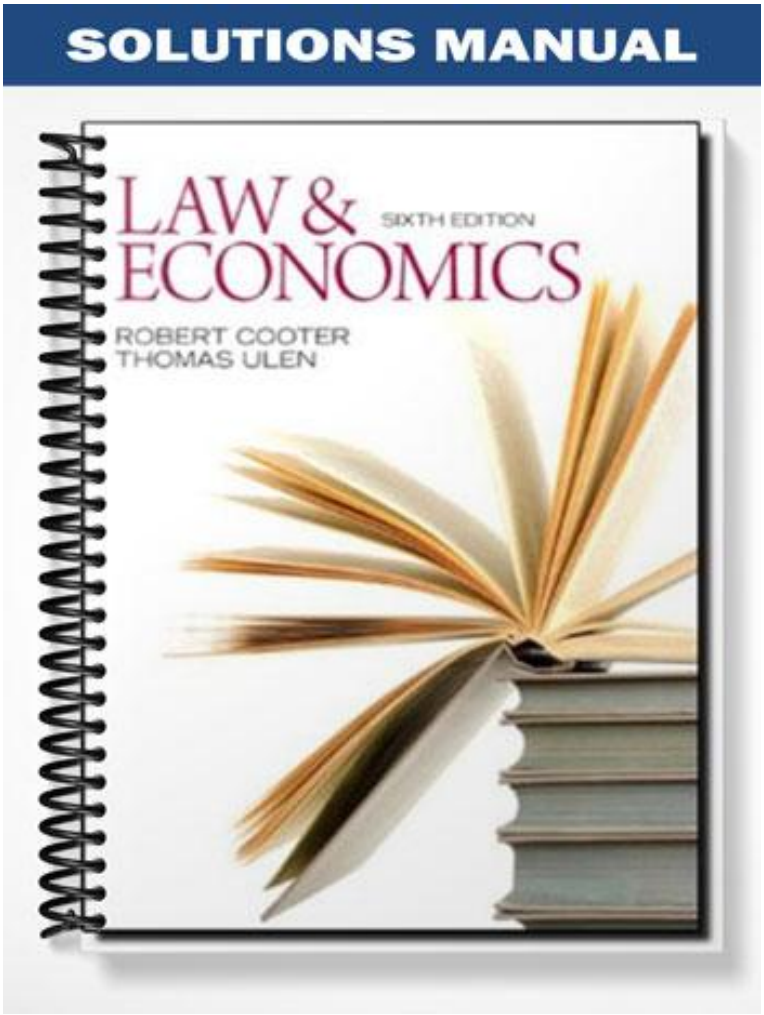
SOLUTIONS MANUAL



Chapter 2
A Brief Review of Microeconomic Theory

This chapter reviews microeconomics theory. As the suggested guide for teachers in the Introduction to this manual has indicated, not every class using this text will find that they need to cover this material. Some instructors tell us that even if their students do not know microeconomic theory, they do not take time early in the semester to review this chapter. Rather, they tell the students to read through the chapter on their own.

No one should expect students who have never studied economics to emerge from their reading of Chapter 2 a full-blown economist. Perhaps the better message to give to students who have not heretofore studied economics is to read through the chapter solely to familiarize themselves with where in this chapter they can later find treatment of various economic topics. For example, a student may not want to labor over the material on game theory now. Rather, she may want to know where this treatment is in Chapter 2 so that when she meets game theory in Chapters 4 and 8 she can return to this point in Chapter 2 for a refresher.

Other teachers tell us that they spend up to three weeks of a fifteen-week semester reviewing microeconomic theory before they get to the legal material.

Still others take three or four lectures at the beginning of the semester or term to go over selected parts of Chapter 2. For example, in teaching law students (some of whom were economics majors as undergraduates, but many of whom have never studied economics) one might focus on the sections in Chapter 2 on market failure and decisionmaking under uncertainty.

Our experience has been that because a great deal of the economic analysis of law consists of demonstrating that legal commands and institutions can correct for such market imperfections as external costs and benefits, public goods, information asymmetries, and collective action and group coordination problems, students need to be thoroughly familiar with those concepts before launching into Chapter 4 and the subsequent material.

Ulen frequently uses the first week of the semester to stress only limited aspects of micro theory for the law students he teaches. For example, he discusses welfare economics much more extensively than is the case in the text, stressing the sources of market failure and their correctives, spending time on the Arrow Impossibility Theorem, and introducing some intriguing uses of economics to discuss important public policy issues, which we describe in more detail below and in the *PowerPoint* presentations that are available on the Instructor's Resource website.

■ Notions of Efficiency

Be certain to distinguish between Pareto and Kaldor-Hicks efficiency. Pareto efficiency requires consent—that is, the gainers from a reallocation must receive the explicit consent of the losers. Presumably, they will only be able to do so when their gains are greater than the total of all losses. (In Chapter 4 we refer to this difference as "cooperative surplus.") In contrast, Kaldor-Hicks efficiency is a species of cost-benefit analysis in which a change is deemed efficient if the total gains exceed the total losses but without the requirement that the gainers compensate the losers.

There are several reasons for taking care with this distinction between two very different definitions of efficiency. First, many economics students will not be aware of the difference. Modern microeconomic theory uses the notion of Pareto optimality almost exclusively, so that even those with some familiarity with microeconomics may not be aware of Kaldor-Hicks efficiency. Law and economics uses Pareto optimality as its efficiency criterion in relatively few instances, most having to do with contractual matters. Instead, the literature uses, implicitly or explicitly, Kaldor-Hicks efficiency as its central efficiency concept.

Second, the difference between Pareto and Kaldor-Hicks efficiency has very much to do with transaction costs—a central notion in law and economics that we develop in Chapter 4. (Transaction costs are, in brief, the costs of effectuating a bargain.) The connection between the different efficiency norms and transaction costs is this: when transaction costs are so high that they make consensual, mutually advantageous bargaining unlikely or impossible, there must be some criterion other than consent for deciding on the efficient allocation of resources. The transaction costs of compensation—identifying the gainers and the losers and transferring resources from the gainers to the losers—may be greater than the difference between the benefits and the costs. In those circumstances, a bargain cannot take place, even though (leaving transaction costs to one side) the total gains from a reallocation exceed the total costs. Kaldor-Hicks efficiency allows us to speak about those reallocations in the absence of unanimous consent.

■ Optimality

We stress the point—unremarkable for economists, but striking for non-economists—that the optimal amount of anything occurs when social marginal cost and social marginal benefit are equal. An important implication of this point is that the optimal amount of many bad things is not zero. That is because it costs something to get rid of bad things. Much as we might like to eradicate all air and water pollution, the costs of doing so eventually far outweigh the benefits.

An example of an important law that flies in the face of this point is the Delaney Clause of the Food and Drug Act. That clause instructs the Food and Drug Administration to prohibit all food additives that pose any risk of cancer. This is a good matter for class discussion. There are, of course, lots of other examples. We would be extremely grateful to those of you who send us your examples.

■ Opportunity Cost

This is a central notion in microeconomic theory, and we commend the boxed example that is included in Chapter 2. However, we also highly recommend that you look at the article by Paul J. Ferraro and Laura O. Taylor, "Do Economists Recognize an Opportunity Cost When They See One?: A Dismal Performance from the Dismal Science," 4 *Contributions to Econ. Analy. & Pol'y.* 1 (2005). That article's findings about the inabilities of professional economists to compute opportunity cost are contained on the *Microeconomic Theory II* set of slides.

■ Further Examples

A marvelous example of an external benefit is the automobile theft prevention system known as LoJack.[1] Here are the stylized facts about that system. The LoJack company will sell its system to automobile owners for approximately $500. If an owner pays that fee, representatives of the company insert a secret device in the owner's car. Not even the owner knows where or what the device is. If the car is stolen, the owner calls the LoJack company, and they then turn on their equipment, which picks up a signal transmitted from the device they put into the car, helping the police to locate the car quickly. Because of the large capital expenditure involved for the company, LoJack is currently available only in large cities in the United States.

See Ian Ayres and Steven D. Levitt, "Measuring the Impact of Unobservable Victim Precaution: An Empirical Analysis of LoJack," 113 *Q.J. Econ.* 43 (1998), and then the brief summary of that article on the *Microeconomic Theory II* slides.

An interesting sidelight of the LoJack is how thieves and police have responded to it. Thieves recognize now that any car they steal might be LoJack-equipped and that if it is, they will be caught quickly. So, bright auto thieves in major cities where LoJack is available drive a stolen car to a safe place, park the car, and watch it to see if anyone comes to get it. The police now recognize that this is what thieves do; so, when the LoJack company notifies them that one of their protected cars has been stolen and is parked at a particular place, the police then go to watch that car, too.

How does the LoJack create an external benefit? Contrast the LoJack with a car alarm. Typically there is an external indication that the car is equipped with an alarm. Therefore, a potential thief can look at a car equipped with an auto alarm, recognize that that car is not a viable acquisition, and turn his attention to less well-defended cars. As a result, a car equipped does not confer a benefit on other cars. Indeed, it may make their theft more likely.

But a LoJack does not have this problem. Because one cannot tell whether a car is equipped with a LoJack, thieves may be generally deterred from auto thievery if they suspect that cars are equipped with the system. And, indeed, that is what the early experience with LoJack indicates. In some major cities there has been a significant drop in auto theft after LoJack became available.

We are grateful to Ian Ayres and Steve Levitt for bringing this matter to our attention.

If there is time, you might also discuss, or at least recommend, Ronald A. Coase's "The Lighthouse in Economics," which originally appeared in the *Journal of Law and Economics* and is reprinted in Coase's *The Firm, the Market, and the Law*. The lighthouse has been cited by John Stuart Mill, Paul Samuelson, and generations of economics teachers as an example of a public good—something that because of free riding consumers, private enterprise cannot produce in a socially optimal amount. But Coase demonstrates that in the United Kingdom until late in the 19th century a private company successfully operated lighthouses for commercial shipping.

There are lots of other pithy examples that will illustrate for law students the intriguing view of the world that economics brings. We have found that chapters from Steven Landsburg's *The Armchair Economist* are wonderfully stimulating methods of getting the students to see the world in an economic fashion.

Please don't hesitate to send us your examples so that we might share them with other teachers who use this book.

[1] The company's name is a play on the word "hijack," which means to stop someone and take something from him or her forcefully. Some thieves used to hijack trucks containing valuable materials. Several years ago some criminals began to stop automobiles and take them, usually at gunpoint, from their rightful owners. That practice was called "carjacking."

The London Congestion Charge

Ulen used this example of the application of pricing a non-market good—traffic congestion—to illustrate the ability of economics to help address societal problems. See the *Microeconomic Theory II* slides, and Jonathan Leape, "The London Congestion Charge," 20 *J. Econ. Persp.* 157 (2006).

Ulen has also assigned John Tierney's article, "The Autonomist Manifesto," from the September 26, 2004, *New York Times Magazine* as a great discussion item.

Finally, Ulen has found that Harold Winter's *Trade Offs* is a wonderful short introduction to the use of economics in the discussion of public policy items.

The Arrow Impossibility Theorem

Among many if not most law students, the hardest pill to swallow about law and economics is the elevation of efficiency to the status of a serious legal norm.[2] Many law students have come to law school to further their ability to foster social justice. They will react very negatively to a contention that that goal is misguided or that it should give way to efficiency as a legal norm. We are not ones to pander to our student audiences. Nonetheless, we try to make clear to them that there are sound scholarly reasons that modern economics focuses on efficiency rather than equity. Two of the most important are the First and Second Fundamental Theorems of Welfare Economics, which argue, essentially, that efficiency and equity are separable and the Arrow Impossibility Theorem.

One of us uses a handout on the Arrow Theorem that says the following:

The Arrow Impossibility Theorem addresses the issue of how society aggregates individual preferences about social matters (*e.g.*, about the distribution of income and wealth) into societal preferences. Suppose that these aggregations are made by majority voting. We could imagine that elections are devices for converting individual preferences into societal preference orderings: candidates announce their social welfare functions and the associated distribution on the utility-possibility frontier that they intend to pursue and voters then choose among the candidates, with that policy, social welfare function, or candidate winning that commands the highest number of votes.

Make the following five assumptions about this means of aggregating individual preferences into social preferences:

1. There is no dictatorship—*i.e.*, no one person's preferences determine the group choice.

2. Each individual has ordered all the alternatives according to her preferences and votes for that policy, social welfare function, or candidate that ranks highest in her preference ordering.

3. If every individual unanimously agrees on an alternative, then that alternative is indicated as the society's preference.

[2] Some authors, such as Kaplow and Shavell in *Fairness Versus Welfare*, make a serious case that efficiency (in the sense of improvements in individual welfare) should be the *only* legal norm. We discuss their claims at Web Note 1.1.

4. Each individual's choices are complete, transitive, and reflexive.

5. The preferences between any two candidates or policies depend on how people rank those two alternatives, not on how they rank other alternatives. (This is known as the axiom of the independence of irrelevant alternatives.)

For the purpose of illustrating the Theorem, let us assume that there are only three individuals in society and three policies, candidates, or social welfare functions. Suppose that the individuals' preferences among the three policies—call them *x*, *y*, and *z*—are as follows (with P indicating the relationship "is preferred to"):

Individual 1	*x* P *y*	*y* P *z*	*x* P *z*
Individual 2	*y* P *x*	*y* P *z*	*z* P *x*
Individual 3	*y* P *x*	*z* P *y*	*z* P *x*

Each individual has complete, transitive, and reflexive preferences over the relevant social choices. For instance, for Individual 2, *y* is preferred to *z*, and *z* is preferred to *x*, and so by transitivity *y* should be preferred to *x*, and it is.

What happens if we try to aggregate these individual preferences into a societal preference ordering by means of majority voting? Suppose that we begin with a choice between *x* and *y*, with the winner advancing to a runoff against policy *z*. Thus, letting S stand for the relationship "is socially preferred to," we may write that *y* S *x* because both Individuals 2 and 3 prefer *y* to *x*, while only Individual 1 prefers *x* to *y*. What now happens in the runoff election between *y* and *z*? Individual 1 votes for *y*; Individual 2 votes for *y*; and Individual 3 votes for *z*. Thus, *y* wins so that *y* S *z*, and *y* is the socially preferred policy.

Just for the sake of completeness, what would have happened if we had begun with the pairing *x* and *z*? In that case, Individual 1 would have voted for *x*, but the other two individuals would have voted for *z*, making *z* the winner. Thus, *z* S *x*. If we then advanced the winning policy, *z*, to a runoff against policy *y*, we already know that *y* would have won.

This means that *y* is *the* socially preferred alternative, regardless of the order in which the alternatives are considered. Matters seem to be in good order. Majority voting has converted completed, transitive, and reflexive individual preferences into complete and transitive *social* preferences. (Can you show that the social preferences are, in fact, transitive?)

But Professor Kenneth J. Arrow, a Nobel laureate in economics, demonstrated in *Social Choice and Individual Values* (1952) that this result did not always hold. That is, he showed that complete, transitive, and reflexive individual preferences cannot necessarily be converted into complete, transitive, and reflexive social preferences by means of majority voting that obeys the five assumptions listed previously. To see why, suppose that individual preferences over the three policies of candidate alternatives were as follows:

Individual 1	*x* P *y*	*y* P *z*	*x* P *z*
Individual 2	*y* P *x*	*y* P *z*	*z* P *x*
Individual 3	*x* P *y*	*z* P *y*	*z* P *x*

At first glance there appears to be very little to distinguish this set of individual preferences from the first set. (The only difference has to do with how Individual 3 feels about *x* and *y*.) In both instances each individual has complete, transitive, and reflexive preferences. Let us conduct an election among these policies or candidates to get the social preferences. If we begin with an election between policies *x* and *y*, *x* wins 2-1, so that *x* S *y*. Now pit *x* against the remaining policy *z*; *z* wins 2-1, so that *z* S *x*. It appears to be the case that *z* is the socially preferred policy.

But suppose that the first pairing is not *x* and *y*, but *z* and *y*. If we held an election between alternatives *z* and *y*, *y* wins 2-1. And we know that if we were then to hold an election between *y* and *x*, *x* would be determined to be the socially preferred winner. Finally, if we were to start our election by pitting *x* against *z*, *z* would win. If we were then to pit *z* against *y*, *y* would be determined to be the socially preferred policy.

There's clearly a problem here. We get three different socially preferred policies depending on the order in which we pair then initially. (This possibility of circular group preferences in majority voting was first noted by Condorcet (1743–1794) and is sometimes called the "Condorcet paradox.")

The problem is that majority voting may not give rise to transitive social preferences. We know that if the group preferences were transitive, then, because *z* S *x* and *x* S *y*, it should be the case that *z* S *y*. But notice that *y* S *z* because two people prefer *y* to *z*.

The gist of the Arrow Impossibility Theorem is that even though individual preferences are complete, transitive, and reflexive, group preferences determined through majority voting may not be. There is apparently no way to distinguish between those sets of complete, transitive, and reflexive individual preferences that will give rise to transitive social preferences and those that will not. The only method of guaranteeing transitive social preferences through majority voting is to relax one of the five assumptions made at the beginning. But it is difficult to see which of those five ought to be relaxed.

As you probably know, one of the implications of the Arrow Impossibility Theorem that social choice theorists have teased out is that there are circumstances in which one can achieve one's objectives by controlling the agenda. For example, in the second example given above (the one on page 6) suppose that you are Individual 3, whose preferences indicate that you prefer *z* to either of the alternatives. Further suppose that you, Individual 3, are in control of the voting procedures for your group of three. If so, then by suggesting that the first pairwise voting to occur will be between *x* and *y*, you can guarantee that *z* will be the ultimate selection of your group.

There is a wonderful real-world example of how a clever former law professor used this knowledge of the value of agenda control to achieve his desired end. See "The Flying Club," Chapter 3 in William H. Riker, *The Art of Political Manipulation* (1986). For more on the Arrow Theorem and some possible solutions to its dire predictions, see Daniel A. Farber and Philip P. Frickey, *Law and Public Choice: An Introduction* 38–62 (1991).

Please feel free to use that material. It may not take long to present it in class, and it may serve to indicate why economists are somewhat skeptical about aggregations of individual choices into social choices.