

AN INTRODUCTION TO
ECONOMIC REASONING
AND SOCIAL ISSUES



TRADE-OFFS

SECOND EDITION



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An Introduction to Economic Reasoning and Social Issues

SECOND EDITION

HAROLD WINTER

THE UNIVERSITY OF CHICAGO PRESS
Chicago and London

To Gwill Allen for getting me into economics, Jeremy Greenwood for getting me into the University of Rochester, and Eric Hanushek for getting me out of the University of Rochester (which was much more difficult than getting in).

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Preface to the Second Edition

The first edition of *Trade-Offs* was published on the same day as another book about economic reasoning—*Freakanomics: A Rogue Economist Explores the Hidden Side of Everything*, by Steven Levitt and Stephen Dubner. While I thank the astute Amazon reviewer who titled his five-star review of my book “Infinitely Better than *Freakanomics*,” *Trade-Offs* has not quite had the social (or sales) impact that other book has had. Don’t get me wrong. I am not bitter that Levitt stole my thunder. Perhaps Levitt had a better title. Perhaps I too should have called myself a rogue economist, even though I have no clue what that means in terms of my writing, or Levitt’s for that matter. Whatever the case, I was thrilled to see my book in print, especially for the University of Chicago Press.

Trade-Offs changed my life, and for the better. I had so much fun writing that book that I decided to write more books. To date, I have written and published two more books, one on the economics of crime and the other on the economics of addiction. With all of these books, I became extremely up to date on many economics topics I knew little or nothing about. As a result, I became a much better economist, and a much better teacher of economics. My main target audience has always been undergraduate students, especially my own, and I appreciate all the flattering comments I have received over the years from students and professors who have read my books.

When the University of Chicago Press asked me to write a second edition, I immediately agreed. With many economic texts, new editions come quite frequently, often every other year. The main reason for this is to make the previous edition obsolete in the marketplace, circumventing those pesky used book sales that cut into publisher profits. The University of Chicago Press does not share that philosophy, and neither do I. It has been seven years since the publication of the first edition, and the sole goal of writing a new edition is to add more interesting material that has become available during that time.

In deciding how to proceed with a new edition, I had to consider two important points. The first is that most of the readers of the new edition will not have read the previous one, so the fundamental introductory material covered in the first edition must remain as is. The second point is that a new edition has to be “new,” so I decided to expand from within, updating many of the applications of economic reasoning I discussed in the first edition. I wanted to write the same book, but different, and still keep it at a length that works well as a supplemental text. If you have read the first edition, I hope you find the new material interesting and rewarding. If you haven’t read the first edition, welcome to my world (and please read the [preface to the first edition](#) following this one).

So how is this edition different than the previous one? The first substantial change is that this edition is one chapter shorter. I decided to remove the products liability chapter to keep this edition from getting too big. Also, it was the only chapter that many readers said didn’t fit well with the rest of the book—they thought the tone was

too formal, and the material was more difficult. If you are a fan of the economics of products liability, however, don't worry. I have taken the key material from that chapter, condensed it, and added it to one of the chapters in this edition.

The next big change concerns the chapter on the individual decision to smoke. While the new chapter is still primarily about smoking, I have added some material on drinking and overeating. I have also tackled the topical and controversial issue of the "new paternalism," that is, social policy designed to protect people from themselves, but from an economic perspective. I knew very little about this topic when I wrote the first edition, but I was intrigued enough to eventually write a whole book on the topic of addiction and social policy. With the research I read to write that book, I have completely reworked and expanded the "smoking" chapter in this book.

There are two other major changes. The first involves a lengthy discussion of new research on the economics of infectious diseases, especially concerning the HIV/AIDS epidemic. Economists have some interesting and unusual things to say about policies designed to combat that epidemic. The second greatly expands the material on policies that deal with the shortage of organs available for transplants. I present new research on market and nonmarket solutions, including fascinating research on what is known as *kidney exchange*, a field of inquiry that has actually led to the saving of lives in the real world.

While these are the major changes, there are many more minor changes throughout the book. I have strived to add something new to almost every topic I cover, even if it is just a short expansion at times. As you will see from my chapter endnotes, there is plenty of new material that has been added that makes the second edition stand out from the first. At least that has been my sincere intention. Who knows, maybe I'll get to do this again in seven years. But even if not, I had as much fun writing this edition as I did the first. I hope you enjoy reading it.

Preface to the First Edition: Welcome to My World

Hello. My name is Harold Winter and I am a professor of economics at Ohio University. My main field of interest is economics of law, and my job description involves basically two things—teaching and research. But as a bonus, I often get the opportunity to use economic reasoning to frighten people.

For example, a couple of years ago my mother was visiting me. I have a nice relationship with my mother, but we don't often talk about social issues. One night, however, she asked me what I had talked about in class that day. Usually I would have little to say about what I teach, especially when I am teaching formal economic theory courses. But that day was special: I was doing an independent reading course with a very bright student. We were reading a book about the American health care system written by an intense free-market-oriented legal scholar. In one of the chapters we discussed that day, the author argued that it may be sensible social policy to allow overworked emergency rooms to refuse care to patients who couldn't pay or who didn't have insurance. As I told my mother about this, I went into "professor mode" and ranted on for about ten minutes, showing her my passion for economic reasoning. When I was finished, she had a scared look in her eyes and then simply said, "You're a monster!"

Being called a monster by my mother didn't really bother me, but I started thinking about how completely alien economic reasoning is to some people. I think what surprises many people about economics is that it can be applied to an extremely broad range of issues. Most people expect economists to talk about unemployment, inflation, or the budget deficit, but not about organ transplants, cigarette addiction, or secondhand smoke. But economists can place just about any issue into an economic context, sometimes even to the surprise of other economists.

When I was a graduate student in Rochester, New York, I was once in a professor's office when his phone rang. From his end of the conversation, all I heard him say was: "I'll get there as soon as I can." After he hung up the phone he told me he had to leave immediately to be a consultant for a hospital in Boston. I jokingly asked him if they needed his permission to perform an operation. He said that was exactly what they needed. And he wasn't kidding! The doctors were deciding between some different procedures, and they wanted his opinion on the cost-effectiveness of each one. Can you imagine lying on an operating table and the surgeon tells you not to worry because the economist is on his way?

When using economic reasoning to approach social issues, the concepts of right and wrong can become very murky. I have always found this comforting. When I was young, whenever my parents told me I was wrong about something, I always responded by saying "from whose point of view?" Although that response rarely impressed my parents, I always maintained that the concepts of right and wrong were often a matter of perspective. As I became more exposed to economic reasoning, I came to realize that there is a whole academic discipline that shares this view. Instead of focusing on what is right or wrong, economists focus on costs and benefits.

Cost-benefit analysis allows economists to *detach* themselves not only from their personal views, but also from favoring one side or the other of whatever social issue is at hand. What this entails will be made clear as I discuss specific issues throughout this book, such as product safety, copyright protection, and secondhand smoke. I have my own personal opinions about some of these issues, but it is my professional opinion I intend to relate to you. The mantra I teach my students is this: *if you are on one side of an issue, you are on the wrong side*. I don't expect my students to accept this mantra in their personal lives, but I *require* them to accept it in my class.

In this book, I will be focusing primarily on theoretical issues as opposed to empirical issues or policy solutions. I am going to use many abstract and hypothetical situations to introduce you to economic reasoning. I am not going to present economic reasoning as a cure-all for real-world problems. My goal is far more modest. I simply want to present you with a unique way of thinking about social issues, one that allows you to sidestep some of the moral, ethical, or legal arguments that often are used in public policy debate. Keep in mind that in no way am I claiming that these other concerns are unimportant, and I recognize that they are generally at the forefront of public policy debate. I only want to present economic reasoning as *a* way of thinking about social issues, not *the* way of thinking about them. I do believe, however, that economic reasoning is an important and valid way of thinking about social issues.

Many of the topics I will discuss here have been analyzed in tremendous detail by many types of scholars. My goal is to introduce you to basic economic reasoning, and not to present you with a thorough discussion of all of these details. Furthermore, there are numerous issues I will not cover at all in an attempt to keep my presentation as concise as possible. If you are reading this book as a supplemental text in some policy course, I am sure you will appreciate my brevity. I will provide several references at the end of each chapter for the interested reader to further pursue the topics I discuss, and many others, in greater detail.

I wrote this book in conjunction with preparing a course in health economics, thus many of the issues I will discuss here are health related. Because the course was interdisciplinary in nature, my goal was to make the material accessible to students who had little or no background in economics. The material was presented with no graphs, no math, few statistics, and a few numerical examples when needed for ease of exposition. I will continue that approach throughout this book.

Throughout the years, I have had many discussions of social issues with friends, colleagues, students, and family members. I will relate some of these conversations to you, but usually keep the names of the other parties involved anonymous. In case my memory is faulty, I apologize to those other parties for possible misrepresentations of their views and comments. I assure you that my misrepresentation was done accidentally, unless it was done to be entertaining.

Acknowledgments

For the second edition, I want to thank David Pervin, senior editor at the University of Chicago Press, for making this second edition a reality. I also want to thank Kelly Finefrock-Creed for her excellent copyediting. Thanks also to Shenyun Wu, Melinda Kennedy, and everyone else at the press I have not met but who have helped with this edition.

A special thanks to Chris Matgouranis who was the most enthusiastic research assistant I have ever worked with.

I also want to thank my in-laws, Minda, Walter, and Francis, for helping out with Thomas, who easily could have prevented me from getting this book written. He faces no trade-offs in his life—he gets everything he wants. Enjoy it for now, boy, it will change soon.

Finally, and always, there is Jenn.

For the first edition, my first debt of gratitude goes to Alex Schwartz, senior editor at the University of Chicago Press. Throughout our correspondence, Alex's interest in this project and the encouragement he gave me was without bounds. I have never seen so much energy come from one person. I'm just glad he uses his powers for good instead of evil. I also got to work closely with Catherine Beebe and Mara Naselli. Catherine had the magic touch in picking reviewers, and Mara made my words sound like they were written by someone who knows how to write. Both demonstrated a phenomenal amount of enthusiasm for this project. I also appreciate their patience in dealing with the thousands of questions I asked along the way. And to Peter Cavagnaro and everyone else at the press who has contributed to the publication of this book, thanks for making this the most enjoyable publishing experience I have ever had.

As a student, I had the good fortune to have two academic mentors. Eric Hanushek, my graduate mentor and the nicest economist in the world, made important comments on an early version of this book that significantly affected the way I decided to write it. Gwill Allen, my undergraduate mentor who currently is an anticompetitive watchdog for the Canadian government, also provided helpful comments. These guys are economists' economists. Thanks for all your help over the years.

I have also had the good fortune to be the mentor of several excellent students. Three in particular, Jeff Baird, Ryan Richey, and Michael Taylor, have engaged me in many challenging discussions about economics and public policy. Thanks for keeping me sharp. I also want to thank the students who have taken my health economics course for their patience in watching me develop a new course. It was a great teaching experience for me. Thanks to Tiffany Margrave for assisting me in collecting readings for the course.

I also benefited from many conversations and comments from my colleagues at Ohio University. Early on in the writing process, I had many conversations about the material in this book over chicken wings with Donald Lacombe. Julia Paxton read the first draft of the book and let me know I was on the right track. Ariaster Chimeli,

Charlene Kalenkoski, David Klingaman, and Rosemary Rossiter all read the manuscript and made helpful comments. Also, I thank Roy Boyd for giving me plenty of time to prepare the health economics course.

I owe a special debt of gratitude to William Neilson, my good friend and coauthor. Bill has taught me more about doing research than anyone else I know. His critical reading of the manuscript allowed me to make substantial improvements. And after all the reviews for this book were in, he asked me if his was the harshest. Yes it was, and I appreciate it.

I would also like to thank the anonymous reviewers for their thoughtful comments. Other reviewers who were not anonymous, Edward Foster, Joni Hersch, and Kate Wahl, are also greatly thanked.

I also want to thank my family for their never-ending support. My parents provided me with several stories for this book, my sister collected Canadian cigarette packages for me to use in show and tell in my classes, and my brother and his family listened to my rants on more than one occasion.

Finally, I want to thank Jenn for making me happy.

1 *Approaching Social Issues*

In analyzing social issues, I was trained as an economist not to make moral judgments about right and wrong but to try to identify the trade-offs—that is, the costs and benefits—of whatever issue is at hand. I have seen many of my students struggle with this approach, not just in terms of performing well on their exams but in accepting it as a legitimate way to think about public policy. To introduce them to the economic way of thinking, I present an approach to resolving social issues that has three steps:

Step 1: Identify the theoretical trade-offs of the issue in question. This is the costs and benefits step, a concept that is very familiar to every economist. Regardless of the issue, there are always trade-offs to consider. Furthermore, for any policy solution proposed, there will be those in favor of it as well as those against it (and keep in mind, choosing one solution means foregoing another). If everyone could agree on the resolution of a social issue, it wouldn't be much of an issue in the first place. Economists have a way of identifying costs and benefits that few others would ever consider, largely due to our ability to detach ourselves from many of the personal concerns that can complicate policy analysis. We can argue in favor of drug abuse, obesity, theft, and even death. We can argue against safer products, pollution control, and drugs that improve the quality of life for individuals who have contracted HIV. In sum, economists are a lot of fun to talk to at parties.

Step 2: If possible, empirically measure the trade-offs to determine if the costs outweigh the benefits, or vice versa. If you are interested in proposing a policy solution, it helps to have some idea of the relative magnitude of the trade-offs you identified in step 1. To justify your solution, it generally will be useful to argue that the benefits of your solution outweigh the costs. How you want to measure the trade-offs is an important issue. You may just have a sincere gut feeling about the value of your solution, or you may want to pull out the serious statistical tools to support your claim. Either way, step 2 can be a difficult stage for several reasons.

First, empirical analysis requires data, which can come from several sources, such as surveys, observable market information, or controlled experiments. Unfortunately, data collection is often difficult to do, and as a result, data are often measured inaccurately. Second, the real world is a big and messy place to study. A lot of data that ideally would be needed to accurately measure trade-offs simply may not be available. Third, there are many different statistical methods that can be used to measure the same trade-offs. Advances in computer technology and statistical software have made it possible for almost anyone with a computer to do sophisticated empirical work, so you often get to see many different approaches to the same problem. Finally, not only can the empirical approaches differ in statistical techniques but also in empirical design. What data are most relevant? If there are alternative ways to measure the same variable, which measure should be used?

Fortunately, there are procedures that deal with many of these problems, and the best empirical work deals openly with these shortcomings. What I believe is most

important for empirical work is to allow others to be able to verify the integrity of your data, and to be able to replicate your results. But this may not always be possible if there are proprietary rights that make the sharing of data impossible. Still, being able to examine the robustness of the results of any particular study is important in determining the value of that study. It is often the case that you can have a group of economists who are in complete agreement over step 1 but in complete disagreement over step 2. I should point out, however, that disagreement over step 2 in no way diminishes the value of economic reasoning. There are legitimate and passionate disagreements in how to measure trade-offs, but this simply is an unavoidable consequence of the nature of empirical work. Any academic discipline that attempts to apply empirical analysis to policy issues will have to confront these same problems.

Step 3: Recommend (or implement) social policy based on the first two steps. This may be the most exciting step if you are passionate about public policy. While there are some economists who are in the position to actually implement social policy, the bulk of public policy economic research is meant to imply, or recommend, policy solutions. Many economists keep their research largely to themselves and to a small group of scholars who are interested in the same issues. But some economists step out into the public arena and make their positions clear. The fun begins not only when other economists are right out there bumping heads with them, but when scholars and analysts from all walks of life are also thrown into the mix. Step 3 is where you get to flex your muscles and find out if anyone who is in a position to make policy decisions actually cares about what you have to say. This step is definitely the loudest of the three steps.

Taken together, I believe that these three steps present a reasonably coherent approach to public policy analysis: identify trade-offs, measure trade-offs, and recommend policy. These steps on their own, however, are still incomplete. They have no policy relevance until a policy *objective* can be identified.

OBJECTIVELY SPEAKING

As outlined above, many of the academic debates over public policy occur due to the difficulties associated with step 2, the empirical measurement of trade-offs. But there are also difficulties in pursuing the other two steps. It is one thing to say that we are going to identify trade-offs, but it is another thing to say exactly *which* trade-offs we are going to identify. In a perfect world, it would be nice to identify every conceivable cost and benefit associated with a policy solution, no matter how far-reaching the trade-offs may run. In practice, however, and even in theory, only the most relevant trade-offs are usually considered. And this, in turn, often depends on what policy objective is being considered.

If you are going to recommend or implement public policy, you need to have a policy objective. For example, let's assume that we *can* accurately and unambiguously identify and measure costs and benefits. This would appear to make policy analysis an easy task. Propose a policy solution. If the benefits of the solution outweigh the costs, adopt the solution. If not, abandon the solution. If there is more than one solution, find the one that has the greatest spread between benefits and costs. This is a common

economic approach to public policy, as economists are often solely concerned with maximizing the spread between social benefits and social costs, or what is often referred to as *social welfare* (or *social wealth*) maximization.

If our policy goal is to maximize social welfare, we want to try to identify trade-offs that affect social welfare. For example, assume a new workplace safety regulation is being enforced in which a specific safety feature must be installed. A benefit of the regulation is that it may reduce worker injury or death. A cost of the regulation involves the resources that must be used to physically install and maintain the safety feature. Whatever trade-offs are identified, we can then move on to the next step and measure them.

In measuring trade-offs, it is common for economists to place a monetary value on all the relevant costs and benefits. For example, the installation of the safety feature will involve direct costs that are likely already measured in dollars. But there may be less direct costs, such as the value of lost production if the plant must be closed down while the feature is being installed, or if workers have to spend time in training sessions. Dollar equivalents can also be established for these costs. On the benefits side, a dollar value equivalent can be established for the value of lives saved or injuries avoided. Although this may seem coarse, all of the trade-offs we identify must be measured in the same units, such as dollars, to allow for a direct comparison of the costs and benefits of the safety feature. Thus, social welfare is often measured in dollars.

Even if there is agreement on the broad objective of maximizing social welfare, policy objectives may differ due to differences in the definition of social welfare. A good example of this can be found in the economic analysis of crime. To deter crime, we must use resources for the apprehension, conviction, and punishment of criminals. These costs are offset by the benefits in crime reduction. But should the benefits that accrue to individuals who commit crime (also members of society) be added to social welfare? If yes, this may suggest that fewer resources can be used to deter crime, because crime itself has offsetting benefits. If no, crime is more costly to society, and more resources may be needed for deterrence. Notice, however, that it is a *fact* that a criminal reaps a benefit from committing a crime (or why commit the crime?), yet it is an *opinion* as to whether that benefit should be counted as social welfare. Policy objectives and definitions of social welfare are *subjectively* determined. This accounts for why social issue debates are often extremely contentious.

What, then, should be counted as social welfare? Throughout this book, what counts as social welfare will depend on the specific topic of interest, whether it is safety regulation, copyright protection, secondhand smoke, and so on. Economists tend toward inclusiveness in defining social welfare. That is, they tend to be concerned about identifying the existence of costs and benefits, and not concerned about who reaps the benefits or incurs the costs. In other words, a dollar is a dollar, regardless of who gets the dollar. But this leads to another problem. Even if we can agree on all the trade-offs that should be included in social welfare, we may disagree on the appropriate social policy goal. For example, instead of only being concerned with welfare maximization (*efficiency*), we may also want to be concerned with how that wealth is distributed (*equity*).

Distribution of wealth issues can be very difficult to deal with. The concept of

fairness tends to be open ended. For example, what if you and I are trying to split \$1,000? If I suggest that we each get \$500, I wouldn't be surprised if you considered that to be a fair split. But what if I am rich and you are poor? Maybe, then, to remedy that inequity you should get \$750 and I get only \$250. Wouldn't that be fair? But then again, if I am rich and you are poor, \$250 may be as valuable to you as \$750 would be to me. After all, we may want to consider how each dollar increases our levels of happiness *on the margin*. If a rich person is not likely to value one extra dollar as much as a poor person would, to be fair we may want the rich person to get more. The important point with this exercise is that one can rationalize *any* split of the \$1,000.

In all, proposing policy solutions can lead to endless debate. Even if there is agreement on the objective of social welfare maximization, there may be disagreement as to what should be included in the definition of social welfare. And even if there is agreement over the definition, there may be disagreement over the appropriate goals of social policy. How, then, are we to proceed with the three-step approach to resolving social issues?

MY GAME PLAN

In this book, I am going to focus primarily on step 1. Identifying trade-offs is what I personally am most interested in doing as an economist, and I enjoy thinking abstractly about social issues. Furthermore, step 1 is the least contentious step among economists as there is generally a strong agreement over the identification of costs and benefits. Finally, step 1 is where economic policy analysis begins.

Although I will discuss many empirical studies throughout this book, the formal elements of step 2 will not be emphasized. I prefer to focus on the least contentious aspects of economic analysis. More to the point, the important debates over empirical work do not really involve the opposing results of the studies. Instead, the debates focus primarily on choice of data and statistical techniques. If you have some basic background in statistical economics, (what economists refer to as *econometrics*), discussing how empirical studies differ can be an important and fascinating exercise. I'm going to assume, however, that the typical reader of this book does not have such a background. If you do have further interest in empirical research, I will provide you with several references at the end of each chapter.

As for step 3, one thing I certainly will not do is to present my recommendations for policy solutions. What I personally think about public policy issues has absolutely no bearing on understanding basic economic reasoning. What I will do, however, is often consider the goal of social welfare maximization (that is, maximizing the spread between social benefits and social costs) as my policy objective. How social welfare is defined will depend on the specific issue at hand, and this will become clearer in the chapters to come. I will not, however, be concerned with distributive issues.

I do want to make it clear that in no way I am arguing that the objective of social welfare maximization is what policy decision makers actually *do* care about. The economics field of *public choice* addresses the issue of what policy makers do care about, and if you have further interest in that topic, I recommend that you find out more about that field. I am also not going to claim that social welfare maximization is the objective that policy makers *should* care about. There are many legitimate social

policy goals, and what policy makers should care about is a matter of opinion.

My main reason for focusing on a specific economic objective is that it will allow me to place the trade-offs I identify into a policy context, and I believe that this will facilitate my presentation of economic reasoning. Try to think of identifying trade-offs in the context of social welfare maximization as an abstract exercise, designed to teach you how to think like an economist, not to teach you how to resolve complex, real-world social issues. Although the ultimate goal of policy analysis is to answer questions about how to resolve these issues, I want to focus on the first step toward that goal—*raising* the appropriate questions about trade-offs. No matter how you decide to measure trade-offs, or how you decide to consider trade-offs in any social policy objective context, *trade-offs always exist*. No amount of disagreement about public policy issues can ever change that fact.

2 A Valuable Life (to Some Extent)

I attended a dinner party several years ago that was also attended by a new professor in the Health Administration Department. Professors who are fresh out of graduate school are often wildly enthusiastic about intellectual discussions, and she was no exception. As we sat down to eat, all of a sudden she began to question me about economic studies that attempt to place a dollar value on human life. She had seen some of these studies in graduate school and was uncomfortable with the idea of equating a person's life with a finite dollar amount. She felt that a human life can only be infinitely valued, and she used the words *immoral* and *repulsive* to describe the studies that contradicted her view.

In response, I told her that I could easily convince her that she herself did not place an infinite value on her own life. She was confident that I couldn't convince her of any such thing, but she allowed me the opportunity to try. First, I asked her if she had driven to the dinner party that night. She said yes. I then asked her if she believed it was possible, even just slightly possible, for her to have been killed in an accident on her way to the party. Again, she said yes. Finally, I asked her why she would take even the slightest risk of losing her infinitely valued life, especially just to attend a dinner party. She thought about it for a minute and then conceded that I had a valid point. I hope she didn't think I meant that she should never leave her house again!

My point was that what some economists do explicitly, virtually every individual does implicitly—they place a finite value on human life. Economists, as well as other researchers, routinely use a *statistical value-of-life estimate* in policy analysis to measure trade-offs. This is the value of life in a cost-benefit analysis sense: the dollar cost of improved safety must be compared to the dollar benefit of improved safety. If the benefit is measured in lives saved, a dollar value of life is important to determine. This fact will be made painfully clear in the next section.

THE FORD PINTO

The Ford Pinto case represents a tragic example of the application of value-of-life estimates in a cost-benefit framework. On an Indiana highway in 1978, three girls between the ages of sixteen and eighteen were hit from behind while driving a Ford Pinto. The Pinto caught on fire, exploded, and killed two of the girls immediately; the other died a short time later from severe burns.

In an unprecedented move, the district attorney brought criminal charges of reckless homicide against Ford. Apparently, had Ford made an \$11 modification in the design of the Pinto, the deaths of the girls may have been avoided. Furthermore, Ford was well aware of this, because its engineers had undertaken a cost-benefit analysis in which they had assigned a dollar value to the potential loss of human life in the event of just such an accident. The conclusion of the analysis was that it was more cost effective for Ford to pay damages to the families of accident victims than it was to make the modification. Thus, concluded the prosecuting attorney, Ford had arrogantly, and criminally, traded lives for dollars.

Exactly what did the Ford engineers do? To begin with, they calculated the cost of an \$11 modification for the total number of Pintos on the road. This yielded an amount of approximately \$138 million. Next, they determined how many individuals would probably be killed or injured in a rear-end Pinto collision, and using average liability amounts from wrongful death and injury litigation, they calculated their legal liability of not using the modification. Using a liability amount of \$200,000 for each person killed, and another amount of \$67,000 for each person injured, they totaled their overall liability at approximately \$50 million. (This also included a small amount for the cost of the damaged Pintos.) Because the former figure dwarfed the latter one, Ford concluded that it would be cost effective *not* to use the modification but rather to pay civil liability when required to do so.

Even if you accept the cost-benefit analysis and the numbers Ford used, a common response about the Pinto case is: What was Ford thinking? Let's face it. Why not just put the \$11 modification in the car and charge \$11 more for a Pinto? Lives would be saved, and how could \$11 more in the price of a Pinto really affect anyone? This is a very persuasive argument, but only if you do not delve deeper into the problem.

Have you ever considered how many thousands of decisions must go into something as complicated as product design for an automobile? There are so many margins for an automobile manufacturer to consider, many of which involve safety considerations. Any single improvement in safety may cost just a few dollars, but if there are hundreds of potential safety modifications to consider, the improvements in safety may cost thousands of dollars. And even if government regulations dictate minimum standards for a number of safety features, these decisions still have to be made by some agency. How, then, are these decisions to be made? What criteria should be used? If a safety feature involves lives saved, how are we to value those lives saved? As mentioned earlier, it is senseless to place an infinite value on human life. In that extreme case, the only real sound safety feature for an automobile would be not to produce any at all.

So what did Ford do wrong? Did it make a sound business decision? Quite possibly, yes. But a sound decision from Ford's perspective may not be a sound business decision from society's perspective. Proper cost-benefit analysis doesn't only require using a value-of-life estimate; it requires using the appropriate one. But what is meant by *appropriate*?

HOW VALUABLE IS A LIFE?

In a *wrongful death* case, part of the issue that must be determined by the judge or jury is how to assign a damage award for the loss of life. Although there are statutory differences across states, there are some common factors that are looked at to determine the damage award. Two broad categories of factors are damages based on *contributions* and damages based on *loss to the estate*. The first category primarily deals with the benefits that would have been provided for the decedent's beneficiaries had there been no wrongful death. The second category primarily deals with the probable earnings of the decedent, less probable personal expenses, had there been no wrongful death. Both of these factors focus on the *pecuniary* (or monetary) aspects of the loss, as opposed to the *nonpecuniary* aspects.

From a social perspective, a value of life includes anything that can be considered

valuable to the individual. This tends to involve much broader categories than are included in a legal wrongful death damage determination. The goal of estimating a value of life, then, is to try to place a dollar value on both the pecuniary *and* nonpecuniary aspects of that value. How can this be done?

Individuals routinely take actions that suggest that they are willing to pay to *avoid*, or must be paid to *incur*, an increased risk of death. For example, if you buy a smoke detector for your home, you demonstrate that you are willing to pay a certain price to reduce the probability of being harmed or killed in a fire. Conversely, if you decide not to buy a smoke detector, you demonstrate that you are not willing to pay a certain price to be safer. In either case, your action can be used to infer a statistical value of your life.

To provide an example that is illustrative of a common approach economists use to estimate a value of life, let's consider an individual's decision process in choosing a job. Consider the following hypothetical situation. You are trying to choose between two job offers. Both jobs are completely identical to you except in two respects—one job has a slightly higher risk of death than the other job, and the wage rates may differ. Obviously, if you choose the riskier job it must be because you will be paid a wage premium relative to the less risky job. If you choose the less risky job, the wage premium will not be enough to compensate you for the increased risk. In this case, we may be able to identify the exact wage premium that makes you *completely indifferent* between the two jobs. With that amount, and some idea of the difference in the risk factors of the two jobs, we can estimate a value of life.

Let's make up some numbers to demonstrate the technique. Suppose the riskier job has a one in ten thousand ($1/10,000$) higher death risk than the less risky job. If I were to ask you, what is the minimum annual wage premium you would need to take that risk, how would you answer? If your answer is \$500, this information tells me you need to be compensated \$500 per $1/10,000$ increase in the risk of dying. Now, if we think about 10,000 workers each giving an identical answer to the question, we have a total of $(\$500)(10,000)$, or \$5 million, the workers are willing to pay to face, on average, one death from their group. (We say that there is *on average* one death in the group of 10,000 workers because there is a $1/10,000$ chance of dying, but that does not mean there will be exactly one death.) In a statistical sense, then, we can say that one life is valued at \$5 million. When I ask my students to perform a similar exercise, I get answers that range from \$0 to \$100 million. For the students who answer \$0 and seemingly place no value on their lives, I try to discourage them from seeking careers as airline pilots.

Asking a hypothetical question about a risk choice that you would never explicitly consider in the real world may not be a very reliable way to determine a value-of-life estimate. Economists often use a more sophisticated method that involves using labor market data on the determinants of wage rates. A worker's wage depends on many factors, such as education, experience, type of industry, union status, fatality and injury risks, and several other things. Fortunately, there is a tremendous amount of data that exists on all of these variables for thousands of workers. A statistical technique allows the researcher, in effect, to compare workers with *identical* characteristics across every dimension except job fatality risk, and then determine the wage differential for a corresponding risk differential. If it is found, for example, that a \$500 annual wage

premium is needed to compensate for a 1/10,000 risk premium, the statistical value-of-life estimate for an average worker is calculated (just as above) to be \$5 million.

The main advantage of using labor market data to estimate a statistical value of life is that we are using data based on observable market behavior. We are not asking a hypothetical question. Instead, we are observing wage/risk trade-offs that workers make in determining their optimal employment decisions. We must be careful, however, to take note that it is possible that workers, in general, do not have a good idea about the magnitude of the risks they face. If a worker underestimates the true risk of death, the amount needed to be compensated for accepting that risk *undervalues* the true statistical value of life. Furthermore, workers are not identical. Two workers facing the same risk may require different amounts of compensation. Thus, a statistical value of life found using data from one specific group of workers may not be an accurate value for another group of workers.

There have been numerous empirical studies that have attempted to estimate a statistical value of life. Many of these studies have proceeded along the same lines but have used numerous different data sets. While it is impossible for all of these various studies to reach exactly the same value-of-life estimate, the range of estimates is generally between \$3 million and \$9 million. Furthermore, there is a general belief that the typical wrongful death damage estimate usually (grossly) underestimates the statistical value-of-life estimate found in most empirical studies.

Returning to the Pinto case, the problem with Ford's cost-benefit analysis was not that it was trading lives for dollars. That necessarily must be done in designing products that may be used in ways that create the possibility of injuries or death. From its perspective, Ford correctly determined what it expected its legal liability to be largely based on the \$200,000 wrongful death damage estimate that the courts used. However, if the social value-of-life estimate falls even in the lower end of the \$3 million to \$9 million range, the dollar cost of not adding the safety modification in terms of life lost and injury would be close to \$1 billion. This outstrips the \$50 million cost estimate used by Ford by a factor of twenty! With the larger value-of-life estimate, the conclusion of the cost-benefit analysis shows that the additional safety modification would have been cost effective and should have been implemented. Thus, Ford would have had to face a higher amount of liability to provide it with the incentive to add the safety feature. But this was more of an issue for product liability law or automobile safety regulation than it was for criminal law. Ford was ultimately acquitted of all criminal charges.

SCARCITY

If you accept the notion that there is a finite value of life for cost-benefit purposes, you necessarily accept the notion of trading lives for dollars. This implies that there are some safety features that simply are not cost effective. But what value-of-life estimate should you use? If too low a value is placed on the value of life, many safety features would be deemed not cost effective. If too high a value is used, too many safety features would be considered cost effective. But can you ever really have *too many* safety features? If we are not confident in the value-of-life estimate, shouldn't we at least use a high value so that we bias our results in favor of increased safety? The high