

marrow cancer. In each instance, there are strong protections to prevent pregnant women from taking the drug. And so perhaps the very drug that brought us the deadly drug lag will turn out to be a lifesaver for a new generation of patients.

DISCUSSION QUESTIONS

1. Does the structure of the drug industry have any bearing on the types of errors that drug firms are likely to make? That is, would a drug industry made up of numerous highly competitive firms be more or less likely to introduce unsafe drugs than an industry consisting of a few large firms?
2. How could the incentives facing the people at the FDA be changed to reduce the incidence of Type II errors? (*Hint*: Is it possible to compare the FDA approval process with the drug-approval process in other nations?)
3. What would be the advantages and disadvantages of a regulatory system in which, rather than having the FDA permit or prohibit new drugs, the FDA merely published its opinions about the safety and efficacy of drugs and then allowed physicians to make their own decisions about whether or not to prescribe the drugs for their patients?
4. Suppose, for simplicity, that Type I and Type II errors resulted in deaths only. Keeping in mind that too little caution produces Type I errors and too much caution produces Type II errors, what would be the best mix of Type I and Type II errors?

Ethanol Madness

Henry Ford built his first automobile in 1896 to run on pure ethanol. If Congress has its way, the cars of the future will be built the same way. But what made good economic sense in the late nineteenth century doesn't necessarily make economic sense in the early twenty-first century—although it does make for good politics. Indeed, the ethanol story is a classic illustration of how good politics routinely trumps good economics to yield bad policies.

Ethanol is made in the Midwest just like moonshine whiskey is made in Appalachia: Corn and water are mixed into a mash, enzymes turn starch to sugar, yeast is added, and heat ferments the brew. Once this is distilled, the liquid portion is ethanol and the solids are used as a high-protein animal food. The high-proof ethanol is combustible but yields far less energy per gallon than gasoline does. Despite this inefficiency, the Energy Policy Act of 2005 requires that ethanol be added to gasoline, in increasing amounts through 2012. This requirement is supposed to conserve resources and improve the environment. It does neither. Instead, it lines the pockets of American corn farmers and ethanol makers and incidentally enriches some Brazilian sugarcane farmers along the way.

Federal law has both encouraged and subsidized ethanol as a so-called alternative fuel for more than thirty years. But it was not until 2005 that ethanol really achieved national prominence. The use mandates of the Energy Policy Act, combined with surging gas prices and an existing 51-cent-per-gallon federal ethanol subsidy, created a boom in ethanol production. By 2006, ethanol refineries were springing up all over the Midwest, and imports of ethanol from Brazil reached record-high levels.

Three factors are typically used to justify federal use mandates and subsidies for ethanol. First, it is claimed that adding ethanol to gasoline reduces air pollution and so yields environmental benefits. That may have

been true fifteen or twenty years ago, but even the Environmental Protection Agency acknowledges that ethanol offers no environmental advantages over other modern methods of making reformulated gasoline. Hence neither the congressional mandate to add ethanol nor the 51-cent-per-gallon subsidy for its use as a fuel additive can be justified on environmental grounds.

A second argument advanced on behalf of ethanol is that it is “renewable,” in that fields on which corn is grown to produce ethanol this year can be replanted with more corn next year. This is true enough, but we are in little danger of running out of “nonrenewable” crude oil any time in the next century. Indeed, proven reserves of oil are at record-high levels, and the price of oil would have to exceed \$80 per barrel to match the inflation-adjusted level of twenty-five years ago. Perhaps more to the point, the production of ethanol uses so much fossil fuel and other resources that under most circumstances, its production actually *wastes* resources overall compared to gasoline. In part, this is because ethanol is about 25 percent less efficient than gasoline as a source of energy. But it is also because the corn used to make ethanol in the United States has a high **opportunity cost**: If it were not being used to make fuel, it would be used to feed humans and livestock. Moreover, because ethanol production is most efficiently conducted on a relatively small scale, it must be transported by truck or rail, which is far more costly than the pipelines used for gasoline.

The third supposed advantage of ethanol is that its use reduces our dependence on imports of oil. In principle, this argument is correct, but its impact is tiny, and the likely consequences are not what you might expect. Total consumption of all **biofuels** in the United States amounts to less than 3 percent of gasoline usage. To replace the oil we import from the Persian Gulf with corn-based ethanol, at least *50 percent* of the nation’s total farmland would have to be devoted to corn for fuel. Moreover, any cuts in oil imports will likely *not* come from Persian Gulf sources. Canada and Mexico are the two biggest suppliers of crude oil to the United States, and both countries send almost 100 percent of their exports to the U.S. market.

All of this raises an interesting question: If ethanol doesn’t protect the environment, conserve resources, or have any compelling foreign policy advantages, why do we mandate its use and subsidize its production? The answer lies at the heart of **political economy**, the use of economics to study the causes and consequences of political decision

making. It is true that a critical component of what the government does (such as providing for national defense and law enforcement) provides an institutional structure necessary for the creation and retention of our total wealth. Nevertheless, the essence of much government policy-making has nothing to do with making the size of the economic pie larger than it otherwise would be. Instead, many government policies are directed at dividing up the pie in new ways so that one group gets more resources at the expense of some other group. To do this successfully, politicians must be adept at concentrating the benefits of policies among a few favored recipients while dispersing the costs of those policies across a large number of disfavored individuals.

At first blush, such an approach sounds completely at odds with the essence of democracy. After all, under the principle of “one person, one vote,” it seems like benefits should be widely spread (to gain votes from many grateful beneficiaries), and costs should be concentrated (so that only the votes of a few disfavored constituents are lost). The concept of **rational ignorance** explains what is really going on. It is costly for individuals to keep track of exactly how the decisions of their elected representatives affect them. When the consequences of political decisions are large enough to outweigh the **monitoring costs**, voters swiftly and surely express their pleasure or displeasure, both in the voting booth and in their campaign contributions. But when the consequences to each of them individually are small relative to the monitoring costs, people quite sensibly don’t bother to keep track of them—they remain “rationally ignorant.”

In the case of ethanol, almost one-fourth of all ethanol for fuel is made by one company: Archer Daniels Midland (ADM). Clearly, even small changes in the price of ethanol are important to ADM. Because federal use mandates and the federal ethanol subsidy both increase the profitability of making ethanol, ADM has strong incentives to ensure that members of Congress are aware of the benefits (to ADM) of such policies. Similarly, corn farmers derive most of their income from sales of corn. Federal ethanol policies increase the demand for corn and thus increase its price; again, because the resulting benefits are highly concentrated on corn farmers, each has a strong incentive to ensure that his or her members of Congress understand the benefits (to the farmer) of such policies.

Contrast this with the typical taxpayer or consumer of gasoline. It is true that the \$3 billion or so spent on ethanol subsidies each year must

come out of taxpayers' pockets. Nevertheless, this amount is spread thinly across tens of millions of federal taxpayers. Similarly, although the mandated use of ethanol in gasoline is estimated to raise the cost of gas by about 8 cents per gallon, this amounts to no more than \$50 per year for the typical driver. Neither taxpayer nor motorist is likely to spend much time complaining to his or her senator.

Thus it is that farmers and ethanol producers are quite rationally willing to lobby hard for use mandates and subsidies at the same time that taxpayers and drivers put up little effective resistance to having their pockets picked. It may make for bad economics, but it is classic politics. And for the producers, farmers, and politicians involved, it just as surely turns corn into "yellow gold."

DISCUSSION QUESTIONS

1. Brazilian ethanol producers (who make ethanol from sugarcane) have lower production costs than U.S. producers. Indeed, even though it costs 16 cents per gallon to transport ethanol from Brazil to the United States, which also imposes an **import tariff** of nearly 60 cents per gallon on Brazilian ethanol, the United States still imports about 60 million gallons of ethanol per year from Brazil. If Congress really cares about protecting the environment and reducing our reliance on foreign crude oil, why do you suppose we have a large import tariff on ethanol?
2. If imports of Brazilian ethanol begin to rise sharply in the future, what do you predict will happen to the size of the import tariff levied on this good?
3. Why do you suppose it is owners of fertile farmland who are given special treatment by the federal government, rather than, say, automobile mechanics?
4. Use the theory of rational ignorance to explain why the ethanol subsidy is only 51 cents per gallon rather than, say, \$5 per gallon.

Flying the Friendly Skies?

Most of us hop into our car with little thought for our personal safety, beyond perhaps the act of putting on seat belts. Yet even though travel on scheduled, commercial airlines is safer than driving to work or to the grocery store, many people approach air travel with a sense of foreboding, if not downright fear.

If we were to think carefully about the wisdom of traveling 600 miles per hour in an aluminum tube 7 miles above the earth, several questions might come to mind: How safe is this? How safe should it be? Because the people who operate airlines are not in it for fun, does their interest in making a buck ignore our interest in making it home in one piece? Is some form of government regulation the only way to ensure safety in the skies?

The science of economics begins with one simple principle: We live in a world of **scarcity**, which implies that to get more of any good, we must sacrifice some of other goods. This is just as true of safety as it is of pizzas or haircuts or works of art. Safety confers benefits (we live longer and more enjoyably), but achieving it also entails **costs** (we must give up something to obtain that safety).

As the degree of safety rises, the total benefits of safety rise, but the marginal (or incremental) benefits of additional safety decline. Consider a simple example: Adding exit doors to an airplane increases the number of people who can escape in the event of an emergency evacuation. Nevertheless, each *additional* door adds less in safety benefits than the previous one; if the fourth door enables, say, an extra ten people to escape, the fifth may enable only an extra six to escape. (If this sounds implausible, imagine having a door for each person; the last door added will enable at most one more person to escape.) So we say that the marginal (or incremental) benefit of safety declines as the amount of safety increases.

Let's look now at the other side of the equation: As the amount of safety increases, both the total and the marginal (incremental) costs of