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JUDICIAL ORGANIZATION AND ADMINISTRATION

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Abstract

This chapter surveys the economic literature on the functions and structure of courts. Issues concerning appellate courts and collegiality are addressed in a companion chapter.

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1. Introduction

Economic analyses of substantive legal rules generally suppress the adjudication of factual and legal disputes that a legal rule might engender. The nature of adjudication, however, will influence greatly both the content of the substantive law and the costs of dispute resolution. An understanding of the structure of adjudication is thus central to an understanding of the effects of legal rules on behavior and on the identification of socially desirable legal rules. In addition, adjudication is a complex task implemented through institutions that vary across time and jurisdiction. The structure of adjudication and questions of judicial organization and administration thus present a rich field of study in their own right.

These two approaches to the study of judicial organization raise different, though equally interesting, questions. As yet, no unitary theory has developed to explain the structure of adjudication. The initial economic analyses of these institutions have raised several important questions: (1) What are the functions of adjudication? (2) Why is adjudication public rather than private? (3) Should there be only one system of courts or should there be many? (4) What is the relation among courts, legislature and executive? (5) How do we explain the organizational features of courts such as their jurisdiction and their hierarchical relation?

The questions presented by judicial organization and administration are contiguous with those presented by appeal and supreme courts. I adopt a somewhat arbitrary division of topics and relegate discussions of the reasons for appeal, explanations of hierarchy and collegiality to Chapter 7200 Appeal and Supreme Courts.

2. The Functions of Courts

2.1 *What Do Courts Do?*

Adjudication resolves disputes. Dispute resolution itself consists of at least four different tasks. First, courts must determine the facts of the dispute. Second, they apply the law to those facts. Third, the court may, in some instances, enforce its judgment against one of the parties. Finally, in some instances, the court may have to compel one or more of the parties to submit to the jurisdiction of the court.

In some legal systems, the judicial function is limited to these four tasks; in others, courts also make law. In civil law theory, for example, courts simply apply the law announced by legislatures to resolve disputes. Legal theorists in common law countries, by contrast, resolve disputes through the application of law but also promulgate new legal rules; courts thus play a lawmaking function as well.

This difference between civil and common law perceptions of adjudication, as well as various structural differences between the two systems, presents a challenge to economic analysts which has yet to be answered.

2.2 *Public vs. Private Adjudication*

Adjudication is commonly considered a quintessential function of government. In recent years, however, there has been a substantial privatization of at least some of these functions through a growing use of arbitration and other 'private judges'. This phenomenon has prompted scholars to study the extent to which government must supply judicial functions. Landes and Posner (1979) provide one of the earliest inquiries into the choice between private and public provision of adjudicatory services. Working within a common law framework, they identify the judicial functions as both dispute resolution and rule generation. They argue that only the dispute resolution function is suitable for (partial) privatization. Some public provision of dispute resolution might be necessary because (1) enforcement of judgments might require public authority and (2) in some instances, public authority may be necessary to compel one or more parties to submit the dispute to adjudication in the first place. A private market in adjudicatory services, however, would meet all other requirements of a dispute resolution system. They argue that a competitive market would produce competent and impartial judges because both qualities would be necessary to induce all parties to a dispute to consent to adjudication of their dispute by a given judge. Cooter (1983) offers a similar argument.

Landes and Posner, however, argue that private provision of rules will not, in general, be desirable. Rule generation is a public good and a private judge who announces a rule will not capture all the benefits that the announcement of a rule creates. Therefore, in a system of private adjudication, rules will be

undersupplied. In addition, competing judges may generate competing sets of rules. They do not, however, explain why rules cannot be adequately supplied by legislatures.

Shavell (1995) considers the choice of private dispute resolution in the context of an established public system of courts. He addresses two questions: why would parties resort to private dispute resolution? and when is it socially desirable? He distinguishes *ex ante* invocation of private dispute resolution, in which the parties agree prior to the emergence of a dispute to resort to private resolution of their dispute, from *ex post* invocation of it, in which the resort to these private methods occurs after the dispute arises. He argues that *ex ante* invocation is socially desirable for three reasons: (1) it may lower the costs and risks of dispute resolution; (2) it may create better incentives to perform because of the greater accuracy of private resolution; and (3) it may reduce the number of litigated disputes. He argues that *ex post* invocation of private dispute resolution is not desirable.

3. The General Organization of Courts

3.1 Judicial Motivation

Economic models of judicial behavior and of court organization require an assumption concerning the motivations of judges. This requirement presents the central challenge to the economic analysis of courts. Several approaches have been adopted, most of which are surveyed here. A supplementary discussion that emphasizes a distinction between 'team' and 'political' models of judges appears in Chapter 7200 on Appeal and Supreme Courts.

The literature has focused primarily on adjudication in common law jurisdictions. This focus has implied that lawmaking is the judicial function that has received the most motivational attention. In this context, the literature has advanced three different types of answers to the question of judicial motivation. First, one can assume that judges meet their obligations as articulated in some jurisprudential theory of adjudication. Put differently, judges 'follow the law'. Team models, discussed in Section 2 of Chapter 7200 Appeals and Supreme Courts attempt to ground this adherence to norms in a more economic framework. Second, one can assume that judges seek to implement their own policy preferences subject to constraints such as review by other judges or by legislatures. This political model is discussed at greater length in Section 3 of Chapter 7200. Third, one may assume that, as in political models, judges act self-interestedly but define self-interest differently. The literature surveyed here has largely attempted to infer judicial motivation from the structure of incentives within which the judge works.

Aranson (1990) surveys the political science literature that applies the spatial theory of voting to courts and compares it to law and economics approaches to judicial motivation. He suggests three competing views of judicial motivation. The first, that it is rule governed, parallels the first strand mentioned above and discussed at greater length in Section 2 of Chapter 7200. The second, that judicial motivation is rent redistributing, and the third, that it is wealth maximizing, describe systemic tendencies rather than the motivation of particular judges. One might understand 'rent redistribution' consistently with the political model discussed in Section 3 of Chapter 7200. Wealth maximization, by contrast, assumes that Posner's claim that the common law maximizes wealth can be explained in terms of judicial success in pursuit of their common aim.

Posner (1973) sketched an approach to the problem of identification of the preferences of judges. He assumed that judges were self-interested and then briefly examined different incentive structures from which he inferred the underlying preferences of the judges. In particular he compared the structure in many states in which judges lack life tenure and aspire to higher political office to the structure of the federal courts in the United States in which the judges have life tenure. These themes were developed in the subsequent literature.

Landes and Posner (1980) argue that utility maximizing judges will primarily seek to maximize their power because their performance is too weakly linked to income and promotion for those concerns to have much effect on judicial behavior. They then adopt the number of times a judge is cited in other cases as a measure of his power. They then argue that judges with higher salaries and more secure tenure will have greater power (and hence be cited more often) because higher salaries both attract more competent judges and reduce the judge's incentives to distort his decisions and because longer tenure reduces turnover and the influence of politics. They then provide an ingenious test of their hypotheses. They create two samples of common law appellate opinions rendered in 1950. First they looked at all 246 tort, contract and property cases decided by the federal appellate courts under their diversity jurisdiction. Second they drew a random sample of 241 tort, property or contract cases decided by state supreme courts in 1950. The number of cases drawn from a specific state matched the proportion of federal cases decided under the law of that state. They then compared the citation rates of state and federal decisions in the two systems. They found only weak support for their hypothesis concerning higher salary and more secure tenure. Federal decisions were more likely to be cited in the state supreme courts of 'other' states (that is, states other than the one of which the federal court applied the law) than the decisions of state courts.

Cooter (1983) adopted a procedure similar to that of Landes and Posner (1979). He developed a theory of behavior of private judges and used that as a benchmark from which to infer the preferences of public judges. He argued that both public and private judges would care about their reputations among other

judges and the bar.

Higgins and Rubin (1980) addressed the concern for promotion somewhat more directly. They argued that judges have preferences over policy 'discretion' and wealth; these preferences are conditional on their age. They argue that a judge's ability to satisfy her preferences are constrained in two ways. First, the reversal rate depends on the judge's policy preferences and the policy preferences of the higher court. Second, wealth depends on the reversal rate (because that affects each judge's prospect of promotion) and age. They then derive a test for the relative effects of discretion and wealth.

They study two samples. The first sample consists of those active district court judges in the eighth federal circuit in 1974 who permitted the release of data on the total number of cases they decided in 1973 and 1974. The second sample consisted of all active district court judges in the fifth federal circuit in 1966. They found that neither age nor seniority explained the reversal rates of the eighth circuit judges. They did find however that the estimated parameter on reversal rate had the predicted sign and was significant at the 10 percent level in a logit estimation of the probability of being promoted.

Greenberg and Haley (1986) argue, contrary to the conventional wisdom in general and to Posner (1985) in particular, that low judicial salaries are socially desirable because they signal a greater willingness to accept the non-pecuniary benefits of the judiciary; moreover, they argue that individuals who derive greater non-pecuniary benefits from judging make better judges.

Elder (1987) identifies two distinct mechanisms for monitoring judges: political and administrative mechanisms. These mechanisms create different incentives so that one should observe different behaviors in systems with different monitoring mechanisms. Without specifying the judicial objective function precisely, he nevertheless argues that judges deciding criminal cases will produce more trial verdicts under political monitoring than they would under administrative monitoring. He then tests this claim on 1977 data drawn from state criminal courts in 247 districts in seven states. His parameter estimates are consistent with his hypothesis.

Cohen (1992) followed up Elder's approach. He argued that Elder implicitly assumed that each judge sought to maximize his preferences defined in terms of minimizing his workload and his reversal rate. He argues that these preferences also imply that, when the penalty range increases, a judge will increase the penalty of those defendants who request a trial more than they increase the penalty of those who plead guilty. He also argues that judges will be concerned about promotion and that this too will influence the pattern of sentencing. He then considers a sample that consists of all federal antitrust indictments from 1955 through 1980. In 1974, Congress increased the maximum penalties for antitrust violations from \$50,000 to \$100,000. He finds that promotion concerns are explanatory with respect to fines but not with respect to incarceration.

Cohen (1991) exploited the data generated by a 'natural experiment' presented by the adoption of new sentencing guidelines by the United States federal courts. He examined 196 decisions by federal district courts that considered the constitutionality of the guidelines. He estimated a probit model of the probability of upholding the guidelines as a function of judicial ideology, caseload, promotion potential and the number of prior decisions for constitutionality. Promotion potential was measured by an index that reflected the (per district court judge) number of open seats on the appellate circuit. He found that the parameters on workload and promotion potential had the predicted sign and were highly significant.

Katz (1988) adopts a behavioral approach. He assumes that judges decide cases on the basis of the arguments presented to it. Each party offers arguments in its favor and the court decides in favor of the plaintiff if the plaintiff's arguments, in light of the 'underlying' (or, perhaps, *ex ante*) merits of the case, outweigh the defendant's arguments and some random error. He then shows that, when cases are more evenly balanced *ex ante*, expenditures of each party on litigation rise; and, if judicial decision is more random or variable, each party's expenditures fall.

3.2 Independence of the Judiciary

Economic analysts have devoted much attention to explanations for, and implications of, 'independent' judiciaries. An independent judiciary is one that is free from external influence, primarily, political influence. This conception of independence is somewhat at odds with the ascription of a political motivation to judges themselves because independence is generally seen as guaranteeing a more 'objective' resolution of disputes. Though the literature has not attended much to this specific problem, there are suggestions that a more general model of constitutional structure might justify an independent branch of politically motivated judges.

Most industrialized countries assert the independence of their judiciaries but the structures that guarantee independence differ greatly. In the federal system in the United States, for example, judges have life tenure and their (nominal) salaries cannot be decreased during their lifetime. In many states of the United States, however, judges serve for a term of years; moreover, in many states, they may be elected in either partisan or non-partisan elections. In both the state and federal systems, as in common law jurisdictions generally, judges are, however, drawn from the general bar. In many civil law countries by contrast, law graduates choose to enter practice or the judiciary at the outset of their career; a judicial bureaucracy then creates incentives for that judge. The insulation of that bureaucracy from 'normal' politics then determines the extent of judicial independence. This institutional variation across jurisdictions permits a comparative study of judicial independence. As a consequence, studies of

independence, unlike studies in other areas of judicial organization, have been primarily comparative in nature.

Landes and Posner (1975) offered the earliest discussion of independence. Their argument rests on the claim that an independent judiciary will, in statutory interpretation, enforce the original legislative understanding. Individual legislatures accede to this practice because they want to increase the time a statute prevails. Landes and Posner then claim that the degree of independence should increase with the size of the jurisdiction because larger jurisdictions provide broader scope for rent-seeking. They then attempt to test their theory on data concerning 97 statutes declared unconstitutional by the United States Supreme Court between 1789 and 1972.

Ramseyer (1994) extends the analysis of Landes and Posner (1975) by drawing on a comparison of Japan and the United States. Ramseyer defines judicial independence as the extent to which politicians do not manipulate careers of sitting judges. He asks why some politicians provide an independent judiciary and others do not. He claims that a political structure will provide for an independent judiciary if (i) politicians believe that elections will continue indefinitely and (ii) politicians believe that their prospects of continued victory are low. He then does three case studies: the United States which satisfies both antecedent conditions and has an independent judiciary; contemporary Japan which satisfies the first condition but not the second and does not have an independent judiciary; and imperial Japan which satisfied condition (ii) but not condition (i) and did not have an independent judiciary.

Cooter and Ginsburg (1996) also deploy comparative data to study the question of judicial independence. They work with a different conception of independence than Ramseyer. Ramseyer's definition referred to the structure of appointment, pay, promotion and tenure in the judiciary. Cooter and Ginsburg have a more substantive view of independence; they look to the courts' ability to make law that diverges from the views of the legislature. They argue that the degree of judicial independence will depend on both political and constitutional features of a society. In particular they argue that societies in which a cohesive party dominates politics will be less likely to have judicial independence. On the other hand, the more 'legislative vetoes' that the constitution builds into its political process the more independence the courts have. They then asked experts in comparative law to rank the daringness of the judiciary of various countries. They then regressed daringness on the number of vetoes and the duration of the governing coalition. Despite the small sample size, the parameters on both independent variables had the predicted sign and were statistically significant; moreover they explained a substantial part of the variance.

3.3 Jurisdiction

Case and controversy requirement Courts generally resolve disputes but the dispute must generally be, in some way, 'live' and 'real'. In the United States, this requirement of the existence of a real dispute is embodied in the 'case or controversy' requirement of Article III of the Constitution. The requirement, however, is not a peculiarity of United States federal courts. With the exception of some constitutional courts, such as those of France and Germany, that have jurisdiction to issue opinions on the constitutionality of legislation prior to its enactment, most judicial systems require some similar trigger. Why should this be so? And who should be allowed to press a claim concerning a 'real' dispute?

Jensen, Meckling and Holderness (1986) address this latter question of who should be allowed to press a claim in a live dispute. They argue for limited rules of standing because, they claim, a liberal standing rule increases the costs of engaging in any rule-governed transaction.

Landes and Posner (1994) address the first question concerning the justification of a requirement of a concrete case to trigger the adjudicatory power. They extend a model of legal advice developed by Shavell (1988, 1992) and Kaplow and Shavell (1992) to investigate questions concerning the use of attorneys to the question the case or controversy requirement. They focus on the distinction between type 1 and type 2 error - the wrongful attribution of liability to defendants versus the wrongful excusal from liability of defendants. They argue that this distinction can be deployed to explain much of the observed pattern of exceptions to the case or controversy requirement. Specifically, they note that anticipatory adjudication, in violation of the concreteness requirement, increases both errors. They then examine in detail the institutions of declaratory judgments, *res judicata*, advisory opinions, and preliminary injunctions.

Stearns (1995, 1996) argues that the case or controversy requirement serves to restrict the occurrence of cycling that plagues institutions of social choice. For a fuller discussion, see the section on collegiality in Chapter 7200.

Specialized courts vs. courts of general jurisdiction Over what disputes should a court have jurisdiction to decide? Two methods for defining the subject matter jurisdiction of courts predominate. First, and most commonly, a court might have jurisdiction over any dispute that arises within a specified geographic area. Virtually all court systems consist primarily of these courts of general jurisdiction. Second, a court might have jurisdiction over disputes with a specified subject matter. Notice that these organizational patterns could be applied to courts of first instance (that find facts as well as apply law) only, to appellate courts only, or to both courts of first instance and to appellate courts. Moreover, in a system with specialized courts of first instance but appeal to

courts of general jurisdiction, one could limit appeal to a single general court of jurisdiction or one could allocate non-exclusive jurisdiction to a number of appellate courts. In the United States, one may understand the administrative law structure as establishing administrative agencies as specialized courts to determine the facts and make initial legal rulings that are then appealed to courts of general jurisdictions. Thus most labor disputes, welfare disputes and immigration disputes are first heard in administrative agencies and then, if necessary, appealed to the federal courts of appeals. In these instances, each of the federal courts of appeal has jurisdiction to hear appeals from these specialized tribunals. Many environmental disputes, by contrast, may only be appealed to the US Court of Appeals for the DC Circuit. Finally, there are some specialized courts of appeal such as the tax court and the federal circuit for Court of Appeals for the Federal Circuit which has jurisdiction over patent and other intellectual property disputes. What is the appropriate way to allocate jurisdiction among courts?

Posner (1985) argues that specialized appellate courts are likely to be more ideological than courts of general jurisdiction because judges on specialized courts are likely to be more focused on the subject matter of their jurisdiction and hence more likely to be sensitive, and responsive, to controversy.

Revesz (1990) analyzes the desirability of vesting appellate authority over administrative agencies in specialized courts. His analysis emphasizes the effect of the nature of the appellate court's jurisdiction on legislative ability to control agencies. He argues that review by specialized courts reduces the effectiveness of congressional delegation to administrative agencies. He develops a simple principal-agent model in which Congress is the principal and the administrative agency the agent. They have different policy preferences because commissioners in agencies have terms that do not correspond to the terms of the commissioners and because there may be a divergence in preferences between Congress and the President who appoints the head of many agencies. Congress has three mechanisms for the control of agencies: it may overrule particular decisions, it may exercise oversight through one or more committees, and it may alter the agency's budget. Congress, however, might also use the courts to monitor the agency. Revesz argues that a court of general jurisdiction is a better monitor.

3.4 Court Congestion

Comparative law scholars have often noted the variation in 'litigiousness' across countries. There is little economic literature that seeks to explain this cross-cultural variation but there is a substantial literature analyzing the causes of 'congestion' in the courts of one notably litigious society, the United States.

Virtually every proposal to reduce court congestion in the United States federal courts recommends the abolition of diversity jurisdiction which grants

federal courts the authority to resolve disputes between citizens of different states, even when they involve only questions of state law. One justification for diversity is that it prevents discrimination against out-of-state residents. Goldman and Marks (1980) tested this claim by looking at two samples of attorneys drawn from the US District Court for the Northern District of Illinois in 1976. They randomly sampled 200 attorneys tied to specific questions and asked them their reasons for litigating in federal court. They had a 62 percent response rate. In addition they randomly sampled 205 attorneys from the law division of Cook County District Court in 1976; this court had a \$15,000 amount a controversy minimum so that the cases within its jurisdiction were reasonably comparable to those within the jurisdiction of the federal court. This survey had only a 37 percent response rate. Only 40 percent of the attorneys in federal court listed local bias as a reason for choosing federal court. Attorneys drawn from state court cases were asked to consider a hypothetical case identical to the one litigated but in which their client was an out-of-state resident. Roughly 25 percent said they would file in federal court. Local bias thus had very little influence on the choice of forum.

Noam (1981) attempts to assess the social cost of court congestion by calculating the effects of congestion on criminal sentences and then on the crime rate. He argues that plea bargain reached between prosecutor and defendant will depend on the caseload of the court. The higher the caseload per judge, the lower the average sentence. Moreover, he argues that the per capita crime rate is a function of the average sentence. Using simple specifications of these functional relations he derives an equation that represents the marginal effect of additional resources devoted to the criminal courts. He then estimates his equation using FBI data on crime rates for four types of crimes against property in the District of Columbia. This estimation yields very high marginal returns to increased investment in the court system.

4. Fact-Finding

To resolve disputes, courts must determine the facts. A substantial portion of procedural rules govern the fact-finding process. Each of these rules influences the structure of the judicial system because each influences the cost of litigation relative to the cost of settlement and to self-help remedies. (The literature on evidence and the choice between settlement and litigation are summarized elsewhere in this volume.) Some procedural rules play a more central role in the organization of court systems. In this section, I examine the structure of trials and the use of juries, a characteristic element of many but not all court systems.

4.1 Sequential vs. Unitary Trials

Most disputes present more than one factual issue for resolution. Should these be resolved simultaneously or sequentially? In the United States, factual issues are generally resolved simultaneously, but often the question of liability and the question of remedy are decided sequentially, sometimes by different fact-finders.

Landes (1993) presents the primary investigation of this issue. He modifies his own, early model of the choice between settlement and litigation (see Landes, 1971) to analyze several issues concerning the effect of trial structure on the settlement rate. The analysis rests on the insight that a sequential structure to the litigation reduces the expected cost of litigation. Hence, the plaintiff's incentive to sue increases, which implies that the number of lawsuits will increase. Landes argues further that sequential trials reduce the probability of settlement because they narrow the range of acceptable settlements.

4.2 Juries

Many legal systems divide the law-finding (or law-applying) and fact-finding functions of trial courts. These systems delegate fact-finding to a *jury*, generally a group of lay individuals chosen more or less randomly to decide one case. This procedure raises several questions.

Jury selection Bowles (1980) compares the cost of jury trials in Britain to the cost of a system of fact-finding by a three-judge court. The cost of a jury trial consists primarily of the production foregone by persons serving on the jury. Bowles notes that high wage earners will attempt to avoid jury service more vigorously than low wage earners. He concludes that a jury trial will be less expensive if the cost of a judge is more than three times the cost of a juror. He does not, however, correct for the speed of the trial.

Martin (1972) also estimates the social cost of the jury system in the United States. He first estimates the occupational distribution of jurors on the assumption that juror days of service are distributed identically to jurors. He then multiplied by the median daily wage rate for each occupation and estimated the social cost at \$233 million (\$135 million) in 1958 dollars. He then compares the cost of two systems of jury selection: random selection and a 'keyman' procedure in which lists are constructed through consultation with community leaders. He finds that random selection is significantly less expensive because community leaders are more likely to draw jurors from high wage occupations than random selection. Finally Martin argues that voluntary service would reduce costs even further.

Jury size and jury voting rules Models of jury size and the effects of jury voting rules must specify how juries deliberate and vote. Many models assume no deliberation. Moreover, until recently, the literature assumed that each juror voted conscientiously; her vote expressed her view of the guilt or innocence of the defendant. When one assumes in addition that each juror is more likely than not to decide correctly and that jurors' judgments are independent of each other, the Condorcet jury theorem applies and one can easily show first, that a unanimity rule minimizes the probability of wrongful convictions; second, that majority rule maximizes the probability of a correct decision; and third, that, as the number of jurors increases, the probability of wrongful conviction under a unanimity rule decreases towards zero and the probability of a correct decision under majority rule increases towards one. Recently, however, analysts have introduced models of strategic voting by jurors and these models yield dramatically different results.

Austen-Smith and Banks (1996) and Feddersen and Pesendorfer (1996) show how radically the assumption of strategic behavior by jurors undermines the Condorcet Jury Theorem. When a juror acts strategically, the information aggregation feature of the Condorcet Jury Theorem disappears because each juror now decides how to cast her vote in light only of those instances in which her vote will be pivotal. As a consequence, as Austen-Smith and Banks show clearly, a juror's vote may not reveal her actual view concerning the case. Feddersen and Pesendorfer show, more dramatically, that the probability of wrongful conviction may be higher under a unanimity rule than under a different voting rule.

These models raise important questions about the appropriate way in which to model juries. These questions parallel those presented in the study of collegial courts, discussed in Chapter 7200, where team models in which judges act in a fashion somewhat analogous to the assumption underlying the naive Condorcet Jury Theorem models contend with political models in which judges act strategically.

In the United States, until the 1970s, juries typically consisted of twelve individuals and required unanimity to render a verdict. Then, the United States Supreme Court ruled that neither the number twelve nor unanimity were constitutionally required in state criminal proceedings. These decisions spurred research into the importance of these requirements.

Klevorick and Rothschild (1979) provide a model of jury deliberation in order to determine whether non-unanimous juries or unanimous juries of fewer than twelve jurors would yield different verdicts than the 'standard', twelve-person unanimous jury. Their analysis uses a stationary Markov model to provide a dynamic model of the majority persuasion hypothesis, derived from Kalven and Zeisal (1966), that the final verdict is the same as the majority position on the first ballot. They offer both a discrete and continuous model of

jury deliberation. The cores of the models are identical. The jurors enter the jury room with a view on the merits and cast an initial ballot. The vote then changes incrementally as time passes with one person changing her vote at each instant until unanimity is reached. The transition probabilities are given by the current vote: the probability of one more vote for the plaintiff equals the percentage of jurors who favor the plaintiff's case. In this model one can calculate both the expected number of jury ballots until unanimity is reached (conditional on the initial vote) and the probability that a non-unanimous jury will agree with a unanimous one. Klevorick and Rothschild show that a move to a requirement of ten votes for judgment rather twelve always alters the probability of conviction by less than 0.0055. Their result, of course, depends critically on the manner in which majority pressure operates in the jury room. When they adopt a different assumption concerning transition probabilities, they calculate that the move to ten for judgment may lead to as many as 1/6 of the cases decided differently. Klevorick and Rothschild also show that this shift substantially reduces the expected number of ballots prior to judgment.

Schwartz and Schwartz (1992, 1995, 1996) offer a somewhat different approach to jury decision making. The earliest paper addresses three questions concerning the decision rules of juries. First, why do juries fail to reach a verdict? Second, what verdict will a jury reach when it may convict for lesser included offenses or when multiple offenses are litigated simultaneously? Third, how, if at all, will the jury decision rule alter the charges filed by prosecutors? To this end, they assume that a defendant might be charged with any number of counts within some interval. They consider two regimes. In one the prosecutor chooses one count in the interval, and the jury must choose among three outcomes, conviction on that count, acquittal, or no decision. In the second regime, the prosecutor chooses two counts, one entailing a lesser punishment than the other, and the jury chooses among four outcomes, acquittal on both counts, conviction on the lesser count, conviction on the more severe count, or no decision. In the event of no decision, a retrial before a different jury occurs. Each jury consists of four people, chosen randomly from a population. Each potential juror is an expected utility maximizer, characterized by spatial 'preferences' for punishment of the defendant; that is, each juror has an ideal outcome that represents the crime for which she believes the defendant should be convicted. The simple model implies that a defendant always prefers a non-unanimous, super-majority rule to unanimity because his expected verdict is lower under the non-unanimous rule. This result occurs because, though the probability of conviction is greater under non-unanimity, the probability of acquittal rises more rapidly. When the jury may convict on a lesser included offense, the analysis is more complex and less clear-cut.

Schwartz and Schwartz (1995) extend the analysis of their prior article in the context of the liability and punishment phases of capital offenses in the

United States. They argue that the decision process for fact finding has three elements: the voting rule, the jury selection process, and the characterization of the set of outcomes among which the jury may choose. They argue that, in a multi-stage fact-finding process, the voting rule must be the same in each stage in order to avoid the jury at one stage nullifying the law governing the jury at a different stage. In addition, only *reciprocal* voting rules will avoid hung juries (where a rule is reciprocal if 'conviction' requires c of n votes then 'acquittal' requires $n - c$ of n votes).

Schwartz and Schwartz (1996) carries the argument of the prior two papers further. They argue that any voting rule should satisfy at least two properties: (1) it should be decisive; and (2) it should satisfy the 'one person/one vote' criterion. This second property does not eliminate any anonymous voting rule, whether majority, supermajority, or submajority. (Super and submajority rules would violate neutrality). The first criterion identifies majority rule as the unique decisive voting rule when there are only two possible outcomes. To satisfy the desire to minimize wrongful convictions that the unanimity rule is said to promote, Schwartz and Schwartz argue that the size of the jury should be increased perhaps to 15.

5. Concluding Remarks

Economic analysis of judicial organization and administration, though it has greatly increased understanding, is only in its infancy. No question has received an exhaustive treatment and many have not been examined at all.

This area suggests a multitude of comparative questions, most of which have not received any attention at all. They are ripe for analysis.

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