

AXIOMATIC ANALYSIS
OF LEGAL/INSTITUTIONAL ISSUES

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Matthew L. Spitzer

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ABSTRACT

Abstract of Introductory Essay

An essay defines and explores the strengths and limits of the Axiomatic Analysis of Legal/Institutional Issues, and then derives guidelines for the use of axiomatic work in papers prescribing policies.

Abstract of Chapter I

Given certain fundamental assumptions, it is possible to engage in economic analysis of costly interactions between the government and individuals. Such an analysis must necessarily focus upon a potential rule's effect on governmental behavior. Various models of governmental behavior are either borrowed or developed, and these models are then independently analyzed.

Economic efficiency suggests that a particular immunity rule should be adopted with regard to certain models. In the case of other models, however, rigorous economic analysis is impossible; in such cases, suability is chosen over immunity on the basis of fairness and comparative utility. Based upon this analysis, three potential governmental immunity rules are formulated, and, based largely on considerations of administrative costs and fairness, the indicated rule is that the government should be suable in tort for monetary damages.

Abstract of Chapter II

The limitations of Multicriteria Choice Processes are analyzed by examining the Federal Communications Commission's initial broadcast license comparative hearings. A possibility theorem, developed especially for comparative hearings, shows that the FCC must use an illegal process. This fundamental problem helps to explain previous criticisms of the comparative hearings' practical defects and to separate sufficiently effective reform suggestions from ineffective proposals.

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INTRODUCTORY ESSAY ON THE AXIOMATIC
ANALYSIS OF LEGAL/INSTITUTIONAL ISSUES

A legal/institutional issue involves the effects of law upon interactions between private and institutional actors. The following two papers axiomatically analyze legal/institutional issues. This short essay defines the general axiomatic analysis paradigm, explores its powers and limitations, and derives guidelines for the use of axiomatic work in papers prescribing policies.

I. Definition of the Axiomatic Analysis of Legal/Insti-
tutional Issues

A paradigmatic Axiomatic Analysis of a Legal/Institutional Issue (hereinafter "AA") starts with the selection of an appropriate issue. This issue must involve interactions between the legal environment, private actors and institutions. Next, the researcher must model the issue by choosing an axiom set that characterizes the actions and interactions of the institutional actors, private actors, and their environment (the positive axiom set). The analyst generates answers -- in the form of theorems -- to the problems posed by the issue, and then mathematically shows that the axioms prove (or are insufficient to prove) the theorems. This process often requires the analyst to substitute alternative axioms into the model and redo

the answers. Last, the analyst deduces an appropriate policy for the model -- generally some change in the legal environment -- by using explicit ethical postulates to choose the policy prescription. The model's policy prescription, deduced in strict Aristotelian fashion from positive axioms and ethical postulates, provides the foundation for the analyst's policy prescriptions for society.

A. The synthetic process of answering the questions

The process begins with the analyst choosing positive axiom sets and trying to get some initial results. Since the ultimate appeal of his policy recommendation will rest upon the appeal of the individual axioms, the analyst naturally will be led to examine phenomena bearing upon his issue. As the analyst uses alternative axiom sets to generate alternative answers to the issue's questions, he reinterprets both the basic issue and the observed phenomena. Although logically distinct from this process, the analyst occasionally checks possible ethical postulates and corresponding policy prescriptions, balancing the flamboyance of the resulting policy prescription against the importance of the phenomena neglected by the positive axiom set. Each time he substitutes new axioms into the positive axiom set, the analyst goes through this "checking" procedure.

B. The resulting model

The resulting model may contain widely varied private parties and environments, but the institutional actors will always include a body that prescribes legal rules. For example, the following two papers employ models with widely varying economic environments. The model of governmental immunity uses conditions on production functions, capital and labor markets, etc., while the FCC paper assumes that broadcast licensees can make a high enough return on investment to make applying for the license a rational activity, plus the applicability of the governing statutory schemes (the US Constitution and the FCC Act). Similarly, although neither of the following papers focuses on private actors, it is necessary to characterize their behavior, and they occupy vastly different roles in the two works. In the immunity piece private actors eat wheat, take train rides and farm. In the FCC piece the private actors -- the applicants -- apply. Both papers include courts as institutional actors. The FCC paper characterizes the District of Columbia Circuit Court of Appeal (along with the FCC), while the immunity paper uses a generalized court (and a government bureau).

C. Developing a full appreciation of the model's inner workings

By the time the analyst arrives at a resultant model, he understands the interactions between his three axiomatized sectors. He has worked for so long with the axioms in an attempt to characterize the observed phenomena, that later data observations are understood within the axiomatic framework.

Axiomatizing institutions provides much of the intellectual challenge in these pieces. Because there is no generally accepted theory of institutional behavior, the analyst must generate models applicable to his legal/institutional setting. Also, institutions are complex, contradictory creatures whose behavior evades quick and easy axiomatization. For example, virtually all of the FCC paper deals with the plausibility of characterizing the DC Circuit's behavior with a set of mutually inconsistent axioms, while the immunity paper analyzes alternative axiomatic approximations to a generalized bureau's behavior.

D. The derived, basic results

Hopefully, the simultaneous interaction of the institutions, private parties, and environment produces some economic result. For example, in the FCC paper the DC Circuit was attempting to influence the legal environment (which in turn affected the FCC) in an impossible manner. Analogously, in the immunity paper, an agency acting as a Product-Maximizing Budget Consumer

must be suable for society to arrive on the production possibilities frontier. Unfortunately, many sets of appealing axioms allow no deductions, thereby denying the analyst positive results with which to work and necessitating the use of much stronger ethical postulates to prescribe policies. For example, in the immunity paper a Malevolent Entity's behavior cannot be completely characterized under suability or immunity. Therefore, instead of prescribing suability as a means of maximizing consumer satisfaction, the paper relies on fairness and comparative utility -- much stronger ethical assumptions-- to prescribe suability for that model.

E. Ethical postulates

~~By the time the analyst has derived the model~~ and its basic results, he has most likely chosen his ethical postulates and the model's accompanying policy prescription. The desire to get striking results has probably led him, during the synthesis of a model, to consider alternative ethical postulates. If the ultimate recommendation is to be appealing, the analyst must provide convincing arguments in favor of each assumption. These arguments force the analyst to understand why he prefers one policy or institutional action to some other and require widely varying degrees of attention. For example, the complex ethical foundations of the

sovereign immunity paper require extensive discussion, while the FCC's simple statement that an institution should not be subject to contradictory requirements needs almost no defense.

F. Prescribing policy recommendations based on an AA

The use of an AA to prescribe societal policies provides the AA's ultimate test. The policy recommendation's appeal will reflect the degree to which the axioms match observed data, the sensibility of the model's basic results, and the ethical postulates' normative appeal. Only if the analyst performs his AA with care will this step seem natural. (See Section IV of this essay).

II. Power and potential of an AA

The most important and attractive feature of an AA is its ability, within the domain described by the axiom sets, to make precise, powerful statements. For example, previous papers dealing with the FCC's initial broadcast license comparative hearings had noted the slow, confused, expensive, and intellectually bankrupt nature of the process. By axiomatizing the process, my paper detected an impossibility in the constraints on the FCC's behavior. In general, the AA can make use of strict "if, then" statements. By choosing precise axioms to satisfy the "if," the "then" can be made correspondingly exact. Thus, just as the ability to state precisely

the basic impossibility gives the FCC paper its appeal, so, in general, an AA's ability to make precise statements gives the AA its general appeal.

An AA also allows the analyst to focus on a particular aspect of a legal/institutional issue. By changing axioms regarding a single actor (or other phenomenon) the analyst can effectively direct attention to that actor (or other phenomenon). For example, the immunity piece focuses attention upon the importance of the governmental bureau's motivations by varying assumptions regarding the bureau's behavior.

Selecting the positive axioms forces the analyst to learn thoroughly about his issue. Every set of axioms that describes an interesting institution and that leads to positive results must leave out some salient and intuitively important element of the legal/institutional issue. Institutions and individuals exhibit ambiguous, contradictory behavior in difficult situations. Mathematically precise axioms (given the language of mathematics) cannot capture all of these behaviors. When the analyst chooses the axioms he must consider, for each axiom, the importance of the neglected phenomena and the changes that would result from replacing the axiom by another. By going through this process for each axiom, the analyst must map the boundaries con-

straining his ability to make positive statements.

(Similarly, when selecting ethical postulates, the analyst must dwell upon the ethical foundations supporting his policy prescriptions).

For example, in the FCC paper Axiom IV states that no absolute scales or weights are used in the initial broadcast license comparative hearing choice process. This axiom partially neglects language in FCC Reports which terms preferences "large," "moderate," "slight," etc. However, because of basic ambiguities in these terms, the FCC's many failures to give any indication of preference size, and some language plainly hostile to the concept of absolute scales, the neglected phenomena are not very important. The substitution of an axiom allowing absolute scales would neglect these ambiguities, failures, and hostilities, and such an axiom would destroy the paper's basic results. For all of these reasons, I concluded that Axiom IV is an acceptable constraint on the FCC paper's ability to get results. Similar judgments are academic in any attempt to axiomatize real-world processes.

III. Limitations of the axiomatic approach

The AA's problems and limits derive from its tendency to highlight any weaknesses in one's work, the unsuitability of many legal/institutional issues to the

analysis, and the lack of an audience trained in both legal and social scientific schools of thought.

A. Highlighting weaknesses

The AA is plagued by two basic tradeoffs. First, the axiom set's general applicability varies inversely with the analyst's ability to get results. For example, the model of sovereign immunity in tort might have used hypothetical factor markets that could be competitive or noncompetitive -- assuming noncompetitive markets allows wider applicability than postulating competitive markets. Unfortunately, the wider assumption prevents the analyst from proving that a fixed job/cost minimizer should be suable in tort. As a general matter, each axiom's specificity and appeal are inversely related.

For example, postulating competitive factor markets, a more specific assumption than allowing competitive and noncompetitive factor markets, neglects phenomena such as the oil and copper cartels, and is correspondingly less appealing. Since the analyst wants to get some positive results, he will be strongly tempted to use a specific (i.e. not generally applicable) and unappealing axiom. Although these basic tradeoffs plague virtually all analytical styles, the AA guides a reader in subjectively appraising each assumption, thereby greatly increasing the probability that he will raise objections where the axioms

grate on his intuition. Hence, the first, and most basic limitation is a writer's decreased ability to slip anything suspect past a reader. Note that this limitation is dictated by the same considerations that result in a thoroughly explored model (part of the strength of an AA).

B. Unsuitable issues

Given the limits of current social scientific theory, there are many important legal/institutional issues which very probably cannot profitably be attacked with an AA. This is generally because the types of questions involved do not sufficiently resemble paradigmatic economic issues. For example, the issue of a person's criminal sanity would not seem to be easily analysed with the axiomatic approach. Assuming that deterrence is the object of the criminal law, the insanity issue, in economic terms, involves separating rational actors from other actors. In almost all economic theories both of these actors would be undefined, non-derived concepts. Although it is possible that a clever axiomatic application of current economic theory could help classify criminally insane individuals, it is so unlikely that a researcher should start attacking the problem with another analytical style.

C. Audience

At present, works containing an AA are read by formally trained social scientists or lawyers. While the lawyers have a far greater grasp of which problems or legal/institutional issues are interesting, they do not have the basic tools to understand all of an AA. Conversely, the social scientists can understand all of the AA but do not always understand the context of the problem, and therefore cannot assess the usefulness of the analysis or the aptness of its policy prescriptions. Therefore, the writer must be careful to explain the context of the issue and the limitations placed on prospective prescriptions for the social scientists and to recount the basic nature and workings of the AA for the lawyers. Since the contextual explanations are also needed by lawyers and reciting the AA's inner workings in English also aids social scientists, the writer's time is well spent.

There is another problem centering on the legal audience. Typical legal analysis does not force one to think very hard about exactly which elements the analysis contains or omits. Conversely, an AA contains within itself explicit consideration of neglected phenomena. When attorneys, an extremely sceptical and argumentative group, are forced to focus on an argument's defects, they will naturally tend to reject the argument.

IV. Implications of the power and limitations of an AA for writing an article

The analyst must first carefully pick a legal/institutional issue that will benefit strongly from an AA because he cannot depend on an AA to help analyze all legal/institutional issues. Next, since the axiomatic analysis will highlight his assumptions' shortcomings, he must carefully choose the individual postulates.

The power and limits of an AA have deeper implications for the scope of an article using an AA and for the philosophy of making policy recommendations with an AA.

A. Scope

Since often only narrow axiom sets get results, a paper's scope must often be drawn too narrowly for adequate policy prescription if it is restricted to these narrow axiom sets. A full treatment of a problem may require the analyst to treat facets of an issue that cannot be analyzed axiomatically. It is important to let one's sense of the overall problem determine the scope of a paper. For example, the sovereign immunity piece derived no positive results for any of the nonmaximizing models. Nevertheless, immunity was prescribed on the basis of fairness and comparative utility. At that point

the article departed from the basic AA and engaged in traditional linguistic argumentation. In this manner, an AA may support only part of a paper's recommendations.

B. Philosophy of using an AA to make policy recommendations

Every potent axiom set both neglects important phenomena and highlights that neglect. The AA's tendency to highlight its own limits or shortcomings can tempt one to totally reject making policy recommendations based on an AA. Discouraged by the obvious shortcomings of the axioms, the analyst may choose instead analytical styles which do not emphasize their own excluded phenomena. Analysts can prescribe policies derived from nonaxiomatic analytical styles more easily because the weaknesses in the formulation on which they are based are not so glaringly exposed.

Every style of analysis has its own defects. For example, a traditional, linguistic, fairness-oriented analysis of tort law has two main drawbacks. First, such an analysis generally neglects the economic effects of choosing alternative tort rules. Since slick verbal arguments relating to the morally-anchored norm of the reasonable man may appeal to the reader far less once it is demonstrated that the "fair" rule is inefficient, a pure fairness-oriented analysis is generally incomplete.

Second, to the extent that such an analysis does consider economic effects, they are loosely derived -- perhaps merely assumed -- with virtually no attention paid to basic postulates. The economic conclusions may thus be based on untenable postulates which are embedded in an implicit, unworkable model. If the analyst dwells upon the basic truth that defects permeate all analytical styles, he will be led to consider, for any given problem, the defects associated with analyzing the problem with any particular style. These drawbacks should be compared and evaluated within the problem's context, and the analyst should accordingly choose the most appropriate analytical technique. In this vein, rather than just reject every AA because of revealed defects, the analyst should consider making axiomatic policy recommendations within the following framework.

Policy recommendations based on axiomatic work follow from a short (often implicit) argument containing two propositions:

1. The formal AA and its recommendation.
2. The real world looks enough like the axiom set in the AA to warrant using the recommendation, even though the recommendation cannot be strictly supported.

To evaluate proposition 2, look at the neglected phenomena and ask if there is anything left out

which obviously and unacceptably weakens the model. Then ask if the model contains enough of the elements one would expect in complete legal and economic analyses. This task requires evaluating the axioms, results, and neglected phenomena against the analyst's sense of legal and economic aesthetics. Ultimately, it is the analyst's sense of economic and legal aesthetics which will guide him in using any analytical style.

CHAPTER ONE

An Economic Analysis of Sovereign Immunity in Tort

Tort law is a system of reallocating the costs of accidents.¹ When one of the parties in an accident is the government, sovereign immunity in tort may preclude any reallocation.² Hence, the government and private citizens face different structures of incentive to be careful (or to take risks). This Note will assess the desirability of sovereign immunity through an examination of the economic consequences of presenting the government and private citizen with alternative incentive structures.³

Like the analysis of private accidents, prediction of the overall effect of a liability rule for public sector/private sector accidents is very sensitive to assumptions about the parties' motivations.⁴ Although some commentators challenge the cost-minimizer model—which posits that parties attempt to minimize overall costs—of the behavior of private individuals in damaging

1. G. CALABRESI, *THE COSTS OF ACCIDENTS* (1970); Brown, *Toward an Economic Theory of Liability*, 2 J. LEGAL STUD. 323 (1973); Posner, *A Theory of Negligence*, 1 J. LEGAL STUD. 29 (1973).

2. See W. PROSSER, *HANDBOOK OF THE LAW OF TORTS* 970 (4th ed. 1971); Borchard, *Government Liability in Tort* (pts. 1-3), 34 YALE L.J. 129, 229 (1924); Borchard, *Government Liability in Tort* (pts. 4-6), 36 YALE L.J. 1, 757, 1039 (1926); Borchard, *Government Liability in Tort* (pts. 7-8), 28 COLUM. L. REV. 577, 734 (1928); Davis, *Tort Liability of Governmental Units*, 40 MINN. L. REV. 751 (1956); *Symposium—Governmental Tort Liability*, 9 LAW & CONTEMP. PROB. 179 (1942).

3. Fleming James, Jr., attempted an analysis of this subject, but his treatment was incomplete. See James, *Tort Liability of Governmental Units and Their Officers*, 22 U. CHI. L. REV. 610 (1955).

4. Although the subject of this paper is governmental immunity in tort, the style of analysis may easily be applied to the charitable immunities. For a description of charitable immunity doctrines, see W. PROSSER, *supra* note 2, at 992-96. For general background on the issue of governmental immunity in tort, see James, *supra* note 3; sources cited note 2.

Since many footnoted propositions are supported by formal, mathematical proofs, readers less interested in rigorous mathematics may find it helpful to ignore footnotes on initial reading. Wherever possible, sources of general application are footnoted.

situations,⁵ the model has been widely accepted, however, as a close approximation of private economic behavior. Moreover, since no widely accepted model for governmental behavior in the accident context exists, one must construct or borrow a variety of plausible models before proceeding with analysis. This Note will use ten such models. Within each model, governmental tort immunity will be evaluated according to an explicit set of goals by adopting the following variation of economic tort scholar's approach to private party accidents:⁶

(1) Assume that all private parties involved are cost minimizers, and that the government entity behaves in accord with one of nine specific models;

(2) Assume that there is some unbargained-for costly interaction between the parties;

(3) Insert either immunity or suability into the situation and determine the expected behavior of each party;

(4) Pick an immunity rule on the basis of some predetermined criteria (such as minimization of the sum of accident costs).

To aid the exposition, the following example will be used throughout this Note. A government-owned railroad travels next to wheat farms.⁷ Its railroad engines periodically emit sparks which set wheat fields afire; the amount of burned crops is a function of the technology adopted by the railroad (*e.g.*, spark arresters, type of engine used, type of track and wheels used)⁸ and of the adjustment of wheat-planting practices to the technology used by the railroad (*e.g.*, planting further from the tracks).

I. OVERVIEW OF GOVERNMENT TORT IMMUNITY

A rule on governmental tort immunity can be synthesized from basic assumptions and principles; no intricate knowledge of modern governmental tort immunity law is required. Nevertheless, since some acquaintance with existing rules is necessary to appreciate the scope of the inquiry, the broad outlines of the immunity doctrine are sketched below.

Governmental entities are often immune from liability for any damages

5. See F. HARPER & F. JAMES, *THE LAW OF TORTS* 740-41 (1956); Epstein, *A Theory of Strict Liability*, 2 J. LEGAL STUD. 151, 152 (1973); Fletcher, *Fairness and Utility in Tort Theory*, 85 HARV. L. REV. 537 (1972).

6. See, *e.g.*, G. CALABRESI, *supra* note 1.

7. Prosser notes that enterprises similar to a government-owned railroad would probably be suable in tort. Nevertheless, the example is useful as an analytical tool. W. PROSSER, *supra* note 2, at 979-82.

8. Assume that engine efficiency is inversely related to crop protection.

that they cause under circumstances which would make a private party liable.⁹ The doctrine's basic premise is that a government must *consent* before it can be sued.¹⁰ The government's failure to consent makes it completely immune to tort suit, thereby mooting any inquiry into the merits of the claim.

The immunities of the United States government are defined in the Federal Tort Claims Act,¹¹ where the federal government is made generally liable

for money damages . . . for injury or loss of property, or personal injury or death caused by the negligent or wrongful act or omission of any employee of the Government while acting within the scope of his office or employment, under circumstances where the United States, if a private person, would be liable to the claimant¹²

There are three principal exceptions to this general rule of suability. First, the government is absolutely immune from suit for torts occurring while it is engaged in a set of specific tasks, including collecting taxes and fighting wars.¹³ Second, the government is granted immunity from a set of causes of action, including "any claim arising out of assault, battery, false imprisonment, false arrest, malicious prosecution, abuse of process, libel, slander, misrepresentation, deceit, or interference with contract rights."¹⁴ Third, the United States may escape liability if it can show that the acts or omissions complained of were "based upon the exercise or performance or the failure to exercise or perform a discretionary function or duty on the part of a federal agency or an employee of the Government, whether or not the discretion involved be abused."¹⁵

State and local government tort immunities are found in state constitutions,¹⁶ statutes,¹⁷ and court rulings.¹⁸ In most states tort immunity attaches to

9. See W. PROSSER, *supra* note 2, at 970.

10. *Id.* at 971.

11. Federal Tort Claims Act, 28 U.S.C. §§ 1291, 1346, 1402, 1504, 2110, 2401-2402, 2411-2414, 2671-2680 (1970), *as amended* by Act of Mar. 16, 1974, Pub. L. 93-253, § 2, 88 Stat. 50, 28 U.S.C. § 2680(h) (Supp. IV 1974).

12. *Id.* § 1346(b). In other words, the federal government has, in general, consented to be sued.

13. *Id.* § 2680.

14. 28 U.S.C.A. § 2680(h) (West Supp. 1976); *see* note 61 *infra*.

15. 28 U.S.C. § 2680(a) (1970).

16. *E.g.*, ALA. CONST. art I, § 14.

17. *E.g.*, CAL. GOV'T CODE §§ 810 *et seq.* (West 1966); CONN. GEN. STAT. ANN. § 4-141 *et seq.* (West 1969); IOWA CODE ANN. § 25A.1-22 (West Supp. 1976).

18. *E.g.*, Jackson v. City of Florence, 294 Ala. 592, 320 So. 2d 68 (1975) (abolishing municipal tort immunity in Alabama); Lorence v. Hospital Bd., 294 Ala. 614, 320 So. 2d 631 (1975) (denying immunity to county entities); Shellhorn & Hill v. Delaware, 55 Del. 298, 187 A.2d 71 (1962) (upholding state tort immunity).

all judicial or legislative actions.¹⁹ The immunity is generally extended to "the exercise of an administrative function involving a basic policy decision."²⁰ Very few generalizations can be made about state tort immunities since the law varies widely.

II. ASSUMPTIONS

Because a very large number of assumptions are necessary in this analysis of governmental immunity in tort, it is important to identify and scrutinize them openly. Although every positive economic assumption used in this analysis is in some sense "false" (*i.e.*, there exist counterexamples in daily life), the assumptions collectively capture enough essential features of the problem to give them appeal. To the extent that the assumptions do not, however, the analysis is inadequate.

Several important "ethical"²¹ assumptions are used in this analysis.²² First, given several states of society it is assumed that some states of society are better than others.²³ This choice from among alternative states of society is

19. For a set of references on state and local tort immunity, see RESTATEMENT (SECOND) OF TORTS, Special Note to the Institute Regarding §§ 895B & 895C, at 12-22 (Tent. Draft No. 19, 1973).

20. *Id.* § 895B(3)(a).

21. These assumptions represent widely accepted notions of good and bad, *i.e.*, what *ought* to be the goals of a rule on governmental immunity in tort. Taken as a whole, they probably place this Note in the "economic efficiency" group. See note 22 *infra*.

22. There are three main ethical schools in the tort law today. One school teaches that tort rules should be framed with reference to ideas of natural justice. See G. CALABRESI, *supra* note 1, at 24-26 (the first goal of accident law is justice, *i.e.*, justice acts as a constraint on the acceptability of a system of tort law); Epstein, *A Theory of Strict Liability*, 2 J. LEGAL STUD. 151, 152 (1973) (a theory of justice based upon causal paradigms in the English language); Fletcher, *Fairness and Utility in Tort Theory*, 85 HARV. L. REV. 537 (1972) (a just system of tort law is one which gives recompense for damage incurred from nonreciprocal risk-producing activity).

A second school seeks to compensate accident victims and spread the burdens of compensation. See R. KEETON & J. O'CONNELL, PROTECTION FOR THE TRAFFIC VICTIM 115 (1967) ("First, we want to be sure that each deserving victim is compensated. . . . Second, we want to distribute fairly the burdens of compensating victims."); James, *supra* note 3, at 614, 620, 639.

A third school asserts that tort law should promote economic efficiency. See G. CALABRESI, *supra* note 1, at 26-31 (arguing that tort law should minimize the sum of accident costs); Ellickson, *Alternatives to Zoning: Covenants, Nuisance Rules and Fines as Land Use Controls*, 40 U. CHI. L. REV. 681 (1973).

23. This Note assumes that there exists a social welfare function (denoted "W"). W gives an ordering over various possible states of society. If one state of society is "better" than another state of society, then W attaches a higher social preference (represented by a higher numerical ranking) to the first state than to the second. W can be thought of as a type of moral ordering, and may be a function of all that is imaginable. For example, W may be affected by the weather, foreign policy, and the number of blades of grass in Alumni Park. The level of spark emission by the governmental railroad is assumed to be in the argument of W.

W is assumed everywhere twice differentiable. Differentiability of W implies that there is no amount of spark emission for which the state of the world suddenly skips from one level to another with no possibility of constructing a state of the world which is between the two levels

based on the preferences (or happiness levels) of the citizens.²⁴ If the citizens unanimously prefer one state of society over a second, then the former state is better than the latter.²⁵ Finally, if nothing can be rigorously said about the unanimous happiness of the citizens,²⁶ alternatives are judged on the bases of fairness and comparative utility.²⁷

just by varying the level of spark emission a slight bit. This continuity assumption adds a certain "smoothness" to the moral order; in other words, there are no kinks or sharp points. Since one may approximate a kinked function as closely as desired by a smooth function, however, this is not a critical feature of the argument. For a more rigorous explanation, see Assumptions 1 and 2 and sources cited note 40 *infra*.

24. Formally, this Note assumes that society's preference can be represented by:

$$W(U_1(c_{11}(a), c_{21}(a)), \dots, U_n(c_{1n}(a), c_{2n}(a)))$$

where U_i is the utility function of the i th individual, c_{1i} is the amount of the first commodity consumed by the i th individual, c_{2i} is the amount of the second commodity consumed by the i th individual, a is the level of spark emission by the governmental railroad, and n is the number of individuals in society.

A utility function is a ranking, in ordinal terms, of an individual's preferences. For example, if an individual prefers an ice cream cone to a sandwich, then his utility function will evaluate an ice cream cone at a higher value than that of a sandwich. It makes no difference what the numbers are, as long as the number associated with the ice cream cone has a higher value. It is not necessary to assume that these functions actually exist, but only that an individual's preferences may be represented in this manner. See Definitions 7, 8 note 47 *infra*.

25. Technically, this Note assumes that the social preference, W , is positively responsive. This means that the value of W increases if one of W 's arguments increases while the rest of its arguments are held constant. Conversely, W 's value decreases if one of its arguments decreases while the rest of its arguments are held constant. See Assumption 12, note 42 *infra*.

Positive responsiveness is an unattractive assumption for one who feels that there are some individuals who should be tortured. Alternatively, one may feel that there are some people who just do not count, *i.e.*, a change in the way an individual feels should not affect what "society" prefers. This last position is a plausible conceptualization of the morals behind slavery.

26. It is possible, for example, that the state of society engendered by immunity is preferred over the state of society in which the government is suable by all but one citizen. In that case, one would prefer to know how strongly the various citizens feel about the respective states of society before choosing an immunity rule. If the unhappy citizen does not care very much, it might be better for society if he would "give in." Without such data, however, it is impossible to draw such a conclusion. It is likely that any attempt to gather this information would be very expensive and, due to changes in citizen preferences, quickly outdated. Thus, rather than assuming that a particular citizen ought to "give in" under certain circumstances, this Note will resort to other criteria in choosing an immunity rule. See text accompanying notes 27-30 *infra*.

27. The following additional ethical assumptions will be used in this Note:

(a) W has a global maximum with respect to spark emissions by the government railroad. This means that it is better to have a few sparks than no sparks, but that it is also better to have only a few sparks than a continuous torrent of sparks. There is some number of sparks which is optimal. See Assumption 4, note 40 *infra*.

(b) Given two alternative legal rules on governmental immunity and two associated states of the world, the legislature should adopt the legal rule which generates the state of society to which W assigns the higher value. This is also the method for choosing between immunity and no immunity within each model of governmental behavior. This criterion will be denoted "W-max." See Assumption 3, note 40 *infra*.

(c) This Note assumes a highly technical restriction on the shape of W . See Assumption 2 note 40 *infra*.

The fairness and comparative utility criteria strongly suggest that the government should be suable. Two fairness considerations mandate such a result. First, wherever there are no alternative avenues of compensation, and where there are no rigorously provable economic benefits from immunity, suability prevents capricious redistribution of wealth. Insofar as random wealth redistributions are unfair, suability will help minimize the unfairness.²⁸ Second, there is a normal expectation that injurers meet their victims in a court of law. Wherever a citizen is prevented from suing the government, the citizen is bound to be frustrated and indignant: the government is supposed to aid citizen interests. Absent a compelling economic justification, it is fairer to spare the citizen this added trauma, since he reasonably expects that the courts will provide an avenue of compensation should he be tortiously harmed.²⁹

Wherever economic production will not vary much between suability and immunity, a comparative utility argument further supports suability. Assuming it is possible to measure intensities in preferences and to compare individuals' preferences, the notion of comparative utility suggests that the aggregate utility of a group of individuals may be increased by taking a small amount of goods and services from all individuals to compensate an injured individual.³⁰ Therefore, whenever it is impossible to select an immunity rule on the basis of rigorous economic analysis, it will be assumed that the government should be suable in tort.

~~Several technical and analytical assumptions will also be used in this Note. First, it is assumed that the government and its citizens will not or cannot resolve their dispute by bargaining.³¹ Second, it is assumed that the efficiency of a liability rule can be determined from a simplified model in which only two goods exist³² and in which each citizen prefers to have more of~~

28. See, e.g., Michelman, *Property, Utility, and Fairness: Comments on the Ethical Foundations of "Just Compensation" Law*, 80 HARV. L. REV. 1165, 1182-83 (1967) (wealth redistributions, otherwise arbitrary, may be justified if accompanying an efficient program); *id.* at 1212 (collective allocational decisionmaking, attended by capricious redistributions, may be unacceptable for reasons stemming from Hume's theory of property).

29. Borchard, *Government Liability in Tort* (pts. 1-3), 34 YALE L.J. 1 (1924).

30. For a rigorous analysis of interpersonal aggregation and comparability, see A. SEN, *COLLECTIVE CHOICE AND SOCIAL WELFARE* 89-104 (1970).

31. See Assumption 15, note 47 *infra*. This assumption is generally valid in the context of interactions with governmental entities because it may be illegal for a government to accept money in return for alteration of conduct. *E.g.*, 18 U.S.C. § 201 (1970); see Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (1960) (analyzing the analogous problem in the private sector when there is bargaining between the parties).

32. This is implicit in the form of *W* assumed in note 40 *infra*, and has been used in legal-economic literature before. See Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (1960).

each good than less of each good.³³ This model restricts the number of variables that require consideration and insures that "more is better."³⁴ Third, for the purposes of this analysis it is assumed that all relevant models of governmental behavior are presented.³⁵ This assumption is needed only in the synthesis of a comprehensive governmental immunity rule: the analytical results within each model remain valid without this assumption. Finally, the governmental immunity rule is created under a presumption that the legal system works costlessly, focusing the inquiry on the importance of governmental accident costs—as opposed to the cost of running the legal system.³⁶

33. This assumption is termed nonsatiation of consumers. See Assumption 10, note 47, *infra*.

34. Although there may be some goods for which a saturation point is quickly reached, these goods are probably the exception rather than the rule over the range of production and consumption in modern society.

35. This assumption is only needed for a rigorous derivation of the necessary conditions for sovereign immunity. Since all of the obvious or currently accepted models of governmental behavior are included in this analysis, future advances in sociology or political science must provide any additional relevant paradigms.

36. The following additional assumptions of a more technical nature are used in this Note, but are not listed in the text.

(a) Within a given model of governmental behavior, the only options are to grant or deny governmental immunity; there is no third choice. This assumption is not very confining because the court will be permitted to characterize the government's behavior with respect to each accident. A given governmental entity could be granted immunity from suit for damage in one situation while the same entity could be liable in other situations. See note 79 *infra*.

(b) There is only one governmental entity—the railroad—and it has control over the level of spark emissions. This assumption may be relaxed in certain places. See Assumption 9, note 47 *infra*.

(c) There is a competitive market in consumer goods. The assumption of competitive markets may miss the essence of such things as cartels, labor unions, efficiencies of scale, or barriers to entry. Grafting these phenomena onto the model, however, is extremely difficult. Currently, this type of "grafting" represents frontier work in the social sciences and economics. *E.g.*, Hendricks, *The Effect of Regulation on Collective Bargaining in Electric Utilities*, 6 BELL J. ECON. 451 (1975); Spence, *Monopoly, Quality and Regulation*, 6 BELL J. ECON. 417 (1975); see Assumption 12, note 47 *infra*.

(d) There is a fixed supply of capital and labor. This assumption is more appealing in a shortrun, static approach than in a longrun, dynamic approach. Since people can enter the labor market at any time, and capital can be created, this assumption fails to take into account ability to change long term behavior patterns. See Assumption 11, note 47 *infra*.

(e) There exist competitive markets in labor and capital, which are the only two inputs to production. The assumption that inputs can be grouped as labor and capital is not an unusual one. The assumption that the market in each input is competitive, however, may miss the essence of the sociological and political phenomena mentioned in (c) above. See Assumption 12, note 47 *infra*.

(f) There is full utilization of all capital and labor in society. In other words, there are no productive resources which are unused. This is partly unappealing because the unemployment rate in our society is probably higher than the frictional rate of unemployment. In addition, there may be excess productive capacity in society (because of unused hammers or drills, for example). See Assumption 11, note 47 *infra*.

(g) All private citizens are profit maximizers. The assumption that there exist only profit maximizers is obviously limited, because people may act out of motivations that appear to be altruistic, or satisficing. See Assumption 14, note 47 *infra*.

III. FORMULATION OF AN IMMUNITY RULE

Employing nine models of governmental activity, this section will undertake an economic analysis of public sector/private sector accidents.³⁷ The behavior of cost-minimizing private parties and a government entity acting in accordance with each of the models examined will be determined under both immunity and suability rules. Thus, either immunity or suability will be chosen on the basis of either economic efficiency or fairness and comparative utility.

There is no agreement on a single, clearly accepted model of governmental behavior. An examination of the literature reveals models of both maximizing ("rational-actor")³⁸ and nonmaximizing³⁹ varieties. The first six models examined in this section can be classified as maximizing models. These models assume that the governmental entity has a goal and is trying to do as well as it can to promote that goal (*i.e.*, maximize).⁴⁰ The last three

(h) The rule of liability is either strict, strict with contributory negligence, negligence with contributory negligence, negligence, or strict liability with dual contributory negligence. This assumption is made because these liability rules represent a set which has been analyzed in the context of accidents between private parties. See Brown, *supra* note 1; Assumption 16, note 47 *infra*.

(i) The production function for private goods is separable. Separability is a technical term which means that the level of cost effective preventive measures that can be taken by the private wheat farmer is invariant with respect to changes in the government's behavior. The way in which this Note models damage awards in tort law requires this assumption. See Definition 15, note 47 *supra*.

37. For analogous analytical style applied to the case of private sector accidents, see Brown, *supra* note 1

38. *E.g.*, G. ALLISON, ESSENCE OF DECISION 10-13 (1971).

39. *E.g.*, W. NISKANEN, JR., BUREAUCRACY AND REPRESENTATIVE GOVERNMENT 48 (1971) (the demand-constrained bureau).

40. This Note contains a set of assumptions and definitions common to the proof of theorems relating to the Welfare-Maximizer, Product-Satisficing-Budget-Consumer, Fixed-Job/Cost-Minimizer, and Profit-Maximizer models. The assumptions and definitions which are unique to each theorem will be presented immediately prior to its statement.

Common Assumptions and Definitions

Assumption 1 There exists a social welfare function, $W(\alpha_1, \dots, \alpha_n)$, $W: \mathbb{R}^n \rightarrow \mathbb{R}$, which maps an n -tuple of real numbers α into a real number. Each α_i represents a governmental variable. [For a discussion of the implications of the use of a social welfare function and restrictions upon its form, see Bergson, *A Reformulation of Certain Aspects of Welfare Economics*, Q.J. ECON. 310-34 (1938). A general discussion of the concepts underlying social welfare functions may be found in P. SAMUELSON, FOUNDATIONS OF ECONOMIC ANALYSIS 219-28 (Atheneum ed. 1974).]

Assumption 2 W is twice differentiable in every variable.

Assumption 3 Given two alternative rules on governmental immunity, two associated states of the world, and that W assigns a value to each, the legal rule that W assigns the higher value is preferred

Assumption 4 W has a global maximum in governmental variables. This is a "bliss point" assumption. It follows from characterizing the α_i as technologies which have external effects (*i.e.*, fires). Without these external effects the assumption of a global maximum would be far less appealing

Definition 1 If C is a subset of \mathbb{R}^n , $f: C \rightarrow \mathbb{R}$, and $a \in \mathbb{R}$, then $L_f(a) = \{x \in C \mid f(x) \leq a\}$.

Definition 2 Given $y \in C$, y is a stationary point of f if $\nabla f(y) = 0$.

Definition 3 $G_f = \{a \in \mathbb{R} \mid L_f(a) \neq \emptyset\}$.

Definition 4 The point to set mapping, $L_f(a)$, is strictly lower semicontinuous (slsc) at point $a \in G_f$ if and only if whenever $x \in L_f(a)$ and there exists a sequence $\{a^i\} \in G_f$ such that $a^i \rightarrow a$, there exists a natural number K , a sequence $\{x^i\}$, and a real number $\beta(x) > 0$ such that

$$x^i \in L_f[a^i - \beta(x)\|x^i - x\|], \quad i = K, K+1, K+2, \dots$$

and $x^i \rightarrow x$.

Now, assume $L_f(a)$ is strictly lower semicontinuous at \bar{a} whenever \bar{x} is a stationary point and $-W(\bar{x}) = \bar{a}$.

The following theorem has been proved:

THEOREM 1 Let f be a real function on C a subset of \mathbb{R}^n and let $\bar{x} \in C$, $f(\bar{x}) = \bar{a}$. Suppose f is differentiable at \bar{x} and $L_f(a)$ is strictly lower semicontinuous at \bar{a} . If \bar{x} is a stationary point of f , then it is also a global minimum of f on C . I. Zang & M. Avriel, On Functions Whose Stationary Points Are Global Minima 5 (Center for Operations Research & Econometrics, Core Discussion Paper No. 7502, Jan. 1975)

This theorem guarantees that

$$\frac{\partial W}{\partial \alpha_i}(\bar{x}) = 0 \text{ for each } i, 1 \leq i \leq n,$$

implies that \bar{x} is a global minimum of $-W$ which further implies that \bar{x} is a global maximum of W . This means that the following is true.

Corollary. If the rate of change of social welfare, W , with respect to an incremental change in every governmental variable, α_i , one at a time, is zero at some given set of governmental activity levels, that set of governmental activity levels is a maximum of social welfare.

Assumption 5 There are n governmental bureaus, and each bureau controls, directly or indirectly, only one governmental activity. This assumption ensures that

$$\frac{\partial \alpha_i}{\partial \alpha_j} = 0 \text{ for each } 1 \leq i, j \leq n, i \neq j.$$

[This assumption may be relaxed so long as the latter condition holds. If α_i and α_j , $i \neq j$, are under the control of a single bureau, then it is more likely that

$$\frac{\partial \alpha_i}{\partial \alpha_j} \neq 0.$$

This is the analog of the assumption of competing economic entities in economic theory. See J. HENDERSON & R. QUANDT, MICROECONOMIC THEORY 105 (2d ed. 1971).]

Assumption 6 Each governmental bureau is under the control of a person whose preferences can be represented by a (utility) function.

Definition 5 A "game" is comprised of persons (players), strategies (what persons do), and outcomes (the situations which result from the juxtaposition of all the player's strategies). For example, a game of chess is a "game" according to this definition. There are two persons involved in the chess game. The strategy which each person selects is the sequence of moves that he chooses for his chess pieces. Three outcomes of the game are possible: the first person wins and the second loses, the first person loses while the second wins, or the two players draw. The outcome of the game is totally determined once the precise strategy of each player is known.

Luce and Raiffa provide a more precise formulation of a "game":

There are n players each of whom is required to make one choice from a well-defined set of possible choices, and these choices are made without any knowledge as to the choices of the other players. The domain of possible choices for a player may include as elements such things as "playing an ace of spades" or "producing tanks instead of automobiles," or more important, a strategy covering the actions to be taken in all possible eventualities. . . . Given the choices of each of the players, there is a certain resulting outcome which is appraised by each of the players according to his own peculiar tastes and preferences. The problem for each player is: what choice should he make in order that his partial influence over the outcome benefits him most?

R. LUCE & H. RAIFFA, GAMES AND DECISIONS 5-6 (1957).

In the following proofs, a series of games will be constructed. The players will be either bureaucrats or private parties. The strategies will involve amounts and techniques of production. Outcomes will be total states of the economy (or alternatively, states of society). The players have preferences over sets of different possible outcomes in the manner described within each

models do not assume maximizing behavior on the part of the governmental entity. No important motivational thread, except for lack of goal orientation, runs between them.

A. THE SIMPLE WELFARE-MAXIMIZING MODEL

This first paradigm of government behavior assumes that the governmental entity wants only to do the best that can be done for the citizens.⁴¹ Neither

proof. By changing the rule on governmental immunity, the structure of the game under consideration will be changed. A given set of strategies may result in different outcomes given different rules on governmental immunity in tort.

In order to make predictions concerning the outcome of a fully defined game, a solution concept must be used. This solution concept, termed a Nash equilibrium, is that knowledge of the other players' strategies should not cause a player to change his own. More formally, in the context of a 2-person game, define α_i to be the first player's i th strategy choice, while β_j is the second player's j th strategy choice, and O_{ij} is the outcome associated with 1 choosing strategy i and 2 choosing strategy j . To Luce and Raiffa,

[i]t seems plausible that, if a theory offers α_{i_0} and β_{j_0} as suitable strategies, the mere knowledge of the theory should not cause either of the players to change his choice: just because the theory suggests β_{j_0} to player 2 should not be grounds for player 1 to choose a strategy different from α_{i_0} ; similarly, the theoretical prescription of α_{i_0} should not lead player 2 to select a strategy different from β_{j_0} . Put in terms of outcomes, if the theory singles out $(\alpha_{i_0}, \beta_{j_0})$, then:

- i. No outcome O_{i_0j} should be preferred by 1 to $O_{i_0j_0}$.
- ii. No outcome O_{ij_0} should be preferred by 2 to $O_{i_0j_0}$.

Any α_{i_0} and β_{j_0} satisfying condition (i) and (ii) are said to be in *equilibrium*, and the *a priori* demand made on the theory is that the pairs of strategies it singles out shall be in equilibrium.

Id. at 63.

An example illustrates the applicability of game theory to the bureaucratic setting. Assume that there are only two bureaus, each a simple welfare maximizer. The first bureau has the job of distributing the main course of a dinner to its only citizen, Prof. Baker. The second bureau is in charge of distributing dessert to Prof. Baker. The first bureau can give Prof. Baker either 2, 3, 4, 5, or 6 servings of the main course. The second bureau can give Prof. Baker 2, 3, 4, 5, or 6 scoops of ice cream for dessert. Prof. Baker's preferences, which are identical with social welfare (he is the only citizen), are listed in figure 1 below.

FIGURE 1.

		Bureau 2				
		Scoops of Ice Cream				
		2	3	4	5	6
Bureau 1 Servings of Main course	2	20	25	30	60	40
	3	30	40	45	85	50
	4	70	80	95	100	95
	5	60	70	90	90	85
	6	88	60	80	85	70

The listed numbers represent only an ordering of his preferences. Any other set of numbers that preserves the given ranking could be used. Note that Prof. Baker prefers most to have 4 servings of the main course with 5 scoops of ice cream for dessert. As long as Bureau 1 believes that Bureau 2 will serve 5 scoops then Bureau 1 will serve 4 servings. Conversely, as long as Bureau 2 believes that Bureau 1 will serve 4 servings of the main course, then Bureau 2 will serve 5 scoops. Thus, 4 servings and 5 scoops is an *equilibrium* for this game. So too, 6 servings and 2 scoops.

41. Welfare maximizing models have been the dominant models of bureaucratic behavior in traditional sociology. See M. WEBER, *THE THEORY OF SOCIAL AND ECONOMIC ORGANIZATION* 124 (1947); R. Noll, *Government Administrative Behavior and Technological Innovation* 10-16

immunity nor suability will affect its production activities, for the entity will do the best it can regardless whether it is suable in tort. For example, suppose that a person in charge of the government-owned railroad wants to satisfy, as much as possible, all of the citizens. Suppose further that he knows how much each of the citizens likes wheat (as opposed to train rides) and he wants only to pick the level of spark emission that makes the citizens as happy as possible. In such a situation, the person running the railroad will choose the same optimal level of spark emission under a suability rule as he would under immunity. Since immunity and suability are thus equally efficient, Simple Welfare Maximizers⁴²—the railroad, for example—should be suable on the

(Cal. Inst. Tech. Soc. Sci. Working Paper No. 62, Oct. 1974) *But see* W. NISKANEN, JR., *supra* note 39, at 36 n.2, 39 (declaring that this model should be regarded as "impossible").

Welfare-Maximizing models of governmental behavior may be attacked as simplistic and naive. First, bureaucrats may not be very concerned with social welfare. They may be more concerned about such factors as budgets, politics, graft, friendship, and tenure. Second, even if a bureaucrat is interested in welfare, it would be virtually impossible for the bureaucrat to assemble needed data: information on consumer preferences is so difficult to obtain and so quickly obsolete that the bureaucrat would be effectively precluded from pursuing his goals. Nonetheless, since some governmental entities may approximate this behavioral model, it must be considered in formulating an immunity rule.

Welfare Maximizer models actually include two types of governmental entities. *See* note 78 *infra*. First, there are bureaus which are run by social welfare maximizing individuals who are *afraid of tort judgments*. These entities may be designated Welfare-Tort Balancers. This type of bureau is considered at notes 73-75 and accompanying text, *infra*.

There may be bureaus, on the other hand, which are run by individuals who do not fear tort judgments. This type of bureau is considered at this juncture.

42. For the general assumptions and definitions, *see* note 40 *supra*.

SIMPLE WELFARE MAXIMIZER MODEL

Specific Assumptions and Definitions

Definition 6 A bureaucrat is a Simple Welfare Maximizer if his utility function is written $U = U(W)$

For purposes of this proof every bureaucrat will be assumed to be a Simple Welfare Maximizer.

Assumption 7 Each bureaucrat wants, other things held constant, to make society better off. In other words, where U_i is the utility function of the i th bureaucrat,

$$\frac{\partial U_i}{\partial W} > 0 \text{ for every } i.$$

THEOREM 2 *A Simple Welfare Maximizer performs optimally under either suability or immunity.*

Proof. The bureaucrats are assumed to be in a game of simultaneous utility maximization. At an equilibrium of this game, $\bar{X} = (\bar{\alpha}_1, \bar{\alpha}_2, \dots, \bar{\alpha}_n)$, the rate of change of each bureaucrat's utility with respect to a change in the level of governmental activity which that bureau controls is zero. In other words, for every j ,

$$(1) \quad \frac{\partial U_1}{\partial W} \frac{\partial W}{\partial \alpha_1} \frac{\partial \alpha_1}{\partial \alpha_j} + \dots + \frac{\partial U_j}{\partial W} \frac{\partial W}{\partial \alpha_j} \frac{\partial \alpha_j}{\partial \alpha_j} + \dots + \frac{\partial U_n}{\partial W} \frac{\partial W}{\partial \alpha_n} \frac{\partial \alpha_n}{\partial \alpha_j} = 0.$$

Since the levels of tort judgments do not enter into this equation, it holds under either immunity or suability.

basis of fairness and comparative utility.⁴³

B. FIVE RATIONAL ACTOR MODELS

The next five models are all of the rational-actor family, but each assumes that the goal being maximized is something other than general social welfare. An analysis of each of the models indicates that immunity should be denied if a governmental entity is found to be acting in accordance with any of the models.

1. *Product-Maximizing Budget Consumer*

Assume that the entity is given a fixed budget. Further, assume that the government is run so as to (1) exhaust the budget allocation, and (2) produce as much as possible.⁴⁴ In the railroad example, the objectives would be to use all of the railroad's budget while producing as many daily train trips as possible.

If the entity is immune from tort liability, the bureau will respond only to internal costs, and not to the social costs of its actions. In attempting to maximize production, the bureau will look for the cheapest methods of production. If the legal system does not force the bureau to consider the social costs of its actions, the bureau will act as if these costs did not exist. Thus, in

Since assumption 5, note 40 *supra*, indicates that each bureau controls (directly or indirectly) only one activity, *i.e.*,

$$\frac{\partial \alpha_i}{\partial \alpha_j} = 0 \text{ for every } i \neq j,$$

and since the rate of change of any activity with respect to itself is always one, *i.e.*,

$$\frac{\partial \alpha_j}{\partial \alpha_j} = 1 \text{ for every } j,$$

line (1) means that for each bureaucrat the product of the marginal utility of social welfare times the rate of change of social welfare with respect to a change in that bureau's activity level is zero at equilibrium. In other words,

$$(2) \quad \frac{\partial U_j}{\partial W} \frac{\partial W}{\partial \alpha_j} (\bar{X}) = 0.$$

By assumption 8, *supra*, each bureaucrat wants, other things being equal, to make society better off. Thus,

$$\frac{\partial U_j}{\partial W} > 0.$$

But this means that at equilibrium the rate of change of social welfare with respect to a change in any activity level is zero. Thus,

$$\frac{\partial W}{\partial \alpha_j} (\bar{X}) = 0 \text{ for all } j.$$

This is the condition needed to satisfy assumption 5, *supra* note 40, so the equilibrium, \bar{X} , is a global maximum of W .

43. See text accompanying notes 27-30 *supra*.

44. The entity may want to make certain that the budget is consumed so that it will not be reduced in the next fiscal period. Product maximization may occur because the entity is following orders, because the person in charge believes that he will get good publicity, as a means to achieve budget maximization, or for other reasons. This model is actually Niskanen's "budget constrained" bureau. W. NISKANEN, *supra* note 39, at 46-47, 57.

his desire to maximize the number of train trips, the railroad manager will allow the engines to emit too many sparks. By denying immunity to the government, society can, through the judgment process, force the railroad to consider the social value of burned crops.⁴⁵ Once the railroad adjusts its behavior to reflect the cost of tort judgments, society will be better off because the citizens will be able to consume greater quantities of goods and services (wheat and train rides).⁴⁶ Therefore, a Product-Maximizing Budget Consumer should be suable in tort.⁴⁷

45. In some jurisdictions, general revenue funds are used to pay tort judgments against governmental entities. *See, e.g.*, Federal Tort Claims Act, 28 U.S.C. §§ 2672, 2677, 2678 (1970) (allowing agency compromise of claims up to \$2,500, but requiring payment of larger claims from a general fund). Other jurisdictions require the offending entities to pay the judgment from their own budgets. *E.g.*, CAL. GOV'T CODE §§ 970-6 (West 1966).

The analyses of the Product-Maximizing Budget Consumer, Fixed-Job Cost Minimizer, and Profit Maximizer depend upon the satisfaction of tort judgments against a government agency by that entity's budget. Where the judgments are satisfied from general revenue funds, the analysis of the three models can no longer rest on economic efficiency grounds. Instead, suability would be recommended on the basis of fairness and comparative utility, leaving this Note's overall results unchanged. *See* text accompanying notes 27-30 *supra*.

It appears nonetheless, on the basis of economic efficiency, that public entities should pay tort judgments out of budget allocations. Payment of tort awards from general revenue funds precludes the possibility of economically adjusting externalities due to government activity. It is only by charging budgets that the Product-Maximizing Budget Consumer, Fixed-Job Cost Minimizer, and Profit Maximizer can be directly forced to consider the social costs of their actions. Of course, indirect pressures could be brought to bear upon an offending agency through the budgeting process where budget increases and other favors are threatened to be withheld unless preventative measures are taken. This is especially so with smaller, local governments where any effect in general is more acutely felt by individual agencies.

46. Technically, it may be necessary to readjust the railroad's budget to achieve these strict results. This readjustment is needed for the same reasons that redistributing wealth is needed in the Profit-Maximizer model and varying the job is required in the Fixed-Job-Cost-Minimizer model.

47. For general definitions and assumptions, see note 40 *supra*.

PRODUCT MAXIMIZING BUDGET CONSUMER
Specific Assumptions and Definitions

Definition 7 U_j is the utility function of the j th citizen. [This use is different from that in the Welfare Maximizer theorem.]

Definition 8 c_{i1} is the amount of the first good or service consumed by the i th individual. c_{i2} is the amount of the second good or service consumed by the i th individual. (The distinction between goods and services is irrelevant in this context.)

Definition 9 α is a measure of the level of some governmental activity (such as spark emission) which has injury-producing side-effects.

Definition 10

$$W = W(U_1(c_{11}(\alpha), c_{12}(\alpha)), \dots, U_m(C_{m1}(\alpha), C_{m2}(\alpha)))$$

Assumption 8 W is positively responsive:

$$\frac{\partial W}{\partial U_i} > 0 \text{ for all } i \text{ everywhere.}$$

In other words, whenever an individual becomes happier, while all other individuals stay at least as happy, social welfare increases. [This condition is similar to but weaker than Arrow's condition P. *See* K. ARROW, SOCIAL CHOICE AND INDIVIDUAL VALUES 96 (1963) (a Pareto-efficiency criterion).]

Assumption 9 There are only two goods or services (including the one produced by the government) and the technology used in governmental production interferes with production by the private party. [The assumption of a two-good world has been used in the legal-economic literature before. *E.g.*, Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (1960).]

Definition 11 K_g is the amount of capital used in production of the government good or service

Definition 12 L_g is the amount of labor used in production of the government good or service

Definition 13 The government production function is of the form $f = f(K_g, L_g, \alpha)$. f has the following properties:

- (i) $f_{K_g} > 0$ everywhere
- (ii) $f_{L_g} > 0$ everywhere
- (iii) for any \bar{K}, \bar{L} there exists $\bar{\alpha}$ such that

$$\frac{\partial f}{\partial K_g}(\bar{K}, \bar{L}, \bar{\alpha}) = 0.$$

Definition 14

$$\frac{\partial f}{\partial K_g} = f_{K_g}, \frac{\partial f}{\partial \alpha} = f_{\alpha}, \text{ etc.}$$

Assumption 10 Consumers are never satiated with respect to any good or service. In other words,

$$\frac{\partial U_j}{\partial c_j} > 0 \text{ for } j = 1, 2, \text{ and for every } j.$$

[This assumption is often used in proofs of the existence of competition equilibrium. See J. QUIRK & R. SAPOSNIK, *INTRODUCTION TO GENERAL EQUILIBRIUM THEORY AND WELFARE ECONOMICS* 100-02 (1968).]

Definition 15 The private production function is of the form $q = q(K_q, L_q, \alpha)$ where K_q and L_q are defined analogously to K_g and L_g . The function q has the properties:

- (i) q_{α} is less than 0 everywhere.
- (ii) $\frac{\partial^2 q}{\partial K_q \partial \alpha} = \frac{\partial^2 q}{\partial L_q \partial \alpha} = 0$ everywhere (separability).

Assumption 11 The total supplies of capital and labor are both fixed and totally utilized. Thus $K_g + K_q = \bar{K} = \text{constant}$, and $L_g + L_q = \bar{L} = \text{constant}$.

Assumption 12 There are competitive markets in capital, labor, and the private good or service.

Definition 16 p_q is the price of the private good or service (wheat). (The private parties believe that p_q is constant.)

Definition 17 r is the interest rate on capital.

Definition 18 w is the wage rate of labor.

Assumption 13 All parties are assumed to believe that r and w are constant. [For a description of the underlying assumptions of a competitive market, see J. HENDERSON & R. QUANDT, *MICROECONOMIC THEORY* 104-05 (1971).]

Assumption 14 The private producer is a profit maximizer.

Assumption 15 No bargaining is possible between the government and the private party.

Assumption 16 The rule of liability is strict with a contributory negligence defense. The rule of liability may also be strict liability if f is separable. In other words, if

$$\frac{\partial f}{\partial K_g}(K_g, L_g, 0) = \frac{\partial f}{\partial K_g}(K_g, L_g, \alpha) \text{ for all } K_g, L_g, \text{ and } \alpha;$$

and if similar conditions hold for L_g . If f is separable, the rule may also be strict liability with dual contributory negligence, negligence with contributory negligence, or negligence. This Note uses strict liability with contributory negligence because it aids the exposition. In addition, definition of negligence for a governmental agency may be difficult, for the final good or service may not be distributed with a pricing system. For a profit maximizing entity, negligence presumably exists if there is some cost effective preventive measure which is not undertaken. In other words, if

$$p_r \frac{\partial f}{\partial K_g}(K_g, L_g, \alpha) < r, \text{ or } p_l \frac{\partial f}{\partial L_g}(K_g, L_g, \alpha) < w,$$

the entity is negligent. The lack of p_q makes defining negligence difficult for the government. Perhaps the entity's failure to use the α which is socially maximal, *i.e.*, satisfies equations (4) and (5) would be a satisfactory way of identifying negligence.

Derivation of production efficiency conditions: In deriving the production efficiency conditions for society, the goal is to maximize the production of f subject to the constraint that $q = q_0 =$ constant. Set $\mathcal{L} = f + \lambda(q - q_0)$ and differentiate. Still using the convention that

$$\frac{\partial \mathcal{L}}{\partial L_i} = \mathcal{L}_{L_i},$$

the following results are obtained:

$$\begin{aligned}\mathcal{L}_{L_1} &= f_{L_1} + \lambda q_{L_1} \frac{\partial L_q}{\partial L_1} = f_{L_1} - \lambda q_{L_1} = 0 \\ \mathcal{L}_{K_1} &= f_{K_1} - \lambda q_{K_1} = 0 \\ \mathcal{L}_q &= f_q - \lambda q_q = 0 \\ \mathcal{L}_\lambda &= q - q_0 = 0.\end{aligned}$$

By combining these equations, the production efficiency conditions are obtained. First, the ratio of the marginal productivities of labor to capital must be the same in the public and private sectors. In other words,

$$(3) \frac{f_{L_1}}{f_{K_1}} = \frac{q_{L_1}}{q_{K_1}}$$

Second, the product of the marginal productivity of the productive technology to the government and the marginal productivity of labor (or capital) to the private producer plus the product of the unproductivity of the government's technology to the private producer and the marginal productivity of labor (or capital) to the government equals zero. In other words,

$$(4) f_q q_{L_1} + q_q f_{L_1} = 0$$

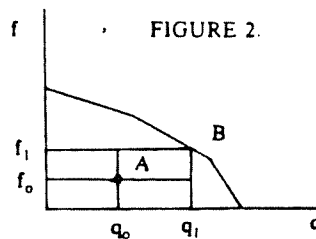
$$(5) f_q q_{K_1} + q_q f_{K_1} = 0.$$

THEOREM 3 *In a society consisting of one Product Maximizing Budget Consumer and one private individual, social welfare (W) will be maximized if and only if the government is suable in tort.*

Proof:

Lemma 1: All maxima of W lie on the production possibilities curve for society. (For a derivation and description of the production possibilities curve, see J. QUIRK, MATHEMATICAL NOTES TO INTERMEDIATE MICROECONOMICS 103 (1976).)

Proof of Lemma 1: Pick any point in the space of total societal output which is not on the production possibilities curve. This point cannot be a global maximum of W (see figure 2).



Call this point interior point A. There is a point on the production possibilities curve, B, at which more of everything is produced. If all of the increase in production (*i.e.*, $f_1 - f_0$ and $q_1 - q_0$) are given to any individual, that individual will be strictly happier according to assumption 11, *supra*. By assumption 9, note 42 *supra*, this means that W assigns higher value at B than at A. Therefore, A cannot be a maximum of the social welfare function. ††

Lemma 2: Society will not produce on the production possibilities curve if the government is immune.

Proof of Lemma 2: Consider granting immunity to the government. Given a budget, B , the government will maximize production subject to the budget constraint. Set up a Lagrangian expression representing governmental immunity, $E = f(K_t, L_t, \alpha) + \lambda_1 (rK_t + wL_t - B)$, and differentiate:

$$(6) \quad E_{K_t} = f_{K_t} + \lambda_1 r = 0,$$

$$(7) \quad E_{L_t} = f_{L_t} + \lambda_1 w = 0,$$

$$(8) \quad E_\alpha = f_\alpha = 0,$$

$$(9) \quad E_{\lambda_1} = rK_t + wL_t - B = 0.$$

Equation (8) states that the marginal productivity of the government's technology is zero at equilibrium. Since it is assumed that the marginal productivity of either labor or capital to the government is nonzero and that the marginal unproductivity of the government's technology to the private producer is nonzero, it is impossible for either production efficiency condition (4) or (5) to hold. ††

Lemma 3: Society will produce on the production possibilities curve if the government is suable in tort.

Proof of Lemma 3: Consider making the government suable in tort. The measure of damages will be taken as $p_q q(K_q, L_q, 0) - p_q q(K_q, L_q, \alpha)$ and will be assessed against the governmental entity. In these circumstances, the Lagrangian expression should be written

$$E = f(K_t, L_t, \alpha) + g(rK_t + wL_t + p_q(q(K_q, L_q, 0) - q(K_q, L_q, \alpha)) - B)$$

where g is a Lagrangian multiplier. Differentiating, the following results are obtained:

$$(10) \quad E_{K_t} = f_{K_t} + g \left[r + p_q [q_{K_q}(K_q, L_q, 0) \frac{\partial K_q}{\partial K_t} - q_{K_q}(K_q, L_q, \alpha) \frac{\partial K_q}{\partial K_t}] \right]$$

$$= f_{K_t} + gr = 0 \text{ by definition 15,}$$

$$(11) \quad E_{L_t} = f_{L_t} + g \left[w + p_q [q_{L_q}(K_q, L_q, \alpha) \frac{\partial L_q}{\partial L_t} - q_{L_q}(K_q, L_q, 0) \frac{\partial L_q}{\partial L_t}] \right] = 0$$

$$= f_{L_t} + gw = 0 \text{ by assumption 15,}$$

$$(12) \quad E_\alpha = f_\alpha - g p_q q_\alpha = 0,$$

$$(13) \quad E_g = rK_t + wL_t + p_q [q(K_q, L_q, 0) - q(K_q, L_q, \alpha)] = B.$$

Combining equations (10), (11), and (12), the governmental *equilibrium* conditions are obtained. First, the ratio of the marginal productivity of capital to labor in governmental production equals the ratio of the interest rate to the wage rate,

$$(14) \quad \frac{f_{K_t}}{f_{L_t}} = \frac{r}{w}$$

Second, the ratio of the marginal productivity of capital (or labor) to the government to the marginal productivity of the technology (*i.e.*, spark emissions) to the government equals the ratio of the interest rate (or wage rate) to the value of the marginal productivity of the technology to the private party.

$$(15) \quad \frac{f_{K_t}}{f_\alpha} = \frac{-r}{p_q q_\alpha} \text{ and}$$

$$(16) \quad \frac{f_{L_t}}{f_\alpha} = \frac{w}{p_q q_\alpha}$$

Consider the incentives of the private producer who is operating under a contributory negligence rule and is trying to maximize profits. Total revenues (TR) will include damage awards if he is *not* guilty of contributory negligence and will include only sales revenues if he is. Without contributory negligence,

$$TR = p_q q + p_q q(K, L, 0) - p_q q(K, L, \alpha).$$

2. Fixed-Job Cost Minimizer

Assume that the government has a certain fixed job to do and is structured in such a way as to minimize the costs of doing the job.⁴⁸ For example, the railroad might have its schedule fixed at ten trips per day and might be instructed to minimize the cost of making those ten trips per day.

A Fixed-Job Cost Minimizer will respond only to internal costs, and not to the social costs of its actions; if immune, the railroad will choose the level of spark emissions that makes running the railroad as inexpensive as possible,

and with contributory negligence,

$$TR = p_q q.$$

The producer will presumably be found contributorily negligent if and only if the value of the marginal productivity of capital or labor (in accident prevention activities) is greater than the cost of capital or labor. In other words,

$$(17) \quad p_q q_K(\alpha) > r,$$

or

$$(18) \quad p_q q_L(\alpha) > w.$$

Sublemma. The private producer will always engage capital and labor to the point where the values of their marginal productivities are equal, respectively, to the interest and wage rates ($p_q q_K(\alpha) = r$ and $p_q q_L(\alpha) = w$.)

Proof of sublemma: [Case 1] Assume that the private producer has decided to be contributorily negligent—he does not count on being compensated. Then he will maximize a profit function which is the difference between the revenues from his sales and his costs due to hiring inputs. (Profit = $\pi = p_q q(\alpha) - rK - wL$.) To maximize his profit he must use inputs to the point that the value of their marginal productivity is equal to their cost. ($p_q q_K(\alpha) = r$ and $p_q q_L(\alpha) = w$.)

[Case 2] If the producer decides to be nonnegligent, then he will maximize the same profit function with damages added. ($\pi = p_q q(\alpha) - rK - wL + (p_q q(0) - p_q q(\alpha))$). This will lead the producer to use inputs to the point that the value of their marginal productivity, given that the interfering technology is unused, equals their cost. By Definition 15, *supra*, this condition is equivalent to hiring inputs until the value of their marginal productivity (with technology at its true level) equals their cost. Thus, by definition 15,

$$\frac{\partial \pi}{\partial r} = p_q q_K(0) - r = 0 = p_q q_K(\alpha) - r,$$

and

$$\frac{\partial \pi}{\partial L} = p_q q_L(0) - w = 0 = p_q q_L(\alpha) - w.$$

Because the sublemma is true under either case ($p_q q_K(\alpha) = r$ and $p_q q_L(\alpha) = w$), the sublemma is proved. ‡

By substituting $p_q q_K(\alpha)$ for r and $p_q q_L(\alpha)$ for w in equilibrium equations (14), (15), and (16), the production efficiency conditions are obtained, thereby proving Lemma 3. ††

Combining Lemma 2 ("only if") and Lemma 3 ("if") results in an "if and only if" proposition, and adding Lemma 1 ("production possibilities curve"), and a judicious choice of the government's budget, Theorem 3 is proved. The choice of budget is needed because the maximum of W lies on the production possibilities curve, but its exact location is not specified. By controlling the government's production (through its budget), society may reach the most desirable production point. Q.E.D.

Since assumption 3, note 40 *supra*, mandates the choice of the liability rule which leads to an optimal state of society, Theorem 3 prescribes suability.

48. An example of this model is a subcontractor with a lump-sum payment for services rendered.

without regard to the value of the lost crops. If immunity is denied, the government railroad will be forced through the judgment process to internalize the social costs that it imposes.⁴⁹ Once the government takes these social costs into account, it will adjust its behavior in such a manner that society will be better,⁵⁰ *i.e.*, the citizens will be able to consume more satisfying amounts of goods and services (wheat and train rides).⁵¹ Therefore, a Fixed-Job Cost Minimizer should be suable.⁵²

3. Profit Maximizer

Profit maximization, a commonly used model of private behavior, can be used to describe governmental motivation. The term "Profit Maximizer"⁵³ is used because the government seeks to make the difference between its costs and revenues as large as possible. In the context of a railroad, the assumption is that the person in charge of the entity will sell tickets to citizens, drive the trains, and choose the level of spark emissions, with the single goal of making money.

If a profit-maximizing governmental entity is granted immunity from tort suits, it will ignore the social costs of its actions when making internal production decisions. The railroad will not care about the acres of wheat that are lost in fires it has caused and will therefore select the level of spark emission at which internal production costs are minimized. Denying the

49. See note 45 *supra*.

50. For an explanation of the reasoning behind this step, see note 52 *infra*.

51. ~~Technically, a redefinition of the fixed job may be needed to achieve strict results.~~ For an explanation of this requirement, see note 52 *infra*.

52. For the general assumptions and definitions, see note 40 *supra*.

FIXED-JOB COST MINIMIZER

The formal economic analysis of this model is so similar to the analysis of the Product-Maximizing Budget Consumer that it will not be fully presented. See note 47 *supra*. Instead, the model will be briefly described.

Specific Definitions and Assumptions

All of the assumptions and definitions used in the Product-Maximizing Budget Consumer are also used here, with the exception that the governmental bureau is assumed to have a fixed job to do ($f = f_0$), and its costs (depending upon the rule of immunity) are either the cost of inputs or the cost of inputs plus the cost of tort judgments. ($rK + wL$, or $rK + wL - p_a q(a) + p_q q(0)$.) In either case, the government minimizes the cost of production while producing the fixed amount. (*I.e.*, the Lagrangian expression is either $\xi = rK + wL + \lambda(f - f_0)$ or $\xi = rK + wL - p_a q(a) + p_q q(0) + \lambda(f - f_0)$.) Following differentiation, the analysis of the Fixed-Job Cost Maximizer is, line for line, virtually identical with that of the Product-Maximizing Budget Consumer. The following theorem is proved by that analysis:

THEOREM 4 *In a society consisting of one Fixed-Job Cost Minimizer and one private individual, society will produce on the production possibilities curve if and only if the government is suable in tort. (Some judicious choice of the job constraint must be made in order to insure that maximality will result.)*

53. For a description of the circumstances in which a bureau might be expected to act as a Profit Maximizer, see W. NISKANEN, JR., *supra* note 34, at 33-35.

government immunity forces it to consider the social costs caused by its production methods.⁵⁴ After considering these social costs, the government would decrease the level of spark emissions, thus permitting citizens to consume more satisfying combinations of goods and services (wheat and train rides). Society will be better off.⁵⁵ To achieve this happy result, however, a Profit Maximizer must be suable in tort.⁵⁶

54. See note 45 *supra*. This result is a well-known theorem in law and economics. See Brown, *supra* note 1.

55. The logical step at this point is provided by some complex economic analysis. See note 56 *infra*.

Technically, a redistribution of wealth may be necessary, following a change in the immunity rule, to achieve these strict results. Changing the immunity rule is, in itself, a wealth redistribution. It is possible that, following a change in the immunity rule, wealth holdings will have been so altered that the competitive system would not produce a better state of society. With an appropriate redistribution of wealth, however, any Pareto-optimal state of society may be achieved. J. QUIRK & R. SAPOSNIK, *INTRODUCTION TO GENERAL EQUILIBRIUM THEORY AND WELFARE ECONOMICS* 149 (1968). This is sufficient to guarantee that with an appropriate wealth redistribution society will be better off if the government is suable. See note 56 *infra*.

56. For general definitions and assumptions, see note 40 *supra*.

PROFIT MAXIMIZER MODEL

Specific Definitions and Assumptions

Every definition and assumption used in the analysis of the Product-Maximizing Budget Consumer will also be used here except that here the government is assumed to act as if its primary goal were profit maximization (This theorem reproduces, in some respects, results contained in Brown, *supra* note 1.)

THEOREM 5 *In a society consisting of two profit maximizers (an individual and a governmental entity), society will produce on the production possibilities curve if and only if the government is suable in tort.*

Proof. Using the results on production efficiency conditions and Lemma 1 found in the analysis of the Product-Maximizing Budget Consumer in note 47 *supra*, consider the two cases: immunity and suability.

Case 1: Assume that the government is immune from tort suit. It will maximize profit without regard to tort judgments and will use the interfering technology to the point where the marginal productivity of the interfering technology is zero. This, in turn, means that society is not producing on the production possibilities curve. (Profit = $\pi = p_f f - rK - wL$ where p_f = price of f . $\pi_a = p_f f_a = 0$ implies $f_a = 0$.)

Case 2: Assume that the government is suable in tort. The measure of damages will be assumed to be the difference between the revenues which the private firm would have had in the absence of interfering technology and the revenue which it actually did have (holding price constant). (I.e., Damages = $p_q q^{(0)} - p_q q(\alpha)$) [On the measure of damages and the need for Definition 15, see note 47 *supra*.]

The government will maximize profits while taking damages into account. (Profit = $\pi = p_f f(\alpha) - rK - wL - p_q q(0) + p_q q(\alpha)$.) This will lead to a use of interfering technology to the point that the marginal value of increasing the technology to the government is equal to the marginal value of the decrease in private production. ($p_f f_a + p_q q(\alpha) = 0$.) The normal input conditions are also obtained. ($p_f f_L = w$, $p_f f_K = r$.)

That the private producer will use inputs to the point that the value of their marginal productivity equals their cost ($p_q q_K = r$, $p_q q_L = w$), follows from the results in the Product-Maximizing Budget Consumer. [See note 47 *supra*.] Q.E.D.

Here it may be necessary to redistribute initial wealth holdings to guarantee optimality.

4. *Empire Maximizer*⁵⁷

Assume that the person in charge of the hypothetical entity is anxious to expand his empire (area of operation). In such a case, the effect of a change in the immunity rule upon the entity's behavior is unpredictable. Depending on the bureaucrat's assessment of the political process, the effect on his empire might be perceived as positive, negative, or zero. Even if the entity's alternative behavior under immunity or suability were known, it would still be unknown in terms of social welfare whether this behavior was good, bad, or indifferent.⁵⁸ Although it may be possible to determine that the bureau's behavior under both immunity and suability is non-optimal, selection of a "second best" solution is likely to be very expensive or fraught with inaccuracies.⁵⁹ Since fairness and comparative utility are thus the most attractive and appropriate criteria for choosing an immunity rule,⁶⁰ an Empire Maximizer should be suable in tort.

5. *Malevolent Entity*⁶¹

Assume that the person running the railroad is a personal enemy of one of the

57. This model is attributed to Professor Michael E. Levine, University of Southern California Law Center.

58. An example demonstrates that with more data it may be possible to predict the direction, but not the desirability, of a legally inspired change in an Empire Maximizer's behavior. The bureau, accountable to an extremely cost-conscious, budget-controlling, and reelection-oriented legislative group, might wish to expand into research and development activities. If the government were suable in tort then the railroad could increase the level of spark emissions to engender more judgments. These judgments could be used as evidence of the cost effectiveness of research and development activities aimed at inventing sparkless train tracks. Higher judgments would lead to a greater probability that the cost conscious legislative group would allow the railroad to undertake research and development activities. Nevertheless, if the railroad were immune it would become impossible to make such arguments to the legislative group and there would be no analogous incentives to make sparks.

In general, the bureau's relations with legislative oversight committees, desires for expansion into certain endeavors, desires for publicity, and sources of funding may be relevant areas of inquiry. The acquisition of this information on any Empire Maximizer, which is likely to be expensive and time consuming, is *unlikely* to yield results on the *desirability* of the bureau's behavior. Information on the relationship of the behavior under either immunity or suability to the citizens' tastes and preferences would still be lacking.

59. See note 26 *supra*.

60. Where it is not possible to say anything rigorously, this Note chooses suability on the basis of fairness and comparative utility. See text accompanying notes 27-28 *supra*.

61. This title might suggest a social welfare minimizer to some readers. For example, someone who hates society might be put in charge of the government's railroad. It is unclear exactly how this could be explained—perhaps madmen or ultra-ambitious individuals have seized control. This rather fantastic model does not seem helpful to the analysis in this context. At the very least, a social welfare minimizing government would be politically unstable. On the other hand, for a summary of the attempt to explain *regulatory* behavior by a theory of "lawyer dominance," see R. Noll, *Government Administrative Behavior and Technological Innovation* 21-26 (Cal. Inst. Tech. Soc. Sci. Working Paper No. 62, Oct. 1974).

For the purposes of the economic analysis in this Note, it is more useful to portray a Malevolent Entity as one which picks on disfavored individuals, such as those who are politically

wheat farmers (Mr. Baker) who lives along the tracks. The railroad is run so as to use the socially optimal amount of sparking everywhere except on that section of track which borders Baker's land. On that track, the spark level is greatly increased through the use of a spark gun. As a result, Baker has a tremendously high number of wheat fires.

The analysis of purely *destructive* sparking is simple. If the government is immune from tort suit for malicious behavior then Baker will suffer as large a torrent of sparks as is feasible. On the other hand, suability will lead to fewer sparks falling on Baker's crops. If malicious behavior were the only consideration under this model, then suability would be the most efficient rule; suability would deter some of the fires on Baker's land, allow him to bring more wheat to market, and let the citizens eat increased quantities of food. Society would be better off.

It is possible, however, that suability for malicious behavior would affect *productive* behavior. If judges and juries were unable to ascertain whether a spark was emitted maliciously or pursuant to productive behavior, suability in tort for malicious behavior might engender judgments for damages resulting from productive sparking. The railroad might lose cases to farmers other than Baker whose crops were burned by the socially optimal amount of sparking. These farmers would claim that they, like Baker, are hated by the railroad. If juries and judges are unable to distinguish between malicious and productive sparking, some of these farmers will prevail. In response, the railroad will adjust its *productive* behavior, resulting in a decrease in the number of train trips available for citizen consumption.

It is impossible, in the abstract, to show rigorously that fewer train rides and more wheat would be better (or worse) than more train rides and less wheat. In specific situations, the importance and magnitude of the losses and gains may be ascertainable. Narrow rules could be developed in accordance

at odds with the government or are personal enemies of the officials in charge. The existence of the White House enemies list should make this assumption more credible.

In particular, malicious prosecution has inspired this model. Public entities are expressly exempted from liability in California for malicious prosecution. *Fish v. Regents of Univ. of Cal.*, 246 Cal. App. 2d 327, 54 Cal. Rptr. 656 (1966); CAL. GOV'T CODE § 821.6 (1966).

In enacting an amendment to the Federal Tort Claims Act the federal government may have accepted some of the arguments of this section. The amendment reads:

The provisions of this chapter and section 1346(b) of this title shall not apply to—
 (h) Any claim arising out of assault, battery, false imprisonment, false arrest, malicious prosecution, abuse of process, libel, slander, misrepresentation, deceit, or interference with contract rights: *Provided*, That, with regard to acts or omissions of investigative or law enforcement officers of the United States Government, the provisions of this chapter and section 1346(b) of this title shall apply to any claim arising, on or after the date of the enactment of this proviso, out of assault, battery, false imprisonment, false arrest, abuse of process, or malicious prosecution. For the purpose of this subsection, "investigative or law enforcement officer" means any officer of the United States who is empowered by law to execute searches, to seize evidence, or to make arrests for violations of Federal law.

28 U.S.C. § 2680(h) (Supp. IV 1974)

with these specific observations. In general, however, fairness and comparative utility suggest that a Malevolent Entity should be suable in tort.⁶³

C. NONMAXIMIZING MODELS

Nonmaximizing models, which are usually the product of sociology or political science,⁶⁴ define the government's motivations only as they are expressed in observable behavior. For this reason, nonmaximizing models are very difficult to analyze rigorously. Nevertheless, these models are a significant part of the existing literature on governmental behavior and must, therefore, be considered.⁶⁵

1. *Product-Satisficing Budget Consumer*

A Product-Satisficing-Budget-Consuming governmental entity seeks to produce some predetermined level of service and does not attempt to produce any more. In addition, the person in charge exhausts the allocated budget.⁶⁶ The railroad would be run, for example, so as to make exactly five trips per day while using all of the budget in the process. No absolute prediction as to the level of sparking is possible given these assumptions. The Product-Satisficing Budget Consumer should therefore be suable in tort based upon fairness and comparative utility considerations.⁶⁷ This result is reached for independent economic reasons, moreover, if it is further assumed that there is some "fat" in the budget.⁶⁸ Under these circumstances, the judgment process takes some of the resources that are being used inefficiently by the government and gives them to the farmers. The farmers could then grow more wheat while the government-produced the same level of service. Whereas immunity would impede this resource redistribution, government suability would enable citizens to consume larger quantities of train rides and wheat. On these grounds, the Product-Satisficing Budget Consumer should be denied tort immunity.

2. *Fixed Producer*

Assume that all of the activities of the governmental entity are predetermined

63. See text accompanying notes 27-30 *supra*.

64. See, e.g., W. NISKANEN, JR., *supra* note 39, at 48; G. ALLISON, *ESSENCE OF DECISION* 67-68 (1971).

65. Because the nature of each paradigm precludes rigorous analysis and behavior prediction, intuition must play a greater role. Obviously, the specification and analysis of these models will seem natural only to the extent that the author's intuition coincides with that of the reader.

66. This model is Niskanen's "demand constrained" bureau. See W. NISKANEN, JR., *supra* note 39, at 48.

67. See text accompanying notes 27-30 *supra*.

68. This expression means that the government is not producing as much as it could with its budgetary resources.

at some level and that the level does not vary with changes in the immunity rule (*i.e.*, the entity's behavior is fixed).⁶⁹ Under these circumstances, no choice between the rules can be made on the basis of production and consumption levels. Once again, a recommendation must be based on fairness and comparative utility: a fixed producer should be suable.

3. *Random, Budget Consumer*

Assume that there is no discernible systematic pattern to the railroad's behavior, except that the entire budget is consumed.⁷⁰ It would then be impossible to predict the effect of a change in the immunity rule on bureau behavior. On the basis of fairness and comparative utility,⁷¹ a Random, Budget Consumer should be suable in tort.

D. PRELIMINARY SYNTHESIS OF AN IMMUNITY RULE

Each analysis of government behavior presented in this section suggests that the governmental entity should be suable in tort. In the cases of the Product-Maximizing Budget Consumer, the Profit Maximizer, and the Fixed-Job Cost Minimizer suability is indicated for economic efficiency reasons. Each of those entities should be denied immunity to force it to consider the social costs of its actions. Although, with regard to each of the other models, it is impossible to say that either suability or immunity would be more economically efficient, immunity should be denied to the entity on the basis of fairness and comparative utility. Thus, the rule which may be synthesized from all of the models is that the government should be suable in tort.⁷²

69. For a more complex variant of this form of model, see G. ALLISON, *ESSENCE OF DECISION* 67-68 (1971). Although Allison does not maintain that government behavior is fixed, he claims that there are an extremely limited number of options. This Note assumes that the number of options equals one. A more sophisticated treatment of his model would still lead to a recommendation of no immunity on the grounds of fairness and comparative utility. See text accompanying notes 27-30 *supra*.

70. The model is similar to a Product-Maximizing or Product-Satisficing-Budget-Consumer model, but it is difficult to imagine how this model could be an accurate reflection of governmental behavior. If the budget is entirely consumed then someone must be paying attention to cash flows and to phenomena associated with these flows. If immunity is granted to the government, then the person who is paying attention to the cash outflow can forget about the cost of wheat fires. Subjecting the railroad to liability, however, will capture the attention of whomever is controlling the money. Gross overuse of sparking may then be corrected because it costs a lot of money in tort judgments.

71. See text accompanying notes 27-30 *supra*.

72. These results are significant in two respects. First, the analyses of individual models are independent of each other. Second, the analyses demonstrate the sensitivity of economic analysis to assumptions about institutions. The results of economic analysis can be altered—from suability to immunity—merely by changing behavioral assumptions. Compare notes 41-43 and accompanying text *supra*, with notes 73-75 and accompanying text *infra*.

IV. REFORMULATION

In the foregoing section, a governmental immunity rule was formulated using nine models of governmental behavior. In the interest of simplicity, however, one relevant model was not considered. This section will analyze that final model and its effect on the rule that was synthesized using the other models.

A. WELFARE/TORT BALANCER

The Welfare/Tort Balancer is a variant of the Simple Welfare Maximizer. Like the Simple Welfare Maximizer, the Welfare/Tort-Balancing bureaucrat wants to do the best that he can for the citizens. Unlike the Simple Welfare Maximizer, however, the Welfare/Tort Balancer dislikes tort judgments against his bureau.⁷³ This difference alters the analysis significantly.

If the government is suable, then it is possible that tort judgments will interfere with the government's desire to help the citizens. The person providing government services might desire to minimize tort judgments for several reasons. He might feel, for instance, that an adverse tort judgment is a statement that he has not done his job well, or that a certain amount of public ridicule and embarrassment accompanies a tort judgment. Under these circumstances, he might be willing to sacrifice citizen welfare to escape some liability; the loss to the bureaucrat from lost social welfare might be more than balanced by a gain in foregone embarrassment. If the government is granted immunity, however, it will be left free to pursue the best course of action (in terms of social welfare), unhampered by the desire to avoid tort judgments.

Suppose, for example, that the manager of the government-owned railroad wants to satisfy, as much as possible, all of the citizens. He knows how much each of the citizens likes wheat (as opposed to train rides) and wants to pick the level of spark emission that makes the citizens as happy as possible. He also wishes to avoid tort judgments against the railroad. If the government is suable in tort, the bureaucrat will believe that tort judgments will change as the level of spark emissions changes.⁷⁴ In such a situation, the railroad manager will choose a non-optimal level of spark emission so that the entity can escape some liability. On the other hand, if the railroad is immune, he will feel free to choose the optimal level of spark emission, unhampered by fears of tort judgments. Therefore, if the government is acting as a Welfare/Tort Balancer, *immunity* is the preferable rule.⁷⁵

73. Legal literature is full of examples of the "fear of tort judgment" assumption. See, e.g., Hjort, *The Passing of Sovereign Immunity in Montana: The King Is Dead!*, 34 MONT. L. REV. 283, 296-97 (1973); James, *supra* note 3, at 652; Kennedy & Lynch, *Some Problems of a Sovereign Without Immunity*, 36 S. CAL. L. REV. 161, 180-81 (1963); Comment, *The Role of the Courts in Abolishing Governmental Immunity*, 1964 DUKE L.J. 888, 896.

74. See Equation (2'), note 75 *infra*.

75. For the general assumptions and definitions, see note 40 *supra*.

WELFARE/TORT BALANCER

Specific Assumptions and Definitions

Definition 19 A bureaucrat is a Welfare/Tort Balancer if his utility function is written $U = U(W, T(\alpha_i))$ where $T(\alpha_i)$ is defined to be the dollar amount of tort judgments against the i th bureau. (For the purposes of this proof, every bureaucrat will be assumed to be a Welfare/Tort Balancer.)

Assumption 17 Each bureaucrat wants, other things held constant, to make society better off. In other words,

$$\frac{\partial U_i}{\partial W} > 0 \text{ for all } i,$$

where U_i is the utility function of the i th bureaucrat. He or she also wishes to minimize the amount of tort judgments against the bureau. In other words,

$$\frac{\partial U_i}{\partial T} < 0 \text{ for all } i.$$

THEOREM 6 A Welfare/Tort Balancer should be granted immunity from tort suits.

Proof.

Lemma 4: Governmental suability may lead to a state of society that is nonmaximal.

Proof of Lemma 4: The bureaucrats are assumed to be in a game of simultaneous utility maximization. At an equilibrium of this game, $\bar{X} = (\bar{\alpha}_1, \dots, \bar{\alpha}_n)$, the rate of change of each bureaucrat's utility with respect to a change in the level of governmental activity that his or her bureau controls is equal to zero. In other words,

$$\begin{aligned} (1') \quad & \frac{\partial U_i}{\partial W} \frac{\partial W}{\partial \alpha_i} + \frac{\partial U_i}{\partial T} \frac{\partial T}{\partial \alpha_i} + \dots + \frac{\partial U_i}{\partial W} \frac{\partial W}{\partial \alpha_i} + \frac{\partial U_i}{\partial T} \frac{\partial T}{\partial \alpha_i} + \\ & \dots + \frac{\partial U_i}{\partial W} \frac{\partial W}{\partial \alpha_n} + \frac{\partial U_i}{\partial T} \frac{\partial T}{\partial \alpha_n} = 0 \text{ for every } 1 \leq i \leq n. \end{aligned}$$

Since the corollary to Theorem 1, note 40 *supra*, indicates that each bureau controls (directly or indirectly) only one activity, *i.e.*,

$$\frac{\partial \alpha_i}{\partial \alpha_j} = 0 \text{ for } i \neq j,$$

equation (1') means that for each bureaucrat the product of the marginal utility of social welfare times the rate of change of social welfare with respect to a change in that bureau's activity level plus the marginal disutility of tort judgments times the rate of change of tort judgments with respect to the bureau's activity is zero at equilibrium. In other words,

$$(2') \quad \frac{\partial U_i}{\partial W} \frac{\partial W}{\partial \alpha_i} + \frac{\partial U_i}{\partial T} \frac{\partial T}{\partial \alpha_i} = 0 \text{ for every } i.$$

Assume that at least one Welfare/Tort Balancer believes that he will not minimize the amount of tort judgments against his bureau at the global maxima of the social welfare function [For a discussion of this assumption, see case b in Case 2 of Lemma 6 in note 78 *infra*.] Then no global maximum can be a Nash equilibrium.

Consider a particular bureaucrat who does not believe that he will minimize the amount of tort judgments against his bureau at the global maxima of the social welfare function. At a Nash equilibrium, this bureaucrat will be maximizing his own utility, subject to the belief that other bureaus' activities are fixed. Hence, equation (2') will be satisfied at equilibrium. It has been assumed that the marginal utility of social welfare is positive, *i.e.*,

$$\frac{\partial U_i}{\partial W} > 0,$$

the marginal disutility of tort judgments is nonzero, *i.e.*,

$$\frac{\partial U_i}{\partial T} \neq 0,$$

B. SYNTHESIS OF AN IMMUNITY RULE

Faced with a sovereign immunity issue, a court should have at its disposal an efficient, concise, fair rule that directs its inquiries.⁷⁶ Three potential rules of governmental tort immunity are suggested by the preceding economic analysis. Each of these rules will be examined in an effort to determine which best satisfies explicit efficiency and fairness criteria. These are the alternatives:

Rule 1: *The government should be suable in tort for monetary damages.*
Rule 1 was the rule originally derived.

Rule 2: *The government should be immune from tort suit for monetary*

and the bureaucrat does not believe that he will minimize the sum of tort judgments against his bureau at the global maxima of the social welfare function, i.e.,

$$\frac{\partial T}{\partial \alpha_i}(\bar{X}) \neq 0.$$

If an equilibrium were to occur at W-max, then equation (2') could not be satisfied. In other words,

$$\frac{\partial U_i(\bar{X})}{\partial W} \frac{\partial W(\bar{X})}{\partial \alpha_i} + \frac{\partial U_i(\bar{X})}{\partial T} \frac{\partial T(\bar{X})}{\partial \alpha_i} = 0 + \frac{\partial U_i(\bar{X})}{\partial T} \frac{\partial T(\bar{X})}{\partial \alpha_i} \neq 0.$$

Hence, an equilibrium is *not* at a maximum of the social welfare function.††

Lemma 5: Granting immunity always leads to a global maximum of W.

Proof of Lemma 5: Immunity means that every bureaucrat knows that no matter what level of activity his bureau undertakes, there will be no tort judgments against it. Hence, each bureaucrat will disregard tort liability as a factor in determining the bureau's behavior. By assumption, the only other important factor is social welfare. Each bureaucrat will adjust the bureau's activity so that the product of the marginal utility of social welfare times the marginal rate of change of social welfare with respect to the bureau's activity is zero. Since the marginal utility of social welfare is positive for each bureaucrat, however, the marginal rate of change of social welfare with respect to *each* bureau's activity is zero. By the corollary to Theorem 1, *supra* note 40, the equilibrium is a global maximum of W. In other terms, at equilibrium,

$$\frac{dU_i}{d\alpha_i} = \frac{\partial U_i}{\partial W} \frac{\partial W}{\partial \alpha_i} + \frac{\partial U_i}{\partial T} \frac{\partial T}{\partial \alpha_i} = 0.$$

Immunity implies

$$\frac{\partial T}{\partial \alpha_i} = 0 \text{ for every } i.$$

Hence,

$$\frac{dU_i}{d\alpha_i} = \frac{\partial U_i}{\partial W} \frac{\partial W}{\partial \alpha_i} + 0 = 0.$$

Because

$$\frac{\partial U_i}{\partial W} > 0 \text{ implies } \frac{\partial W}{\partial \alpha_i} = 0 \text{ for every } i,$$

by the corollary to Theorem 1, *supra* note 40, a global maximum is indicated.‡

Lemmas 4 and 5, *supra*, and assumption 3, *supra* note 40, indicate that immunity is the appropriate rule under these circumstances. Q.E.D.

76. Consider the following. A wheat farmer sues the government in tort for its having started a fire in his fields with engine sparks. The government moves to dismiss the case on the grounds that it is protected by immunity. At this point a rule is needed to help the judge decide whether to allow the tort suit to proceed. This section will formulate that rule.

damages if and only if it demonstrates that it decided, after weighing social costs and benefits, to risk the occurrence of some loss.⁷⁷ Because Rule 2 grants immunity to any welfare-maximizing entity (Simple Welfare Maximizer or Welfare/Tort Balancer), and immunity was *efficient* for both of the welfare-maximizing entities, Rule 2 is efficient.⁷⁸

77. This is similar to the discretionary immunity doctrine that is currently recognized in the tort law. See, e.g., Federal Tort Claims Act, 28 U.S.C. § 2680(a) (1970):

The provisions of this chapter and section 1346(b) of this title shall not apply to—

(a) Any claim based upon an act or omission of an employee of the Government, exercising due care, in the execution of a statute or regulation, whether or not such statute or regulation be valid, or based upon the exercise or performance or the failure to exercise or perform a discretionary function or duty on the part of a federal agency or an employee of the Government, whether or not the discretion involved be abused[.]

CAL. GOV'T CODE § 815.2(b) (West 1966) ("Except as otherwise provided by statute, a public entity is not liable for an injury resulting from an act or omission of an employee of the public entity where the employee is immune from liability."); *id.* § 820.2 ("Except as otherwise provided by statute, a public employee is not liable for an injury resulting from his act or omission where the act or omission was the result of the exercise of the discretion vested in him, whether or not such discretion be abused.").

For a history of the analytical problems involved in trying to define "discretionary" without a paradigmatic reference, see Note, *The Discretionary Function Exception of the Federal Tort Claims Act*, 66 HARV. L. REV. 488 (1953); Note, *The Discretionary Immunity Doctrine in California*, 19 HASTINGS L.J. 561 (1968).

78. In a situation where the Simple Welfare Maximizer and Welfare/Tort Balancer are factually indistinguishable, Rule 2 is the only efficient rule. This implies at least a partial relaxation of the assumption that administrative costs equal zero. See notes 80-85 and accompanying text *infra*. The following proof demonstrates the efficiency of granting immunity to all welfare-maximizing entities under these circumstances. For the general assumptions and definitions, see note 40 *supra*.

WELFARE MAXIMIZER MODEL

Specific Assumptions and Definitions

Definition 20 A bureaucrat is a Simple Welfare Maximizer if his utility function is written $U = U(W)$.

Definition 21 A bureaucrat is a Welfare/Tort Balancer if his utility function is written $U = U(W, T(\alpha_i))$ where $T(\alpha_i)$ is defined to be the dollar amount of tort judgments against the i th bureau. [For the purposes of this proof, every bureaucrat will be assumed to be either a Simple Welfare Maximizer or a Welfare/Tort Balancer. Assume that since it is impossible to tell the difference between these two types of bureaus, the only options are to grant immunity or suability to both types of bureaus. "Welfare Maximizer" denotes both types of bureau.]

Assumption 18 Each bureaucrat wants, other things held constant, to make society better off, *i.e.*,

$$\frac{\partial U_i}{\partial W} > 0 \text{ for each } i$$

where U_i is the utility function of the i th bureaucrat.

THEOREM 7 A Welfare Maximizer should be granted immunity from tort suits.

Proof.

Lemma 6: Governmental suability may lead to a state of society which is nonmaximal.

Proof of Lemma 6:

Case 1: Assume that all bureaucrats are Simple Welfare Maximizers (*i.e.*, $U_i = U_i(W)$ for all i). The bureaucrats are assumed to be in a game of simultaneous utility maximization. At an equilibrium of this game, $\bar{X} = (\bar{\alpha}_1, \bar{\alpha}_2, \dots, \bar{\alpha}_n)$, the rate of change of each bureaucrat's utility with respect to a change in the level of governmental activity which that bureau controls is zero:

$$(1) \frac{\partial U_j}{\partial W} \frac{\partial W}{\partial \alpha_1} \frac{\partial \alpha_1}{\partial \alpha_j} + \dots + \frac{\partial U_j}{\partial W} \frac{\partial W}{\partial \alpha_j} \frac{\partial \alpha_j}{\partial \alpha_j} + \dots + \frac{\partial U_j}{\partial W} \frac{\partial W}{\partial \alpha_n} \frac{\partial \alpha_n}{\partial \alpha_j} = 0.$$

Since assumption 5, *supra* note 40, indicates, however, that each bureau controls (directly or indirectly) only one activity, and since the rate of change of any activity with respect to itself is always one, line (1) means that for each bureaucrat at equilibrium the product of the marginal utility of social welfare times the rate of change of social welfare with respect to a change in that bureau's activity level is zero. In other words,

$$\frac{\partial U_j}{\partial W} \frac{\partial W}{\partial \alpha_j} (\bar{X}) = 0.$$

By assumption 7, *supra* note 42, each bureaucrat wants, other things being equal, to make society better off, *i.e.*,

$$\frac{\partial U_j}{\partial W} > 0$$

means that at equilibrium the rate of change of social welfare with respect to a change in *any* activity level is zero, *i.e.*,

$$\frac{\partial W(\bar{X})}{\partial \alpha_j} = 0 \text{ for every } j.$$

This is the condition needed to satisfy the corollary to Theorem 1, *supra* note 40, so the equilibrium, \bar{X} , is a global maximum of W .

Case 2: At least one bureaucrat is a Welfare/Tort Balancer.

Subcase 2a: Assume that every Welfare/Tort Balancer believes that he will minimize the sum of tort judgments against his bureau at each global maximum. It may be true that, under subcase 2a's assumption, a governmental suitability rule will lead to a welfare-maximizing outcome.

The analysis of this Welfare/Tort Balancer's behavior is identical to that contained in case 1. At a simultaneous utility maximization equilibrium, each Welfare/Tort Balancer will choose an activity level such that the product of marginal utility of social welfare and the rate of change of welfare with respect to a change in the bureau's activity, plus the product of the marginal disutility of tort judgments and the rate of change of tort judgments with respect to a change in the bureau's activity, is zero. In other words,

$$(2) \frac{\partial U_j}{\partial W} \frac{\partial W}{\partial \alpha_j} (\bar{X}) + \frac{\partial U_j}{\partial T} \frac{\partial T}{\partial \alpha_j} (\bar{X}) = 0 \text{ for each } j.$$

Since every Welfare/Tort Balancer believes that tort judgments against his bureau are minimized at every global maximum, *i.e.*,

$$\frac{\partial T(y)}{\partial \alpha_j} = 0 \text{ for every } y \in \{\text{global maximum of } W\},$$

some global maxima, those for which

$$\frac{\partial W}{\partial \alpha_j} (\bar{X}) = 0$$

will satisfy equation (2) and be included in the set of equilibria.

Subcase 2b: Assume that at least one Welfare/Tort Balancer believes that he will not minimize the amount of tort judgments against his bureau at the global maxima of the social welfare function. Then no global maximum can be a Nash equilibrium.

Consider a particular bureaucrat who does not believe that he will minimize the amount of tort judgments against his bureau at the global maxima of the social welfare function. At a Nash equilibrium, this bureaucrat will be maximizing his own utility, subject to the belief that other bureaus' activities are fixed. Hence, equation (2) will be satisfied at equilibrium. It has been assumed that the marginal utility of social welfare is positive, *i.e.*,

$$\frac{\partial U_j}{\partial W} > 0,$$

the marginal utility of tort judgments is nonzero, *i.e.*,

$$\frac{\partial U_i}{\partial T} \neq 0,$$

and the bureaucrat does not believe that he will minimize the sum of tort judgments against his bureau at the global maxima of the social welfare function, *i.e.*,

$$\frac{\partial T}{\partial \alpha_i}(\bar{X}) \neq 0.$$

If an equilibrium were to occur at a W-max, equation (2) could not be satisfied. In other words,

$$\frac{dU_i(\bar{X})}{d\alpha_i} = \frac{\partial U_i(\bar{X})}{\partial W} \frac{\partial W}{\partial \alpha_i}(\bar{X}) + \frac{\partial U_i(\bar{X})}{\partial T} \frac{\partial T}{\partial \alpha_i}(\bar{X}) = 0 + \frac{\partial U_i(\bar{X})}{\partial T} \frac{\partial T}{\partial \alpha_i}(\bar{X}) \neq 0.$$

Hence, an equilibrium is *not* at a maximum of the social welfare function.††

In order for subcase 2b to be plausible, one of three assumptions must be made: that the rule of liability is strict, that the rule of liability is negligence and that the bureaucrat fears juries will inaccurately gauge W, or that costs of moving for dismissal are ignored while costs of litigating suits are viewed as tort judgments, *i.e.*,

$$\frac{\partial T(\alpha_i)}{\partial \alpha_i}(\bar{X}) \neq 0 \text{ for every } i.$$

Three major articles advocating the use of a strict liability standard in torts are Calabresi & Hirschoff, *Toward a Test For Strict Liability in Torts*, 81 YALE L.J. 1055 (1972) (arguing that strict liability should be imposed on categories of best cost avoiders); Fletcher, *Fairness and Utility in Tort Theory*, 85 HARV. L. REV. 537 (1972); and Epstein, *A Theory of Strict Liability*, 2 J. LEGAL STUD. 151 (1972).] For the contention that the negligence rule relieves citizens from tort liability if they act in a social-cost-minimizing manner, see Posner, *A Theory of Negligence*, 1 J. LEGAL STUD. 29 (1973). Accepting his contention, we would conclude that welfare-maximizing behavior would be deemed nonnegligent and therefore exempted from liability. If juries always gauged the W function perfectly then a bureaucrat would never need to fear losing a tort suit for maximizing welfare.

Lemma 7: Granting immunity always leads to a global maximum of W.

Proof of Lemma 7: Immunity means that every bureaucrat knows that no matter what level of activity his bureau undertakes, there will be no tort judgments against it. Hence, each bureaucrat will disregard tort liability as a factor in determining the bureau's behavior. The only other important fact (by assumption) is social welfare. Each bureaucrat will adjust the bureau's activity so that the product of the marginal utility of social welfare times the marginal rate of change of social welfare with respect to *each* bureau's activity is zero. By assumption 3, *supra* note 40, the equilibrium is a global maximum of W. In other terms, at equilibrium,

$$\frac{dU_i}{d\alpha_i} = \frac{\partial U_i}{\partial W} \frac{\partial W}{\partial \alpha_i} + \frac{\partial U_i}{\partial T} \frac{\partial T}{\partial \alpha_i} = 0.$$

Immunity implies

$$\frac{\partial T}{\partial \alpha_i} = 0 \text{ for every } i.$$

Hence,

$$\frac{dU_i}{d\alpha_i} = \frac{\partial U_i}{\partial W} \frac{\partial W}{\partial \alpha_i} + 0 = 0.$$

Because

$$\frac{\partial U_i}{\partial W} > 0 \text{ implies } \frac{\partial W}{\partial \alpha_i} = 0$$

by assumption 5, a global maximum is indicated.††

Lemmas 6 and 7, *supra*, and assumption 3, *supra* note 40, indicate that immunity is the appropriate rule under these circumstances. Q.E.D.

Rule 3: *The government should be immune from tort suit for monetary damages if and only if it demonstrates that it decided, after weighing social costs and benefits, to risk the occurrence of some loss and that its decision process would be affected by potential tort suits.* The strict economic analysis suggests that a Welfare/Tort Balancer should be immune from tort suit, while public entities behaving in any other fashion should be suable. Since administrative costs are presently assumed to be zero, a judge may freely and accurately characterize any governmental behavior with respect to any accident. If the judge finds that the government was Welfare/Tort Balancing, the tort suit should be dismissed. Alternatively, if the judge finds that the government was acting in accordance with one of the other models,⁷⁹ the suit should be heard on its merits. Rule 3 is formulated by combining these two conclusions.

1. *Administrative Costs*

Choosing a final immunity rule requires explicit consideration of administrative costs, which have previously been assumed to be negligible. These costs influence the analysis in two ways. They aid in developing the tentative rules⁸⁰ and, more importantly, in choosing between the alternatives.

Of the three rules, Rule 3 would involve the greatest amount of administrative costs. In administering Rule 3 rather than Rules 1 or 2, a court must distinguish Welfare/Tort-Balancing behavior from the behavior of all the other models (including the Simple Welfare Maximizer). Thus, in addition to identifying welfare-maximizing behavior (as Rule 2 also requires), the court would be required to identify conduct that is affected by the

79. It is entirely possible that a governmental entity may not act with the same motivations as to all types of accidents. For example, a railroad may welfare-maximize with respect to spark-ignited fires but fixed-job cost-minimize with respect to running over cows. A judge should not feel compelled to make a binding choice between the two models. Instead, the railroad should be treated as a welfare maximizer only in suits by cattle ranchers. For different purposes (cattleman suits and farmer suits) the government may be treated as having different motivations.

80. Rules 2 and 3 raise the problem, for example, of allocating the burden of proof. The economic analysis gives no hint, however, as to how the burden of proof should be allocated under these rules. One solution is placing the burden on the party with the best information on the resolution of an issue. See generally J. MAGUIRE, J. WEINSTEIN, J. CHADBOURN & J. MANSFIELD. *CASES AND MATERIALS ON EVIDENCE* 1008 (6th ed. 1973). This rule of burden assignment would help minimize administrative costs because the party with the best information can provide data at least cost. On the issue of governmental behavior, the government clearly has the best information. For example, it has all of its own records and can talk with any of its employees at any time.

The burden of proof can also be seen as a fairness issue. When deciding whether to deny a citizen access to the court system, it may be unfair to make the citizen prove that the courts are available. Having sustained injury from the government and facing a tort immunity claim by the government, it may be unfair to ask the citizen to expend the resources needed to sustain the burden, for the government is likely to have far more resources and time available for the chore.

level of tort judgments. In isolated cases, relevant data might exist. For example, an occasional internal memorandum might discuss the possibility of tort suits and the entity's reaction to potential adverse judgments in those suits. In the vast majority of cases, however, this data will not exist, and distinguishing between a Simple Welfare Maximizer and a Welfare/Tort Balancer will not be possible. This means that if Rule 3 were used, the government would rarely be able to show that it was a Welfare/Tort Balancer rather than a Welfare Maximizer, and the government would almost always be suable—substantially the same result as if Rule 1 were being used. This implies that the effective choice is between Rules 1 and 2.

Rule 2 would also involve significant administrative costs. A judge would be required to distinguish between welfare-maximizing behavior (including both Simple Welfare Maximizing and Welfare/Tort Balancing behavior) and other behavior. This would likely involve consideration of numerous factors, among them: (1) the language of the authorization under which the acting official made any decision; (2) the entity's authority to consider broad policy questions; (3) the nature of the position held by the employee responsible for any crucial decision or action; (4) the existence of any governmental cost-benefit studies discussing the class of damage involved in the suit; (5) the existence of any debate or public hearings on the decision to risk the damage; (6) the tone of internal memoranda dealing with the possibility of damage; and (7) public statements as to governmental motivation (though these may have to be taken with a grain of salt).⁸¹ This list suggests a time-consuming, costly, and difficult inquiry when relevant information is available.

Where information relevant to a Rule-2 inquiry is unavailable, the government will be unable to meet its burden of showing welfare-maximizing behavior. Consequently, Rule 2 would yield the same result as would Rule 1. Even if such information would generally be available, however, Rule 2 is preferable to Rule 1 only if there are so many Welfare/Tort Balancers that an immunity-provided efficiency gain compensates for the greater administrative costs Rule 2 would entail.⁸² Although no empirical evidence is available regarding the frequency of Welfare/Tort Balancing behavior,⁸³ and procedur-

81. Cf. Note, *The Discretionary Function Exception of the Federal Tort Claims Act*, 66 HARV. L. REV. 488, 491-94 (1953) (listing factors relevant to analysis of "discretionary function").

82. This Note assumes that if there are very few Welfare/Tort Balancers, then the cost of the inquiry in Rule 2 will exceed the loss due to the Welfare/Tort Balancers' changed productive behavior.

83. It may be possible, through some appropriately worded and widely distributed questionnaire, to generate some data as to frequency. The survey's costs may be substantial, however, and since the people who respond to the questionnaire will not often understand the underlying concern of the survey, its results may be untrustworthy.

al devices such as presumptions could reduce administrative costs under certain circumstances,⁸⁴ administrative costs seem to tip the scales in favor of the simpler, easier to apply, Rule 1.⁸⁵

2. *Fairness as a Constraint*

Considerations of fairness serve two distinct functions within the framework of this analysis. First, fairness is an independent criterion by which an immunity rule is selected for those models of governmental behavior that do not lend themselves to rigorous economic analysis. Second, fairness is a

84. The administrative costs associated with the inquiry into welfare-maximizing behavior can be reduced by using legal presumptions. Assume that some preliminary gathering of relevant data is affordable, but that a full inquiry is much more expensive. Certain legal presumptions may be developed in response. Given a preliminary set of facts in which the government is negligent, either immunity or suability may be the correct judicial response according to the economic analysis, depending on the type of bureau involved. According to the probabilities of immunity or suability (given the preliminary set of facts), it may be appropriate to grant immunity, deny immunity, or proceed to a full inquiry into the government's behavior. For example, suppose that in 99% of the spark-ignited wheat fires the government was acting as a welfare maximizer, while in 99% of the cow/train accidents the government was acting as a Fixed-Job Cost Minimizer. In response, one may create a pair of presumptions which are based only upon the accident's preliminary facts. If the tort involves a wheat fire, then the government is presumptively immune from tort suit, but if the tort involves a cow/train collision, then the government is presumptively suable. Analogous presumptions may be found elsewhere in tort law. For example, the doctrine of *res ipsa loquitur* allows a court to presume negligence from a preliminary set of facts. A set of sufficient conditions are

- (1) the event must be of a kind which ordinarily does not occur in the absence of someone's negligence; (2) it must be caused by an agency or instrumentality within the exclusive control of the defendant; ~~(3) it must not have been due to any voluntary action or contribution on the part of the plaintiff.~~

W. PROSSER, *supra* note 2, at 214. *See generally id.* at 208-11. Whenever a set of preliminary facts conforms to all three elements of this description, it is very likely that the defendant was negligent. Therefore, the court may *presume* the defendant's negligence.

Despite the use of presumptions, the inquiry mandated by Rule 2 is likely to be very expensive. Assembling the relevant data on this point is not likely to be a regular function of someone within the bureau. Either an attorney or someone within the bureau who is working with an attorney will have to wade through piles of irrelevant material to assemble the salient information. This process will be repeated in every lawsuit, either to establish immunity in the first place or to rebut and reestablish a presumption on the point. Further, determinations of this issue may be frequently appealed, thereby consuming even more resources.

85. Wherever Welfare/Tort Balancers are operating under a negligence rule, and juries correctly perceive social welfare maximizing activities as nonnegligent, bureaucratically optimal behavior, with or without immunity, will coincide with socially optimal behavior.

The choice of Rule 1 also avoids any need to establish, on fairness grounds, an independent compensation agency. The discussion in Section IV.B.2 reduces fairness considerations to access to compensation. Because Rule 2 denies the standard avenue of compensation (the courts) whenever a victim is injured by a welfare-maximizing entity, fairness may require the creation of an independent compensation agency to reimburse deserving victims. For example, Congress provided compensation to the victims denied relief on grounds of immunity in *Dalehite v. United States*, 346 U.S. 15 (1953). Act of Aug. 12, 1955, Pub. L. No. 84-378, ch. 864, 69 Stat. 707. Rule 1 would avoid such a need.

constraint.⁸⁶ Any rule formulated through economic analysis should be subject to the additional constraint that it be fair. An unfair rule should not be adopted. It is therefore necessary to examine, at this juncture, the fairness of Rule 1.

Before this fairness question can be answered, the nature of the constraints that operate in this context must be explored. The following "fairness assumptions" are offered to aid in the exploration:

(1) Fairness considerations for the government do not affect an immunity rule. This fairness examination questions whether the suggested rule deals too harshly with the stochastically selected victims of government activity. The fact that most governmental activities are for collective benefit means that, in some sense, if a citizen is not the victim then he is the injurer. The question of governmental immunity reduces to whether the class of potential injurers (as represented by the government) should allow the victims access to the courts. It may be legitimate to suggest that the injurers should deny the victims access to the courts for reasons of efficiency. In a society where the normal expectation is that injurers must meet their victims in court, however, the injuring class should not be permitted to frustrate this expectation upon fairness grounds. Therefore, fairness to *victims* is the only salient concern.

(2) The name of the entity from which the victim recovers is irrelevant. If fairness demands compensation (or at least access to compensation), then recovery from the railroad is no more or less *fair* than recovery from general revenue funds. An implication of this assumption is that the victim's urge for revenge is given no weight. Although the victim may want to "get back" at the injuring entity by successfully suing it (to the exclusion of all other entities), society should not cater to these primitive desires in the name of fairness.

(3) It is fairer to compensate a victim than to force him to bear the loss himself. Injured parties are victims of activity designed for the collective benefit. Requiring the victim to go uncompensated demands that he contribute more than his proportionate share to societal ventures.

These three assumptions reduce the question of fairness to one of general access to compensation. Rule 1 provides access to the standard avenue of compensation (the courts) under all circumstances. On the other hand, Rules 2 and 3 would deny such access in some cases, assuming that administrative

86. "Fairness," in this sense, will be used in the same way that Guido Calabresi uses "justice" in *The Costs of Accidents*. "[J]ustice is a totally different order of goal from accident cost reduction. Indeed, it . . . is not a goal but rather a constraint that can impose a veto on systems or on the use of particular devices or structures within a given system . . ." G. CALABRESI, *supra* note 1, at 25.

costs would not reduce those rules to the equivalent of Rule 1. Thus, while fairness would not preclude the use of Rule 1, it does suggest that Rules 2 and 3 might be inappropriate.⁸⁷

3. *The Proposed Rule*

Economic analysis suggested three possible rules of governmental tort immunity. While one of these rules was preferred by strict economic analysis, assuming away administrative costs,⁸⁸ other factors must be considered in choosing an immunity rule. After relaxing the assumption of negligible administrative costs and considering the fairness of the alternative rules, the preferred rule is that the government should be suable in tort for monetary damages.

CONCLUSION

Given certain fundamental assumptions, it is possible to engage in economic analysis of costly interactions between the government and individuals. Such an analysis must necessarily focus upon a potential rule's effect on governmental behavior. This was the task undertaken by this Note. Various models of governmental behavior have been either borrowed or developed, and these models have then been independently analyzed. Economic efficiency suggested that a particular immunity rule should be adopted with regard to certain models. In the case of other models, however, rigorous economic analysis was impossible; in such cases, suability was chosen over immunity on the basis of fairness and comparative utility. Based upon this analysis, three potential governmental immunity rules were formulated, and of these three rules, one was chosen based largely on considerations of administrative costs and fairness. The indicated rule is that the government should be suable in tort for monetary damages.

Matthew L. Spitzer[†]

87. See note 85 *supra*.

88. See text accompanying notes 76-79 *supra*.

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CHAPTER TWO

Multicriteria Choice Processes: An Application of Public Choice Theory to *Bakke*, the FCC, and the Courts*

Kenneth Arrow's 1951 work, *Social Choice and Individual Values*,¹ started a new field of social science, usually called "public choice."² From the beginning, public choice scholars have examined alternative democratic processes for making societal decisions.³ Public choice theory assumes that each citizen has preferences about alternative social policies. The fundamental task is to investigate the process used to combine these individual preferences into a social choice. Arrow's theorem demonstrates that democratic methods of social decisionmaking fail to meet some conditions that seem desirable for any such process.⁴

A public choice theory approach can be applied to the decision processes of courts and administrative agencies. When a court or agency purports to select one of many possible outcomes by ranking the outcomes under a set of criteria, the situation parallels the democratic process. In place of the preferences of individual citizens, rankings

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† Member, California Bar.

1. K. ARROW, *SOCIAL CHOICE AND INDIVIDUAL VALUES* (2d ed. 1963).

2. Prior to Kenneth Arrow's seminal work, the literature on the theory of public choice contained only a "few items." *Id.* at vii. Today there is enough literature in the area to justify calling public choice "a separate field." Mueller, *Public Choice: A Survey*, 14 J. ECON. LITERATURE 395, 395 (1976); *see id.* at 424-33 (listing over 200 articles and books in or closely related to social choice field from 1951 to 1976).

3. Arrow focused directly on the problem of whether particular types of processes for making societal decisions by combining individual preferences meet certain rationality conditions that serve as attractive constraints for social decisionmaking processes. *See* K. ARROW, *supra* note 1, at 2, 22-33. For discussions of public choice theory accessible to the layman, *see* R. MUSGRAVE & P. MUSGRAVE, *PUBLIC FINANCE IN THEORY AND PRACTICE* 102-26 (2d ed. 1976); A. SEN, *COLLECTIVE CHOICE AND SOCIAL WELFARE* (1970).

4. *See* K. ARROW, *supra* note 1, at 2-3, 59-60; R. MUSGRAVE & P. MUSGRAVE, *supra* note 3, at 104-06; A. SEN, *supra* note 3, at 35-46.

under criteria determine judicial or administrative choices. This article will use public choice theory to demonstrate that some administrative decision processes cannot possess all of the qualities that either are claimed by the agencies involved or are required by law. It also considers the applicability of public choice theory to judicial decision-making. The existing public choice literature appears to have neglected such an analysis.⁵

In the recent case of *Regents of the University of California v. Bakke*,⁶ the Supreme Court examined procedures that use a set of criteria to select applicants for admission to medical school. In his opinion, Justice Powell found the admissions system at issue unconstitutionally discriminatory, but suggested that one such procedure, still involving race as a criterion, would be constitutional.⁷ Four members of the Court (in an opinion hereafter referred to as the "Brennan opinion") attacked Justice Powell's suggestions, claiming that his alternative process was not significantly different because it would merely permit decisionmakers to achieve the same result "in a manner that is not immediately apparent to the public."⁸ Application of public choice theory to alternative methods for choosing medical school classes can offer insight into the choice process suggested by Justice Powell and also demonstrate the usefulness of the theory for analysis of administrative and legal decision processes. Part I of this article uses the medical school admissions context to explain a particular form of public choice analysis. It also demonstrates that Justice Powell's proposed admissions process must violate at least one of a specified set of axiomatic characterizations of that process, and that the most likely violation directly supports the critique in the "Brennan opinion."

Part II applies public choice analysis to the hearing process used by the Federal Communications Commission (FCC) to choose a broadcast licensee from among competing applicants. It demonstrates that the process is internally inconsistent, and explores interpretations of the ap-

5. In Mueller's 1976 collection of social choice literature there are no sources that concern themselves primarily with agency and judicial decisionmaking processes. See Mueller, *supra* note 2, at 424-33. Although one recent article discusses the possible application of public choice analysis to juries, multiple judge courts, and administrative agencies, Levine & Plott, *Agenda Influence and its Implications*, 63 VA. L. REV. 561, 563, 592-96 (1977), the article applies existing theory to voting in settings other than legislatures or popular elections. This article focuses on how substantive decision elements in the form of "criteria" are combined into a choice, rather than on how votes representing the preferences of individuals are combined into a collective choice.

6. 98 S. Ct. 2733 (1978).

7. *Id.* at 2762-66 (Powell, J., announcing judgment of court).

8. *Id.* at 2794 (opinion of Brennan, White, Marshall, and Blackmun, JJ., concurring in judgment in part and dissenting).

parent inconsistency, as an illustration of the consequences of the analysis for administrative decision processes. Part III considers the application of public choice analysis to judicial decision processes and contrasts the implications of the theory in this setting with the conclusions previously reached concerning administrative agencies.

I. Internally Inconsistent Multicriteria Choice Processes— An Explication Focusing on the *Bakke* Decision

A. Introduction

A multicriteria choice process (MCCP) is a method of choosing a single alternative from many. Three steps characterize an MCCP. First, the decisionmaker defines or is given a finite set of relevant criteria. Second, alternatives are ranked under each of the criteria. Finally, the rankings are combined to generate a choice.

College, graduate, and professional school admissions can be conducted by using an MCCP. In the *Bakke* case, Justice Powell put forward the Harvard College admissions program as “[a]n illuminating example” of a choice process that includes race as a criterion in a constitutionally permissible way.⁹ As described in the Powell opinion, the Harvard program does not assure racial diversity by setting aside a fixed number of places for minorities, as the University of California at Davis Medical School had done. Instead, the Harvard program looks at many criteria to assure diversity in its student body. After Harvard chooses about one-seventh of a class on the basis of the single criterion of intellectual potential, “diversity” is the primary concern in selecting the rest of the class from the large group of remaining applicants who are academically admissible.¹⁰ The “diversity” judgment is made with “a number of criteria in mind”¹¹ including intellectual potential, athletic and artistic talent, strength of character, family background, geographic origin, intended field of study, intended occupation, and membership in “disadvantaged economic, racial [or] ethnic groups.”¹² The comparative value of a high ranking in any one criterion is influenced by the prevalence of high rankings in that criterion by previously admitted applicants;¹³ the goal is to create a diverse class.

9. *Id.* at 2762.

10. *Id.* at 2765 app. (opinion of Powell, J.).

11. *Id.* at 2766 app.

12. *Id.* at 2765 app. These criteria do not comprise an exhaustive list; they are garnered from the description of the Harvard program in the appendix to Justice Powell's opinion. See *id.* at 2765-66 app.

13. *Id.* at 2766 app.

The Harvard program uses an MCCP. A set of criteria are identified, applicants are ranked under those criteria,¹⁴ and the rankings combine to dictate a choice. It also seems clear that, at least in filling the last few places in the class, the process is designed to choose additional members one by one from the pool of applicants remaining.¹⁵

B. *A Class of Internally Inconsistent MCCPs*

This section examines whether an MCCP can conform consistently to a given set of principles or constraints. The first step in the analysis is to choose nine "axioms." Each axiom either characterizes the operation of a wide range of real-world MCCPs or represents a normative principle that is often imposed on the MCCP. The nine axioms yield an internally inconsistent MCCP in the sense that it is not possible for all nine axioms to characterize the MCCP at the same time.¹⁶ Given an MCCP that satisfies some of the axioms, one knows that the process must violate at least one of the remaining axioms. By examining the Harvard program as an MCCP, one gains insight into the dialogue among the justices in the *Bakke* case. This discussion of the Harvard program illustrates the nine axioms in a simple context and serves as a prelude to more complicated treatment of the axioms in their relation to administrative and judicial decisionmaking.

1. *Axiom I: The MCCP chooses one alternative from a pool of alternatives.*

This axiom requires that a choice process operate by selecting a single most desirable candidate from the pool of candidates.¹⁷ Even

14. Although all of the listed criteria are considered with the goal of "diversity" in mind, diversity apparently does not determine all the rankings under each criterion and thereby reduce the process to a single criterion choice process. The continued emphasis on excellence in the description of the Harvard program, *see id.* at 2766 app., suggests that applicants with higher intellectual potential or more striking artistic talents would be preferred, all other aspects being equal, over competing applicants. Thus Harvard would not choose applicants that were less talented than alternative applicants in order to obtain a more "diverse" spectrum of abilities in the incoming class. *Cf.* note 47 *infra* (determination of ranking under single criterion may itself be product of MCCP).

15. *See* 98 S. Ct. at 2766 app. (opinion of Powell, J.). This passage contains an example that suggests a one-by-one choice process. Although one of the facts in the example is that the admissions committee has "only a few [remaining] places left to fill," the example is meant to be a general illustration of how race enters as a factor in the admissions process. *Id.*

16. In the appendices, *see* pp. 768-78 *infra*, the roman numeral axioms in text are translated into a set of arabic-numbered axioms and then a rigorous proof of the inconsistency of the axioms is carried out. In Appendix A, *see* pp. 765-68 *infra*, the proof is explained by relating it to previous, well-known results in public choice theory. Appendix D, *see* pp. 778-79 *infra*, lists the roman numeral axioms for convenient reference.

17. *See* pp. 768-79 *infra*.

when more than one candidate is ultimately chosen, as in the selection of a college or medical school class, this axiom is still satisfied if the group chosen is increased by successively adding the best candidate from the remaining alternatives. In an admissions program, one-by-one addition usually occurs at least for the candidates chosen from a "waiting list." Presumably this waiting list represents a sequential ordering by desirability of the best prospects from the pool of candidates that have not already been accepted.¹⁸

2. *Axiom II: There are at least three "potential alternatives," each of which would be chosen if available and if no better alternative were a possible choice.*

This axiom asserts that the world contains at least three minimally qualified candidates, but makes no claim respecting the number of candidates that are actually alternatives in the choice process.¹⁹ A minimally qualified candidate is one who would be chosen if there were no available better candidate. A candidate who is not minimally qualified will not be chosen even if there are no alternative candidates available. Axiom II is satisfied in the case of medical schools and universities that have more minimally qualified candidates than places to be filled.²⁰

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3. *Axiom III: The choice process can consider any conceivable "potential alternative," regardless of its particular characteristics.*

In the context of an admissions M CCP, this axiom means that any minimally qualified candidate can be considered for a position in the class.²¹

4. *Axiom IV: The M CCP uses no absolute scales or absolute weights to combine categorical rankings into a choice.*

This axiom precludes the use of either absolute scales, which translate rankings within criteria into units of an absolute preference, or absolute weights, which compare and combine the size of preferences

18. The University of California at Davis Medical School used such a waiting list. *See Regents of Univ. of Cal. v. Bakke*, 98 S. Ct. 2733, 2740 (1978) (opinion of Powell, J.).

19. *See* p. 769 *infra*.

20. The Harvard program defines the central admissions "dilemma" as that of "choosing among a large number of 'qualified' candidates." 98 S. Ct. at 2765 app. (opinion of Powell, J.). "'Qualified'" apparently means "'admissible'" and able to do "adequate work at Harvard." *Id.*

21. *See* p. 769 *infra*.

under different criteria.²² When absolute scales or absolute weights are used, the MCCP may combine rankings under various criteria into a ranking under a single criterion that is decisive. For example, a medical school admissions process that selects a class by a formula that combines Medical College Admissions Test (MCAT) score, college grade-point average, and numerical scores recorded by interviewers into a single numerical score violates axiom IV.

A choice process may, without violating axiom IV, involve the use of scaled or quantitative comparisons between applicants within a single criterion. "Quarternary" comparisons, such as "with respect to criterion one, A is preferred to B twice as strongly as C is preferred to D" are acceptable under axiom IV. Only the use of some absolute method of comparison between criteria violates the axiom.

The use of absolute weights or absolute scales need not be in the form of a comprehensive and explicit quantitative formula in order to violate axiom IV. Admissions officers might combine criteria by unstated, informal rules of thumb. They might, for example, recognize membership in racially or economically disadvantaged groups by adding standard numbers of points to a candidate's MCAT scores. In effect, two criteria would be measured on the same absolute scale of MCAT points.

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5. *Axiom V: Given any two alternatives A and B, A will be a more desirable alternative than B, or B will be a more desirable alternative than A, or A and B will be equally desirable alternatives. The more desirable of the two must be chosen if one is more desirable than the other.*

The first part of this axiom is technically described as the existence of a "complete binary relation."²³ The choice process must be able to compare alternatives in pairs. Although some pairs of alternatives may be equally desirable, a complete binary relation exists unless there are pairs that cannot be compared at all.²⁴ The second part of the axiom simply constrains the decisionmaker to choose the more desirable of two unequal alternatives.

An admissions program would probably claim to abide by axiom V. Admissions officers are unlikely to confess an inability to form preferences, including indifference, between candidates and they would

22. See pp. 769-70 *infra*.

23. See pp. 770-71 *infra*.

24. See A. SEN, *supra* note 3, at 3 (indifference between pairs of candidates is to be distinguished from inability to compare pairs of candidates at all; only latter indicates absence of "complete binary relation").

recognize that selection of the less desirable candidate of a pair would be irrational.

6. *Axiom VI: No one criterion totally dominates the MCCP.*

A criterion totally dominates an MCCP if, for all possible pairs of candidates, the candidate who ranks higher under a particular criterion will be chosen regardless of the rankings under other criteria that supposedly enter into the choice process. If axiom VI is violated, rankings under a single criterion determine the choice between any pair of candidates.²⁵

As long as a single criterion would not be decisive in *every possible case*, axiom VI will not be violated. The axiom can still apply if the choice within certain categories of candidates is made on the basis of a single criterion. For example, admitting a medical school class strictly on the basis of MCATs would involve using a single criterion choice process, but choosing between white applicants from high-income backgrounds solely on the basis of MCATs, while using multiple criteria to choose candidates for admission from other groups, would not involve such a process.

7. *Axiom VII: For any set of alternatives, the choice process will have the same result whether the choice is made directly from the entire set or is made from a set of preliminary winners chosen from subsets comprising the entire set.*

This principle means that "agenda" influences will not affect the outcome of the MCCP.²⁶ Suppose, for example, that three candidates are being considered for admission to college and that the admissions committee operates under the rule that one candidate will be preferred to another if the first candidate ranks higher under two out of three criteria used in the MCCP.²⁷ Suppose, in addition, that the committee chooses a candidate by successively comparing pairs of candidates—the "winner" of each pairwise comparison is compared against a candidate from among those who have not yet been considered. If candidates display certain rankings under the three criteria, the agenda alone will

25. See p. 771 *infra*.

26. See *id*.

27. This example is often used to illustrate that decision by majority vote will not necessarily be consistent from one occasion to the next even though the same issue is voted on and the voters have the same preferences. See, e.g., K. ARROW, *supra* note 1, at 2-3; R. MUSGRAVE & P. MUSGRAVE, *supra* note 3, at 106. This "voting paradox" is altered for the purposes of this article by replacing voters with criteria.

determine the winner. Suppose the candidates are A, B, and C and that the rankings under the three criteria are as follows:

Ranking	Criterion 1	Criterion 2	Criterion 3
Best	A	B	C
Middle	B	C	A
Worst	C	A	B

Any of the three candidates can be chosen, depending on which pair of candidates is compared first:

First Pair	Winner of First Pair	Second Pair	Overall Winner
A versus B	A	A versus C	C
B versus C	B	B versus A	A
A versus C	C	C versus B	B

An admissions process that operated in this fashion would violate axiom VII because in some situations the agenda would influence the choice between candidates.²⁸

It is unlikely that admissions committees have analyzed possible agenda influences in their selection processes. It seems safe to assume that, if asked, most committees would agree that agenda influences should not have any effect on the choice between candidates. A contrary assertion would admit that substantive criteria do not alone determine which candidate will be chosen.

8. *Axiom VIII: For every possible set of alternatives, if one member of the set ranks higher than a second member in every criterion used in the choice process, then the second member will not be chosen.*

Axiom VIII precludes the choice of an alternative that is inferior to

28. This type of admissions process can also violate other axioms. Suppose the rankings of four candidates under three criteria are as follows:

Ranking	Criterion 1	Criterion 2	Criterion 3
First	Y	X	W
Second	X	W	Z
Third	W	Z	Y
Fourth	Z	Y	X

Suppose that in the first pairwise comparison W is compared to X; X would emerge the winner of that comparison. Suppose that X is then compared to Y; Y would be the winner of that comparison, but Z would emerge as the choice after being compared with Y in the final pairwise comparison. Z, however, is inferior to W under every criterion. A choice process that selects a candidate when there is another candidate superior under every criterion violates axiom VIII. See pp. 724-25 *infra*.

another alternative under every criterion.²⁹ Admissions MCCPs combine desirable applicant characteristics into a choice. If two candidates are equal under all criteria but one, then the candidate that is superior under the remaining criterion would be more desirable. Hence, if candidate A is superior to candidate B under *every* criterion, A is a more desirable candidate than B. Rationality requires that B not be chosen when a totally superior candidate, A, is available. All admissions committees would claim, if asked, that this axiom characterizes their MCCP.

9. *Axiom IX: For any two alternatives, A and B, construct their comparative categorical rankings. If there are any other two alternatives, C and D, where C has the same comparative rankings relative to D as A has to B, and D is not chosen over C, then B is not chosen over A.*

Axiom IX requires that switching a candidate's social security number and other irrelevant characteristics not alter the choice.³⁰ Most admissions officers would claim that this axiom characterizes their own choice process, *i.e.*, that supposedly irrelevant criteria do not influence the choice between candidates.³¹

C. *The Analytic Use of the Internal Inconsistency Result*

The appendices contain a proof of a "possibility theorem"³² establishing that an MCCP cannot simultaneously satisfy all nine axioms.³³ The possibility theorem aids in the analysis of MCCPs in three ways. First, the law may require that an MCCP satisfy all nine axioms or institutions may claim that one does so. An awareness of the possibility

29. See p. 772 *infra*.

The analysis of MCCPs in this article focuses on a single step in which one candidate is chosen. Axiom VIII precludes the choice of candidate B when another candidate, A, is superior to B under every criterion. If A is chosen in one step, in the next step B could be chosen without violating axiom VIII, because A would no longer be in the pool of candidates. See pp. 720-21 *supra*.

30. See p. 772 *infra*.

31. The examination here focuses on the admissions process at a particular period in time, such as one year. It is clear that criteria change complexion or are added over time. See *Regents of Univ. of Cal. v. Bakke*, 98 S. Ct. 2733, 2765-66 app. (1978) (opinion of Powell, J.) ("concept of diversity" expanded recently in Harvard program to make it desirable that each class contain nontrivial numbers of students from "disadvantaged economic, racial and ethnic groups"). It is assumed for purposes of determining the applicability of axiom IX that the criteria and their significance in the admissions process remain fixed over the period when a particular class is chosen.

32. Even though the theorem demonstrates that it is *impossible* for certain processes to satisfy certain axioms simultaneously, it is of a type that is referred to as "possibility theorems." See A. SEN, *supra* note 3, at 37-40; Mueller, *supra* note 2, at 420.

33. See pp. 720-25 *supra* (discussing axioms); note 16 *supra* (summarizing appendices).

theorem allows one to say for certain that *at least one* of the claims or legal requirements is not satisfied by the MCCP.³⁴

Second, some of the axioms are more likely to be violated than others.³⁵ By examining the probability that each particular axiom is violated, some idea about the ways in which the MCCP under examination departs from institutional claims or legal requirements can be formed. For example, if it is known that a particular process satisfies axioms I-VIII, one knows that axiom IX is violated and can conclude that identical cases may not be decided the same way,³⁶ or that influences not captured by the criteria are affecting the outcome.³⁷ If axioms I-V and VII-IX are satisfied, one knows that axiom VI is violated and choices are determined by the outcome under a single criterion.³⁸

Finally, when an MCCP claims to satisfy all nine axioms, the possibility theorem is useful in analyzing proposed reforms. Reforms that do not propose an acceptable violation of at least one axiom will leave the process in a form that is unable to satisfy at least one institutional claim or legal requirement. However, if the MCCP can use absolute weights or rely on a single criterion, in violation of axioms IV³⁹ or VI⁴⁰ respectively, then the process will not be internally inconsistent under the possibility theorem.⁴¹

D. *Application of the Analysis to the Bakke Case*

The possibility theorem⁴² can be applied in two ways to the choice processes discussed in *Bakke*. First, the theorem can help illuminate the probable operation of some of the admissions programs discussed in the case. Second, the theorem can offer insight into the substance of the debate within the Court about the constitutionality of various admissions processes.

34. The possibility theorem holds only that *at least one* of the nine axioms must be violated. Any particular MCCP may violate more than one axiom.

35. For example, when an axiom is a legal requirement and it is easy to detect a violation of the axiom, the axiom is not likely to be violated. On the other hand, the violation of some axioms may be virtually impossible to detect and therefore may be more likely. See pp. 745-48 *infra*.

36. See note 31 *supra* (MCCPs can change over time; axiom IX focuses on one point in time).

37. See p. 725 *supra*.

38. See p. 723 *supra*.

39. See pp. 721-22 *supra*.

40. See p. 723 *supra*.

41. The process may still be internally inconsistent for entirely separate reasons.

42. See pp. 720-25 *supra*.

1. *Analyzing the Harvard Program Under the Nine Axioms*

Eight of the nine axioms seem to apply to the Harvard program. In at least part of the admissions process, the program seems to employ an MCCP⁴³ that satisfies axiom I by making a series of choices of single applicants from the pool of remaining applicants.⁴⁴ Because there are at least three minimally qualified potential applicants when each choice is made, axiom II is satisfied.⁴⁵ Because the admissions process places no apparent restrictions on the characteristics of applicants, axiom III appears to be satisfied.⁴⁶ Since no single criterion dominates the selection of the last six-sevenths of the class, at least that part of the admissions process satisfies axiom VI.⁴⁷ Axioms V, VII, VIII, and IX all are either highly plausible or highly desirable characteristics of an admissions process: the process will be able to decide that it either favors one of two candidates or is indifferent between them and a more desirable candidate will be chosen over one who is less desirable; the "agenda" will not influence the outcome; a candidate will not be chosen if there is another candidate available for the same slot who is superior to the first candidate under every criterion; and "irrelevant" criteria will have no effect.⁴⁸

Of the nine axioms, axiom IV is the only one that is neither explicitly imposed by the Harvard program nor a plausible or desirable characteristic of the admissions process. The material cited in the Powell opinion does not say that the program uses some kind of absolute scales or absolute weights to combine individual ratings under each criterion into a choice.⁴⁹ Because the Harvard program probably satisfies the other eight axioms,⁵⁰ however, axiom IV is probably

43. For a description of the Harvard program as an MCCP, see pp. 719-20 *supra*.

44. See pp. 720-21 *supra*.

45. See p. 721 *supra*.

46. *Id.*

47. See p. 723 *supra*.

According to the description of the Harvard program in *Bakke*, roughly one-seventh of the class is chosen on the basis of "intellectual potential" alone. 98 S. Ct. at 2765 app. (opinion of Powell, J.). Determining the outcomes for the single criterion of intellectual potential, however, may itself involve an MCCP. If it does, then the elements of that MCCP combined with the elements of the MCCP used to choose the remaining six-sevenths of the class comprise a composite MCCP that is used to determine the choice of the entire class.

48. See pp. 722-25 *supra*.

49. See 98 S. Ct. at 2762-66 app.

It can therefore be assumed, for present purposes, that Justice Powell was referring to a process in which there are no absolute scales or absolute weights.

50. This statement must be qualified in three respects. First, it is arguable that Harvard selects the last six-sevenths of the class based on the single criterion of "diversity," in violation of axiom VI. *But see* note 14 *supra* ("diversity" not single criterion in Harvard program).

The second qualification goes to the question of whether Harvard uses a finite number

violated. In choosing each additional member of a class, with knowledge of the characteristics of those already admitted, the admissions committee must use a system that establishes the relative importance of the various criteria. This system need not be an explicit quantitative method of combining information on performance under each criterion; it may consist of unstated rules of thumb.⁵¹

2. *Harvard's Treatment of Race as a Criterion*

The description of the Harvard program states that in order for Harvard to offer "first-rate education to its students, minority representation in the undergraduate [student] body cannot be ignored."⁵² It goes on to say that "there is some relationship between numbers [of blacks] and achieving the benefits to be derived from a diverse student body."⁵³ Furthermore, "10 or 20 black students could not begin to bring to their classmates and to each other the variety of points of view, backgrounds and experiences of blacks in the United States."⁵⁴ Yet the description states that there are no "target-quotas for the number of blacks" set in the admissions process.⁵⁵ In the conclusion of the statement one is given a hypothetical example of a choice between three applicants to "help to illustrate the kind of significance attached to race."⁵⁶ The lesson of the hypothetical is meant to be that "the critical criteria are often individual qualities or experience not dependent upon race but sometimes associated with it."⁵⁷

of criteria in its decision process. If the choice criteria are infinite in number or unspecified even as rough categories, then the admissions process is not a true M CCP. See pp. 719-20 *supra*. The description of the Harvard program, however, states that the admissions committee proceeds "with a number of criteria in mind." 98 S. Ct. at 2766 app. (opinion of Powell, J.). That statement suggests a choice process based on a finite number of criteria. In addition, many of the criteria considered seem well-defined but broad enough to choose a multifaceted college class. See p. 719 *supra* (listing criteria). Unfortunately, the description does not provide enough information for one to determine whether there is a finite set of criteria. See 98 S. Ct. at 2762-66 app. (opinion of Powell, J.).

A final qualification involves the question of whether the Harvard program satisfies axiom I. There is evidence that at least part of the process operates as a one-by-one choice of members of the class. See p. 720 *supra*. Unfortunately, again, the materials give insufficient information to determine for certain whether axiom I applies.

51. See pp. 721-22 *supra*.

52. 98 S. Ct. at 2765 app. (opinion of Powell, J.).

53. *Id.* at 2766 app.

54. *Id.* at 2765-66 app.

55. *Id.* at 2765 app.

56. *Id.* at 2766 app.

57. *Id.* The hypothetical is as follows:

The Admissions Committee, with only a few places left to fill, might find itself forced to choose between A, the child of a successful black physician in an academic community with promise of superior academic performance, and B, a black who grew up in an inner-city ghetto of semi-literate parents whose academic achievement was lower

After reading the hypothetical, one is tempted to concur with Justice Powell's assertion that race "is simply one element—to be weighed fairly against other elements—in the selection process" so that the constitutionally fatal "facial intent to discriminate"⁵⁸ evident in the Davis Medical School "quotas" is absent. Yet the hypothetical assumes there are "few [remaining] places to fill" in the class.⁵⁹ By that point, the admissions committee would presumably have admitted significant numbers of blacks. Otherwise, Harvard could not fulfill its goal of sufficient minority representation to assure "first-rate education to its students."⁶⁰ As a result, the weight given to minority status would be lower than it would be if much of the class had been admitted but the college was far short of its goal of sufficient minority representation.⁶¹

The possibility theorem suggests that, in extreme circumstances, the Harvard program would act as if it admits students under the following rule of thumb: "only blacks shall fill the remaining places in the class." If Harvard had admitted most of its class, but had admitted very few black students, there would be a large premium granted to black applicants.⁶² If the situation were extreme enough, then any minimally qualified black applicant might be preferred over any remaining nonblack applicant regardless of the nonblack applicant's other qualifications. Such machinations constitute an effective but imprecise quota. The probable violation of axiom IV suggests that this effective quota must be implemented through an absolute-weights or absolute-scale process at least in the form of rough rules of thumb.

3. *The "Brennan Opinion" Critique*

The "Brennan opinion" criticized Justice Powell's distinction between the Davis "quota" admissions policy and the Harvard program

but who had demonstrated energy and leadership as well as an apparently abiding interest in black power. If a good number of black students much like A but few like B had already been admitted, the Committee might prefer B; and vice versa. If C, a white student with extraordinary artistic talent, were also seeking one of the remaining places, his unique quality might give him an edge over both A and B.

Id.

58. *Id.* at 2763.

59. *Id.* at 2766 app.

60. *Id.* at 2765 app.; see pp. 730-31 *infra*.

61. In an MCCP with *absolute* weights, it might seem logical that the weights themselves would not change to reflect the goal of racial diversity, but one of the criteria would take into account information about the number of candidates already admitted who belong to a disadvantaged group and about the number of spaces remaining to be filled in the class. For purposes of exposition, the weights have been described as changing, although one could view the weights themselves as fixed while a "racial diversity" criterion varies.

62. The amount of the premium would depend on the number of blacks already admitted to the class and on the number of spaces that remain to be filled.

by hypothesizing an absolute-scale process designed to achieve approximately the same number of minority admissions as a "quota" system:⁶³

There is no sensible, and certainly no constitutional distinction between, for example, adding a set number of points to the admissions rating of disadvantaged minority applicants as an expression of the preference with the expectation that this will result in the admission of an approximately determined number of qualified minority applicants and setting a fixed number of places for such applicants as was done here.⁶⁴

The high likelihood that the Harvard program violates axiom IV and uses an absolute scale or absolute weights suggests that this hypothetical is exactly on point. Public choice analysis only strengthens the criticisms in the "Brennan opinion" by suggesting that the weight given to membership in a disadvantaged group will be higher if the actual number of previously admitted applicants from the disadvantaged group is lower. Such a system would cause the automatic fulfillment of a rough quota.

Justice Powell also argued that the "Court would not assume that a university, professing to employ a facially nondiscriminatory admissions policy, would operate it as a cover for the functional equivalent of a quota system."⁶⁵ The Harvard program was Justice Powell's primary example of a process employing a facially nondiscriminatory admissions policy.⁶⁶ Harvard's description of its admissions process combined with the analysis in this article suggests, however, that that program will operate as the functional equivalent of a quota system when circumstances demand such a system to achieve adequate minority representation. Since the Harvard admissions process probably employs a system of absolute weights or an absolute scale, further factual inquiry should be undertaken before drawing the sort of distinction

63. The "Brennan opinion" did not use the term "absolute scale" to characterize its hypothesized process. Against the background of the Davis program, in which each applicant's qualifications were reduced to a single numerical score, *see* 98 S. Ct. at 2740 (opinion of Powell, J.), however, the process hypothesized in the "Brennan opinion" suggests an absolute scale. In a Davis-type process, disadvantaged minority applicants presumably would receive enough points added to their "rating" so that they would constitute the desired proportion of the final admitted class. The idea of combining each applicant's qualifications into a single numerical rating strongly suggests an absolute scale process because each quality, including membership in a disadvantaged minority group, is transferred onto the same scale of points.

64. *Id.* at 2794 (opinion of Brennan, White, Marshall, and Blackmun, JJ., concurring in judgment in part and dissenting) (footnote omitted).

65. *Id.* at 2763.

66. The only other example that Justice Powell referred to was Princeton's undergraduate admissions program which he described as being "similar" to Harvard's. *See id.* at 2762 n.51.

that Justice Powell does between the Harvard program and an admissions process that directly employs quotas. When an absolute scale or absolute weights underlie an admissions process, discovery of the exact nature of the scale or weights is the most important step in deciding whether the process meets constitutional standards. Justice Powell's facial constitutionality test only would be appropriate for hypothetical processes not subject to examination at the trial level.⁶⁷ Finally, the fact that an absolute scale or absolute weights probably are used at Harvard, but are hidden from view, supports the "Brennan opinion" view that Harvard's program approximates the Davis quota system; as the opinion states, the only difference is that the Harvard program "proceeds in a manner that is not immediately apparent to the public" since it "does not . . . make public the extent of the preference [for minority students] and the precise workings of the system."⁶⁸ The "Brennan opinion" captured most of the results that can be achieved by an application of public choice theory to admissions processes. In the administrative area, however, the defects of particular decision processes have not been as apparent to judges and commentators.

II. The Use of Internally Inconsistent Multicriteria Choice Processes by Administrative Agencies

Administrative agencies sometimes use MCCPs to make regulatory decisions.⁶⁹ This discussion focuses on FCC use of an MCCP in initial

67. Justice Stevens emphasized that the focus of the case should be on the Davis process. *See id.* at 2809-10 (Stevens, J., concurring in judgment in part and dissenting in part). Because the case could be decided based on federal statutes and the facts about the Davis admissions process, Justice Stevens found that no consideration should properly have been given to admissions programs not before the Court. *See id.* at 2809-10, 2815.

68. *Id.* at 2794.

It has been asserted that decision processes that hide the actual mechanics of decision may be desirable when a decision involves a clash of fundamental values. Resolving the issue explicitly would involve the painful choice of one value over another when both are held dear. *See G. CALABRESI & P. BOBBITT, TRAGIC CHOICES* 24-26, 57-58 (1978). Justice Powell cited as one reason for holding a quota system unconstitutional the fact that such a system "will be viewed as inherently unfair by the public generally as well as by applicants for admission," since "[f]airness in individual competition, . . . especially [for benefits] provided by the State, is a widely cherished American ethic." 98 S. Ct. at 2763 n.53 (emphasis added). *But see* Calabresi, *Bakke: Lost Candor*, N.Y. Times, July 6, 1978, at A19, col. 3 (conflict between equality-of-opportunity ethic and goal of reparations for past bias should not justify subterfuge in admissions process; subterfuge should be reserved for situations in which "irreconcilable fundamental principles are at stake and openly affirming one value destroys the other").

69. Although FCC initial broadcast licensing is the only example discussed extensively in this article, there are other instances of MCCPs used by administrative agencies. For example, until recently, the Civil Aeronautics Board (CAB) used an MCCP to award domestic airline routes. Although the Federal Aviation Act of 1958 directed the CAB to

broadcast licensing comparative hearings ("comparative hearings") to select one broadcaster from a set of candidates for the exclusive right to broadcast over a particular wavelength in a particular region. Although the focus is on one kind of regulation by one agency, the same type of analysis can generate similar policy conclusions about MCCPs used by other administrative agencies.

This discussion first describes FCC comparative hearings and then demonstrates that each of the nine axioms described previously are either physical constraints or legal requirements for the hearing process. Since public choice theory dictates that the hearing process cannot obey all of the axioms, the second part of this section discusses the likelihood that the MCCP violates particular axioms and the legal and normative implications of the violations; it concludes by using the analysis previously developed to evaluate various proposals to reform FCC comparative hearings.

A. *FCC Initial Broadcast Licensing Comparative Hearings and the Applicability of the Nine Axioms*

1. *The FCC Initial Broadcast Licensing Comparative Hearing Process as an MCCP*

The FCC has allocated the broadcast spectrum to various uses, including radio and television transmission. The Commission has allocated radio and television channels to communities throughout the United States.⁷⁰ Since only one broadcaster can use a frequency in a

authorize service on any route as "required by the public convenience and necessity," 49 U.S.C. § 1371 (1970), the Board has often withheld route authority from all but one applicant. *See, e.g.,* Chicago-New Orleans Nonstop Route Proceeding, 2 Av. L. REP. (CCH) ¶ 22,234 (1977); Chicago-Montreal Route Proceeding, 2 Av. L. REP. (CCH) ¶ 22,224 (1976).

The CAB awarded routes on the basis of a set of criteria, including the number of passengers who would receive service for the first time, the strength of a challenge to a foreign carrier, the amount of revenue diverted from existing carriers, the total beyond-area benefits, and the need for carrier strengthening. *See, e.g.,* Phoenix-Des Moines/Milwaukee Route Proceeding, 2 Av. L. REP. (CCH) ¶ 22,255.02, at 15,051-54 (1978); Chicago-Montreal Route Proceeding, 2 Av. L. REP. (CCH) ¶ 22,224, at 14,875 (1976). Rankings under each criterion were combined to pick authorized carriers.

Recent changes in the operations of the CAB have made this description obsolete, *see* MESSAGE FROM THE PRESIDENT OF THE UNITED STATES, AIRLINE DEREGULATION, H.R. DOC. NO. 92, 95th Cong., 1st Sess. (1977), and the CAB's authority to restrict the number of airlines serving particular routes will lapse altogether on December 31, 1981, Airline Deregulation Act of 1978, Pub. L. No. 95-504, § 40(a), 92 Stat. 1744 (to be codified in 49 U.S.C. § 1601).

70. *See* National Broadcasting Co. v. United States, 319 U.S. 190, 210-13 (1946); 47 C.F.R. § 73.202 (1977) (FM radio); *id.* § 73.606 (television); Anthony, *Towards Simplicity and Rationality in Comparative Broadcast Licensing Proceedings*, 24 STAN. L. REV. 1, 7-10 (1971).

particular region at any given time, the FCC must often pick a single licensee from among several applicants. When no legally qualified broadcaster wishes to renew an existing license for a particular frequency, the Commission grants an "initial broadcast license" for the frequency.⁷¹ The Commission's choice process employs an MCCP and is divided into application and hearing phases.

In the application phase, the FCC determines whether or not applicants meet minimal qualifications for receiving a license.⁷² In making that determination, the FCC's Broadcast Bureau scrutinizes applicants for legal,⁷³ financial,⁷⁴ technical,⁷⁵ and moral⁷⁶ soundness. In addition, the Bureau reviews other factors related to the "public interest," including program service plans, concentration of control of the mass media, and any allegations of an applicant's anticompetitive or monopolistic practices.⁷⁷ After these preliminary evaluations, every application is forwarded to the Chief of the Broadcast Bureau who

71. Until recently, the FCC treated hearings involving competition between a broadcaster wishing to renew a license and broadcasters wishing to obtain the license for the first time quite differently from hearings involving only initial licensing. See Anthony, *supra* note 70, at 106-10. "Renewal" hearings in which potential new licensees take part have now become similar to initial broadcast hearings in their governing standards and procedures. See *In re Formulation of Policies Relating to the Broadcast Renewal Applicant, Stemming from the Comparative Hearing Process*, 66 F.C.C.2d 419, 430 (1977) (if applicant meets certain standards of past performance that are higher than those minimally required for renewal, then renewal may follow without making comparison with other applicants for license; otherwise renewal candidate will be considered in normal comparative hearing except that renewal candidate will be favored to some degree on basis of "legitimate renewal expectancy"). The Supreme Court, however, has recently held that the Commission may use different standards in comparative renewal hearings than in initial broadcast licensing comparative hearings. See *FCC v. National Citizens Comm. for Broadcasting*, 436 U.S. 775, 810-11 (1978).

The discussion in this article is limited to the choice process used to select a licensee in initial broadcast licensing comparative hearings. Technically, the procedures described in this article apply only to granting the right to construct a broadcast facility. The right to broadcast over the facility, however, is routinely granted once construction has been completed. Anthony, *supra* note 70, at 11. As a result, this article will treat comparative construction permit hearings as comparative license hearings.

72. The application phase limits consideration at the hearing phase to "potential alternatives" in the sense of axiom II. See p. 721 *supra* ("potential alternative" or "minimally qualified candidate" is one who will be chosen if no other alternatives or candidates are available); p. 769 *infra* (technical definition of potential alternative); Anthony, *supra* note 70, at 34.

73. See, e.g., 47 U.S.C. § 310(b) (Supp. V 1975) (requiring applicant, its directors, officers, partners, and four-fifths of its stockholders to be United States citizens); 47 C.F.R. § 73.35 (1977) (applicant may not own any AM radio or television station in same market as AM station that is being awarded).

74. See Anthony, *supra* note 70, at 18-19.

75. See *id.* at 18 (technical factors include availability of frequency, coverage and clarity of signal, studio location, antenna location, and equipment requirements).

76. See *id.* at 19.

77. See *id.* at 19-24.

designates the set of minimally qualified applicants for a comparative hearing before a hearing examiner.⁷⁸

In the hearing phase, the FCC selects a single licensee from this set of qualified applicants. The relevant federal statute, the Communications Act of 1934,⁷⁹ provides meager guidance for choosing a licensee. The statute merely states that the FCC shall grant a license to an applicant if the Commission finds "that the public convenience, interest or necessity would be served" by such a grant.⁸⁰ The courts and the FCC have understood this language as mandating the selection "on a comparative basis" of the applicant who will best serve the public interest.⁸¹ In response to this vague mandate, the FCC created an MCCP for choosing among applicants in a comparative hearing. The Commission's 1965 Policy Statement on Comparative Broadcast Hearings⁸² describes the MCCP and lists six criteria that are intended to dictate the choice between minimally qualified applicants for an initial broadcast license.⁸³

The six criteria are diversification of control of the media, integration of ownership and management, proposed program service, past broadcast record, likely degree of efficiency in use of the frequency, and character. The 1965 policy statement describes the diversification criterion as "a factor of primary significance."⁸⁴ The diversification criterion rests on the belief that diffusing control of the mass communication media will produce an increased flow of information to the public.⁸⁵ Under this criterion, an applicant who does not own or control any other media interests will be preferred to one who does. An applicant who has existing media interests is further disfavored under the diversification criterion to the extent that his interests "are larger,

78. *Id.* at 34. If some question arises as to the minimal qualifications of one or more of the applicants, the applications may be routed through the full Commission before being sent to a hearing examiner. *Id.*

79. 47 U.S.C. §§ 151-609 (1970 & Supp. V 1975).

80. *Id.* § 309(a).

81. Ulysses Sherman Bartmess & W.H. Hansen, 35 Fed. Reg. 16,064-65 (1970); see note 139 *infra* (citing cases).

82. 1 F.C.C.2d 393 (1965) [hereinafter cited as 1965 Policy Statement].

83. The two goals that shaped the FCC's choice of criteria were "first, the best practicable service to the public, and, second, a maximum diffusion of control of the media of mass communications." *Id.* at 394.

In addition to the six criteria listed in text, the FCC may insert "other factors" into comparative hearings. *Id.* at 399. The existence of other factors in particular hearings does not affect the analysis. One is merely faced with an MCCP that has more than six criteria. In addition, a leading commentator on the FCC comparative hearing process has stated that use of "other factors" is "rare." Anthony, *supra* note 70, at 43.

84. 1965 Policy Statement, *supra* note 82, at 394.

85. See *id.* at 394 n.4.

i.e., go towards complete ownership and control.”⁸⁶ Such interests are also more detrimental to the degree that they are in media “in, or close to, the community being applied for,” or are “significant” because they reach large numbers of people in a locality or extend to regional or national coverage.⁸⁷

The 1965 policy statement attributes “substantial importance” to the factor of “integration of ownership and management.”⁸⁸ This criterion reflects the view that owner participation in station management increases a station’s responsiveness to its legal duties and to the broadcast area’s changing needs.⁸⁹ Accordingly, an applicant that plans to integrate ownership and management will be preferred to one that does not. The number and nature of the factors used to discriminate between applicants under the integration criterion may, however, make ranking applicants difficult.⁹⁰ For example, an owner’s full-time participation is greatly preferred to part-time work,⁹¹ but the importance of an owner’s work will depend on his actual activities at the station, his past broadcast experience, and his residence within the broadcast area.⁹²

In its 1965 policy statement the FCC admitted that, although program service is crucially important to the public, “[t]he feasibility of making a comparative evaluation is not so obvious.”⁹³ The FCC expects each applicant to ascertain the broadcast needs of the community and to design an adequate program plan for those needs. In the absence of “material and substantial differences between applicants’ proposed program plans,”⁹⁴ however, the Commission gives no weight to this criterion.⁹⁵

Another criterion employed by the FCC concerns the applicant’s performance in previous ownership or management of a broadcast station. When the Commission evaluates this criterion of “past broadcast record,” it is seeking an indication of the applicant’s likely future performance. Although the FCC will disregard a past broadcast record within the bounds of average performance,⁹⁶ it will consider both unusually good and unusually poor records.

86. *Id.* at 395.

87. *Id.* at 395-96.

88. *Id.*

89. *Id.*

90. See Anthony, *supra* note 70, at 29 n.169.

91. See 1965 Policy Statement, *supra* note 82, at 395.

92. See *id.* at 395-96.

93. *Id.*

94. *Id.*

95. *Id.*

96. *Id.* at 398.

The final two criteria are likely efficiency in using the frequency and the applicant's character. The FCC will favor an applicant proposing technically superior service.⁹⁷ It will disfavor applicants with serious character deficiencies,⁹⁸ but will disregard character considerations in the absence of such serious defects.⁹⁹

The FCC ranks the applicants under each of the applicable criteria, sometimes ranking ordinally¹⁰⁰ and sometimes hinting at preference size.¹⁰¹ Finally, the rankings are combined, in some undefined manner, to choose a licensee. The 1965 policy statement states that the process is "inherently complex" and that "the subject does not lend itself to precise categorization or to the clear making of precedent."¹⁰² Furthermore, the Commission asserts that the various criteria "cannot be assigned absolute values."¹⁰³ The importance of any one criterion is only determinable "upon consideration of the circumstances and conditions before us in an actual hearing case."¹⁰⁴

2. *Different Ways in which the Axioms Can Apply to an Administrative Process*

Particular axioms can constrain an administrative process in several ways. First, an axiom can be a "physical constraint," a constraint imposed not by human institutions but by technological or natural limitations. For example, it is not physically possible with present technology for two broadcasters to share the same frequency at the same time in the same region. Thus, the FCC must grant only one broadcast license for each frequency in a region at a given time.¹⁰⁵

"Explicit legal constraints" and "implicit legal constraints" are two

97. *See id.* at 398-99.

98. *Id.* at 399.

99. *See id.* The general exclusion of character evidence is intended to prevent an applicant from turning "the hearing into a search for his opponents' minor blemishes, no matter how remote in the past or how insignificant." *Id.*

100. An ordinal ranking is one that specifies the order in which applicants are ranked but gives no other information. A ranking that is constructed by assigning each applicant a number expressing how much that applicant is preferred is a "cardinal," as opposed to ordinal, ranking.

101. *See, e.g.,* Mid-Florida Television Corp., 33 F.C.C.2d 1, 21 (1972) (specification of degree of preference for some applicants over others under various criteria as "small" or as "substantial"); WHDH, Inc., 22 F.C.C. 767, 860-61 (1957) (under civic participation criterion, two applicants entitled to "some preference" over third applicant and to "significant preference" over fourth applicant).

102. 1965 Policy Statement, *supra* note 82, at 393.

103. *Id.*

104. WHDH, Inc., 22 F.C.C. 767, 858-59 (1957).

105. Note that the FCC's MCCP could theoretically choose more than one applicant to receive a license. In such a case, the FCC would have to resort to means other than its MCCP to narrow the field to one applicant. *See* note 117 *infra* (axiom requiring that MCCP choose only one applicant from any group of applicants is not physical constraint).

other kinds of axiomatic limitations on administrative agencies. A legal constraint is explicit when courts have indicated that an agency must obey the constraint. Implicit legal constraints are easily constructed extrapolations of present legal doctrine that have never been considered explicitly by courts.¹⁰⁶ This second type of constraint is important because administrative agencies and courts will sometimes not have cause to consider or explicate various aspects of agency decision-making with the degree of rigor required for application of highly precise axioms.¹⁰⁷

Three kinds of legal principles are particularly important in the analysis of FCC comparative hearings. The Commission must (1) comply with the statutory provisions that establish and govern it;¹⁰⁸ (2) use procedures that meet the minimal standards of procedural due

106. See, e.g., pp. 743-44 *infra* (arguments, by extrapolation from physical and explicit legal constraints, that axioms VII and VIII are implicit legal constraints on FCC).

Although implicit legal constraints are based on extrapolations from existing legal principle, and have never actually been imposed by courts, they are acceptable as binding constraints under the theory that existing legal principle is to be taken seriously because courts derive their legitimacy in a democracy from making principled decisions. See notes 211 & 235 *infra*.

As understood here, explicit legal constraints embody a legal realist's conception of the role of law in society, i.e., "law" as an expression of courts' holdings, and nothing more. See Holmes, *The Path of the Law*, 10 HARV. L. REV. 457, 457 (1897) (object of study of law is "prediction of the incidence of the public force through the instrumentality of the courts"). Alternatively, implicit legal constraints, relying as they do upon an evaluation of the FCC's statutory mandate, institutional setting, and relation to the courts, reflect a far broader notion of what is law in our society. It may nevertheless be true that even legal realists will ultimately have to see the FCC's implicit legal constraints as "law." This change would be the result of the new, activist role that the D.C. Circuit has been playing with respect to the FCC. See, e.g., *Central Fla. Enterprises, Inc. v. FCC*, 4 MEDIA L. REP. (BNA) 1502 (D.C. Cir. Sept. 25, 1978), *amended*, No. 76-1742 (D.C. Cir. Jan. 12, 1979) (renewal hearing). Since all of the implicit constraints discussed here are easily linked to accepted legal rules, it seems likely that they would be enforced by the D.C. Circuit in an appropriate case.

Only one who argued that the law is nothing more than an expression of what the courts have actually done and are actually *likely* to do would claim that some of the axioms are not properly called "law." Such a person would see the implicit constraints as merely elements that must be hidden in the FCC's opinion writing process in order for the opinion to escape reversal.

107. Sometimes this effect results from the technical nature of the axioms. See p. 743 & note 147 *infra* (unlikely that agencies or courts have ever considered impact of "agenda" influences on institutional decisionmaking processes). In other situations, an axiom may express a principle that is so obviously inherent in a decision process that it may never be considered explicitly. See note 151 *infra* (principle that candidate inferior to another under all criteria used will not be chosen may be so obvious as never to be considered). The difficulties inherent in applying axioms to real-world institutions have been recognized elsewhere. See Plott, *Axiomatic Social Choice Theory: An Overview and Interpretation*, 20 AM. J. POLITICAL SCI. 511, 555 (1976) (need usually to focus on models of processes rather than real-world processes themselves; "only a few [real-world] processes can be modeled with the degree of precision required by [axiomatic] methods").

108. See, e.g., *FCC v. Pottsville Broadcasting Co.*, 309 U.S. 134, 144-45 (1940); *Greater Boston Television Corp. v. FCC*, 444 F.2d 841, 850-51 (D.C. Cir. 1970).

process;¹⁰⁹ and (3) avoid decisions that are arbitrary and capricious, *i.e.*, lacking any reason to support them.¹¹⁰

The procedural due process standards include the requirement that an agency cannot ignore its own precedents and previously enunciated policies. It must either adhere to the precedents and policies or explain the reasons for departing from them.¹¹¹ The FCC therefore must honor previous claims about its decisionmaking process made in case law or in policy statements.¹¹² Although the claims may have been imposed by the FCC on itself, they operate as legal constraints.

The principle that agency decisions must not be "arbitrary and capricious" requires that an agency use "reasoned decisionmaking." Whether the decisions are made in adjudication or policymaking, a reasoned basis must be provided.¹¹³ The United States Court of Appeals for the District of Columbia, the court with exclusive jurisdiction to hear appeals from FCC comparative hearings,¹¹⁴ has stated that "reasoned decisionmaking" as opposed to "bidding" or "chance" must be the basis of choices between potential licensees, even "when a certificating agency is required to choose between two or more applicants endowed with virtually equivalent qualifications."¹¹⁵

109. See *Greater Boston Television Corp. v. FCC*, 444 F.2d 841, 851 (D.C. Cir. 1970).

110. See *id.*; Administrative Procedure Act § 10(e)(B)(1), 5 U.S.C. § 706(2)(A) (1976).

111. See, e.g., *Environmental Defense Fund, Inc. v. EPA*, 510 F.2d 1292, 1299 (D.C. Cir. 1975) ("an agency is not required to adhere to a prior policy with iron rigidity" but law requires that agency "explain the reasons for its modification"); *UAW v. NLRB*, 459 F.2d 1329, 1341 (D.C. Cir. 1972) (principle that "agency must either conform to its own precedents or explain its departure from them" is "elementary tenet of administrative law").

112. See, e.g., *Pasadena Broadcasting Co. v. FCC*, 555 F.2d 1046, 1051-52 & n.45 (D.C. Cir. 1977) (FCC cannot examine only single criterion of technical efficiency in granting initial license; doing so would be departure from long-settled precedent mandating that multiple criteria be examined); *Greater Boston Television Corp. v. FCC*, 444 F.2d 841, 852 (D.C. Cir. 1970) (dictum) (special judicial vigilance required when agency changes its policies; agency "must supply a reasoned analysis indicating that prior policies and standards are being deliberately changed, not casually ignored").

113. See, e.g., *Permian Basin Area Rate Cases*, 390 U.S. 747, 792 (1968) (rate setting must be done only after "reasoned consideration . . . of the pertinent factors"); *Rhode Island Consumers' Council v. FPC*, 504 F.2d 203, 210 (D.C. Cir. 1974) (record only vaguely describes reasons for agency action; it must "disclose with unmistakable clarity the reasons" for action).

The requirement that changes in policy or departures from precedent must be accompanied by "reasoned decisionmaking" is distinct from the previous point that an agency must follow the rules and policies that it has enunciated. The reasoned decisionmaking requirement restricts the ways by which an agency can change its policies, even when it does so openly.

114. 47 U.S.C. § 402(b) (1970); see *Citizens Committee to Save WEFM v. FCC*, 506 F.2d 246, 266 (D.C. Cir. 1974).

115. *Greater Boston Television Corp. v. FCC*, 444 F.2d 841, 852 (D.C. Cir. 1970) (dictum).

3. *The Applicability of the Nine Axioms to FCC Comparative Broadcast Licensing Hearings*

It is not difficult to demonstrate that each of the nine axioms discussed above is a physical or legal constraint on FCC comparative hearings. Axiom I requires the FCC to choose only one licensee for any given broadcast license.¹¹⁶ The axiom, for example, eliminates any M CCP that selects several "winners" and then randomly chooses one of them to receive the license. This requirement is an explicit legal constraint on the choice process,¹¹⁷ which must proceed by reasoned distinctions and not by "chance" even when the applicants being compared are nearly identical. The District of Columbia Circuit has mandated that, between two applicants, comparative hearings "must reveal which would *better*" serve the public interest.¹¹⁸ Since two applicants cannot simultaneously "better" serve the public interest, the FCC's M CCP must choose exactly one winning licensee on the basis of substantive "public interest" considerations contained in the criteria.

Axiom II requires that there be at least three minimally qualified potential applicants for each initial licensing decision.¹¹⁹ Because the axiom speaks of *potential* applicants, it is not necessary that three minimally qualified applicants actually apply. There need only be at least three minimally qualified possible applicants in the world. This requirement is necessarily satisfied because any given region contains a large number of minimally qualified potential applicants for a broadcast license.¹²⁰ In practice, FCC comparative hearings often include

116. See pp. 720-21 *supra*.

117. The FCC is not physically constrained to use an M CCP that results in exactly one winner. It could use an M CCP that selected several of the applicants as winners and then choose one licensee from the set of "winning" applicants. This final choice, which would not be part of the M CCP, could be by lottery or by some other method not related to the M CCP.

118. *Johnston Broadcasting Co. v. FCC*, 175 F.2d 351, 356 (D.C. Cir. 1949) (emphasis added). Although *Johnston Broadcasting* was decided before the 1965 Policy Statement, *supra* note 82, the D.C. Circuit has subsequently stated that the case describes "the decisional process to be followed" in FCC comparative hearings. *Star Television, Inc. v. FCC*, 416 F.2d 1086, 1088 (D.C. Cir.), *cert. denied*, 396 U.S. 888 (1969). Although many of the principles stated in *Johnston Broadcasting* can be taken as dicta, the Commission seems to have adhered to the principles as scrupulously as to holdings in other cases. In discussing the fact that much of *Johnston Broadcasting* can be read as dicta, a leading commentator notes that nonetheless, "the Commission over the years seems to have observed the court's dicta as solicitously as its narrow holdings, and it is hard to escape the impression that the court conceived its entire opinion [in *Johnston Broadcasting*] as a detailed set of instructions to the Commission." Anthony, *supra* note 70, at 110 (footnote omitted).

119. See p. 721 *supra*.

120. For example, any given region contains wealthy individuals of good character who do not have any connection with broadcasting. These individuals could apply for a license. They could, by employing the right individuals, establish a technically good, pro-

three or more minimally qualified applicants as competing candidates.¹²¹

To satisfy axiom III, the choice process must be able to consider any conceivable minimally qualified applicant regardless of the characteristics it possesses.¹²² Because the FCC states that it will include any minimally qualified applicant in a comparative hearing,¹²³ it appears that this axiom is satisfied in practice. Indeed, for the same reason, compliance with axiom III can be characterized as a legal requirement. The Commission must obey its own policy directives unless it announces a policy change openly and offers a reasoned explanation.¹²⁴

Axiom IV forbids the use of absolute weights or absolute scales in combining categorical rankings into a choice.¹²⁵ The FCC incorporates this axiom by presuming that criteria cannot be assigned "absolute values."¹²⁶ One commentator has described the process of combining outcomes on the different criteria as one of "subjective 'weighing,'"¹²⁷ because there are no absolute weights or absolute scales.¹²⁸

gramatically responsive, and financially sound broadcasting company. In addition, the owners could live in the communities that received the broadcasts and could take an active role in the management of the station.

121. See, e.g., *Mid-Florida Television Corp.*, 33 F.C.C.2d 1, 1-2 (1972) (five minimally qualified applicants); *WHDH, Inc.*, 22 F.C.C. 767, 767-68 (1957) (four minimally qualified applicants).

122. See p. 721 *supra*.

123. See pp. 733-34 *supra*.

124. See p. 738 *supra*.

~~The courts will enforce the reasoned decisionmaking requirement. See pp. 742-43 *infra* (use of single criterion in contravention of 1965 policy statement and without explanation is illegal and would not be tolerated by court); *Central Fla. Enterprises, Inc. v. FCC*, 4 MEDIA L. REP. (BNA) 1502, 1509-11 (D.C. Cir. Sept. 25, 1978), *amended*, No. 76-1742 (D.C. Cir. Jan. 12, 1979) (renewal hearing) (FCC did not give adequate rationale for its decision; FCC orders vacated and case remanded to Commission).~~

125. See pp. 721-22 *supra*.

126. 1965 Policy Statement, *supra* note 82, at 393.

The FCC has designated three criteria as of "primary" or "substantial" importance. Anthony, *supra* note 70, at 42-43. As Anthony points out, however, there is no specification of which of the three criteria take precedence in case of conflict. *Id.* at 43. In addition, there is no discussion of the relative importance of several other criteria. Yet these other criteria sometimes override the criteria described as primary. See *id.* at 43 & n.248. Thus, the FCC's hints as to the relative importance of some of the criteria give little indication of relative importance in practice.

127. *Id.* at 42.

128. See *id.* at 42-44:

Fundamental are the problems of subjectivity presented by the need to choose the winning applicants on the basis of *multiple* preferences drawn from multiple criteria. . . . There is no comprehensive system of priorities that establishes whether or when or to what extent one kind of preference . . . should have more weight than another. . . . The decision makers thus lack principles to govern them in deciding whether the preferences [for] one applicant [on the criteria] outweigh those [for] another [on other criteria].

....
The complexities and uncertainties of reaching ultimate decision are carried even

The 1965 policy statement and case law prior to it indicate a belief that use of absolute scales or absolute weights in comparative hearings would be impossible.¹²⁹ Experience and the nature of the criteria themselves suggest that this belief is well founded. At times it has been extremely difficult for the FCC merely to rank applicants ordinarily.¹³⁰ In addition, the nature of the criteria seems to defy application of an absolute scale even to a single criterion. Each criterion breaks down into a large number of elements that are difficult to compare, and under any one element there is a large degree of variability in possible applicant characteristics.¹³¹ For example, the diversity criterion compares an applicant's existing media interests on the basis of extent of control, proximity to the community that the new licensee will serve, size and area of audience, significance of regional or national coverage, and significance with respect to other media.¹³²

In any event, axiom IV, like axiom III, operates as a legal constraint on the FCC because there exists an announced policy against the assignment of absolute values to the various criteria. Until this policy is changed publicly, the Commission cannot legally grant licenses on the basis of a secret or open set of absolute weights or an absolute scale.¹³³

Axiom V requires that there be a complete binary relation¹³⁴ within any possible set of minimally qualified potential applicants for each license, and that the M CCP choose a more desirable applicant over a

further by the fact that the preferences to be weighed are *variable in size*. This variability raises the problem of how to weigh against each other, for example, a "substantial" preference from one subject area and "moderate" or "slight" preferences awarded under other headings. . . .

The Commission has established no principles or standards to govern this ultimate step [of weighing the preferences for one applicant under some criteria against the preferences for another under one criteria] in the decision process.

129. See p. 740 *supra*; *Johnston Broadcasting Co. v. FCC*, 175 F.2d 351, 357 (D.C. Cir. 1949) (there are "no essential absolutes" in comparing applicants; there are such absolutes for determining if applicants are minimally qualified).

130. See, e.g., *Moline Television Corp.*, 31 F.C.C.2d 263, 284-87 (1971) (Johnson, Comm'r, dissenting) (renewal hearing) (renewal applicant should not have been ranked higher on past programming record criterion than new applicant; new applicant should have been given "substantial preference" under integration criterion); *Flower City Television Corp.*, 9 F.C.C.2d 249, 262 (1967) (Johnson, Comm'r, dissenting) (disagreeing with majority's rankings under integration criterion).

131. See 1965 Policy Statement, *supra* note 82, at 393 ("differences between applicants with respect to each factor are almost infinitely variable"); Anthony, *supra* note 70, at 46 (absolute scale cannot be established for present criteria because consideration under each criterion involves too many variable factors).

132. 1965 Policy Statement, *supra* note 82, at 395.

133. See p. 738 & note 124 *supra*.

134. A "complete binary relation" exists when the decisionmaker can specify, between any two alternatives, that one is more desirable than the other or that the two are equally desirable. See p. 722 *supra*; pp. 770-71 *infra*.

less desirable one.¹³⁵ The FCC is required to satisfy this axiom because of two explicit legal constraints. Under the principle of reasoned decisionmaking, the Commission must choose between applicants in some manner rationally related to its statutory duty to further the "public convenience, interest or necessity."¹³⁶ In addition, it must choose only one applicant for any particular license.¹³⁷ These two requirements are both satisfied only if the FCC is capable of determining which of any two potential applicants would better serve the public interest. If the Commission can make such a determination, there exists a complete binary relation within any possible set of potential applicants.¹³⁸ Moreover, because the public interest must control every outcome, it would be unlawful for the FCC ever to select a less desirable candidate over a more desirable one.¹³⁹

If the outcome under one criterion determines the outcome in all possible cases, axiom VI is violated.¹⁴⁰ This axiom is embodied in an explicit legal constraint on the FCC. Appellate courts consistently require that the FCC consider all material differences between applicants raised by the parties in a comparative hearing.¹⁴¹ In a recent case,¹⁴² the District of Columbia Circuit referred to "long-settled precedent"¹⁴³ in rebuking the FCC for apparently deciding between applicants solely on the basis of the technical efficiency criterion. One applicant had been excluded from consideration solely because it proposed to broadcast a weaker signal than the other applicants.¹⁴⁴ The court noted that the applicant's "other attributes might show that the

135. See pp. 722-23 *supra*.

136. 47 U.S.C. § 307(a) (1970); see pp. 738-39 *supra* (choice among applicants must proceed by reasoned distinctions; illegal to decide between applicants by chance).

137. See p. 739 *supra*.

138. In fact, there is more than a complete binary relation. Since the FCC must choose only one applicant by its MSCP, it must be able to establish a *strict preference* between any two applicants. Indifference as a result of a comparison would not allow the FCC to choose between two applicants.

139. See, e.g., *National Broadcasting Co. v. United States*, 319 U.S. 190, 215-17 (1943); *FCC v. Pottsville Broadcasting Co.*, 309 U.S. 134, 138 n.2 (1940).

140. See p. 723 *supra*.

141. See, e.g., *Greater Boston Television Corp. v. FCC*, 444 F.2d 841, 851 (D.C. Cir. 1970), *cert. denied*, 403 U.S. 923 (1971); *Scripps-Howard Radio, Inc. v. FCC*, 189 F.2d 677, 680 (D.C. Cir.), *cert. denied*, 342 U.S. 830 (1951). The courts will not hesitate to overturn licensing decisions that ignore relevant criteria put at issue by the parties. See *Citizen's Comm. to Save WEFM v. FCC*, 506 F.2d 246, 262 (D.C. Cir. 1974) (FCC failed to give adequate consideration to program service criterion because it did not inquire into whether program format should be retained when it is "unique or otherwise serves a specialized audience that would feel its loss").

142. *Pasadena Broadcasting Co. v. FCC*, 555 F.2d 1046 (D.C. Cir. 1977).

143. *Id.* at 1051.

144. *Id.* at 1048.

satisfaction accorded to those who will listen counterbalances, as far as the public interest is concerned, the fact that fewer could hear."¹⁴⁵

To satisfy axiom VII, the outcome of an MCCP must not be affected by a change in the "agenda" in any particular comparative hearing.¹⁴⁶ Specifically, the choice from a set of minimally qualified applicants should be the same whether the choice is made directly from the whole set or the set is divided into subsets and an overall winner is chosen from the preliminary winners in each subset. There appear to be no FCC or court decisions dealing specifically with agenda influences.¹⁴⁷ Axiom VII, however, is an implicit legal constraint following from the explicit legal requirement that the FCC choose applicants on the basis of the public interest¹⁴⁸ and from the requirement that the FCC be able to specify which of any pair of minimally qualified applicants will better serve the public interest.¹⁴⁹ Suppose that, under one agenda, applicant A would be chosen while, under a second agenda, applicant B would be chosen. Assuming that the FCC can determine that one of the two applicants will better serve the public interest, one of the agendas would not choose this preferred applicant. A failure to adhere to axiom VII would therefore be legally unacceptable.

Axiom VIII states that if there exists an applicant, A, who ranks higher than applicant B under every criterion, then applicant B will not be granted the license.¹⁵⁰ This requirement is an easy extrapolation from certain explicit legal constraints.¹⁵¹ When courts support an FCC initial license award that has been challenged as arbitrary or irrational, they usually first point to the winner's superiority over the challenger under certain criteria and then defer to the FCC's discretion in weighing and combining all of the criteria.¹⁵² But if the challenger were superior under all criteria, such judicial support for the FCC decision

145. *Id.* at 1053.

146. See pp. 723-24 *supra*; p. 771 *infra*.

147. Although agenda influences may be detectable by agencies and courts in some cases, see pp. 745-46 *infra*, the abstruse and technical nature of agenda influences make it unlikely that the FCC, the courts, or the public have considered the general problem of agenda influence on comparative hearings.

148. See pp. 738-39 *supra*.

149. See pp. 739, 742 *supra*.

150. See pp. 724-25 *supra*.

151. The lack of more explicit consideration by the FCC and by the courts of the principle inherent in axiom VIII is probably caused by a perception that failing to follow the principle would be a flagrant violation of the reasoned decisionmaking requirement. See p. 738 *supra*. Thus, axiom VIII may be so far within the core of the law that the FCC would not even consider violating it, at least explicitly.

152. See, e.g., *Massachusetts Bay Telecasters, Inc. v. FCC*, 261 F.2d 55, 64-65 (D.C. Cir. 1958), *cert. denied*, 366 U.S. 918 (1961); *Pinellas Broadcasting Co. v. FCC*, 230 F.2d 204, 205-06 (D.C. Cir.), *cert. denied*, 350 U.S. 1007 (1956).

would be impossible. In addition, courts will overturn an FCC decision if the FCC has not considered all of the public interest criteria raised by the parties.¹⁵³ If the FCC were to choose one applicant over another that is superior under *every* criterion, it would have ignored all of the criteria raised in the case. Such a decision would obviously be unlawful.

Axiom IX requires that, for any four applicants A, B, C, and D, if C compares to D under the criteria as A compares to B, and if D is not chosen over C, then B will not be chosen over A.¹⁵⁴ In essence, the axiom requires that an applicant's name or other irrelevant characteristics not affect the choice. Axiom IX is an explicit legal constraint on the FCC. If, in the hypothetical above, D were not chosen over C in one case, then in a subsequent case the FCC would have to follow the precedent and not choose B over A.¹⁵⁵ The FCC could only ignore the precedent if it could make reasoned distinctions between the two cases. Yet if the two cases were identical under the public interest criteria, it would not be possible to make such distinctions.¹⁵⁶

B. *Determining which Axiom is Likely to be Violated by FCC Comparative Hearings*

The possibility theorem indicates that the FCC's M CCP cannot simultaneously obey all nine axioms, even though all nine constitute legal or physical constraints on comparative hearings. It seems clear, therefore, that the FCC is legally required to use a choice process that has internally inconsistent properties. Although such a conclusion clashes with the principle that regulators and regulated parties should not be subjected to contradictory legal requirements,¹⁵⁷ in practice, the Commission must be violating one or more of the axioms. The main task that remains is to determine which axioms are most likely to be violated.

Axiom II is a physical constraint that binds the FCC in choosing

153. See pp. 742-43 & note 141 *supra*.

154. See p. 725 *supra*.

155. See p. 738 *supra*. The general principle that the FCC must follow its own precedents or explain departures from them has been evident in the holdings of many recent cases. See, e.g., *Garrett v. FCC*, 513 F.2d 1056, 1060-61, 1063 (D.C. Cir. 1975) (FCC must adhere to its own precedents and reconcile its disposition with past decisional practice; case remanded with instruction that FCC reevaluate its decision in light of its own past precedents); *Columbia Broadcasting Sys., Inc. v. FCC*, 454 F.2d 1018, 1027 (D.C. Cir. 1971) (FCC's "utter failure to come to grips with" past precedents "constitutes an inexcusable departure from the essential requirement of reasoned decisionmaking").

156. In discussing axiom IX, the focus is on a single point in time. As a result, the same policies must be in force for both cases.

157. See L. FULLER, *THE MORALITY OF LAW* 69 (rev. ed. 1969) ("legislative carelessness about the jibe of statutes with one another can be very hurtful to legality").

broadcast licensees.¹⁵⁸ Some of the remaining eight axioms are unlikely to be violated because such violations either would be easily detected by reviewing courts or would require blatant dishonesty on the part of the FCC. To violate axioms III, VI, or VIII and avoid judicial detection, for example, the FCC would probably have to include false information in its opinion. If the FCC were to violate axiom III by refusing to consider a qualified candidate, violate axiom VI by using a single criterion choice process, or violate axiom VIII by selecting a candidate inferior under all criteria, it could not admit this conduct openly without bringing about appellate reversal.¹⁵⁹

It would also be extremely difficult to cover up violations of any of these three axioms. Since there is a body of rules and decisions concerning minimal qualifications, the Commission would have to fabricate an entire comparative hearing decision in order to avoid comparing any minimally qualified applicant to others as required by axiom III.¹⁶⁰ If the same single criterion choice process were consistently employed for any period of time, the pattern of the cases would probably reveal that fact and, in each case, the FCC would have to "pretend" to be considering the other criteria.¹⁶¹ To violate axiom VIII, the FCC would have to distort the case enough to make plausible the selection of an applicant who was inferior under all criteria.¹⁶²

It would be far easier for the FCC to violate axiom VII. In the abstract, the FCC's refusal to define precisely its choice process prevents any theoretical check on possible agenda influences. In practice, it is difficult to gauge the plausibility of either an inadvertent or deliberate violation of axiom VII. In most cases, there are relatively few ap-

158. See pp. 739-40 *supra*.

159. See pp. 742-43 *supra* (courts will overturn any FCC attempt to use single criterion choice process); pp. 743-44 *supra* (violation of axiom VIII would be more serious than other illegal administrative acts; axiom VIII is probably so deep within core of law that agency would not violate it).

160. At least one recent case indicates that courts will detect and overturn FCC decisions that are too implausible or depart too much from past precedents. See *Central Fla. Enterprises, Inc. v. FCC*, 4 MEDIA L. REP. (BNA) 1502, 1516 (D.C. Cir. Sept. 25, 1978), *amended*, No. 76-1742 (D.C. Cir. Jan. 12, 1979) (renewal hearing) (FCC order "is unsupported by the record and the prior law on which it purported to rely").

161. An effort to "tell a story" in each case that directed attention away from the use of a single criterion choice process would involve assessment in opinions of criteria that were not given weight in the actual decision. Such an effort would almost certainly have to be conscious.

162. It is likely that if any significant distortion were involved, courts would detect it and vacate the FCC action. See *Central Fla. Enterprises, Inc. v. FCC*, 4 MEDIA L. REP. (BNA) 1502, 1510 (D.C. Cir. Sept. 25, 1978), *amended*, No. 76-1742 (D.C. Cir. Jan. 12, 1979) (renewal hearing) (1965 policy statement "imposed an orderliness on the inquiry which made it obvious when applicants were not in fact on an equal footing").

plicants¹⁶³ and the FCC should be able to detect the end result of agenda influences, at least when they lead to selection of an applicant who is clearly inferior to at least one other applicant. In such a situation, a reviewing court could also detect this result. It would, however, be unable to correct the underlying agenda influences, unless the FCC had made these influences plain in its decision.¹⁶⁴ Moreover, if one of a group of quite similar applicants prevailed under the MCCP, deliberate or inadvertent agenda influences might be impossible for anyone to detect.

The situation is roughly the same for axioms I and V. Although it would probably be easy to detect a choice of a clearly inferior applicant resulting from a violation of either axiom, it would be difficult to determine which, if either, of these axioms had been violated. Even worse, it would be virtually impossible to detect any problem at all when the hearing compared a group of similar applicants. A violation of axiom I would mean that the FCC does not rely entirely on the MCCP to choose one applicant. In some cases the FCC might use chance or legally irrelevant considerations to choose a final licensee. In order to do so, it would have to offer false reasons related to the public interest in support of its decision. The same kind of deception would be required to disguise the violation of axiom V that would take place if the FCC were unable to distinguish between roughly similar candidates on the basis of public interest considerations,¹⁶⁵ or chose to select the less desirable of a pair of candidates. Yet, in any such case, it would be easy to emphasize minor differences between candidates and write a conclusory opinion that would pass muster.¹⁶⁶

163. Although the FCC often considers three or more minimally qualified applicants for a particular license, the number rarely exceeds five or six for a particular case. See note 121 *supra* (citing cases).

164. FCC opinions usually indicate the rankings of the applicants under various criteria and give sequential overall comparisons of applicants to explain the choice made. See, e.g., *Mid-Florida Television Corp.*, 33 F.C.C.2d 1, 21-22 (1972); *WHDH, Inc.*, 22 F.C.C. 767, 881-82 (1957). When only a few applicants are considered, it is difficult to imagine that an applicant who is clearly inferior to another would be chosen because of agenda influences. There would be a natural inclination to "test" the winner against other strong candidates either as a final step in the decision process or in the opinion. As long as there are only a few applicants, the FCC and the courts can easily compare the "winner" against all the other applicants.

165. Commentators have recognized the possibility that the FCC may labor diligently to write an opinion that rests solidly on public interest grounds. See H. FRIENDLY, *THE FEDERAL ADMINISTRATIVE AGENCIES* 59-60 (1962) (FCC opinions sometimes include "tortuous argumentation wherein the opinion writer seeks to give the successful applicant a preference under every 'criterion' or at least to minimize its disadvantage"); *id.* at 63 (changes in policy may be disguised so that "the opinion writers remain free to pull [the prior authorities] out of the drawer whenever the agency wishes to reach a result supportable by the old rule but not the new").

166. The FCC usually simply states the rankings of various applicants under different criteria and then selects a licensee after a sequence of conclusory comparisons between

Axioms IV and IX could be violated most easily and with the least chance of detection because either axiom may be violated without any conscious falsification on the part of the Commission. The FCC can violate axiom IV without consciously using absolute scales or absolute weights if it uses rough rules of thumb to compare the significance of characteristics under different criteria. Use of rough rules of thumb can violate axiom IV as effectively as use of absolute weights or of an absolute scale.¹⁶⁷ Moreover, it would be hard to detect a deliberate or inadvertent violation of axiom IV, even if the comparative hearing process did not violate any of the other axioms.¹⁶⁸ As long as the FCC claims that "[t]he weight to be given to each factor is dependent upon the circumstances of each particular case,"¹⁶⁹ no rationale need support the use of particular weights in any given case other than talismanic public interest language. As a result, it would be easy to hide absolute weights or absolute scales behind a facade of conclusory statements much like those that presently characterize FCC opinions. Further, the rough rules of thumb might shift over time as the Commission changed its conception of the public interest. The FCC would feel no need to articulate the change since the weights used in any decision could be characterized as unique.¹⁷⁰ Such circumstances would probably prevent detection of a system of absolute weights. One could not distinguish between the claim that no absolute weights or absolute scales are used and the claim that such weights and scales are used, but the precise weights or scales change over time.¹⁷¹

applicants based on performance under all of the criteria. *See* note 164 *supra* (citing cases). Since the treatment of the significance of comparative performance under each criterion is conclusory, as long as a candidate is superior under at least one criterion, that candidate can be chosen. In fact, commentators have noted that the comparative hearing process seems to operate without any apparent rules governing the combination of criteria into a choice. *See* note 171 *infra*.

167. *See* pp. 721-22 *supra*.

168. If some of the other axioms are violated, detection of a violation of axiom IV would be even more difficult. For example, if the FCC violated axiom IX by letting influences not covered by the criteria affect the decision, then decisions might be too haphazard to allow detection of absolute weights or absolute scales.

169. *Hearst Radio, Inc.*, 15 F.C.C. 1149, 1176 (1951). The FCC repeated this assertion after its 1965 policy statement. *See* p. 736 *supra*.

170. Although there is a requirement both that changes in policy be articulated and that a reasoned explanation be given for the changes, *see* p. 738 *supra*, if the FCC uses different weights in each particular case, there is no general policy to alter or explain.

171. Commentators have repeatedly noted that the FCC operates with no rules for the combination of criteria into a choice. *See, e.g.*, H. FRIENDLY, *supra* note 165, at 67 (FCC "must develop enough courage to penetrate the fog it has helped create" by revealing clearly what weight newspaper ownership will carry); Botein, *Comparative Broadcast Licensing Procedures and the Rule of Law: A Fuller Investigation*, 6 GA. L. REV. 743, 752-54 (1972) (FCC comparative hearings operate under vague and contradictory criteria and are inherently subjective). In a statistical analysis of comparative hearings for granting television stations, one study has even shown that qualities that the FCC claims

If the FCC's M CCP violates axiom IX, then factors not among the criteria claimed to comprise the M CCP may enter into the decision process. In this case, the FCC would have to hide its use of outside factors by not revealing the entire basis for its decision. Axiom IX, however, can also be violated without any intent to deceive on the part of the Commission. The objectives of the decision process may be so ill-defined that identical cases are not necessarily decided identically.¹⁷² A violation of axiom IX arising in this manner would be difficult to detect. Absolutely identical cases will never arise, and it is hard to evaluate the significance of small variations from case to case when the weights that criteria will receive in different cases are as ill-defined as they are at present.

This discussion indicates the futility of attempting to establish definitely, by empirical analysis, which of the nine axioms is violated. The more difficult it is to detect the violation of any particular axiom, the more likely it is that the axiom is, in fact, violated. When detection is easy, appellate review and public criticism will forestall or rapidly correct violations. Conversely, difficult detection may tempt the Commission to commit violations.

C. *General Implications of this Analysis*

1. *The Seriousness of the Problem*

One might suggest that, despite the results derived here, the comparative hearing works well enough to be continued. It is important, however, to recognize the seriousness of the comparative hearing's defects. Any violation of an axiom by the FCC constitutes a violation of a legal standard. In addition, some of the most likely violations are also the most serious. If axiom I is violated, the FCC does not, or cannot, despite its claims, rely entirely on its M CCP to choose a single broad-

are desirable actually have lessened an applicant's chances of being awarded a license. See R. NOLL, M. PECK & J. MCGOWAN, *ECONOMIC ASPECTS OF TELEVISION REGULATION* 112-14 (1973).

One recent case may indicate some judicial awareness of this problem. See *Central Fla. Enterprises, Inc. v. FCC*, 4 *MEDIA L. REP.* (BNA) 1502, 1510 (D.C. Cir. Sept. 25, 1978), *amended*, No. 76-1742 (D.C. Cir. Jan. 12, 1979) (renewal hearing) (FCC has not "even vaguely described how it aggregated its findings into the decisive balance," but simply indicated that it relied on "administrative 'feel'"; "[s]uch intuitional forms of decision-making, completely opaque to judicial review, fall somewhere on the distant side of arbitrary").

172. The Commission has only the vague statutory standard of the "public convenience, interest or necessity" as an ultimate guide for its choices. See p. 734 *supra*; H. FRIENDLY, *supra* note 165, at 54-57 (vagueness of congressional mandate leaves FCC to perform frustrating task with little guidance).

cast licensee in each case.¹⁷³ If axiom V is violated, the Commission either cannot draw distinctions based on the statutory public interest standard, or it makes some decisions directly contrary to that standard.¹⁷⁴ If axiom IV is violated, then the Commission uses a secret system of absolute scales or absolute weights despite claims to the contrary.¹⁷⁵ If axiom IX is violated, then irrelevant factors are influencing decisions or the choice process is so ill-defined that identical cases may not be decided identically.¹⁷⁶ Each of these violations contravenes deeply-held tenets of the administrative process: those subject to the process are entitled to be given at least a rudimentary knowledge of its operation,¹⁷⁷ and agencies gain their power from and must adhere to the statutory purposes specified by the legislative branch.¹⁷⁸

The possibility theorem's attack upon comparative hearings is bolstered by commentators' criticisms. Three common criticisms of the process are that it fails to implement the policy objectives inherent in the agency's own criteria,¹⁷⁹ that its extreme vagueness engenders a

173. See p. 739 *supra*.

174. See pp. 741-42 *supra*.

175. See pp. 740-41 *supra*. The secret use of absolute scales or absolute weights may not be deliberate. See p. 747 *supra*.

176. See pp. 744, 748 *supra*.

177. See p. 738 *supra* (reasoned decisionmaking requirements). Some commentators have contended that when there is an allocative decision that involves a clash of fundamental values, it may be desirable to allow the clash to be resolved in a way that does not appear to violate either value. Such a result is usually accomplished via "subterfuges" that hide the fact that one value will be sacrificed for the sake of another. See note 68 *supra*. It is doubtful, however, that these commentators would judge that preserving all of the axioms, especially IV and VI, which could be violated without sacrificing the principles of rational decisionmaking, is a vital enough objective to justify subterfuge.

178. In theory, Congress cannot delegate power to agencies unless it does so by legislation whose "explicit or reasonably discernible implicit purposes, and . . . history, taken together" provide "the administrator with sufficiently clear guidance" so that a reviewing court "can 'ascertain whether the will of Congress has been obeyed.'" McGowan, *Congress, Court, and Control of Delegated Power*, 77 COLUM. L. REV. 1119, 1127-28 (1977) (footnote omitted). In practice this "delegation doctrine" is never used by federal courts to strike down legislation. *Id.* at 1127. Judge McGowan, however, has suggested that it might be appropriate to revive the doctrine for cases "in which Congress debates alternative policy choices entirely feasible for it to make, but chooses instead to compromise the matter by delegation in order to get a bill enacted or to avert the assumption of direct responsibility." *Id.* at 1129-30 (footnotes omitted). In the Judge's opinion, such cases involve "a subversion of the democratic decisionmaking contemplated by the Constitution, as well as an imposition upon both the administrative process and judicial review." *Id.* at 1130 (footnote omitted).

179. See note 171 *supra*; Fisher, *The President's Comment*, 21 FED. COM. B.J. 117, 118 (1967) (procedures have "not reflected the only two policy principles [diversification of ownership and integration of management and ownership] of consequence in the broadcast field"); Geller, *A Modest Proposal for Modest Reform of the Federal Communications Commission*, 63 GEO. L.J. 705, 715-18 (1975) (criteria and standards for combining them often ignored or unsatisfactorily explained away; failure to implement policies inherent in many criteria is evident and there is some evidence that political or other biases dictate some decisions).

great potential for illegitimate influences,¹⁸⁰ and that it is too time-consuming and expensive.¹⁸¹ The first criticism is clearly related to possible violations of the axioms. If axiom IX is violated, then either the criteria are applied inconsistently or factors other than the criteria affect decisions. If axiom I or the first part of axiom V are violated, then the decision process does not use the criteria as the sole vehicle for choosing licensees. If the second part of axiom V is violated, the M CCP picks the less desirable of a pair of applicants. If axiom VI is violated, all but one of the criteria are ignored. If axiom VIII is violated, then an applicant who is inferior to another under every criterion may be chosen. If axiom VII is violated, then the agenda as well as the criteria influence the decision. Only a violation of axiom IV might not involve a serious departure from the policies inherent in the criteria, but even if that axiom is violated, continual shifting of the weights, scales, or rough rules of thumb employed can leave the impression that the policies underlying the criteria are not implemented in a consistent manner.¹⁸²

The possibility theorem also helps illuminate the fear that illicit influences might enter into the process. Three of the five axioms most likely to be violated, I, V, and IX, are axioms that limit the process to a decision based on the criteria.¹⁸³ If the comparative hearing process violates any of these axioms, then it is likely that outside and possibly illicit influences affect the decision process.¹⁸⁴

Finally, given the nature of the axioms and the fact that one of them must be violated, it is not surprising that the comparative hearing process has turned out to be costly and time-consuming. If no absolute

180. See Geller, *supra* note 179, at 715-18 (flexibility of process FCC uses in selecting licensees leads to heavy role for preferences of commissioners); Johnson, *A New Fidelity to the Regulatory Ideal*, 59 GEO. L.J. 869, 883, 885 (1971) (discussing attempts by those regulated by FCC to influence Commission via lobbying and public relations campaigns; "deferred bribe" of future employment with broadcasters may affect decisionmaking by FCC personnel); Levin, *Regulatory Efficiency, Reform and the FCC*, 50 GEO. L.J. 1, 24-25 (1961) (applicants may attempt to influence FCC through congressional pressure, by approaching commissioners who may be dependent on applicant for future employment, or by making inflated and impossible claims about future performance).

181. See, e.g., Anthony, *supra* note 70, at 47 (uncertainty in and diversity of issues are primary cause for length and complexity of comparative hearings; lawyers in such situation will quite properly assemble huge record in order not to fail to point out any fact that may help client obtain license—result in many cases is vast amount of irrelevant material in record); Levin, *supra* note 180, at 26-29 (delay and high cost characterize hearings).

182. See p. 747 *supra*.

183. See pp. 746-47 *supra*.

184. If influences other than performance under the criteria may be decisive, applicants may attempt to apply political pressure on the FCC or to bribe commissioners by offers of future employment. See note 180 *supra*.

scales or absolute weights are used, or if the FCC secretly uses weights or scales that it periodically alters,¹⁸⁵ applicants in a comparative hearing will have great difficulty in ascertaining what rankings will lead to a license award. As a result, the applicants will be tempted to submit tremendous amounts of detailed evidence in an effort to cover all possibilities. Hearing examiners, afraid of excluding possibly relevant facts, will tend to accept almost all of the evidence submitted and allow applicants to argue the importance of each fact. The elements of cost and delay will be further exacerbated if axioms I, V, or IX are violated, because then applicants can not safely limit themselves to arguing about facts linked to the criteria.¹⁸⁶ The inability to predict what rankings will lead to a license may tempt applicants to expend resources, not to improve themselves, but to exert political pressure on the FCC or to bribe FCC personnel by offering them future jobs with the applicant.¹⁸⁷

2. *Implications for Reform Proposals*

In evaluating proposed reforms of the licensing process, a crucial issue is which axiom the FCC should *choose* to violate, in order to escape from the impossibility of satisfying all of them.¹⁸⁸ There are two routes that reform might take. First, some reforms retain a rational decisionmaking procedure aimed at choosing applicants who will maximize social objectives. Reforms from this group must satisfy axioms I, III, V, VII, VIII, and IX, which are rationality constraints,¹⁸⁹ in addition to satisfying the physical constraint inherent in axiom II. Axioms IV and VI can be violated: an absolute weights or absolute scales

185. It is likely that one of these two possibilities holds because there is no apparent set of rules that the FCC relies on to combine criteria into a choice. See note 171 *supra*.

186. A violation of axiom VI through the adoption of a single criterion choice process would reduce costs if the parties to comparative broadcast hearings knew that such a process was in effect. If the parties knew, however, courts would probably also know and would prevent the use of such a process.

187. See p. 750 & note 180 *supra*.

188. A large body of literature explores the process of deleting or changing public choice axioms in response to the conclusion that a choice process cannot simultaneously satisfy a set of axioms. See, e.g., Mueller, *supra* note 2, at 419-22; Plott, *supra* note 107, at 551-54.

189. If axiom I or VII is violated, the decision process is not based entirely on the criteria meant to govern choices under the process. If axiom III is violated, then some minimally qualified applicants cannot be considered in the choice process despite the fact that they would be chosen if no other applicant were available. If axiom V is violated, then either the process cannot form preferences between applicants on the basis of the criteria that are supposed to govern the process or applicants may be chosen in direct contradiction to the outcome dictated by the criteria. If axiom VIII is violated, then the choice dictated by the criteria that govern the choice process may not be the actual choice. If axiom IX is violated, then the choice process is arbitrary in the sense that different applicants will be chosen in factually identical cases.

method of combining criteria can be employed or the decision process can be reduced to one that rests on a single criterion. Second, other reforms abandon the rational decisionmaking procedure in favor of a lottery or similar device not requiring evaluation by the FCC. If this path is followed, axiom IX no longer constrains the choice process.¹⁹⁰ Commentators have offered reform proposals that fit within each of these two groups. The most commonly proposed reforms include, in the first group, an auction, "first come, first served," and absolute weights or scales, and, in the second group, a lottery.

Several commentators have favored or considered use of an auction.¹⁹¹ Applicants would be required to possess specified minimal qualifications, and the highest minimally qualified bidder would be awarded the license. Such a procedure employs the single criterion of number of dollars bid, and thus violates axiom VI. "First come, first served," a similar escape from the impossibility result, would award each license to the first minimally qualified applicant to file an application. Although criticized on grounds of general broadcast policy and on the ground that programming regulation would be required,¹⁹² such a system would avoid the impossibility result by using only the single criterion of application speed. Finally, one commentator has proposed that the licensing process rest in part on an absolute weights

190. The outcome in factually identical cases could be different because evaluation of the facts under a set of criteria would not enter into the decision.

191. Even though they disagree about the desirable degree of continued government regulation of broadcasting, some writers have suggested auctioning rights to broadcast. See Coase, *The Federal Communications Commission*, 2 J.L. & ECON. 1, 23-24, 30-35 (1959) (favoring auctioning rights to broadcast combined with minimal regulation); De Vany, Eckert, Meyers, O'Hara & Scott, *A Property System for Market Allocation of the Electromagnetic Spectrum: A Legal-Economic-Engineering Study*, 21 STAN. L. REV. 1499, 1532-33, 1556-59 (1969) (advocating use of auction at least on experimental basis to allocate portions of electromagnetic spectrum); Levin, *supra* note 180, at 22-23, 29-37 (favoring auction as possibility in setting of continued government regulation and control). Other commentators have considered an auction procedure, but have rejected it for various reasons. See Anthony, *supra* note 70, at 99-102 (auction would be quick, cheap, and conclusive but would result in abandoning public interest considerations in allocating broadcast rights and would put premium on financial resources); Botein, *supra* note 171, at 759-61 (auction, although "administratively feasible and economically valid" would "abandon any attempt at reaching a reasoned decision" based on public interest); Grunewald, *Should the Comparative Hearing Process Be Retained in Television Licensing?* 13 AM. U.L. REV. 164, 167-69 (1964) (auction would eliminate delays and possible improprieties in present allocation process, but would lead to excessive commercialism and possibly to concentration of ownership in hands of wealthy).

192. See Anthony, *supra* note 70, at 102-04 (first come, first served system would ignore public interest considerations and would unfairly penalize careful preparation of applications; also, hard questions as to completeness of applications might arise); Grunewald, *supra* note 191, at 168-69 (use of first come, first served system would require programming regulation by FCC).

and absolute scales approach.¹⁹³ Insofar as the process relied on that approach, it would avoid the impossibility result by violating axiom IV.

Some commentators have considered use of a lottery to choose broadcast licensees from the pool of minimally qualified applicants.¹⁹⁴ The adoption of a lottery would mean the abandonment of rational decision-making in favor of allowing chance to dictate the result in any given case.¹⁹⁵ As a consequence, the process would not have to conform to axiom IX.

Many reform proposals, although attractive on the surface, will be ineffective unless combined with measures that release the FCC from one of the axioms. For example, at least one commentator has suggested that granting longer tenure for commissioners and taking other steps

193. See Anthony, *supra* note 70, at 64-66. Anthony suggests that the FCC take four steps to set up "a system of standards and priorities for choosing among mutually exclusive applicants in broadcast licensing cases." *Id.* at 64. First, criteria must be selected to evaluate applicants. *Id.* Second, the FCC should formulate "standards for awarding applicants fixed credits under each of those" criteria. *Id.* Third, the Commission should set up a "schedule of priority categories to rank the applicants on the basis of the credits they earn." *Id.* In doing so, a "weighted point system may be helpful." *Id.* Finally, the FCC should award each license to the applicant with the greatest number of total credits with ties to be broken by lot. *Id.*

After setting out the four steps, Anthony provides a specific illustration of his type of system. *Id.* at 64-65. In the illustration, diversification of control of mass media and past broadcast record are the only criteria. Under the diversification criterion, the FCC awards an applicant three points if the applicant has no substantial media interests, two points for no substantial interest in nearby or national media, and zero points otherwise. Under the past-broadcast-record criterion, an applicant earns four points for an outstanding record, one point for a satisfactory record, and zero points otherwise. Each applicant's points are totaled, and the applicant with the most points gets the license.

Such a system would violate axiom IV insofar as it relied upon an absolute-weights system as in the illustration. In practice, a system like Anthony's proposal might function as a lottery. Because broadcast rights are valuable, it would seem likely that several applicants, each with outstanding broadcast records and no substantial media interests, would apply for each license. The highest level under each criterion would in effect become a minimum standard, and the FCC would use a lottery as the core of its choice process.

194. See *id.* at 102 (lottery offers all benefits of auction—"speed, economy, objectivity, and conclusiveness"; lottery avoids defects of auction except for lack of explicit public interest considerations in choice of licensee); Botein, *supra* note 171, at 758-59 (lottery might reduce administrative costs and potential corruption in present system but result could be that "by concentrating on threshold qualifications . . . a lottery would just shift the procedural locus of the comparative hearing's deficiencies" without any reduction in either costs or potential corruption); Grunewald, *supra* note 191, at 169 (lottery system could be used, thereby cutting costs and political influences on choices, but such system might require programming regulation by FCC).

Judge Leventhal, in discussing reform of the comparative hearing, suggested that "[p]erhaps a lottery could be used, for luck is not an inadmissible means of deciding the undecidable." *Star Television, Inc. v. FCC*, 416 F.2d 1086, 1095 (D.C. Cir.), *cert. denied*, 396 U.S. 888 (1969) (Leventhal, J., dissenting).

195. One could visualize a lottery as a single criterion choice process that violates axiom VI. The single criterion would be the outcome of the draw. Chance, however, seems to have little to do with the public interest goal that underlies the comparative hearing process.

to attract more highly qualified commissioners might alleviate the defects of the comparative hearing process.¹⁹⁶ An FCC composed of commissioners "dedicated to the public interest would be effective despite structural deficiencies, possibly inconsistent duties, and vaguely defined legislative standards."¹⁹⁷ A proposal of this sort is rooted in a deeper conception of the "New Deal" administrative agency. Well-trained administrators will develop "expertise" in their agency's subject area. When faced with a problem, these expert administrators will naturally understand all of the complexities presented and then somehow will combine all of the considerations into the "best" resolution of the problem.¹⁹⁸ Yet, regardless of their quality or expertise, decisionmakers who conduct the current FCC comparative hearing process must act in a way that offends at least one implicit or explicit legal constraint. Improving personnel will be futile since the process itself is internally inconsistent.

Other reform proposals are similarly flawed. A former FCC hearing examiner has urged that if the parties to each hearing proceeded with fuller, clearer, and more concise reasoning, then "it may be fairly assumed that the decisions, both initial and final, would likewise take on a desired quality of logic and consistency."¹⁹⁹ Judge Friendly suggested in 1962 that the criteria in the FCC's M CCP be given better definition by means of policy statements or rulemaking.²⁰⁰ The FCC issued its 1965 policy statement "to serve the purpose of clarity and consistency of decision, and the further purpose of eliminating from the hearing process time-consuming elements not substantially related to the public interest."²⁰¹ In that policy statement, the FCC reduced the number of criteria to be considered and refined the elements to be considered under each criterion.²⁰² One commentator has urged direct

196. See Geller, *supra* note 179, at 720-24 (in order to secure higher quality commissioners, they should have 15-year terms with no reappointment possible and should be barred from employment in communications field for five years after FCC service).

197. *Id.* at 720-21.

198. See Freedman, *Crisis and Legitimacy in the Administrative Process*, 27 STAN. L. REV. 1041, 1056-60 (1975) (criticizing and tracing development of expertise rationale).

199. Irion, *FCC Criteria for Evaluating Competing Applicants*, 43 MINN. L. REV. 479, 498 (1959).

200. See H. FRIENDLY, *supra* note 165, at 67-69; *id.* at 69 (policy statement with respect to diversification criterion "would promote administrative consistency and intelligibility, and also facilitate congressional action if Congress desired to act").

201. 1965 Policy Statement, *supra* note 82, at 394.

202. Prior to the policy statement, the FCC commonly compared applicants under a large number of criteria including local ownership, integration of ownership and management, participation in civic activity, diversification of background of stockholders, length of total past broadcast experience, record of past broadcast experience (including sense of public service responsibility), proposed program policies, proposed staff and technical facilities, and diversification of ownership of mass media. See *Television Inquiry: Hearings Pursuant to S. Res. 13 & 163 Before the Senate Comm. on Interstate and Foreign*

steps to increase the efficiency of the hearing process: reducing the classes of relevant evidence, limiting the hearings in time, and limiting the amount of written evidence that will be considered.²⁰³ Steps like increasing the level of advocacy, refining the criteria, and attempting to make hearings more efficient all stop short of remedying the basic inconsistencies of the present comparative hearing process. More effective advocates, like more effective commissioners, cannot cure defects that arise from the process itself. The refinement of the criteria in the 1965 policy statement left the structure of the hearing process fundamentally unchanged.²⁰⁴ Attempts to improve the efficiency of the system by limiting evidence that can be presented do not address the basic problem: counsel will tend to submit a great deal of evidence when faced with a process that allocates extremely valuable rights but does not give a clear indication about the basis upon which decisions will rest.²⁰⁵

3. Conclusions

Public choice theory can provide insight into administrative agency decision processes. After expressing the physical and legal constraints

Commerce, 84th Cong., 2d Sess. 979 (1956) (letter from George C. McConaughy, FCC Chairman); *Irion*, *supra* note 199, at 481. The 1965 policy statement reduced the number of commonly used criteria to three or four. *See* pp. 734-36 *supra*. Only a reduction to one criterion, however, would have ensured that the FCC could escape from the serious consequences of the fact that no MCCP can simultaneously satisfy the nine axioms.

203. *See* Grunewald, *supra* note 191, at 178-80 (favoring expediting hearings by FCC limitations on permissible evidence, on total time of hearing process, and on amount of written material submitted; also favoring deletion of such unnecessary considerations as staffing and signal strength).

204. *WHDH, Inc.*, 22 F.C.C. 767 (1957), illustrates the ineffectiveness of the 1965 policy statement. In 1954, the FCC began comparative hearings to grant the initial broadcast license for television channel five in Boston to one of four minimally qualified applicants. After weighing and balancing rankings under 13 different criteria, *see id.* at 859-81, the Commission selected a winner, WHDH. The choice process was slow, turbid, and unpredictable. Because the Commission later discovered that representatives of WHDH had attempted to influence the FCC Chairman improperly while the comparative hearings were in progress, WHDH's grant was voided. *See WHDH, Inc.*, 29 F.C.C. 204, 212-13 (1960). Three competing applicants challenged WHDH at renewal time and, due to various delays, the Commission's final decision was not rendered until 1969. *WHDH, Inc.*, 16 F.C.C.2d 1 (1969). Because the FCC treated the renewal hearing as if it were an initial licensing hearing under the 1965 policy statement, *see id.* at 7-8, a scholar can compare the initial disposition of channel five before and after the policy statement. This comparison shows that the 1969 decision was only slightly more acceptable than the 1957 decision. When the 1969 hearings compared the four applicants under only four categories, *see id.* at 10-17, one applicant ranked no lower than any other applicant under every criterion and thus was awarded the license. Unfortunately, the relationship between the evidence and the rankings was not obvious—the hearing examiner had chosen a different licensee on the same facts. *Id.* at 8-10, 19. If the ultimate winner had not been preferred under every criterion, the Commission would have had to engage in the same unsatisfactory weighing and balancing process that characterized pre-1965 decisions. In addition, of course, the decision process remained very slow.

205. *See* pp. 750-51 & note 181 *supra*.

on an agency as axioms, one can test a decision process for internal consistency. A finding of inconsistency is valuable for two reasons. First, forcing litigants and public servants to operate within an internally inconsistent system has heavy costs. Even the most able and idealistic administrators will be frustrated when their best efforts must result in a violation of a principle that they accept or are constrained to obey. Resources are wasted and risks of corruption or illicit influence arise when lawyers and parties have to work within an inconsistent system. If the faulty system is an adjudicative mechanism, its continued failure to live up to the constraints placed on it may undermine public confidence not only in the mechanism, but also in law and government themselves. In addition to helping to detect internal inconsistency in agency decision processes, public choice theory also helps to separate useful reform efforts from those that are doomed to failure. A successful reform effort must lead to a relaxation of one of the axiomatic constraints that leads to inconsistency. Otherwise, even well-intentioned proposals will be ineffective.

III. The Use of Internally Inconsistent Multicriteria Choice Processes by Courts

Like administrative agencies, courts sometimes use MCCPs. These MCCPs may be required by statute²⁰⁶ or they may be created inde-

206. Federal law dealing with bank mergers, for example, establishes an MCCP for determining the legality of anticompetitive mergers. The statute provides that the responsible agency shall not approve a bank merger that will substantially reduce competition or cause a restraint of trade "unless it finds that the anticompetitive effects of the proposed transaction are clearly outweighed in the public interest by the probable effect of the transaction in meeting the convenience and needs of the community to be served." 12 U.S.C. § 1828(c)(5)(B) (1976). The section further provides that "[i]n every case, the responsible agency shall take into consideration the financial and managerial resources and future prospects of the existing and proposed institutions, and the convenience and needs of the community to be served." *Id.* The statute therefore provides several criteria under which the agency is to reach a decision.

In *United States v. First City Nat'l Bank*, 386 U.S. 361 (1967), the Supreme Court considered the role of courts in reviewing bank merger decisions by the responsible agency. *Id.* at 367-70. Federal law provides that "the standards applied by the court" in such cases "shall be identical with" those that the responsible agency must apply. 12 U.S.C. § 1828(c)(7)(B) (1976). In addition, 12 U.S.C. § 1828(c)(7)(A) (1976) requires the court to "review *de novo* the issue presented" in bank merger cases. In *First City National Bank* the Court held that under these provisions courts should make an "independent determination of the issues," which need not give any weight to the agency determination. 386 U.S. at 368. As a result, it is "[t]he task of the district courts . . . to inquire *de novo* into the validity of a bank merger" to determine "whether the merger offended the anti-trust laws and . . . if it did, whether the banks had established that the merger was nonetheless justified by the convenience and needs of the community to be served." *United States v. Third Nat'l Bank*, 390 U.S. 171, 178 (1968). Thus, courts must evaluate the convenience and needs defense under the statutory MCCP.

pendently by the courts themselves.²⁰⁷ There are a number of ways in which one might apply public choice analyses to judicial decision-making.²⁰⁸ This section focuses on the task of analyzing judicial choice processes using the possibility theorem developed previously.²⁰⁹

Violations of some of the axioms by courts would be highly significant. For example, if it were known that all the axioms but axiom V were satisfied, then either the judiciary would not be able to distinguish between alternatives on the basis of the criteria it claims to use or there would be a possibility that the judiciary was choosing inferior alternatives.²¹⁰ Either situation would be extremely serious for an institution that derives its legitimacy in a democracy from a reliance on principled decisionmaking.²¹¹ It is generally much more difficult, however, to apply the possibility theorem to the judicial process. Because of the nature of the process, courts reveal less of their decisionmaking process than do administrative agencies.²¹² Thus, it may be quite dif-

207. One example is the way in which courts decide the state of corporate citizenship in diversity jurisdiction cases. Under the Constitution, "[t]he judicial Power shall extend . . . to Controversies . . . between Citizens of different States." U.S. CONST. art. III, § 2. If any civil action over which the federal courts have original jurisdiction is filed in state courts, it "may be removed by the defendant . . . to the district court of the United States." 28 U.S.C. § 1441(a) (1976). When a defendant corporation seeks to remove a state court action under diversity of citizenship, the corporation's state "citizenship" is a crucial issue. Because federal statutes equate citizenship with the corporation's "principal place of business," *id.*, § 1332(c), courts must choose one principal state of business from a set of mutually exclusive alternatives. Courts appear to use an M CCP to make this determination. See *Kelly v. United States Steel Corp.*, 284 F.2d 850, 854 (3d Cir. 1960) (ranking states and deciding principal place of business under criteria that include location of administrative officers, location of corporate employees, location of tangible property, and location of productive capacity).

208. For example, *Levine & Plott*, *supra* note 5, at 563, 592-96, suggests that models of voting behavior can be used to illuminate the agenda influences inherent in the rendering of special verdicts by courts.

209. The axioms used here are only one of many possible sets of axioms. Because this set includes axiom II—which requires that there be at least three potential choices—it can only produce interesting conclusions concerning judicial decisions involving at least three possible outcomes. Compare note 206 *supra* (bank merger law allows only two outcomes) with note 218 *infra* (many possible outcomes in procedural due process cases).

210. See pp. 722-23 *supra* (stating and discussing axiom V).

211. Administrative agencies are subject to the legal requirement of "reasoned decision-making." See p. 738 *supra*. Although courts are not subject to a similar legal requirement, and although for the highest level of appellate courts there is no formal institution to oversee the quality of decisionmaking, many scholars have argued that courts derive their legitimacy in a democratic society from basing decisions upon principle. See, e.g., A. BICKEL, *THE LEAST DANGEROUS BRANCH* 205-06, 238-40 (1962); Wechsler, *Toward Neutral Principles of Constitutional Law*, 73 HARV. L. REV. 1, 15, 19 (1959) (judicial judgments must not be ad hoc and merely political, but based on principles that both transcend given case and require particular result).

212. A court is limited to deciding the cases before it. Although it can enunciate general standards and principles in any given case, it cannot comprehensively detail its decisionmaking process in a particular area of law by a device like the FCC's 1965 policy statement. See, e.g., *Flast v. Cohen*, 392 U.S. 83, 94-97 (1968) (dictum) (constitutional

ficult to discern from judicial opinions whether particular axioms are satisfied or, indeed, whether an MCCP is used at all. Moreover, even when the possibility theorem can be applied, violations of some of the axioms have different implications for courts than for administrative agencies.

A. *Difficulties in Deciding Whether an MCCP is Used and Whether the Nine Axioms Apply—An Illustrative Example*

This discussion uses procedural due process cases to illustrate the difficulties inherent in ascertaining whether courts use an MCCP and whether certain of the nine axioms apply.

1. *Procedural Due Process—Is an MCCP Used?*

Currently, courts examine three criteria to determine what procedures are constitutionally required before the government takes an action harming a person or denying him a valuable benefit:²¹³ the private interest affected, the risk of error, and the government's interests.²¹⁴ This test was set out by the Supreme Court in *Mathews v. Eldridge*,²¹⁵ and has been repeatedly used by the Court in procedural due process cases.²¹⁶

The definition of an MCCP includes three aspects: specifying a finite number of criteria for evaluating alternatives, ranking the al-

restriction of federal jurisdiction to "cases" and "controversies" bars federal judiciary from issuing advisory opinions); *Muskraat v. United States*, 219 U.S. 346, 361 (1911) (federal judicial power is limited to "the right to determine actual controversies arising between adverse litigants"). Furthermore, an administrative agency often deals with a single problem over a long period of time while courts spend much of their time dealing with new, unresolved problems. See pp. 763-64 *infra* (litigators will not tend to raise issues that are resolved and courts can dispose of such issues summarily when raised). Even though a court can enunciate general principles in a particular case, it is often reluctant to do so until there is a body of related case law. See Friendly, "Some Kind of Hearing", 123 U. PA. L. REV. 1267, 1301-02 (1975) (comprehensive prescription of procedures required by due process in certain types of cases amounts to unwise judicial legislation; it is best to allow slow evolution of requirements through case law). By that time, however, a court may be able to impose a clear solution; it may be able to establish an MCCP with clearly established weights for various criteria.

213. The determination of the procedures that are necessary follows the determination that a plaintiff has an interest in "life, liberty or property" that falls within the due process clause. U.S. CONST. amend. XIV. If he does not have such an interest, then the government need not make available any particular procedure. See Note, *Specifying the Procedures Required by Due Process: Toward Limits on the Use of Interest Balancing*, 88 HARV. L. REV. 1510, 1510 (1975).

214. See *Mathews v. Eldridge*, 424 U.S. 319, 334-35 (1976).

215. *Id.*

216. See, e.g., *Dixon v. Love*, 431 U.S. 105, 112-15 (1977) (procedures required before suspension of driver's license); *Ingraham v. Wright*, 430 U.S. 651, 674-82 (1977) (procedures provided by public school before corporal punishment permitted).

ternatives under each criterion, and combining the rankings into a choice.²¹⁷ In a procedural due process case, it is plausible to assume that alternative procedures are ranked by judges under each of the three *Mathews* criteria. At least in some cases, however, a court will be faced with a large number of possible procedures that are minimally acceptable.²¹⁸ It may be nearly impossible to rank all of the possibilities under each criterion. If courts use an M CCP in such a context, they must do so by limiting consideration to a few candidates.²¹⁹ But, if the initial winnowing process is too restrictive, only one candidate will remain and it will not be necessary to apply an M CCP. Thus, the argument that courts rank alternatives to decide what process is due depends on rather delicate assumptions about the existence and strength of this winnowing process.²²⁰

Failure to rank alternatives under the criteria is only one way in which a judicial decisionmaking process can fail to conform to the definition of an M CCP. The other major way is failure to use criteria at all. This discussion is limited, however, to situations in which courts explicitly employ a set of criteria to evaluate alternatives.

2. *Difficulties in Determining Whether Axioms I and II Apply*

A threshold issue that arises in applying the possibility theorem to a judicial M CCP is whether there are at least three alternatives, each of which would be chosen if no other alternatives were available. If not, then axiom II, which is a merely technical requirement, will not be satisfied.²²¹ As a result, one will not be able to say on the basis of the possibility theorem that one of the more interesting axioms must be violated. Many cases have only two outcomes; sometimes, for example, the question may be only whether or not a particular procedure is adequate.

217. See p. 719 *supra*.

218. There may be many possible combinations of procedural elements that could be required in a given case. See Friendly, *supra* note 212, at 1279-95 (listing 11 elements). Within some of the elements there may be many gradations. Thus, even when only a few procedural elements are under consideration, there may still be many possible combinations.

219. In FCC comparative hearings, the number of candidates is limited both by the number that apply and by the FCC's own initial winnowing process, which excludes candidates that do not possess certain minimal qualifications. See pp. 733-34 *supra*.

220. In FCC comparative hearings, the number of candidates that must be considered is limited by the number of applicants. A parallel limitation in procedural due process cases might be that courts will only consider the parties' own proposed candidates for a minimally required set of procedures. Placing such attention on issues raised by the parties, however, could lead to a "yes-no" type of decision with respect to each procedural element put at issue by the parties. Such a series of decisions would violate axiom II. See pp. 760-61 *infra*.

221. See p. 721 *supra* (stating and discussing axiom II).

For axiom II to be satisfied in the procedural due process cases, the decisionmaking process must go beyond a mere "yes-no" determination of whether particular procedures meet minimal constitutional standards. In order to avoid the problem, it is necessary to make assumptions about the hidden mechanics of judicial decisionmaking. One might assume that courts determine what minimal process is due, after considering many possible candidates, before they compare the actual process afforded with what is due. This assumption would avoid the threshold problem of axiom II.

It is difficult to tell from the case law whether the assumption holds. When existing procedures are found to be adequate, there is no reason to specify the minimal requirements or, in some cases, even to consider them. In practice, courts usually do not specify the constitutional minimum in such cases.²²² However, when courts find existing procedures inadequate, they usually do set out a minimal set of required procedures.²²³ Yet even when they do so, courts may limit themselves to a series of "yes-no" decisions about the need for particular procedural elements. Commentators are sharply divided about whether courts should be comprehensive in specifying what procedure is required.²²⁴ If no comprehensive specification is provided, decisionmaking by a series of "yes-no" determinations with respect to each procedural element sought by a party would seem at least as likely as decisionmaking that first defined, in a single step, a comprehensive, minimally required process.²²⁵ A series of "yes-no" determinations would constitute a set

222. See, e.g., *Smith v. Organization of Foster Families*, 431 U.S. 816, 855-56 (1977) (finding procedures adequate for transferring foster child to new foster parents); *Ingraham v. Wright*, 430 U.S. 651, 674-82 (1977) (finding procedures preceding administration of corporal punishment in public school adequate). But see *Board of Curators v. Horowitz*, 98 S. Ct. 948, 959-62 (1978) (Marshall, J., concurring and dissenting) (attacking majority dictum that procedural due process would have been satisfied by less procedural protection than provided; *Mathews* test mandated all procedural protection actually provided).

223. See, e.g., *Goss v. Lopez*, 419 U.S. 565, 577-84 (1975) (requiring notice and informal hearing before short suspension from public school); *Goldberg v. Kelly*, 397 U.S. 254, 266-71 (1970) (requiring extensive procedural protection before deprivation of welfare payments).

224. Compare *Friendly*, *supra* note 212, at 1301-02 (comprehensive prescription of procedures required amounts to unwise judicial legislation; it is best to allow slow evolution of requirements through case law) with Note, *supra* note 213, at 1520-21 (to avoid uncertainty, court should always articulate set of procedures to govern not only "case before it" but also "broad range of similar cases").

225. In at least one recent opinion, the Supreme Court undertakes a series of "yes-no" determinations with respect to procedural elements that could be required. See *Smith v. Organization of Foster Families*, 431 U.S. 816, 850-55 (1977). It is unclear, however, whether this series of arguments represents judicial thought processes. In addition, even if the *Smith* case was decided by a series of "yes-no" determinations, it may be that other cases are decided by a single-step determination of a comprehensive, minimally required set of procedures.

of decisions, each of which violated axiom II. In any event, procedural due process opinions do not provide enough insight into the decision-making processes of judges to determine whether or not axiom II applies.

A related problem is that there may be no single minimally required set of procedural rights. Some procedural elements may be traded off against others to yield equivalent packages of rights. For indigent plaintiffs in welfare or disability cases whose benefits have been temporarily suspended pending pursuit of formal remedies, for example, the right to counsel without the right to confront adverse witnesses may be roughly equivalent to the right to confront witnesses without any right to counsel. If there are groups of equivalent packages of procedural rights, axiom I's requirement that the M CCP choose *one* alternative may be violated.²²⁶

One might assume that judges merely arrive at a *class* of equivalent procedures, but there is no support for this assumption in actual opinions. Indeed, in many cases, courts have specified a single procedural package as the constitutional minimum.²²⁷ It seems more likely that judges see their task as one of discovering such a single minimum procedure. But there remains a significant possibility that their decisionmaking violates axiom I because they could easily choose any of several constitutionally equivalent outcomes.²²⁸

3. *Applicability of Axioms III-IX*

Axioms III, V, VII, VIII, and IX seem to be desirable traits of the judicial process: courts should be able to consider any potential alternative; they should be able to determine whether one alternative is more desirable, less desirable, or equally desirable to another; they should choose a more desirable alternative over one that is less desirable; the order or "agenda" in which alternatives are considered should

226. Perhaps with this problem in mind, Judge Friendly has produced a list of elements of procedural protection in decreasing order of priority. See Friendly, *supra* note 212, at 1278-95. Judge Friendly's purpose in producing such a list, as well as a corresponding list ranking the severity of various government actions, was that such lists "may help to produce more principled and predictable decisions" than does the bare requirement that private and government interests be balanced against each other. *Id.* at 1278. But Friendly also observed that some protections can be traded off against others to obtain a similar amount of overall protection. See *id.* at 1279 ("the elements of a fair hearing should not be considered separately; if an agency chooses to go further than is constitutionally demanded with respect to one item, this may afford good reason for diminishing or even eliminating another").

227. See note 223 *supra* (citing cases).

228. Axiom I, like axiom II, is a technical axiom. Violation of axiom I prevents a demonstration that, on the basis of the possibility theorem, an M CCP violates at least one of the more interesting axioms. See p. 759 *supra*.

not affect the outcome; an alternative should not be chosen if there is another one that is superior under every criterion; and "irrelevant" criteria should not affect the choice.²²⁹ Although these axioms cannot be said to be legal constraints analogous to the requirement of "reasoned decisionmaking" that is imposed on administrative agencies,²³⁰ courts derive their legitimacy in a democracy from grounding their decisions on principle.²³¹ It is therefore reasonable to view axioms III, V, VII, VIII, and IX as constraints on any judicial M CCP.

In the procedural due process cases, there is evidence that axioms IV and VI apply. Both the Supreme Court and commentators have indicated that no one criterion is so overwhelmingly important that it would determine the outcome in every case,²³² so axiom VI appears to be satisfied. In fact, reform proposals often focus on changing from an M CCP to a single criterion choice process even if the single criterion itself is somewhat ill-defined.²³³ Commentators have also noted that the process of "balancing" the criteria seems to be inherently subjective and that the criteria themselves seem to be incommensurable.²³⁴ Thus, axiom IV appears to be satisfied.

B. *The Implications of Judicial Violation of Some of the Axioms*

Violation of at least two of the axioms might be acceptable in a judicial setting. One might have no objection to a court decision that

229. See pp. 721-24 *supra* (stating and explaining axioms III, V, VII, VIII, and IX).

230. See pp. 739-44 *supra* (all nine axioms apply to FCC comparative hearings as physical constraints, explicit legal constraints, or implicit legal constraints).

231. See note 211 *supra*.

232. See, e.g., *Mathews v. Eldridge*, 424 U.S. 319, 348 (1976) (government interest in minimizing fiscal and administrative burdens on agencies "is a factor that must be weighed" but not "a controlling weight" by itself); Lawrence, *A Restatement of the Roth-Fuentes Analysis of Procedural Due Process*, 11 GA. L. REV. 477, 502-04 (1977) (*Mathews* downplayed but did not eliminate government interest as factor and shifted greater emphasis to individual interest).

233. See, e.g., Lawrence, *supra* note 232, at 507 (proposing that single test of "fairness" to private individuals affected by government action replace present M CCP in determination of form of hearing required by procedural due process); Note, *supra* note 213, at 1539-42 (single concept of procedural fairness and decency should govern decision as to what process is due rather than group of factors under interest-balancing test).

234. See, e.g., Friendly, *supra* note 212, at 1278 (test in procedural due process cases consisting of balancing government interests against individual interests is "uncertain and subjective"); Note, *supra* note 213, at 1519-20 ("[n]o scale has been calibrated" that permits courts and administrators "to sensitively and predictably measure either the relative severity of deprivations inflicted upon individuals or the relative importance of governmental interests in summary action" and even if weights of government interest and private interest "can somehow be accurately measured in isolation from [each] other," there is "no method" by which they could "be compared"; result of having to compare incommensurables is that it is "unpredictable what procedures are required by due process in particular cases").

violated axiom IV by announcing openly an absolute scale for combining various criteria, or violated axiom VI by announcing a single-criterion test. In addition, although a secret violation of axiom VI appears unacceptable in the judicial context, there may be situations in which a court's covert violation of the axiom, unlike a similar action by an administrative agency, would not be totally unreasonable.

Such a secret violation of axiom IV might be only mildly objectionable when a court faces a complex issue. In such a case, there may be some agreement about the factors that should be considered in deciding the issue, but there may not be enough knowledge or agreement to establish a wise, comprehensive, and systematic solution that will govern future cases. It would then be understandable for a court to enunciate decision criteria without announcing any absolute weights or scales for combining rankings under the criteria.²³⁵ By announcing the relevant criteria, the court can encourage counsel to concentrate on the appropriate facts in future cases, while, at the same time, avoiding problems that might arise from the premature creation of rules for combining the various criteria into a choice. Later repudiation of prematurely fixed rules would weaken the reputation of the judiciary as a principled, nonlegislative decisionmaking institution²³⁶ and would harm those who had relied on the previous rules.²³⁷

The policy formulation situation just described can occur in an administrative agency as well as in a judicial setting. Some agencies go through a period when they learn how to ascertain what policies and decisions are in the public interest.²³⁸ That period, however, is meant to be of limited duration, and agencies that have been addressing the same problems for decades can be expected to use processes that violate

235. Many scholars and judges agree that a court should not lay down general rules or guidelines when these are not necessary to decide the case before the court. *See, e.g.,* Friendly, *supra* note 212, at 1301-02 (courts perceive case at hand but not total spectrum of cases that could arise; general rules unnecessarily established by court to decide case may have unintended and undesirable consequences); *cf.* A. BICKEL, *supra* note 211, at 238-40 (legitimacy of Supreme Court rests on ability of Court to make principled decisions that command widespread acceptance; "[t]he first wisdom" is to defer decision until Court has enough experience to render judgment that will command such acceptance).

236. *See* notes 211, 212 & 235 *supra*.

Prolonged operation without the formulation of general rules may also weaken respect for the judiciary. But, in some cases, the premature imposition of rules may be even more detrimental.

237. When an area of law is unsettled and courts are not using even unannounced absolute weights or scales, another type of violation may occur. If one views the principles of *res judicata* and *stare decisis* as constraining an MCCP to be consistent over time, then axiom IX must apply to cases that are separated in time. Yet, if the rules for combining outcomes under different criteria are in flux, it may be that there is no guarantee that the same case will be decided the same way on two different occasions.

238. *See* H. FRIENDLY, *supra* note 165, at 12-14; Freedman, *supra* note 198, at 1072.

axiom IV only in a principled and explicit manner, if at all.²³⁹ On the other hand, courts are constantly required to spend a great deal of time on new, unresolved problems. Litigants will tend not to raise issues that are already clearly resolved, and courts can deal with such issues by summary references to precedent or statute when they do arise. Policy formulation situations can thus be expected to be quite common for courts and somewhat less common for mature administrative agencies.

Conclusion

Public choice theory can be used to probe the mechanics of adjudication, as well as to analyze voting. The theorem developed here is most usefully applied to tribunals, like administrative agencies, that deal with the same problem continually and are subject to the requirement that their controlling principles of decision be both explicit and reasonable. Although public choice theory cannot eliminate the need to make vexing allocative decisions, such as deciding who shall be admitted to medical school or who shall be given broadcasting licenses, it can point the way toward reforms of our decisionmaking processes that will make those choices more rational and consistent.

239. See *In re Formulation of Policies Relating to the Broadcast Renewal Applicant, Stemming from the Comparative Hearing Process*, 66 F.C.C.2d 419 (1977) (discussing possibility of using quantitative guidelines in comparative hearings); H. FRIENDLY, *supra* note 165, at 14 (when initial standard is general so that agency can set policy on basis of experience, "it is imperative that steps be taken over the years to define and clarify it"; process of definition and clarification should be "carried to the point of affording a fair degree of predictability of decision in the great majority of cases and of intelligibility in all").

Appendix A: Overview of the Proof of Internal Inconsistency and its Relation to Previous Work in Public Choice Theory²⁴⁰

Arrow's general possibility theorem²⁴¹ demonstrates that individual preferences cannot be combined to choose a social policy if the choice process must meet certain conditions. The proof that an MCCP cannot simultaneously conform to the nine axioms presented in the text²⁴² relies, ultimately, on Arrow's theorem. That theorem assumes that each individual's preferences form an "ordering." An ordering is a relation between alternatives that is "complete," "transitive," and "reflexive."²⁴³ "Complete" means that the relation can compare any two alternatives and indicate that one is preferred to another or that there is indifference between them. Completeness is, by definition, a feature of an MCCP because such a process "ranks" the alternatives under each criterion.²⁴⁴

An ordering is transitive if the following is true for rankings under a given criterion: where alternative A is at least as good as alternative B, and alternative B is at least as good as alternative C, alternative A is at least as good as alternative C. This property also follows from the assumption that in an MCCP alternatives are ranked under each criterion. For example, if A is ranked third and therefore is preferred to B, who is ranked fifth, and B is preferred to C, who is ranked sixth, then A is preferred to C. Setting up a ranking under each criterion precludes the possibility of intransitivity under any given criterion.²⁴⁵

Finally, a relation is reflexive if it applies when an alternative is considered against itself. For example, if the relation were "at least as good as," then it would be reflexive since an alternative is at least as good as itself under any criterion. Since the analysis has not ruled out ties between alternatives under any given criterion, the relation under consideration must be of the form "is at least as good as" in order to satisfy the reflexivity condition.²⁴⁶

240. This appendix links the technical demonstration that the nine axioms cannot simultaneously apply to an MCCP to previous results in public choice theory. The appendix is meant both for the general reader who wishes to know what that link is and for the reader who desires to have a "roadmap" to the proofs in Appendix C.

241. The original version of the theorem and its original proof can be found in K. ARROW, *supra* note 1, at 46-60. A version of the theorem and its proof that is accessible to the general reader appears in A. SEN, *supra* note 3, at 37-46.

242. See pp. 720-25 *supra*.

243. The term "ordering" is not always used to describe a relation that has the three qualities of completeness, transitivity, and reflexivity. See A. SEN, *supra* note 3, at 9. Those three qualities, however, are assumed to be qualities of the individual preferences considered in the general possibility theorem. See *id.* at 37.

244. See p. 719 *supra*.

245. Even though rankings under each criterion are transitive, the overall choice process may not be. For example, in the choice process discussed at pp. 723-24 *supra*, there are rankings and therefore transitivity under each criterion, but the choice process as a whole is not transitive. Although A is preferred to B and B is preferred to C, C is preferred to A. See *id.*

246. The relation "is at least as good as" still permits one to form a strict ranking. If the relation holds as to A against B but not as to B against A, then A is strictly preferred to B since A is at least as good as B but B is not at least as good as A.

In addition to these three conditions on the rankings under the criteria, Arrow's general possibility theorem imposes four major conditions on a choice process. First, the choice process must be able to operate for any particular ordering of the alternatives under the criteria.²⁴⁷ This condition is reflected in axiom III.²⁴⁸ If a potential candidate with any conceivable set of characteristics can be considered in the choice process, then the choice process must be able to operate for any conceivable set of rankings that could arise. Second, the choice process must conform to the "weak Pareto principle."²⁴⁹ This principle requires that if one alternative is preferred to a second one under every criterion, then the first alternative must be preferred in the choice process. This principle is equivalent to axiom VIII, which states that an alternative will not be chosen when there is another available alternative that is superior to the first one under every criterion.²⁵⁰ Third, Arrow's theorem uses the "condition of nondictatorship."²⁵¹ In the context of the aggregation of individual preferences, this condition requires that social choices not always conform to any one individual's preferences.²⁵² In this article, "nondictatorship" is imposed by axiom VI's requirement that the outcome under any single criterion not always determine the outcome of the choice process.²⁵³

The remaining condition of Arrow's theorem is "independence of irrelevant alternatives."²⁵⁴ This condition requires both that the choice among a fixed set of alternatives depend only on the ordinal rankings of those alternatives under the given criteria and that the addition of other alternatives in the comparison not change the rankings of the original choices.²⁵⁵ As an example, consider a choice among four candidates, W, X, Y, and Z, under seven criteria.²⁵⁶ Suppose that the choice process operates first by assigning each candidate one point for the lowest ranking under a criterion, two points for the second ranking, and so on up to the highest ranking, and then by choosing the candidate with the highest total number of points over all the criteria. Consider the following set of rankings:

Criterion	1	2	3	4	5	6	7
Ranking							
First	W	X	Y	W	X	Y	W
Second	X	Y	Z	X	Y	Z	X
Third	Y	Z	W	Y	Z	W	Y
Fourth	Z	W	X	Z	W	X	Z

247. See A. SEN, *supra* note 3, at 37.

248. See p. 721 *supra*.

249. See A. SEN, *supra* note 3, at 37.

250. See pp. 724-25 *supra*.

251. See A. SEN, *supra* note 3, at 38.

252. See *id.*

253. See p. 743 *supra*.

254. See A. SEN, *supra* note 3, at 37.

255. See *id.* at 37-38.

256. This example is taken from Fishburn, *Paradoxes of Voting*, 68 AM. J. POLITICAL SCI. 511 (1976).

When all four candidates are considered, Y will be chosen, but if Z is not included in the pool of applicants under consideration, W will be the winner and Y will fall back to third in total points. In fact, W, X, and Y will rank exactly opposite in total points:

	Total Points	
	Z included	Z deleted
W	18	15
X	19	14
Y	20	13
Z	13	

The outcome of the choice process between W, X, and Y depends on whether Z is also considered. The process therefore violates the condition of independence of irrelevant alternatives.

Unfortunately, difficulties with the independence-of-irrelevant-alternatives axiom preclude the direct application of Arrow's theorem to judicial and administrative decisionmaking processes. First, it is difficult to determine whether MCCPs violate the condition. In order to make such a determination, one would either have to be considering a precisely specified choice process, such as in the example presented above, or one would need to have empirical or descriptive information about the effect of excluding certain alternatives from consideration. Many interesting MCCPs are not precisely defined,²⁵⁷ and most attempts to determine the effect of excluding certain alternatives from consideration would involve hypothetical speculation. Finally, even if violations of the condition of independence of irrelevant alternatives were easy to detect, the condition's legal and normative implications are not as meaningful or interesting as the implications of the axioms that replace it.²⁵⁸

Arrow's general possibility theorem holds that not all of the conditions in his theorem can be satisfied by a choice process simultaneously.²⁵⁹ Appendices B and C link the nine textual axioms to the conditions of the theorem. Appendix B lists technical axioms that follow directly from the textual axioms.²⁶⁰ Appendix C consists of two parts. First, the condition of independence of irrelevant alternatives is derived from some of the technical axioms.²⁶¹ The technical axioms provide all of the additional conditions necessary for Arrow's theorem.²⁶² The second half of Appendix

257. See, e.g., p. 727 *supra* (Harvard program does not specify explicitly how considerations under various criteria are combined to make choices between applicants); p. 736 *supra* (FCC does not give clear indication about how rankings under criteria are combined to choose single candidate from among many applicants for broadcast license).

258. For example, axiom IX can be related to the requirement that a court or agency adhere to precedent. See p. 744 *supra*.

259. See A. SEN, *supra* note 3, at 37-38.

260. See pp. 768-72 *infra*.

261. This derivation is accomplished by proving Lemmas 1-3. Lemma 3 is the condition of independence of irrelevant alternatives. See pp. 772-76 *infra*; A. SEN, *supra* note 3, at 41 (stating condition of independence of irrelevant alternatives in form similar to Lemma 3).

262. See pp. 765-66 *supra*.

C proves Arrow's theorem.²⁶³ Because the theorem holds that not all of the conditions can be satisfied simultaneously, and because the nine textual axioms imply all of Arrow's conditions, every MCCP must violate at least one of the nine textual axioms.

Appendix B. Translation of Roman Numeral Axioms into Arabic Number Axioms Used in Proofs in Appendix C.

In this appendix, the roman numeral axioms are transformed into an equivalent set of arabic number axioms, that are then employed in Appendix C to prove that the nine axioms presented in text cannot be simultaneously satisfied by an MCCP. All of the arabic number axioms are either direct "translations" of a roman numeral axiom into more formal terminology or axioms that are implied by a roman numeral axiom. This appendix presents each arabic numbered axiom and then explains the link between that axiom and the corresponding roman numeral axiom.

Before proceeding with the arabic numbered axioms a few definitions need to be provided:²⁶⁴

E = the set of all potential alternatives²⁶⁵

v = a subset of E

N = a set of n criteria, c_i , $i = 1, 2, \dots, n$

U = the set of all real-valued functions on $E \times N$

Given $a, b \in v$; $u \in U$, $u(a, c_i) \geq u(b, c_i)$ means a is at least as good as b under criterion i .

1. *Axiom 1*: $\exists C(v, u)$, a single-valued choice function, which depends on v , the set of alternatives under consideration, and on the numbers assigned to each alternative under each criterion by the function u .

263. See pp. 776-78 *infra*.

264. It is assumed in this appendix and in Appendix C that the reader is familiar with elementary logical and mathematical symbols. For readers who do not have such familiarity, the commonly used symbols and their meanings are as follows:

\sim	— it is not the case that
\exists	— there exist(s)
\forall	— for all
\in	— is a member of
$>$	— greater than
\geq	— greater than or equal to
$A \subset B$	— set A is contained in set B
$\bigcup_{i=1}^n C_i$	— the union of sets C_1, C_2, C_3, \dots , and C_n
$ E $	— the number of elements in the set E
s.t.	— such that
:	— such that
\Rightarrow	— implies
\Leftrightarrow	— if and only if

265. "Potential alternatives" here is meant in the sense of axiom 2 in this appendix, see p. 769 *infra*. A "potential alternative" is one that will be chosen if no other alternative is available.

This axiom is equivalent to axiom I in the text.²⁶⁶ Both axioms specify that the MCCP chooses a single alternative from the set of alternatives under consideration.

2. *Axiom 2:* $|E| \geq 3$. In addition, $\forall u^1 \in U, C(a, u^1) = a \forall a \in E$.

The first part of this axiom states that E , the set of potential alternatives, contains at least three members. This part of axiom 2 is simply a technical statement of axiom II in text.²⁶⁷

The second part of axiom 2 follows from the definition of potential alternatives as those that will be selected if there are no other alternatives under consideration.

3. *Axiom 3:* $C(v, u^1)$ is defined $\forall v, \forall u^1 \in U$.

Axiom 3 states that regardless of the set of numbers assigned to the alternatives by the function u^1 , which establishes rankings under various criteria, the choice function will generate an "answer" when possible choices are limited to any subset, v , of the set of all potential alternatives. The axiom does not specify the form of the "answer." It may be that no choice or more than one alternative is the "answer." Other axioms such as axioms 1 and 2 put restrictions on what the answer can be.²⁶⁸

Axiom 3 follows directly from axiom III in text.²⁶⁹ Axiom III states that the choice process can consider any potential alternative regardless of the particular characteristics it possesses.²⁷⁰ But axiom 3 states only that the choice function is defined for any subset, v , of the set E of all *potential* alternatives.

4. *Axiom 4:* For every $u^1, u^2 \in U, \forall v \subseteq E$, if $\exists n + 1$ numbers $\alpha, \beta_1 > 0, \beta_2 > 0, \dots, \beta_n > 0$ such that $\forall c_i \in N$, and $\forall a \in E, u^1(a, c_i) = \alpha + \beta_1 u^2(a, c_i)$ then $C(v, u^1) = C(v, u^2)$.

This axiom states that if the numbers used to represent a ranking within any one criterion are rescaled by a "positive linear transformation" consisting of multiplying the original numbers by some positive number or of adding the same number to each of the numbers or both, there will be no change in the outcome of the choice function over any set of potential alternatives, v . For example, suppose that a composite MCAT score is one of the criteria for making decisions between candidates for admission to medical school. If axiom 4 applies, the choice will be unaffected if the MCAT scores are rescaled by a positive linear transformation. In other words, the choice will not depend on whether the original MCAT score is used or each MCAT score is multiplied by the same positive number, β , and then increased by the same number, α .

This arabic numbered axiom follows from axiom IV in text.²⁷¹ Axiom IV allows "quarternary comparisons" between the degree of preference

266. See pp. 720-21 *supra*.

267. See p. 721 *supra*.

268. See pp. 768-69 *supra*.

269. See p. 721 *supra*.

270. See *id.*

271. See pp. 721-22 *supra*.

under any single criterion. Thus one can make a comparison like "alternative a is preferred to alternative b under criterion two by five times as much as alternative c is preferred to alternative d under the same criterion." What axiom IV does not permit is a process that combines such comparisons into a choice by using a set of absolute weights,²⁷² by translating each comparison onto a single absolute scale,²⁷³ or by assigning importance to a criterion not on the sole basis of the relative size of preferences under the criterion but by reference to the score on an absolute scale.²⁷⁴ If axiom IV holds, then the choice will be unaffected if the numbers representing the ranking under any criterion are rescaled by a positive linear transformation since the size of preferences under one criterion will not be linked to the size of preferences under any other criterion by absolute weights or by a common scale. Only the *relative* size of preferences under any criterion, as opposed to some absolute score for the criterion, will affect the choice.

5. *Axiom 5*: \exists a complete binary relation, R, that rationalizes C. (A relation, R, rationalizes a choice function if $\forall v \in E, C(v) = \{x \in v: \forall y \in v, xRy\}$; R can be thought of as "is at least as desirable as.")

The first part of axiom 5, stating that there exists a complete binary relation, is merely a technical statement of the first half of axiom V in text.²⁷⁵ The existence of a complete binary relation means that between

272. Suppose that a medical school admits students on the basis of two criteria: a 0 to 100 score on an aptitude test and a 0 to 4 college grade point average. Assume the school uses absolute weights to combine the two criteria by adding 25 times grade point average to the aptitude scores and choosing the candidate with the highest aggregate score. If the school were to scale down the aptitude test scores by dividing them by 100, ~~greater prominence would be placed on grade point average so that some choices between possible candidates would be changed.~~ Specifically, after the "scaling down," a 0.04 difference in grade point average would compensate for a 100-point difference in test score while previously a 0.04 difference in grade point average would only have compensated for a one-point change in test score.

273. Translating each comparison onto a single absolute scale is equivalent to using absolute weights. By using absolute weights, differences in scores under different criteria become directly comparable. The weights translate the point differences under one criterion into equivalent point differences under others. One could choose the scale of quaternary comparison units under any one criterion and use the weights to translate differences under any other criterion into units of that scale. The net result would be a common absolute scale.

274. Suppose that academic potential is one of the criteria for admission to medical school and that aptitude test scores are used to rank applicants under that criterion. If the absolute difference between candidates' scores has significance for the importance of the criterion, then rescaling the aptitude test scores might affect whether or not a particular applicant is chosen. On the other hand, if only relative differences between candidates matter, then rescaling should have no effect on any outcome. Consider the case in which A has a score of 800, B a score of 750, and C a score of 725. If an admissions committee weights the criterion against others by reference to absolute differences, then a rescaling in which the scores become 800, 790, and 785 respectively would dilute the impact of the criterion. Yet if only relative differences were considered, then the gap between A and B would still be twice as much as the gap between B and C after the rescaling, and the choice process would be unaffected.

275. See pp. 722-23 *supra*.

any two alternatives the relation indicates that one is more desirable than the other or that the two are equally desirable.²⁷⁶

The second part of axiom 5 states that R "rationalizes" the choice function, C. This means that for any set of alternatives, v, if x is an alternative that is in the subset chosen under the choice function, then the relation xRy will hold for all alternatives y in the set v. "xRy" can be read as "alternative x is at least as good as alternative y."

The second part of axiom 5 follows from the second part of axiom V in text and from axioms 1 and 7.²⁷⁷ The second part of axiom V states that from any two alternatives, the most desirable alternative must be chosen if one is more desirable than the other. Axiom 5 goes beyond the case of two alternatives to state that the choice function will select an alternative that is at least as desirable as all the other possible alternatives. To see how that axiom follows from axiom 1, axiom 7, and the second half of axiom V, consider a series of pairwise comparisons of alternatives using the choice function: the first and second alternative are compared and the winner is compared to the third alternative, the winner of that comparison is compared to the fourth alternative, and so on until a final choice emerges from a comparison involving the last alternative. Axiom 1 guarantees that each pairwise comparison will have a single winner, and axiom 7 implies that the order in which the elements are set up for pairwise comparison will not affect the outcome. Suppose alternative F is the outcome. F could then be designated as the first element in the sequence for pairwise comparison. F would then be compared sequentially to each other available alternative. But by the second half of axiom V, F would have to be at least as desirable as any other available alternative in order to survive as the winner of such a sequential pairwise comparison with all the other alternatives.

6. *Axiom 6:* \exists no i such that $\forall a, b \in E, u(a, c_i) > u(b, c_i)$ implies that $C((a, b), u) = a$ where u is the function chosen to scale rankings under each criterion.

This axiom states that there is no one criterion such that the outcomes on that criterion determine the choice between any two potential alternatives. The axiom is a technical restatement of axiom VI in text.²⁷⁸

7. *Axiom 7:* $\forall v \subseteq E$, given n subsets, v_i , of v such that $\bigcup_{i=1}^n v_i = v$, then $C(v, u) = C(\bigcup_{i=1}^n C(v_i, u))$.

This axiom states that the outcome of a choice process will not depend on whether a choice is made from the entire set of alternatives or is made from a subset of "winners" chosen by applying the choice function to subsets the union of which is the entire set. The axiom is equivalent to axiom VII in text.²⁷⁹

276. See p. 722 *supra* (explaining "complete binary relation").

277. See pp. 722-23 *supra*.

278. See p. 723 *supra*.

279. See pp. 723-24 *supra*.

8. *Axiom 8*: $\forall v \subseteq E$, if $a, b \in v$ and if $u(a, c_i) > u(b, c_i) \forall i$ then $b \notin C(v, u)$.

This axiom states that if a is superior to b under *every* criterion then b cannot be chosen when a and b are both alternatives. The axiom is a technical restatement of axiom VIII in text.²⁸⁰

9. *Axiom 9*: $\forall a, b \in E, \forall u^1 \in U$, if $w, z \in E$ and $u^0 \in U$ such that $\forall c_i \in N$,
 $u^1(a, c_i) = u^0(w, c_i)$, and
 $u^1(b, c_i) = u^0(z, c_i)$

then if $z \notin C((w, z), u^0)$ then $b \notin C((a, b), u^1)$.

This axiom states that if a has the same categorical rankings as w , and b has the same categorical rankings as z , then if b is not chosen over a , z will not be chosen over w . The axiom is equivalent to axiom IX in text.²⁸¹

Appendix C: Proof of the Inconsistency of the Nine Axioms

Two tasks are performed in this appendix. First, the nine axioms in Appendix A are used to derive the single condition of Arrow's general possibility theorem, independence of irrelevant alternatives, that is not already incorporated in one of the axioms.²⁸² Lemmas 1 and 2 provide groundwork for the derivation of independence of irrelevant alternatives as Lemma 3. The second part of the appendix, Lemmas 4 and 5 and a final theorem, provides a proof of Arrow's general possibility theorem.

A. Deriving the Independence of Irrelevant Alternatives

1. ~~Lemma 1: R , the binary relation that rationalizes the choice function,²⁸³ is~~

- (i) unique
- (ii) total ($\forall x, y \in E, xRy$ or yRx)²⁸⁴
- (iii) reflexive ($\forall x \in E, xRx$)
- (iv) transitive ($\forall x, y, z \in E, xRy$ and $yRz \Rightarrow xRz$).

*Proof:*²⁸⁵

(i) *Uniqueness*: Uniqueness follows directly from the single-valuedness of the choice function postulated in axiom 1.²⁸⁶ For any two potential

280. See pp. 724-25 *supra*.

281. See p. 725 *supra*.

282. See pp. 765-68 *supra* (explaining both independence of irrelevant alternatives and use of Arrow's general possibility theorem in Appendix C proof that nine axioms used in text cannot all apply simultaneously to MCCP).

283. See pp. 770-71 *supra* (axiom 5).

284. R signifies the relation between alternatives. xRy can be thought of as "x is at least as good as y."

285. The bulk of this proof is taken from Plott, *Path Independence, Rationality and Social Choice*, 41 *ECONOMETRICA* 1075, 1086 (1973).

286. See pp. 768-69 *supra* (axiom 1). Henceforth in this appendix, no cross-references will be made to arabic-numbered axioms when the axiom number is stated in the text of the appendix. All of these axioms are set out in Appendix B, pp. 768-72 *supra*.

alternatives, x and y , the choice function must choose one of them if they are the only two potential alternatives considered. Suppose that x is chosen, i.e., $C(x, y) = x$. Then it must be true that xRy and $\sim yRx$ since otherwise the choice function would not be single-valued.²⁸⁷ Examining the outcome of the choice function for each pair of potential alternatives will define the unique relation, R , between each pair of potential alternatives that rationalizes the choice function.

(ii) *Totality*: Axiom 3 postulates that the choice function is defined for all sets of potential alternatives. Axiom 5 requires that the relation R rationalize the choice function. As a result, it must be that xRy or yRx for all potential alternatives x and y .

(iii) *Reflexivity*: Under a relation R of the type "is at least as good as," an element is at least as good as itself so that for any potential alternative x it must be the case that xRx . More formally, axiom 2 requires that a potential alternative must be chosen if it is the only alternative available. Thus for any potential alternative x , $C(x) = x$ so that it must be the case that xRx .

(iv) *Transitivity*: Consider a set of three potential alternatives $\{x, y, z\} = v$. Suppose $x = C(x, y)$, $y = C(y, z)$. Axiom 7 $\Rightarrow x = C(x, y) = C\{C(x), C(y, z)\} = C\{C(x, y), C(z)\} = C(x, z)$. Axiom 5 $\Rightarrow R$ rationalizes C . Therefore, we have

$$(1) \quad xRy, \sim yRx, yRz, \sim zRy \Rightarrow xRz, \sim zRx.$$

But single-valuedness under axiom 1 $\Rightarrow [\forall a, b \in E, aRb \Rightarrow \sim bRa]$. Therefore (1) reduces to

$$(2) \quad xRy, yRz \Rightarrow xRz,$$

and transitivity is proved.

2. *Lemma 2*: For every $u^1, u^2 \in U$, $\forall v \subseteq E$, if $\exists 2n$ numbers $\alpha_1, \dots, \alpha_n$, $\beta_1 > 0, \dots, \beta_n > 0$ s.t. $\forall c_i \in N$ and $\forall a \in E$
 $u^1(a, c_i) = \alpha_i + \beta_i u^2(a, c_i)$ then
 $C(v, u^1) = C(v, u^2)$.

Proof:²⁸⁸ Choose arbitrary $u^1 \in U$; $\alpha_1, \dots, \alpha_n$; $\beta_1 > 0, \dots, \beta_n > 0$ and construct $u^0 \in U$ s.t. $\forall z \in E, \forall c_i \in N, u^0(z, c_i) = \alpha_i + \beta_i u^1(z, c_i)$. We must show $C(v, u^1) = C(v, u^0), \forall v \subseteq E$. Construct $u^2 \in U$ s.t. $\forall z \in E$ and $\forall c_i \in N, u^2(z, c_i) = 1 + \beta'_i u^1(z, c_i)$ where β'_i is defined by:

(i) pick arbitrary $\theta < \min_{j \in N} \{\alpha_j\}$ ²⁸⁹

$$(ii) \beta'_i \equiv \frac{\beta_i}{\alpha_i - \theta} .$$

287. See pp. 768-69 *supra* (choice function must be single-valued); pp. 770-71 *supra* (definition of "rationalizes" and requirement that R rationalizes choice function).

288. This proof is taken from D'Aspremont & Gevers, *Equity and the Informational Basis of Collective Choice*, 44 REV. ECON. STUD. 199, 205 (1977).

289. The expression $\min_{j \in N} \{\alpha_j\}$ means the smallest value from the set of all the numbers α_j .

Now, by axiom 4

$$(A) \quad C(v, u^2) = C(v, u^1), \quad \forall v \subseteq E.$$

Now write

$$u^1(z, c_i) = [u^2(z, c_i) - 1] \left[\frac{\alpha_1 - \theta}{\beta_1} \right]$$

$$\begin{aligned} \text{So} \quad u^0(z, c_i) &= \alpha_1 + \beta_1 u^1(z, c_i) \\ &= \alpha_1 + \beta_1 \left[\frac{\alpha_1 - \theta}{\beta_1} \right] [u^2(z, c_i) - 1] \\ &= \alpha_1 + (\alpha_1 - \theta) [u^2(z, c_i)] + \theta - \alpha_1 \\ &= \theta + (\alpha_1 - \theta) [u^2(z, c_i)]. \end{aligned}$$

Now, by axiom 4

$$(B) \quad C(v, u^0) = C(v, u^2) \quad \forall v \subseteq E.$$

Now, putting (A) and (B) together we get $C(v, u^0) = C(v, u^1) \quad \forall v \subseteq E.$

Q.E.D.

3. Definitions:

Definition: for each $c_i, \forall u^k \in U, \forall a, b \in E,$
 $aR^k_i b \Leftrightarrow u^k(a, c_i) \geq u^k(b, c_i).$

Definition: $aP^k_i b \Leftrightarrow aR^k_i b$ and $\sim bR^k_i a.$

4. *Lemma 3:* Given $u^1, u^k \in U, \forall v \in E$ s.t. v has at least two elements, if $\forall a, b \in v$ and $\forall c_i \in N$ it is true that $aR^k_i b \Leftrightarrow aR^1_i b$ then $C(v, u^k) = C(v, u^1).$

Proof: Pick arbitrary $a, b \in v, a \neq b.$ Assume we have any $v \in E$ and any $u^1, u^2 \in U$ with $\forall x, y \in E, xR^1_i y \Leftrightarrow xR^2_i y, \forall c_i \in N.$ We must show $C(v, u^1) = C(v, u^2).$

We will first show $C(\{a, b\}, u^1) = C(\{a, b\}, u^2).$ Assume, without loss of generality, that $aR^1_i b$ (which $\Rightarrow C(\{a, b\}, u^1) = a$). Now we know from the definition of R^k_i that $u^1(a, c_i) \geq u^1(b, c_i) \Leftrightarrow u^2(a, c_i) \geq u^2(b, c_i)$ since $aR^1_i b \Leftrightarrow aR^2_i b.$

Say

$$\begin{aligned} u^1(a, c_i) &= m^1_1 \\ u^1(b, c_i) &= m^1_2 \\ u^2(a, c_i) &= n^1_1 \\ u^2(b, c_i) &= n^1_2 \end{aligned}$$

Construct u^3 by setting²⁹⁰

$$\alpha_i = \begin{cases} m^i_1 - n^i_1 & \text{if } n^i_1 = n^i_2 \\ m^i_1 - \frac{m^i_1 - m^i_2}{n^i_1 - n^i_2} n^i_1 & \text{if } n^i_1 \neq n^i_2 \end{cases}$$

$$\beta_i = \begin{cases} 1 & \text{if } n^i_1 = n^i_2 \\ \frac{m^i_1 - m^i_2}{n^i_1 - n^i_2} & \text{if } n^i_1 \neq n^i_2. \end{cases}$$

Now define $u^3(x, c_i) = \alpha_i + \beta_i u^2(x, c_i)$. By Lemma 2, $C(v, u^3) = C(v, u^2)$, $\forall v$. Specifically, for $v = \{a, b\}$, $C(\{a, b\}, u^3) = C(\{a, b\}, u^2)$. Note, however, that we can show $u^3(a, c_i) = m^i_1$ and $u^3(b, c_i) = m^i_2$:

$$u^3(a, c_i) =$$

$$\text{case 1: } n^i_1 = n^i_2 \text{ then } u^3(a, c_i) = \alpha_i + \beta_i u^2(a, c_i) = m^i_1 - n^i_1 + n^i_1 = m^i_1.$$

$$\text{case 2: } n^i_1 \neq n^i_2 \text{ then } u^3(a, c_i) = \alpha_i + \beta_i u^2(a, c_i) = m^i_1 - \frac{m^i_1 - m^i_2}{n^i_1 - n^i_2} n^i_1 + \frac{m^i_1 - m^i_2}{n^i_1 - n^i_2} n^i_1 = m^i_1.$$

$$u^3(b, c_i) =$$

$$\text{case 1: } n^i_1 = n^i_2 \text{ then } u^3(b, c_i) = \alpha_i + \beta_i u^2(b, c_i) = m^i_1 - n^i_1 + n^i_2 = m^i_1. \text{ But } n^i_1 = n^i_2 \Leftrightarrow m^i_1 = m^i_2,^{291}$$

$$\text{so } u^3(b, c_i) = m^i_1 = m^i_2.$$

$$\text{case 2: } n^i_1 \neq n^i_2 \text{ then } u^3(b, c_i) = \alpha_i + \beta_i u^2(b, c_i) =$$

$$m^i_1 - \frac{m^i_1 - m^i_2}{n^i_1 - n^i_2} n^i_1 + \frac{m^i_1 - m^i_2}{n^i_1 - n^i_2} n^i_2 =$$

$$m^i_1 + (n^i_2 - n^i_1) \left[\frac{m^i_1 - m^i_2}{n^i_1 - n^i_2} \right] = m^i_1 - (m^i_1 - m^i_2) = m^i_2.$$

Now by axiom 9 and the single-valuedness of the choice function postulated under axiom 1, $C(\{a, b\}, u^3) = C(\{a, b\}, u^1)$ since the values of u^i for each of the choice functions are the same for all alternatives and for all criteria. But we constructed u^3 so that by Lemma 2, $C(\{a, b\}, u^3) = C(\{a, b\}, u^2)$. As a result, it must be that $C(\{a, b\}, u^1) = C(\{a, b\}, u^2)$.

290. Note that $[m^i_1 > m^i_2 \Leftrightarrow n^i_1 > n^i_2] \Rightarrow \frac{m^i_1 - m^i_2}{n^i_1 - n^i_2} > 0$ if $n^i_1 \neq n^i_2$.

291. By definition, $aR^i_1 b \Leftrightarrow u^i(a, c_i) \geq u^i(b, c_i)$. See p. 774 *supra*. So if $n^i_1 = n^i_2$ then it must be the case that $aR^i_1 b$ and $bR^i_1 a$. But, by the assumptions of Lemma 3, $xR^i_1 y \Leftrightarrow xR^i_2 y$ for all elements x, y in E . Now $[aR^i_2 b \text{ and } bR^i_2 a] \Leftrightarrow [aR^i_1 b \text{ and } bR^i_1 a]$. By the definition at the beginning of this note, $[aR^i_1 b \text{ and } bR^i_1 a]$ implies that $m^i_1 = m^i_2$ since $m^i_1 = u^i(a, c_i)$ and $m^i_2 = u^i(b, c_i)$. So we have shown in this note that $n^i_1 = n^i_2 \Leftrightarrow m^i_1 = m^i_2$.

By axiom 7 any choice over a set V can be decomposed into a series of choices between pairs of alternatives without affecting the overall choice. As a result, $C(\{a, b\}, u^1) = C(\{a, b\}, u^2)$ for any two elements of any subset of E with more than two elements $\Rightarrow C(v, u^1) = C(v, u^2) \forall v \in E$ with more than two elements.

Q.E.D.

B. Proof and Application of Arrow's General Possibility Theorem²⁹²

1. Definitions:

Definition: A set of criteria, \hat{C} , is *almost decisive* for x against y if $[xP_i y \forall c_i \in \hat{C} \text{ and } yP_i x \forall c_i \notin \hat{C}] \Rightarrow xPy$.²⁹³

Definition: A set of criteria, \hat{C} , is *decisive* for x against y if $[xP_i y \forall c_i \in \hat{C}] \Rightarrow xPy$.

Definition: $D(x, y)$ means c_j is almost decisive for x against y .

Definition: $\bar{D}(x, y)$ means c_j is decisive for x against y .

Note that $\bar{D}(x, y) \Rightarrow D(x, y)$. Also, $C(v, u)$ can be written $C(v; R_1, \dots, R_n)$.

2. *Lemma 4:* If any criterion, c_j , is almost decisive for an arbitrary ordered pair, x, y , then the choice process violates axiom 6.

Proof: Assume $\exists x, y \in E$ s.t. $D(x, y)$. By axiom 3 we can pick $z \in E$, $z \neq x$, $z \neq y$, and let i index all criteria, c_i , other than the criterion, c_j , that is almost decisive between x and y .

(1) Assume $xP_j y$ & $yP_j z$ and
 $yP_i x$ & $yP_i z$.

Note that $[D(x, y) \text{ \& } xP_j y \text{ \& } yP_i x] \Rightarrow xPy$. Also $[yP_j z \text{ \& } yP_i z] \Rightarrow y = C(\{y, z\}; R_1, \dots, R_n) \Rightarrow yPz$, by axiom 8. Next xPy and $yPz \Rightarrow xPz$, from Lemma 1. By Lemma 3, the independence of irrelevant alternatives, the choice between x and z , $C(\{x, z\}; R_1, R_2, \dots, R_n)$ must not be affected by changes in the rankings under criteria for other pairs of alternatives. Hence, the assumptions concerning the rankings between x and y and between y and z under various criteria can be changed without affecting the fact that x will be chosen over z . The only assumption with respect to the pair x, z was that $xP_j z$. Thus $xP_j z \Rightarrow xPz$, i.e., $D(x, y) \Rightarrow \bar{D}(x, z)$.

(2) Suppose $zP_j x$ & $xP_j y$ and
 $zP_i x$ & $yP_i x$.

292. The proofs of Arrow's general possibility theorem are taken from A. SEN, *supra* note 3, at 41-46.

293. The relation P means "strictly preferred to." So xPy is equivalent to $[xRy \text{ and } \sim yRx]$ where R is the relation "is at least as good as."

Now $[zP_x & zP_x] \Rightarrow zPx$. Further $[D(x, y) & xP_y & yP_x] \Rightarrow xPy$.
 Lemma 1 $\Rightarrow zPy$.

By similar reasoning to (1), $zP_y \Rightarrow zPy$, so that $D(x, y) \Rightarrow \bar{D}(z, y)$.

(3) By interchanging y and z in (2), we obtain: $D(x, z) \Rightarrow \bar{D}(y, z)$.

(4) In (1) replace z with x , y with z and x with y to obtain: $\bar{D}(y, z) \Rightarrow \bar{D}(y, x)$.

(4') Using (1), (3), and (4), we get $D(x, y) \Rightarrow \bar{D}(x, z) \Rightarrow D(x, z) \Rightarrow \bar{D}(y, z) \Rightarrow D(y, z) \Rightarrow \bar{D}(y, x)$.

So

(5) $D(x, y) \Rightarrow \bar{D}(y, x)$.

Note that $D(x, y) \Rightarrow D(y, x)$ as an immediate result. Hence $D(y, x) \Rightarrow [\bar{D}(y, z) & \bar{D}(z, x) & \bar{D}(x, y)]$ by interchanging x and y in (1), (2), and (5).
 By combining this with (4') we get

$D(y, x) \Rightarrow [\bar{D}(y, z) & \bar{D}(z, x) & \bar{D}(x, z) & \bar{D}(z, y) & \bar{D}(x, y) & \bar{D}(y, x)]$
 which means c_j is decisive for any ordered pair from the set $\{x, y, z\}$.
 This implies c_j is decisive for any $a, b \in E$. To see this, note that, for any pair $a, b \in E$ there are three cases:

case 1: a and b are the same as x and y . Then, by the result above, c_j is decisive for a against b .

case 2: if only one of a and b is the same as x or y , (say $a = x$ without loss of generality) then take y and form the three element set $\{a, b, y\}$. By the argument above, $\bar{D}(a, b)$.

case 3: neither a nor b is the same as x or y . First, form $\{x, y, a\}$. We know $D(x, y) \Rightarrow \bar{D}(x, a) \Rightarrow \bar{D}(x, a)$. Now form $\{x, a, b\}$. We know $D(x, a) \Rightarrow \bar{D}(a, b) & \bar{D}(b, a)$. Hence, given $D(x, y)$ for some arbitrary $x, y \Rightarrow \forall a, b \in E, \bar{D}(a, b) (& \bar{D}(b, a))$. But this means $aP_b \Rightarrow aP_b$ which $\Rightarrow a = C(\{a, b\}; R_1, \dots, R_n)$, which violates axiom 6.

Q.E.D.

3. *Lemma 5:* It must be the case that some criterion, c_j , is almost decisive for some pair, x, y .

Proof: Axiom 8 implies that for any pair of applicants, x and y , the set of all criteria, $\{c_i\}$ for $i = 1, 2, \dots, n$, is decisive because the axiom establishes that an alternative that is preferred over another one under every criterion will be chosen over that other one. From among the set of sets of criteria that are decisive between some pair (not necessarily the same pair) choose one of minimal size. Call this set \hat{O} and let it be decisive, and therefore almost decisive, for x against y . If we can show that there is only one criterion in \hat{O} , then the Lemma is true.

Assume there are two or more categories in \hat{O} . Now divide \hat{O} into \hat{O}_1 (containing one criterion from \hat{O}) and \hat{O}_2 (containing all the other criteria in \hat{O}). Let \hat{O}_3 be the set of all criteria not in \hat{O} .

By axiom 3, the choice process can operate on alternatives with any set of rankings under the criteria, *i.e.*, we can choose any $u^i \in U$. By axiom 2, there is at least one potential alternative other than x and y . Call that alternative z and consider the following set of rankings:

- (1) $\forall c_i \in \hat{O}_1, xP_iy \ \& \ yP_iz$
- (2) $\forall c_j \in \hat{O}_2, zP_jx \ \& \ xP_jy$
- (3) $\forall c_k \in \hat{O}_3, yP_kz \ \& \ zP_kx.$

Since $\hat{O} = \hat{O}_1 \cup \hat{O}_2$ is almost decisive for (x, y) , $xP_my \ \forall c_m \in \hat{O} \ \& \ yP_kx^{294}$
 $\forall c_k \in \hat{O}_3 \Rightarrow xPy.$

Consider the pair of alternatives (y, z) . Now $zP_jy \ \forall c_j \in \hat{O}_2$ and $yP_mz \ \forall c_m \in \hat{O}_1 \cup \hat{O}_3$. If zPy , then \hat{O}_2 is almost decisive for (y, z) . But since \hat{O} was chosen to be of minimal size and \hat{O}_2 is smaller than \hat{O} by one element, \hat{O}_2 cannot be almost decisive. Therefore by the single-valuedness of the choice function under axiom 1 and by axiom 5, it must be that yPz .²⁹⁵

Now, $xPy \ \& \ yPz \Rightarrow xPz$, by transitivity under Lemma 1. However, $\forall c_i \in \hat{O}_1, xP_iz$ while $\forall c_m \in \hat{O}_2 \cup \hat{O}_3, zP_mx$. Hence, the single criterion in \hat{O}_1 is almost decisive for (x, z) . However, this is contrary to the assumption that \hat{O} is of minimal size and contains more than one criterion. Therefore \hat{O} has only one criterion in it.

Q.E.D.

4. *Theorem: Axioms 1-9 cannot be simultaneously satisfied.*

Proof: By combining Lemmas 4 and 5, axiom 6 must be violated.

Note that axioms I-IX in the text imply axioms 1-9 so that the theorem demonstrates that one of the textual axioms must be violated by any MCCP.²⁹⁶ Note also that although the theorem is stated here in terms of axioms 1-9 and not in terms of the conditions for Arrow's general possibility theorem, the theorem here is essentially Arrow's theorem. The only difference is that axioms 1-9 were used to obtain as Lemma 3 the single condition of Arrow's theorem that is not already expressed in one of the axioms or in the definition of MCCPs.²⁹⁷

Appendix D: List of the Nine Axioms Used in Text

This appendix lists the nine axioms that are used in the text of the article:²⁹⁸

1. *Axiom I: The MCCP chooses one alternative from a pool of alternatives.*

294. yP_kx follows from [yP_iz and zP_kx] since the preferences under each criterion are transitive by assumption. See p. 765 *supra*.

295. See pp. 772-73 and notes 287 & 292 *supra*.

296. See Appendix B, pp. 768-72 *supra* (demonstrating that each arabic-numbered axiom is restatement of or follows from roman numeral axioms in text).

297. See pp. 765-66, 767-68 *supra*.

298. For an explanation of the meaning of the axioms, see pp. 720-25 *supra*.

2. *Axiom II: There are at least three "potential alternatives," each of which would be chosen if available and if no better alternative were a possible choice.*
 3. *Axiom III: The choice process can consider any conceivable "potential alternative" regardless of its particular characteristics.*
 4. *Axiom IV: The M CCP uses no absolute scales or absolute weights to combine categorical rankings into a choice.*
 5. *Axiom V: Given any two alternatives A and B, A will be a more desirable alternative than B, or B will be a more desirable alternative than A, or A and B will be equally desirable alternatives. The more desirable of the two must be chosen if one is more desirable than the other.*
 6. *Axiom VI: No one criterion totally dominates the M CCP.*
 7. *Axiom VII: For any set of alternatives, the choice process will have the same result whether the choice is made directly from the entire set or is made from a set of preliminary winners chosen from subsets comprising the entire set.*
 8. *Axiom VIII: For every possible set of alternatives, if one member of the set ranks higher than a second member in every criterion used in the choice process, then the second member will not be chosen.*
 9. *Axiom IX: For any two alternatives, A and B, construct their comparative categorical rankings. If there are any other two alternatives, C and D, where C has the same comparative rankings relative to D as A has to B, and D is not chosen over C, then B is not chosen over A.*
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