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EXPERIMENTAL LAW AND ECONOMICS

Richard H. McAdams

Professor of Law, Boston University School of Law

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Abstract

This chapter reviews experimental economics research relevant to law and economics. The introduction includes a brief discussion of experimental methodology and a survey of the categories of economics experiments relevant to law and economics, with citations to other reviews and compilations. The bulk of the chapter reviews two series of economics experiments designed to test theoretical claims of law and economics: those relating to the Coase theorem and those relating to pre-trial bargaining and settlement.

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A. Introduction

1. Introduction

The laboratory experiment is a time-honored tool for empirical inquiry. Although some economists have always made use of the technique (see Roth, 1993), historically, most relied on field research. In recent years, however, the pace of economic experimentation has greatly accelerated. 'From the early 1970s the number of papers has grown from two or three per year to numbers approximating 100 per year. The number of researchers has grown from a small handful in the early 1970s to hundreds' (Plott, 1991, p. 901). Economists use experiments, by themselves or in combination with field observation, to test existing theories, investigate puzzling phenomena - sometimes unguided by theory - and to evaluate policies, private or public. (See Roth, 1987b, p. 2; Roth, 1986).

Thus, when Elizabeth Hoffman and Matthew Spitzer first introduced the idea of experimental *law and* economics, they did so by reviewing a substantial portion of the extant experimental literature for its possible application to law (see Hoffman and Spitzer, 1985b); Hoffman, 1985). Today, however, the body of experimental economics is too vast for a short review, yet most of it remains relevant to law and economics. Several books provide useful introductions, including Roth (1987b), Thaler (1992), Davis and Holt (1993), Kagel and Roth

(1995a), and, as does a web site maintained by Roth.

This chapter reviews experimental law and economics in the following order. Section 2 discusses experimental methodology. Section 3 reviews six categories of experimental economics and briefly comments on their relevance to law. The remainder of the article reviews experiments that directly test propositions of law and economics. Section 4 describes the few law and economics experiments concerning individual decision making under conditions of no bargaining. Sections 5-6 discuss law and economics experiments relevant to the Coase Theorem. Sections 7-10 discuss law and economics experiments relevant to pre-trial bargaining and settlement. Section 11 concludes.

2. Experimental Methodology

The essence of a true experiment is random assignment: by randomly placing subjects in groups exposed to different experimental and control conditions, the researcher can control the effect of variables other than the ones he or she seeks to study (see Zeisel, 1973, p. 107). By focusing only on the variables a particular theory makes relevant, experiments have the potential for strong internal validity and provide the most favorable setting for testing a theory. If the theory fails to predict the relationship between variables in a pristine laboratory environment, there are strong grounds to reject it (see Plott, 1991, p. 905; Wilde, 1981, p. 143). Another methodological advantage to experiments is replication. Anomalous findings in the field may be dismissed as measurement error, but unexpected experimental findings often prompt others to repeat the experiment. Replicated 'anomalies' demonstrate the need for revising existing theory.

A constant methodological concern, however, is an experiment's 'parallelism' or 'external validity' - the degree to which the results may be generalized to populations and behavior outside the experiment (see Smith, 1982). The artificiality of the laboratory poses some inherent risk in this regard. Wilde (1981, p. 142) contends, however, that, properly constructed, the experiment creates 'a small-scale microeconomic environment in which real economic agents make real economic decisions'. In other words, in these experiments, the laboratory *contains* a market. 'Since the laboratory economies are real, the general principles and models that exist in the literature should be expected to apply with the same force to these laboratory economies as to those economies found in the field' (Plott, 1991, p. 905). Of course, some differences remain. Laboratory markets are often populated only by students. Moreover, the experimenter's presence and observation may affect these (or any) subjects differently than does the presence or observation of other actors in real world markets.

The idea of creating a market in the laboratory helps to distinguish experimental economics from a similar experimental literature in social and

cognitive psychology. Psychological experiments are often quite relevant to economic theory and some experiments in one discipline are inspired by experiments in the other (see Rabin, 1998; Thaler, 1991, 1992). But besides differences in the kind of questions each discipline finds interesting, there is a methodological difference. Psychologists tend to ask their subjects questions. Typically, the psychologist records the answers of subjects exposed to different experimental conditions but rewards them all the same (including sometimes not at all). (See Smith, 1989, pp. 162-167, 1991, pp. 878-887).

By contrast, economic experimenters employ conditions that create different incentives for behavior and then observe how subjects react. Typically, creating market incentives involves differential rewards of subjects, that is, letting the subjects know the size of the payment they receive depends on the outcome of decisions they make in the experiment. These two methods often produce different results as verbal behavior diverges from non-verbal (sometimes called 'actual') behavior. (See Smith, *ibid*). As Vernon Smith observes, the difference is itself interesting and researchers should address 'the gap between evidence concerning how people think about economic questions and evidence concerning how people behave in experimental markets' (Smith, 1989, p. 163). But a concern with actual behavior (so understood) continues to characterize economic experiments.

For further methodological discussion, see Roth (1988, 1994) and Thaler (1991, pp. 189-195).

3. Categories of Economics Experiments Relevant to Law

The experimental economics literature intersects law and economics at many points. Categorizing the literature is difficult because a series of experiments is typically relevant to a number of economic topics. Combining the comprehensive reviews in Davis and Holt (1993) and Kagel and Roth (1995), I observe six (somewhat overlapping) primary categories of experimental economics research relevant to legal research: (1) individual decision making; (2) collective action (public goods) and coordination problems; (3) bargaining; (4) auctions; (5) industrial organization; and (6) experimental asset markets (asymmetric information).

Individual Decision Making

In one sense, all economic experiments investigate how individuals make decisions, but most of the experiments have the individual interact with others in a market or bargaining situation. A narrower subset of experiments focus on individual choice in relative isolation, usually to study decision making under conditions of risk or uncertainty. These experiments reveal various failures in

expected utility theory, cognitive errors and biases. For reviews, see Camerer (1995), Davis and Holt (1993, pp. 435-504); Thaler and Tversky (1992).

The nature of individual decision making is obviously important to legal analysis. Consider two examples. First, Hoffman and Spitzer (1993), survey the extensive economic literature on the difference in willingness to pay and willingness to accept, finding the deviation relevant to the choice between property and liability rules (pp. 104-112). This subject is perhaps the topic of greatest overlap with psychological experiments. For examples, see Korobkin (1998) and Rachlinski and Jourden (1998).

Second, the quality of decision making under risk is relevant to virtually any area of law. Hasen (1990), for example, finds one area of this research - 'framing' effects - relevant to the rules governing products liability and contracts of adhesion. A separate issue is how differences in risk-preferences might affect legal analysis. Block and Gerety (1995) report an experiment showing that students are more risk averse than prisoners. Relative to one another, students were deterred more by increases in the severity of punishment, while prisoners were more sensitive to changes in the certainty. Brinig (1995a, 1995b) reports experimental data on the link between gender and risk aversion and considers how a gender gap in risk preference could be relevant to divorce law.

Collective Action (Public Goods) and Coordination Problems

Economic experiments test the predictions of game theory concerning public goods and coordination problems. The public goods experiments discover more cooperation and less free riding than game theory predicts; the experiments begin to identify the conditions that produce these results. For reviews, see Davis and Holt (1993, pp. 317-80); Ledyard (1995) and Roth (1995a, pp. 26-35). The coordination experiments study adaptive learning and the emergence of equilibria in games with multiple equilibria. For a review, see Ochs (1995).

These results matter greatly to law because state action is often justified by the need to subsidize public goods or to establish efficient equilibria. Conversely, antitrust law is concerned with the conditions under which firms will constrain free riding and cooperate on price and other matters. Similarly, McAdams (1995, pp. 1011-1017) relies on the public goods/collective action problem experiments in predicting the resiliency of cartel-like behavior by racial groups.

Bargaining

Bargaining experiments test how frequently individuals will reach agreement and how frequently the agreement will be efficient. For reviews, see Davis and Holt (1993, pp. 241-275) and Roth (1995b). This subject is the matter at issue in the Coase Theorem and of great relevance when choosing between liability and property rules. See Hoffman and Spitzer (1985, pp. 1009-1013). Bargaining experiments are also relevant to predicting settlement of litigation

and selecting default rules in contract.

Auctions.

Auction experiments isolate the conditions that facilitate and hinder competitive pricing. For reviews, see Davis and Holt (1993, pp. 125-172, 275-305) and Kagel (1995). Competitive pricing is an obvious concern of antitrust law. In addition, these experiments reveal 'incentive-compatible' means of measuring the demand for public goods - a matter relevant to efficient regulation and taxation (see Hoffman and Spitzer, 1985, pp. 1002-1009, 1015-1020). Auction experiments are also relevant to public contract law, by which the government seeks to structure competitive bidding to obtain competitive prices. See, for example, Ayres and Cramton (1996); Marshall, Meurer and Richard (1991).

Industrial Organization

Experiments in industrial organization reveal how different institutions and industrial structures facilitate competition or collusion, central issues for antitrust and consumer protection law. For reviews, see Davis and Holt (1993, pp. 173-240) and Holt (1995). Experimental markets also reveal the number of informed 'shoppers' and the level of warranty enforcement necessary to ensure competitive pricing, a subject of obvious import for consumer protection law, contracts and antitrust (see Hoffman and Spitzer, 1985b, pp. 1021-1023).

Experimental Asset Markets (Asymmetric Information)

Experimental asset markets test the predictions of the rational expectations model, including the effect that asymmetric information, suspensions in trade, limitations on price changes and method of compensating traders have on the formation of equilibria. For reviews, see Davis and Holt (1993, pp. 381-433) and Sunder (1995). These matters are of obvious concern to the regulation of securities.

4. Law and Economics Experiments: Individual Decision Making

Many law and economics scholars have begun to apply the data from economic (and other) experiments to the economic analysis of law. The applications grow increasingly common. For an illustrative example, see Jolls, Sunstein and Thaler (1998). Law and economics scholars have also contributed directly to this literature by conducting experiments themselves. Two series of law and economics experiments deserve extended attention, which begins in the next section: (1) experiments relating to the Coase Theorem, that is, that concern bargaining around legal entitlements; and (2) experiments relating to pre-trial

bargaining and settlement. These bargaining experiments merit review because they were designed to test theoretical propositions of law and economics and because they have reached a critical mass.

One other type of law and economics experiment deserves mention because it tests law and economics propositions but, unfortunately, has *not* reached a critical mass. Lewis Kornhauser's and Andrew Schotter's experiments study individual decision making (rather than bargaining) under different legal rules. In experiments modeling one-person accidents (see Kornhauser and Schotter, 1990), the subjects decided how much to spend to affect the probability of an accident. The subjects made this decision knowing that they would have to compensate for the harm of any accident according to either a negligence or strict liability standard. Kornhauser and Schotter found that the two standards unexpectedly produced different levels of care: strict liability initially produced overprecaution followed by underprecaution, while negligence produced a more optimal level of care. In Kornhauser and Schotter (1992) they modeled two-person accidents, where the care of both subjects affected the probability of an accident, but where subjects chose their care level without bargaining with the other. The results were largely consistent with predictions of tort theory, except that negligence with contributory negligence achieved greater efficiency than a simple negligence rule.

This type of experimental design is obviously important. According to economic theory, where transaction costs prevent bargaining, legal rules will affect individual behavior. Experiments can test whether, in these circumstances, particular legal rules have the predicted effect. Nonetheless, with the exception of Kornhauser and Schotter, law and economics experiments focus exclusively on bargaining behavior, as will the remainder of this article.

B. Experiments Relating to the Coase Theorem

5. When will Bargaining around Legal Entitlements Produce the Efficient Outcome?

5.1 Experiments Relating to the Coase Theorem: Introduction

A number of experiments purport to 'test' the Coase Theorem. Yet even stating the Coase Theorem is a matter of some controversy; there are various interpretations, a few of which seem unfalsifiable. For example, see Donohue (1989), Ellickson (1989) and Lindgren (1990). Thus, rather than discuss whether these experiments 'prove' or 'disprove' the Theorem, I will simply address how their findings relate to certain questions that are widely acknowledged to be important for legal analysis: When will parties bargain around legal entitlements? How often they will reach the efficient outcome by doing so? And given such bargaining, will the allocation of legal entitlements

affect the distribution of wealth? The experiments relating to the Coase Theorem begin to answer these questions by identifying (a) the conditions under which bargaining achieves an efficient outcome regardless of legal entitlement and (b) the conditions under which legal entitlements affect the distribution of wealth. Roth (1995b, pp. 292-293) notes that

most of the evidence [generated by economists] suggests that disagreements and costly delays are pervasive even when it is evident that there are gains to be had from agreement. ... [E]xperimental evidence suggests that disagreements are pervasive even in situations ... that eliminate the most obvious potential sources of incomplete information.

Forsythe, Kennan and Sopher (1991, p. 267), for example, review experiments resulting in a substantial range of inefficient outcomes. But most of this evidence arises from experiments where the bargaining is anonymous; researchers have often sought to exclude 'volatile' social influences in order to test certain baseline predictions of game theory see (Roth, 1995b, p. 303). For legal analysis, however, the bargaining of interest is usually face-to-face. We cannot assume that anonymous and public bargaining produce the same level of efficient agreement. Indeed, Radner and Schotter (1989) and Roth (1995b, pp. 296-298) find that face-to-face bargaining produces greater efficiency. Against this background, law and economics scholars have sought to determine how frequently parties will, through face-to-face bargaining, reach an efficient outcome, even when that outcome requires one party to 'sell' its legal entitlement.

5.2 Hoffman and Spitzer

In this regard, Elizabeth Hoffman and Matthew Spitzer have conducted a series of experiments that are perhaps the best known in law and economics. The series is based on a design introduced in the initial article (see Hoffman and Spitzer, 1982). First, two subjects (students) were designated as A or B and one of them was selected - by coin flip - to be the 'controller'. The controller was granted the power to select a number from a chart that indicated the number of dollars that A and B would then receive. For example, in one experimental condition, the payoff schedule was as follows (p. 86):

<u>Number</u>	<u>A's Payoff (\$)</u>	<u>B's Payoff (\$)</u>
0	0.00	12.00
1	4.00	10.00

<u>Number</u>	<u>A's Payoff (\$)</u>	<u>B's Payoff (\$)</u>
2	6.00	6.00
3	8.00	4.00
4	9.00	2.00
5	10.00	1.00
6	11.00	0.00

Note that, without the *possibility* of bargaining, the conventional prediction is that A would choose number 6 and B would choose number 0. But Hoffman and Spitzer explicitly provided for bargaining. Subjects A and B were placed in a room together, each was given the entire payoff schedule, and the instructions informed them that the non-controller 'may attempt to influence the controller to reach a mutually acceptable joint decision' and 'may offer to pay part of all of his or her earnings to the controller' (p. 83). In addition, Hoffman and Spitzer provided in the instructions an 'agreement form' and indicated that, if the parties used the form to reallocate part of one party's payoff to the other party, the experimenters would pay the subjects according to their agreement (p. 84). With the possibility of bargaining, the prediction is that, regardless of who the controller is, A and B will agree to choose and split the largest joint payoff, number 1.

In this experimental condition, Hoffman and Spitzer (1982, p. 92) found that nearly all (23 of 24) of the pairs did bargain to the point of their highest joint return. They did not actually demonstrate that the bargaining *produced* these optimal outcomes because they did not include a control in which bargaining was not permitted. Harrison and McKee (1985), however, provide exactly such a test using a very similar design except without permitting side payments. In none of twelve such decisions did the parties choose the joint profit maximum (p. 664). By contrast, and confirming Hoffman and Spitzer, Harrison and McKee (p. 664) found that when side payments were permitted, the overwhelming majority of pairs agreed on the optimal outcome. With a controller rule like Hoffman and Spitzer's, 88 percent (15 of 17) reached that outcome; with a joint controller rule where the parties risked a poor outcome if they failed to agree, they reached the optimal result in 97 percent of the decisions (33 of 34). Thus, there is experimental support for the proposition that, under certain conditions, face-to-face bargaining can induce nearly all parties to reach an optimal outcome they would otherwise not achieve.

Hoffman and Spitzer's (1982) initial experiment contained several other conditions, each of which presented a less favorable or at least different setting for bargaining. Their subsequent experiments also introduced new features designed to make bargaining more difficult. In most cases, the parties still bargained to the optimal joint outcome.

For example, in one condition of the initial experiment, they provided each party with incomplete information: subjects were shown the schedule for their own payoffs only, though they were allowed to share information during bargaining. Hoffman and Spitzer (1982, p. 92) found that nearly all (19 of 20) of the pairs still bargained to reach their highest joint return. In addition, over 90 percent (27 of 29) of 3-person groups with full information reached the jointly optimal outcome. With limited information, 3-person groups with one controller almost always (19 or 21) agreed to the jointly optimal outcome. But limited information did impede such agreements when Hoffman and Spitzer created a more complex 3-person arrangement with limited information and *two* 'joint controllers' - in which the lowest number selected by either controller would dictate the monetary payoffs. These groups agreed on the optimal outcome in only 60 percent of the cases (9 of 15).

In a later experiment, Hoffman and Spitzer (1985a) manipulated the mechanism of determining which subject was the 'controller'. They used a simple coin flip (the original means) and a game in which the winner was controller, each with and without a statement that the winner had thereby 'earned' the right to be controller. The subjects still made the optimal agreement over 90 percent of the time (p. 275). Hoffman and Spitzer (1986) used the basic design for groups of three, four, ten, and twenty, with full or limited information and single or joint controllers, making single or sequential decisions. The prior result held: of 445 experimental decisions, '93 percent . . . chose the profit-maximizing outcome; 98 percent of the ten- and twenty-subject decisions chose it. Efficiency [was] somewhat lower (91 percent) with limited than with full information (94 percent), but -critically - it is at least 90 percent for all but a few experimental treatments' (p. 156). Hoffman and Spitzer concluded that their data justifies a presumption in favor of the Coase Theorem - by which they mean that parties will bargain around legal entitlements to reach efficient outcomes - in 'a substantial class of disputes' such as neighborhood nuisances involving dog kennels or funeral parlors (p. 162).

5.3 Other Experiments on Coasean Bargaining and Efficiency

Coursey, Hoffman and Spitzer (1987) introduced a new complication by having the subjects bargain over more than monetary payments. To introduce an item that could affect the 'dignity' of a subject, they made part of the 'payoff' that subject A, but not B, might have to hold in his or her mouth for 20 seconds an ounce of a 'very bitter-tasting and unpleasant substance,' sucrose octa-acetate

(SOA) (p. 223). The payoff sheet provided (p. 248):

<u>Number</u>	<u>A's Payoff (\$)</u>	<u>A Tastes?</u>	<u>B's Payoff (\$)</u>
1	10	No	0
2	10	Yes	20

Coursey, et al. (1987) believed that number 2 was the joint-profit-maximizing outcome (p. 225) because a separate bidding experiment had shown that the average value placed on avoiding the required taste of SOA was \$4. Even if this result were rejected in favor of survey data, the absolute maximum value for avoiding the taste is \$15 (p. 223). Coursey, et al. (1987) described the taste of SOA to all subjects but manipulated information according to who was allowed to sample the SOA prior to bargaining: A and B, A only, B only, or neither. In the end, none of the variations affected the success of bargaining to reach the optimal outcome: when B was the controller, he or she selected number 2 in every case (22 of 22); when A was the controller, he or she selected number 2 almost 90 percent of the time (16 of 18) (1987) (p. 227). Thus, Coursey, et al. (1987), conclude that even when parties in the real world face physically unpleasant externalities like loud noises or foul odors, their data suggests that parties are very likely to bargain to the optimal result regardless of legal entitlements.

Schwab (1988) obtained somewhat contrary results using a very different experimental design. Schwab created a bargaining scenario for students in a labor law course and an industrial and labor relations course. Subjects were not paid but their performance was a factor in their grade. Schwab provided the subjects with a preference sheet allocating points for bargaining outcomes along four dimensions: hourly wage, number of vacation days, noise reduction, and the right of the firm to transfer work to its nonunion plant during the contract term (the 'relocation clause'). Subjects were only told their own preferences; they were permitted to reveal their preferences orally but forbidden from disclosing their preference sheet. The point allocations for each side left room for substantial cooperative gains.

Schwab distinguishes two issues I have been discussing together: whether the contracts achieved all possible cooperative gains and whether a legal entitlement affected the amount of cooperative gains achieved. As to the first, he rejects what he terms the 'strong efficiency hypothesis' because only '20 percent of the contracts were fully efficient' (p. 251). Of 108 contracts, all included the efficient noise reduction clause and all but three contracts included a wage that fell within the cooperative range (p. 251 n.38). But only 31 percent (33) required a sufficient number of vacation days to exhaust the potential

cooperative gain and only 65 percent (70) included the efficient relocation clause. Nonetheless, Schwab confirms what he terms the 'weak efficiency hypothesis'. For the relocation term, Schwab had created varying contract presumptions, specifying that, unless otherwise agreed, the company either could or could not relocate. Regardless of condition, there was no statistically significant difference in the number of contracts requiring the company to stay or in the number of contracts reaching the optimal result for this issue, which varied across contracts within each condition (p. 252). Thus, the parties achieved roughly the same less-than-perfect level of efficiency regardless of how the legal entitlement was allocated.

Because there are many differences between Schwab's experiment and the Hoffman and Spitzer design, it is not possible, without additional work, to specify which conditions produced the different rates of efficient contracts. Perhaps Schwab's results apply to complex bargaining over a set of issues while the earlier experiments are valid for bargaining over an single issue. Or, possibly, Schwab failed to induce the subjects to put forth enough effort because he did not pay them for their efforts. Perhaps, however, the Hoffman and Spitzer design is flawed because it remains abstracted from actual legal entitlements: (i) the 'controller' subjects are never told that the *law* gives them the right to select the control number, and (ii) the non-controller subject is never told that he or she suffers from an externality *caused* (in part) by the controller. If these omissions are important, Schwab's experiment may have elicited typical emotional reactions that impede bargaining, while Hoffman and Spitzer's design did not. To use one of Hoffman and Spitzer's examples, it would be interesting to employ their design, but to inform the subjects that, for purposes of the experiment, they should assume that one of them owns a noisy, smelly dog kennel and the other owns a nearby residence, and that the law entitles one of them to select unilaterally the level of kennel operations.

Admittedly, Hoffman and Spitzer found similar results (concerning efficiency) when subjects were told one of them 'earned' the right to be controller by defeating the other subject in a simple game. But perhaps parties bargain differently if they are told - as Schwab's subjects were - that the source of their entitlements is legal. Hoffman and Spitzer also used SOA to test whether subjects would bargain over matters affecting their dignity. But the abstract experimental design does not make it appear that one subject (rather than the experimenter) is *causing* or threatening to cause the other to taste SOA. Providing a real world factual scenario - where a kennel owner causes the neighbor to smell something unpleasant - might invoke a different or stronger set of emotions and impede bargaining.

Of course, Schwab's results confirm Hoffman and Spitzer on the claim that legal entitlements will not affect the degree to which people bargain to the efficient result. But the experiments do not yet justify Hoffman and Spitzer's

claim for a factual presumption that parties will bargain around legal entitlements. What their experiments appear to demonstrate is that, if potential bargainers are (i) enticed by money or grades to meet together in a room and (ii) invited to bargain, then the initial assignment of entitlements will not affect the percentage of efficient agreements they create. Hoffman and Spitzer generalize from this data to predict how people in the real world will react to externalities. Yet many individuals may never consider offering to sell or buy a legal entitlement that is not explicitly a market good. The neighbor of the dog kennel may not - without the kind of prompting provided in the experiment - consider offering the kennel owner money to limit the noise or smell of his operations. In addition, when individuals are interested in bargaining - and especially when large groups are involved - a crucial barrier may be the cost of gathering the parties together at a single place and time. Indeed, one strategy of hard bargaining is to pretend to be uninterested in even meeting with the other side. However compelling the experiments are for demonstrating what happens after parties meet for the purpose of bargaining, they do not provide evidence that parties in the real world will get that far.

In sum, even though this area is one of the richest for experimental work, these experiments only begin to identify the conditions under which face-to-face bargaining will achieve an efficient outcome.

6. When will Legal Entitlements Affect Wealth Distribution?

6.1 Coasean Bargaining and the Distribution of Wealth

If individuals will bargain around legal entitlements, the law may not affect allocative efficiency. But law may still affect the distribution if legal entitlements work to enrich those who can sell them. On this score, the first Hoffman and Spitzer study found a surprising result. Hoffman and Spitzer (1982, pp. 92-95) found that significant numbers of controllers 'shared' the maximum payoff equally or nearly equally. The standard prediction would be that a controller would demand at least his individual maxima - what he could get without cooperation. But more controllers evenly split the payoff than received at least their individual maxima. Over half of the 114 bargains resulted in a division within one dollar of an even split. Thus, subjects did not exploit the potential monetary gain from being the controller. This finding suggests that the entitlement affects wealth less than is expected.

Subsequent experiments retested this result. Hoffman and Spitzer (1985a) proposed that the arbitrary means of selecting the controller - a coin flip - caused many subjects to believe that the 'fair' distribution was an even split. Thus, they reran the experiment using four different means of selecting a controller: (1) Some subjects played a game and the winner was controller;

researchers told the subjects the winner had 'earned' that right. (2) Some controllers were selected by a coin flip and told that the winner 'earned' the right. The remaining controllers were selected by winning (3) the game or (4) a coin flip, but with no statement. In the latter two conditions, with no 'moral authority' statement, 61 percent of the bargains resulted in nearly even splits (p. 275). Conversely, in the first condition, with the game plus 'moral authority,' only 32 percent were nearly even splits. The second condition fell in between: 50 percent nearly even splits (p. 277). Further analysis revealed that the 'moral authority' statement significantly affected the allocation; the method of selection was also weakly significant (p. 280).

Hoffman and Spitzer speculate about the significance of these interesting findings. But they do not acknowledge the potential limitation the results have for the design of their experiment: fairness might be a restraint on bargaining. If individuals react strongly to the perceived fairness of the situation - if they are willing to sacrifice money in order to achieve a fair outcome - then they might refuse to consent to a bargain that produced an unfair result, even if it constituted the joint maximum payoff. Perhaps an individual would think it 'unfair' for a polluter to benefit by being paid to refrain from exercising its legal entitlement to pollute. As stated above, one cannot confidently predict that parties will bargain around legal entitlements in the real world unless the experiment has attempted to elicit all the responses - including, potentially, fairness concerns - that might inhibit bargaining. Yet the Hoffman and Spitzer design, though it elicits such fairness concerns in the distribution of the payoff, seems too abstract to test fairness as a constraint on bargaining. For a more general discussion of fairness in experiments, see Roth (1995b, pp. 270-274, 279-281).

Perhaps the concern is overstated. In the similar experiment by Harrison and McKee (1985), researchers used a coin flip to select the controller, but their experiment provided different explanations for the payoff sharing in these experiments. First, they found that altruistic payoff divisions declined as the stakes increased (p. 662). Increasing the available surplus from \$1 to \$2 decreased such divisions from 60 percent (9 of 15) to 11 percent (1 of 9). Second, 'learning' decreased altruistic payoff divisions (p. 665). Harrison and McKee created a condition involving 'joint property rights', where both parties must agree to the number or they receive either a random payoff or a payoff of zero. When subjects 'trained' under this condition were then given the power of a unilateral controller, they received at least their individual maxima payoff in 76.5 percent (13 of 17) of the bargains.

With these manipulations, the legal entitlements *did* affect the distribution of wealth, almost as much as theory predicts. But there is one situation where economic theory does not expect an entitlement to affect distribution: where it merely states a presumption. Nonetheless, Schwab (1988) found that a waivable

contractual presumption did affect distribution. In his collective bargaining experiment, Schwab specified in one condition that, unless otherwise agreed, the company could relocate; in the other condition, the presumption was against relocation. The subjects often bargained around this presumption when it was efficient to do so. But union negotiators obtained significantly better overall contracts when the presumption favored them, while management did significantly worse. '[B]argainers ... acted as if they must purchase the right when the legal presumption favored the other party and thus were in a weaker bargaining position' (p. 255).

In sum, the experimental results are difficult to explain. Though legal entitlements can be made to affect distribution in the anticipated direction, there remain some instances where they have far less effect than expected. And a mere contractual presumption unexpectedly appears to affect the distribution of wealth.

C. Experiments Relating to Pre-Trial Bargaining and Settlement

7. Pre-Trial Bargaining and Settlement: Introduction

Law and economics scholars have also used experiments to investigate pre-trial bargaining and settlement. Along with empirical studies of litigation, the accumulated evidence is beginning to have some effect on the theoretical models describing the decision to proceed to trial. Settlement models are also affected by psychology experiments on the subject. For example, see Korobkin and Guthrie (1997).

As a preliminary matter, note that the Coase Theorem experiments reviewed above (and bargaining experiments generally) are relevant to the settlement of litigation. Both involve bargaining with potential cooperative surplus. The Hoffman and Spitzer design is sufficiently abstract to encompass litigation settlement, if one imagines the controller - whether A or B - as a plaintiff who can, by going to trial, obtain a judgment equal to the maximum payoff available to him or her on the payoff schedule. The joint maximum represents the settlement alternative, larger than any non-cooperative outcome because it avoids the costs of trial. If so, the results are encouraging because litigation is a context in which parties, or their agents, usually contemplate a bargaining solution. Nonetheless, the limitations of the Coase Theorem experiments are significant, most notably because they do not model the risks involved in the outcome of litigation.

8. Coursey and Stanley

Settlement experiments focus on bargaining under conditions of risk. Don Coursey and Linda Stanley tested economic predictions about settlements rates under different rules for assessing litigation costs: (1) the American rule, where each party bears its own costs; (2) the British rule, where the loser pays both sides' costs; and (3) a modified version of Rule 68 of the Federal Rules of Civil Procedure where a plaintiff pays both sides' costs if he or she does no better at trial than the defendant's final settlement offer and otherwise each side pays his or her own costs (see Coursey and Stanley, 1988). Coursey and Stanley had pairs of subjects (students) anonymously bargain to divide 100 tokens, each to be redeemed at the end of the experiment. Absent agreement, a random draw provided a number representing the trial outcome according to a probability distribution the subjects were given. Trial costs were represented by 40 tokens which were taken from one or both subjects according to one of the three cost rules being tested. Coursey and Stanley found that the modified Rule 68 and the British rule produced more settlements than the American Rule. In addition, settlements under the modified Rule 68 were more favorable to the defendant than settlements under the American Rule, while the British rule settlements favored the defendant more than the American rule only when the probability of plaintiff success was less than 50 percent (pp. 174-175).

In a subsequent experiment using a similar design, Stanley and Coursey (1990) tested certain implications of the 'Priest-Klein hypothesis'. George Priest and Benjamin Klein attempt to explain why litigants sometimes fail to settle even though proceeding to trial imposes significant costs on each (given the American rule) (see Priest and Klein, 1984; Priest, 1985). They propose that each side, using imperfect information, estimates the value of the case with error. When the plaintiff overestimates and/or the defendant underestimates the trial result, there is no settlement range and the parties proceed to trial. If so, as parties gain more information about the suit, their error range should decline, and so should the probability of trial. Stanley and Coursey (1990) confirmed this result. They had the color of a chip randomly drawn from an urn determine the 'trial outcome'. When they permitted the subjects to sample larger numbers of chips from that urn, to determine more accurately the likely trial outcome, the settlement rate increased. The Priest-Klein model also implies that the settlement rate would increase as the cost of trial increased, thereby creating greater benefits to avoiding trial. Yet Stanley and Coursey failed to find support for this prediction.

9. Loewenstein and Babcock

Another study provides a possible explanation for this latter finding. Loewenstein et al. (1993) created a highly realistic settlement scenario. They provided subjects (all students) with 27 pages of testimony from an actual accident case. They assigned pairs to the roles of plaintiff and defendant and provided a half-hour for them to bargain over a settlement. Besides the fixed fee paid to each subject, the experimenters provided the defendant \$10 and explained that defendant would have to pay \$1 of that amount for every \$10,000 the plaintiff was awarded in settlement or by trial. The subjects were told the trial award was based on the valuation provided for the experiment by a judge; they were not told the amount, which was \$30,560. If the parties failed to reach agreement, the plaintiff was awarded this amount; the parties also had to pay litigation costs, which were specified in advance but varied across subjects. Before negotiations began, however, the subjects wrote down their estimate of what the judge would award and what would be 'fair'. They were informed that these estimates would not be shown to the other side.

Loewenstein et al., confirm the unexpected finding of Stanley and Coursey: differing levels and distributions of litigation costs did not significantly affect the frequency of settlement (pp. 149-150; 152). The focus of Loewenstein et al., however, was the relevance of two other factors to settlement. (1) Psychology evidence suggests that an 'egocentric' or self-serving bias causes individuals to interpret facts in ways that further their interests or self-image. (2) Economic evidence suggests that individuals are motivated, in part, by a concern for fairness. The first point suggests that the estimation errors regarding the outcome of a trial are *not* - as the Priest-Klein model suggests - random, but that each side tends to overestimate its chances of prevailing. The second point suggests that parties will be less influenced by factors not relevant to assessing fairness. Finally, given bias, a party is likely to view as 'fair' an outcome relatively favorable to his or her interests.

The results confirm the importance of these factors. First, even though the parties had (and knew they had) identical information about the suit, Loewenstein et al., found that their estimates for the case were significantly different: 'Plaintiffs' predictions of the judge's award, on average, were \$14,527 higher than defendants'. Mean plaintiffs' fair-settlement values were \$17,709 higher than defendants'' (p. 150). These differences disconfirm the Priest-Klein assumption that errors are randomly distributed. Second, the difference in fairness assessments were slightly better predictors of settlement than the difference in the predictions of the judge's award (pp. 152-153). This finding supports the importance of perceived fairness to settlement and may explain why litigation costs were surprisingly unimportant: because individuals based their assessments of fairness only on the merits of the case (p. 154).

A similar study by the same authors, Babcock et al. (1995), provides striking confirmation of the effect of egocentric bias on settlement. The researchers had the subjects (graduate students in business, law and public policy) bargain over settlement as above, but manipulated the order in which subjects read the case material and received their assigned role. When the roles of plaintiff and defendant were assigned after the subjects read the case materials, they settled 94 percent of the time. When the roles were assigned *before* the subjects read the materials, the settlement rate fell to 72 percent, a highly significant difference (p. 1339). The parties differed in their assessments of the fair settlement and their predictions of the judge's award, only when they were assigned their roles before reading the case material (p. 1340). Thus, parties appear to interpret information egoistically when they have a stake in the subject matter of the information at the time they receive it. The mutual bias decreases settlement. The authors suggest, contrary to most analyses, that increasing the information each side has about the dispute may therefore *decrease* the probability of settlement (p. 1342).

More generally, the importance of these studies is to suggest that simpler experiments, like that of Coursey and Stanley (1988), may fail to capture some important dynamics of settlement by abstracting away from the complexities of a lawsuit. The simple bargaining game Coursey and Stanley use is, in their words, 'devoid of any similarities to real world legal processes' (p. 167). Yet a fair test of the egocentric bias hypothesis may require a realistically complex set of facts to permit different parties to reach different conclusions about the expected outcome. And a fair test of the fairness hypothesis may require a set of facts that, for many subjects, raise fairness concerns. Of course, complexity imposes costs of its own. The point is not that we cannot learn further from simple experiments testing how very narrow factors affect settlement, but that we cannot fully generalize the results of such experiments until after the findings are confirmed in more realistic settings.

10. Other Experiments on Pre-Trial Bargaining and Settlement

More recent studies continue to use very simple bargaining games to study pre-trial negotiation and settlement. Thomas (1995) created a settlement game with monetary payoffs. He gave the subjects (students) an estimate of the expected outcome of trial along with a range of error uniformly distributed around the estimate. He found support for the Priest-Klein claim that 'disputes close to the decision standard' - meaning where the defendant's conduct is just above or below the level at which liability is imposed - 'go to trial at a higher rate than do other disputes'. He could not confirm a second claim, however, that the 'improvements in the ability of parties to evaluate information increase

the settlement rate', though the coefficient for error had the expected sign (p. 219).

Croson and Mnookin (1997) conducted an experiment to test the claim of Gilson and Mnookin (1994) that parties to a lawsuit can achieve gains by employing lawyers as agents. The claim is that lawyers develop reputations for conducting litigation either in a highly contentious and costly manner - as 'gladiators' - or a cooperative mode - as 'cooperators'. If parties who do not trust each other choose cooperative agents, they may lower the joint costs of conducting the litigation. To test the idea, Croson and Mnookin ran modified prisoners' dilemma games in which subjects (law students) chose one or the other type of lawyer (or a third type without a reputation) to represent them for 10 rounds. In the 'litigation game', the dominant strategy was to select a gladiator, which most subjects did. But in the 'prelitigation game', a subject could change his or her lawyer if, but only if, he or she had selected a cooperator for the prior round but the opponent had selected a gladiator. For this game, there are two Nash equilibria - two cooperators or two defectors. The result was that 76 percent of subjects employed cooperators in the prelitigation game as opposed to 17.5 percent in the litigation game (p. 341). Generalizing the result is difficult, however, since litigants in the real world are able to switch *from*, as well as to, gladiators.

In sum, the experiments on litigation settlement are not yet sufficiently plentiful to allow strong generalizations. As with experiments on Coasean bargaining, there is some indication - not yet proved or disproved - that the process of negotiation may be affected by the factual nature of what is being negotiated.

D. Conclusion

Experimentation is still relatively new to economics and even more novel for law and economics. Kagel and Roth (1995) and Davis and Holt (1993) comprehensively review the experimental economics literature, virtually all of which is relevant to law. Two series of bargaining experiments directly test claims of law and economics theory: experiments related to the Coase theorem and to pre-trial settlement. Both are still fairly undeveloped, leaving open a great need for further work merely to resolve the different results of existing experiments. Such work could be very fruitful as experimentation remains a powerful tool for testing and refining theory.

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