10: Asymmetric Information

"You can fool some of the people all of the time; you can fool all of the people some of the time, but you can never fool all of the people all of the time."
(variously credited to Jacques Abbadie, P. T. Barnum, and William J. Groo)

February 21, 2019

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10.1: Market Failure Due To Poor Information

Our next topic is the regulation of consumer goods for safety and value. The market failure that can justify this regulation is imperfect information. Let's start by talking about the problem generally.

The reasoning for the Invisible Hand is that if seller X has a better product or lower price than seller Y, buyers will choose seller X. That seems obvious, but it has a hidden assumption: that buyers know seller X is better. What if they can't tell the quality? The reasoning breaks down. The buyer might buy from the seller with the worse quality, so surplus isn't maximized.

If there's just one seller, his quality is the only choice, but there's still the problem of whether to buy or not. Ordinarily, a transaction benefits both sides. The buyer wouldn't buy unless the value to him were greater than the price. But what if he is fooled about the value, because the product doesn't actually work? He may even make a mistake about the price, what he gives to the seller in the transaction. In some transactions, the buyer just pays a price, but in others, the "price" is a set of things the buyer must do. Someone who "buys" a loan, for example, generally has to sign a complicated contract saying what amounts he will pay back when, and what happens if he misses payments. If the consumer misunderstands the terms of the loan, then he may agree to a loan that does not have positive social surplus because it is more expensive to him than he thinks.

Information problems are not all due to lack of information. Consider various scenarios under which a large number of sellers in a market sell bottles of bug spray that dilute the standard active ingredient, DEET, to only 1% of the liquid, compared with the more typical 10%, 20%, or even higher.

Scenario 1
The bottles say that they contain 20% DEET, a lie.

Scenario 2
The bottles say that they contain 1% DEET, but the buyer thinks, wrongly, that that is typical and is enough.

Scenario 3
The bottles say that they contain only 1% DEET, but the buyer doesn't read the label.

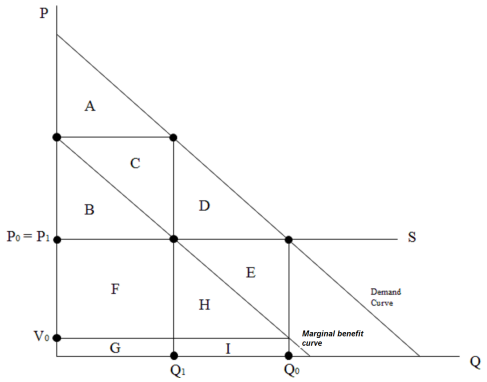
Scenario 4
The bottles say that they contain only 1% DEET, and the buyer knows that isn't enough, but he buys a bottle anyway because he likes the pictures of dead bugs on it. He later regrets his purchase.

In scenario 1, the buyer is misinformed about what is in the bottle. In scenario 2, the seller told the truth, but the buyer has the wrong idea about what the product will

do for him. In scenario 3, the seller told the truth, but the buyer has misinterpreted the information. In scenario 4, the buyer has not only made poor use of the information, he has willfully ignored it.

You might pause to think about the morality of these four situations. Is it ethical in each case for the seller to allow the buyer to purchase the sand?[1] "Being legal is not the same as being ethical." That saying is a commonplace, but let's think it through. It's not true because the law is wrong. What is legal is heavily influenced by the practicality of enforcing a rule and the possibility that government failure may make result in court action that causes harm even if ideally planned and administered regulation would help. We would like everyone to do what is ethical, but if it's hard to know what they're doing and costly for the state to intervene, we don't use law to make them behave ethically.

FIGURE 10.1
THE LOSS FROM POOR INFORMATION:
AN OVERVALUED PRODUCT



Poor Information	Good Information
$CS_0 =$ B-E	$CS_1 =$ B
$PS_0 = 0$	$PS_1 = 0$
$TS_0 =$ B-E	$TS_1 =$ B

Suppose that instead of just one misinformed consumer, we had a whole market of people making the same mistake, each person with a different willingness to pay. Let's see how this would look on a supply-and-demand diagram and what the surplus loss would be. We already did this in Chapter 2, so let's start with the same diagram, which is figure 10.1 here.

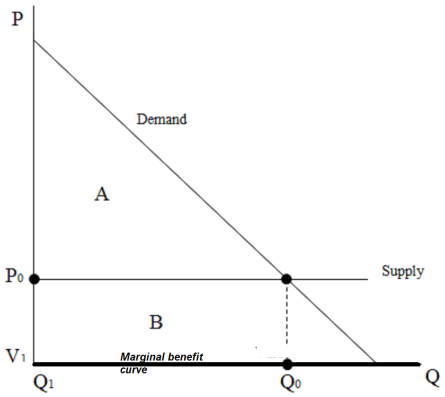
In DEET Scenario 1, the **marginal benefit curve** is different from the **demand curve**. The marginal benefit curve, recall, is the amount the buyers would pay if they were perfectly informed— the demand curve under perfect information. As drawn, the marginal benefit curve tells the story that even 1% DEET has quite a bit of use. The marginal benefit curve in figure 10.1 is not flat at zero, but not as high as the demand curve either.

When the demand curve and the marginal benefit curve are different, the demand curve is used to find the equilibrium price and the marginal benefit curve to calculate the surplus. The laissez faire price and quantity are P_0 and Q_0 in figure 10.1 because

[1] A fascinating book on the ethics of transactions is Levine, Aaron, *Economics and Jewish Law: Halakhic Perspectives*, Yeshiva University Press (1987). He writes as an Orthodox Jew, but the problems and concepts he analyzes are universal.

that is where quantity supplied equals quantity demanded. At Q_0, however, the price on the marginal benefit curve is only V_0, which is less than the P_0 consumers are paying. The true value of the Q_0th unit is only V_0, and the consumer is buying it only because he is misinformed. His surplus from that last unit is a negative amount, $V_0 - P_0$. To find the total consumer surplus, we need to look for the excess of consumer value, given by the marginal benefit curve, over the price they pay, which is P_1. For quantities in the interval between 0 and Q_1, consumer surplus is area B, which is positive. For quantities in the interval between Q_1 and Q_0, consumer surplus is area -E, which is negative because consumer value is less than the price paid. Total consumer surplus combines the two groups of consumers to get B-E. The consumer surplus does not include areas A+C+D+E, because that area is "imaginary consumer surplus", surplus the uninformed consumers expect to get but don't.

FIGURE 10.2
THE LOSS FROM POOR INFORMATION: A WORTHLESS PRODUCT



Poor Information	Good Information
$CS_0 =$ -B	$CS_1 = 0$
$PS_0 = 0$	$PS_1 = 0$
$TS_0 =$ -B	$TS_1 = 0$

Despite the fact that consumers are overpaying for DEET, producer surplus is zero, because the price exactly equals the minimum that sellers would accept. Seller volume and revenue is greater than it would be if consumers were well-informed, but seller profit is zero because sellers bid the price down to marginal cost.

If consumers became informed, the demand curve would drop to equal the marginal benefit curve. The price would fall to P_1 and the quantity to Q_1. The consumer surplus for the units in the interval from 0 to Q_1 would still equal B, producer surplus would still equal zero, and total surplus would increase by amount E because the negative-surplus consumers would not buy.

If 1% DEET is actually so weak that insects don't even notice it, the bottles are

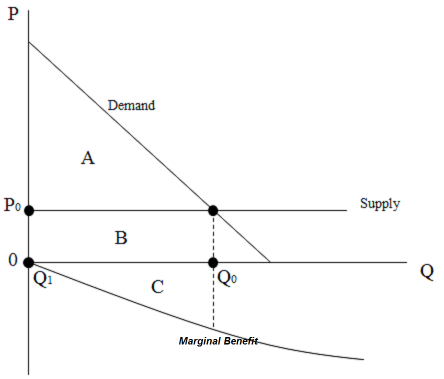
entirely worthless. Figure 10.2 illustrates that story. The marginal benefit curve is flat and runs along the Q-axis because $V(Q) = 0$ for every Q.

Consumers think they are getting area A as consumer surplus when they pay the price P_0, but they are actually getting -B because they are throwing their money away on something worthless. Producers are competing away the potential profits, so in the end their fraud earns them zero producer surplus.

If information were perfect, this market would cease to exist. Consumers would buy zero, and the market price would be undefined since nothing would be produced.

It can even happen that the marginal benefit curve is negative. Suppose that the the buyer wouldn't go into the woods without bug spray, but he buys the 1% DEET and exposes himself to the mosquitoes there. Even if the product has some benefit, he is worse off as a result of having bought it, and would be worse off even if his money were later fully refunded. Figure 10.3 shows this.

FIGURE 10.3
THE LOSS FROM POOR INFORMATION: A HARMFUL PRODUCT



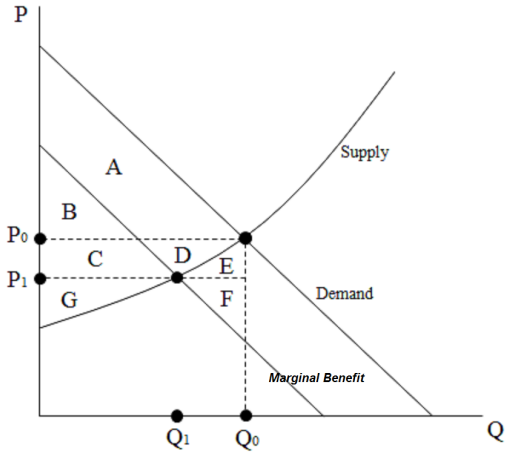
Poor Information	Good Information
CS_0 = -B-C	$CS_1 = 0$
$PS_0 = 0$	$PS_1 = 0$
TS_0 = -B-C	$TS_1 = 0$

Understanding figure 10.3 will help you understand how supply and demand curves work, as the abnormal so often helps us understand the normal. What it says is that the consumer who would pay the most for a bottle also gets the least harm from it—0, in this case, though we could have started at a negative number (how would that change the way the marginal benefit curve looks in figure 10.3?) Consumers think they are getting A in consumer surplus, but they are actually getting -B-C, because they are

paying good money for something that destroys value. As in our earlier examples, the dishonest sellers compete away all the profits. Since there are no gains from trade from even a single buyer and seller, if information were perfect this negative-value market, like the one with zero value, would cease to exist.[2]

In the diagrams so far, we have drawn the supply curve flat, which is appropriate if all suppliers are identical, so when the industry expands, the marginal cost does not rise. That is why producer surplus has always been zero. Figure 10.4 has an upward-sloping supply curve, to show the often more realistic but more complicated case where producer surplus is positive.

FIGURE 10.4
AN OVERVALUED PRODUCT AND UPWARD SLOPING SUPPLY



Poor Information	Good Information
$CS_0 =$ B -D-E-F	$CS_1 = B + C$
$PS_0 =$ C+G+D	$PS_1 =$ G
$TS_0 =$ B+C+G-E-F	$TS_1 =$ B+C+G

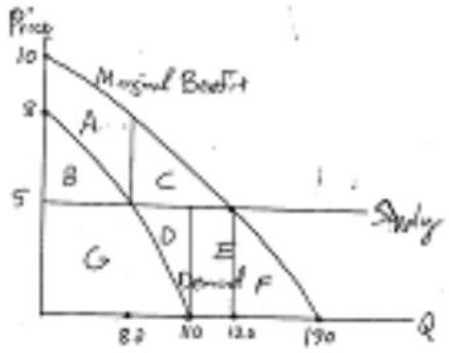
Consumers think they are getting consumer surplus A+B, but area A will not materialize when they consume the product and their actual surplus will be B -D-E-F because they are paying areas D+E+F without getting any value in return. Producer surplus is C+D+G, which makes up the big triangle below the price and above the supply curve. Area E+F is deadweight loss due to overproduction.

[2]You could tell a different negative-value story. What if the consumers with the highest demand price also suffer the most harm from the product? In this case, maybe they were willing to pay so much for the bug spray because they suffer the most from mosquitoes. What would the marginal benefit curve look like then? It would actually slope up, if you think about it.

Under perfect information, the price and quantity fall to P_1 and Q_1. Consumer surplus rises to area B. Producer surplus falls to area G.

Figure 10.5 shows a different case than has been discussed so far: the case of consumers undervaluing a project rather than overvaluing it. Do you understand how the market will fail to maximize surplus? If supply were upward-sloping would there be more hope that the market would work out things on its own without regulation?

FIGURE 10.5
AN UNDERVALUED PRODUCT



Poor Information	Good Information
$CS_0 = A + B$	$CS_1 = A + B + C$
$PS_0 = 0$	$PS_1 = 0$
$TS_0 = A + B$	$TS_1 = A + B + C$

In all these diagrams the market has failed. We have satisfied the first part of the test for whether regulation is needed. Before we go on to what the government might do, though, let's take a detour to look at the interesting topic of what happens when the problem is not that consumers are lied to but when they fail to process information correctly, the problem in scenarios three and four.

10.2: Irrationality

The quote on the cover page of this chapter said, "You can fool some of the people all of the time; you can fool all of the people some of the time, but you can never fool all of the people all of the time." That is a wise saying. You and I make a lot of foolish mistakes. Thinking requires some effort. We are on auto-pilot most of the time, and quite sensibly so. It would be hard to even walk down the hallway if we thought precisely about optimizing every footstep. But our auto-pilot can mislead us, as when we keep walking normally when we come to an icy patch of sidewalk. Some people are on mental auto-pilot all the time, it seems. That's an exaggeration, but they do make the same mistake over and over. Some people are suckers for get-rich-quick frauds,

and they keep on being suckers. Even after one con man has fooled them, they fall for the next. But any scheme that relies on fooling an entire marketplace is hard to carry off successfully. Someone who isn't fooled can gain by informing the potential victims.

FIGURE 10.6
THE MULLER-LYER ILLUSION

Cognitive psychology is the science of how people think. Even when we think about a decision, we use mental short-cuts that can go wrong, and psychologists try to identify how we use these "heuristics". Economists call incorrect information processing **irrationality**.[3] Ordinarily in their analysis, economist assume players are maximizing their payoff functions, given the available information. In **behavioral economics** (which would be better called "psychological economics"), they assume that players follow some fixed rule in choosing their actions, a rule that the players wouldn't follow if they really understood the situation.

We'll look at a number of common quirks in everyday thinking that can lead to these irrational behavior rules. You can think of these quirks (or "fallacies") as being like the optical illusion in figure 10.6. The bottom line looks longer, but in fact both lines have equal length. They look different because of the arrows on the ends, and regardless of your intelligence your impression will be that the bottom line is longer. You can overcome the impression, however, by thinking about the vertical lines at the end of the lines, which show that they must be of equal length. Logical fallacies are like that too. It is easy to be deceived by first impressions, but education and experience help us to fall for such deceptions less than we might otherwise.[4] So let's look at a number of ways mental short-cuts can go wrong.

Quirk 1: Anchoring. It actually takes some effort to keep information out of your mind. One theory of learning is that it takes some effort to reject an idea or fact one hears or sees, and so unless we actively filter input, our beliefs become contaminated

[3] Of course, going a level further, if thinking takes effort, it would be "irrational" to exert the effort to be rational all the time. That paradox is the subject of much current economic research.

[4] Many fun optical illusions are on the web at "106 Visual Phenomena & Optical Illusions," Michael Bach (2014) michaelbach.de/ot/.

by dubious information. Anchoring is one example of that: the use of irrelevant numbers in making decisions merely because one's mind has been exposed to them recently.

MIT's Professor Ariely conducted a mock auction for chocolate with his MBA students. First, students had to write down the last two digits of their Social Security numbers. Next, they submitted their bids. The half of the group with higher two-digit numbers submitted bids from 60 to 120 percent higher.[5] Their bids were "anchored" by the numbers they'd written down.

Quirk 2: The Representativeness Heuristic. When we think of the word "influenza" we think of various characteristics— fever, muscle ache, headache, a dry cough— that would represent typical influenza. This leads us astray if the match is so good that it leads us to a quick conclusion so we ignore other information such as that the person has just come from a country with an Ebola epidemic. Another example is the white lab coat worn by the actor who played Marcus Welby, M.D. in a popular TV program when he later appeared in an aspirin commercial says, "I am not a doctor, but I play one on TV." Of course, many people could not shake off the association with the trustworthy Dr. Welby, but even those who hadn't seen that show would be influenced by the representativeness heuristic: "He has a white lab coat, so he must know about medicine."[6]

In a classic experiment, psychologists Daniel Kahneman and Amos Tversky gave student subjects a description like this and asked whether (a) or (b) was more probable:[7]

> Linda is 31 years old, single, outspoken and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in antinuclear demonstrations. a) Linda is a bank teller
> b) Linda is a bank teller and she is active in feminist movement

[5] Ariely, Dan, *Predictably Irrational: The Hidden Forces That Shape Our Decisions*, HarperCollins (2008). See also Dan Ariely, "The Fallacy of Supply and Demand," http://danariely.com/the-books/ (2010).

[6] See "Why White Lab Coats?", http://www.mommd.com/white-lab-coats.shtmlhttp://www.mommd.com/white-lab-coats.shtml.

[7] Tversky, Amos & Kahneman, Daniel, "Extension versus intuitive reasoning: The conjunction fallacy in probability judgment," *Psychological Review*, 90: 293—315 (October 1983).

85% of students chose (b), even though the conjunction— being a bank teller *and* being a feminist— can't be more probable than just being a bank teller. Moreover, trying the experiment with a different group of students, 65% chose (b) even after being given the following correct arguments based on logic and on the representativeness heuristic:

> Argument 1. Linda is more likely to be a bank teller than she is to be a feminist bank teller, because every feminist bank teller is a bank teller, but some women bank tellers are not feminists, and Linda could be one of them.
> Argument 2. Linda is more likely to be a feminist bank teller than she is likely to be a bank teller, because she resembles an active feminist more than she resembles a bank teller.

How can people's behavior be explained? Steve Sailer suggests that people are familiar with the storytelling principle of "Chekhov's Gun." The author Anton Chekhov said,

> Remove everything that has no relevance to the story. If you say in the first chapter that there is a rifle hanging on the wall, in the second or third chapter it absolutely must go off. If it's not going to be fired, it shouldn't be hanging there.

and Sailer adds,

> But what did Chekhov know about human nature? To the Aspergery Israelis, it was indisputably irrational for listeners to assume that Tversky and Kahneman didn't just put in the details to fool them. After all, that's exactly what the professors were trying to do: con them.

Thus, one conclusion from the experiment might be that people are naive about experimenters trying to con them— the experimental subjects ought to have looked for the trick, but they didn't. Of course, gettingthe answer wrong didn't cost them anything either, so perhaps they were rational after all.

A related view, associated with the work of Gerd Gigerenzer, is that people don't take questions like this literally. They answer "What is Linda more like?" rather than "What is Linda more likely to be?" Klaus Fiedler found that the conjunction fallacy largely disappeared when he rephrased the question in the Linda experiment using frequencies instead of probabilities. Using frequencies, it would be something like "There are 100 people that fit this description. Rank how many of them are: a) bank tellers b) bank tellers and active in the feminist movement." [8] Some people still chose (b), though, and the fallacy does exist in the original phrasing. The question is how relevant it is in daily behavior– perhaps, when someone is trying to figure out from a product description what the product will do.

[8] Klaus Fiedler (1988) "The Dependence of the Conjunction fallacy on Subtle Linguistic Factors," *Psychological Research*, 50: 23–129. See also Gerd Gigerenzer (1991) "How To Make Cognitive Illusions Disappear," *European Review of Social Psychology*, 45: 83–115.

Does this kind of mistake justify regulation? It might increase total surplus if people were often enough fooled by the manipulation of the representativeness heuristic, just as regulation might be justified if people held false beliefs that led them to make wrong decisions. TV networks now have the self-regulatory "White Coat Rule". They do not permit advertisers to use doctors or actors portraying doctors to sell over-the-counter medicines. They do allow them in ads for prescription medicine, perhaps because consumers have to see a real doctor before buying those, so the possible harm from trusting the white-coated recommenders is lower.[9]

Quirk 3: Combining background and current information in the wrong way. The conjunction fallacy is simple, so it's not surprising that people have trouble with probability calculations when it comes to more complicated probability problems. In another experiment, subjects were divided into two groups. One group was told that someone named Dick came from a sample of 30 engineers and 70 lawyers; the other group had reversed numbers, with Dick coming from a sample of 70 engineers and 30 lawyers. Both groups were told the following.[10]

> Dick is a 30 year old man. He is married with no children. A man of high ability and high motivation, he promises to be quite successful in his field. He is well liked by his colleagues.

Surprisingly, both groups said that the probability that Dick was an engineer was .5. The description represented either occupation equally well, and they focussed on it and ignored their other information— that 30% of the sample (for group 1) and 70% (for group 2). Group 1 should have answered .3 and group 2 should have answered .7.

With more informative descriptions, the fully rational answer becomes more difficult to compute, and so of course subjects continue to do badly. Let's go through the rational process, since it is useful and shows how hard it is to be perfectly rational. Let's suppose that you are told that Dick is from a group of 50 lawyers and 50 engineers and "Dick is a 30-year-old man. He did well in high-school math, and he likes solving problems." The biggest problem you have is poor information— that you don't really know how many lawyers and engineers in the general population fit the description; you just think it fits engineers a lot better. Suppose you think 90% of engineers are like that, and 20% of lawyers are. A first mistake you might make is to conclude that Dick is an engineer. He is, probably, but not with probability 1. Realizing that, your natural inclination will be to say that there is a 90% probability that Dick is an engineer. That would be wrong.

The easiest way to think about this is using number frequencies instead of probabilities, as we know from the Linda experiments. We want to estimate how many out

[9] "Today's Hot Topic: The White Coat Rule," Marilyn Colaninno, *Adlaw by Request* (May 2, 2013).

[10] Tversky, Amos & Kahneman, Daniel, "Judgment under Uncertainty: Heuristics and Biases," *Science*, 185: 1124–1130 (1974).

of the 100 men are engineers, given this description. The key mental step is to narrow the problem down to thinking only about men in the sample who fit the description. Of the lawyers, 10 fit the description (20% of 50), and of the engineers, 45 fit it (90% of 50), for a total of 55 men. Thus, 45 out of 55 are engineers, which is about 82%, not 90%. This kind of reasoning is an example of **Bayes's Rule** or **Bayesian reasoning** in action.[11]

If you are told that Dick is from a group of 80 lawyers and 20 engineers, that should change your estimate. The frequency approach is straightforward. Of the lawyers, 16 now fit the description (20% of 80), and of the engineers, 18 fit it (90% of 20), for a total of 34 men. Thus, 18 out of 34 are engineers, which is about 53%.

Bayes's Rule is subtle enough that most people are not going to be fully rational, any more than their answers are going to be fully rational if you ask them what $1,712 \cdot 24$ is. They'll make mistakes. But we could at least hope that they would realize that as the proportion of engineers in the sample rises, the estimate of the probability that Dick is an engineer should rise too.

Another example uses the probability of dying of liver cancer. Suppose you know that in the general population, 2% of people have undiagnosed liver cancer. You are offered a free test that detects your liver cancer, if you have it, with 90% probability, but falsely detects liver cancer with 20% probability even if you are healthy. This false detection is called a **false positive**, even though it is a bad thing for you, because **testing positive** is the standard term for what happens when a test for whether X is true does say that X is true.

Suppose we start with 1,000 people. 20 of them will have undiagnosed liver cancer, and 980 won't, since the probability is 2%. Of the 20 who have cancer, 18 will test positive, the 90% detection rate. Of the 980 who don't, 196 will test positive, the false positive rate. Thus, of the 214 people who test positive, only 18 will actually have cancer— just 8 percent of them.

The cancer test example has real-world application. Doctors routinely use PSA test for prostate cancer for checkups for older men. Richard Ablin, the discoverer of PSA, thinks this is wrong and that the Food and Drug Administration should not have approved the test for that purpose. He approves of the test as a way to see how effective prostate removal has been. For diagnosing cancer, however, the rate of false positives is so high that he believes most of the further tests and even the surgery done is unnecessary, and to a considerable degree prompted by the financial motive of doctors. Even if the doctor tells the patient that the test has a high false-positive rate (68%, Ablin reports), it is hard for the patient to understand that his actual probability

[11] As an equation, Bayes's Rule would set the problem up as $\text{Probability (Engineer}|\text{Description)} = \frac{\text{Prob (Desc.}|\text{Eng.)} \cdot \text{Prob (Eng.)}}{\text{Prob (Desc.}|\text{Eng.)} \cdot \text{Prob (Eng.)} + \text{Prob (Desc.}|\text{Lawyer)} \cdot \text{Prob (Lawyer)}} = \frac{.9 \cdot .5}{.9 \cdot .5 + .2 \cdot .5}$. After teaching the formula for many years, I now think the frequency approach is better for simple problems.

of cancer is low.[12]

Quirk 4: Systematically Wrong Priors. What is probably a much bigger problem than people not updating their priors correctly using new information is that they have to start out with a prior that is wrong. Suppose the drug Ecstasy is so dangerous that you shouldn't try it, but 50% of teenagers underestimate the danger and 50% overestimate it. Teenagers have the correct estimate on average, but 50% of people make the wrong decision. Thus, we have market failure. Worse still, there is no reason why priors should be correct on average. Teenagers are similar to each other, so they might all make the same mistake, with 100% of them underestimating the danger. When people encounter a situation for the first time, with little information and no experience, we should not be surprised if they tend to make the same mistake. People with more information and experience can force them to make better decisions. Lack of experience, as much as lack of intelligence, is why we allow parents to regulate their children so heavily. We could call this problem lack of information or we could call it poor thinking, but the end result is the same: many people make the wrong decision.

Quirk 5: Finding Patterns in Randomness. This fallacy consists of a person seeing a pattern in data that he should know is actually random. Francis Bacon said in 1620 in Book I, paragraph 45 of *Novum Organon*, which lays out his proposal for how modern experiments should replace Aristotelian natural philosophy,

> The human understanding, from its peculiar nature, easily supposes a greater degree of order and equality in things than it really finds; and although many things in nature be sui generis, and most irregular, will yet invent parallels and conjugates, and relatives where no such thing is. Hence the fiction, that all celestial bodies were in perfect circles, thus rejecting entirely spiral and serpentine lines, (except as explanatory terms.)

Our minds are wired to look for patterns in the world around us, so we can figure things out. That means we often find simple patterns where the outcome is really random or follow a less obvious pattern. We see that a cloud looks like an elephant or a ship, for example. Or, as Bacon says, we look at the ways the stars and sun move and construct a formal informal model in which they move in circles, rather than ellipses.

In the case of the clouds, we don't really think that cloud demons are up there drawing elephants. But what if you saw a roulette wheel go Red-Black-Red-Black-Red-Black? Wouldn't you be tempted to say that the next time the ball would stop on Red?

I am sure that if I asked you to write a random sequence of Reds and Blacks you wouldn't pick the alternating sequence. You'd pick something like Red-Black-Black-Red-Black-Black, because it looks more random. But if you think about it, those two

[12]Eric J. Topol & Richard J. Ablin, "PSA Test Is Misused, Unreliable, Says the Antigen's Discoverer," *Medscape*, August 08, 2014.

sequences have exactly the same probability. A bet on RBRBRB and a bet on RBBRBB would have the same probability of success. If I asked you to write out 100 sequences, and you didn't pick any that looked nonrandom, you'd *not* be replicating randomness. Sometimes patterns do show up by accident.

The following sequences might help you understand this. It is random– I promise you. I used Excel's random-number generator, and only did it one time.[13]. But does it look entirely random?

BrBrrBrrrrrBBrrBBrBBBrrrBBrrrr

How about if I do a little grouping? Now it looks like there are some nonrandom patterns. In fact, it *all* looks rather special. Do you start to wonder if maybe some extraterrestrial intelligence is trying to send a message to us? I don't think so. Rather, human brains are good at finding patterns, even in randomness.

BrBr rB rrrrr **BBrrBB** r **BBB**rrr **BB** rrrr

One place where this is important is "cancer clusters": towns with unusually high incidence of rare cancers. Suppose the probability is only one tenth of one percent—.001—that a town of 5,000 people has 10 cases of brain cancer in a year. A friend comes to you and says that Smallsville is a death trap because it had 10 cases last year. Should you wonder what evil company has dumped toxic waste in Smallsville? If there are 1,000 towns that size in America, you shouldn't be too impressed. Odds are that each year one of them will look like a death trap.

Another example of reading patterns into randomness is the *gambler's fallacy.* This is believing that if Red has come up 10 times in a row, the next color will almost surely be Black. That is a fallacy because a sequence that contains a sequence of 10 Reds followed by Black is just as likely as a sequence of 10 Reds followed by another Red. Both are highly unlikely— but that is because they both start with the unlikely sequence of 10 Reds in a row. The roulette wheel doesn't have a memory, and 10 Reds plus a Black is no more likely than 10 Reds plus a Red. In 1913 at the casino in Monte Carlo, Black came up twenty-six times in a row on a roulette wheel. There was a rush to bet on red, beginning after Black came up fifteen times. Players doubled and tripled their stakes. In the end the unusual run made the Casino considerable profit.

The human tendency to find patterns in everything is crucial to understanding the stock market. If you look at the stock market going up and down, it's a lot like a roulette wheel. So be careful. If you look carefully, you'll always see patterns, even if everything is random. Efficient market theory say that the ups and down essentially are random, though slightly trending upwards for every stock. The reasoning is that

[13]If you want to try it yourself, the Excel formula is: =IF(RAND()>0.5,"r","B")

if it were not, it would be a public opportunity many people could discover. Someone would notice and bid up the price of any stock with an unusually high expected return, so the opportunity would not persist. Studies of the stock market confirm this; there is no way to look at patterns in stock price movements and predict what will happen next.

Quirk 5: Present-Orientedness and Lack of Self-Control. People have trouble making decisions that involve time. As we have seen, present discounted value calculations are hard to correctly. You might categorize this as poor information— they don't know the present value formulas— or as poor information-processing— they can't take the flow of payments and discount rate and rationally combine them to get a present value. Usually this shows up as present-orientedness, as choosing small benefits now despite big costs later. This might be due to poor information or reasoning, or it might just be because the person has a high discount rate. Depending on which, there either is market failure or the person is simply maximizing a utility function that has a higher discount rate than the rest of us.

One approach that turns a high discount rate into market failure is the **multiple-selves model**. Think of the impatient spender not asa one person, but as a sequence of persons through time, each with his own utility function. The 2020 John Smith is very similiar to the 2019 John Smith, but there is a crucial difference: the 2019 John Smith gets to control their initial wealth because he comes first. He can spend it on himself, or save it for the future John Smiths. Or, he could put them into debt. Some people care about their future selves enough not to consume everything at once, and this is what we interpret as a low discount rate. Other people are more selfish and they look like they have a high discount rate. This interpretation supports a case for rejecting a person's time preference for consumption as a reason to allow him to make his choices freely. If there are externality effects on future selves— what have been called **internalities**— then there is market failure justifying regulation. Or, rather, there is market failure if we wish to assign ownership of Smith's property to all of the Smith-selves jointly, with the 2019 Smith as a trustee with a duty to use it for all of their benefit. If we say that the 2019 Smith is the owner, free to use the property as he wishes, then there is no externality because he will use his property to maximize his own utility and the future Smiths are in the same position as any other poor person. Here, indeed, we have an abstract philosophical question with implications for public policy. The question is, "Since John Smith is constantly changing, what do we really mean by saying he is one person?"" Depending on the answer, we may wish to restrict credit card debt or not. Ontology matters for personal finance.[14]

This is an argument used to justify forcing consumers to buy energy-efficient ap-

[14]Ontology is the science of being, of what we mean when we say a rock exists or a dog has four legs.

pliances: that they do not understand that the higher price is worth it for the future electricity savings. This can be very difficult to distinguish from simply having a high discount rate, however. Someone might simply want to consume more goods today and not care much about tomorrow. Economists do not call that irrationality, seeing it just as another personal preference that we accept in calculating surpluses. Whether we are correct to do that, however, can be questioned. Perhaps someone who prefers the present is just ill-informed as to how much he would enjoy consumption in the future, or cannot control his impulses. In those cases, one might argue that the government should control his spending for his own good.

Even the multiple selves idea casts the problem in terms of time. More psychologically, the problem could simply be lack of self-control. When Sam drinks another glass of whisky he knows it is killing him, and he doesn't expect to enjoy it, but he can't help himself. Some economists would say that economics should just rely on "observed preference", and define Sam's surplus in terms of what he actually does, rather than what he says he wishes he were doing. For many applications, that is appropriate. If we are trying to estimate Sam's demand curve for whisky, we are trying to predict how much he will drink, not how much he enjoys drinking it. In thinking about whether there is market failure, though, I would argue that we need to treat Sam's compulsions as more like a technological problem. If a cruel ruffian were to force the whisky down Sam's throat, we would not treat that as showing that Sam wants to drink the whisky. When the ruffian is Sam's worse nature, it seems no different; there is something beyond his control which is keeping him from making his desired decision. He will tell you that if you ask him.

The view that the problem of lack of self control explains why Sam himself may take steps to ward off temptation, not keeping alcoholic drinks in his house, for example, which is hard to explain by poor information or poor reasoning (though the multiple selves idea deals with it nicely). Economic models using **hyperbolic discounting** do tackle it. Hyperbolic discounting is a model of utility across time in which someone might use a discount rate of 20% for the choice between today and tomorrow and one of 5% for between tomorrow and the day after. The idea is that "today" keeps moving, so tomorrow our chooser will use the "right now" discount rate of 20% instead of the 5% rate he would have used the previous day. Whether we label this as lack of self control, multiple selves, or hyperbolic discounting, the upshot is that Smith might happily vote for a ban on liquor, as a way of binding his hands.

How to Think about Irrationality

All humans think logically, but some people are better than others, and everybody will fall prey to these mental quirks unless they keep a careful watch on their decisions and stay humble. Thinking takes time and effort. People rationally don't always do it, especially if the stakes are small. The quirks above are just a few of the problems

that psychologists have noted with human reasoning. The significance of the problem for us here is that irrationality, like poor information, causes market failure. If people reason poorly enough, then they might benefit from government paternalism to save them from their own mistakes.

Indeed, this, together with poor information, is the argument for moral paternalism and literal paternalism. Children have less information than adults, and they are worse at putting it together to make a decision. Thus, we allow parents to override the decisions of their children. In the present-day United States we end this at age 18, but some people would benefit from a longer period of external control, and, indeed, most of us ask our parents for advice long into adulthood, though we don't always follow it.

We are only human, after all, and it is hard enough to get simple arithmetic right, much less Bayes's Rule. Since information is never perfect and people are never perfectly rational, someone who wanted to impose regulation on the economy could use this as an excuse for anything at all. Thus, it is important to see how great the harm from irrationality is, whether there exist market solutions, and— something crucial— to what extent voters authorizing policies or government policymakers implementing them are subject to the same kind of irrationality. Irrationality is an argument against regulation as well as an argument for it.

10.3: Market Solution I: Selling or Giving Away Information

Fortunately some poor information and irrationality is fixed by market forces.[15] If consumers underestimate the quality of a product, producers have incentive to advertise to make them better informed. If consumers overestimate the quality of Acme's product, Acme's competitors have incentive to advertise to let them know how bad it is. If consumers make mistakes in both directions, Internet sites and magazines such as *Consumer Reports* and *PC World* can make profits by offering to inform them. *Consumer Reports*, to be sure, is produced by a nonprofit organization. Some people will provide information just from the good of their hearts. Much Internet information is like that, because people know they can benefit hundreds of other people at very little cost to themselves. Nonprofits are not always so different from for-profits, though. Remember, the people who work at *Consumer Reports* are paid salaries that will disappear if the magazine's quality drops and it can't get consumers to subscribe, just as at a for-profit company. Thus, it, too, has incentive to provide useful information.

Buyers also respond to poor information by simply collecting better information. If you aren't sure of the quality of a used car, you can hire a mechanic to look at it for you. If you aren't sure of the quality of a job candidate, you can look at his resume (his advertising, in effect), interview him, and give him a test. Testing is generally more accurate in predicting job performance than interviews or credentials,

[15] "Melior" is Latin for "better," just as "optimus" is Latin for "best".

as well as being quicker and cheaper. Testing is not subject to the representativeness heuristic or stereotyping, so it is not vulnerable, like interviews, to the irrationality of the interviewer.

A curious example of the use of tests to determine quality is how some employers use SAT scores in hiring college graduates. Many entry-level jobs in financial services ask for a combined SAT score (the score on the most common U.S. college admissions test) of at least 1,300 out of the maximum 1,600. A typical investment-banking ad at HotJobs.com said,

> Minimum expectations include an overall score of 1350 on the SAT's. . . . You will be required to provide official scores and transcripts, so please do not respond if you do not meet the aforementioned requirements.

Configuresoft, a Colorado systems-management software company, asks applicants for SAT scores when they apply for sales jobs. One reason to put it in job ads is to see whether applicants are paying attention to details. In applying to fill one account-manager position on an online job board, fewer than 10% of the hundreds of respondents bothered to send their SAT scores to Configuresoft. Buyers often acquire information in subtle ways. Asking for SAT scores tells the buyer of labor how smart the applicant is, but it also shows whether he pays attention to instructions. The company may have as little use for an applicant with a perfect score on the LSAT who doesn't notice he's supposed to submit it as for a less intelligent applicant with a low score.[16]

Employers do have to take care in using ability testing. The use of such tests is severely limited by U.S. laws which require employers to show that if minorities do worse on the test they must show a close connection between test performance and job performance, something most employers lack the statistical expertise to do to the satisfaction of a court.[17]

10.4: Market Solution II: Reputation

Another market force is **reputation**. Even if a company could make a short-run profit by cheating consumers, it might make even more profit by being honorable towards them—especially if it has a good reputation to begin with and can charge premium prices as a result.

The problem of poor information is most severe for infrequent or unrepeated purchases. If someone buys something from a low-quality producer once, he can learn from the experience and switch to a different producer until he eventually learns who has high quality. Also—a different effect—if the producer can choose between high and low quality, as opposed to simply being able to produce only one or the other, then

[16] See "Career Journal: More Employers Ask Job Seekers for SAT Scores," *The Wall Street Journal* (28 October 2003).

[17] See Criteria Corp., "Pre-Employment Testing: Whitepaper," (undated; viewed October 11, 2010).

repeat purchases give him a strong incentive to choose high quality so as to preserve his reputation and obtain repeat purchases.

We will go through a particular model of reputation, the **Klein-Leffler Model**, that carefully explains how having a good reputation can make a firm continue to produce high quality.[18]

Some firms have good reputations. Why?

One reason is that those firms produce good products and consumers can see that directly. But then reputation is not important in the buying decision—consumers don't need it.

A second reason is that even though the consumer can't see the quality until after he buys, the firms have produced good-quality products in the past. But why should that matter? Won't they want to cut costs and produce lower quality in the future, if people are willing to pay a high price anyway?

The Klein-Leffler model shows how reputation can give firms an incentive to produce high quality. It simplifies to the following story. A certain number of firms decide to enter the market for a new product whose quality might be low or might be high. High quality is more expensive to produce. Consumers can't tell the quality until after they have purchased, but very soon word will spread.

If consumers have pessimistic expectations and expect low quality, that is self-fulfilling. A firm won't produce high quality, because it won't be able to sell at any higher a price. Pessimistic consumers won't believe it. If consumers are extremely pessimistic, they will think that even if a firm produces high quality once, that doesn't mean it will continue to produce high quality—it might just be an effort to raise the price and trick them when the quality falls again.

If consumers have optimistic expectations, good reputations can be self-fulfilling. Firms will charge a high price. Consumers will deduce that they have high quality and be willing to pay that high price. A firm won't deviate to low quality because if it did, it would lose its reputation and its customers.

Klein and Leffler pointed out something crucial to this story: firms must be making positive economic profits for it to work. Think of a firm with a reputation for high quality. At each point in time, it will do a calculation of whether it should continue to choose high quality, or deviate to low quality. If it chooses high quality, it makes a moderate profit this period and keeps its reputation. If it chooses low quality, it makes a big profit this period but loses its reputation—and its future profits.

If the firm's future profits are zero, then the most profitable choice is to cheat and produce low quality. That will yield an economic profit for a short time at least. Having

[18] Benjamin Klein & Keith Leffler, "The Role of Market Forces in Assuring Contractual Performance," *Journal of Political Economy*, 89: 615–641 (August 1981). Their original article does not phrase the result in terms of game theory, but we will recast it here.

a reputation for quality is not valuable.

Thus, to deter cheating, the firm's economic profits must be positive when it sells high quality at a high price. They must be at a level high enough that the present discounted value of all the future profits is bigger than the one-time gain from cheating.

Note that competition won't bid the price down to marginal cost. If rational consumers see one firm trying to undercut the others, they will believe it has low quality, since at such a low price the present discounted value of future profits is so low that the one-time gain from cheating is bigger. This breakdown of price competition is why each firm can earn positive economic profit in equilibrium.

Also note that reputation depends on how much the firm cares about future profits compared to present ones. If the firm has a high discount rate, it doesn't care so much about future profits, so if it is to continue to produce high quality, the price must be even higher above marginal cost. Firms near bankruptcy have very high discount rates. One of the costs of being near bankruptcy is that consumers know you are likely to start cashing in your reputation by producing lower quality.

BOX 10.1
RESTAURANT INSPECTIONS[a]

Following are results of recent inspections of food establishments by the Monroe County Health Department. Critical violations are reported. They are most likely to affect public health, such as grossly soiled surfaces that come into contact with food, foods kept at improper temperatures, chemicals stored near food and employees handling food without wearing gloves.

CRITICAL VIOLATIONS

- Wendy's, 221 W. Second St., Jan. 8, foods held at improper temperature, corrected during inspection.
- Kentucky Fried Chicken, 2901 E. Third St., Jan. 20, chemical sanitizer concentration low, corrected during inspection.
- Office Lounge, 3900 E. Third St., Jan. 21, dirty dishes in hand sink which should not be used for other purposes, corrected during inspection.
- 10th Street Market Inc., 1809 E. 10th St., Jan. 11, various types of raw frozen meats all in packages together causing cross contamination problems. Different meat items needed to be separated.

NO VIOLATIONS

- Jimmy John's, 1827 E. 10th St., Jan. 21.
- Village Pantry, 1831 E. 10th St., Jan. 21.
- Limestone Grill, 2920 Covenanter Drive, Jan. 14.

[a]Selected from a list in the *Bloomington Herald Times*, February 16, 2009.

10.5: Ways to Regulate

Suppose the market solutions of advertising, sale of information, and reputation have not solved the problem of poor information. Since we have a market failure, that opens up the possibility that government regulation will help. But what kind of regulation? There are a number of possibilities.

1. Require truthfulness in safety or health claims.
2. Require disclosure of safety or health risks.
3. Offer voluntary measurement of health, safety, and quality.
4. Require measurement by the government of health, safety, and quality.
5. Offer an overrideable default choice (**weak paternalism**, the **nudge strategy**)

6. Require a mandatory quality level (**strong paternalism**)

Let's think about these in a bit more detail.

1. Require truthfulness in safety or health claims. This is close to laissez faire, really, since it really is no stronger than government enforcement of contracts. Yet, like non-enforcement of cartel agreements in antitrust law, it is extremely powerful. If fraud is a crime, there will be a lot less lying.

Most false claims don't result in criminal prosecutions, of course, Fraud is indeed a crime and can be subject to severe punishment, as with Bernard Madoff's 150-year prison sentence for depriving investors of $65 billion.[19] It is regulated in other ways too. The Federal Trade Commission handles not only anti-trust but false claims. It collects consumer complaints and forwards them to state and federal prosecutors, but it also issues injunctions against false advertising.[20] Private civil suits are another means of combating lying. You can enforce a contract by going to court and asking for damages for breach of contract to compensate you for the other party's falsehood. If the product is actually damaging, rather than merely inadequate, you can sue for tort, to recover damages for the injury done you.

This policy nonetheless won't work completely. It does not prohibit silence about flaws in the product. If I don't think to ask whether the car you sold me has been in an accident, a truthfulness policy won't protect me. Also, many claims are hard to prove or disprove. After Joe says "Big Joe's Burgers has the best hamburgers in the world!" should the government be allowed to put him in jail for fraud if he can't substantiate his claim? Probably not. The law regards such statements as "mere puffery," not to be taken seriously. Even more serious claims such as "I will provide you with prompt and thorough service," can be difficult to judge, though, because "prompt and thorough" is so ambiguous.

2. Require disclosure of safety or health risks or low quality. We could go a step farther than simply banning lies and require pro-active information disclosure. Many states require house sellers to disclose specific kinds of known defects, for instance, and breakfast cereal boxes all have to say how much Vitamin C the cereal contains. This helps improve information, but it creates extra costs for sellers that are not always justified.

3. Offer voluntary measurement of health, safety, and quality. The government could offer, for free or for a fee, measurement of how good the product is. This is useful if no private business has found it profitable to provide information.

[19] "Fraudster Madoff Gets 150 Years," BCC News (29 June 2009) http://news.bbc.co.uk/2/hi/business/8124838.stm.

[20] "About the Bureau of Consumer Protection," Federal Trade Commission, http://ftc.gov/bcp/about.shtm.

4. Require measurement by the government of health, safety, and quality. Going a step further, the government could make quality measurement mandatory. The government measures the crash safety of every type of car sold in the United States.

*5. Offer an overrideable default choice (***weak paternalism***, the* **nudge strategy***).* The government could make suggestions to consumers of which products are best, "nudging" them towards certain choices, but allowing them to make other choices if they want to after being warned. The government advises consumers not to eat too much fat, but if the consumer really wants to eat lots of potato chips and be a big fat slob—or if he runs marathons and doesn't have to worry about obesity— he can eat chips to his heart's content.

*6. Require a mandatory quality level (***strong paternalism***).* The government could say that low-quality products simply are illegal. Car bumpers must be strong enough to withstand a certain severity of crash. Building codes require electrical wiring to meet a particular threshold of safety against burning up and starting fires. Apartments must have a certain amount of square footage per occupant. If a consumer wants lower quality at a lower price, too bad. The government won't let him have it.

The Food and Drug Administration requires all substances sold to treat illness to be safe and effective, and it insists on strong proof for both. It's good to be able to know that drugs are highly safe and effective, but this policy means that people are not allowed to decide for themselves whether to use a drug that is too new to be thoroughly tested, or that so narrowly failed to meet FDA standards that it is probably safe but not certainly safe.

Can you think of situations where each form of regulation is appropriate from the following list?

> Automobile design, Airline service, chemical levels in the workplace, chemical levels affecting people living near a factory, effectiveness of a drug, safety of a drug, sugar content of cereals, alcohol level of beer, risk of misuse of a chainsaw, dangers of canoeing, dangers of hangliding, roller coaster rides, cleanliness of slaughterhouses, peanut content of cookies, the danger of gall bladder surgery.

A problem is that the government itself is prone to poor information and irrationality. This is made worse because not only are government officials subject to them, but so are voters. Government officials do not have strong incentives to avoid irrationality, particular if other officials are not avoiding it.

When the Food and Drug Administration (the FDA) is thinking about approving a drug, it starts from the position (the "null hypothesis") that the drug is unsafe and it must be shown to be safe. In deciding whether to approve a drug, the FDA official must balance the possibility of two kinds of mistakes: false positives and false negatives. Starting from the presumption that the new drug is unsafe and ineffective, the official

looks at evidence the drug company brings to try to overcome that presumption. A **false positive** is when the official decides that the drug should be approved, but the drug is actually unsafe or ineffective— the positive result was false. A **false negative** is when the official disapproves a drug, but the drug is actually safe and effective—the negative result was false.[21]

If the Food and Drug Administration (the FDA) tests a drug and makes a false negative error, mistakenly concluding that it doesn't work, people will die because they can't use the drug. But the particular people will never know if that it was the FDA's fault. On the other hand, if the FDA tests a drug and mistakenly concludes that it works when it does not, a false positive, people will use the drug widely and discover the mistake. They will know exactly who to blame—the FDA. Thus, the FDA will have a rational bias towards rejecting innovation.

FDA General Counsel Peter Barton Hutt and former FDA Commissioner Alexander Schmidt said,

> "FDA employees have been praised only for refusing to approve a new drug, not for making a courageous judgment to approve a new drug that has in fact helped patients and advanced the public health."

and

> "In all our FDA history, we are unable to find a single instance where a Congressional committee investigated the failure of FDA to approve a new drug. But the times when hearings have been held to criticize our approval of a new drug have been so frequent that we have not been able to count them. The message to FDA staff could not be clearer."

Here, as always when we look at incentives, we must not oversimplify decisonmaking. FDA staff members are not thinking of their careers alone. It is just that concerns about the effect on the regulator's reputation of making mistakes are always in the background and it takes conscious effort to balance them. A noteworthy example is the doctor who was oncology (cancer) chief at the FDA for thirteen years and was denounced by cancer patient groups as being obstructionist in approving new drugs. After his wife developed ovarian cancer and died after three years, he said, "I have a much greater sense of urgency these days. I have been on a jihad to streamline the review process and get things out the door faster. I have evolved from regulator to regulator-advocate." This personal experience had more effect than being criticized by name in Washington D.C. city bus ads and in the *Wall Street Journal* or being

[21] In the scientific tests of a new drug, the null hypothesis is that the drug is ineffective, so a false positive is when the test disproves the null accidentally and says the drug is effective, while a false negative is when the drug accidentally doesn't work in the test. That matches the false positives and negatives of the regulator. This gets confusing, because when the null hypothesis is that a drug is *safe*, the false positive is when the drug accidentally looks unsafe in the test and the false negative is when it accidentally *doesn't* hurt people. Then a false positive on the drug would cause it to be *disapproved*.

threatened so often that security guards had to be posted at some public meetings he attended. The oncology chief was clearly a man of integrity, but he was influenced by agency culture, which in turn is influenced by agency incentives.[22]

Strong paternalism, the sixth in the list of policies above, is the idea that people do not know what is best for them, so quality should be required to be higher than they want, or products should be banned altogether. One might, for example, argue that people irrationally buy refrigerators that use a lot of electricity rather than pay more for technology that has positive present value and would save them money within a very few years. It is the motivation for much of morals regulation. The rationale is that people who really knew what they were doing would not buy things such as pornography or heroin. John Stuart Mill wrote the standard 19th century textbook for economics. He said:

> Now it is an unquestionable fact that those who are equally acquainted with, and equally capable of appreciating and enjoying, both, do give a most marked preference to the manner of existence which employs their higher faculties.
>
> Whoever supposes that this preference takes place at a sacrifice of happiness- that the superior being, in anything like equal circumstances, is not happier than the inferior- confounds the two very different ideas, of happiness, and content. It is indisputable that the being whose capacities of enjoyment are low, has the greatest chance of having them fully satisfied; and a highly endowed being will always feel that any happiness which he can look for, as the world is constituted, is imperfect. But he can learn to bear its imperfections, if they are at all bearable; and they will not make him envy the being who is indeed unconscious of the imperfections, but only because he feels not at all the good which those imperfections qualify. It is better to be a human being dissatisfied than a pig satisfied; better to be Socrates dissatisfied than a fool satisfied. And if the fool, or the pig, are a different opinion, it is because they only know their own side of the question. The other party to the comparison knows both sides.[23]

Mill's argument is controversial among economists. If someone pays less for heroin than his maximum willingness to pay, does the transaction create consumer surplus or not? Some people would say that it does: that person has made his choice, and outsiders should not judge it. Other people would say that this was such a bad choice that the person must not be acting rationally. But there is general agreement that it is good if consumers are better informed—that if they are considering using heroin, it is best if they know the risks.

The issue also comes up with respect to *merit goods*: goods that are favored by public policy because they have merit beyond what people are willing to pay for them in

[22]"F.D.A. Regulator, Widowed by Cancer, Helps Speed Drug Approval," *New York Times*, January 2, 2016.

[23]Mill, John Stuart , *Utilitarianism*, chapter 2,"What Utilitarianism Is," http://www.utilitarianism.com/mill2.htm (1863).

an unregulated market. Merit goods have positive externalities or are underappreciated by consumers, at least in their purchase decisions. People might wish to have a symphony orchestra in their town, for example, from civic pride, or because they think it will have a civilizing cultural influence on the town, or because they think that the music will improve the taste of the townspeople and make them better and happier people. Voters might favor subsidizing the symphony even if they themselves dislike classical music and intend never to hear it perform, just as they might favor a ban on pornography even though they secretly, to their shame, are addicted to it. Part of this is that they wish to signal to others, and perhaps to themselves, that they and their fellow citizens value high art.

One might say that voters who support merit goods are not maximizing surplus at all. Instead, their goals– or part of their goals— are nobility, virtue, and beauty. Those goals, however, do not make surplus analysis irrelevant. Remember that the definition of surplus is very broad— essentially, a situation where someone pays less for something than he would be willing to pay if he had to. If someone is willing to impose taxes on himself to support a symphony, we say that the symphony creates surplus for him. This is no different from our earlier discussion of Yosemite Valley in the chapter on conservation. Yosemite, too, is a merit good. Even people who do not visit there are willing to pay for it to be preserved. The hard question, as with conservation, is how much people are really willing to pay, since they are paying for it jointly with other taxpayers. Once we acknowledge that merit goods create surplus, though, all the tools of economics—opportunity cost, marginalism, incentives, triangle losses, and so forth—can be usefully applied. Economics cannot tell us that a symphony is a merit good, but it can help decide how it is organized and how much should be spent on it.

BOX 10.2
NUDGING PEOPLE TO MAKE THE CORRECT CHOICE

Nationwide Mutual Insurance Corporation thought that more of its employees would benefit from investing part of their salaries in its 401(k) program, a tax-advantaged way to save for retirement. Around 74% of its employees were enrolling each year. In 2007, the company changed its policy. Enrollment was still voluntary, but each employee was automatically enrolled, and had to pro-actively ask to be removed. Moreover, each year the employee contribution would rise unless the employee objectd. 6% of employees still opted out of the program, but the enrollment rate had increased to 94%.

One recent idea, mentioned above in our list of policies dealing with information, has been to use a nudge policy to have the best of both worlds, to get the uninformed consumers to make better choices while not preventing informed consumers from mak-

ing choices that suit their particular idiosyncratic tastes.[24] This is the idea of weak paternalism, of the government (or someone else) nudging buyers towards what is probably their best choice while allowing them to choose something else if they really want to. An employer using a nudge strategy might tell employees that if they don't override the default, their pension funds will be invested in an index fund mimicking the S & P 500, but if they really want to, they can use the funds to buy some very risky asset such as interest rate options on margin.

Law

Even in a world with information that is imperfect (some things are unknown) and asymmetric (some people know things that others do not), if contracts were perfect we could overcome information problems. A buyer could put into the contract all of the assurances of the seller and his own beliefs about the product with penalties for the seller if the buyer beliefs turned out to be incorrect. Of course, this is impractical because it takes time and energy to write contracts. In addition, it is too expensive to be worthwhile to go to court to enforce most contracts.

When it comes to unsafe products, however, as opposed to ineffective ones, the damage is often great enough to be worth the cost of a lawsuit. This is done via **tort** suits: suits that a **plaintiff** brings to recover compensation (**damages**) for injuries caused by the **defendant**. The first issue for the court is liability. If the defendant is **liable** he must pay compensation; if he is **not liable** then he does not have to pay. The second issue is the amount of damages. In both, imperfect information is a challenge to a court that is trying to find out the truth based on opposing claims from the two parties.

In deciding liability there are three rules that are commonly used:

The negligence rule: Was the defendant "negligent" in causing or failing to prevent the injury, or was he taking enough care and should not be blamed for the harm?

The comparative negligence rule: How negligent was the defendant compared to the plaintiff? If both are equally negligent, then the plaintiff would pay only 50% compensation.

The strict liability rule: The defendant must pay if he or his product caused the harm, even if if he took all reasonable precautions.

Suppose that a car company can choose from three levels of safety: spending $20 million for a low level, $50 million for a medium level, and $100 million for a high level. Consumer accident costs will be $150 million if the safety level is low, $80 million if it is medium, and $60 million if it is high.

Suppose there is no issue of driver negligence,so we can put aside comparative negligence. A negligence rule's effect would depend on the level of care that the court

[24]Thaler, Richard H., & Sunstein,Cass R., *Nudge: Improving Decisions About Health, Wealth, and Happiness,* (2009).

defines as negligent. If the court says that only low safety is negligent, then the company will choose the medium level. It will pay $50 million in safety manufacturing costs and be exempt from liability.

If the rule were strict liability, what would happen? In that case, the firm would still choose the medium level of safety. It would now be liable for the accident costs, but its total costs will be $50 million plus $80 million in accident costs, which is still less than the $100 million in manufacturing plus $60 million accident costs it would pay if it switched to a high level of safety. Courts usually favor strict liability in product liability because it does lead firms to pick the efficient level of safety.

The problem with strict liability is that it leads to more lawsuits and so to increased costs of lawyers and of plaintiff and defendant time and attention.

In some cases, **punitive damages** are awarded. Punitive damages are awarded only if the defendant was not only negligent but reckless or intentional in causing the harm.

Ordinarily tort cases are decided by a jury, like criminal cases, but by just a majority vote, not a unanimous one. Also very important is that even before the jury is convened the judge dismisses many cases by **summary judgement**, ruling that even if every fact the plaintiff claims to have evidence for is true, he still would not win. An example would be if the court uses a negligence rule and the defendant does not have any evidence that the plaintiff was careless.

When a tort case is based on harm caused by a product, it is called a **product liability** case. Companies carry product liability insurance, and the insurance company helps with the legal proceedings and pay for the damages. The companies pass along the cost of the liability insurance to consumers in the form of higher prices. **Medical malpractice** suits are the medical variety of product liability. One result of product liability and medical malpractice suits is that companies, hospitals, and doctors are highly defensive. They require customers to sign consent forms add warning against ridiculous hazards, and, since they err on the safe side, make it more difficult for customers to discover the true dangers, as opposed to the far-fetched.

10.6: Concluding Remarks

Information is a big topic, and much can be said about it. The three-part test is useful here, as always. Is there market failure? Is there some regulation that would help? Is there government failure?

Market solutions are particularly important, since usually consumers know their information is poor and they are willing to pay someone for better information. Government regulation is also particularly attractive here too, though, because it can take a mild and relatively cheap form: requiring sellers to provide truthful and complete information. Often this—or direct government provision of information— will solve the market failure. When it does not, we must think about the more difficult question

of whether the government should mandate particular levels of qualty, a policy much more likely to fall prey to government failure and make things worse, but one which can also increase total surplus if done well.

Review Questions

1. In what ways can poor information lead to market failure?
2. What are common fallacies in thinking, and why do they lead to market failure?
3. How are information collection and reputation solutions to market failure?
4. In what ways can asymmetric information be regulated, and when should the different methods be used?
5. How does the law deal with unsafe products?

Readings

1. "Why the Newest Sunscreens Still Haven't Hit the U.S. Market," *The Washington Post*.
2. "The Skeptical Consumer - How Behavioral Economics Can Influence the Adoption of Self-Driving Cars," Doug Salvemini, *Fox Business*.
3. "Casino Rewards Total Loyalty," *The Guardian*.
4. "The Four Idols of Francis Bacon," Manly Hall, *Sirbacon.org*.
5. "When Trans Fats Were Healthy: With a New FDA Proposal to Outlaw Trans Fats, This May Be the End of What Was Once Considered 'A Great Boon to Americans' Arteries'," *The Atlantic*.