

Summer 1977

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Ira Horowitz
University of Florida

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Recommended Citation

Horowitz, Ira (1977) "Decision Theory and Antitrust: Quantitative Evaluation for Efficient Enforcement," *Indiana Law Journal*: Vol. 52 : Iss. 4 , Article 1.

Available at: <http://www.repository.law.indiana.edu/ilj/vol52/iss4/1>

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Decision Theory and Antitrust: Quantitative Evaluation for Efficient Enforcement

IRA HOROWITZ*

Developments in computer technology and advances in applied mathematics and statistics have helped make an increasing number and variety of managerial decision problems susceptible to solution by mathematical and decision-theoretic procedures. Assuredly, management is occasionally confronted by truly unique decisions that are perceived as being *too* important to delegate to the cold calculus of scientific decisionmaking, but where repetitive decisions are involved the applicability of the quantitative approach associated with management science is unquestioned.¹ The analyst's responsibility in the latter event is helping management to correctly define the problem and to quantify those subjective managerial inputs, such as probability judgments and risk preferences, that are to be incorporated into the decision-making process.

An extra dividend of the quantitative approach to decisionmaking is that it indicates how people *should* behave in complicated situations, *provided*

*Professor and Chairman, Department of Management, University of Florida. The first draft of this paper was written during the author's fifteen-month stint as Senior Economist in the Economic Policy Office of the Antitrust Division, U.S. Department of Justice. The present version has benefitted from, but should not be blamed on, the comments of my former EPO colleagues Ted Gebhard, George Hay, Jon Joyce and Robert McGuckin, as well as those of Professor Joseph Brodley of Indiana University School of Law, Bloomington. An earlier draft was presented before the Society of Government Economists in Atlantic City, NJ, on September 16, 1976.

¹See, e.g., Weinwurm, *Limitations of the Scientific Method in Management Science*, 3 MANAGEMENT SCI. 225 (1957), where the author observes that "when top level management decisions are at stake . . . a much larger and often a decisive portion of the required data are non-quantitative and there is much uncertainty as to expected developments. Under those conditions, decision making will involve substantial individual judgment. The chances are much smaller that mathematical models and quantitative data will be sufficient or suitable to provide a basis for optimum decision making." *Id.* at 229. There has, however, been some very important work undertaken to refine the art of quantifying ostensibly judgmental, non-quantifiable issues, which has as one of its major virtues the fact that it specifically permits the use of scientific decision-making in unique decisionmaking contexts. See, e.g., Savage, *Elicitation of Personal Probabilities and Expectations*, 66 J. AM. STATISTICAL A. 783 (1971); Winkler, *The Assessment of Prior Distributions in Bayesian Analysis*, 62 J. AM. STATISTICAL A. 776 (1967); Winkler, *The Quantification of Judgment: Some Methodological Suggestions*, 62 J. AM. STATISTICAL A. 1105 (1967).

[they] can make choices in a coherent manner in relatively simple, un-complicated situations."² It both clarifies the informational inputs that should enter into the decisionmaking process and calls attention to any instances in which decisionmakers are reaching decisions that are at variance with their "true" preferences. Decisionmaking in the antitrust context is especially amenable to quantification and can particularly benefit from these important bonuses of the quantitative approach. The latter observation provides the *raison d'être* for this article.

In particular, the purposes of this article are three-fold. First, I shall attempt to formally set out the decision-theoretic framework within which the information processing problem in an antitrust context is resolved. Second, I shall more directly infer from this framework both the informational demands of effective antitrust policy and how this information should be processed.³ Finally, I shall suggest the changing nature of the economist's role in the effective implementation of antitrust policy both in determining which situations should be investigated in detail and in determining which alleged anticompetitive acts should be prosecuted. In so doing I shall neglect the potentially important but complex "portfolio" aspects of the problem, *i.e.* given the time and resource constraints, what is the optimal set of suits that should be brought by the authorities at any point in time?

SOME PRELIMINARY OBSERVATIONS

One of the purposes of this article is to reflect on the economist's role in the antitrust process. It therefore seems appropriate to specify at the outset the two principal philosophical biases that underlie these reflections.

The first bias stems from a basic belief that the field of industrial organization affords economists an opportunity to blend microeconomic theory and classical empirical techniques in unique and sophisticated ways. Until recently, however, this opportunity has not been exploited by economists directly involved with antitrust enforcement. Rather, economic practitioners have permitted, if not encouraged, an intimate knowledge of the antitrust laws and a general understanding of legal precedent to become of greater import in the analysis of realized and prospective antitrust cases than either microeconomic or basic statistical theories.⁴ Indeed, the traditional role

²Raiffa, *Risk, Ambiguity, and the Savage Axioms: Comment*, 75 Q.J. ECON. 690 (1961) (emphasis in original).

³This article restricts attention to the information-processing problem from the standpoint of the antitrust decisionmaking authority. A forthcoming paper treats the problem from the court's point of view. See Horowitz, *A Bayesian View of Post-Acquisition Evidence and Antitrust* (Mimeo 1977).

⁴This permission is not necessarily extended to analyses for the purposes of making internal recommendations. As David D. Martin has written: "The policy of competition did not originate with the economics profession. It is deeply rooted in the law and other institutions of American society and, fortunately, it does not depend upon universal or even widespread acceptance by professional economists. Indeed, the continued acceptance by society of professional economists as relevant and useful advisers to a democratic government and as teachers of the young is more likely to depend in the years ahead upon the profession's acceptance of democratic, decentralized

of economists in antitrust enforcement has been to provide lawyers and courts with only such economic information as has been accepted in the *law* as being relevant to antitrust. This implies that economic information must be in a form that is intelligible to attorneys, irrespective of the availability of less easily understood, but more sophisticated and meaningful techniques and formats.⁵

The position of the Attorney General's National Committee to Study the Antitrust Laws, that "[l]egal requirements are prescribed by legislatures and courts, not by economic science,"⁶ pretty much puts in perspective, proper and otherwise, the place to which economists and economic science have been relegated where antitrust enforcement is concerned. Notably, the prosecution of perceived anticompetitive acts has traditionally required the background services of an economist to perform certain clerical tasks, such as the computation of concentration ratios, the collection and collation of economic information, or the graphical presentation of a time series of economic data. The rules of evidence are generally invoked to command the presence of the economist in the courtroom to introduce or to defend the fruits of these labors. To the extent that an economist serves as either an expert witness, or is on hand to suggest questions to be asked of expert witnesses, it is subject to the constraints implied by the legal procedures of antitrust enforcement.⁷

Restricting the economist's input in this fashion is not entirely unreasonable in view of the emphasis given to market structure by *both* antitrust lawyers and industrial organization economists. The traditional concerns of industrial organization are market structure and its determinants, the economic performance associated with various market structures, and the principal methods of business conduct employed to effect this performance

structures of control of economic activity as a *sine qua non* of economic analysis of public policy issues." Martin, *Industrial Organization and Reorganization*, 10 J. ECON. ISSUES 81, 94-95 (1976). Martin's comments on statistical analysis are also representative of this point of view: "My own conclusion is that demonstration of the relationship [between concentration and profits] is relevant, but not by any means necessary or sufficient, to justify government intervention to accomplish a more decentralized structure of control, and that it has been persuasively demonstrated within the limits of the data and the statistical method." *Id.* at 92.

⁵Assuredly, economists might be called upon as expert witnesses and, based upon whatever sophisticated analytical tools and methodologies they might employ, testify as to certain relevant economic issues and conclusions. Alternatively, an economist might employ sophisticated analysis in the preparation of questions to be asked of, *e.g.*, an expert witness during cross-examination. But, if the judge or jury trying the case are unable to understand the logic that underlies the testimony, it is doubtful whether this expert testimony or cross-examination is going to have much of an impact on the decision, notwithstanding the expert's credentials. As the editors of the *Antitrust Law and Economics Review* have written: "One can deplore the fact that the possessors of advanced scientific knowledge do not, in the main, hold the policymaking positions in our society but one cannot change it one iota, at least in the short run. Antitrust policy in America is controlled entirely by lawyers, and they read only words not math symbols." *Foreward*, 8 ANTITRUST L. & ECON. REV. 7 (No. 2, 1976). Indeed, the last sentence in note 4, *supra*, attests to the fact that even for a person who understands the logic, one concentration ratio can be worth a thousand regressions.

⁶U.S. DEPT OF JUSTICE, REPORT OF THE ATTORNEY GENERAL'S NATIONAL COMMITTEE TO STUDY THE ANTITRUST LAWS — 1955, at 316 (1955).

⁷See note 5 *supra*.

under various structural conditions.⁸ Strictly from an antitrust standpoint, however, methods of business conduct have tended to remain ancillary issues, except insofar as they represented clear and unequivocal restraints of trade.⁹ In the latter event, the government's problem is to produce the "smoking gun" or its equivalent. Measures of economic performance have been of interest insofar as they could be used to infer the structural conditions generating the performance. Thus, the literary debates between the structuralists and the behaviorists notwithstanding,¹⁰ as a practical matter antitrust enforcement has in the main retained its structural orientation.¹¹ On the one hand, this structural orientation is unassailable when the sole policy concern is the preservation of a competitive economy and polypolistic industries, which by any standards implies the inability of any single economic agent to influence price. On the other hand, the correspondence between industry structure and market power, with all of the latter's tenebrous forebodings, is not isomorphic. This suggests that implementation of an antitrust policy aimed at preserving industrial structures in which prices are to all essential purposes freely determined by market forces demands that primary consideration be given as to how prices are, in fact, determined. The focus should be on an industry's economic performance, and the key concern should be with whether the behavior that effected this performance was the logical outgrowth of structural conditions within the industry.

The second bias that underlies these reflections is the view that antitrust is a *policy instrument*. There are two aspects to this view. First, because antitrust laws are a part of an economy's institutional framework, changes in the laws fit into the array of instruments at the policy makers' disposal.¹²

⁸The tradition was apparently started by Edward S. Mason. See Mason, *Price and Production Policies of Large-Scale Enterprise*, 29 AM. ECON. REV. 61 (Supp. 1939).

⁹In *Maple Floor Mfrs' Ass'n v. United States*, 268 U.S. 563 (1925), the Court stated "that trade associations . . . which openly and fairly gather and disseminate information . . . without however reaching or attempting to reach any agreement or any concerted action with respect to prices or production or restraining competition, do not thereby engage in unlawful restraint of commerce." *Id.* at 586. The Court thus distinguished acceptable (noncollusive) trade practices from those that are blatantly anticompetitive in nature. See, e.g., *United States v. Container Corp. of America*, 393 U.S. 333 (1969); *FTC v. Cement Institute*, 333 U.S. 683 (1948); *Sugar Institute, Inc. v. United States*, 297 U.S. 553 (1936); *United States Maltsters Ass'n v. FTC*, 152 F.2d 161 (1945); *Salt Producers Ass'n v. FTC*, 134 F.2d 354 (1943). See also *United Shoe Machinery Corp. v. United States*, 347 U.S. 521 (1954) (per curiam), *aff'd* 110 F. Supp. 295 (D. Mass. 1953); *United States v. New York Great Atl. & Pac. Tea Co.*, 173 F.2d 79 (7th Cir. 1949); *United States v. Aluminum Co. of America*, 148 F.2d 416 (2d Cir. 1945). These latter cases all reflect a judicial concern with the implications of business practices for market structure, rather than concern with whether the practices are in and of themselves anticompetitive.

¹⁰For a concise summary of the issues, see F. SCHERER, *INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE* 6-7 (1970).

¹¹See, e.g., Brodley, *Oligopoly Power Under the Sherman and Clayton Acts—From Economic Theory to Legal Policy*, 19 STAN. L. REV. 285 (1967). As Brodley noted: "[I]n determining whether a challenged activity unreasonably restrains trade . . . or threatens to injure competition . . . a prime decisional factor should become the relationship between the challenged conduct and oligopoly market structure." *Id.* at 339.

¹²An analogous situation would be the policymakers' changes in the tax system or in the extent of public ownership of enterprises.

Principle and practice diverge, however, insofar as the laws themselves might be quite simple, whereas the courts' interpretation of what constitutes a violation of those laws may be very complex and not readily amenable to legislative revision for economic policy purposes.

Second, the decision whether or not to invoke, or to consider invoking the antitrust laws in a particular instance is also a policy decision. In the latter context, when consideration is given to the use of an antitrust statute in a particular situation, this potential use becomes an instrument of direct control.¹³ Assuredly, in a world of cost-free legal administration, and where the determination of an anticompetitive act is a quickly and easily resolved issue, the decision to investigate and bring suit against an alleged anticompetitive act would be a foregone conclusion: all such allegations would be prosecuted. In our world, however, antitrust enforcement is neither cost nor error free. The time factor is of enormous importance, and these issues combine to make it inefficient or impractical to attempt to investigate or prosecute all allegations of anticompetitive behavior. Thus, the decision whether or not to investigate a situation, as well as the decision to sue, becomes a matter of policy. The decision to sue has in the past been resolved by the decision rule that all "good" cases, those whose *gross* benefits are not negative, are filed. The justifications for this rule are: (1) there are too few, rather than too many candidates; (2) there is an important deterrent factor to the active prosecution of the antitrust laws; and (3) once the legal process begins to unfold and a violation of the law is perceived, there are moral and ethical hazards in not following through. The counterarguments to this rule are: (1) the first justification suggests that budget and staff reallocations might be warranted; (2) it is not unlikely that undiscovered pricefixing is the most prevalent anticompetitive act, despite the fact that pricefixing cases are constantly being filed, and the availability to defendants of stalling tactics may make it possible for them to reap all the profits of anticompetitive behavior before a final judgment is reached that halts that behavior; and (3) greater effort should be expended at the preliminary investigation stage, as well as the preceding stage wherein judgments are made as to situations that will in fact be investigated in some detail to assure that the "important" rather than simply the "good" cases are filed. The thrust of these counterarguments is that the crucial question involves where and how in the administrative hierarchy these policy decisions should be made.¹⁴

The position taken here is that irrespective of whether legal or economic issues are pertinent at trial, it is the economic policy considerations that are pertinent to the policy decision that determines whether there will be a trial. As policy instruments, the antitrust laws have as their main objective main-

¹³For a detailed discussion of policy instruments, see N. SPULBER & I. HOROWITZ, *QUANTITATIVE ECONOMIC POLICY AND PLANNING* 112-19 (1976).

¹⁴The issue is not unique to antitrust. Where a traffic violation is concerned, for example, a state trooper might make the decision; where an allegation of discriminatory hiring practices is concerned, a university's affirmative action officer might make the decision. In these cases even clear-cut violations are not necessarily prosecuted, nor do lawyers necessarily make the policy decision.

taining polypolistic industrial structures in the United States. Economic theory tells us that such structures result in lower prices and higher outputs than those obtained in comparable oligopolistic and monopolistic industries. When exploited, the power to raise price and restrict output, resulting in excess profits that benefit corporate stockholders, *also* impacts upon many of the desiderata of economic policy that are the perennial concerns of policymakers. In particular, anticompetitive practices not only help maintain and promote income inequities, they also contribute to unemployment and adversely affect the rates of inflation and real economic growth, working conditions, the balance of payments, and other problem areas.¹⁵ Thus, policy decisions with respect to the implementation of the antitrust laws should take into consideration the impact of this measure on *all* of the objectives of economic policy. Such consideration places the issue clearly within the domain of the economist rather than that of the lawyer. As is conceded with respect to restraints of trade,¹⁶ all monopolies are not created equal. In the real world, as in a theoretical world with a finite number of competitors, every firm has some power to raise price. In a polypolistic industry this power is miniscule. There comes a point, however, where the power to raise price becomes "unreasonable," precisely because of its macroeconomic, as well as its microeconomic implications.¹⁷ If, in fact, the preservation of a competitive economy is a national goal, it is a national goal because it enables us to better achieve our national desiderata than would an economy of monopolies, and not simply because competition, in and of itself and irrespective of its economic consequences, is a desideratum. The present position thus argues for a broader perspective of "the monopoly problem" under which the overall economic implications of antitrust decisions will play at least as great a role as the legal aspects.¹⁸

The bottom line on all of this is to recognize that market structure and its various indicia¹⁹ only signal the *potential* for anticompetitive behavior: notably, the power to raise price, which can have ubiquitous economic im-

¹⁵The "other problems areas" include the potential social and political problems created by large firms in oligopolistic industries, as exemplified by the recent revelations of corporate bribery.

¹⁶See, e.g., *Standard Oil Co. of New Jersey v. United States*, 221 U.S. 1 (1911).

¹⁷The producers' power to increase the price of bubble gum, e.g., is unlikely to have dire implications for firms outside of the bubble gum industry or for nonpurchasers of the product. In contrast, the power of the steel manufacturers to increase price is fraught with danger for the economy as a whole. An increase in the price of steel could have a serious inflationary impact, could lead to severe unemployment (e.g., in the automobile industry), could slow down the nation's rate of economic growth, and could have deleterious effects on the balance of payments as steel-using imports are substituted for domestically produced products.

¹⁸Moreover, from this broader perspective the current set of antitrust statutes may well suffice to accomplish any restructuring of American industry designed to promote economic welfare. That is, if society's goals are being adversely affected by an industry's structure, then these adverse affects should be due to anticompetitive behavior that can be remedied in the courts. To achieve the desired end, the judicial process would seem to have at least as much to recommend it as does the legislative process.

¹⁹The various indicia of market structure include concentration ratios, number of sellers and buyers, the absolute size of firms, barriers-to-entry proxies, extent of product diversification and degree of vertical integration.

plications. Similarly, the various forms of what is apparently anticompetitive business conduct, *i.e.* price leadership, reciprocity, and tying agreements, are only symptomatic of structural conditions that both facilitate anticompetitive behavior, and adversely affect microeconomic and macroeconomic performance. Economic performance as indicated by price, product quality, technological progress and efficiency is a matter of ultimate microeconomic interest. The key issues, however, are the extent to which actual performance approximates the industry potential, and the extent to which the desiderata of economic policy are adversely affected, as well as recognition of the fact that the industry's potential is not necessarily the norm that obtains in a perfectly competitive world of microeconomic theory.

These neither novel nor indisputable views argue for an increasing reliance upon more sophisticated economic analysis in the antitrust enforcement process than has heretofore been the case. At least in this respect, they are not incompatible with courtroom trends.²⁰ As a concomitant, the informational demands that are made upon industrial organization economists will increase. In particular, at the theoretical level there remains the need to specify the determinants of market structure, and the linkages between structure, conduct, and performance, including macroeconomics impacts, in an uncertain world in which economic rationality is not necessarily a universal affliction. Within the present broader perspective there is the need to refine the relationship between various empirical data, including economic indicia, and the economist's theoretical constructs, in order to determine how these data might best be used in antitrust analysis. It is also necessary to determine optimal industry structures and performance potentials, given the empirical facts of life. At the empirical level, it will be necessary (1) to continue to generate firm and industry data relating to structure, conduct, and performance; (2) to provide estimates of the "payoffs" to society of investigating, prosecuting, and, possibly, convicting firm(s) of allegedly anticompetitive acts; (3) to assess the various probabilities that previous anticompetitive behavior has led to less than optimal economic performance or that an acquisition will have an anticompetitive impact; and (4) to perform the latter assessments both *a priori*, based on an initial stock of theoretical and empirical knowledge, and *a posteriori*, after having *systematically* revised the former, initial judgments, based upon additional information gathered in the course of subsequent investigation. This conglomeration of economic information, which is at most tangential to the strictly legal aspects of antitrust, is, or at any rate should be crucial to the antitrust decisionmaking process at some if not all of its several stages. The cost of information, the direct costs incurred by both prosecution and defense in the course of an antitrust suit and the

²⁰See, *e.g.*, United States v. General Dynamics Corp., 415 U.S. 486 (1974), *aff'g* 341 F. Supp. 534 (N.D. Ill. 1972). In affirming the district court's "fully justified" reliance "on evidence relating to changes in the patterns and structure of the coal industry and in United Electric's coal reserve situation after the time of acquisition," 415 U.S. at 506, the Court gave precedent-establishing evidence of a willingness to accept broader and more sophisticated economic analysis and economic considerations, notwithstanding the possibility of "a positive decision on the part of the merged companies to deliberately but temporarily refrain from anti-competitive actions." *Id.*

potential costs to society of an incorrect decision, all argue in favor of improving the decisionmaking process. As I hope to make evident, there is both room for improvement and reason to be optimistic about the possibility of achieving improvement.

THE ANTITRUST PROBLEM

Antitrust policy is implemented primarily through the enforcement of sections 1 and 2 of the Sherman Anti-Trust Act,²¹ section 7 of the Clayton Act,²² and section 5 of the Federal Trade Commission Act.²³ Both the Sherman Act and Federal Trade Commission Act are concerned with alleviating *observed* anticompetitive behavior; the Clayton Act is concerned with preventing a potential lessening of competition.²⁴ Thus, while both the Sherman Act and the Federal Trade Commission Act are concerned with the past and present, the Clayton Act is concerned with the future. Despite this dichotomy, the fundamental questions that must be considered in implementing antitrust policy under these acts are only superficially different. In any instance one must ask: What are the costs and benefits to society of both the allegedly anticompetitive act and the prospective remedy and what are the probabilities that an anticompetitive act has in fact been committed and that the courts can be convinced that the antitrust laws have been violated?

With respect to benefits and costs, the Supreme Court's position is clear:

[A] merger the effect of which 'may be substantially to lessen competition' is not saved because, on some ultimate reckoning of social or economic debits and credits, it may be deemed beneficial. A value choice of such magnitude is beyond the ordinary limits of judicial competence, and in any event has been made for us already, by Congress [when it] proscribed anticompetitive mergers, the benign and the malignant alike, fully aware, we must assume, that some price might have to be paid.²⁵

²¹15 U.S.C. §§ 1-2 (Supp. V 1975).

²²15 U.S.C. § 18 (1970).

²³15 U.S.C. § 45 (Supp. V 1975).

²⁴Section 1 of the Sherman Act declares illegal those contracts, combinations, or conspiracies "in restraint of trade or commerce among the several States, or with foreign nations." 15 U.S.C. § 1 (Supp. V 1975). Section 2 of the Sherman Act deems persons guilty of a felony, who either individually or in combination "shall monopolize, or attempt to monopolize . . . any part of the trade or commerce among the several States, or with foreign nations." 15 U.S.C. § 2 (Supp. V 1975). Section 5 of the Federal Trade Commission Act declares unlawful: "Unfair methods of competition . . . and unfair or deceptive acts or practices in or affecting commerce." 15 U.S.C. § 45(a)(1) (Supp. V 1975). The crucial section 7 of the Clayton Act prohibits the acquisition of the capital stock or assets of one corporation by another "where in any line of commerce in any section of the country, the effect of such acquisition may be substantially to lessen competition, or to tend to create a monopoly." 15 U.S.C. § 18 (1970).

The only other serious candidate for inclusion in an itemized list would be section 2 of the amended Clayton Act, *i.e.*, the Robinson-Patman Price Discrimination Act, 15 U.S.C. § 13(a) (1970), which makes it unlawful "to discriminate in price between different purchasers of commodities of like commodities of like grade and quality," unless such price differences reflect "due allowance for differences in the cost of manufacture, sale, or delivery. . . ."

²⁵United States v. Philadelphia Nat'l Bank, 374 U.S. 321, 371 (1963).

It is equally clear, however, that in deciding which cases to prosecute, or which situations to investigate in depth when time pressures and limited resources constrain antitrust enforcement activity, the antitrust authorities are constantly making these benefit-cost evaluations, and properly so, even though they are doing so without even mildly approaching quantitative precision and without due cognizance for all of the relevant economic issues.²⁶

With respect to probabilities, these evaluations are inherent within our judicial system in general. With specific regard to antitrust, they are incorporated in two different, if related, ways.

In the first instance, the antitrust authorities, are necessarily concerned about the probability of "proving" an allegation. Similarly, a judge or jury is concerned about the probability that an allegation has indeed been "proved." Specific probability assessments may not be made, but there is a necessary underlying concern with whether the probabilities that a firm's behavior has been both anticompetitive and a demonstrable violation of the antitrust laws are sufficiently high as to justify, in the case of the prosecutor, bringing suit, and in the case of the court, rendering a verdict of guilty. The defense staff must make analogous probability judgments in deciding, for example, whether to seek an out of court settlement, or whether to enter a plea of *nolo contendere*. Moreover, although the probabilities in question may differ between whether a particular allegation can be sustained and also shown to be an unreasonable restraint of trade in either the *per se* or "rule of reason" sense,²⁷ or is refutable by the defense insofar as *prima facie* issues are involved,²⁸ the probabilities will be recognized and assessed, however vaguely.

²⁶When the Justice Department dropped its antitrust suits against tire manufacturers Goodyear and Firestone in March 1976, the Antitrust Division Head Thomas E. Kauper stated that "[i]t was clear that neither of the individual defendants had a reasonable probability of obtaining a monopoly. . . ." Wall St. J., March 3, 1976, at p. 3, col. 1. It is estimated that the Justice Department invested more than \$1 million in the pretrial investigation, but nonetheless the suits were dropped "with the greatest reluctance," according to Mr. Kauper, because "at this point, I believe it irresponsible to proceed further." *Id.* When the FTC began its "broad antitrust investigation of the auto industry that could have major long-range consequences for the "Big Three car makers," it was estimated by FTC officials "that the investigation would span two to three years with only a 50% chance of producing sufficient evidence to support formal antitrust charges." Wall St. J., Aug. 4, 1976, at p. 3, col. 1.

In each of these instances both probabilities and the considerable costs of time and money were important considerations, whether the decision was to drop the suit, as in the first instance, or to conduct a pretrial investigation, as in the second. Each situation is quite clearly of major potential import. Yet, as will become clear below, neither decision, apparently, gave due consideration to *all* of the relevant probabilities, costs, and potential benefits. If this is the case with respect to million-dollar investigations of the crucial auto and tire industries, it is unlikely to be otherwise—at best—in situations whose potential implications for the antitrust authorities and the economy are not quite as profound.

²⁷*Per se* prohibitions relate to practices whose illegality does not hinge on their social implications. See, e.g., United States v. Trans-Missouri Freight Ass'n, 166 U.S. 290 (1897). "Rule of reason" violations are those which hinge on whether unusual business practices that have anti-social implications are involved. See, e.g., United States v. Standard Oil Co. of New Jersey, 221 U.S. 1 (1911).

²⁸Although strictly speaking there are no well-established *prima facie* issues in an antitrust case, with respect to specific issues in specific cases, evidence can be "taken in the context of a *prima facie* case." United States v. Pabst Brewing Co., 384 U.S. 546, 560 (1966). Similarly, although there are no formal, unbending *prima facie* rules to guide the decision of whether to

In the second instance, a probability is itself directly involved in the allegation. In particular, over seventy years ago the Supreme Court noted that the Sherman Act "directs itself against that dangerous probability as well as against the completed result . . . the law seeks to prevent—for instance, the monopoly. . . ." ²⁹ And, nearly twenty years ago the Court observed that "Section 7 is designed to arrest *in its incipency* . . . restraints or monopolies in a relevant market which, as a *reasonable probability, appear at the time of suit likely to result* from the acquisition . . . [W]hether or not *actual* restraints or monopolies, or the substantial lessening of competition, have occurred or are intended." ³⁰ Both the courts and the antitrust authorities must therefore assess these probabilities, even if the lower bounds of dangerousness and reasonableness are never specified. ³¹

In sum, then, from its incipency to its conclusion, an anti-trust case requires a series of both subjective probability assessments and benefit-cost value judgments, although these are rarely made explicit and quantified. The latter observation implies that an antitrust case is quite aptly described as a compound decision problem under uncertainty. Further, framing it as such greatly clarifies both (1) the responsibilities of the antitrust authorities, including both the legal and economic staffs, and the courts, in the implementation of antitrust policy, and (2) the informational needs of effective antitrust enforcement. The remainder of this article is devoted to these framing and clarification ends.

THE ANTITRUST PROBLEM IN A DECISION-THEORETIC CONTEXT

Antitrust enforcement decisions can be characterized as two-action problems in which the decisionmaking authority can either choose (1) to do nothing, or (2) to proceed as if an anticompetitive act as occurred and a conviction can be obtained. Indeed, it is tempting to restrict an analysis of the antitrust decision process to the classic two-action framework of statistical decision theory. It can be inferred that the authorities have had considerable difficulty in resisting the temptation.

Formally framing the two-action problem, the choice of whether or not to initiate an antitrust action will depend upon the decisionmaker's initial probability judgments as to whether some anticompetitive act has occurred, the extent to which the odds favoring the allegation of anticompetitive behavior are revised upwards on the basis of the empirical evidence, and the potential

file suit, the Department of Justice's *Merger Guidelines* suggest instances when "the Department will ordinarily challenge any merger between one of the most likely entrants into the market" and firms already in the market. U.S. DEPT OF JUSTICE, MERGER GUIDELINES 22 (May 30, 1968).

²⁹Swift & Co. v. United States, 196 U.S. 375, 396 (1905) (emphasis added).

³⁰United States v. E.I. DuPont De Nemours & Co., 353 U.S. 386, 389 (1957) (emphasis added).

³¹In fact, there is no need to make these probabilities specific. Rather, one might simply assign probabilities to there being a dangerous or a reasonable probability of monopoly. At a more sophisticated level, one might assess a probability function for the probability of a monopoly, *i.e.* one might assess a probability of P_1 that there is a probability of Q_1 that a particular practice or merger will result in a monopoly.

losses associated with taking the incorrect course of action. Each of these factors is amenable to explicit quantification. With the factors so quantified there is a greater likelihood that the "take action" act will be the optimal choice when the following is found: (1) the decisionmaker's initial feelings are strong that an anticompetitive act has occurred; (2) there is subsequent evidence to indicate a greater probability that an anticompetitive act has taken place; and (3) the loss associated with an incorrect decision to act as if there has been no anticompetitive behavior is greater than the loss associated with choosing to do nothing when in fact an anticompetitive act has taken place.³² Whether the chosen act actually is or is not optimal, however, will also depend upon other factors that lurk in the background. Yet, the suspicion persists that in the actual decisionmaking process the antitrust authorities tend to be myopic and vague with respect to one or more of the factors³³, and fail to give appropriate weight and recognition to all.

Even if explicitly quantified, however, both the probabilities and the losses would obscure a complex of underlying factors. This is because the implementation of antitrust policy involves, in any given instance, a *sequence* of decisions. The sequence starts with the decision of whether to investigate a particular situation, proceeds to the subsequent decision of whether to bring suit, and concludes with the court's judgment. The elements in the decision process are set out in the decision tree of FIGURE I. Additional branches could be included at the end points to allow for the possibility of one or more appeals by either the defense or the prosecution, but these branches only contain modified versions of decision sequences that are already included. Thus, their inclusion would contribute to complexity but not substance. Conversely, many of the branches could at the outset be cut off, because they represent paths that would never be taken, such as the decision to file suit in the face of convincing procompetitive evidence, or include probabilities that will always be zero.

This particular decision tree, which except for the specifics has the pleasant property of being devoid of unique features, is constructed from the standpoint of the antitrust authority. The squares indicate points at which a

³²In technical terms, let V denote the outcome that an anticompetitive act obtains, and let \bar{V} denote the outcome that an anticompetitive act does not obtain. Also, denote by $P(V)$ the probability assigned to V , and denote by $P(\bar{V})=1-P(V)$ the probability assigned to \bar{V} . Then, $P(V|D)$ and $P(D|V)$ are, respectively, the conditional probability assigned to outcome V , given some set of data D , and the probability assigned to acquiring that set of data D , given that outcome V obtains; $P(\bar{V}|D)$ and $P(D|\bar{V})$ are similarly defined. Finally, denote by $L(V)$ the loss associated with the act of doing nothing, A_1 , when in fact there is an anticompetitive act, and denote by $L(\bar{V})$ the loss associated with taking action, A_2 , when in fact there is no anticompetitive behavior. Then, act A_1 can be shown to be optimal when

$$\frac{P(D|\bar{V})}{P(D|V)} > \frac{P(V)L(V)}{P(\bar{V})L(\bar{V})}$$

or, equivalently, when

$$\frac{P(\bar{V}|D)}{P(V|D)} > \frac{L(V)}{L(\bar{V})}$$

Act A_2 is optimal when the inequality is reversed. The two acts are equally preferred when the strict equality holds.

³³See note 26 *supra*.

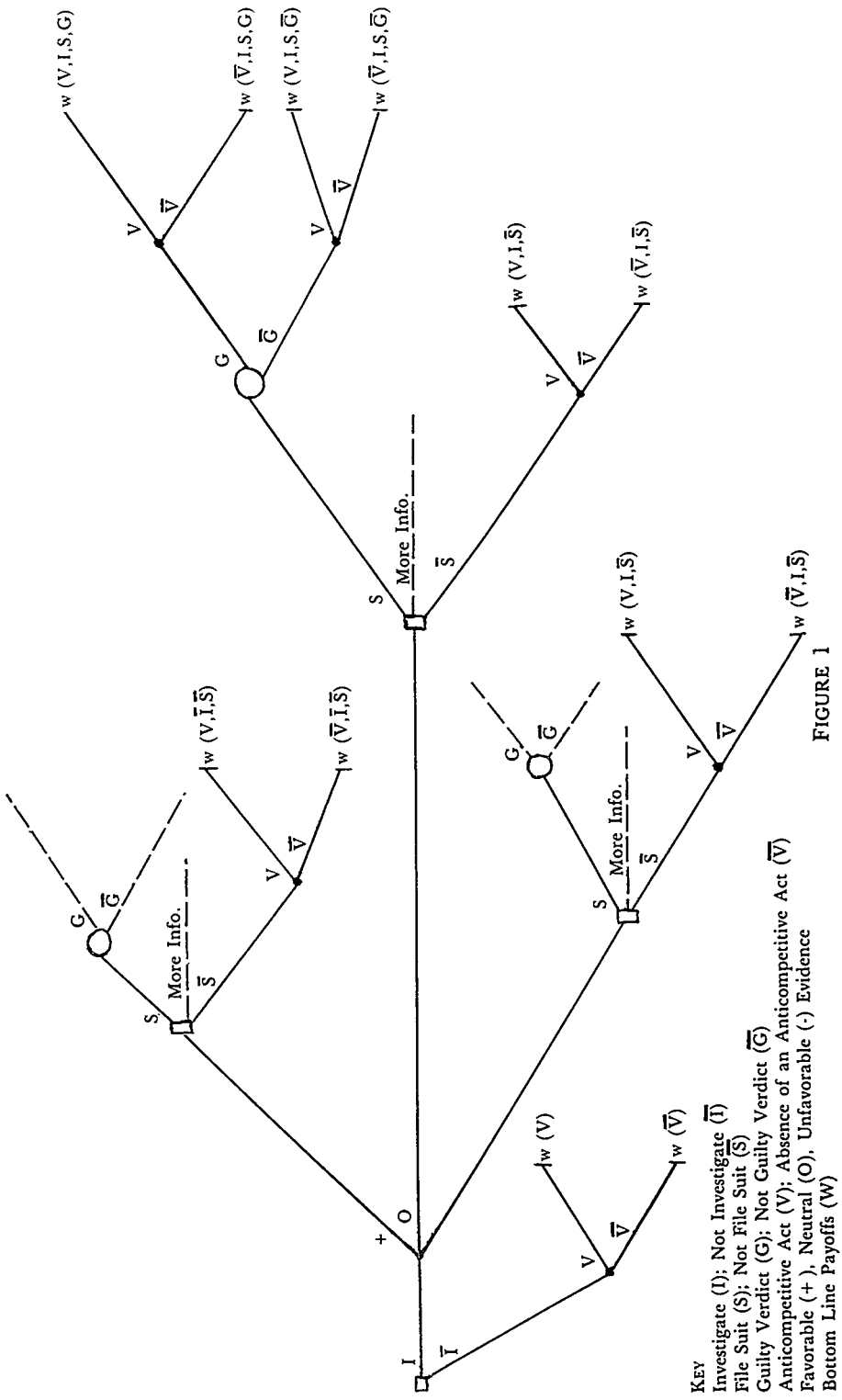


FIGURE 1

decision must be taken. The first decision, indicated by the square at the far left of the tree, requires a choice between investigating (I) or not investigating (\bar{I}) a particular situation or allegation. The only other decision, as indicated by the remaining squares, requires a choice between bringing suit (S) or not bringing suit (\bar{S}) given what, for expository purposes, are limited to the favorable (+), neutral (0), or unfavorable (-) results of the investigation or, alternatively, one might delay and seek yet additional information. This information determines the path to be followed along the decision tree. In actual practice, however, there are a series of steps at each stage. To the extent that these steps can be defined in advance they can be incorporated into a more complex decision tree with a multitude of decision points.

The circles indicate a judicial decision subsequent to a decision to bring suit. From the standpoint of the antitrust decisionmaking authority, however, the court's decision adds an additional element of uncertainty, albeit one that is amenable to quantification in terms of probabilities or odds. These probabilities, which can be purely subjective, may be assigned even prior to the initial decision of whether or not to conduct a preliminary investigation, and can also be systematically revised prior to the investigation. The revision will be contingent on the character of any additional information that might be uncovered during the preliminary investigation. Thus, the probability assigned to whether a verdict of guilty (G) or not guilty (\bar{G}) will ultimately be rendered will depend on both the prosecuting staff's initial impressions, as conditioned by prior knowledge and experience, and on the evidence uncovered in the course of the pretrial investigation.³⁴ In the Bayesian spirit, the only restrictions imposed on these probabilities are that they must obey the various laws of probability,³⁵ and they must reflect the decisionmaker's beliefs as regards the relative likelihood of one outcome as opposed to another. Whether these probabilities are "right" or "wrong" is not an issue; the only relevant question is whether these are the beliefs upon which the decisionmaker's decisions will be based, irrespective of whether these decisions are given the full, formal treatment.

The dots indicate points at which, again, the outcomes of individual events are uncertain. In particular, prior to the initiation of the entire deci-

³⁴As a result of a preliminary investigation and/or the decision to file suit, the company that is the subject of the allegation might seek an out-of-court settlement or enter a plea of *nolo contendere*. As a result of an indication to proceed with litigation, the parties to a merger might decide not to carry through with their plans. To simplify the presentation, these possibilities are not included in the decision tree, but they are, in effect, the equivalents of a guilty verdict. Similarly, the government's option to drop a suit, or to oppose a settlement or plea, is always available, although not considered in this decision tree.

Also for expository purposes, the probabilistic processes involved are considered to be discrete rather than continuous. Finally, to the extent that new information becomes available at the time of trial, at that time the probabilities will be revised to take this information into consideration. If the possibility of this information turning up has been recognized, then this contingency will be allowed for in the decision process. If this possibility has not been recognized, then the information will not affect the decision process, although it will still affect *subsequent* probability judgments.

³⁵For example, the probabilities must be nonnegative.

sion process, it is not known what evidence will be gleaned through the pretrial investigation. The outcomes of this investigation will be evidence favorable, neutral, or unfavorable to the allegation of anticompetitive behavior. Thus, these sample outcomes must also be assigned probabilities. The latter probability assignments will directly depend upon the probabilities associated with yet another uncertain situation: whether in fact an anticompetitive act has (V) or has not (\bar{V}) been committed.

In each case the probability of the outcome of the uncertain event can be assigned either *a priori* or *a posteriori*. An *a posteriori* probability is conditional on the outcomes of prior uncertain events. The latter outcomes include any sample information, *e.g.* evidence, that has been generated up to that point.³⁶

³⁶P(V) is the prior probability that an anticompetitive act has been committed, as assessed, *e.g.*, solely on the basis of an analyst's institutional and general knowledge, and P(V/+) is the analyst's revised probability assessment of anticompetitive behavior. Here, P(V) has been *systematically* revised to yield P(VI+) on the basis of sample information favoring the hypothesis that an anticompetitive act has in fact occurred. The revision will ordinarily be accomplished using Bayes' rule:

$$P(V|+) = \frac{P(V)P(+|V)}{P(V)P(+|V) + P(\bar{V})P(+|\bar{V})}$$

Here, the denominator $P(V)P(+|V) + P(\bar{V})P(+|\bar{V}) = P(+)$ is the prior probability that an investigation will yield information favorable to the allegation.

The terms "prior" and "posterior" are both terms relative to the specific sample information. Given an additional sample, P(VI+) now becomes a prior probability to be revised on the basis of that new sample information. In the course of an antitrust investigation, probability judgments are constantly being revised, although I suspect that the first instance where this has been done formally via Bayes' rule has yet to be uncovered. The present discussion reserves the term "prior" for probability assessments made prior to a pretrial investigation and the term "posterior" for probability assessments made subsequent to that investigation. Thus, probabilities formulated through, *e.g.*, the Antitrust Division's formal Business Review procedure become prior probabilities with respect to any subsequent pretrial investigation. For discussions of the Bayesian Approach and the law see Finkelstein & Fairley, *A Bayesian Approach to Identification Evidence*, 83 HARV. L. REV. 489, 498-514 (1970) (positive position); Kaplan, *Decision Theory and the Factfinding Process*, 20 STAN. L. REV. 1065, 1083-86 (1968) (positive position); Kornstein, *A Bayesian Model of Harmless Error*, 5 J. LEGAL STUD. 121 (1976); Tribe, *Trial by Mathematics: Precision and Ritual in the Legal Process*, 81 HARV. L. REV. 1329, 1350-68 (1971) (negative position).

As a general rule, the conditional probabilities P(VI*) and P(\bar{V} I*) will be assigned in accordance with Bayes' rule. The conditional probabilities P(GI*) and P(\bar{G} I*) may be assigned using Bayes' rule, and based upon prior probability assignments P(G) and P(\bar{G}), but I perceive these conditional probabilities as being easier to assign directly. In fact, decisionmakers are always well-advised to assess directly those probabilities that they feel most comfortable about assessing directly. But, one would ordinarily be ill-advised to assess directly both P(V) and, say P(VI*), because (1) the subjective assessment of posterior probabilities generally results in probability assignments different from those obtained using Bayes' rule and the prior assessments and (2) for most persons the direct assessment of posterior probabilities will, given their prior judgments, result in an underutilization of the sample information. An important related issue is the fact that the probabilities will ordinarily be assigned by groups of people, legal and economic staffs, and thus reflect their combined judgments. The assignment of probabilities for a group of individuals whose judgments will not necessarily coincide presents its own unique problems. See, *e.g.*, Edwards, *Conservatism in Human Information Processing*, in *FORMAL REPRESENTATION OF HUMAN JUDGMENT* 17 (B. Kleinmuntz ed. 1968). See also Hogarth, *Cognitive Processes and the Assessment of Subjective Probability Distributions*, 70 J. AM. STATISTICAL A. 271 (1975); Winkler, *Comment*, 70 J. AM. STATISTICAL A. 290 (1975); Edwards, *Comment*, 70 J. AM. STATISTICAL A. 291 (1975); Hogarth, *Rejoinder*, 70 J. AM. STATISTICAL A. 294 (1975).

The end point of each branch of the decision tree shows a payoff associated with that particular sequence of decisions and outcomes. The payoffs, denoted by the letter w , reflect the antitrust authority's willingness to accept risk, as well as the economic consequences of the particular sequence of outcomes and decisions. Thus $w(V)$ is the "payoff" to the antitrust authority, *i.e.* the policymaking body that is entrusted with reflecting societal preferences, in the event that no action at all is taken when in fact an anti-competitive act has occurred. Similarly, $w(\bar{V}, I, S, G)$ is the "payoff" in the event that there is no anticompetitive behavior (\bar{V}), but that, nonetheless, an investigation is undertaken (I), a suit is brought (S), and the defendant corporation is found guilty of an antitrust violation (G). In principle, such costs as the costs of conducting a pretrial investigation, the costs of bringing suit, including the costs of going to trial, and the social costs of failing to attack and correct anticompetitive behavior will enter into the payoff function; and again in principle, and appropriate payoff function can be specified.

In sum, at the pre-investigation stage the uncertainties involve whether anticompetitive behavior obtains and the direction in which the evidence that has not yet been gathered will point. At the pretrial stage, the uncertainties involve whether anticompetitive behavior obtains and the direction in which the evidence that has not as yet been gathered will point. At the trial stage, the uncertainties involve whether anticompetitive behavior obtains and the court's decision. At the retrospective stage, the uncertainty once again, is with respect to whether *in fact*, as evaluated by some omniscient jurist, there has indeed been anticompetitive behavior.³⁷ To determine the antitrust authority's optimal decision at each of the two decision points requires an assessment, both *a priori* and *a posteriori*, of the probabilities, associated with each of these uncertain events, as well as the terminal stage "payoffs," for every given sequence of decisions and outcomes, assigned to that sequence by the decisionmaking authority.

Assuredly, many of these same elements enter into the current decision-making process, although in a less formal, non-quantitative fashion. In particular, with respect to the payoffs, the traditional approach contents itself with what are at best vague and general statements of the monetary costs of taking positive actions up to the next decision point, and the losses to society of failing to halt anticompetitive behavior. These losses presumably equal the benefits to society of an effective remedy for the alleged act. In contrast, the decision-theoretic approach demands an initial and specific statement of *all* payoffs. These can be expressed as net benefits, which include the monetary costs of proceeding from all decision points, as processed through the payoff function, or alternatively in terms of the losses associated with failing to correct anticompetitive behavior, and the losses associated with obtaining a conviction when anticompetitive behavior is not occurring.

³⁷That is, notwithstanding the court's verdict, we will not necessarily know with certainty whether an anticompetitive act did or did not occur. The best that we can ordinarily do is to "quote some odds" on the verdict in fact being a "correct" verdict.

With respect to the probabilities, the traditional approach has several defects beyond the obvious failure to formally quantify probabilistic judgments. First, the latter failure results in the inevitable general failure to appropriately utilize prior knowledgeable judgments,³⁸ and, second, in the subsequent misuse of any additional information that is generated during the decision process. Finally, not specifying prior judgments either leads to a failure to consider the likelihoods of getting the various kinds of sample information, or when the latter likelihoods are in fact considered, however vaguely, almost certainly results in assessments that are inconsistent with what the prior judgments would have been, had they been specified.

The lack of a formal decisionmaking structure also contributes to a basic confusion between the probability of a given "state of nature" conditional upon the sample information that has been obtained, and the probability of obtaining that sample information, conditional upon the "state of nature." This confusion is important, because it can mislead. For example, the probability that a monopoly firm with *complete* monopoly power will have a one hundred percent market share does not, in general, equal the probability that a monopoly firm with a one hundred percent market share has *any* monopoly power, complete or otherwise.³⁹ This exemplifies why economic *analysis* that extends beyond the presentation of structural *indicia* is vital to an effective antitrust enforcement policy.

All of the above implies the authorities' failure to have these probabilities specified in advance of the very first decision that must be taken. Instead, particularly at the lower levels in the decisionmaking hierarchy, one risks over emphasizing the legal issues of the likelihood of developing a "good" case and the likelihood of getting a verdict of guilty, a *nolo* plea, or an out of court settlement. In contrast, the decision-theoretic approach demands that all probabilities be quantified at the outset, that these probabilities be *systematically* revised at each stage, and therefore that sample information be *anticipated* and not be wasted or misused by giving it an inappropriate weight.⁴⁰ Finally, with respect to the actual decisions, the traditional ap-

³⁸For an interesting illustration of the formal use of prior judgments and the Bayesian approach in economic forecasting, see Stekler, *An Analysis of Turning Point Forecasts*, 62 AM. ECON. REV. 724 (1972).

³⁹In the strict economic sense, by *definition* a monopoly with complete market power has a one hundred percent market share, so that the former probability would be unity. A monopolist that is the sole seller in a particular geographic area, however, might have virtually no market power—that is, the power to raise price—because of, *e.g.*, low barriers to entry, potential competitors "waiting in the wings," or low barriers to exit from the geographic area by buyers that are unwilling to "sit still" for any price increases on the part of the monopoly seller. It is evident that part of the problem relates to the critical question of market definition, but the basic point is relevant, nonetheless.

This point is developed in greater detail in another article. See Horowitz, *A Bayesian Interpretation of Concentration Data*, 1 INDUS. ORGANIZATION REV. 205 (1974). See also Comanor & Schankerman, *Identical Bids and Cartel Behavior*, 7 BELL J. ECON. 281 (1976). Comanor and Schankerman make the same point in formally distinguishing, via Bayes' rule, the probability of a cartel, given identical bids among firms, and the probability of identical bids, given a cartel. *Id.* at 286 n.12.

⁴⁰Consider the following well-known illustration placed into an antitrust context. Assume the probability of anticompetitive behavior is assessed, absent of other information, as "one out

proach generally considers probabilities and payoffs separately, one decision at a time, whereas the decision-theoretic approach combines these decisions to generate a prespecified strategy that contains a set of prespecified tactics to meet each contingency as it occurs. The optimal strategy is readily determined: it is the sequence that maximizes the statistically expected payoffs.

THE ECONOMIST'S ROLE

The economist has two basic roles to play in a formal antitrust decision-making procedure. The first is to provide or obtain the numerical assignments for the various elements that comprise the decision tree; the second is to outline the optimal strategy. It is important to recognize, however, that in formal decisionmaking the latter becomes solely a *computational* chore to be undertaken by a technician or a computer. No judgments are involved at this stage. Rather, the judgments, both legal and economic, have already been quantified for use as inputs in generating the optimal decision strategy.

There are three types of input information that the economist must help to generate: (1) the risk-preference functions; (2) the terminal payoffs; and (3) the various probabilities, with the exception that those probabilities relating strictly to legal matters are to be assessed by the legal staff.

If one accepts the view that antitrust activity should reflect national policy rather than the personal policy of any single individual or administrative agency then the risk-preference function employed in the analysis should be a *societal* preference function.⁴¹ Antitrust action is simply one of the nonquantitative instruments available to national planners for possible use as a measure in effecting national economic policy. Determination of when this instrument is or is not activated in a particular instance should be guided by the same societal preferences that determine such factors as the rates of government taxing and spending and the extent to which monetary policy is

of twenty," *i.e.* $P(V) = .05$. Also, assume that the information is that the eight-firm concentration ratio is $+ = .6$. Finally, assume that one has determined that the conditional probability of an eight-firm concentration ratio of at least $+ = .6$. Finally, assume that one has determined that the conditional probability of an eight-firm concentration ratio of at least $+ = .6$, given that there is anticompetitive behavior, is $P(+|V) = .9$, and that the probability of the concentration ratio's attaining this level in the absence of anticompetitive behavior is only $P(+|\bar{V}) = .2$. Then, using Bayes' rule, *see* note 36 *supra*, it is immediately determined that the revised probability of anticompetitive behavior, revised on the basis of the rather high level of industrial concentration, is still only $P(V|+) = .19$. The "no anticompetitive act" outcome is a conclusion that is almost surely at variance with the conclusion that would be reached by persons who fail to formally recognize their prior beliefs and instead are mesmerized by high concentration ratios. An awareness of the issue suffices to snap the spell, even though it might not provide a complete cure.

⁴¹If one does not accept this view, then the risk-preference function employed in the analysis will be different, the benefit and cost terms introduced into the risk-preference function to generate the payoffs may be different, but the fundamental features of the decision-theoretic analysis will be unaltered. The present view and my second bias only goes to the question of whose risk-preference function to employ.

employed. The principal means suggested for deriving such a preference function, as well as the related difficulties and caveats, are well known.⁴²

Although the notion of economists *qua* technicians being able to systematically extract from policymakers the risk-preference functions upon which those policymakers would prefer to have their decisions based may seem somewhat farfetched, the point of doing so is not because in reaching policy decisions we want to take into consideration society's preferences and attitudes towards risk. In effect, just as there are some decisions that are too important to be turned over to computers, there are even some decisions that are too important to be turned over to lawyers! Assuredly, it is not feasible to ask citizens to vote on whether, for example, it is worth spending \$Y in order to have a probability of P(Y) of breaking up an alleged price-fixing conspiracy among the manufacturers of wood flour toilet seats,⁴³ where that conspiracy costs society, or at least those citizens that purchase wood flour toilet seats, an estimated \$Z. It is feasible, however, for economists to *attempt* to answer the question, in the same manner as we *attempt* to assess the tradeoffs that we are willing to accept between, *e.g.*, the unemployment rate and the rate of inflation when making recommendations on the size of the government deficit. These types of decisions suggest the need for political inputs as a reflection of the preferences of various constituencies. Antitrust policy should be responsive to precisely the same forces as are the other policy instruments. It should be part of a national planning package, rather than be abandoned, by default, to administrative whim, be it that of lawyers *or* economists. As previously suggested, among other things the antitrust decisionmaking process should consider the effects of the alleged behavior, as well as the effects of any proposed remedy, on such desiderata as the distribution of income, the rate of inflation, the unemployment rate, the quality of life, and the balance of payments. Such consideration is clearly within the purview of the economist. To the extent that one is concerned with the "demonstration effects" or "deterrent aspects" of antitrust suits, these should show up in the payoff function. Whether these benefits universally outweigh the potential costs of a suit to the point where they should be a predominant consideration, is another matter.

The principal implication of the preceding remarks is that even if the assessment of the terminal payoffs derived from any sequence of decisions and outcomes remains as vague in the immediate future as it is today, the range of factors that enter into the assessment should be greatly expanded. Specifically, there are benefit and cost considerations that extend well beyond theoretical concerns as to whether the social costs of monopoly and anticompetitive behavior should be evaluated via triangles, or triangles plus rectangles.⁴⁴ The wider considerations are *not* irrelevant to evaluating the costs

⁴²For a discussion, see N. SPULBER & I. HOROWITZ, *QUANTITATIVE ECONOMIC POLICY AND PLANNING* 84-106 (1976).

⁴³See *United States v. Beatrice Foods Co.*, CR 4-82165 (E.D. Mich. 1974).

⁴⁴The "triangles" and "triangles plus rectangles" are geometric configurations whose areas, as determined by the positioning of industry supply and demand curves, have been suggested as

to society of anticompetitive behavior. They do, however, greatly expand the informational demands that are made upon economic science. Specifically, they force us to establish theoretically, and estimate empirically, the impact in a specific setting of a particular anticompetitive practice, or a lessening of competition, on any societal desideratum. And there is in all of this the further implication that the failure to recognize and allow for these impacts can result in a serious underestimate of the costs of failing to successfully prosecute certain anticompetitive acts, particularly those acts involving the major firms in major industries. For example, there is a substantive *economic* justification for the antitrust authorities' showing greater concern over, *e.g.*, vertical integration among oil refiners than over alleged price fixing among toilet-seat manufacturers. The economic concerns might very well outweigh the likelihood of obtaining a conviction under some antitrust statute when a decision is being made as to whether to file suit; they may also outweigh the likelihood of uncovering sufficient evidence during a preliminary investigation to subsequently warrant filing suit when a decision is being made as to whether to conduct such an investigation.⁴⁵

There are, in general, two different sets of probabilities that are the economist's responsibility to assess: (1) the prior probabilities that a particular act is or is not anticompetitive and (2) the conditional probabilities that evidence, favorable, neutral, or unfavorable to the hypothesis that anticompetitive behavior obtains, will be generated during an investigation, given that anticompetitive behavior actually does or does not obtain. The remaining probabilities follow immediately from the latter probability assignments, given the sample evidence. The single exception to this is the set of probabilities associated with the trial decision, *i.e.* the probabilities of obtaining verdicts of guilty or not guilty, given the nature of the sample evidence. The latter probabilities, it would seem, are most knowledgeably assessed by the legal staff.

It is in these stages of the analysis that the economist should be making use of the various economic indicia that frequently are considered to be "evidence" when a case is actually being tried. In particular, *prior* to an investigation the various structural data and institutional knowledge that might be readily available, such as the level of seller's and buyer's concentration, the number of firms in the industry and the size of geographic markets, and the extent of vertical integration, should be used to permit the economist to assess the prior probability that a given situation will support some allegation of anticompetitive behavior.⁴⁶ The evidence generated at the investigation stage,

appropriate measures of social distortions or welfare losses due to monopoly. See Harberger, *Monopoly and Resource Allocation*, 44 AM. ECON. REV. 77 (Supp. 1954) (triangles); Posner, *The Social Costs of Monopoly and Regulation*, 83 J. POL. ECON. 807 (1975) (triangles plus rectangles); Tullock, *The Welfare Costs of Tariffs, Monopolies, and Theft*, 5 W. ECON. J. 224 (1967) (triangles plus rectangles).

⁴⁵Which is not to suggest that these same considerations might not provide ample justification for prosecuting the latter case rather than the former.

⁴⁶For some probes in this direction, see Hay & Kelley, *An Empirical Survey of Price Fixing Conspiracies*, 17 J.L. & ECON. 13 (1974).

evidence relating to conduct and performance, is then used to revise these initial judgments, after we have previously established the conditional probabilities that, for example, the existence of trade associations, reciprocity, buy-sell arrangements, and comparative-number price catalogues lead to, or are *symptomatic* of, anticompetitive behavior or market structures that are incompatible with that of a competitive economy.

Thus, for example, data revealing a high degree of seller's concentration only indicate that there is a higher probability, *a priori*, of an anticompetitive finding than in the case where the data reveal a low degree of seller's concentration. Similarly, data revealing that there are only a few sellers in a market only indicate that there is a higher *a priori* probability of collusion among them, and a greater probability therefore that a merger between any two will effect a lessening of competition, than when there are many sellers. Neither the concentration ratio nor the number of sellers are determinative of anything with respect to the *actual* degree of competition.

In the case of *per se* violations, such as price fixing, the mathematics works itself out such that given the discovery of price fixing, the probability of an anticompetitive act is automatically revised to unity, irrespective of one's prior beliefs. In other instances, evidence of an especially high rate of return, various intra-industry contractual arrangements, tying agreements, and the like will simply be used to *revise* the prior probability that there is anticompetitive behavior.

In each of the latter instances, the economist's role should not be reduced solely to performing the clerical tasks, or conducting the investigation that produces the data upon which these probability assessments will be based. Rather, the economist's efforts should be directed toward establishing what these data really imply with respect to the probability assessments.⁴⁷ This is not to say that we will soon see the day where a court reaches a judgment in an antitrust case based strictly upon an economic expert's probability statements. It remains the lawyers' responsibility to obtain a courtroom conviction, presumably based, at least in part, on the economic evidence developed under the economist's guidance, irrespective of whether the lawyers and the court give this evidence the appropriate weight and economic interpretation, as opposed to legal interpretation. This does suggest, however, that as an instrument of economic policy, decisions regarding the implementation of the antitrust laws, and the attempted use of an antitrust statute as a measure in a given situation, should be guided by economic science and the economist's knowledgeable judgments.

⁴⁷This is not meant to imply that economists should absent themselves from the dirty-hands tasks associated with antitrust. Frequently, one learns a good deal, in the course of getting one's hands dirty, besides which the economist, as opposed to an assistant, might be essential to the actual information-grubbing process. As part of the evaluation process, and irrespective of the attitudes of the court, the economist's judgments should reflect *all* information, including post-acquisition information. Information is a valuable commodity. It should not be wasted.

CONCLUSION

Antitrust problems involve legal issues, insofar as we deal with them through existing statutes, and they involve economic issues, insofar as they relate to economic questions that are matters of national economic policy. As such, the attorney's contribution to the antitrust process should become paramount in the courtroom, and the economist's contribution should become paramount in deciding whether an antitrust problem gets to the courtroom in the first place. In this context, the economist's job is the analysis of economic information and legal inputs for the purposes of providing attorneys with the economic data which courts need in deciding antitrust cases and providing antitrust administrators with the optimal strategy, and its decision-theoretic rationale, for antitrust enforcement. The attorney's job is incorporating the economist's data into the appropriate legal framework for courtroom presentation. My impression is that we are heading in that direction.

