in 1998 were over \$36 billion. Although Ray Kroc often is given credit for founding this company, the history of the restaurant goes back to 1937 when two brothers, Dick and Mac McDonald, opened a drive-in restaurant. These brothers conceived of the idea of a clean, efficient, quick-service restaurant with a limited menu featuring hamburgers and French fries. However, Kroc had the vision and the ability to take this idea and expand it nationwide. Taking advantage of potential gains from trade, the McDonald brothers sold Kroc the exclusive rights to franchise copies of their operation. This transaction resulted in one of the most successful business operations of all time.

*Source: C. Shook and R. Shook (1993), *Franchising: The Business Strategy That Changed the World* (Prentice Hall: Englewood Cliffs, NJ).*

2.2 Shifts in Demand, Quantity, and Price at the Ryder Cup

The Ryder Cup features competition between top American and European golfers. It has become one of the more prominent golfing events in the world. In 1995, the Ryder Cup was held at Oak Hill Country Club in Rochester, New York. The event attracted over 30,000 spectators a day. Many of these spectators (for example, Prince Andrew of Great Britain) were from outside the Rochester area.

A significant number of these visitors were avid golfers who wanted to play while they were in Rochester. Rochester has several courses that are open to the public. However, many courses in the area are private (only members and their guests can play). Facing this dramatic temporary increase in the demand for public golf courses, several of the private courses decided to become public during the week of the Ryder Cup. These courses charged high fees ranging from \$100 to \$250 per round (their normal guest fees were approximately \$50). This example highlights that shifts in demand motivate increases in the quantity supplied and the price of a product (in this case, golf times).

2.3 High Prices and Criminal Activity: Computer Chips Become a Big Black-Market Item

The strong incentives that high prices provide to suppliers to bring products to market unfortunately can be seen in the activities of criminals. Intel 486 chips sold for about \$450 to \$500 in 1993. These prices motivated increased theft of computer chips. For example, in September 1993, six masked men overwhelmed employees at one of Intel's right distributors, making off with \$739,000 of microprocessors. Many similar robberies have been reported. According to *The Wall Street Journal*, "Forget drugs. Forget arms. If you want to make a black-market killing these days, steal computer chips. Chips are the dope of the 90's." Fortunately, the high prices of computer chips also have motivated legal activity to increase chip supply—other computer companies have developed producers to compare with Intel.

Source: E. Gonzales (1993), "Chips Become Big Black-Market Item," The Wall Street Journal (September 16), B1.

2.4 Supply of Online Résumés Bogs Down Employers

The Internet has reduced significantly the cost of submitting résumés to would-be employers. Job seekers no longer must print their résumés on high-quality paper, address, stamp, and mail an envelope. A click of the mouse and the résumé is gone. Some companies have thousands of résumés dumped into their e-mail boxes each day. During 1999 there were almost 5 million résumés on the Internet—200 times more than in 1994. When the cost of a good (like submitting a résumé) falls, the quantity supplied increases.

Source: S. Armour (1999), "Online Résumés Bogging Down Employers," Democrat and Chronicle (July 19), 1F.

2.5 Learning the law of Demand the Hard Way

Mercury One-2-One is a British mobile-phone company. In a promotion to attract new customers, the company offered free telephone calls on Christmas to customers who signed on between November 8th and Christmas Eve.

The company "never dreamed its customers would be so generous in spreading the holiday cheer." The promotion generated more than 33 000 hours of calls, jamming the network and prompting hundreds of complaints from people who couldn't get through to place their calls. The volume on Christmas was about 10 times the daily average. Many people placed overseas calls and simply left the phone line open, logging free international calls of up to 12 hours. The average call was about 1.5 hours long; the typical caller rang up about \$60 worth of calls—equal to the average monthly bill of a cellular company in the United States. The promotion ended up costing the firm millions of dollars. One

member of Parliament vowed to file a complaint with Britain's Board of Trade. To quote one executive of the company, "There's certainly been insatiable demand."

Source: K. Pope (1994), "Phone Company's Gift of Gab Jams Its Line", The Wall Street Journal (December 28), B1.

2.6 Increased Foreign Competition and Demand Elasticities

Price elasticities for products usually increase with available substitutes. In recent years, there has been a dramatic increase in the amount of foreign competition facing many American companies. One result has been an increase in the demand elasticities for many American products. A specific example is film produced by Eastman Kodak. For years, Kodak had a virtual worldwide monopoly in the production of film. Correspondingly, consumers were relatively insensitive to the price of Kodak film—they had no alternative sources. Kodak now faces intense pressure from Japan's Fuji Corporation. Competition also comes from producers of store-brand film, such as the 3-M Corporation in the United States (store-brand film is sold under the store name at large discount drug, retail, and grocery stores). As a result, the demand for Kodak film is much more price-elastic. This change in price elasticities has motivated Kodak to change its pricing and product development strategies: It can no longer focus exclusively on selling high-quality film at high prices.

2.7 Short-Run versus Long-Run Effects of Increases in Gasoline Prices

In the 1960s, gasoline sold for about 25 cents per gallon in the United States. At this price, Americans tended to purchase large, powerful automobiles with poor gas mileage. In the early 1970s, Americans experienced an extraordinarily disruptive gasoline crisis. Not only did the price rise but for a time there were shortages of gasoline; people had to wait in line sometimes for hours to fill their tanks. The increase in gasoline prices and waiting times resulted in a near-term decline in the quantity demanded of gasoline (people carpooled, drove less frequently, etc.). The longer-term effect was much greater; in response to changes in consumer demand, car companies began designing smaller, more fuel-efficient automobiles. Currently, many cars travel at least 20 miles per gallon (and often much more). In the 1960s, many cars traveled fewer than 10 miles per gallon.

2.8 First-Mover Advantages and Financial Innovation

US investment banks have introduced an impressive list of innovative financial products. Bankers estimate that developing a new financial product requires an investment of \$50,000 to \$5 million. Yet the securities they create cannot be patented and SEC regulations compel innovators to disclose quite detailed information about product design. Thus rivals can copy the product at low cost and exploit the innovating bank's investment in educating investors, issuers, and regulators. Bankers estimate that imitators incur costs that are only 25 to 50 percent of the costs incurred by innovators. If financial innovation is profitable, these cost disadvantages of innovation must be offset by other benefits—first-mover advantages. These advantages might include higher prices, lower costs, or larger volume.

In a study of 58 financial innovations that raised almost \$280 billion over the period 1974—1987, there is no evidence that innovative banks charged higher prices during the brief "monopoly" period prior to the introduction of imitative products. In the longer run, they actually charged prices that were lower than those of their imitative rivals. This result should not be extraordinarily surprising. Investment banks typically choose one of their best customers as the issuer of an innovative product. These issuers will have special burdens placed on them in explaining the innovative product to investors, regulators, and rating agencies. If immediately following the offering, a rival firm were to issue an imitative

product at a lower cost using a competing investment bank, the firm's managers might be understandably annoyed. Thus, investment banks profit from product innovation in ways other than charging higher prices. They underwrite more offers of the products they innovate than do imitating rivals. Innovation also appears to lower costs by allowing banks to exploit economies of scope and learning effects.

Source: P. Tufano (1989), "Financial Innovation and First-Mover Advantages," Journal of Financial Economics 25, 213–240.

2.9 Using Technology to Assess Demand

The ACNielsen Corporation has been using handheld computers known as *la maquinita*—the little machine—to collect information on the buying habits of Hispanics. As part of a pilot program in Los Angeles, 500 Latino households are taking all their household purchases and scanning their bar codes into the device. This is the first time that comprehensive information has been collected on the buying habits of the Latino community, which now represents 12 percent of the US population. Eventually ACNielsen will sell the database to consumer product firms. The likely upshot will be more spending on ads targeting the Latino community. In 1998, an estimated \$1.71 billion was spent on advertising to Latinos, representing about 2 percent of total advertising dollars in the United States. This example highlights how new technologies are being employed to assess product demand.

Source: R. Wartzman (1999), "A Push to Probe Buying Habits in Latino Homes," The Wall Street Journal (August 5), B1.

2.10 On Estimating Demand Curves for Common Stocks

There has been a long-running debate over the demand elasticities of common stocks of individual firms. Many economists argue that these demand curves are perfectly elastic, since there are numerous stocks with similar risk-return characteristics available in the market. In this case, the demand curves for individual stocks are horizontal. Others argue that each stock is unique and has very few substitutes. Here, the individual demand curves would be downward-sloping.

Managers care about the slopes of the demand curves for their common stock since these slopes affect the price at which they can sell new securities. If demand curves slope downward, price must be decreased below the current market price to sell new securities. If demand curves are horizontal, new securities can be issued at the current market price. Managers, of course, want to sell new stock at the highest possible price.

The existing empirical evidence suggests that stock prices decline by about 3 percent when firms announce new issues of common stock. This finding seems to suggest that the demand curves for common stocks are downward-sloping. This finding, however, is subject to alternative interpretations. If the stock market thinks that firms tend to issue new stock when they are overvalued, an announcement of a new issue will cause the entire demand curve to shift down and price will decline (since the market infers from the new information that the firm is overvalued). The observation that prices decline when new stock is issued is not sufficient to allow us to identify the price elasticity of a firm's common stock—the price decrease might be due to either a shift in demand or a shift in quantity demanded.

This example illustrates that it is not always easy to estimate demand curves, even when data on prices and quantities are readily available. Indeed, the data on prices and volumes for publicly traded securities are among the best available in the world.

Source: C. Smith (1986), "Investment Banking and the Capital Acquisition Process," Journal of Financial Economics 15, 3-29.

2.11 Rich Manufacturing (optional - refers to cost-plus pricing)

Gina Picaretto is production manager at the Rich Manufacturing Company. Each year her unit buys up to 100,000 machine parts from Bhagat Incorporated. The contract specifies that Rich will pay Bhagat its production costs plus a \$5 markup (*cost-plus pricing*). Currently, Bhagat's costs per part are \$10 for labor and \$10 for other costs. Thus the current price is \$25 per part. The contract provides an option to Rich to buy up to 100,000 parts at this price. It must purchase a minimum volume of 50,000 parts.

Bhagat's workforce is heavily unionized. During recent contract negotiations, Bhagat agreed to a 30 percent raise for workers. In this labor contract, wages and benefits are specified. However, Bhagat is free to choose the quantity of labor it employs.

Bhagat has announced a \$3 price increase for its machine parts. This figure represents the projected \$3 increase in labor costs due to its new union contract. It is Gina's responsibility to evaluate this announcement.

Discussion Questions

1. Why do many firms use cost-plus pricing for supply contracts?
2. What potential problems do you envision with cost-plus pricing?
3. Should Gina contest the price increase? Explain.
4. Is the increase more likely to be justified in the short run or the long run? Explain.
5. How will a \$3 increase in the price of machine parts affect Gina's own production decisions?

BY ROBERT J. BARRO

ATTENTION CONSUMERS: CREATIVITY NEVER COMES CHEAP



FOREVER:
Whether you
are buying a
music CD or
prescription
drugs, the
cost of
development
has to be
part of the
price

What do Napster Inc. and proposals to limit prescription drug prices have in common? Both seek to reduce prices of goods that cost little to produce but were expensive to create initially. Cutting prices today looks great for users and, arguably, for society as a whole. If it costs virtually nothing to copy a CD over the Internet, why should people not be able to copy and listen to the music, rather than having to pay \$15 down at the local store? If it costs only a few dollars to produce and distribute a standard quantity of Prozac, why should people not be able to buy the drug at \$10, rather than at \$100?

The problem is that the "high" price is the reward for the costly, long-term effort that went into the creation of the product. Music companies and artists expend time and money to create hits, and the bulk of the expenses goes into failed projects. To compensate for these efforts and to provide incentives for future hits, the industry has to reap large profits on its few successes.

IT'S ONLY FAIR. Piracy has long been a problem for producers of music and similar items, such as books, movies, and computer software. The incentive to abridge intellectual-property rights reflects the big gap between the prices charged by the copyright owners and the actual costs of copying and distribution. Innovations in the Internet and computer technology have dramatically lowered these costs. These advances are desirable because they allow products to reach a vastly expanded audience.

But there is a downside as well—the threat to intellectual-property rights. These rights are partly a matter of fairness, in the philosophical sense that inventors ought to be able to control the use of their discoveries. But more concretely, if intellectual-property rights disappear and no other effective method of compensating creativity is adopted, we will see much less brilliance in future music, books, movies, and software.

It may be that the Internet makes impossible the effective enforcement of intellectual-property rights in certain areas. If so, we are likely to be in trouble with respect to future creations. However, the best policy for now would be to maintain the highest feasible degree of property rights, and the pursuit of the legal case against Napster is a helpful part of this policy.

Prescription drugs are similar in many respects, although the Internet has not yet figured out how to physically copy drugs. However, the costs of sale and distribution will likely be reduced significantly because of the Net, once ef-

fective ways are developed to ensure the identity of the buyer.

One way to see that prices of patented drugs exceed current costs of production is to compare U.S. prices with the lower ones in some other countries. For example, Prozac sells in Canada for less than half of its U.S. price. Some people deduce that the U.S. ought to adopt Canada's single-payer policy for prescription drugs or, alternatively, allow reimportation of the cheaper pharmaceutical drugs back into the U.S. A more reasonable view is that the incentives for drug research and innovation created by high U.S. prices give Canada, Mexico, and other countries a free ride. If the U.S. were to follow Canadian policies, then fewer new drugs would be available in the U.S. and the rest of the world.

Complaints about high drug prices are on the rise, and the irony is that pharmaceutical companies would be facing fewer attacks if they had been less successful at developing new drugs. The winners of recent years include antidepressants, ulcer medications, agents to lower cholesterol levels, new types of antibiotics, and protease inhibitors to fight HIV. One would have thought that people would prefer the current environment, with many effective new drugs at high prices, to one with few or no new drugs at low prices. This choice is the relevant one for society, but many people pretend that they can have both low prices and many new drugs. It isn't so.

WHO PAYS? Particularly depressing are current suggestions for "solving the problem" by subsidizing purchases of prescription drugs through Medicare. If we have decided (I would say wisely) not to reduce the rewards to pharmaceutical companies for effective drugs, then the question becomes: Who shall pay for them? Adding drug purchases to Medicare means that payment will come from the general taxpayer rather than elderly users.

This shift might be defensible, despite the budgetary costs, if seniors were poorer than average. However, the opposite is now true, particularly because of the past expansions of Social Security and Medicare. The elderly are among the more well-off groups in America today.

Proposals for additional public spending on new health-care entitlements makes one year for the bad old days of budget deficits. At least at that time, attention was focused on effective ways to curb Medicare, rather than on ways to expand it.

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