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Thinking like an Economist: A Guide to Rational Decision Making
Course Guidebook

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Each fall he presents Financing Life, a wildly popular financial literacy lecture series attended by students, faculty, staff, and community members. He also conducts a 3-hour crash course on basic financial literacy for the senior class in the week just prior to graduation. He is currently the director of the Urban Studies program.

Prior to joining the faculty at Smith, Professor Bartlett taught at Williams College and the University of Washington. He also worked for the Federal Trade Commission for 2 years. He is the author of 3 books and numerous articles. His most recent book, *The Crisis of America’s Cities*, explores the problems and prospects of urban America.
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Thinking like an Economist:
A Guide to Rational Decision Making

Scope:

To think like an economist is to see the world in a unique way. Is it rational to commit a crime? Is it optimal to maintain an insurance policy on a car that’s worth almost nothing? In this course, we will develop a tool kit to help you view the world through the economist’s lens, enabling you to better understand the world around you and to improve your day-to-day decision making.

We begin to build our tool kit with 6 foundation principles that are manifested in virtually all human endeavors, from personal choices to global policies. These include examining any decision, yours or someone else’s, in terms of incentives, seeing the world as a system with limited resources, and seeing all human interactions as interconnected and beyond careful control. Next we add the 3 core concepts that are always part of economic thinking: rationality, marginal analysis, and optimization.

We’ll learn to apply our tool kit to situations as diverse as combating global warming and purchasing a snow blower. We’ll see how rational individual choices can result in efficient social outcomes. But we’ll also take a page from game theory and its prisoner’s dilemma, in which interdependent rational decisions make both parties worse off. Environmental damage is an example of the tragedy of the commons, in which no one has a direct incentive to protect a public good but everyone suffers as a consequence. What do economists see as the solution to these problems?

We go on to examine the importance of information and risk in rational decision making. No amount of information is sufficient for us to be certain about some outcomes, so we use the concept of expected value to make optimal decisions. What if the information you need is known and controlled by someone else—someone who has a stake in your decision? We learn how to navigate the world of information asymmetry, found, among other places, in retail shopping, job searches, and political campaigns. We then
factor in the impact of timing, the value of money, and psychology. The field of behavioral economics introduces us to many well-documented, but puzzling, behaviors that seem inconsistent with what we’ve learned about rational decision making. We will learn how human psychology sometimes leads to our making unexpected or less than optimal decisions. We wrap up our course by exploring ways to devise incentives for ourselves to overcome some of our behavioral irrationality.

By the end of the course, you should have a clear understanding of what it means to think like an economist. You will have internalized a mental tool kit you can apply to personal, work, and political decisions. This approach will help you better understand the motivations of others and of yourself—and to optimize the decisions you make.
The Economist’s Tool Kit—6 Principles
Lecture 1

The New York Times nonfiction bestseller lists have really been extraordinary for economists in recent years. ... There have been a number of books about how economists think. ... These aren’t books about success in business; they’re not books about investing for wealth. ... Steven Levitt and Stephen Dubner’s Freakonomics, Tim Harford’s The Logic of Life, and Richard Thaler and Cass Sunstein’s book Nudge, among others. ... At first glance it seems strange that so many seemingly rational people have made that choice. Or is it? Perhaps it’s that the authors have finally been able to communicate the power of thinking like an economist.

There’s a certain essence of what it means to think like an economist. When made comprehensible, economic thinking can be incredibly powerful and useful in understanding the world, in making personal decisions, in formulating business strategies, or in choosing national policy. Developing your ability to make these evaluations more effectively is the objective of this course. Once you learn to think like an economist, you will never be quite the same again.

To think like an economist is to view the world from the 6 foundation principles of economic thinking. Principle number 1: People respond to incentives. No premise is more central: If you reward a behavior, people will do more of it and more intensely; if you penalize it, they’ll do less of it. If you tax cigarettes more, people will smoke less. If you offer free breakfast, people will line up around the block.

People respond to incentives: Taxing cigarettes decreases sales.
Principle number 2: There is no such thing as a free lunch. It sounds silly, but that expression captures a lot of economic thought. When economists look at the world, they see an unavoidable imbalance between the wants we have on one hand and the limited resources we have on the other. A fundamental reality is that there is always going to be scarcity: Any use of time or limited resources for one purpose is an opportunity forever gone to use them for another. More of anything always means less of something else; and it’s that option that you had to give up that economists call opportunity cost.

Principle number 3: No thing is just one thing; there are always at least 2 sides to every interaction. I recently read a column arguing that it was unethical for those of us who had jobs in a period of economic difficulty to continue spending when others are unemployed. But the reality is that every dollar of my expenditure is a dollar of income coming in for someone else. If there’s less total spending, there’s also by definition less total income.

Principle number 4: The law of unanticipated influences. We can see this with a concept from chaos theory called the butterfly effect. In chaos theory, hypothetically, a butterfly on one side of the world can flap its wings and, through a chain of causation that’s totally unpredictable, cause a hurricane on the opposite side of the world. This is true in economics: No event ever takes place in a bubble; a change in any one part of an economic system is going to have ripple effects, often in far removed places. The 1979 embassy takeover in Tehran, Iran, resulted in an increase in dental costs in the United States. How does that happen? There was fear that there might be war in the Middle East, which could result in the disruption of financial markets. People turned to gold and silver as a hedge against this uncertainty, which impacted the costs of dental fillings and X-ray film. Butterfly effects are real: We are often impacted by things we cannot anticipate or control.

Principle number 5: The law of unintended consequences. In our interconnected world, our actions are always going to have multiple consequences. A number of cities have installed red light cameras, which take a photograph of the license plate of any car that enters an intersection after the light has turned red. The intended purpose, of course, was to reduce the number of intersection accidents. The cameras achieved this, but they
also increased the number of rear-end accidents caused by people slamming on their brakes to avoid the cameras.

Principle number 6: No one is, and no one ever can be, in complete control. If you apply an incentive to some subset of 6 billion complexly interrelated people, whose interactions are totally unforeseeable and have unintended consequences, and then predict the final result, that would be monumental. To go further and try to control that outcome would be utterly impossible.

When economists approach any problem, they are grounded in a paradigm defined by these 6 principles. At face value, they are simple, but they can be applied in endless contexts. Their richness comes not from the complexity of the vision but from their adaptability to so many different situations.

**Important Terms**

**butterfly effect**: In chaos theory, the hypothesis that small events can be linked through distant causal chains to seemingly unrelated events (e.g., the beating of a butterfly’s wings would theoretically set in motion a chain of events that would lead to a change in a distant weather pattern).

**opportunity cost**: The value of the next-best thing that must be given up when time or resources are devoted to one use. It is what is forgone.

**Take-Away Points**

1. Economists look to the incentives facing decision makers to predict, explain, or prescribe their choices and behavior. Incentives are key.

2. In a world of scarcity, nothing is truly free. There is always a cost in terms of opportunities forgone, even if not in terms of money.
The Economist’s Tool Kit—3 Core Concepts

Lecture 2

No one who’s read both Charles Dickens and Ernest Hemingway will ever confuse one with the other. As artists, their styles were reflections of themselves and reflections of the times in which they wrote; and perhaps also, in some small measure at least, they were reflections in the way they were paid. Most of Dickens’s novels were serialized, usually in about 20 parts, and he would receive a contract payment every time he filled up 32 pages of printed text. ... Hemingway, of course, got paid by the completed manuscript. There was no financial incentive for him to modify his sparse style of writing. ... Thinking like an economist means being ever cognizant of the incentives you face.

The 3 core analytic concepts in economics are rationality, marginal analysis, and optimization. Economists believe in rationality: They build extraordinarily complex models on the assumption that humans are fundamentally rational in their behavior. People will choose strategically rather than randomly. In principle, making rational decisions means following 4 simple steps: First, clarify the objective. Second, identify all possible alternative paths to achieve the objective. Third, evaluate carefully the payoffs from each of those alternatives. This is where economic thinking can help a lot—developing tools to help you understand how to put value on difficult things. Fourth, select the best option and implement your decision. In our world of scarcity, evaluating alternatives is all about valuing the opportunity costs. Rationality says that you should always choose the option with the highest

People make rational decisions by weighing alternatives.
net payoff; to knowingly choose anything worse would be irrational. The presumption of rationality works 2 ways: It helps us with the prediction and the description of behavior, and it also gives us a way to evaluate after the fact and draw conclusions about values. The concept of strategic decision making and rationality as both an objective for and a description of human behavior is fundamental to economic thinking.

The concept of strategic decision making and rationality as both an objective for and a description of human behavior is fundamental to economic thinking.

The second core concept is marginal analysis. Economists tend to look carefully at sequences of small changes made on the margin, because most of the choices we make in life are not all-or-nothing decisions; most of them involve marginal trade-offs. A little more of one thing inevitably means a little less of another. If we woke up tomorrow and gas prices had doubled, how would that affect automobile usage? As the marginal value changes, more of something makes the marginal value fall; less of something makes the marginal value rise. At high gas prices, some trips would not be worth it, but others certainly still would be. Thinking like an economist means we reject claims that a change in price is going to make things stop altogether. People adjust on the margin until the value of the last trip taken reflects the new, higher costs of driving.

The third core concept is about optimization in the equimarginal principle. This means figuring out the best attainable allocation given a set of constraints. Imagine yourself on a new TV reality show. You’re flown by helicopter deep into the wilderness, with nothing but the clothes on your back. You’re given 4 chits that you get to exchange for units of food or units of shelter. If you think like an economist, you’re going to realize that survival is not about either food or shelter; it’s about the best attainable combination of the two. Gorging on food while freezing to death is not a good strategy; basking in warmth and comfort while starving to death is not either. The optimal solution is to find the balance between food and shelter that will make the marginal value of each of them equal; hence the name “equimarginal principle.”
Applying the concepts of rationality, marginal thinking, and optimization in a world proscribed by the 6 foundation principles means you are thinking like an economist. Complex econometric models are based on these essential ideas. Thinking like an economist means being aware of the incentives you face and, perhaps more importantly, the incentives those around you face. It means anticipating what’s strategically rational for them, and how that will affect your options. It means focusing on the margin, on trade-offs, and on adjustments to find the optimal balance. The question is always how much? And of which?

**Important Terms**

**marginal value**: The change in a starting total value from a slight increase or decrease in an activity. If a bus company provides service between 2 cities, the marginal cost is the addition to cost of taking on 1 more passenger. The marginal revenue is the increase in revenue from selling the final ticket.

**optimization** (a.k.a. *constrained maximization*): The process of deriving as much benefit as possible within a given limit, for example, deriving the maximum possible benefit from a fixed income.

**rationality**: In economics, rationality means always choosing from among available options the one that provides the greatest net gain. It refers to the process of making choices, not to the objective sought.

**Take-Away Points**

1. Economic rationality refers to the process of reaching decisions: clarifying the goal, identifying and valuing all alternatives, and selecting the one with the highest net payoff.

2. Optimization comes from making small, sequential trade-offs and adjustments until there is a balance of marginal costs and benefits. Life’s decisions are not either/or; they are about doing more or less of something.
The Myth of “True Value”
Lecture 3

First and foremost, rational choices can lead all of us involved to better, more socially efficient outcomes. They don’t have to. That failing is most likely to take place when our decisions and our strategies are interdependent: When my best strategy depends on your choice; when your best strategy depends on mine. If we don’t need each other’s consent, if we don’t communicate and we don’t negotiate, or if some kind of an enforceable agreement isn’t possible, we may end up rationally choosing paths that harm us both.

When all of the rational decisions made by individual actors are connected and added up, what are the social consequences? This is the final concept that completes our tool kit: the concept of economic efficiency. Efficiency is related to rationality, but it’s slightly different. Rationality refers to the process by which individuals reach choices; efficiency is a measure that we use to judge the social consequences of those many choices. Economists define efficiency as people being made better off. What determines whether you’re better off? You do; it’s a measure of how you feel.

The more difficult question is when is a society better off? Can we determine objectively when a change is a clear social gain, as opposed to a purely personal gain? Economists spent decades trying to find a good, objective measure of social welfare. Finally, at the beginning of the 20th century, they gave up. They figured they could not find a strong, objective measure of social welfare, so they settled for a very weak one instead. They adopted a principle from the sociologist Vilfredo Pareto, who said that the only unambiguous standard of a social gain is this: If we take a number of people, and something makes any one of them better off by their own judgment without making anyone else worse off, that is an unambiguous social improvement. We call such a situation in which no one can be made better off without harming another a Pareto optimum. The allocation of resources is efficient—not just, not necessarily fair, not philosophically ideal, just efficient. Failure to take advantage of a Pareto improvement would also be inefficient.
When do rational decision processes inevitably lead to Pareto efficient results? Won’t there be constant competition for resources? Don’t all interactions violate Pareto’s standards: One wins, one loses? Whenever there are counterparties, there are conflicting interests. Won’t there always be competition to see who will prevail; every sale is a purchase, every loan made is a debt due? In fact, in most of the world, most of the time, there is a significant degree of cooperation and stability. How can that be? Thinking like an economist provides an answer. Economists believe that nothing has a timeless, objective true value. Value to any person is the marginal contribution to that person’s welfare, and it can be quite different in different circumstances or for different people. The value of a glass of water when I’m sitting at home next to a free-flowing tap versus when I’m crawling across a broiling desert is quite different. If rationality holds, then no one will pay more for an item than it is worth to them at that time in that circumstance, nor sell it for less, but the 2 parties can be trading a single thing that literally has 2 different values.

Economic efficiency is the exhaustion of all possible unambiguous increases in self-defined welfare. We know that individual rationality will promote it, as long as the incentives driving each decider reflect the costs and benefits that result from decisions. Each harm must be accurately compensated, each gain must be appropriately priced, rights must be clearly defined, information must be complete and true, and promises must be kept. But this, of course, is not the world in which we live. Our world falls short in so many ways: We may not understand the true consequences of our actions; we may voluntarily choose ones that make us worse off; people may lie about their intentions or break their promises; rights may be ambiguous. It is when the incentives that guide choices fail to be accurate or comprehensive that individual rational choices can make the decider, or someone else, worse off. Thinking like an economist has its greatest value in these instances—by understanding the harms that these imperfections cause and formulating strategies to overcome them. The rest of this course focuses on doing just that.
The Prisoner’s Dilemma

The prisoner’s dilemma is a problem loved by economists and game theorists. It has implications for us as individuals making decisions, as well as in terms of our survival as a species. Imagine this scenario: The police have arrested 2 suspects and put them in separate interview rooms. They offer each suspect a choice. The suspects cannot communicate with each other, but the choice each makes will affect the other.

Here’s the situation: They were arrested for possession of a stolen car, for which they can receive 2-year sentences. But the police also believe the car was used in a drive-by shooting, and to get that conviction, they need a confession from at least 1 suspect—this will give them the charge of assault with a deadly weapon. The police tell each suspect that if he testifies against the other, he’ll get a 1-year sentence for the auto theft and a walk on the shooting. The second suspect will take the fall; he’ll do 8 years for the crimes. The prosecutors know, however, that if both testify, they won’t need a trial at all, and each person will get a plea bargain sentence of 4 years. If both suspects stonewall, there’s only enough evidence to convict them on the stolen car charge, and each will do 2 years.

What’s the individual rational decision for each suspect? This is the realm of game theory. Game theorists look for interdependent strategic decisions, putting each individual’s best response to a situation into a framework called a payoff matrix. Each player says, “If he does \( x \), what does that do for me if I do \( a \) or if I do \( b \)?” An example in this case looks like this: If he confesses, and I don’t confess, I’ll do 8 years; if I also confess, I’ll do 4. My conclusion is that if my partner is in the other room confessing, I minimize my cost by confessing myself. But what if my partner doesn’t confess? Then if I confess and testify, I’ll serve only 1 year; if I stonewall while he’s stonewalling also, I’ll get 2. One year is better than doing 2 years. So if he does not confess, I minimize my cost by confessing. Regardless of my partner’s strategy, the optimal
choice for me—the individually rational choice for me—is to confess. Of course, my partner faces the same payoff matrix, so no matter what I do, his best strategy is to confess. As a consequence, both confess and serve 4 years. If they were able to trust each other or communicate, they would each do 2 years.

Of course, the police were thinking like economists. They created this situation so the suspects’ incentives did not compel any concern for each other. The police left each suspect to make an individually rational choice—to his own, and their collective, detriment. We encounter prisoner’s dilemmas in many contexts. Whenever decisions are interdependent but have to be made individually and there are no enforceable agreements or compensation, it can lead to harmful results.

Take-Away Points

1. Truly voluntary interactions between rational individuals will make all of them better off and will thereby improve social efficiency.

2. However, when rational individual decisions are interdependent and are not the result of negotiated consent and enforceable agreements, rational individual choices can lead to social outcomes detrimental to all parties (as in the prisoner’s dilemma).
Each time we establish a right or a rule, we’re defining incentives and we’re affecting other people’s behavior.

So far in this course, we have built our economic thinking tool kit and used it to explore a central conclusion in economics: Individuals making rational choices can aggregate into socially efficient outcomes. But in some cases, individual choices can end up making everyone worse off. This lecture explores the issues of incentives and optimal choice as illustrated by the prisoner’s dilemma being played out today on the high seas.

Several of the world’s commercial fisheries are on the verge of collapse; overfishing has been depleting the populations, and the rate of catch has become unsustainable. In the game theoretic context, commercial fishers are the prisoners, because what it makes sense for each of them to do individually is leading to a disaster for all of them collectively. All of the fishers could get together and agree to catch less, but large agreements like that are almost impossible to negotiate and invariably break down. Under the current payoff matrix, if everyone else restricts their fishing, I’m best off taking as much as I can. If no one else restricts their fishing, I’m still best off taking all that I can. Current controls have proven inadequate: There is a limit on the length of the season, which gets shortened each year in order to limit the total catch. But fish populations continue to decrease, so the season must get shorter, and the incentives for individual fishers become extreme. They buy bigger and faster boats and more expensive equipment; and they go out regardless of weather conditions, making fishing increasingly dangerous.

Something has to be done. An economist came up with a very basic solution, which was first put into practice in Iceland. The thinking is that changing individual incentives changes behavior, which changes the social outcome. Incentives were redesigned so that the behavior of individual fishers would become more consistent with the preservation of fisheries, rather than their eventual destruction. Each fishery is assigned a total allowable catch for the year, and each boat is then assigned an individual tradable quota.
fishing seasons are expanded, decreasing the incentive to fish in dangerous conditions. And there’s even more economics to this: The quotas are not only permanent, they are also tradable. Now a superior boat can increase its catch—if it buys shares from someone else. A boat with problems, or even a lazy captain, can avoid the danger and the cost of putting to sea. Both parties in a voluntary trade of rights are made better off; it is Pareto efficient. Overfishing is controlled, and the prisoner’s dilemma is solved.

The issue of overfishing teaches us to examine rules and rights. In some cases, rights are determined for the players by an outside force, such as the government. In other situations, the rules have evolved as part of a game, designed and accepted by the players themselves. Defining rights can remove obstacles to Pareto efficient outcomes and trades; in fact, the implicit wisdom in economic thinking has become a foundation for principles of law. What does all of this mean for you? It means that in thinking like an economist, you should always ask yourself the following questions: Are the rules and rights in this situation creating any prisoner’s dilemma incentives—incentives that cause individuals to adopt rational strategies that ultimately harm us all? Could the rules or rights be redesigned or renegotiated to induce individuals to reach better decisions? Rights and rules define incentives and
optimal individual strategies. Anticipating how is a large part of thinking like an economist.

### Take-Away Points

1. The rules and rights surrounding any interaction define the incentives that relevant individuals face. Altering, clarifying, or redefining rights will also redefine optimal strategies for players.

2. Rights and rules can be consciously designed for the purpose of influencing the choices and behavior of others. Examples in this lecture are ownership of any residual after college textbooks are bought or tradable rights to a share of commercial fishing catch.
When you’re asked or faced with any issue, to think like an economist is to think: Are there real consequences to a choice that are somehow not being paid for, that are not accounted for, in the incentives facing this decider? How are the false incentives distorting the outcome? Are there mechanisms we can employ to be sure that the consequences are going to be effectively priced? Are there free rider problems here that are preventing our cooperation that would make many of us better off?

Would rational people ever destroy their own planet? Economic thinking teaches us that even though nobody’s really in control, individual rational decisions can lead to socially efficient outcomes. But what if people are not considering all of the consequences that their actions have on others? Or what if the incentives that people are given are simply inaccurate? One kind of inaccuracy that is important to economists is externalities, which occur any time we take an action that creates a benefit for somebody else or imposes a cost on somebody else with no payment made. When externalities exist, rational individual decisions can lead to inefficient outcomes in 2 distinct ways: False incentives may cause us to make decisions that cause significant harm to other people, or we may fail to consider choices that would cause benefit.

The dilemma of global warming is an example of the tragedy of the commons. A commons is something that we all use collectively and no one is directly responsible for. The presumption is that we’ll all use the commons responsibly, but the incentives for each user of a commons work against that hope. If other people pay the costs, I get protected without doing a thing; I can be what economists call a free rider. There are 2 practical ways to try to overcome the free rider problem: compulsory participation (e.g., taxation) and linking the public good to a desirable private good (e.g., getting people to pay voluntarily).

There are strong economic forces incentivizing us to use the atmosphere as a free-for-all dump for greenhouse gases. Any solution to this problem will
be a public good of mammoth proportions: There are 6 billion people, all of whom have an incentive to try to ride for free. Thinking like an economist helps define how much our behavior ought to change and gives us some guidance on what kind of policies we could use to make that happen. How much of a reduction in greenhouse gases makes sense? If you want to answer a question about optimality, you go to the margin. Some carbon dioxide in the atmosphere is natural; the question is how much of it would be optimal. When the gain from reducing a unit of emission has fallen down to meet the rising cost of reducing it, we’ve hit the equimarginal principle. Once we’ve identified the desired level, how do we get there? To an economist, the answer’s simple: The problem is caused by the fact that the price is wrong, so change the price. If we were to put a price on pollution—say, $100 per ton—then every time you emit a ton, you have to pay a real cost. If you can reduce your emissions at a cost of less than $100 a ton, economic logic alone says do it. You don’t need a mandate; the invisible hand will take care of everything. Economists started making this argument back in the 1960s, and people thought it was a crazy idea. But now, putting a price on pollution is embraced by policy makers all over the world as the most plausible hope for impacting global climate change. An additional practical advantage to pricing pollution, rather than just regulating and restricting, is that when we need to change the pollution target, we just adjust the price—players will adjust their behavior at the margin.

Unfortunately, it’s not as simple as just applying what economists know to solve the problem; policy makers have to actually make it happen. The invisible hand can lead to conflict and paralysis in the political arena. Politicians, like the rest of us, respond to incentives. Each actor prefers a solution to climate change that’s paid for by somebody else; the benefits
from being a free rider on the global scale are huge. Politicians in each nation know they will be punished back home if they take a large share of the costs. But without enough paying passengers, this train is not going to leave the station. That outcome would be both individually rational and collectively tragic.

Take-Away Points

1. When the incentives facing decision makers do not accurately reflect the true costs and benefits of their actions (i.e., externalities), rational individual decisions can result in damaging and inefficient outcomes.

2. Individual incentives to be a free rider can prevent voluntary solutions to public goods problems, such as brush fire prevention or greenhouse gas reduction. Overcoming free riding requires either compulsory contributions or a linked connection with an excludable private good.
When computers first came out, there was a principle that was adopted that still holds called the GIGO principle: garbage in, you’re going to get garbage out. I think there’s kind of a GIGO to life as well: If you get garbage info in before you make your decision process, the decisions you make are likely to be garbage as well.

Rational decision making is dependent more than anything else on the quality of the information that you have. Suboptimal information will likely lead to poor decisions. Economically speaking, for each decision there’s an optimal level of ignorance—you need to examine the trade-offs between ignorance and information.

How much information, and how much ignorance, is optimal? Is it the same for every decision? As always, we look at the marginal benefit and the marginal cost of information. What does more information buy you? If you have more information, there’s a reduced chance that you’ll make a suboptimal decision. Sometimes the difference between choices is trivial: The movie I chose to see was awful; I would have enjoyed the other one more. Sometimes the difference is monumental: If I had gone to the doctor before my disease became terminal, my life would have been saved. The size benefit from making the right choice, or the cost of making the wrong choice, is what establishes one of the parameters—the maximum possible value of information. It would have been irrational for me to spend $100 buying information about movie choices before I went to the theater. But I should have paid far more than that to go see the doctor.

No matter what that maximum is, at some point the marginal value of information starts to decline. When I know a lot, a little more information doesn’t add that much. Also, when I’m acquiring information, some of it’s easy to acquire, but at some point the marginal cost of getting more starts to rise. When the marginal value of information and the marginal cost of acquiring information are equal to each other, the equimarginal principle has been satisfied. We have defined the optimal amount of information, as well
as the optimal level of ignorance—to acquire information beyond that point would be irrational.

How can individuals overcome some of the costs of ignorance and decrease our vulnerability to bad decisions? Is there a way to aggregate and use the collective knowledge out there in the world? One finding from experiments and studies is that if we take many independent estimates and average them, they can yield information better than any one participant can generate. That is much of what’s behind economists’ affinity for markets. Markets provide an inexpensive, accurate, and valuable way to take a lot of information and compress it into a clear and accessible form.

Prices can give us a lot of important information about the wisdom of the crowd, but sometimes we need information that price alone isn’t enough to carry. Depending on incentives, this information may be gathered by individuals, private entities, or governments. Another way we acquire information at lower costs is in the principal-agent relationship. We pay somebody more knowledgeable than ourselves to make important decisions for us. An obvious case of this is diagnostic physicians: When we are having chest pains and shortness of breath, it’s too late to start applying to medical school. Instead, we turn to experts who provide us with this knowledge.

People must balance the cost of acquiring more information with the cost of making wrong decisions.
Where does this leave us? Complete ignorance is certainly not bliss: It leads to bad decisions, often with harsh consequences. On the other hand, complete omniscience is neither humanly possible nor affordable. The human dilemma is to navigate rationally between these 2 extremes, balancing the costs of making wrong decisions with the costs of acquiring more information. How do you apply this in your daily life? You should base the amount of investment you make for information on the size of the cost if you make a wrong decision. When information is widely scattered, you can look for processes, like markets, that aggregate and compress the information to see if it reveals the wisdom of a crowd. But remember to ask yourself the following: Is this a situation where there are multiple people making truly independent evaluations, or is this a structure where each is just repeating what others have said? Finally, you should turn to expert advice to reduce the cost of overcoming ignorance, but only if it is in the expert’s best interest to disseminate unbiased information. As always, economic thinking involves a consideration of incentives—yours and everyone else’s.

**When the marginal value of information and the marginal cost of acquiring information are equal to each other, the equimarginal principle has been satisfied.**

The Economics of Car Safety Information

One thing we all care about is the crashworthiness of our cars. We could try to buy one of each model of car and crash it into a wall, but that would be prohibitively expensive. This is valuable information for me, but I can’t produce it myself. Are there incentives for someone else to do that for me?

That’s a complicated question. Information used by one can be equally valuable to other people, and information isn’t like an ice cream cone—if one person consumes it, it’s not gone; it’s still available to
others. This is good because there’s the potential for us to divide up the extraordinary cost, produce the information once, and then share it and use it many times. The shared cost for each of us will be less than the combined benefit will be. The unfortunate part is that collecting that information is similar to cleaning up the atmosphere: Everybody wants to do it, but nobody really wants to pay for it. If I can wait and get enough others to chip in and pay for the crash test results, I get them for nothing. Voluntary cooperation among 250 million Americans is not likely to occur. Could an entrepreneur come along and make a profit by conducting these tests and selling the results? Maybe, but there are obstacles: Once the first few sales are made, the information is impossible to control and the profit potential disappears.

Yet information on crashworthiness does get generated; it’s made available to the public free of charge. Who has an incentive to do that? Actually, there are 2 sets of crash test data that get generated. The first is produced by the National Highway Traffic Safety Administration, which solves the free rider problem by drawing its funding from our compulsory taxes. There’s a second group, the Insurance Institute for Highway Safety, that is benefited by getting that expensive information and giving it away for free. Insurance companies’ profits decrease when people drive less crashworthy cars, so the more information in consumers’ hands, the higher the insurance companies’ profits. How do you get the widest distribution possible on information? You make it free.

Take-Away Points

1. Because information is costly, for each decision there is a rational degree of ignorance, beyond which the marginal cost of additional information would be greater than its marginal cost.
2. It is rational (and wise) to seek or devise mechanisms or relationships to reduce the cost of acquiring information. Examples include artificial markets such as the Iowa Electronic Markets (to realize the potential wisdom of the crowd) and principal-agent relationships (to capitalize on the resaleability of expertise).
We would like to know some future event is going to come out in certainty. Some cases are absolutely unknowable. If you spent your entire fortune gathering data on coin flipping—you got data information on the mass of coins, on rotational forces, on wind velocity, on the bounce response from different surfaces—no matter how much information you got, you would never know for certain what’s going to happen the next time you flip that coin. ... It depends on chance; there’s unavoidable risk.

You can never be too safe, right? It may surprise you to know that in thinking like an economist, there is such a thing as being too safe. Every increase in safety has its cost, if not in dollars then in opportunity cost. Diminishing marginal value and rising marginal cost dictate that at some point, adding a little more safety is not going to justify the rising cost of achieving it.

This doesn’t sound right—isn’t a human life priceless? Individuals actually decide the value of their safety every day. Every time we drive a car or walk across a street, we risk harm and death. The fact that we do it means that we rationally decide that we value getting to the destination enough to justify undertaking that risk. Whenever public policy issues are under consideration, economists see that we must put some measurable value on human lives, at least in a statistical sense. We could choose to live in hermetically sealed bubbles, but it would cost us too much—not just in terms of money, but in terms of the experiences we’d have to give up. There are some aspects of life that we cherish even more than a bit more safety.

The concept of safety extends to the various risks we face in life: That car you bought might be a lemon; the retirement portfolio you’ve been building for 30 years could go broke. In a world where everything affects everything else, where some consequences and influences are always unknowable, and where no one is in control, there will always be risks. We can try to understand and manage them, but we can’t eliminate them.
So what is the smart thing to do when faced with a decision that involves risk? Economists use a concept called **expected value**. Expected value conceptually is what would happen if we could replay decisions over and over again. It gives us the average outcome, even though in reality we may only be making this decision one time. To find the expected value, simply take the **probability** of each possible outcome, multiply that by the value of the outcome, and add all of these values together. Knowing the expected value helps you make a rational decision.

But a lot of probabilities in our lives cannot be calculated exactly. What are the chances that my house is going to catch fire or that my car will be stolen? I can only estimate those probabilities using historical data. For example, the risk of dying in a hurricane in the United States in any given year is about 1 in 6 million, but I can guess that if I live in the Midwest my risk is lower, and if I live along the Gulf of Mexico it is higher. The whole idea of thinking like an economist means being ever cognizant of your incentives and those of others. Do not be misled by other people’s interpretation of risk, which will not necessarily mesh with yours. Also, keep in mind that our knowledge of probabilities can be systematically distorted. When there’s a lot of group interaction, the people making decisions feed off each other. Rationally ignorant people (i.e., all of us) are susceptible to **information cascades** that can lead us wildly astray. These include events like stock market crashes and the dot-com tech bubble in the 1990s. Many of the decisions we make in life...
involve inescapable, probabilistic risks. It is up to us to estimate carefully both the probabilities and the payouts from various outcomes.

**Important Terms**

**expected value**: Formally, it is the sum of the payoffs from all possible outcomes, each multiplied by the probability of its occurrence. In essence, it is the average outcome that would result from repeating the same decision multiple times.

**information cascade**: A growing group assessment of a situation where all members are uninformed of actual facts but form opinions based on the number of others who assert something to be true. Once this process has begun, people still undecided about the truth of the proposition in question view each new adherent as evidence of the proposition’s truth.

**probability**: The probability of any event (e.g., getting heads in a coin toss) is 1 divided by the number of total possible outcomes. In the case of a coin toss, the probability of heads is 1/2.

**risk**: The degree to which an outcome depends on probability because future events cannot be perfectly predicted.

**Take-Away Points**

1. When making decisions involving outcomes that will be determined by chance, the best “bet” is determined by the expected value of each option. Expected value, in turn, is determined by the probability of each possible outcome and the payoff or consequence should that outcome occur.

2. Comparing the expected value of alternatives aids in rational decision making. When the expected value of a total-loss collision for an older car becomes less than the cost of insurance to cover it, it becomes rational to cancel that coverage.
You can see that [the financial crisis of 2008]—the rise and the fall, the bubble and the burst—are really reflections of information asymmetry, rational ignorance, and risk. Far too many of us accepted a financial blind date, forgetting how easily trust can be misplaced; not because everybody we deal with is inherently dishonest, but because, just like us, everyone we deal with faces inevitable uncertainty, ignorance, and risk. When we forget that is when we collectively get into some real trouble.

Because we are rationally ignorant, we have to get most of our information from others. This opens the door for other people to use information strategically. Anytime you have a decision to make that’s going to affect somebody else, and that person has information relevant to your decision, that person has an incentive to filter, distort, obfuscate, subsidize, or hide some of the information to influence your decision in a way that will benefit them. People know that altering the composition and quality of the information they give to others can probably influence the other’s choice; in fact, it would be irrational of them not to alter the information.

George Akerlof shared the 2001 Nobel Prize in Economics in part for examining the social consequences of information asymmetry. Here is a summary of his analysis: Who knows how dependable a used car is going to be? The current owner; he has years of experience with it. He’s much more likely to get rid of an undependable car but keep a good one. The result is, according to Akerlof, that problem cars will probably be overrepresented in the used car market. Buyers don’t have any way of knowing how effective an individual car is because there’s information asymmetry. Potential buyers, if they assume that sellers are rational, must expect most of the cars to be lemons. So buyers will use expected value analysis and be unwilling to pay a price that’s appropriate for a gem of a car, because if it was a gem, why would the owner be trying to sell it? And of course, actual owners of gems won’t be willing to sell at a lemon price.
The average quality of used cars on the market fulfills the expectations that they’re all going to be lemons. The seller has information the buyer needs, but he can’t be trusted to reveal it. Potentially advantageous trades go unmade, and the market breaks down. Everybody behaves rationally, but everybody loses. Buyers disproportionately end up with lemons, and sellers of gems can’t get the price they deserve. The result is something that economists call adverse selection. The gems are selected out of the market, and only the lemons remain.

Maybe we need a “hostage.” In medieval times, when a rival to a sitting king felt he had to signal his own trustworthiness, he might leave his son in the king’s castle to be held as a hostage. Then if the rival broke the promise and invaded the king’s realm, the king would at least have an opportunity for vengeance if not for direct resistance. The rival had changed his own payoffs from an invasion. Modern warranties are really just hostages; they follow the same reasoning. You know that the car you are selling is a gem. If you offer to pay 50% of any necessary repairs over the first 90 days, that’s a credible assertion that your car is not a lemon. Another seller’s unwillingness to offer a warranty is credible information that her car is a lemon. That creates an incentive for the owners of disproportionate asymmetric information to reveal it accurately through the use of a warranty.

How do we apply this information? First, we must remember that our inevitable ignorance makes information strategic. Second, we must approach all cases of information asymmetry with a healthy dose of skepticism. If something sounds too good to be true, it probably is.
adverse selection: When the incentives in a situation result in the elimination of the best alternatives, leaving only less desirable options (e.g., when uncertainty about quality drives the best used cars from the market, leaving the lemons).

information asymmetry: A situation in which one party to a transaction has access to information not available, but important, to another party.

**Take-Away Points**

1. Because a certain degree of ignorance is always rational, there is always the potential for others to use the information they possess to try to influence our choices. Whether called the blind date principle or information asymmetry, this can result in distorted and suboptimal decisions.

2. Rationality dictates that we be ever conscious of the incentives for those from whom we acquire information. Do their ultimate objectives align, or conflict, with our own? Can we create mechanisms or a “hostage,” such as a warranty, that would make it in their own interest to reveal their information to us truthfully?
Ben Franklin understood [the concept of compound interest]. At his death, he willed $500 to the city of Boston, but with a condition: He prohibited the city from drawing on that for 200 years; he wanted the power of compounding to work for 2 full centuries. When finally the city of Boston was able to get into that account and open it up, there was not $500 in there anymore: It was worth over $6.5 million.

Economic thinking is focused on how people will and should respond to their incentives, to the benefits and costs of their decisions. But a lot of those benefits and costs won’t occur until sometime into the future. How does the timing affect the value of the incentives today? When we add time to the equation, it brings 2 new elements to rational decision making: the real value of money and the time value of money.

First, we look at the real value of money. Money is an abstract unit. We can use it to measure all kinds of important underlying things, but money is a highly elastic unit of measure. Inflation constantly changes the purchasing power of money and alters its real value. If we’re going to make rational decisions, we need to look not at how many dollars are involved but at what the equivalent of those dollars is. What can they buy? This is the concept behind the price index the government uses to measure inflation. Not considering the effects of inflation on the value of money can lead to grievous mistakes.
But there’s no perfect predictor of future inflation, so important decisions have to be made with incomplete information.

Second, we examine the time value of money, and of everything else. The question of timing matters not only because inflation changes the value of a dollar but also for a more subtle reason: People almost always prefer to have good things happen sooner and bad things happen later. Economists refer to this as pure time preference. If timing matters to you, then it is an important element in rational decision making. The time value of money is made up of 2 parts: discounted present value and future value. To give some precision to the concepts of present and future value, I’m going to offer you a choice. Do you want $1000 today or $1000 a year from today? Besides the fact that you simply want to have the money sooner, money you receive today can start to earn interest. If I have $1000 today and put it in an interest-bearing account at 5%, a year from now there will $1050 in it. Financially, $1000 today and $1050 in a year are equivalent events: $1050 is the 1-year future value of $1000 today. The concept of present value uses the same metaphorical balance scale, just starting from this side: If I’m going to have $1050 in a year, what’s the present value I need to be equivalent? The answer is that $1000 today is the present value equivalent of $1050 a year from today.

The topic of future value naturally leads to the extraordinary topic of compounding. That $1000 turned into $1050 in a year; and in the second year, I’ll be earning interest not just on the original $1000 but also on the $50 of first-year interest. As time goes on, with the magic of compound interest, I’ll earn interest on interest as well as on the original principal. After 10 years, the $1000 will grow to more than $1600; after 30 years, more than $4300; and after 50 years, almost $12,000. As the interest accumulates, the original principal becomes less significant, because I’m mostly earning interest on past interest. The longer the time involved, the more spectacular the results. ■
Lecture 9: A Matter of Time—Predicting Future Values

**Important Terms**

**compound interest**: Interest earned based on the sum of the original principal plus interest accrued. Interest earned in one period is added to the principal for the next period. Over time, interest is increasingly being earned on interest from earlier periods. The result is exponential growth in total dollar value.

**discounted present value**: The current equivalent value of an event that will not occur until sometime in the future. The further away an event is, and the higher the discount rate, the lower its current, or discounted, present value.

**future value**: The dollar value at some point in the future of funds held today. Because of compounding interest, each dollar today will compound to more than a dollar in the future. The further into the future, the greater the future value.

**nominal value**: The value of anything expressed in dollars unadjusted for inflation. If the nominal price of something is $100, it is impossible to determine if that is high or low without knowing the purchasing power of a dollar.

**price index**: The proportionate cost of a given typical consumer market basket of goods relative to some arbitrary base year denoted as 100. A price index of 127 means that compared to the base year, it now takes 27% more dollars to buy the same bundle of goods.

**real value of money**: Money that has been adjusted to remove the effects of inflation or deflation. Using real money allows comparisons of actual value over time.

**time value of money**: The monetary value of an event or product adjusted for when it occurs or exists.
1. Time matters. *When* events, both good and bad, happen is an important element of evaluating options. Money is an elastic measure, and its real value changes as the cost of living changes. Any measure in dollar units must be examined to determine which type of dollars (nominal or real) are being used.

2. Because of interest, money also has a time value. The present equivalent of receiving $1000 at some point in the future becomes smaller and smaller as that event moves further into the future. Similarly, the longer interest accumulates on an amount of principal, the greater its compounded future value.
For many of us, risk has its own cost; or for some of us, its own reward. Recall when we’ve talked about people we’ve always measured their welfare—it’s their own self-evaluated quality of life. It’s never about money per se; it’s never about material goods. Rationality meant choosing whatever alternative improves your self-defined quality of life. For you to go on a rafting trip just because you won a ticket would be irrational if you have an intense fear of drowning, no matter what the market value of the trip. To turn down that trip would be irrational if you have an intense love of adventure travel.

Let’s examine a recent purchase that I made and use some of the concepts developed in this course to determine whether I made a rational decision. I was buying a new television, and the sales associate tried to persuade me to purchase the extended warranty contract. The economist’s tool kit gave me a framework to think about this problem. The decision involved risk, uncertainty, and information asymmetry.

The sales associate tried to help me overcome my rational ignorance. He freely offered me lots of information on repair risks, but I knew that I couldn’t trust that information to be unbiased. I don’t think he was lying; I just think he was using information selectively to influence my assessment of the risks that I faced. What I really wanted was unbiased information on the true expected value of repairs using real objective probabilities, but where could I get that at a reasonable cost? I suppose I could have asked him to wait while I went to the library and invested several days doing online research on the likelihood of that television needing repairs over time. But that would have been impractical, so instead I applied shortcuts that we’ve learned about thinking like an economist.

First, I applied the 6 foundation principles and 3 core concepts. Remember that people, including those who own giant electronics chains, respond to incentives. So if those owners are strategic and rational, and have all the information I need, is there a way I can get them to reveal it to me? Of
course—they already have. Here’s how: I know that a company will price the warranties so that they will make a substantial profit on them. They don’t share with me the underlying data or calculations, but their enthusiasm for selling me that contract gave me confidence that they were asking a price well above the discounted present value of the expected value of the repairs. But how could I tell if their offered contract price was too much above the cost, if it was unreasonable? Sometimes even the simplest of comparisons based on your own experience or that of your friends is enough for you to gauge the reasonableness of a contract. They were asking me to pay 15% of the purchase price for protection in years 2 and 3, after the manufacturer’s warranty ran out. I thought about my anecdotal knowledge of televisions, and the probability that the television would self-destruct in year 2 or 3 seemed low. But a ballpark estimate told me that there would have to be about a 1 in 7 chance of that happening for me to rationally pay for their extended warranty. It was pretty obvious that there was a substantial overestimate of the real probabilistic risk in the contract price.
What about the factor of time? Remember, they were asking me to pay a premium today for protection that would begin in the future. If I’m paying it all up front, before I’m even covered, that raises the real cost of the contract. Another troubling factor was the lack of competition: They were offering me the extended warranty in a context that had no competition and no alternatives. I was pretty confident that the price of the contract they were offering was quite a bit above the expected value of any future repairs. Clearly it was going to be a good deal for them but not such a good deal for me.

All I needed to reach that conclusion was the framework of thinking like an economist. But what if I had nagging doubts? What if I thought I was the one outlier whose television would inexplicably explode the day the factory warranty expired? Won’t I regret not having bought the warranty? Actually, if I think like an economist about all the purchases I make, then I won’t. If I took all the money that I would have spent for contracts on all my major purchases and put it in a reserve account earning a little interest, I guarantee you the funds in that account would be enough to cover all future repairs. Buying that contract would have been irrational: The cost almost certainly exceeded any value of the benefits.

There’s one last piece to this puzzle. If I am risk averse—if I am the kind of person who will lie awake every night trembling with fear that someday I may have to pay a large television repair bill—then I should be willing to pay for a warranty. In this case, I’m not paying to protect the television but rather to protect myself from the discomfort of risk. Even though the price of the protection is greater than the present value of the expected value of the repairs, it can make me better off. Thinking like an economist gives me a framework to shape my decisions.
**Important Terms**

**risk aversion**: A preference for a certain option over a risky option with an identical expected value. Risk aversion stems from psychological discomfort arising from the mere existence of risk.

**uncertainty**: Any situation in which there is less than perfect information. Increases and improvements in information reduce uncertainty.

**Take-Away Points**

1. A seemingly simple decision (e.g., forgoing an offer for an extended warranty contract) in fact is a complex conjunction of many important aspects of thinking like an economist. To decide rationally is to understand what that contract consists of and to be able to evaluate rationally its reasonableness.

2. Even when the hard data is missing for a complete calculation of a complex number—like the discounted present value of a stream of expected values for repairs—thinking like an economist provides us with both a framework for analyzing choices and shortcuts for estimating the boundaries of reasonableness.
When I was young, there was a very famous comic strip named *Pogo Possum*, and one of the most famous quotes out of that was one day when the title character said, “We have met the enemy, and he is us.” The strange findings of behavioral economists make that observation applicable here.

**Behavioral economics** is a field that crosses the boundary between economic thinking and experimental psychological research. In this relatively new field, we find that the behavior of human beings in both experimental and real-life situations is often very puzzling. The foundation principles and core concepts we’ve learned envision a world made up of individuals who are always maximizing: They’re calculating their options and thinking rationally about how to maximize their self-defined welfare. Yet when actual human behavior is observed, in many different contexts and in many different ways, people seem to make decisions that just don’t fit that vision.

A lot of the evidence in behavioral economics comes from carefully controlled experiments run in laboratories where the experimenters will set up structured tasks or games. One of the most famous of these is the ultimatum game, which has shown us an astonishing result: People will often forgo a gain for themselves rather than let someone else become unjustly enriched. Doesn’t rationality dictate that you should choose to receive money over not receiving any? Not necessarily; rationality refers to the process of reaching decisions, not to the objectives and motivations. The evidence here is showing us that for many people, fairness has a real value, and unfairness has a real cost. Therefore, rationality requires that their behavior respond to that.

A second puzzling behavior has to do with anchor points. Anchor points are a heuristic that we use, subconsciously, when we find ourselves faced with decisions. Before we go into transactions, we have in our mind conceptions that give us a benchmark of what an appropriate price is. Our psychological
anchor points are set by the context in which we live. An anchor point can be an efficient and rational response when we’re faced with our inevitable ignorance, but we need to recognize that other people can use them to influence our decisions. Here’s an interesting example: Restaurant consultants often suggest that a restaurant add high-priced entrées and wines to its menu to increase the average bill that its diners undertake. Why do they do that? It’s not because a lot of people are going to select the new high-priced options; in fact, the evidence is that the bill rises because those items create a higher anchor point in consumers’ minds, making the next-highest-priced option seem more reasonable.

Another surprising finding in behavioral economics is the endowment effect. In the normal economic view, an item’s value is determined by its value for me; there’s nothing intrinsic about it. But the endowment effect is the opposite of the grass is always greener effect: It says that once the grass is mine, it gets greener. It’s hard to think of an economic reason why that should be so, but apparently it is. Another puzzler is something called loss aversion. There’s no rational reason why the value we place on $1 won versus $1 lost should be much different, but experimentally we find that a loss hurts about twice as much as a gain helps. This tendency sometimes makes us bypass rational choices that have real expected value gains.

One last behavioral trait is the status quo effect. Once we have made a decision, we tend not to revisit it or consider whether it still makes sense. A study done by TIAA-CREF—which is the organization that organizes pensions for college professors—found that half of all college professors never change the allocation of their contributions. Whatever they picked on that first day, they stuck with for their whole career.
What have we learned from the field of behavioral economics? The thing that most prevents us from making rational decisions—the ones prescribed by our economic thinking—is often us. If we really want to make rational decisions, we need to be aware of—and consciously take action to overcome—our intrinsic tendencies toward irrationality.

**Important Terms**

**behavioral economics**: A subfield of economics that draws on evidence and techniques taken from social psychology. It focuses on experimental data on how people actually behave when faced with economic decisions.

**status quo effect**: In behavioral economics, the bias toward not changing once a decision has been made, even if conditions dictate that it would be rational to adapt.

**Take-Away Points**

1. Social psychology and behavioral economics have uncovered persistent tendencies toward irrationality and bias in human decision making: We adopt subjective anchor points that set parameters for our decisions, we remain attached to past decisions even when they no longer make sense, and we revalue things simply because we possess them.

2. By understanding our biases and tendencies it is possible, and even rational, for us to redefine our (or others’) incentive structures to purposefully alter our (or others’) decision architecture and overcome our (or others’) irrationality.
To think like an economist is to accede to a particular paradigm shift that forever changes the world in which you live.

It’s time for our final exam. Let’s see if you can think like an economist about some complex real-world issues. First, how can you think like an economist about crime? In 1992, Gary Becker won a Nobel Prize in Economics in part for applying economic thinking to the question of crime and punishment. Leaving aside things like serial murder and crimes of passion, Becker argued that criminals are just like the rest of us: Crime can be a rational individual choice. First, you look at opportunity cost. What’s the highest legal earning you could have? Compare that, then, to the criminal option. That analysis must include the expected value of legal punishment, which depends on both the probability of conviction and the sentence that might be incurred. Not surprisingly, there’s evidence that the amount of criminal activity does in fact depend on both the certainty and the severity of punishment.

Another complex question is what is the rational response to our irrationality? Behavioral economics shows us that we systematically make irrational decisions about our futures. Is there a way we could use our understanding of incentives to promote better outcomes for ourselves? One example is retirement plans in which your employer will match funds that you contribute. The match being offered is free money, but an astonishing number of people, perhaps due to status quo bias, fail to take advantage of it. What if we redesigned the incentive structure some way,
such as changing the default position so that all employees are automatically enrolled in their retirement plan? Economists are starting to recognize that society can find ways to nudge people to make better choices.

Economists are starting to recognize that society can find ways to nudge people to make better choices.

What about nudging yourself? Let’s look at a puzzle that lots of economists have examined: Many people buy annual health club memberships and then go so infrequently that it would be cheaper to pay by the day. Could you change your own incentive structure to alter your future behavior? Here’s a strategy: Join a health club with a friend, and sign a contract with him agreeing to pay each other a $25 fine each week that you fail to work out 3 times. If both of you go 3 or more times, no money changes hands. If neither of you shows up, the money goes into a fund that goes to the person who next receives a payment. Our knowledge of loss aversion says that the direct $25 marginal cost of skipping the gym is a strong motivator. You changed your incentives to counter your irrationality, and you could wind up healthier—and possibly wealthier.

Now that we’ve reached the end of this course, I hope you have a clear understanding of what it means to think like an economist. I know that you have the tools you need to do just that. Thinking like an economist does not mean that you have well-defined, memorized rules and answers to any question that can arise; it means you have a framework that can provide you with the questions necessary to think your way through—to analyze and reason your way to an important decision. It’s all about seeing the world in a particular way and improving the decisions you make in that world. This lecture wasn’t actually your final exam; the final test of your ability to think like an economist is going to be what you do with these tools as you confront the many personal, business, and policy decisions in your life. I do sincerely hope that you do well on that exam, because it’s the only one that really matters.
Thinking like an economist does not mean having memorized answers or strict decision rules. It means viewing the world from a particular perspective and seeing problems and issues within a specific framework. It defines questions; it does not dictate final answers.

The usefulness of economic thinking extends far beyond narrow economic issues such as the future world price of oil. It is a framework that can bring sense to problems as complex as choking traffic congestion, as pressing as high rates of crime, as pervasive as global climate change, and as personal as linking your children’s allowance to completion of their chores.
adverse selection: When the incentives in a situation result in the elimination of the best alternatives, leaving only less desirable options (e.g., when uncertainty about quality drives the best used cars from the market, leaving the lemons).

behavioral economics: A subfield of economics that draws on evidence and techniques taken from social psychology. It focuses on experimental data on how people actually behave when faced with economic decisions.

butterfly effect: In chaos theory, the hypothesis that small events can be linked through distant causal chains to seemingly unrelated events (e.g., the beating of a butterfly’s wings would theoretically set in motion a chain of events that would lead to a change in a distant weather pattern).

compound interest: Interest earned based on the sum of the original principal plus interest accrued. Interest earned in one period is added to the principal for the next period. Over time, interest is increasingly being earned on interest from earlier periods. The result is exponential growth in total dollar value.

constrained maximization: See optimization.

discount rate: The percent by which an event’s present value is diminished as the event moves further into the future. The higher the discount rate, the greater the value placed on current, as opposed to future, events.

discounted present value: The current equivalent value of an event that will not occur until sometime in the future. The further away an event is, and the higher the discount rate, the lower its current, or discounted, present value.

expected value: Formally, it is the sum of the payoffs from all possible outcomes, each multiplied by the probability of its occurrence. In essence,
it is the average outcome that would result from repeating the same decision multiple times.

**future value**: The dollar value at some point in the future of funds held today. Because of compounding interest, each dollar today will compound to more than a dollar in the future. The further into the future, the greater the future value.

**information asymmetry**: A situation in which one party to a transaction has access to information not available, but important, to another party.

**information cascade**: A growing group assessment of a situation where all members are uninformed of actual facts but form opinions based on the number of others who assert something to be true. Once this process has begun, people still undecided about the truth of the proposition in question view each new adherent as evidence of the proposition’s truth.

**law of unanticipated influences**: A principle that asserts that in a complex interdependent system, it is impossible to anticipate all the external influences and impacts that will alter conditions.

**marginal value**: The change in a starting total value from a slight increase or decrease in an activity. If a bus company provides service between 2 cities, the marginal cost is the addition to cost of taking on 1 more passenger. The marginal revenue is the increase in revenue from selling the final ticket.

**nominal value**: The value of anything expressed in dollars unadjusted for inflation. If the nominal price of something is $100, it is impossible to determine if that is high or low without knowing the purchasing power of a dollar.

**opportunity cost**: The value of the next-best thing that must be given up when time or resources are devoted to one use. It is what is forgone.

**optimization** (a.k.a. **constrained maximization**): The process of deriving as much benefit as possible within a given limit, for example, deriving the maximum possible benefit from a fixed income.
**paradigm:** In the framework for understanding science first proposed by Thomas Kuhn, a paradigm is a shared worldview held by practitioners of a given science.

**present value:** See discounted present value.

**price index:** The proportionate cost of a given typical consumer market basket of goods relative to some arbitrary base year denoted as 100. A price index of 127 means that compared to the base year, it now takes 27% more dollars to buy the same bundle of goods.

**probability:** The probability of any event (e.g., getting heads in a coin toss) is 1 divided by the number of total possible outcomes. In the case of a coin toss, the probability of heads is 1/2.

**randomness:** A situation where the outcome cannot be predicted with accuracy. Each succeeding event is not correlated with the one before it, so the outcome depends only on chance.

**rationality:** In economics, rationality means always choosing from among available options the one that provides the greatest net gain. It refers to the process of making choices, not to the objective sought.

**real value:** The value of anything expressed in constant dollars, adjusted for inflation. A price index is used to deflate or convert nominal to real dollars.

**real value of money:** Money that has been adjusted to remove the effects of inflation or deflation. Using real money allows comparisons of actual value over time.

**risk:** The degree to which an outcome depends on probability because future events cannot be perfectly predicted.

**risk aversion:** A preference for a certain option over a risky option with an identical expected value. Risk aversion stems from psychological discomfort arising from the mere existence of risk.
status quo effect: In behavioral economics, the bias toward not changing once a decision has been made, even if conditions dictate that it would be rational to adapt.

subjective probability: What one perceives to be the likelihood of a probabilistic event. Without complete information, or because of psychological distortions, people can believe events to be more or less likely than they objectively are.

time value of money: The monetary value of an event or product adjusted for when it occurs or exists. See also discounted present value, future value.

uncertainty: Any situation in which there is less than perfect information. Increases and improvements in information reduce uncertainty.
Ariely, Dan. *Predictably Irrational*. New York: Harper Collins, 2008. This is a wonderfully written summary of many of the findings of behavioral economics, the topic of Lecture 11. It documents many of our peculiar irrationalities and the ways in which others can strategically use these to alter our decisions and behaviors.


Iowa Electronic Markets website. http://www.biz.uiowa.edu/iem. This website, discussed in Lecture 6, is a mechanism for gathering, collating, and compressing widely scattered information.

mature, and ultimately collapse. Rather than learn from past experience, we seem to repeat past mistakes, often with tragic consequences.

Levitt, Steven, and Stephen Dubner. *Freakonomics: A Rogue Economist Explores the Hidden Side of Everything.* New York: Harper Collins, 2005. In this bestseller, Levitt and Dubner find economic forces behind a wide variety of phenomena. They use statistical analyses of sumo wrestling tournaments to conclude that the wrestlers must at times collude. They use the same logical argument to prove that some school teachers responded to incentives to improve student scores by changing student answers. Economic thinking, they argue, can be used to explain the incomes of drug dealers and the elements of effective parenting. Often controversial, this book is always provocative.

Poundstone, William. *Prisoner’s Dilemma.* New York: Doubleday, 1997. This book traces the development of game theory in the 1940s and 1950s and then applies it to a number of situations. Used to form national strategy during the Cold War, game theory is applicable to topics as diverse as bidding strategies in auctions and understanding thematic plots in literature.

Schelling, Thomas. *Micromotives and Macrobehavior.* New York: W. W. Norton, 1978. This is one of the earliest books in which an economist tries to use the powers of economic thinking to explore the connection between individual rational choices and less than optimal social outcomes in everyday life. Ranging from the choice of seats in an auditorium to issues of neighborhood racial segregation, Schelling shows how interdependent rational choices do not always lead to desirable results.

Shiller, Robert J. *Irrational Exuberance.* 2nd ed. New York: Doubleday, 2005. This is a classic in the field of financial volatility. Its examination of past and current crises includes some of the psychological forces that drive markets. It covers bubbles and panics in both financial and real estate markets.

direct or environmental harm. Sunstein argues for thinking carefully (like an economist) about the marginal benefits and costs of safety regulation. He also develops the idea of cascades as socially created distortions of information about risk.

Surowiecki, James. *The Wisdom of Crowds.* New York: Doubleday, 2004. This book explores ways and contexts in which the judgments or estimates of many people can be combined to produce judgments that are more accurate than those of individual experts. Whether estimating the weight of an ox or the location of a lost submarine, averaged independent estimates prove accurate.

Taleb, Nassim Nicholas. *The Black Swan: The Impact of the Highly Improbable.* New York: Random House, 2007. The title refers the astonishment of British ornithologists upon seeing their first black swan from Australia. All English swans are white, and early naturalists assumed that all swans everywhere were white. Taleb uses this as a metaphor for failure to account for the possibility of catastrophic outcomes simply because we have not yet experienced them. The validity of expected value (discussed in Lecture 7) as a measure depends on accurately including all possible outcomes.

Thaler, Richard H., and Cass Sunstein. *Nudge: Improving Decisions about Health, Wealth, and Happiness.* New Haven: Yale University Press, 2008. This book provides a blueprint for “libertarian paternalism,” their term for purposefully designing choice architectures to nudge people to voluntarily make wiser decisions. One of many examples is making participation in a retirement plan the default that people must explicitly opt out of. Those plans have much higher participation rates than otherwise identical programs for which people must take explicit steps to opt in.