Law and Economics II: The Sequel

By Randal C. Picker†

The first rule of modern American culture is that a successful book or movie begets a sequel. Batman does great box office, so you do Batman Returns. If Alien is a good thing, then Aliens must be a better thing, and then Alien³ must be even better. Given the rule, it’s a little surprising to me that there has been no sequel to Richard Posner’s Economic Analysis of the Law.

Twenty years have passed since the first edition was published. As measured by the field it largely defined, the book was a great success and surely warranted a sequel. There have been other editions—the fourth came out recently—but the core of the book remains the same.

In each case, the dominant mode of analysis uses the traditional tools of classical microeconomics. Individuals maximize utility or profits subject to constraints. Individuals are pricetakers if the market is competitive, pricetsetters if a monopoly exists. These individuals are also perfectly informed. A sizable and largely successful academic legal literature applies the microeconomist’s tool of marginal analysis to a vast array of legal problems. This was the approach of Posner’s first edition, and very little of the basic approach to law and economics has changed since.

It is time for a sequel. No single book will serve as a sequel to Dick’s book, but it appears possible now to identify the methodological sequel that will drive the next generation of law and economics. The last twenty years have seen a major shift in the fundamental methodological tools that microeconomic theorists use. Game theory now augments the twin, polar paradigms of pure competition and monopoly.

At the same time, in a related development, a richer variety of asymmetric and incomplete information now supplements the formerly standard assumption of perfect information. Rational actors now need worry about the actions of others—this is the fundamental strategic interdependence that game theory addresses—and they do so in an environment in which the information they possess is partial and fuzzy.

Intellectual infrastructure

You would have done well to put money in game theory stocks in the 1980s, for it was a major growth industry.

Dick, of course, has switched his focus from economics to sex (or at least economics and sex in his Sex and Reason), and I guess it’s hard to argue with that trade. Nonetheless, the approach to law and economics seen in Economic Analysis of the Law remains the dominant approach to the field.

A sample of well-known textbooks and research monographs makes the point. Look at Mitch Polinsky’s Introduction to Law and Economics, which is now in its second edition; Cooter and Ulen’s Law and Economics textbook, which came out in 1988; and the two torts monographs, Landes and Posner’s “The Economic Structure of Tort Law” and Steven Shavell’s “Economic Analysis of Accident Law,” both of which were published in 1987.

† Randal Picker is now writing a book, Strategic Behavior and the Law: The Role of Game Theory and Information Economics in Legal Analysis, with his colleagues Douglas G. Baird and Robert Gertner. This article is based on chapter 2 of that book, to be published by Harvard University Press.
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such as Gary Becker’s Economic Theory, did for the law and economics pioneers.

Why do we need this hardware, and what will it get us? The answer to the first question is fairly clear. A sizable fraction of economic life is left out if we assume that either a competitive or monopoly paradigm applies.

Consider an accident on a country road involving a motorist and a pedestrian. The likelihood of an accident turns both on how much care the motorist uses in driving and how much care the pedestrian uses in crossing the street. We do not expect the motorist to drive so slowly so that there is never any possibility of hitting a pedestrian. Nor do we insist that the pedestrian cross only when there is no car in sight. We want them both to take sensible precautions. If both act reasonably, the chances of an accident as well as the inconvenience to both parties is minimized.

If they could bargain with each other, we would expect that each would agree to act in this way. The problem arises, of course, because the two are strangers and cannot communicate with each other. The motorist and the pedestrian both recognize that the actions of the other influence what will happen, and that basic fact must be recognized if we are to have a sensible analysis of the situation. Game theory is the right tool for this problem.

Switch from torts to contracts. Markets are built upon the idea of mutually beneficial trade. Some trades, of course, require no contract at all. When a seller gives a buyer grain at the same time the buyer gives the seller cash, each party acts simultaneously and neither risks that the other will not perform.

In many instances, however, performance cannot take place in an instant. A seller may have to commit resources to a particular trade before the buyer pays. The buyer may have to prepare for the seller’s shipment without knowing whether the seller will in fact deliver the goods as promised. The willingness of either party to enter into a contract and to perform that contract depends directly on what the other prospective party to the contract will do. Each needs to account for the actions of the other, and this again is precisely the domain of game theory.

Common law subjects often give rise to situations involving strategic behavior, but strategic issues are no less frequent when we turn to the New Deal administrative state and law through statutes rather than judges. The government now routinely requires disclosure of information, forbids disclosure, or attempts to suppress efforts to acquire information. The need for these rules and the likelihood that they will be successful depends on whether information can be inferred from the failure to reveal information voluntarily. That in turn will depend on whether different players are likely to play identical strategies—to pool, in the language of game theory—or to play different strategies—to separate. In many cases, an inference can be drawn from silence: the failure of the dog to bark allows Sherlock Holmes to solve the mystery of Silver Blaze.

The tools developed in game theory and information economics may provide a way to analyze everything from mandatory disclosure laws to anti-discrimination laws. These laws cannot work effectively unless we understand how people are likely to respond to them.

Simultaneous decisionmaking and country roads

Why game theory? The answer is that in many situations, individuals will need to consider the acts of other individuals. Laws have a large role in such settings, and game theory is the best tool for modeling those situations.

What does game theory get us? A sense of what is possible may be seen by looking at the simplest of the problems that I have mentioned. This situation also can be represented using the most accessible of the game-theoretic models, the two-by-two normal form game. Return to the accident on the country road. To jump right in, consider the following “game”:

<table>
<thead>
<tr>
<th>Motorist</th>
<th>No care</th>
<th>Due care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No care</td>
<td>-100, 0</td>
<td>-100, -10</td>
</tr>
<tr>
<td>Due care</td>
<td>-110, 0</td>
<td>-20, -10</td>
</tr>
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Payoffs: (Pedestrian, Motorist)

Figure 1—No Law
Here are the stylized facts that this game is seeking to represent. If an accident takes place between the motorist and the pedestrian, the motorist and car will not be hurt, but the pedestrian will, of course, suffer harm. Assume that we can represent the harm to the pedestrian as a dollar amount and set that amount at $100.

Both the motorist and the pedestrian decide on how much care to take. Assume that they each choose between taking “no care” and “due care.” Representing the decision of how much care to take as a binary choice oversimplifies greatly, but it is the natural place to start. Assume that it costs nothing to exercise “no care” but costs $10 to exercise “due care.”

“Due care” is really a legal term for a physical level of care. Consistent with the convention, “due care” is the level of care that minimizes the total expected costs of the accident. We also need to know how the care choices relate to the probability of an accident occurring. Assume that the accident is certain to happen unless both the motorist and the pedestrian exercise “due care,” but there is still a one-in-ten chance of an accident occurring even if both exercise “due care.”

So far, we have set out the brute facts of nature: the choices available to our players (the motorist and the pedestrian), or what a game theorist would call the strategies of the players and the physical consequences associated with those strategies (whether an accident takes place and the resulting harm).

To fully specify this game, we need one more item, and it is this item that determines the precise structure of the game set forth above. We need to know the legal rule for allocating the harms of an accident.

The problem of strategic behavior that the legal analyst faces is a simple problem of simultaneous decisionmaking. The amount of care that the motorist and pedestrian each take would turn on the amount of care each expects the other to take. The amount of care that each takes will turn in some measure on the legal rule that is in place—when and to what extent the motorist will have to pay damages to the pedestrian in the event of an accident.

The first question for the legal analyst concerns the effect of changes in the legal rule on the behavior of the parties. Start with a rule of no liability, or of letting the parties bear their own losses. In this case, if an accident occurs, the motorist is not harmed and the pedestrian is harmed, and the legal rule of no liability does not reallocate any of the harm by having the motorist pay damages.

We can now explain the game in Figure 1 and determine how to solve it. In a legal regime of no liability, in which the motorist was never liable for the accident:

- If neither exercised care, the motorist would enjoy a payoff of $0 and the pedestrian a payoff of -$100. The cost of “no care” is zero, an accident is certain to happen, and the accident harms the pedestrian to the tune of $100.
- If both exercised care, the motorist would receive a payoff of -$10 and the pedestrian a payoff of -$20. (The pedestrian invests $10 in care and, assuming the pedestrian is risk neutral, still faces $10 in expected accident costs, a one-in-ten chance of a $100 accident.)
- If the motorist exercises care and the pedestrian does not, the motorist receives a payoff of -$10 (the cost of taking care) and the pedestrian a payoff of -$100 (the cost of the accident, which by assumption is certain to arise unless both take care).
- Finally, if the motorist does not take care and the pedestrian does, the motorist has a payoff of $0 and the pedestrian a payoff of -$110 (the pedestrian invests $10 in taking care and still suffers a $100 injury).
What is the likely outcome of this game? In this model, taking care costs the motorist $10 and provides no benefit to the motorist in return. The motorist always does better by not taking care than by taking care. We can predict the motorist's likely choice of strategy because there is a single strategy ("no care") that, in the context of this model, is better for the motorist no matter what choice the pedestrian makes. In the language of game theory, this is a dominant strategy (really a strictly dominant strategy). In corresponding fashion, a strategy which is always worse than another strategy, again regardless of what the other player does, is a dominated strategy. In Figure 1, "due care" is a dominated strategy for the motorist. We should predict that a player will embrace a dominant strategy wherever possible and will not embrace any strategy that is dominated by another.

I know that you know that I know . . . .

This idea by itself, however, tells us only what the motorist is likely to do in this model. We cannot use this concept to predict the pedestrian's behavior. Neither of the strategies available to the pedestrian is dominated by the other. It makes sense for the pedestrian not to take care when the motorist does not, but to take care when the motorist does. The pedestrian lacks a dominant strategy because either course of action could be better or worse than the other, depending upon what the motorist does.

To predict the pedestrian's behavior, we need to take the idea that players play dominant strategies one step further. Not only will a player likely adopt a strictly dominant strategy, but a player will predict that the other player is likely to adopt such a strategy and will act accordingly. We can predict, in other words, that the pedestrian will choose a strategy based on the idea that the motorist will not choose a strategy that is strictly dominated by another.

This idea travels under the name of iterated dominance and allows us to solve this game. The pedestrian should understand that the motorist has a dominant strategy—play "no care"—and, therefore, the pedestrian should play "no care" as well.

Given that the motorist plays "no care," the payoff to the pedestrian from playing "due care" is -$110 and that from playing "no care" is -$100. (Recall that the accident is certain to happen unless both players play "due care"; once the motorist will not, the pedestrian is better off by not wasting any money on care.) The pedestrian should play "no care" as well. Neither player exercises care.

Note that to reach this solution, we proceeded iteratively: we first identified the strategy that the motorist would play using dominance arguments—this is the first iteration—and we next identified the pedestrian's strategy given the motorist's strategy as determined in the first stage of the argument—this is the second iteration. This is the logic of iterated dominance.

This extension of the idea that dominated strategies are not played requires us to make a further assumption about the rationality of the players. We not only act rationally and do the best we can given our preferences, but we also believe that others act rationally as well and do the best they can given their preferences. This solution concept seems plausible if the number of iterations is small. After all, most people act rationally most of the time and we can choose our own actions in anticipation that they will act this way.

If we accept this solution concept, we can solve the game in Figure 1. The pedestrian will not exercise care because the pedestrian will believe that the motorist will not exercise care and, in that event, the pedestrian, under our assumptions, is better off not exercising care either. We cannot, however, make this prediction as confidently as we can predict the motorist's behavior. The solution to the game turns not only on the motorist acting in a way that advances his or her self-interest, but also on the pedestrian anticipating that the motorist will in fact act in this way.

Play under a rule of no liability puts us far from the social goal of having both players exercise due care. This result in itself is hardly startling. To say that the strategy of taking due care is dominated by another strategy of taking less than due care restates in the language of game theory a familiar insight from law and economics, the insight that in a world without tort law, parties tend to take less than due care because they do not fully internalize the costs of their actions. The motorist enjoys all the benefits of driving fast, but does not bear all the costs (the danger of injuring another motorist). By capturing the problem of the pedestrian and the motorist in the form of a two-by-two game, however, not only are the incentives of the motorist made manifest, but we can see how a change in the legal rules changes the incentives of the motorist and the pedestrian at the same time.

A legal rule brings about changes through the consequences it attaches to behavior that never happens either when the legal rule is in place or when it is not.
To see this, consider the legal regime of negligence coupled with contributory negligence. This is the regime that Anglo-American law has embraced for a long time. Under this regime, the pedestrian can recover only if the motorist is negligent and if the pedestrian is not. This rule of law leads to the normal form game set out in Figure 2:

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**Payoffs: (Pedestrian, Motorist)**

**Figure 2—Negligence with contributory negligence**

Compare Figure 2 with Figure 1. They are identical except in the box in which the pedestrian exercises due care and the motorist fails to do so. In this event, the motorist rather than the pedestrian bears the cost of the accident. The pedestrian bears the cost of the accident whenever the pedestrian fails to exercise care and in the case in which both players exercise care. The legal rule does not change the strategies available to the players or the sum of the payoffs in each box. All that changes is the allocation of the cost of the accident between the parties.

In this game, unlike the game in Figure 1, the pedestrian has a dominant strategy. The pedestrian is always better off taking care. The motorist no longer has a dominant strategy. Whether the motorist is better off taking care turns on whether the pedestrian also takes care. If we accept the idea of iterated dominance, however, we can predict the strategy that the motorist will choose. The motorist will recognize that the pedestrian will play “due care” and then decide to play “due care.” Hence, under this legal regime, both pedestrian and motorist will take due care.

**Changing outcomes that don’t happen**

A comparison between the two models focuses our attention on the way in which this legal rule works and reveals a counterintuitive insight about the role of law. The only difference between Figure 1 and Figure 2 is in the box representing the strategy combination in which the pedestrian exercises due care and the motorist does not. In Figure 1, the payoffs were -$110 and $0 for the pedestrian and the motorist respectively. In Figure 2, they are -$10 and -$100.

This strategy combination is not the solution to either game: in Figure 1, neither player exercises care, while in Figure 2 both players exercise care. Yet it is how the negligence/contributory negligence regime reallocates the harm when the pedestrian takes care and the motorist does not—an outcome that is not reached in either game—that completely alters the expected play of the game.

Under either liability rule, we would never expect to observe the pedestrian exercising due care and the motorist exercising no care, but it is precisely how the law treats the outcome that will not happen that determines whether the efficient due care-due care outcome occurs. A legal rule brings about changes through the consequences it attaches to behavior that never happens either when the legal rule is in place or when it is not.

This model also focuses on a central assumption underlying the Anglo-American rule. To believe that this rule works, we must believe both that the motorist acts rationally and that the pedestrian believes that the pedestrian acts rationally as well. The motorist will take care in order to avoid liability only if the motorist believes that the pedestrian is similarly motivated to act in a way that tries to avoid bearing the cost of accidents and will take care as well. If the motorist believed that the pedestrian would not take care, the motorist would not take care either. This liability rule turns crucially on the assumption that the motorist believes that the pedestrian will exercise due care.

At this point, it is worth discussing how this way of examining different tort rules in this rarefied environment differs from the traditional law and economics approach. The technical difference is largely that the traditional law and economics analysis rests upon another game theory solution concept, the Nash equilibrium solution concept—named after its creator John Nash—rather than ideas of dominance and iterated dominance.

The standard law and economics model is in a sense game theory under a different name. This explicit game theoretic approach does, however, isolate two features of the law in a way that the traditional law and economics analysis does not. First, it unpacks the rationality assumption upon which the basic law and economics model rests. We must assume not only that individuals behave rationally, but also that individuals expect others to behave rationally as well. Second, this way of looking at the problem reveals one of the important, but subtle, ways in which a legal rule works. A change in a legal rule
can alter the behavior of both parties even by changing outcomes that are never seen under either the new or the old regime.

**Sequel as Prequel as Sequel**

I started with the first rule on American culture about sequels. Unfortunately, the second rule is that the sequel usually falls far short of the original. If this rule applies with equal force to the academy, those of us in search of a sequel to the first-generation law and economics would be better served to take up a different enterprise.

But I take comfort in *The Godfather* and *The Godfather, Part II*. *The Godfather*, of course, was Francis Ford Coppola's epic tale of the Corleone Family, headed by the Godfather, Don Corleone, played by Marlon Brando. The movie was a popular and commercial success and took an Oscar as Best Picture. Attempting a sequel seemed a foolish endeavor. Nonetheless, barely two years later, *The Godfather, Part II* was released. This film looked both back and forward. Coppola interspersed the story of the young Don Corleone, played by Robert De Niro, with the story of the post-Don family, led by his son Michael, played by Al Pacino. This film won six Oscars, including Best Picture.

In a somewhat surprising way, game theory is both prequel and sequel to the first generation law and economics. The paper generally credited with starting the formal analysis of torts is "Toward An Economic Theory of Liability," by John Prather Brown, published by the Law School's Journal of Legal Studies in 1973. What is remarkable is that Brown's analysis was explicitly a game theory analysis. He used a different notion than the one described in this article—Nash equilibrium rather than dominance arguments—but he focused precisely on the circumstances under which different liability rules will give rise to efficient choices of care. Brown's use of formal analysis proved influential in subsequent work in torts, as the Landes and Posner and Shavell monographs attest—but the fact that his tool was game theory rather than classic microeconomics was virtually ignored.

The field of game theory has changed dramatically since Brown's paper was written. Dominance arguments of the sort made here are increasingly common (see, e.g., Orr, 1991), and there are now a staggering variety of tools available to the applied game theorist. Whether these will suffice in the face of the second rule of sequels is uncertain—though some of us are finding the rushes promising—but the time is clearly ripe to prove the first rule true.

**References**


