

Volume 13
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Regional Review

The Federal
Reserve Bank
of Boston

How drug patents
help—and hurt
The slow adoption of
electronic payments
Where do states
spend their money?

vice or virtue?

The economics
of sin taxes



this issue

MANY ECONOMIC DECISIONS we make have an impact not only on ourselves, but also on the others around us. This issue explores several examples of the social effects of individual economic choices.

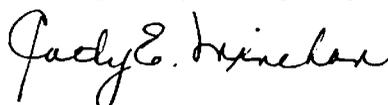
In **Too Much of a Good Thing Can Be Bad**, Carrie Conaway examines how patent law affects the market for pharmaceuticals. Because drugs are expensive to develop and easy to duplicate, drug companies need patents to protect their research investments. But too much patent protection can raise prices and stunt innovation, leaving companies and consumers worse off.

Likewise, electronic payment usage has been slowed because payment networks are more valuable, the more people and firms use them, according to Joanna Stavins

in **Perspective on Payments**. No bank wants to invest in joining a network, only to find that none of its customers or competitors are participating. As a result, banks may adopt new payment technologies more slowly than is best from a system-wide point of view.

One justification for taxing “sinful” products such as tobacco or alcohol is that an individual’s decision to use them may cause injury to others, as Phineas Baxandall highlights in **Taxing Habits**. Raising the price of these goods should discourage their use and reduce these social harms. But, Baxandall notes, these taxes also raise revenues, leaving state governments to weigh the social benefits of reduced consumption against increased tax receipts when people indulge.

Finally, the current fiscal crisis for state governments leads E. Matthew Quigley to examine how states spend their money in **Issues in Economics**. Quigley points out that states face the same difficult choices as individuals—especially during tough economic times.



CATHY E. MINEHAN
PRESIDENT, FEDERAL RESERVE BANK OF BOSTON



A business cooperative in Somerville, Massachusetts sees itself as a model for similar ventures. Page 27

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Using vegetable oil to reduce the environmental problems from diesel fuel; how coupon clippers help the rest of us pay less for our cereal.

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www.bos.frb.org/economic/nerr/regrev.htm

observations



A biodiesel-fueled truck transports coal to make energy for the UMass Amherst campus.

Fill'er up

RUN YOUR VEHICLE on vegetables! Biodiesel fuel—processed veggie oil that can be used to run diesel trucks, buses, and cars—sounds like the perfect remedy for our current reliance on pollutant-potent diesel fuel. Biodiesel cuts emissions up to 45 percent, lowers our reliance on foreign oil, requires no new equipment purchases, and is safe enough to drink. Sound too good to be true? Maybe it is—biodiesel can cost up to 50 cents more per gallon than regular diesel, it underperforms in cold weather, and it actually emits more nitrogen oxide, the main ingredient in smog.

Add biodiesel to the dizzying list of alternative fuels being experimented with nationwide as Americans seek to mitigate the impacts of diesel fuel. Accounting for a mere 5 percent of driven miles, diesel-powered vehicles are responsible for one-third of the nation's nitrogen oxide emissions and one-half of urban particulate matter, the soot linked by the Environmental Protection Agency to 15,000 premature deaths each year. Despite the plethora of fuel alternatives, not one has emerged as the ultimate solution to our woes. Compressed natural gas, embraced for its low soot and smog output and historically cheaper than diesel, requires buying new vehicles, building new maintenance facilities, and installing expensive high-pressure fueling stations. Ultra-low sulfur diesel, which can be readily used with existing infrastructure and cuts particulate matter emissions up to 95 percent, is pricey, and special particulate traps—at \$5,000 to \$8,000 a pop—must be installed on vehicles to fully capture the environmental benefits. Electric vehicles require time to recharge. Hybrids do not meet federal standards for alternative fuel credits. Methanol has abysmal fuel efficiency.

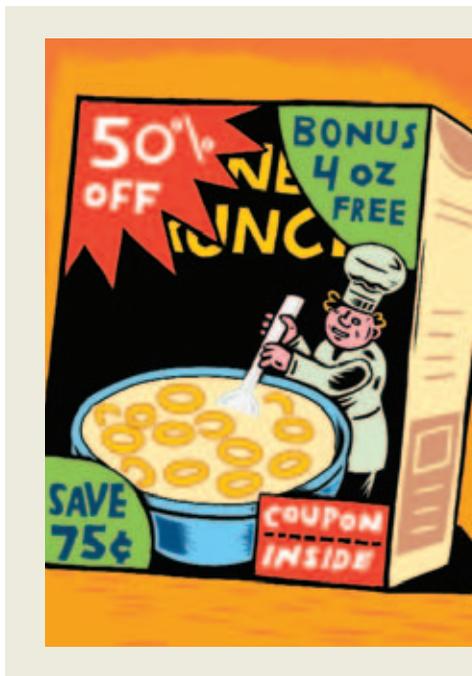
Given this array of substandard options,

New England fleet managers are grappling to find the best solution. In Norwalk, Connecticut, experiments with both natural gas and biodiesel yielded high costs, prompting officials to invest in ultra-low sulfur diesel and a new fleet of buses outfitted with particulate traps. UMass Amherst's Fleet Services, seeking to save up to \$20,000 per year through federal clean fuel incentives, opted for biodiesel because of the lack of nearby natural gas or ethanol fueling facilities. The Massachusetts Bay Transportation Authority ini-

tially chose compressed natural gas buses to clean up air quality around Boston, but costly delays in building new natural gas facilities have compelled them to supplement with new ultra-low sulfur diesel vehicles.

With no clear winner in the alternative fuels game, transit fleets are relying on trial and error to find the best balance of cost and effectiveness. But they remain hopeful that one day reducing the impact of diesel fuel will not mean wrestling with imperfect options.

—Mary C. Fitzgerald



Easy money?

Coupons are a bargain for people who take the time to clip them, but everyone else pays a higher price, right? Wrong—at least for breakfast cereals. Shelf prices on cereals are actually lower when coupons are offered, according to recent research by Aviv Nevo and Catherine Wolfram at the University of California at Berkeley. Like the market for many products, the cereal market is dominated by a few large producers. So if Post offers a coupon on Raisin Bran, Kellogg's often reacts by lowering its shelf price or offering a coupon, (continued on next page)

Observations

CONTINUED FROM PREVIOUS PAGE

too. This may force Post to cut its shelf price to compete; then all consumers pay less.

Yet despite the threat of these price wars, manufacturers still distributed about 300 billion coupons in 2001. Why? Because coupons are one of the most effective ways of introducing new products and increasing market share. Discounts can entice price-sensitive and non-brand-conscious customers to try a new product, and some of those who try it will then continue to purchase it even without the price break. Plus the mere existence of a coupon alerts consumers about the product, which may lead them to buy the product in the future. Best of all, coupons are cost-effective. A recent study by Promotion Decisions showed that coupons generate almost as much sales volume as discounts direct to retailers, at half the cost.

But manufacturers would prefer to reap the benefits of coupons while avoiding their price war side effect. To this end, some have started putting their coupons on complementary products; for example, a cereal company might put one on a milk carton. Unlike traditional coupons in Sunday newspapers, these cross-coupons are not publicly published, making them difficult for competitors to detect and therefore lessening the chance of price slashing. Other manufacturers use information from customer purchases to generate instant coupons at the cash register for competing products (if a customer buys Dannon yogurt, they might get a coupon for Colombo)—also hard for competitors to track. And companies are using Internet and paperless coupons to reduce distribution costs and better target their customers. It looks like the days of unintended discounts for nonclippers may be numbered.

—Jiaying Huang

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SPENDING CUTS mean making difficult tradeoffs; every line item matters to someone.





By E. Matthew Quigley

issues in economics

“STATES ARE FACING THEIR WORST FISCAL CRISIS SINCE WORLD WAR II.”

“GOVERNOR TO ANNOUNCE \$300 MILLION IN CUTS.”

“STATE RESERVES DEPLETED.”

“CORE STATE SERVICES THREATENED BY RECESSION.”

Over the past several months, newspaper headlines such as these have appeared almost daily, as state governments across the nation confront record deficits. These shortfalls threaten to force large cuts in the services state governments provide. But does this matter?

Most people know that the federal government pays for the Army, Navy, and Air Force that defend us; regulates the planes and automobiles in which we travel; insures our bank deposits; and protects the safety of our food. Local governments protect our homes from robbery and fire, educate our children, and pick up the trash. But, aside from collecting taxes, maintaining highways, and licensing cars, most people know relatively little about what state governments do and whether it makes a real difference. Should we be concerned about spending cuts?

The short answer is “yes,” for two reasons. First, states are major economic players, spending a combined total of \$1.1 trillion in 2000. Their spending—which includes funds spent directly by states, transfer payments to individuals, and aid to local governments—represents 11 percent of GDP. Second, state governments provide an array of important services that are not covered by federal or local governments.

HOW DOES THE STATE SPEND MY MONEY?

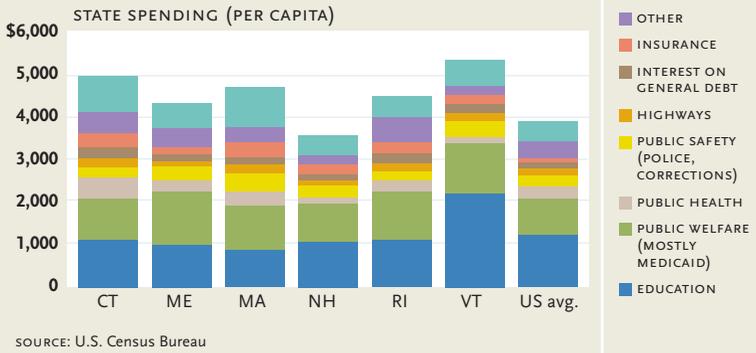
Education is the largest area of state spending, accounting for 32 percent of spending nationwide and 27 percent in New England. Programs ranging from kindergarten to graduate school all fall within this category. At public elementary schools and public universities, this money buys books, Bunsen burners, and basketballs; it pays teachers and librarians, coaches and security guards; it provides reeds for clarinets and seeds for playing fields.

But comparing states within this category is tricky, since schools are funded jointly by state and local government, with the share assumed by each varying from state to state and town to town. New Hamp-

With states facing record budget deficits, it's worth asking what state governments do

Where the money goes

Education and public welfare comprise half of spending.



shire and Vermont, for example, impose statewide property taxes and redistribute revenues to municipalities based on need. Thus, most education spending is attributed to the state. The remaining New England states fund education primarily through local property taxes, supplemented by state funds. In these cases, most education spending appears on local government books. As a result, state support for education appears higher in Vermont both as a percent of overall expenditures (44 percent) and per person (\$2,190). State spending appears lower in Massachusetts, where education accounted for 19 percent of overall state spending, or \$889 per person—but where more of the money flows through the cities and towns.

The second-largest category of state spending is public welfare. Assisted by matching funds from the federal government, expenditures in this category mainly support Medicaid, which provides basic healthcare to millions of uninsured and low-income people. Like education, these services vary by state. Some states cover prescription drugs, others may not. Some cover visits to the optometrist, others visits to the dentist. Beyond Medicaid, public welfare spending also underwrites programs for the mentally ill, the elderly, abused children, and other human services. In New England, public welfare expenditures ranged from a high of 29 percent of expenditures in Maine to a low of 19 percent in Connecticut. Per capita, Maine spends the most, at \$1,228 per person, while New Hampshire spends the least, at \$868 per person.

The other half of state spending is divided among seven categories. They are public health, public safety, highways, interest on general debt, insurance trust expenditures, government administration, and a remaining category called “other and unallocable.”

Spending on public health, including outlays on public hospitals as well as programs such as those aimed at preventing the spread of infectious diseases and discouraging smoking, comprised roughly 7 percent of the typical state budget. Within New England, public health spending varied significantly, from 10 percent of expenditures in Connecticut to 2 percent in Vermont, with per capita spending slightly less than the national average.

Public safety—keeping prisoners housed, providing police protection, and other programs—costs states about 4 percent

of their budgets nationwide and 3 percent in New England.

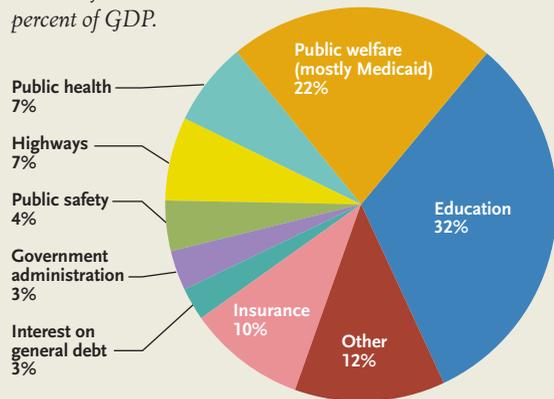
Another 7 percent of spending pays for highway, bridge, and tunnel operation and maintenance. Massachusetts, saddled with the costs of the Big Dig and other large transportation projects, led the pack in New England, spending \$439 per person on highways, roughly \$174 more than the national average. Interest payments on bonds issued to finance construction or fund special projects such as a convention center ranged from a high of just over 7 percent of expenditures in Massachusetts to a low of roughly 4 percent in Vermont. New England’s older infrastructure was one reason why these costs, at \$259 per person, were more than double the national average.

Insurance trust expenditures cover the costs of insurance for the state, its employees, and those covered under state programs. Nationally, these fixed expenditures cost states nearly 10 percent of their budgets. In New England, the bill ranged from 13 percent of expenditures in Rhode Island to 4 percent in Vermont.

State and federal functions

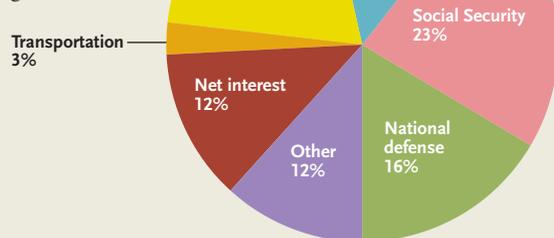
State spending in 2000

At \$1.1 trillion, state spending accounts for about 11 percent of GDP.



Federal spending in 2000

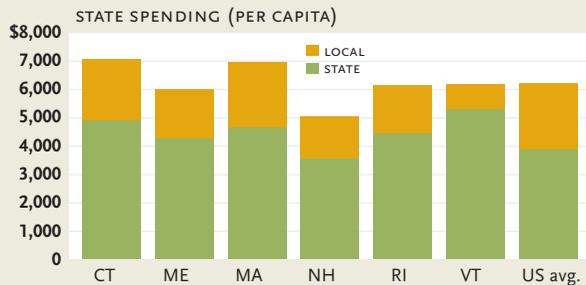
The \$1.8 trillion of federal spending includes \$260 billion in matching funds and other transfer payments to state governments.



SOURCES: U.S. Census Bureau and Economic Report of the President, 2003

Sharing the burden

Each New England state divides spending responsibilities between its state and local governments differently.



SOURCE: U.S. Census Bureau

Beyond these large and clearly delineated functions, states provide a number of other services that do not fall into any other category and are thus classified as “other and unallocable.” Depending on how states classify various services, these can range from economic development programs to environmental protection and conservation programs to housing subsidies and childcare. The wide spread of programs that can fall into this category and the differences among states in how they categorize certain programs make comparisons across the states difficult.

Finally, administering all these programs, like running a business or household, costs money. Compliance with federal laws and regulations needs to be monitored, salaries need to be paid, inventories tracked, pension funds administered, and floors swept. New England’s state governments cost about \$200 per resident, slightly over 4 percent of overall expenditures.

WHY DOES SPENDING ALWAYS RISE OVER TIME?

Even when not embarking on major new initiatives, state spending tends to increase at roughly the same rate as economic growth for two reasons: inflation and population growth.

Inflation affects state governments, just as it affects businesses and consumers. Police cars and chalkboards cost more in 2003 than they did in 1993. Employees expect higher wages and vendors charge higher prices. Overall, services that cost New England state governments \$1,000 to provide 10 years ago cost nearly \$1,400 today.

Population growth also places cost pressures on government. More residents mean more children in the schools, more drivers on the roads, more readers in the libraries, and higher case-loads for social service agencies. In order to provide the same level of service to citizens over time, government spending must increase.

Beyond these two factors, the devolution of many government programs from Washington to the states, coupled with the rising costs of healthcare and prescription drugs, exerted spending pressure on New England states in the 1990s. Likewise, the court-ordered changes in how the public schools are funded in New Hampshire and Vermont have forced these two states to significantly realign state spending, while cost overruns from the Big Dig are taking a toll in Massachusetts.

FACING DIFFICULT CHOICES

Unlike the federal government, most states—including all six in New England—are not legally allowed to carry deficits from one budget period to the next. Budgets must be balanced. Therefore, when revenues collapsed in 2001, New England states had only two options: cut spending or raise taxes. Most states chose both. As the fiscal crisis continued into 2002 and 2003, cuts became deeper and tax increases more widely discussed. Barring a dramatic turnaround in tax revenues, further cuts are likely.

Determining the appropriate distribution of cuts is a difficult task involving a series of tradeoffs. As many commentators have noted over the years, there is no line item for fat or waste. Programs that some consider frivolous or wasteful are cherished by others. Even within a particular line item or program, separating needless from necessary spending is a difficult task. In addition, significant portions of state spending, such as pension-fund obligations and debt service, are largely fixed, leaving spending cuts to fall disproportionately on those programs where there is flexibility—typically in social services and public health.

Complicating matters, state revenue growth has historically lagged overall economic recovery, and state revenue forecasters are widely predicting another tough year in fiscal year 2004, which begins July 1, 2003. As a result, lawmakers will face another round of difficult choices as they sit down to consider their budgets this spring. *

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Spending measures

State budgets are confusing enough. But comparing spending across states can be even more confusing because different measures highlight varying aspects of the differences among states.

Spending per capita shows the average dollar amount spent per person. By controlling for population, this measure makes it easier to compare spending in large and small states. However, it doesn’t take into account differences in demographic characteristics across states. For example, some states have higher shares of elderly people, while others have higher shares of children. Thus, it might be useful to compare how much different states spent on programs for the elderly per elderly person or on programs for children per child.

Share of state expenditures describes how spending in a particular category—public welfare or transportation, for example—compares to spending in other categories for that state. This measure shows how states prioritize functions relative to one another within the overall spending mix. Note that in a poor state, the spending share in a particular category can be high even though the amount spent per person is lower than in a rich state.

perspective on payments

Electronic payments networks benefit banks, businesses, and consumers. Why do so few use them?

By Joanna Stavins

Twenty years ago, depositing a paycheck at a bank was an exercise in patience. Long lines snaked through bank lobbies as hundreds of customers per day waited to deposit their money. This routine was a fact of life for every worker, every government check recipient—indeed, everyone who received checks regularly. Today this is no longer a Sisyphean task, and one major reason is the automated clearinghouse (ACH).

ACH systems are meant to facilitate small, repeated financial transactions between businesses and consumers. Using ACH, employers can electronically submit paycheck deposits directly into their workers' bank accounts rather than writing paper checks. Likewise, mortgage lenders, utilities, and other businesses that bill the same customers repeatedly can receive payments automatically.

Clearinghouse transactions are becoming increasingly popular in the United States.



PAPER CHECKS are more expensive to process than electronic payments, but getting users to switch takes coordination



More than 5 billion payments (including both debits and credits) were made by ACH in 2000, comprising 8 percent of all noncash transactions and 12 percent of the total dollar value of transactions that year. Over half of American households have the option of direct deposit available for either salaries or federal benefits payments, and this proportion has been growing at 15 to 20 percent annually over the last several years. Eighty percent of Americans eligible for Social Security receive their benefits electronically, largely due to federal legislation mandating direct deposit for most payments made by the U.S. Treasury. Direct payment of bills is still relatively less common, but electronic transactions have been making inroads here, too; nearly 30 percent of insurance payments and over 20 percent of loan payments are made electronically.

Despite this progress, ACH usage is nowhere near as high as in Europe, where in some countries as many as two-thirds of payments are completed electronically. Why are American banks, businesses, and consumers so slow to adopt ACH?

THE ELECTRONIC PAYMENTS DECISION

One reason Americans might use electronic payments less frequently could be that at current prices, we simply prefer checks to electronic transactions. While check transactions are significantly more costly for banks to process than electronic payments on a per-item basis, the prices consumers pay for bank services typically do not reflect this. Thus, the cost of using a check, from a consumer's perspective, does not include the full transaction costs as the check winds its way through the payments system. For consumers, even a free electronic transaction is only slightly cheaper than a check, and checks are more familiar and perceived as more reliable and trustworthy. And banks fear losing customers by forcing them to abandon the comfortable check and move toward electronic payments. As a result, nearly 60 percent of payments are made by check.

But my recent research with Gautram Gowrisankaran shows that low electronic payment usage may be due to more than just preference. It may also result from the difficulty individual users face in calculating the full costs and benefits of implementing a payments network, particularly in the decentralized banking structure in the U.S. Market incentives may not be sufficient to encourage users to adopt ACH, even though ACH is cheaper than paper checks for the system as a whole.

The problem starts because joining an electronic payments network is costly. About three-quarters of electronic payments are made through FedLine (the Federal Reserve System's electronic network, which among other things facilitates ACH transactions). To participate in FedLine, financial institutions

must invest in a dedicated PC, modem, printer, a special security card for encryption, and special ACH processing software. After the installation, banks must invest significant resources in training their employees to use the system, and they must pay a substantial monthly user fee. Furthermore, banks cannot simply abandon the old check clearing infrastructure when they adopt ACH, since not all transactions will occur electronical-

and constantly changing, it is impossible for banks to know how much they will gain if they put an electronic payments network in place. They might invest in one anyway if the cost of implementing the decision were low or if they could be certain that all of their competitors will also be joining. But the existence of a network externality means the market provides little incentive for banks to join the network by themselves, since oth-

Electronic payments systems are risky investments because the initial costs are known, but the payoff depends on user participation

ly. So investing in ACH results in additional expense, not a replacement for current expenditures.

Nonetheless, one might expect this to be a relatively simple business investment decision: invest in an ACH network if its benefits exceeds its costs, don't invest if the costs outweigh the benefits. But in this case, the costs are relatively easy to calculate, whereas the benefits are not. An electronic payments network increases in value as the number of other users increases. (Economists call this a network externality.)

In this situation, if a bank decides to adopt a particular electronic payment technology, this benefits other banks that already use it because they can then directly exchange payments with another institution. Likewise, network customers benefit when more patrons sign on, since this increases the acceptance and availability of the system and helps new customers to learn about its benefits.

Because the benefits of electronic payments are both indirect

ers' behavior affects the full return on their investment. Thus, banks tend to delay implementing electronic payments until they are compelled to by competition or by regulation.

MEASURING NETWORK EXTERNALITIES

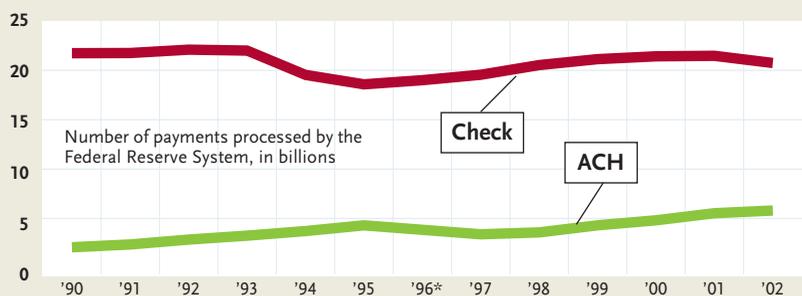
Network externalities are common for technical products and services that improve communication. Imagine, for instance, how useless Alexander Graham Bell's telephone would have been without Thomas Watson to answer it. More recently, the expansion of the fax machine and email were both slowed by the fact that both technologies were not very useful until they were sufficiently widespread. Coordinating technology adoption is especially difficult across businesses, particularly when the institutions to be networked are decentralized. The decision to lay phone lines, for instance, was easier when AT&T was the sole provider of telephone service. As a monopolist, AT&T could much more easily calculate the benefit of extending service than if it also had to consider the potential effects of the infrastructure investment decisions of its competitors.

While the existence of network externalities is clear in theory, measuring their impact has been difficult in practice. For one thing, with high technology goods, price and costs generally decrease over time. It is hard to identify whether increasing demand for the product is due to the network benefit from having more users or simply due to the lower prices. The ACH system, however, provides an opportunity to separate these effects because the Federal Reserve's prices are set in advance once or twice a year and thus are less directly affected by changes in demand.

But measuring the benefits of ACH still requires solving the problem of the proverbial chicken and egg. The probability that Bank A adopts ACH is affected by how many of its competitors also use it,

Still writing checks

Increased direct depositing of paychecks and a federal mandate to disburse many payments electronically have fueled growth in the ACH market. But ACH still lags far behind checks in transaction volume.



*ACH volume accounting method changed.
SOURCE: Board of Governors, Federal Reserve System

Did Blockbuster kill Betamax?

but the probability that a competitor adopts ACH depends on Bank A's choice. Gowrisankaran and I dealt with this problem by asking ourselves three questions. Are banks more likely to invest in ACH technology if other banks geographically near it also have ACH? Are larger banks or banks with few local competitors more likely to invest in ACH, since they are not waiting for others to adopt ACH before they adopt it themselves? And are small independent banks more likely to adopt ACH if a larger bank with a branch in its geographic area has already done so?

We found evidence of network externalities in all three scenarios. A 10-percentage-point increase in the number of banks with ACH capability in a local area increases the probability of adopting ACH by an estimated 4 to 9 percentage points for a bank that otherwise would have had a 50/50 chance of investing in electronic payments technology. These results hold even after controlling for other factors that might influence adoption rates, like changes in prices, differences in technology, or trends in electronic payment usage over time.

POLICY IMPLICATIONS

If network externalities are significant—as our evidence suggests they are—then everyone would be better off if more banks used electronic payment networks. But while banks react to the costs and benefits they face individually, they do not have the information or incentive they need to also account for the increasing value of the payment network as more institutions join it. As a result, they underinvest in networking technology.

Network externalities can also explain the difference between European and American ACH usage. Europe's relatively centralized banking structure makes it much easier for banks to coordinate on an electronic payment system. They do not need to worry as much that they will invest in a system that later loses value due to lack of participants.

Greater adoption of ACH technology would have several other important benefits for the U.S. It would reduce the cost of payment transactions, since electronic payments are cheaper to process than checks even after considering the cost of maintaining the old check clearing system. It would foster economies of scale in the ACH system, further reducing the marginal cost of electronic transactions. And if more institu-

When ACH was initially developed, the Federal Reserve System stepped in to implement a single communications standard for all transactions. But for other industries, arriving at a common standard in the face of network externalities is more challenging. The legendary battle between Betamax and VHS is a case in point.

The first home video recording system, Betamax, was introduced by Sony in 1976; rival Matsushita Electric came out with the Video Home System (VHS) a year and a half later. The two product designs, though based on a common ancestor, were just different enough that the videotapes on which material was recorded were incompatible. This set the stage for a showdown over the home video market.

Technological improvements like increased playing time, enhanced picture quality, and additional features came so quickly that neither product was able to establish a definitive edge over the other in that regard. But Sony was less effective in getting other VCR manufacturers to license its technology, and Matsushita's simpler design and willingness to incorporate licensees' suggestions facilitated mass production. As a result, the VHS standard began to develop a small advantage in licensing its technology to leading color TV manufacturers—who were key to expanding the VCR market because of the complementary nature of the products and their brand-name cachet.

Yet even in 1980, nearly 40 percent of VCRs were still Beta models. But that was before the rise of the video rental store. Before then, most people used their VCRs to play back television shows they had recorded themselves. For the most part, people did not share tapes, so there was less need to have one standard tape format.

The growth of the video rental industry, however, depended on choosing a single standard to avoid duplication and save costs. VHS's slight market advantage led many stores to invest in the VHS format, believing that it would ultimately become the industry standard. Sony couldn't compete in the new environment. As a result, what started as a small edge for VHS spiraled into market dominance. After years of declining sales, Sony finally bowed out of the Beta market in 1988.

tions joined the ACH network, its value to its current participants would increase.

In a decentralized banking market like the U.S., network externalities mean that the process of ACH adoption will likely proceed more slowly than it would in a more centralized environment. It could, however, be hastened by initiatives to improve awareness of the benefits. For instance, in May 2003 the Federal Reserve System will be rolling out a campaign highlighting the benefits of ACH for consumers and companies as part of National Direct Deposit and Direct Payment Month. The Fed could also foster greater coordination among banking institutions in its supervisory and regulatory role to help overcome the problems of a decentralized market. With these types of efforts in place, the benefits of an electronic payment system can be fully realized. *

JOANNA STAVINS IS SENIOR ECONOMIST WITH THE FEDERAL RESERVE BANK OF BOSTON. HER ARTICLE, "NETWORK EXTERNALITIES AND TECHNOLOGY ADOPTION: LESSONS FROM ELECTRONIC PAYMENTS" (COAUTHORED WITH GAUTAM GOWRISANKARAN), WILL APPEAR IN *RAND JOURNAL OF ECONOMICS*.

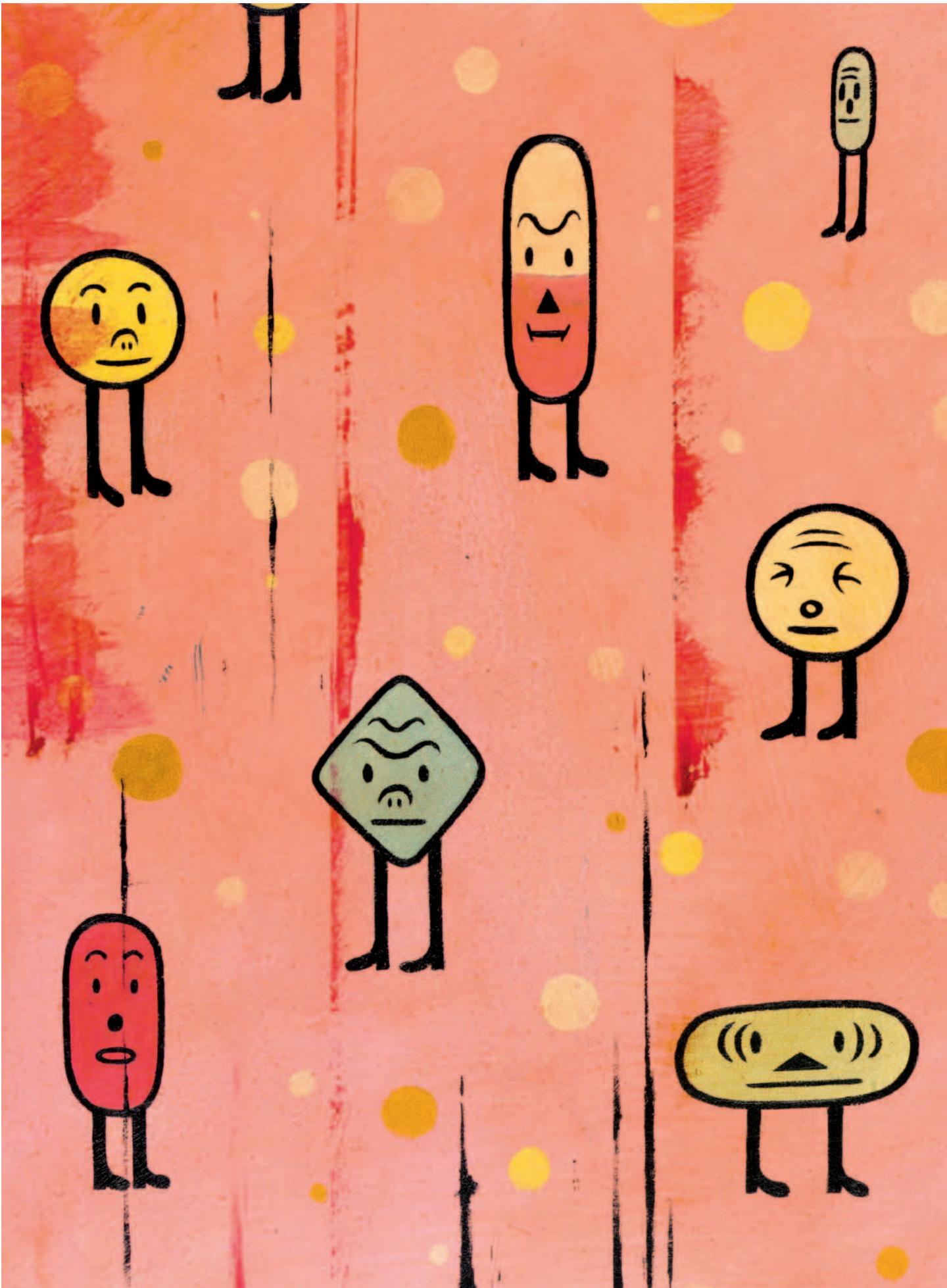
LIKE MANY things in life, some cholesterol is good, but **TOO MUCH OF A GOOD THING CAN BE BAD.** Cholesterol is necessary for producing the bile that helps digest the fats in our food. It also helps stabilize and protect cells, and it plays a key role in the production and use of vitamin D and certain sex hormones. But extra cholesterol can build up and constrict or block arteries, leading to angina, heart attacks, and stroke. ¶ Doctors had suspected for years that cholesterol played a role in heart disease. But their suspicions weren't confirmed until 1984, when a national study demonstrated that cutting cholesterol significantly reduced the risks of heart attacks and death from coronary heart disease. On this news, doctors rushed to help their patients with high cholesterol find a way to bring it under control. But at the time, the available treatments were only mediocre. A few anti-cholesterol drugs such as Lopid, Cholybar, and Questran were on the market, but none were very effective and patients complained about their flavor and gastric side effects. The other proven remedy, diet and exercise, was as unpopular, difficult, and frequently unsuccessful then as it is now. Yet the potential market for a new anti-cholesterol treatment was huge, since about one-half of Americans have cholesterol levels above the magic number of 200 milligrams per deciliter. The drug race was on. ¶ Just three years later, Merck Pharmaceuticals introduced Mevacor, a blockbuster new drug that promised to cut cholesterol levels by 30 percent with minimal side effects. In less than 18 months, Mevacor had

By Carrie Conaway

THE PROS AND CONS OF PHARMACEUTICAL PATENTS

Illustrations by Gary Taxali

Patents can yield more and better drugs for society by protecting the economic value of drug research.



captured 42 percent of the market for cholesterol-reducing drugs. Through the success of Mevacor and a follow-on product, Zocor, Merck would dominate the anti-cholesterol pharmaceutical market for almost a decade.

But don't let this fast timeline fool you. By the time of the 1984 cholesterol study, Merck was already well on its way to putting Mevacor on the market. The research behind the new class of drug Merck discovered, known as statins, originated decades earlier when scientists began to uncover how cholesterol was produced in the body. It took many years and thousands of rejected compounds to move statins from research idea to the drugstore shelf, even after the basic science of cholesterol was known.

The payoff on this investment of time and resources has been huge, for Merck and for society. Today cholesterol-reducing drugs are the nation's pharmaceutical sales leaders, with more than \$11 billion of sales per year in the U.S. alone, and physicians have rated statins the fourth-most-important medical breakthrough of the last 30 years after magnetic resonance imaging, ACE inhibitors, and angioplasty.

The cost and uncertainty of the drug development process mean that pharmaceutical firms need to receive large returns on any successful drug in order to counterbalance the failures along the way. Yet the products they make, once discovered, are extremely easy for other firms to copy. Without some kind of legal right to the economic returns from their research findings, pharmaceutical companies would have no incentive to develop new drugs—and society would miss out on the new and improved treatments for disease and illness that the companies would discover. To solve this problem, the government grants drug manufacturers patents—short-term monopolies that limit competition and thus help ensure that companies receive a return on their research. But this benefit to inventors comes at a social cost. The shield from competition that patents provide gives manufacturers the economic power to set prices higher than competitive markets would allow, on the very goods that society regards as critically important to make available.

There is no doubt that patents foster innovation, especially for pharmaceuticals. But it is harder to know whether their current structure has struck the right balance between their costs and

benefits for society. With drug patents, as with cholesterol, too much of a good thing may be bad.

LONG TIME IN COMING

Research and development is critical to the long-term health of any pharmaceutical firm, as these companies live and die on their pipeline of new drugs. Without a steady stream of new products on the horizon, a drug company will falter as its older products are superseded by other companies' inventions. But new products are not easy to find. Only 10 percent of potential drugs advance to the human trial stage, and only a small fraction of those tested ever make it to market.

The first steps towards what ultimately became Mevacor were taken in the early 1950s, when a Merck scientist isolated mevalonic acid from a yeast extract and demonstrated that it could be converted into cholesterol. But Merck didn't make much more progress with cholesterol drug development until 1973, when researchers at the University of Texas uncovered critical details about the chemical reactions behind cholesterol production in the liver (where 70 percent of the body's cholesterol is made).

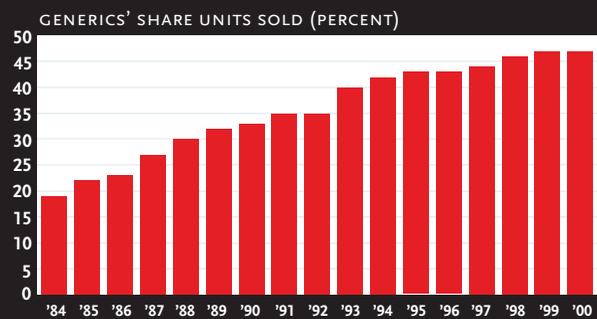
Three years later, scientists at Sankyo, a Japanese pharmaceutical firm, found a fungus-derived compound that could block the activity of HMG CoA reductase, an enzyme at the head of the cholesterol production chain. By looking at similar fungi, in 1978 Merck zeroed in on another compound, lovastatin, which successfully blocked cholesterol production in animals. They were now ready to take the next step in getting the drug on the market—obtaining approval from the federal Food and Drug Administration (FDA).

The FDA requires that any consumer pharmaceutical product go through a series of rigorous clinical trials to demonstrate the drug's safety, efficacy, and proper dosage in humans. Once Merck knew its new compound worked in animals, it launched into human testing. But worries about a potential cancer risk in Sankyo's similar compound halted the trials for almost four years, and they weren't resumed in full force until May 1984. Lovastatin turned out not to be carcinogenic and in fact had very few side effects, leading the FDA to approve the drug only 10 months after application—near-record time. Merck received final approval to put lovastatin, trade-named Mevacor, on the market on September 1, 1987.

The length of the research and development process for Mevacor—two decades before the initial research on cholesterol production led to a target for a potential drug, and another 11 years before Mevacor went on the market—is not at all atypical for the pharmaceutical industry. And companies can invest years in searching for a drug treatment and still find nothing at all. As a result, pharmaceutical development is extremely expensive. The Pharmaceutical Research and Manufacturers of America, the pharmaceutical industry's trade association, estimates that the U.S. pharmaceutical industry spent over \$30 billion just on research and development in 2001. This amounts to almost one-sixth of their sales revenue, near the highest among high-technology industries. In total, each new drug that makes it to market can cost half a billion dollars to develop from beginning to end, including the cost of all the wrong turns along the way.

THE GROWTH OF GENERICS

The Hatch-Waxman Act of 1984 eased many restrictions on developing generic drugs. As a result, the percentage of prescriptions written for generics has more than doubled in the last two decades, saving consumers billions each year.



SOURCE: IMS Health

It can take years to develop a chemical into a marketable drug, and thousands of possibilities are discarded along the way.



TAXALI



Patents keep competitors at bay. During a patent's 20-year lifespan, no one else can make the same product without a license or permission.



THE HATCH-WAXMAN ACT: R_x FOR THE GENERIC DRUG MARKET

Until 1984, federal regulations made it extremely difficult to get a generic drug on the market. Generic manufacturers had to perform the same safety and efficacy testing required for brand-name drugs, even though they were producing a drug chemically identical to one that had already been approved. Few companies were willing to take on this costly process unless they knew their generic would capture significant market share, so manufacturers made generic equivalents only for the most popular and effective drugs. In 1984, less than 20 percent of pharmaceutical prescriptions were written for generics.

But spiraling drug costs in the early 1980s spurred Congress to pass the Hatch-Waxman Act, with the hope of fostering the generic drug market while also protecting brand-name drugs. Generic manufacturers would no longer have to repeat the safety and efficacy tests; they would only need to demonstrate that

their product was bio-equivalent to its trade-name counterpart. The legislation further laid out criteria under which generic manufacturers could challenge a patent's validity and thereby start making a protected product before its patent actually expired. They also received additional protection from patent infringement lawsuits brought by brand-name drug companies.

In exchange, brand-name manufacturers were granted five years of guaranteed market exclusivity before any generic competitor could challenge a patent, along with patent life extensions to compensate them for the time lost between patent filing and FDA approval. These changes added an average of about three years to the effective life of pharmaceutical patents.

In addition, unlike any other patent owners, brand-name drug makers were also guaranteed 30 months of protection from generic competition for each time a

generic manufacturer filed a suit over a patent's validity, to allow time to sort out the competitor's claims before any economic damage was done. (In other industries, if a competitor claims a patent is invalid, the patent owner must obtain a preliminary injunction from a court to prevent the competitor from making its product, and this injunction is not guaranteed.)

In the two decades since the Hatch-Waxman Act was passed, the generic market has opened up considerably. Today nearly half of all prescriptions are written for generics, saving consumers and insurers billions of dollars each year. And the Act appears to have had little impact on pharmaceutical innovation levels. While it didn't solve every problem in the pharmaceutical market, most observers agree that the Hatch-Waxman Act has struck a good balance between protecting intellectual property and promoting market entry for generics.

When a pharmaceutical company thinks it has identified a possible winner, then, it begins to worry about how to protect its research investment. And that was exactly Merck's situation in 1979. It had a promising molecule in hand and knew it was facing competition, especially from Sankyo, in turning the chemical into a marketable drug. So on June 15, 1979, the company applied for a patent with the U.S. Patent and Trademark Office.

THE ECONOMICS OF SECRETS

For firms in which research drives growth, nothing is more valuable than the knowledge they create—their intellectual property. The longer they keep their trade information secret from their competitors, the more money they make. This is why many companies require employees to sign noncompete contracts preventing them from jumping ship to work for a competitor, and it's why they spend billions of dollars each year to keep their research and product designs from being stolen by computer network attacks, reverse engineering, and industrial espionage.

But while keeping this information secret may reward inventors, it doesn't always benefit society. If no product designs were ever publicly released, innovation would stagnate. Inventors would be forced to start from scratch on every new product and would wastefully duplicate others' efforts. Knowing a product's design also helps to accelerate the use of the new technology and to improve the quality of future innovations, especially in cases where the new product must be compatible with earlier versions.

To adjudicate between inventors' interest in maximizing the return on their investment and society's interest in disclosing product designs, the U.S. Constitution provides for patents: exclusive time-limited property rights granted to inventors in exchange for their publishing information about how they design and make their product. During the life of the patent (currently 20 years from the date of application filing), no other manufacturer may make the same product without first obtaining a license or other permission from the patent owner. Once the patent has expired, the product is fair game for anyone to copy.

Since there are almost always competing—though possibly inferior—products on the market when a new design arrives, patents do not typically create true monopolies. But they do limit the competition a product will face during the life of its patent, since no other company can make an exact copy. This is the social tradeoff of patent protection. The very shield from competition companies need as an incentive to innovate can translate into higher prices and reduced access for the rest of society while the patent is in effect. In many cases, patented products turn out to have limited commercial value, mitigating this problem. But for the few especially successful products, the economic value of their patents—and the potential impact on society in terms of price and access—can be quite large.

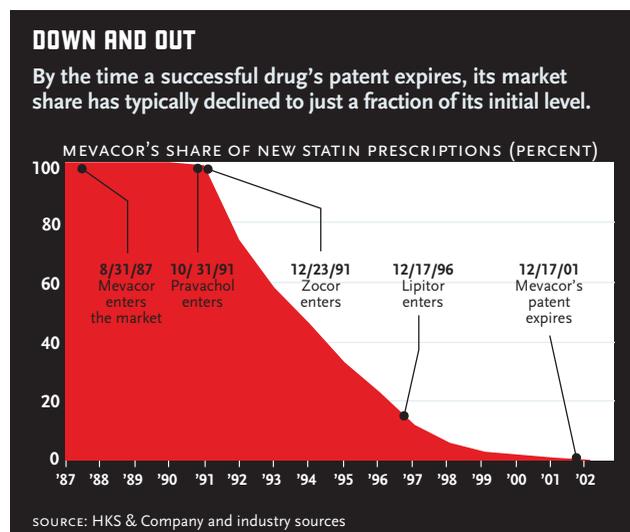
Empirical estimates of this value are hard to come by, since it is not easy to determine what a company's prices or profits would have been were it not for its patent protection. But there is no

doubt that the value of patent protection is higher for drugs than for most other high-tech products. While other companies can rely on inventive lead time and employee secrecy to keep competitors at bay, with pharmaceuticals the cat is out of the bag once the product hits the market. With only the pill itself in hand, it can take just weeks for a competitor to replicate it, a trifle compared to the years of work invested in its discovery. Copycatting is made even easier by the FDA approval process, since the application itself discloses key details about how the drug is manufactured. And the potential payoff to copying is especially great because drugs work by themselves, instead of being just one element of a complex machine (think of all the innovations that go into the average DVD player or computer).

To be sure, patents are by no means the only reason why pharmaceutical prices are high. As noted earlier, the process for discovering and developing drugs is quite time-intensive and expensive. Furthermore, consumers and even doctors are often not well informed about prescription options and prices and often choose brand-name products marketed to them by pharmaceutical companies, rather than the cheapest drug that will treat their problem. Those with insurance coverage for drugs don't pay the full cost of their prescriptions, reducing their incentive to shy away from the most expensive brand-name products. And regulated drug prices overseas mean that pharmaceutical companies must charge more in the unregulated U.S. market to make up for losses elsewhere. Notwithstanding these and other issues, patents are a significant factor in pharmaceutical prices, since they leave the door open for drug companies to restrict competition and raise prices.

DISTINCTION WITHOUT A DIFFERENCE

With a patent in hand by 1980 and FDA approval for Mevacor in 1987, Merck was ready to take on the anti-cholesterol market. Thanks to an easy-to-use product with a large potential audience—and to the success of its direct-to-consumer advertising, one of the first times a drug company used this approach—Mevacor quickly became one of Merck's biggest sellers. In Mevacor's first year on the market, it earned an estimated \$260 million, the highest sales ever for any prescription medicine to that date.



In response, other pharmaceutical companies ramped up their efforts to find a drug that could compete. They could not literally replicate the molecule Merck had patented; that could only come once the patent expired. But they could design around it, using the knowledge Merck had gained to find a similar, but not identical, compound that generated similar results.

This approach makes sense in an environment in which intellectual property is protected with patents. Short of inventing an entirely new product, designing around an existing product is the quickest and easiest way for manufacturers to enter a market. Indeed, it can take as little as one year before the first design-around products make their way to store shelves. The strategy is to capture market share either by pricing the product at a discount or by improving on the original in some way. These new products will be fighting an uphill battle to gain sales, since the name recognition and familiarity of the original product will help the innovating firm to maintain its revenues. But design-arounds can often make a significant dent in market share—sometimes as much as 15 or 20 percent in their first year on the market.

From a social perspective, though, there's a tradeoff. The incentive to design around an existing product is also an incentive to create products with distinctions that make no difference. Products that make substantial improvements to the original design—in the case of pharmaceuticals, perhaps drugs that are more effective or easier to tolerate—are always welcome. And these improved products carry the added benefit of increasing competition, which tends to hold the line on prices. But design-arounds can also be "me-too" products with little to no advantage over the original. While they might help increase competition, this benefit may not outweigh the cost of discovering the copycat drug. Furthermore, it would be less socially wasteful if the effort that went into developing me-too drugs had instead gone toward truly novel innovative activity, which could have had greater benefits in terms of quality or cost.

Because of its unprecedented success and large potential audience, Mevacor was a natural target for me-too drug development. The first on the market, in October 1991, was Bristol-Myers Squibb's pravastatin sodium, sold as Pravachol. Pravachol is a classic me-too drug. It is less effective at reducing cholesterol than Mevacor, but it is also priced 5 to 10 percent lower, making it attractive to managed care plans and others looking to cut prescription costs. Pravachol's price advantage was enough to capture 20 percent of the statin market by 1994.

But Merck had another trick up its sleeve. During the period when human testing on lovastatin was halted, Merck scientists continued to look for another agent that blocked HMG CoA. They came up with simvastatin, which turned out to cut cholesterol more effectively than either Mevacor or Pravachol. Trade-named Zocor, simvastatin entered the market at the end of 1991 and quickly outstripped both Mevacor and Pravachol in sales and new prescriptions. Zocor and Mevacor continued to dominate the market for the next six years, even as two more copycat drugs entered the market. Only in late 1996 did a product finally appear that significantly improved on Zocor. Both cheaper and more effective than any other statin, Pfizer's Lipitor vaulted into first place in sales by 1998 and has remained there ever since.

Successful drugs attract competition from copycats as well as products that substantially improve on the original formulation.



THE GENERIC THREAT

Competition from copycat drugs had been cutting into Mevacor's market share for years. But its patent expiration on December 17, 2001, was its death knell. The axe had been slated to fall the previous June, but at the last minute, the FDA granted Merck an additional 6 months of market exclusivity in exchange for studies on Mevacor's safety and effectiveness in children. The very day that extension expired, seven separate generic manufacturers put generic lovastatin on the market at around \$1 per pill—half the cost of Mevacor.

What makes generics so threatening to brand-name drug companies is that they are exact copies of an FDA-approved drug that can be sold at a much lower price since they cost much less to develop. Federal legislation passed in 1984 helped open the markets for generics, which prior to that point had comprised only about 20 percent of prescriptions (see sidebar on page 15). Today nearly half of all prescriptions are written for generics (see chart on page 12), and they cost an average of 70 percent less than trade-name drugs. Generics typically capture almost half of the market for their brand-name equivalent within their first year of availability, substantially cutting consumers' prescription costs. A 1998 Congressional Budget Office study showed that using generics saved consumers \$8 billion to \$10 billion in 1994 alone.

One might expect that drug companies would try to compete with generic equivalents by lowering their prices. But instead, they typically keep prices high, capitalizing on the fact that patients tend to be loyal to drugs that they have found effective. In a rare break with this practice, Merck once offered a two-week discount of about 4 percent off Mevacor and Zocor in 1993 in response to price competition from Pravachol. But prices quickly returned to their normal levels, and the discount was never repeated. Today, even though its patent has expired, a single Mevacor pill still costs around \$2—almost the same as its 1991 price in real terms.

BALANCING ACT

Merck certainly stood to lose financially when generic lovastatin hit drugstore shelves. But it's easy to forget that by 2001, Mevacor controlled less than 1 percent of the statin market. Mevacor had long ago lost the pole position, first to Merck's own Zocor and later to Pfizer's Lipitor. In general, competition from similar brand-name drugs can shave four times more off a drug's present discounted value than does generic competition. And truly innovative products can completely decimate a previously successful drug class, as Mevacor did for Lopid, Cholybar, and Questran in the late 1980s. For most drugs, the real revenue losses come not when they are copied, but when they are superseded.

Yet drug companies spend millions of dollars each year staving off generic competition at the end of their products' lives. They routinely sue generic firms for patent infringement. They separately patent the active ingredient of a drug, its form of administration, and even the by-products of its breakdown in the body to make it more difficult for competitors to design around the original product. They make the existence of some patents known only at the last minute, forcing potential generic competitors to go back and prove that they are not violating these "submarine patents." A few have even paid generic competitors not to make their drugs,

a tactic which has not won them friends with the Federal Trade Commission, the nation's antitrust enforcement agency.

Drug companies do this for two reasons: it pays off, and they can. Every year that drug companies add to a product's effective patent life increases the drug's expected return by an average of \$12 million, according to a 1990 Congressional Budget Office study; the figure would likely be significantly higher today due to pharmaceutical price inflation. This may not be much relative to the returns for finding a blockbuster new drug, but it's enough to justify the expense of litigating the patent violations. Plus this income is far more certain than the unpredictable returns from new product development. More important, while brand-name drug companies can't do anything about the me-too products that design around their patents, they *can* use their patent protection to limit the competition they face from exact duplicates.

The reason society grants patents, however, is to ensure a fair balance of returns for both inventors and society, not to keep competition at bay indefinitely. Inventors should be able to reap the rewards of their innovations, but so too should society be able to profit from product design disclosures and from the lower prices and increased access to products once the patents expire. Some are now arguing that in the case of pharmaceuticals, the scales may have tipped out of balance. One recent proposal to address this problem would limit drug companies to one 30-month extension of protection upon patent litigation versus the unlimited number of extensions available today. Another would disallow generics from being paid by brand names not to market their drugs.

An even more effective tactic would be to foster greater pharmaceutical innovation. Drug companies would not need to be so concerned with patent expirations if they had lucrative drugs waiting in the wings, and developing new drugs would also have the additional advantage for society of creating more and better treatments for disease. The pharmaceutical industry is already moving in this direction, using clues from basic science research to identify new treatments rather than relying on blind searches for pharmacologically active chemicals. This approach should lead to more efficient research processes and therefore greater innovation. Another way to promote innovation is to create a more competitive marketplace. Adjudicating more antitrust claims and reducing the restraints on generic entry, for example, would provide a greater incentive for drug companies to find new treatments.

Ironically, however, it may not make sense to try to encourage innovation by extending patent life or breadth. Patent protection is already strong in the United States. In this legal environment, adding on to the life of a patent or allowing patents to cover more aspects of a product's design could actually stall innovation by preventing later inventors from improving on the original design.

Nonetheless, patent law will always play a key role in protecting the rewards from discovery in the pharmaceutical industry. It has proven itself effective at ensuring both that inventors receive the economic benefits of their innovation and that valuable treatments see the light of day. But reaping the full social benefits of pharmaceutical invention, including fair drug prices and quantities and abundant treatment options, takes more than just patent protection. It takes more invention, and patents are only a piece of that puzzle. *

TAXING

When it comes to state taxes, sin is in.

BY PHINEAS BAXANDALL PHOTOGRAPHS BY REENA BAMMI In 2002, new tobacco levies were implemented in 21 states, amounting to the largest average per-pack increase ever imposed in one year. Thanks to a new \$1.50 tax hike, a pack of cigarettes bought in New York City now costs \$7. New increases in alcohol taxes were passed in Tennessee and Alaska and were considered in 19 other state legislatures. Gaming taxes, casino revenue-sharing agreements, and new lotteries also brought in record levels of state revenue.

Taxes on “sin” have been an American tradition since the Puritans placed levies on morally suspect items like liquor, tobacco, tea, and immoderate foods like meat pies. But the modern sin tax advocate is more likely to be punching a calculator than thumping a bible. Today’s sin taxes are propelled by the twin logics of public health and budget politics. Efforts to discourage the use of tobacco and alcohol by raising their price through taxes makes the population healthier while filling government coffers. States also raise revenues through their share of the proceeds on gambling.

But these levies have problems. They are paid disproportionately by the poor. They don’t assess responsible consumers differently from irresponsible ones. And there are other policies that could also discourage harm-

HABITS



A 10 percent price rise leads to a 3 to 5 percent

ful consumption and improve public health. Yet, given the political realities of budget constraints and the unpopularity of other types of taxes, state governments will likely continue to find it appealing to balance their budgets by taxing sin.

SMOKING AND PUBLIC HEALTH

Modern sin taxes are born of the economists' creed that behavior responds to price, coupled with the politicians' desire to improve society while raising revenues. But the term "sin tax" is something of a misnomer. It refers almost exclusively to taxes on tobacco, alcohol, and gambling. Each has a long-standing cultural taint as vaguely naughty—if somewhat glamorous—even to those who indulge in them. By contrast, activities that are truly reprehensible, like molesting children or torturing animals, are criminally sanctioned rather than taxed.

The fact that a single cigarette can raise as much as 7.5 cents for state governments and another 2 cents for the federal government shows what a lightning rod tobacco has been for such taxes. And for good reason. Cigarettes are the leading cause of preventable sickness and death in the United States. According to the American Cancer Society, smoking is responsible for 90 percent of all lung cancer deaths, 30 percent of all other cancers, and a significant part of respiratory and heart disease deaths. Tobacco products (of which cigarettes constitute the vast majority) are credited by the U.S. Department of Health and Human Services with one-third of all deaths during middle age. Taxes on cigarettes are also easy to administer because they are paid directly by manufacturers, of which there are only a few.

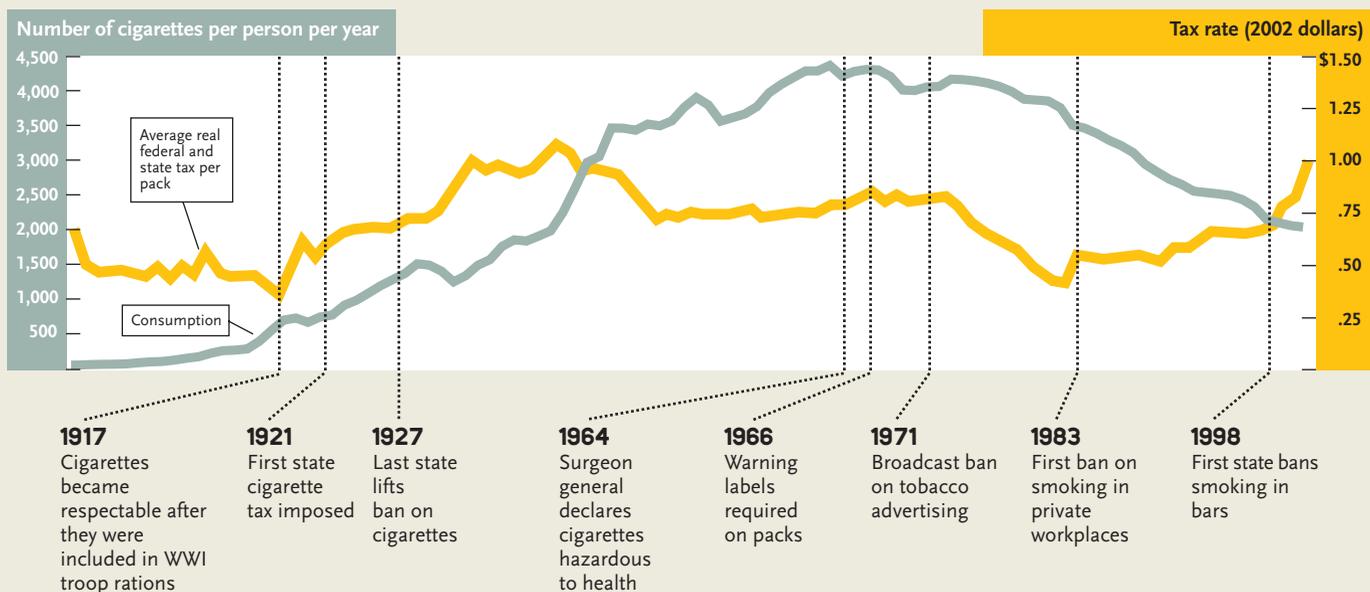
Taxes on cigarettes reduce smoking. High prices discourage people from starting to

smoke and encourage smokers to cut back or quit. Studies show that a 10 percent increase in cigarette prices will lead to about a 3 to 5 percent reduction in smoking in the short run, and a drop of about double that over longer periods of time. And cigarette taxes are especially effective at discouraging teenagers—which has enormous public health benefits since three-quarters of all cigarette smokers start before their nineteenth birthday. Because teenagers have less discretionary income, their smoking habits are more sensitive to price. Since 1998 when cigarette prices have been rising sharply, teens have given up smoking faster than adults.

Because cigarettes are addictive—the immediate craving for cigarettes is hard to ignore, even when the long-term desire is to quit—one might think that smokers would not stop simply because taxes increase the price. Instead, cigarette taxes seem to mimic

Up (and down) in smoke

While taxes affect average cigarette consumption—since the mid 1980s, the rise in the average real tax rate has coincided with reduced smoking—other factors matter also. For example, smoking and real tax rates both dropped during the 1970s, perhaps because of legal restrictions and consumer response to health warnings.



NOTE: Consumption data for the population aged 18 and above; figures for 2001 and 2002 are preliminary. 1901–1909 tax rate is only for the packs that were priced at more than \$2 per 1,000.
SOURCE: CDC, USDA, Orzechowski & Walker Consulting, Campaign for Tobacco-Free Kids

drop in smoking in the short run, and even more over time





Alcohol is taxed by the drink, but the same drink

other ways that smokers try to quit such as by throwing away their cartons, making bets with their friends, or otherwise making the habit more costly.

Fairness is another appeal of cigarette taxes. Taxes can compensate and correct for the otherwise unpaid costs that smokers impose on nonsmokers. The healthcare costs of smokers are significant: an estimated \$12,000 more than nonsmokers over an average lifetime, according to Thomas A. Hodgson of the National Center for Health Statistics. Smokers do not pay higher payroll or income taxes to support this additional burden on the healthcare system. Nor do they pay anything to cover the costs of second-hand smoke, a problem that the Environmental Protection

Agency has determined is responsible for 3,000 lung cancer deaths a year, as well as many other health problems like asthma and bronchitis.

Are cigarette taxes now high enough to cover the costs that smoking imposes on others? There are conflicting views about the answer to this question, in part because of differences in what to count as a cost. The Centers for Disease Control estimates that the extra medical costs and lost productivity from smoking amount to slightly more than \$7 a pack—not including factors such as second-hand smoke, problems of low birth-weight babies caused by smoking during pregnancy, and damage from smoking-ignited fires. These costs are far more than the amount col-

lected through federal and state taxes, which average about \$1 a pack. By contrast, the Congressional Research Service defines costs more narrowly and subtracts health care costs “saved” by smokers’ dying prematurely. Using this procedure, they figure that smoking imposes costs on others of only 33 cents a pack. Neither study captures the pain and suffering of friends and family members over the illness and early death of people they love.

JUST A GLASS OF WINE?

Sin taxes are levied on things that are fun. Even smokers who are interested in quitting generally find it enjoyable to light up and inhale. But while the social costs of smoking may outweigh these benefits, the calculus for alcohol is somewhat more complex. Only a fraction of those who drink abuse alcohol or suffer health problems, and many enjoy health benefits. The risks that drinkers pose to others may have less to do with how much alcohol they consume and more to do with how much they drive.

An estimated 18.5 million Americans abuse alcohol. This not only affects the health of the person drinking, especially in increased liver disease, but it can also impose costs on others in the form of lost work time, higher healthcare costs, and strains on family relationships. As with cigarettes, taxing alcohol can improve public health to the extent that higher prices reduce excessive consumption and abuse. But medical research also shows that for many people, responsible drinking can be healthful. People who drink moderately—both red wine and other types of alcohol—have reduced rates of heart disease, strokes, and dementia.

The risks of alcohol consumption are amplified greatly when the drinker gets behind the wheel of a car. For example, according to a study by economists Steven Levitt at the University of Chicago and Jack Porter at Harvard University, drivers who have been drinking are about seven times more likely to cause a fatal car accident than drivers who have not been drinking. Most of the people killed in al-

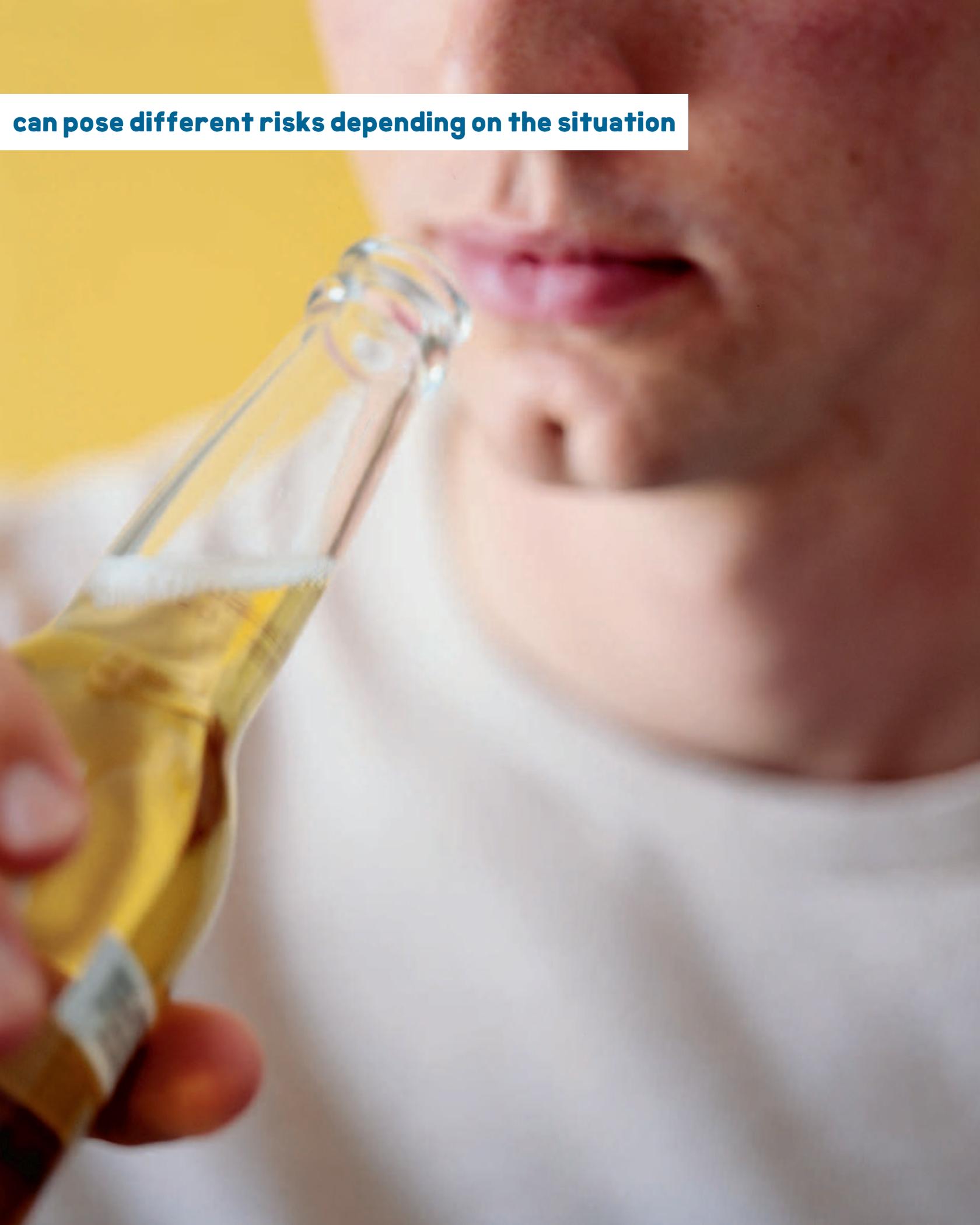
Taxing other sins?

To some, the focus of sin taxes on cigarettes, alcohol, and gambling is both arbitrary and incomplete. There are other untaxed products that pose equally serious health risks or impose costs on non-users. Sugary and fatty foods contribute to obesity, which causes 300,000 premature deaths a year and greater healthcare costs than tobacco. According to the American Lung Association, charcoal starter fluid used in the backyard barbecue is a smog menace. And antibacterial soap breeds resistant strains of bacteria that can endanger public health.



Over the past few years, a host of new “sin” taxes have been proposed. Bills were recently introduced in California to extend sin taxes to ammunition for firearms and high-calorie soda. If they had passed, the monies would have gone to fund the hospital care of gunshot victims and for physical education in schools. And Wisconsin and California legislators tried to impose a tax on pornography similar to one in France in which sexually explicit material faces higher tax rates than other products. But these measures stalled when lawmakers were unable to agree on what constitutes smut. It is apparently easier to raise tax rates on old sins than reach the consensus necessary to create new ones.

can pose different risks depending on the situation





Unlike alcohol and tobacco taxes, state lotteries

cohol-related accidents are the drinking drivers and their passengers, but the authors estimate that in 1994 drinking drivers were responsible for 3,000 deaths outside their own automobiles.

Moreover, while alcohol is taxed by the bottle or the drink, the same drink imposes very different risks depending on the situation. A 21-year-old college student whose weekly intake consists of seven beers while

driving on Friday night, for instance, pays the same levy as a 40-year-old who drinks a beer each night with dinner. The heaviest-drinking 6.5 percent of adults, who consume half of all alcohol, end up paying the majority of all alcohol taxes. But even many of them drink without risk to themselves or others. It's hard to imagine a taxing scheme sophisticated enough to distinguish between the problem drinkers who impose costs on others and the rest of us who are drinking to good health.

Prohibition

An alternative approach to discouraging the consumption of certain products is legal prohibition. At the end of the nineteenth century, one might have predicted that cigarettes rather than alcohol would be banned, as the National Anti-Cigarette League expanded its efforts. By 1890, 26 states had passed laws banning sales to minors; and by the end of 1909, 17 states prohibited cigarette sales altogether. The turnaround came during World War I. Soldiers seeking relief from the stress of war were given cigarettes as part of their rations because they could be smoked more easily in the trenches than pipes or cigars. A cigarette in the mouth became an identifying feature in patriotic depictions of the “Yank,” and smoking became respectable.

Instead alcohol was banned with the passage of Prohibition in 1919. Temperance was framed as a family issue and a socially acceptable goal of the early women's movement before women won the right to vote in 1920. Support was also fed by anxiety about immigrants in growing urban centers. Rural, largely Protestant citizens often viewed these mostly Catholic newcomers and their drinking habits with alarm. Immigrants congregated in saloons to reaffirm their culture, but others feared that saloons were becoming centers of local political corruption, gambling, and prostitution that should be closed down. National prohibition of alcohol might also have been averted if beer and wine producers had opposed early temperance laws, instead of wrongly supposing that they could continue to gain market share from state-level restrictions that targeted only hard liquor.

The failures and unpopularity of Prohibition, which was repealed in 1933, are well-known. Prohibition drove business into the hands of organized crime and sent drinkers to speakeasies and to hard liquor, which was easier to conceal than beer or wine. But while it wasn't able to eliminate alcohol consumption, Prohibition was more successful than most realize at reducing it. Historians have no measures of illegal consumption, but they can track hospital admission rates for alcoholism and cirrhosis, and arrest rates for public drunkenness—all of which fell as a result of the ban. Based on these data, they estimate that the consumption of alcohol (in pure volume) fell by between about 30 percent and 45 percent in 1921 and 1922, when enforcement was strict and punishments severe.



A law enforcement official, surrounded by onlookers, breaks open casks of illicit alcohol during U.S. Prohibition.

THE ART OF PLUCKING A GOOSE

State legislators undoubtedly care about public health, but often the more pressing problem is how to close the holes in state budgets when voters are hostile to other ways of raising money. Before income taxes were introduced in 1913, for example, taxing sin was one of the main ways that government activities were financed. Alcohol and tobacco levies provided 37 percent of the federal budget in 1910, but only 2 percent today.

Over the past several decades, with demands on state governments increasing and other taxes unpopular, state legislators once again looked to sin as a way to balance their budgets. State revenues from alcohol had been fairly stable in real terms since the mid 1980s. And while tax rates and revenues from cigarettes and tobacco were rising, their success in reducing smoking limited the proceeds going to state coffers. States turned to gambling—excise taxes on gambling proceeds, revenue-sharing agreements with state-sanctioned casinos, riverboats, and restaurant slot machines—and especially state lotteries to raise new revenues.

The first state lottery in the nation was established in New Hampshire in 1964. Faced with a huge budget deficit, Governor John King was determined not to raise taxes and instead launched a limited “sweepstakes” linked to horse racing. Today's state lotteries offer incomparably greater convenience, speed, and variety. Unlike taxes on smoking or drinking, government gambling arrangements are not

are not designed to reduce vice



designed to reduce the vice that provides the funding. State governments actively advertise and promote their lotteries—to the tune of \$400 million per year. And revenues from lotteries have increased five-fold between 1980 and 2000, exceeding the sum of cigarette and alcohol tax revenues.

The allure of sin taxes has grown even greater since 2001 as state governments, facing sudden deficits, have needed new sources of funds. Legislators grew accustomed to rising tax receipts during the long boom of the 1990s, and committed state governments to higher spending levels. Some cut income taxes, tolls, or licensing fees, and many (although not the New England states) let their rainy-day funds dwindle. When state revenues fell, states—required by law to balance their budgets—had to scramble to find money where they could. Connecticut Governor John Rowland signed a 61-cent-per-pack cigarette tax increase. Rhode Island passed new taxes on tobacco that will automatically increase by 10 cents a pack every year.

These taxes are a relatively popular way to raise government funds because they are viewed as voluntary user fees that also have beneficial side effects. “Taxation,” said King Louis XIV’s finance minister Jean-Baptiste Colbert, “is the art of trying to pluck the most feathers from a goose while producing the least hissing.”

Lawmakers know that new sin taxes arouse far less voter hostility than broader-based taxes. Taxes on income or property are far more visible and affect more taxpayers. They also seem to punish “good” things like making a living or owning a home. A growing number of voters since the 1990s tell pollsters that they dislike taxes; yet the majority support higher cigarette taxes. Smokers may resent being singled out, but they are a minority who garner little sympathy. In Connecticut, one poll showed that 71 percent of residents supported a large increase in cigarette taxes, even though a majority said the tax would be unfair to smokers.

POOR SINNERS

One downside of balancing budgets on sin is that the money raised is paid disproportion-

ately by the poor. The tax on a \$4 bottle of wine is the same as that on a \$40 bottle, so those who buy top-shelf liquor (or premium cigarettes) pay a smaller portion of the price in taxes. Poor people don’t drink more than the affluent, but the alcohol taxes they pay are a far larger portion of their incomes. For cigarettes, the problem is exacerbated by the fact that the poor do smoke more than the better-off. According to Harvard Law School Professor Kip Viscusi, over 30 percent of people earning less than \$10,000 a year were smokers in 1990, compared to less than 20 percent of those earning over \$50,000 annually.

State-organized gambling acts as “an astonishingly regressive tax” that draws disproportionately from those with lower incomes, according to the 1999 National Gambling Impact Study Commission. State lotteries are the most regressive of these activities, and a disproportionate number of lottery outlets are located in poor neighborhoods. Lottery players with incomes below \$10,000 spend almost \$600 a year on tickets, more than any other income group. High school dropouts spend four times as much as college graduates; blacks spend five times as much as whites. Since those who gamble are overwhelmingly likely to lose money, some characterize gambling as a tax on bad math, or—more sympathetically—as a tax on those with limited prospects. In either case, the money comes mostly from those who are least able to pay.

ADDICTED TO SIN?

There are a number of reasons to think that sin taxes could continue to grow. By international and historic standards, American sin taxes are still low. The World Health Organization estimates that the tax burden on cigarettes in the United States was only one half as high as that in the rest of the developed world. Alcohol taxes are far higher in many other wealthy nations. But even if we can agree that there is too much smoking and too much problem drinking, and that taxes are effective at reducing consumption, increased sin taxes are not the only tool for solving these problems.

Direct legislative restrictions can also reduce consumption and abuse, and the costs

that go with them. These measures cost money to enforce and are more difficult to administer than simply raising the tax rate, but they target the consumption that is most costly to society—such as drinking among teens or drivers, or smoking around nonsmokers. Drunk driving is reduced by such things as low legal blood-alcohol levels, mandated training of servers in bars and restaurants, and policies that make it easier to rescind driving licenses, according to the National Institute on Alcohol Abuse and Alcoholism.

Similarly, restrictions on smoking force smokers to take the time and effort to move outdoors or face fines, while simultaneously providing zones of comfort to nonsmokers. And economists William Evans, Edward Montgomery, and Matthew Farrelly estimate that bans on smoking in private workplaces reduce the number of smokers by about 5 percent and bring consumption down by 10 percent.

Nontax measures also express social disapproval, whereas taxes can convey a kind of tacit acceptance—especially when education budgets depend on them. Tellingly, the first state-level taxes on cigarettes were not passed at the height of anti-cigarette fervor at the beginning of the twentieth century, but in the 1920s, when cigarettes first became socially acceptable.

Setting tax levels on sin depends on weighing different goals: public health, virtue, and the desire to raise revenue, against efficiency and the impact on the poor. Sin taxes can be simplistically portrayed as “win-win” because they raise revenues at the same time as saving lives or promoting economic development.

But there are tradeoffs. Insofar as policies discourage alcohol and cigarette consumption, they also cut off potential sources of revenue. Punishing those who create social costs also disproportionately punishes the poor. And singling out a vice for taxation indirectly promotes the activity as a virtuous contributor to the public purse. Sin taxes may or may not be good policy, but so long as they remain one of the few acceptable ways to raise revenue, governments are likely to continue to depend on them. *



Members of
Community
Builders
Cooperative
at work.

letter from somerville, massachusetts



By Phineas Baxandall § The structure at 24 Webster Avenue sits on the Somerville border, alongside other businesses that serve the bustling city of Cambridge and take refuge from its high rents. A converted schoolhouse, the building is home to a no-nonsense construction shop with three large rooms of neatly arranged tools, big machines, and piles of lumber. Renovation has been the mainstay

For these builders, weekly meetings and a cooperative business model take the place of a boss

Each partner brings unique skills to the group, but the worst work is shared equally.



of the Community Builders Cooperative (CBC) since it was founded 23 years ago. As a worker-owned cooperative, CBC is an unusual business, but members see themselves as providing a model of how such a group can succeed. And along with many of the places they've renovated, CBC has been transformed over the years yet maintained its character.

CBC's 12 original partners first met in a

Cambridge living room in 1979. Back in those days, they had no office, just an empty checking account and a home phone number. Some of the members were experienced carpenters and professional designers, others were relatively new to the business, but all wanted a change from the lack of input and frequent lay-offs that were common in traditional construction jobs. They agreed to try working to-

gether for six months, with regular Wednesday night meetings to collectively make the decisions that would take the place of a boss.

"The one thing I never envisioned was that we'd own this big building and have a fat bank account," says Marc Rudnick, one of the original partners. "We thought a handful of tools and a broken-down truck were a lot to have accumulated." The truck, a 1960 Ford pick-

up, was purchased from one of the partners for \$100 when they realized they would need a vehicle for the business.

Their first job—and their big break—came that summer when a friend asked the group to gut-renovate his townhouse at a busy corner with lots of visibility. It was a hot summer and some of the first exercises in cooperative decision making were to leave work early and swim at Walden Pond. “A cooperative isn’t

Like many of the buildings it has renovated, CDC has been transformed over the years yet has maintained its character

necessarily the most efficient way to run a business,” explains Sally Wetzler, another of the founding members, “but it’s a great place to work.”

During the first few years, the partners experimented with a four-tier wage system. The highest rates were for time spent on dirty and dangerous work like insulation and trash removal. Next came highly skilled cabinet making and carpentry, followed by general labor, and then paperwork. Over time, members found that this system became cumbersome and that their skills became more equal, so they moved to paying a single wage rate for all types of work, including any apprentices or workers hired for individual jobs. While each person in the cooperative has different skills that will always mean some specialization in work roles, when it comes time to fill up the garbage truck, the designer does that, too. The worst of the work still is shared equally.

Keeping the books is another task that originally rotated among members. A gray Stride-Rite shoebox passed from partner to partner each quarter along with receipts and a ledger. Rudnick, the son of a bookkeeper, recalls opening the box one day to find a wet blob of unlogged receipts. After that, accounts would be done only by those who were capable and interested. “But,” he admits, “I didn’t really

know how to keep books.” Finally in 1985, work-study students from the Boston College of Accounting helped them set up a binder-based system of double-entry bookkeeping. “That was a revolution for us.”

Now that they are well established in the business, CBC partners can pick and choose among jobs. “It’s pretty back there,” says one partner in support of taking on a new renovation project in Waltham. “And it’s an interesting job with slated oak paneling,” adds another. “Is there any good food nearby?” Most of their jobs are in Cambridge and other relatively well-off areas, but the group also takes jobs at below-market rates if members feel strongly about the project, such as at a battered women’s shelter, a poverty agency’s food pantry, or a renovation at another cooperative.

The group has established some formal criteria for making its business decisions, such as refusing to accept jobs for condominium conversions that eliminate low-income housing or that use exotic woods from endangered rainforests. Clients are informally screened for their respectful attitude toward construction workers. And as partners have aged, the type of work they do has shifted toward cabinetry and dormers, and away from unpleasant and physically taxing tasks like demolition and floor sanding. “More and more,” they find themselves deciding that “a particular job is just so unenjoyable that we are going to pay someone else to do it.”

And while the 1960 Ford pickup is no longer around, it continues to serve as a reminder of CBC’s unusual beginnings and a model for its distinctive path to success. Unlike most construction firms that strut their prosperity with shiny new SUVs, CBC members prefer to cut costs so that they can afford the luxury of paying their least-skilled workers the same wages as everyone else. Plus an older truck allows them to blend nicely into their surroundings.

“We park our truck where it belongs,” says Rudnick. “Right in our mechanic’s yard, across the street from the Waste Management transfer station in Somerville.” *

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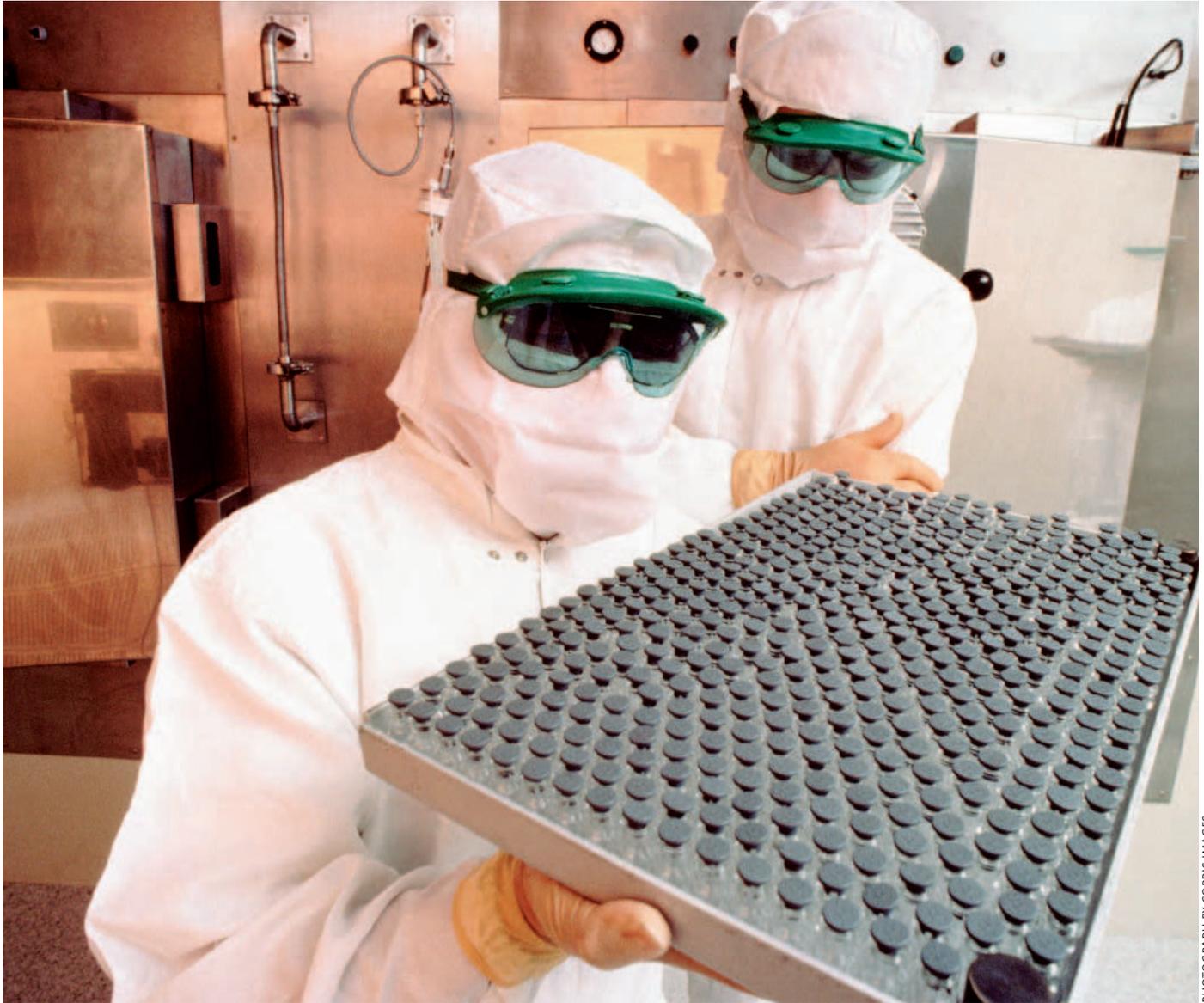
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Drug manufacturers couldn't function without patent protection. But how much protection is too much? Page 10

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