

# THE POWER OF INCENTIVES

## *How Seat Belts Kill*

Most of economics can be summarized in four words: "People respond to incentives." The rest is commentary.

"People respond to incentives" sounds innocuous enough, and almost everyone will admit its validity as a general principle. What distinguishes the economist is his insistence on taking the principle seriously at all times.

I remember the late 1970s and waiting half an hour to buy a tank of gasoline at a federally controlled price. Virtually all economists agreed that if the price were allowed to rise freely, people would buy less gasoline. Many noneconomists believed otherwise. The economists were right: When price controls were lifted, the lines disappeared.

The economist's faith in the power of incentives serves him well, and he trusts it as a guide in unfamiliar territory. In 1965, Ralph Nader published *Unsafe at Any Speed*, a book calling attention to various design elements that made cars more dangerous than necessary. The federal government soon responded with a wide range of automobile safety legislation, mandating the use of seat belts, padded dashboards, collapsible steering columns, dual braking systems, and penetration-resistant windshields.

Even before the regulations went into effect, any economist could have predicted one of their consequences: The number of auto accidents increased. The reason is that the threat of being killed in an accident is a powerful incentive to drive carefully. But a driver with a seat belt and a padded dashboard faces less of a threat. Because people respond to incentives, drivers are less careful. The result is more accidents.

The principle I am applying is precisely the same one that predicted the disappearance of gasoline lines. When the price of gasoline is low, people choose to buy more gasoline. When the price of accidents (e.g., the probability of being killed or the expected medical bill) is low, people choose to have more accidents.

You might object that accidents, unlike gasoline, are not in any sense a "good" that people would ever choose to purchase. But speed and recklessness are goods in the sense that people seem to want them. Choosing to drive faster or more recklessly is tantamount to choosing more accidents, at least in a probabilistic sense.

An interesting question remains. How big is the effect in question? How many additional accidents were caused by the safety regulations of the 1960s? Here is a striking way to frame the question: The regulations tend to *reduce* the number of driver deaths by making it easier to survive an accident. At the same time, the regulations tend to *increase* the number of driver deaths by encouraging reckless behavior. Which effect is the greater? Is the net effect of the regulations to decrease or to increase the number of driver deaths?

This question cannot be answered by pure logic. One must look at actual numbers. In the middle 1970s, Sam Peltzman of the University of Chicago did just that. He found that the two effects were of approximately equal size and therefore cancelled each other out. There were more accidents and fewer driver deaths per accident, but the total number of driver deaths remained essentially unchanged. An interesting side effect appears to have been an increase in the number of pedestrian deaths; pedestrians, after all, gain no benefit from padded dashboards.

I have discovered that when I tell noneconomists about Peltzman's results, they find it almost impossible to believe that people would drive less carefully simply because their cars are safer. Economists, who have learned to respect the principle that people respond to incentives, do not have this problem.

If you find it hard to believe that people drive less carefully when their cars are safer, consider the proposition that people drive *more* carefully when their cars are more dangerous. This is, of course, just another way of saying the same thing, but

somehow people find it easier to believe. If the seat belts were removed from your car, wouldn't you be more cautious in driving? Carrying this observation to the extreme, Armen Alchian of the University of California at Los Angeles has suggested a way to bring about a major reduction in the accident rate: Require every car to have a spear mounted on the steering wheel, pointing directly at the driver's heart. Alchian confidently predicts that we would see a lot less tailgating.

It is in no sense foolhardy to take more risks when you have a padded dashboard. Driving recklessly has its costs, but it has its benefits too. You get where you are going faster, and you can often have a lot more fun along the way. "Recklessness" takes many forms: It can mean passing in dangerous situations, but it can also mean letting your mind wander, or temporarily diverting your attention from the road to look for a tape cassette. Any of these activities might make your trip more pleasant, and any of them might be well worth a slight increase in accident risk.

Occasionally people are tempted to respond that nothing—or at least none of the things I've listed—is worth any risk of death. Economists find this objection particularly frustrating, because neither those who raise it nor anybody else actually believes it. All people risk death every day for relatively trivial rewards. Driving to the drugstore to buy a newspaper involves a clear risk that could be avoided by staying home, but people still drive to drugstores. We need not ask whether small pleasures are worth *any* risk; the answer is obviously yes. The right question is how *much* risk those small pleasures are worth. It is perfectly rational to say, "I am willing to search for a cassette while driving if it leads to a one-in-a-million chance of death, but not if it leads to a one-in-a-thousand chance of death." That is why more people search for cassettes at 25 miles per hour than at 70.

Peltzman's observations reveal that driving behavior is remarkably sensitive to changes in the driver's environment. This affords an opportunity for some drivers to influence the behavior of others. Those ubiquitous Baby on Board signs provide an example. The signs are intended to signal other drivers that they should use extraordinary care. I know drivers who find these signs insulting because of the implication that they do not *already* drive as carefully as possible. Economists will be quite

unsympathetic to this feeling, because they know that nobody *ever* drives as carefully as possible (do you have new brakes installed before each trip to the grocery store?) and because they know that most drivers' watchfulness does vary markedly with their surroundings. Virtually all drivers would be quite unhappy to injure the occupants of another car; many drivers would be especially unhappy if that other car contained a baby. That group *will* choose to drive more carefully when alerted to a baby's presence and *will* be glad to have that presence called to their attention.

This, incidentally, suggests an interesting research project. Economics suggests that many drivers are more cautious in the presence of a Baby on Board sign. The project is to find out how *much* more cautious by observing accident rates for cars with and without the signs. Unfortunately, accident rates can be misleading for at least three reasons. First, those parents who post signs are probably unusually cautious; they have fewer accidents just because they themselves are exceptionally careful drivers, independently of how their sign affects others. Second (and introducing a bias in the opposite direction), those parents who post signs know that the sign elicits caution from others, and they can therefore afford to be less vigilant themselves. This would tend to involve them in *more* accidents and at least partially cancel the effects of other drivers' extra care. Third, if Baby on Board signs really work, there is nothing to stop childless couples from posting them dishonestly. If drivers are aware of widespread deception, they will tend to suppress their natural responses.

This means that raw accident statistics cannot reveal how drivers respond to Baby on Board signs. The problem is to find a clever statistical technique to make all the necessary corrections. I do not propose to solve that problem here, but I offer it as an example of a typical difficulty that arises in empirical economic research. Many research projects in economics revolve around creative solutions to just such difficulties.

After this slight digression into the challenges of empirical research, let me return to my main topic: the power of incentives. It is the economist's second nature to account for that power. Will the invention of a better birth control technique reduce the

number of unwanted pregnancies? Not necessarily—the invention reduces the “price” of sexual intercourse (unwanted pregnancies being a component of that price) and thereby induces people to engage in more of it. The percentage of sexual encounters that lead to pregnancy goes down, the number of sexual encounters goes up, and the number of unwanted pregnancies can go either down or up. Will energy-efficient cars reduce our consumption of gasoline? Not necessarily—an energy-efficient car reduces the price of driving, and people will choose to drive more. Low-tar cigarettes could lead to a higher incidence of lung cancer. Low-calorie synthetic fats could increase the average weight of Americans.

Criminal law is a critical area for understanding how people respond to incentives. To what extent do harsh punishments deter criminal activity? A case of particular interest is the death penalty. The deterrent effect of the death penalty has been studied intensely by innumerable government commissions and academic scholars. Often their studies consist of nothing more than examining murder rates in states with and without capital punishment laws. Economists tend to be harshly critical of these studies because they fail to account for other important factors that help to determine murder rates. (Often they fail even to account for how stringently the death penalty is enforced, although this varies appreciably from state to state.) On the other hand, the refined statistical techniques collectively known as *econometrics* are designed precisely to measure the power of incentives. This makes it natural to apply econometrics in examining the effect of the death penalty. The pioneer in this effort was Prof. Isaac Ehrlich of the University of Buffalo, whose work was published in 1975. His sophisticated analysis led to a striking conclusion: During the 1960s, on average, each execution that took place in America prevented approximately 8 murders.

The details of Ehrlich's methods have been widely criticized by other economists, but it is possible to make too much of this. Most of the criticisms involve esoteric questions of statistical technique. Such questions are important. But there is widespread agreement in the economics profession that the *sort* of empirical study that Ehrlich undertook is capable of revealing important truths about the effect of capital punishment.

In 1983, Prof. Edward Leamer of the University of California at Los Angeles published an amusing article called "Let's Take the Con Out of Econometrics," in which he warned that the prejudices of the researcher can substantially affect his results. Leamer used the death penalty as an example. He showed that a simple econometric test, with a prodeath penalty bias built in, could demonstrate that each execution prevents as many as 13 murders. The same test, with an antideath penalty bias built in, could demonstrate that each execution actually *causes* as many as 3 additional murders. Still, unless one goes very far in the direction of building in a bias against the death penalty, most econometric research reveals a substantial deterrent effect of capital punishment. Murderers respond to incentives.

How can this be? Are not many murders crimes of passion or acts of irrationality? Perhaps so. But there are two responses to this objection. First, Ehrlich's results indicate that each execution prevents 8 murders; it does not indicate *which* 8 murders are prevented. As long as some murderers can be deterred, capital punishment can be a deterrent. The second response is this: Why should we expect that people engaged in crimes of passion would fail to respond to incentives? We can imagine a man who hates his wife so much that under ordinary circumstances he would do her in if he thought he had a 90% chance of escaping execution. Perhaps in a moment of rage, he becomes so carried away that he will kill her even if he has only a 20% chance of escaping execution. Then even in the moment of rage, it matters very much whether he perceives his chances to be 15% or 25%.

(Let me mention a third response as well. Ehrlich did not just make up the number 8; he arrived at it through a sophisticated analysis of data. Skepticism is fine, but it is incumbent on the serious skeptic to examine the research with an open mind and to pinpoint what step in the reasoning, if any, he finds suspicious.)

There *is* evidence that people respond significantly to incentives even in situations where we do not usually imagine their behavior to be rational. Apparently psychologists have discovered by experiment that when you hand a person an unexpectedly hot cup of coffee, he typically drops the cup if he perceives it to be inexpensive but manages to hang on if he believes the cup is valuable.

Indeed, the response to incentives may be as innate as any other instinctive behavior. In a series of experiments at Texas A&M University, researchers have allowed rats and pigeons to "purchase" various forms of food and drink by pushing various levers. Each item has its price, such as three lever pushes for a drop of root beer or ten for a piece of cheese. The animals are given "incomes" equal to a certain number of pushes per day; after the income is exhausted the levers become inoperable. In some versions of the experiments the animals are able to earn additional income by performing various tasks. They earn additional lever pushes at a fixed wage rate for each task they perform.

The researchers have found that rats and pigeons respond appropriately to changes in prices, changes in income, and changes in wage rates. When the price of root beer goes up, they buy less root beer. When wage rates go up, they work harder—unless their incomes are already very high, in which case they choose to enjoy more leisure. These are precisely the responses that economists expect and observe among human beings.

Incentives matter. The literature of economics contains tens of thousands of empirical studies verifying this proposition, and not one that convincingly refutes it. Economists are forever testing the proposition (while perhaps secretly hoping to make names for themselves by being the first to overturn it) and forever expanding the domain of its applicability. Whereas we used to think only about shoppers responding to the price of meat, we now think about drivers responding to seat belts, murderers responding to the death penalty, and rats and pigeons responding to wage, income, and price changes. Economists have studied how people choose marriage partners, family sizes, and levels of religious activity and whether to engage in cannibalism. (This trend has gone so far that the *Journal of Political Economy* published a satirical article on the economics of toothbrushing, which "predicted" that people spend exactly half their waking hours brushing their teeth. "No sociological model," boasted the author, "can yield such a precise conclusion.") Through all the variations, one theme recurs: Incentives matter.