

Manufacturing the Future: A History of Western Electric

By Stephen B. Adams and Orville R. Butler, New York: Cambridge University Press, 1999, 269 pp., \$34.95 hardcover.

The subtitle of this book might easily suggest that it is just another laudatory company history created by internal public relations specialists. Not so. Western Electric was unusual, if not unique, in several ways: (1) It had a 127-year history that spanned the communications revolutions of the nineteenth and twentieth centuries; (2) it was unique as a captive supplier of a regulated monopoly; (3) the company's innovations in quality control and industrial psychology were adopted worldwide yet only slowly adopted internally; (4) in response to government initiatives, the company became a leader in equal opportunity; (5) it was severely affected by "creative tension" between its parent (AT&T) and the government, so that, although itself not regulated by the government, its role was constantly narrowed to the manufacture of domestic telephone equipment; and (6) with divestiture by AT&T in 1984, it emerged as Lucent Technologies, a new darling of Wall Street that now ranks among the top ten public companies in market capitalization.

Surely there are lessons for business economists in such a story, including economic history, regulation, technological innovation and



implementation, plus labor and government relations. The authors have produced a readable and informative book. The book was the idea of Dan Stanzione, the president and chief operating officer of Lucent, but the authors were given a free hand, along with access to company personnel and records. Therefore, the book presents a factual history, warts and all. The authors are distinguished scholars: Dr. Adams is the Gordon Cain Fellow at the Chemical Heritage Foundation and Dr. Butler is the historian for the Academy of Management's International Management Division.

Western Electric's parents were Western Union in the 1870s and AT&T in the 1890s. The company also was the product of very strong leaders through most of its history, but especially at the beginning. Enos Barton and Theodore Vail were "straightlaced, honest and paternalistic," and their divergent visions helped shape the company. Barton, Western Electric president from 1886 to 1908, sought to give the company a broad scope as a "department store of electrical apparatus." Vail, president of AT&T from 1885 to 1887 and 1907 until 1919, wanted to restrict the company to a telephone apparatus manufacturer. Vail's idea prevailed through much of its history. Western Electric innovative creations—adding sound to motion pictures, developing typewriters, manufacturing calculating machines and distributing appliances—were passed to others because they were not a part of Western Electric's core mission. Graybar Electric Company took over the distribution of electrical equipment, ITT got the international operations, and Bell Labs became the R&D arm of AT&T.

Western Electric continued to focus on production of domestic telephone equipment, with emphasis on quality, efficiency and good financial reporting.

The company's role as a manufacturing company was changed dramatically by the advance of technology. In the 1970s and 1980s, large plants, large work forces, and rewards for service and loyalty were all changed by specialized production of increasingly complex electronic devices using automated fabrication. From 1970 until the antitrust settlement in 1982, the work force shrank by 29 percent while revenues increased 115 percent. Old-style plants were closed, and merit-based incentives replaced paternalism, loyalty, and rewards for length of service.

However, the final demise of Western Electric was tied more to the 1982 settlement with the Justice Department. The regional operating companies were separated, and AT&T kept Western Electric and Bell labs. Western Electric was restructured and its functions spread among various lines of business in AT&T. The company's name disappeared in 1984, but many of its functions were spun off by AT&T, along with Bell Labs, as Lucent Technologies in 1998.

Unlike other large companies, the direction and ultimate fate of Western Electric was decided not by competitive forces but by decisions of the principal customer (the parent company) and the government. Western Electric officials often were not part of the decision-making process, nor were they often consulted on actions that would affect the company's future. Nevertheless, Western Electric was a giant among

U.S. manufacturing companies and for many years provided leadership in areas of production, innovation and financial administration. In the economic history of the United States, it was a company the like of which we are not likely to see again.

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The Age of Modularity: Using the New World of Modular Products to Revolutionize Your Corporation

*By Peter O'Grady, Iowa City: Adams
and Steele Publishers, 1999, 247
pp., \$49.75 hardcover.*

One of the hot buzzwords in business today is "mass customization." This is the process by which consumers can order, and have delivered quickly, custom-designed products, but at mass-market prices. It is counter to the tenets of mass production as done by Henry Ford, who was able to drastically drive down the price of automobiles by delivering a homogeneous product. The amount of choice in a Model T was exemplified by his statement that a customer could have any color he wanted "as long as it was black."

In *The Age of Modularity*, Peter O'Grady, Professor and Chair of the Department of Industrial Engineering at the University of Iowa, shows how modularity not only can help organizations achieve mass customization, but also shorten product development cycles, speed tech-

nological change, and help lower cost. Modularity is the process of assembling final products from a number of predetermined and interchangeable modules. Because there may be many different module choices, a broad range of products can be offered. The book is not theory, but based on practices by companies such as Microsoft, Boeing, Chrysler, Fidelity Investments, 3Com, Motorola, Swatch, Nippon-deno, Ford, ContiTires, Northern Telecom and Sun Microsystems.

He developed seven key findings as to what modularity can do. Product development times can be reduced by an order of magnitude; product variety can also be increased by at least an order of magnitude; capital requirements for new products can be substantially reduced; modularity can reduce overall costs; as well as design flexibility, ease of upgrade, and faster technological change.

While the companies he looks at stretch across a number of industries, he bases more of his examples in the PC hardware and software industries than anywhere else. He shows how, because the PC is made up of a number of discrete modules such as a CPU, hard drive, modem, etc., that the pace of technological change was able to move at a break-neck speed.

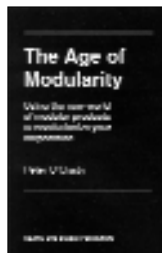
With modular products, the crucial design problem is one of designing the interfaces between the modules, which may be mechanical, electrical, data, or all three. For instance, a computer modem manufacturer knows the specifications for how its product physically fits into the expansion slot; how it passes data to the rest of the computer; and how it draws power. Those are the same for every modem manufacturer, and allow for interchangeable modems. The manufacturers put their creative

efforts instead into making modems faster.

Interfaces don't have to be complex. A simpler example is the standard telephone jack. Because of the standard design, a whole range of phones, answering machines, faxes, and modems can be connected to the telephone network. Simpler still—consider the light bulb. Because of the standard mechanical interface for the light bulb, we have an almost infinite variety of lighting devices.

This design process often puts the module integrator, who controls the overall architecture design of the interfaces, in a dominant position. But the position may not be permanent. For example, IBM controlled the design phase of the first PC, and it gave them a temporarily dominant market share, but since the design of the PC was open, it was possible for both module integrators and module providers to come into the market. It was not long before two module suppliers, Intel and Microsoft, as well as more nimble integrators supplanted IBM from leadership in this industry. (He shows how Compaq surpassed IBM as an integrator, although owing to the lags in the book publishing business, he ends that particular story before Dell passes Compaq in turn. In fact, perhaps the best current example of modularity and mass customization from a consumer point of view, is the computer ordering process at the Dell web site, www.dell.com.)

The author compares the overall module design and manufacturing process to that of a typical integrated design product, in at least one case within the same company. He shows how Boeing uses a modular design philosophy with success in their Delta IV rocket program, but does not use it in their commercial aircraft business. He also shows how Microsoft has used modularity to great effect in the



Windows CE operating system. Left unsaid, however, are the problems that Microsoft is having in bringing their more integrated Windows 2000 operating system to market.

Modularity can be applied to both “hard products” which are physical goods, as well as “soft products” which can be services or software. O’Grady devotes his last chapter to information products, which play an increasingly important role in our economy. Modularity is important to them because what makes these products different often makes it a “winner take all” market. They are costly to develop but cheap to reproduce. They have a network effect, in that they become more useful as more people use them. There are switching costs that tend to lock-in users, and there is positive feedback and tipping. Because of these factors, modularity’s advantages in speed and in adapting to technological change make it especially suited to information products

The book itself is concise and well organized, free of jargon, and driven by examples throughout. However, because there is a 35 page executive summary, overviews at the beginning of each chapter and a list of key points at the end, I felt a slight case of déjà vu as I read the book. But as a starting point to understanding the modular design process, and how your company can adapt to it, it is a clear roadmap.

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The Spatial Economy: Cities, Regions, and International Trade

*By Masahisa Fujita, Paul Krugman,
and Anthony J. Venables, Cambridge,
MA: The MIT Press, 1999, 367 pp.,
\$35.00, hardcover.*

The *Spatial Economy* will likely become the cornerstone of the revitalized field of economic geography. Economic geography has always been a critical link in the stories economists have told, but most have regarded the field as essentially intractable. The new willingness to work in this field results largely from new tools (especially those from international trade and growth theory) that have removed some of the technical barriers that once prohibited extensive research efforts in this field.

The authors rely heavily upon the familiar Dixit-Stiglitz model of monopolistic competition that offers a way to respect the effects of increasing returns at the level of the individual firm but simplifies things enough to avoid getting bogged down in the details of increasing returns. This model is used to answer two very useful questions: (1) What are the conditions under which a spatial concentration of economic activity is sustainable, and (2) when is a symmetric equilibrium, without spatial concentration, unstable? Before answering these questions, however, the authors present a useful review of both urban economics and regional science.

Urban economists are familiar with the classic monocentric city model, which is augmented by a theory of agglomeration based on exter-



nal economies, and it is this model that underlies much of the analysis in the book. The classic monocentric model of urban economics is von Thunen’s model substituting commuters for farmers and substituting a central business district for von Thunen’s isolated town. As urban economists recognized, we do not see monocentric models in reality. As a result, they developed models that do support a polycentric urban structure. This book is meant to serve as a complementary work in many respects to the existing urban economic work. While most of the traditional literature focuses on how and why economic activity spreads out from a city center (centrifugal forces), Masahisa Fujita, Paul Krugman, and Anthony Venables develop a theory of spatial organization that takes account of the distance-related tension between centripetal and centrifugal forces.

A brief review of the existing tenets of regional analysis follows in which the authors work through the development of a spatial version of the Dixit-Stiglitz model of monopolistic competition. In this framework, externalities emerge as a result of interactions involving economies of scale at the firm level. The benefit of this treatment is that there is no direct assumption of external economies, which is what exists in most traditional urban models. One unusual feature of the Dixit-Stiglitz approach is that the range of manufactures supplied becomes an endogenous variable. It therefore becomes very important to understand the impact on the consumer of a change in the number and variety of goods and services offered.

Some time is spent laying out the mathematical details of the Dixit-Stiglitz model as it applies to spatial analysis in Chapter 4. The important results are those that lead to agglom-

eration effects: (1) An area with a large manufacturing sector tends to have low price indexes for manufactures; (2) areas with a large demand for manufactures tend to have disproportionately large manufacturing sectors because of the home market effect; and (3) manufacturing workers themselves demand manufactured goods so that locations with large concentrations of manufacturing also tend to have large demand for manufactured products.

The core-periphery model is then developed by setting up the Dixit-Stiglitz economy with two sectors, agriculture and manufacturing, where the geographical distribution of resources is partly exogenous and partly endogenous. Transportation costs are modeled initially as von Thunen/ Samuelson "iceberg" costs in which part of the goods in transit simply "melt away." This assumption is relaxed in Chapter 7, in which the authors develop a model of agricultural transport costs. While the core-periphery model presented here is simple enough for some basic analysis, it is complex enough to yield some interesting conclusions. It shows in some detail, for example, how spatial economies emerge from the interactions among increasing returns at the level of the firm, transportation costs, and factor mobility. The next chapter stays with the essence of this basic model, but considers the implications of multiple regions.

Interestingly, in the multiple-region model, much of the intuition from the simple two-region model carries through. According to the authors, "The same factors that work toward concentration of economic activity in that model tend to produce fewer, larger concentrations in a multiple-region or continuous-space model." This is the conclusion of the Turing analysis, taken from a classic

paper in theoretical biology, which is presented in this section.

The authors then turn to the questions of what holds a city together and why the locations of cities are so persistent; although individuals and firms that make up these cities are continually "turning over." These questions are answered with a heuristic approach. It is shown that firms locate at a cusp in the market potential function that is created by a concentration of other firms. The authors also show that cities may form along a hierarchy due to differences in transport costs and scale economies. The fundamental question of city formation is also addressed. It is shown that cities are formed by a growing agricultural population, which eventually makes it advantageous for individual producers to establish new cities. They also show that it is possible to apply their region/city analysis of earlier chapters to the processes that drive specialization and trade among nations since "international trade theory is simply international location theory."

In *The Spatial Economy*, Fujita, Krugman, and Venables bring together a variety of disparate models in an effort to bring geography and space back into the vocabulary of the economist. While much of the book is quite rigorous in its mathematical approach to economic geography, this is sure to become required reading for urban and regional economists. It is critical for many applied business economists to be well versed in the technical details of modeling spatial economies as well as to understand the major results emerging from these models. This book should also be an important tool for urban planners, international economists, and others interested in answering the important questions of how, why, and in what manner spatial

concentrations develop and are sustained.

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To Serve and Protect: Privatization and Community in Criminal Justice

By Bruce L. Benson. Foreword by Marvin E. Wolfgang, New York: New York University Press, 1998, 372 pp., \$37.50 hardcover.

Crime and crime control are big business. I have a friend—an ex-con—in the faith-based prison business who says, "Fifteen years ago, I'd go to public meetings of the Texas Department of Corrections, and there'd be a dozen people there. Now there are hundreds, and most of 'em want to sell something."

Prisons and jails now house nearly two million inmates, almost double that of ten years ago, and another four million are under supervision of the justice system outside of jails. The nation is building another thousand-bed prison each week. Over the last three decades, the share of GDP spent by the public sector on crime control has tripled and now tops \$100 billion annually. Private sector spending to combat crime in the United States exceeds an estimated \$300 billion a year.

Crime rates have declined in the 1990s, suggesting some benefit from all these resources, yet crime stubbornly remains three times higher than 30 years ago, according to FBI



statistics. These data imply a decline in the productivity of law enforcement bureaucracies.

Efficiency improvements must rest on getting incentives right, or at least close to right. Custom and law must internalize (privatize) more benefits for crime suppressors and make crime producers bear more of the costs they impose on victims, including taxpayers.

Bruce Benson, an economist at Florida State University, pursues this logic brilliantly. Benson is a veteran researcher on crime and law, and in this volume he integrates a sprawling literature in a way that transforms the whole discussion. The book works on two levels. First, it provides nearly encyclopedic coverage of private techniques in criminal justice that range from medieval Anglo-Saxon days to contracting out of corrections today. Second, it redirects attention away from social engineering goals like deterrence toward a focus on justice and individual rights and responsibilities.

Criminology has for the most part ignored a rights-based or libertarian perspective. Benson's book fills that void. His premise is that justice for victims should be the goal of any justice system worthy of the name. All else follows from this moral premise.

Offenses thought of as crimes today, like murder and robbery, were once treated as private torts, with economic compensation as the primary remedy. This civil system of justice worked well and could do so again, according to Benson. With the prospect of recovery of damages, the victim had a greater incentive to report a crime, correcting a major failing in our present system where victims only report about 40 percent of crimes to the police. Restitution rights were transferable, too, thereby promoting efficiency in apprehension and liability.

Primary reliance on the state to protect property rights and control criminals is very recent, less than two centuries old in most respects. The historical reason for this evolution was that kings took away victims' property rights to restitution, and the meandering path of criminal justice in England then veered away from individualism toward collectivism. In the tradition of economists Ronald Coase and Steven Cheung, who empirically debunked the presumption that private markets must fail to supply lighthouses or pollinate fruit, Benson's historical research subverts the doctrine that a justice system is a nonexcludable "public good" that only governments can provide.

Benson is no blue-sky theorist. His careful historical treatment allows anyone to learn a great deal. At the same time, he allows the reader the ideological space to choose policy changes according to taste, from incremental to radical. Ultimately, because Benson's work is solidly anchored in history, his logic in favor of a fully private justice system is surprisingly strong, more persuasive than previous anarcho-capitalist tracts like those by Robert Nozick or Murray Rothbard.

Benson's most arresting evidence may come from Japan Inc. Japan has the lowest crime rate among industrialized nations by far, and only Japan's crime rates have fallen continuously since World War II. A primary reason, claims Benson, is that the system is more privatized and victim-oriented than ours is. The fundamental right is for the victim to be restored to his or her original condition. In contrast to our culture, a key feature of Japanese culture that apparently underlies the success of restitution is that there is no acceptable excuse for criminal activity. The criminal must bargain for forgiveness

with the victim, and if the wrongdoer negotiates an acceptable settlement package and shows true contrition, public sector punishment is lenient.

Our system is also moving toward victims' rights, recently enshrined in many state statutes and constitutions. Benson sees these as largely illusory gains, however, because prosecutor and law enforcement bureaucracies have co-opted victims' rights organizations. He urges victims' groups to forge an independent path in order to transform criminals' "debts to society" into private, transferable debts to individual victims.

Benson misses a few things like the role of faith-based and similar voluntary, nonprofit entities in the current or a more privatized justice system. Overall, however, I wish more economists were like Benson: first-rate on the narrow stuff (fairly common) and on the big stuff, too (rare).

Clearly, the crime solution lies in more individual responsibility and less governmental responsibility. Benson's daring conclusion—privatize both the demand and the supply of criminal justice services—leaves us with a wealth of provocative diagnoses. From private enterprise jobs and wages behind bars to privatizing the parole and probation system, competition and market-driven reforms could improve things immediately, at no taxpayer cost, as well as in the long run.

Benson has given us a breakthrough book. A rights-based system with property rights to restitution would produce far less crime.

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E.W. Scripps and the Business of Newspapers

By Gerald J. Baldasty, Champaign, IL: University of Illinois Press, 1999, 217 pp., hardcover \$42.50, softcover \$16.95.

Students of mass media industries—and especially those of us working in these industries—have been fascinated by the rapid evolution of Internet media and the frantic search for successful Internet business models. Bedazzled by high technology that we understand only imperfectly, it is easy to forget that this has all happened before. It happened in the newspaper industry near the end of the nineteenth century.

Professor Baldasty has written about one of the newspaper industry pioneers from that period. Edward Willis Scripps was eighteen when he left the farm in 1872 to join his half-brother James who edited the morning Tribune in Detroit. Soon after, E.W. joined his siblings in a new style daily in the same city called the *Evening News*. The *Evening News* was cheap (two cents vs. five cents), independent in politics (compared to partisan competitors), smaller in size (both format and number of pages), and aimed primarily at working class readers (to build a larger circulation). E.W. used the lessons learned with his brothers and sister to refine this model and to found and build, over the next forty years, the first nationwide chain of daily newspapers.

That forty-year span was one of rapid evolution and change in the newspaper industry. A precipitating event (and one that Professor Baldasty failed to mention) was the



development of cheap groundwood newsprint in the 1860s and 1870s. Previously the high cost of paper had kept newspapers from becoming truly a medium for the masses. It was cheap newsprint that made possible inexpensive, new style newspapers like the *Evening News*.

Another precipitating event was the rapid opening up of the midwest and west by railroads. This created rapid growth of both small and large urban centers at the nodes of the rail transportation network that was fashioning a national marketplace. These urban places provided growth opportunities for a burgeoning newspaper industry.

The development of telegraphy also brought immediacy to the content of newspapers that had not been possible before. In its own way, this can be looked at as another major cost-reducing innovation; the cost of acquiring a volume of interesting information from distant and not so distant places was dramatically reduced as well as greatly accelerated.

The technologies of publishing were far from what we know today, but they were readily available, fairly cheap at small scale, and sufficient to support a wave of industry expansion. And expand it did! Cheap paper, plentiful information, easy entry, and a multiplicity of new and growing markets created an era of explosive growth in numbers, in competition, and in size among newspapers. It also led to considerable experimentation as entrepreneurial editors and publishers experimented to find successful business models. Out of this ferment was formed the business model that we recognize as a modern newspaper and the industry that became the bedrock of mass media in America.

E.W. Scripps was one of the pioneers who took the then relatively

primitive business of newspapering and turned it into a nationwide business.

Scripps had several guiding principals. Hold costs down to the lowest possible level. Differentiate the product by seeking out working-class audiences not already well served. Integrate the chain's operations vertically as much as possible.

The working-class strategy made possible substantial circulation growth as long as prices could be kept low and cheap newsprint and rock bottom operating costs kept subscription prices down. Scripps also did not believe in heavy dependence on advertising as a source of revenue; he preferred to avoid dependence on the major department store accounts that could limit his independence and make his product less attractive to a working-class audience. This combination of tactics permitted the Scripps papers to avoid direct competitive confrontation with established (and establishment) products.

These tactics also facilitated growth of the chain. By keeping costs down and avoiding confrontation, he could economize on the amount of capital it took to found a newspaper in a new market. During the course of his career, he founded or bought some 40 daily newspapers. In the process, he built the first nationwide chain of daily newspapers.

Hearst followed somewhat later but eventually built a larger chain in terms of total circulation. There was an important difference. Hearst started with a healthy supply of capital (from the Homestake gold mine in South Dakota) while Scripps started with no capital and built on his financial success. Scripps had no political ambitions, either.

Vertical integration took the form of centralized collection of news and features with heavy use of this mate-

rial by all operating newspapers (an early exploration of the advantages of networking). He followed a deliberate strategy of founding (or buying) newspapers in locations that he regarded as important news sources. He then organized what became the International News Service (as a competitor to the then developing Associated Press service) to distribute news product among the newspapers of the chain. He also organized the Newspaper Enterprise Association to produce and distribute feature materials in the same way.

The author could carry out a signal service if he were to extend his history of the chain that E.W. Scripps built to tell us how it faltered in the 1920s and 1930s and was eventually transformed into the modern media company that it has become.

Professor Baldasty has done a good job of recounting this history and its importance in 154 pages of text. Carefully annotated and a reasonable index, run the page total to 217. The story he tells is hardly earth shattering, but it is important. Only by understanding the ways in which economic institutions have evolved in the past can we begin to explain the present and predict the future.

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The Productivity of Health Care and Pharmaceuticals: An International Comparison

By H.E. Frech, III and Richard D. Miller, Jr., Washington DC: The AEI Press, 1999, 108 pp., \$14.95 paper.

The title of this book, *The Productivity of Health Care and Pharmaceuticals: An International Comparison*, may be a little misleading. A better one might be, *The Difficulties in Comparing International Health Care Statistics, Especially with Regard to Pharmaceuticals*. The current title conveys the goal, but the book is mostly about the quest.

The goal of the authors, H.E. Frech III, a professor of economics at the University of California, Santa Barbara, and Richard D. Miller Jr., a research analyst with the Center for Naval Analyses, was “to study the production of health with emphasis on the productivity of pharmaceutical consumption and other health care.” In other words, they wanted to assess pharmaceuticals and other components of health care across international lines.

The authors begin their task with an extensive review of the available literature. Since international comparisons in health care face a number of difficulties—such as exchange rates, different methods of measuring health, cultural differences, etc.—there is always room to improve on older studies. Explaining how the authors tried to avoid the pitfalls takes up much of the book. As a result, one of the best uses of the book may be as a guide for others who are also trying to do internation-

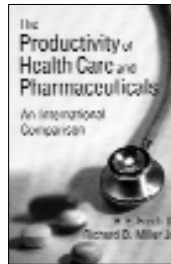
al comparisons in health care issues.

Frech and Miller point out that the first major problem is converting “a nation’s per capita pharmaceutical expenditures to U.S. dollars for the purpose of cross-national comparisons.” You can use purchasing power parity (PPP) based on countries’ gross domestic products, but the authors contend that conversions using GDP PPP exchange rates “invariably underestimate actual pharmaceutical expenditures outside the United States.” A better measure is the pharmaceutical PPP exchange rate. For example, a GDP PPP exchange rate (for the year 1985) shows that for every \$150.00 spent in the U.S., the French spent \$176.36. A pharmaceutical PPP exchange rate yields \$401.38 in spending for the French per \$150.00 in the U.S. (Pharmaceutical PPP exchange rates also more closely approximate comparisons made by economists Patricia M. Danzon and Allison Percy (1995) and a much earlier study (1986) by economist Tadeusz J. Szuba.)

Thus the authors settle on pharmaceutical PPP exchange rates for 21 OECD countries, conceding that they, “however imperfect, are the best conversion factors available” and that “our measure of pharmaceutical consumption should still be viewed as only a reliable approximation.”

As a comparison of all the countries demonstrates, “France seems to outspend the other countries significantly, with Italy and Germany at the next tier, with expenditures significantly higher than those in the United States. Switzerland and the United Kingdom tend to consume fewer pharmaceuticals than the United States no matter which measure is used.”

Even though the authors stress the role pharmaceuticals play in the health of a nation, that is only part of



their aim: "Our primary interest is the determinants of the health of a nation's citizens." The method they use is familiar to business economists. They estimate an econometric production function. Here, they look at such standard health indicators as life expectancy and infant mortality as outputs. The inputs are per capita real expenditures on pharmaceuticals, nonpharmaceutical health care, GDP, smoking, alcohol, and animal fat consumption.

Not many surprises here. The authors did discover something they consider to be surprising. "[T]he lifestyle variable with the greatest apparent effect on life expectancy at all ages is the consumption of animal fat." Apparently, developing countries would improve their health outcomes by adding more animal fat to the diet, while developed countries would enhance their health outcomes by reducing fat consumption." At low levels, increasing animal fat consumption seems to fight-off infection, but at high levels it seems to lead to cancer and heart disease.

Their primary finding has to do with pharmaceuticals. "Pharmaceutical consumption appears sur-

prisingly productive. It has positive and statistically significant relationships with the life expectancies at the ages of 40 and 60." According to the authors, pharmaceutical consumption (measured in additional days per 1990 dollar) for the United States increased life expectancy by 1.2 to 1.4 days for a 40-year-old and 1.5 to 1.8 days for a 60-year-old. This pattern follows for males and females in all of the 21 countries examined.

According to the authors, "The most interesting result is that countries such as France, Italy, Germany and Belgium—the biggest consumers of drugs—stand to gain the least by marginally increasing their drug consumption. Conversely, the beneficial effect of increased drug consumption is much higher in low-drug-consumption countries such as Ireland, where the effect is roughly five times greater than in France. The results indicate that a country such as Turkey—where drug consumption is extremely low by OECD standards—could dramatically improve life expectancy by increasing pharmaceutical consumption."

U.S. health policy experts can also learn from this book that phar-

maceuticals are a cost-effective way of treating illness and saving lives. The long-term challenge will be to improve health via pharmaceutical consumption without controlling the highly productive and innovative pharmaceutical industry.

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EDITOR'S NOTES

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