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DECISION TREE MODELING OF
AUDITOR LIABILITY LITIGATION

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ABSTRACT

Decision Tree Modeling of Auditor Liability Litigation

The concern of the accounting profession with professional liability litigation has resulted in increasing interest in alternative dispute resolution - the resolution of legal disputes outside of court. Alternatives to litigation are problematic, however, because of the uncertainty and complexity inherent in law-related decisions. Decision tree analysis, a technique for dealing with complex decisions made under conditions of uncertainty, represents a possible solution. In this paper, a decision tree model of a typical auditor liability case will be developed. Various uses of the model - for example, to calculate the overall probability of success, the settlement value of a case, and a research budget - are also discussed. The paper concludes with a review of the advantages and limitations of decision tree analysis.

Decision Tree Modeling of Auditor Liability Litigation

Auditors face increasing exposure to professional liability as a result of changes in the common law rights of third parties, with whom auditors have no contractual relationships, and the impact of statutes such as the Racketeer Influenced and Corrupt Organizations Act (RICO). According to Mednick [1987, p. 119]:

More suits have been filed against accountants in the past 15 years than in the entire previous history of the profession.

The number of lawsuits reported to the special investigations committee of the American Institute of CPAs SEC practice section has increased in each of the last six years.

According to available data, the largest accounting firms collectively have paid more than \$250 million in settlements of mostly audit-related lawsuits since 1980.

Legal liability is especially threatening in the accounting profession, where partners face potential personal liability for judgments rendered against a firm and insurance is increasingly expensive or unavailable. Even when a firm wins a case, a major and often hidden expense is the cost incurred when auditors are pulled away from activities of a more productive nature in order to participate in the litigation process.

The concern of the accounting profession with litigation is shared by the business community in general, where there is great interest in alternative dispute resolution (ADR) - that is, the resolution of legal disputes outside the court system [Edwards, 1986; Lieberman and Henry, 1986]. Most alternatives follow one of two well-known models, arbitration and mediation, both of which involve the participation of a neutral third party. A key variable in distinguishing these and other dispute resolution processes is the third party's control over the decision [Thibaut and Walker, 1978]. With arbitration the third party is empowered to decide the dispute while a

third party mediator merely assists the disputants in their attempt to reach a settlement.

The ADR movement has led to the development of new processes that go beyond traditional mediation and arbitration models. The most promising of these processes is the mini-trial, which has been labelled "The Cadillac of the corporate dispute resolution system" [Berreby, 1986, p. 14]. The mini-trial brings together disputants in a structured process that calls for them first to listen to short presentations by their attorneys and then to negotiate privately without attorney involvement. The process often utilizes neutral parties who act in an advisory role rather than as mediators or arbitrators [Edelman and Carr, 1987].

The accounting profession is cognizant of the ADR movement. A paper prepared by an AICPA special committee on accountants' legal liability concluded that "in those instances when the opponent is reputable, the issues complex, and the stakes high, these flexible [ADR] approaches may provide a better way to reach a fair result with less cost, less time wasted and less embarrassment" [1987, p. 6]. And the benefits and limitations of arbitration as a process for resolving CPA liability disputes have been explored by Banick and Broeker [1987].

Perhaps the one factor that best characterizes ADR - whether the dispute involves auditor liability specifically or business litigation in general - is greater involvement by the parties in the resolution of their dispute and corresponding less control by their attorneys. For example, the mini-trial has been defined as "an extra-judicial procedure which converts a legal dispute from a 'court-centered' problem to a 'business-centered' problem" [Davis and Omlie, 1985, pp. 531-532].

While the involvement of the parties is important if ADR processes are to be successful, it is also problematic because clients often have difficulty in dealing with the uncertainty and complexity inherent in law-related decisions. A possible solution to this problem is the use of decision tree analysis. Decision analysis is defined generally as a discipline devoted to the formalization of important decisions. Decision tree analysis refers to a specific decision analytic technique for dealing with complex decisions made under conditions of uncertainty [Howard and Matheson, 1983].

Decision tree analysis has been used for years in the business community, where "it has become an accepted part of the staff services that major corporations draw on routinely..." [Ulvila and Brown, 1982, p. 131]. In the early 1980s, corporate lawyers began to recognize the benefits of the technique as a vehicle for the discussion and analysis of legal decisions with clients. A survey of corporate lawyers conducted in 1984 concluded that approximately 20 percent of the respondents used decision analysis in advising their clients and several consulting firms, including at least four of the Big Eight accounting firms, use the technique in providing litigation support services [Siedel, 1988].

The primary purpose of this research is to develop a decision tree model of an auditor liability case. The second section of this article presents a profile of a typical auditor liability case. The third section describes a hypothetical case based on the profile. In the fourth section a decision tree model of the hypothetical case will be developed. Various uses of the model in making settlement decisions will be addressed in the fifth section. The major advantages and limitations of the decision analytic approach are summarized in the concluding section.

A PROFILE OF AUDITOR LIABILITY LITIGATION

A decision tree model of the hypothetical case discussed in the next section will incorporate theories that are common to auditor liability litigation. In order to determine the nature of these theories and related information, a profile of auditor liability litigation was developed. Using the LEXIS system and working back from December 31, 1987, 100 auditor liability cases were identified. Both federal and state libraries were searched, using the primary search term "auditor and liability." The cases located through the computerized search yielded additional citations to auditor liability cases, as did a review of secondary sources [e.g., Causey, 1986].

The 100 cases located through this search date back to the beginning of 1984. Thus the case profile is based on an examination of auditor liability cases as observed through a four-year (1984-87) window. The profile includes a combination of cases that are still pending (55 percent) and those that appear to be final (45 percent). Some of the "final" cases might be subject to appeals that have not been reported (that is, published). The profile also includes a fairly even mix of trial (51 percent) and appellate (49 percent) decisions.

The profile that emerges from an analysis of the 100 cases is:

1. Five percent of the cases were filed by clients of the auditor.

These cases do not include derivative actions in which damages are claimed on behalf of a client corporation, for the reason that derivative actions are filed by investors and the corporation is forced into the litigation as a nominal defendant. The remaining 95 percent of the cases were commenced by third parties. Almost half of the third party plaintiffs (46 percent) were investors and

another 34 percent were creditors. The remaining 20 percent of the third party cases were brought primarily by customers and insurers.

2. Because the cases occasionally named multiple defendants, accounting firms were named as defendants a total of 107 times in the 100 cases. Of this total, 67 percent were Big Eight firms.
3. Fifteen of the 100 cases included information regarding damages claimed by the plaintiff. These claims ranged from \$435,293 to over \$1 billion; the median claim was \$16 million. Six of the fifteen cases were still pending. The accounting firms prevailed in eight of the cases that had been concluded - that is, no damages were awarded to the plaintiffs - while in the remaining case the plaintiff recovered \$500,000.
4. An analysis of the liability theories discussed in the cases indicates that the three dominant theories are negligence¹ (in 52 percent of the cases), violation of securities law² (51 percent) and fraud³ (49 percent). Two theories in most cases asserted with negligence or fraud are negligent misrepresentation⁴ (21 percent)

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1. Negligence is the failure of an auditor to act in accordance with the degree of care expected of an average auditor.
 2. Violation of securities law includes state legislation as well as the Securities Act of 1933 and the Securities Exchange Act of 1934. The great majority of securities law cases involved alleged violations of section 10(b) of the 1934 act and related rule 106-5, an antifraud provision.
 3. Fraud is generally defined as the intentional false representation of a material fact that is relied on by another party to its detriment.
 4. Negligent misrepresentation is similar to fraud except that the misrepresentation of the material fact is not intentional but, instead, results from negligence.

and gross negligence⁵ (13 percent). Other theories raised in more than one case are RICO violations (23 percent), breach of contract (18 percent), breach of fiduciary duty (12 percent), and conversion⁶ (4 percent).

On average, 2.5 theories were asserted per case. In single theory cases - 30 percent of the total - the most popular theories were negligence (12 percent of the total cases) and securities law violations (12 percent). In 30 percent of the cases two theories were asserted, the most common combinations being fraud and securities law violations (6 percent of the total cases), and negligence and fraud (6 percent). In the remaining cases anywhere from three to nine theories were asserted, but no combinations were dominant.

The profile of an auditor liability case that emerges from the analysis of the 100 cases decided at mid-decade (1984-87) shows a case filed by a third party who has invested in or is a creditor of a company audited by a defendant Big Eight firm. The plaintiff, who is seeking damages in the eight-figure range, asserts two to three theories of liability based on a combination of fraud, securities law violations, or negligence.

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5. An auditor who acts with reckless disregard of the facts is subject to liability for gross negligence, even though there was no intention to misrepresent the facts.
 6. Conversion occurs when one party unlawfully controls property owned by someone else.

A HYPOTHETICAL AUDITOR LIABILITY CASE

The following hypothetical case, based on the profile of auditor liability cases discussed in the preceding section, has been developed from the facts in two of the 100 cases upon which the profile is drawn [In re American International, Inc. Securities Litigation, 1984, 1985]. The hypothetical case will be used in the next section to illustrate the development of a decision tree model of auditor liability litigation.

The plaintiff in the hypothetical case is a third party investor who purchased well over a million shares in ABC, Inc. The defendant, a Big Eight accounting firm, is ABC's independent auditor. The plaintiff alleges that material misrepresentations and omissions in ABC's year-end financial statements resulted in a loss of \$16 million. These are "hard" dollars - that is, it is clear that the plaintiff will recover this amount if the defendant's liability is established. The accounting firm estimates that, whether it wins or loses the case,⁷ its future legal and related costs will total \$300,000.

The plaintiff asserts two key theories of liability in the complaint: fraud and negligence. Plaintiff alleges that the accounting firm committed fraud in that there was a pattern of compromise by the firm with regard to adjustments to income. For instance, a special investigative report conducted by another Big Eight firm showed that adjustments should have been made which would have reduced reported income by over \$50 million and that an additional amount relating to intangible assets should have been written off.

7. In the United States, the general rule is that, win or lose, each party pays its own legal costs.

The plaintiff alleges that the firm was negligent in its audit of year-end financials. The plaintiff claims that the law of State X (where much of the alleged negligence took place) should be applied rather than the law of State Y (where plaintiff is based and where the injury occurred). According to the plaintiff, State X follows a modern rule whereby third party investors are allowed to recover damages from accounting firms that have been negligent in conducting an audit.

The accounting firm has received a report from its attorneys analyzing the plaintiff's complaint as follows:

1. There is a very low probability that the plaintiff will be able to show the pattern of compromise necessary to prove fraud.
2. The chances are better than even that the court will decide that the accounting firm was negligent in conducting its audit.
3. The question of whether the law of State X or State Y applies raises technical legal considerations. The court might apply one of two choice of law rules in selecting the appropriate state law: (a) a "contacts" test that focuses on the number of contacts that a state has with the parties or the activity that is the subject of the litigation or (b) an "interests" analysis that emphasizes the government interests and policies that are involved in the dispute. In this case (the accounting firm's attorneys conclude), there is an even chance that the court will select either State X or State Y law.
4. If the court adopts the law of State Y, a traditional rule will be applied which makes it difficult for third parties to recover even when an accounting firm is negligent. Under this rule, the third party must show that it was a member of a known, determinate group

which, the accounting firm contemplated, would rely on the audit.

In this case the probability is low that the plaintiff can show that the audit of ABC was conducted with the plaintiff investor in mind.

5. The law of State X is unsettled at the present time. If the court selects the law of State X, it is likely that (as plaintiff claims) a modern rule will be applied which would allow the plaintiff to recover if negligence is proven. If the court does not apply the modern rule for State X and, instead, uses the traditional rule, the analysis would be the same as described at 4 above.

The accounting firm has recently learned through its attorneys that the plaintiff is willing to settle its \$16 million claim for \$7 million. This represents a final settlement offer. The firm must now decide whether to accept the offer or proceed with the litigation.

A MODEL OF THE AUDITOR'S SETTLEMENT DECISION

It is assumed that, before making a final decision to litigate or settle, the defendant accounting firm in the hypothetical case (or the parties in any case in which alternative dispute resolution is utilized) will raise a number of specific questions, such as: What are the overall chances for success in court if the firm continues to litigate? What is the settlement value of the case? And, if further research is necessary before a decision can be reached, on what issues should the research be focused, given financial and time constraints? These are difficult questions to answer because of the multiplicity of issues and because the attorneys, like most lawyers, have analyzed the case using verbal probability statements. However, decision tree models are designed to facilitate decision making under conditions of complexity and uncertainty and, as discussed in the next section, can be used to address these questions and others.

Developing a decision tree model involves first depicting the decision in a tree format and then assigning probability and endpoint values.

The Decision Tree Format

A decision tree representation of the auditor's decision includes a number of branches that emanate from either decision forks or chance forks. Decision forks, depicted in the tree by squares, represent alternatives over which the firm has control. The accounting firm in the hypothetical case faces only one such alternative - the decision whether to settle or continue with the litigation. Chance forks, depicted by circles, represent uncertain events that the accounting firm does not control. In this case, the factual or legal issues to be decided by the court would appear as chance forks, as shown in Figure 1.

[Insert Figure 1 here.]

The amount of detail included in the decision tree is open to debate. Several decision analysts who have attempted to model litigation decisions [Peterson, 1983; Raiffa, 1982; Behn and Vaupel, 1982; Bodily, 1981] have utilized a simple model in which specific legal issues are combined into one chance fork with a win and a lose branch, as shown in Figure 2. A simple model is not recommended because it is not useful in answering the questions noted above.

[Insert Figure 2 here.]

At the opposite extreme is a complex model that, in attempting to incorporate every conceivable legal or factual issue (such as the specific elements necessary to prove negligence), requires hundreds of branches.

FIGURE 1

A Decision Tree Model of the Auditor's Settlement Decision

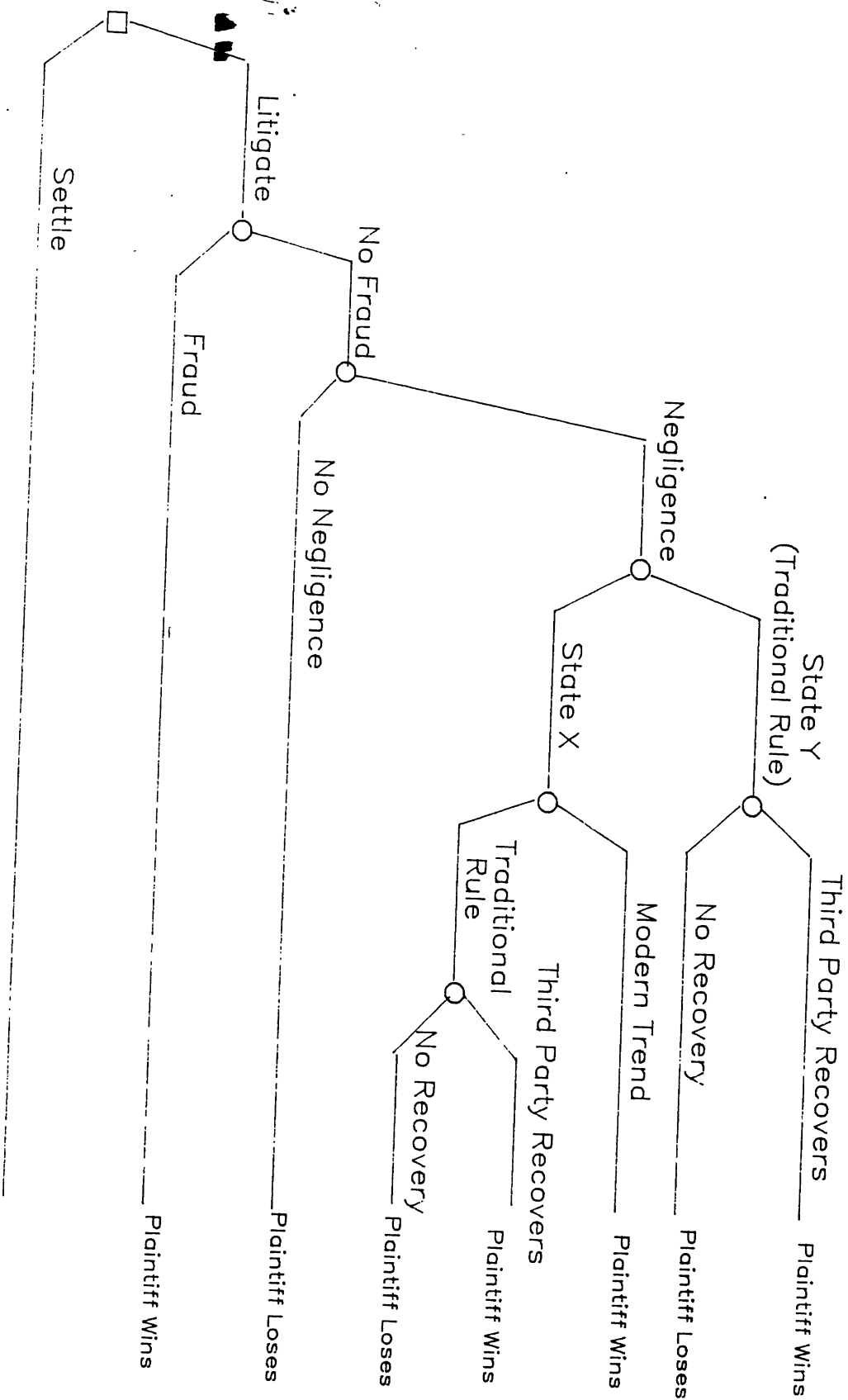
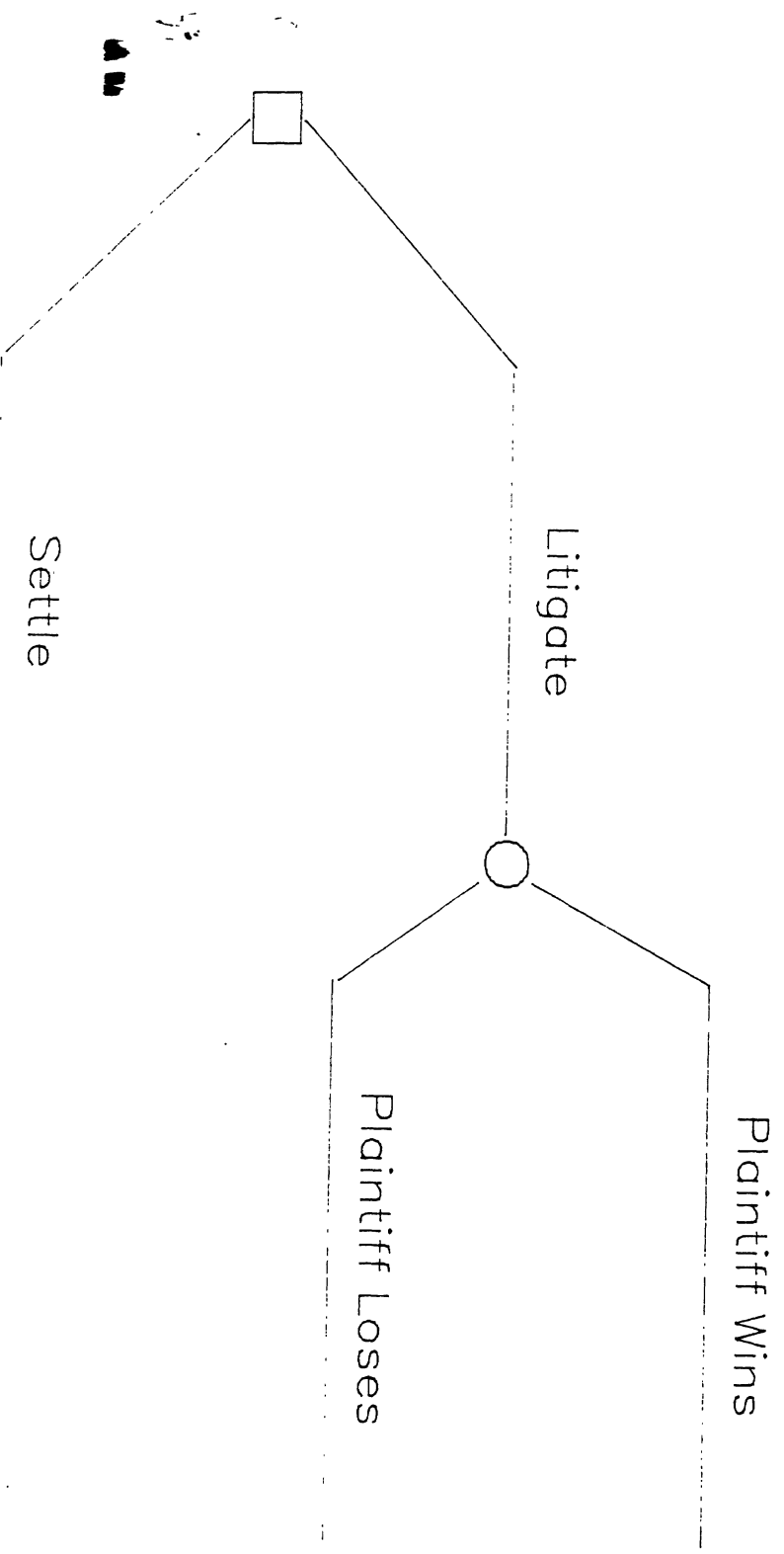


FIGURE 2

A Simplified Decision Tree Model of Litigation



While a professional analyst might prefer a tree that explicitly includes every possible uncertainty, this adds a level of complexity that makes the tree unwieldy and diminishes its value as a vehicle for communication between attorney and client. Consequently, the model in Figure 1, which focuses on the major legal issues, is recommended over both the simple and complex options.

Assigning Probabilities and Endpoint Values

The decision tree model is completed by assigning probabilities at each of the chance forks and replacing the "plaintiff wins" and "plaintiff loses" endpoints with dollar amounts. The analysis of a case by a trial attorney in large part involves probability assessment [Eggleston, 1978, p. 4]. The problem is that attorneys traditionally have used verbal rather than numerical probabilities in their analyses. Verbal probabilities are often ineffective in communicating an analysis to a client because they are ambiguous [Beyth-Marom, 1982; Lichtenstein and Newman, 1967].

For example, in discussing the law of State Y in the preceding section, at 4, the accounting firm's attorneys conclude that under the traditional rule "the probability is low that the plaintiff can show that the audit of ABC was conducted with the plaintiff investor in mind." Stated another way, there is a high probability that the accounting firm will be successful under State Y law. But what does "high probability" mean? One study [Behn and Vaupel, 1982, p. 76] concluded that to some people, high probability means a 40 percent chance while to others it means a 98 percent chance. The accounting firm's decision whether to accept the settlement offer might vary depending on the interpretation placed on the verbal probability statements, an interpretation that might be quite different from what the attorneys intended.

The conversion from verbal to numerical probabilities could be accomplished simply by asking the attorneys what their verbal statements mean. Alternatively, a more formal technique such as a decision wheel can be used to elicit the numerical probabilities [Moore and Thomas, 1988, pp. 140-141; Spetzler and Stael von Holstein, 1975], although this might require the services of a professional decision analyst. Regardless of the technique, in this case it is assumed that the attorneys assign the following probabilities, which they consider to be independent, to their verbal assessments:

1. Fraud: "very low probability" = 10 percent
2. Negligence: "better than even" = 60 percent
3. Choice of Law: "even chance" = 50 percent
4. Traditional Rule: "low probability" = 20 percent
5. Modern Trend: "it is likely" = 70 percent

These probabilities have been incorporated into Figure 3.

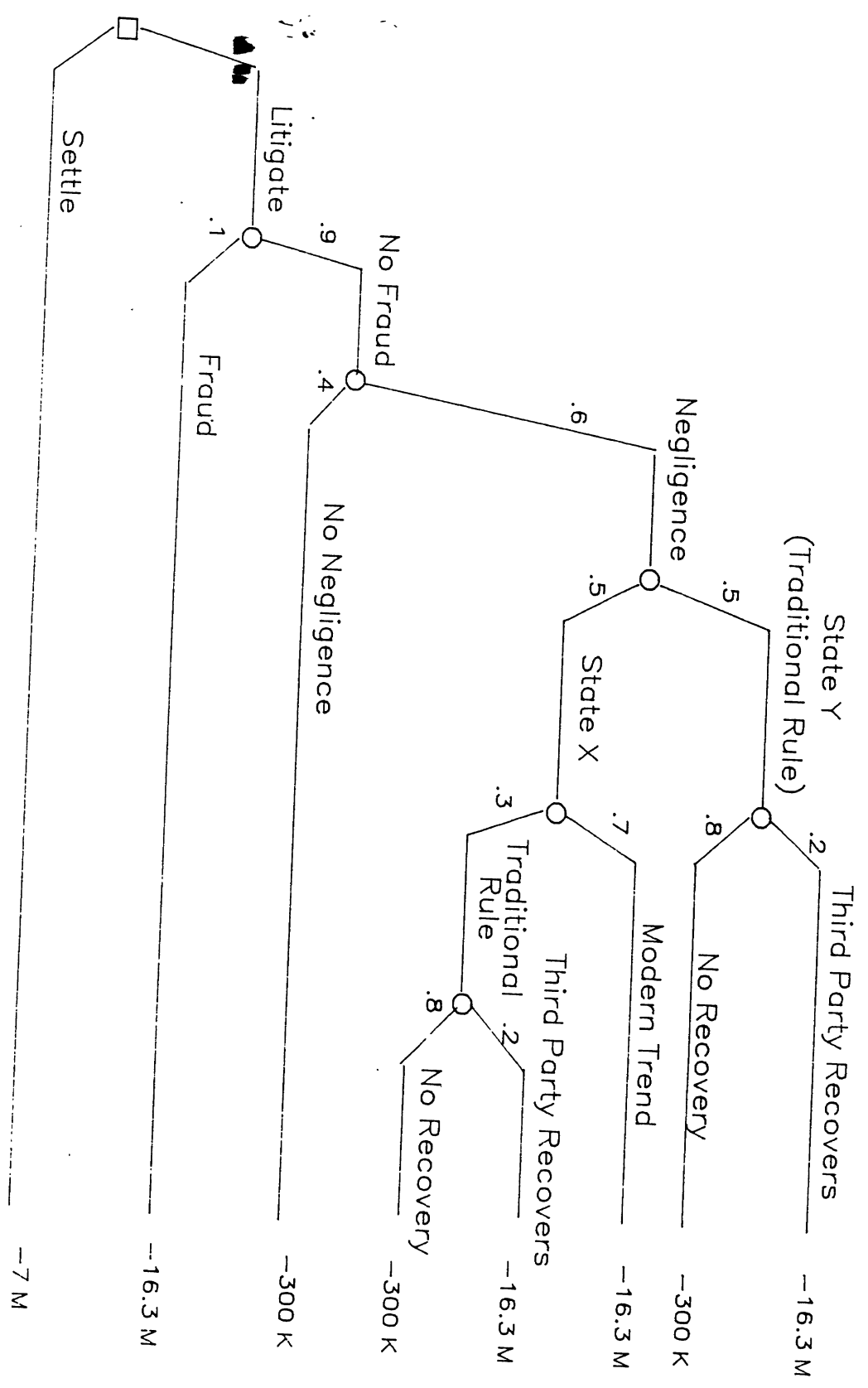
Assigning endpoint values need not be a complicated process in many auditor liability cases where financial losses are easier to calculate than in personal injury cases. In the hypothetical case, for example, the assumption is made that the plaintiff's claim is based on "hard" dollars that plaintiff will recover if defendant is liable. As indicated in Figure 3, the amount assigned at the endpoints for each of the "plaintiff wins" branches is -\$16.3 million (representing damages and costs), while -\$300,000 (costs) is assigned at the end of each "plaintiff loses" branch.

[Insert Figure 3 here.]

If the damage estimates were more uncertain, chance forks with appropriate probability distributions could be added at each of the present

FIGURE 3

The Decision Tree Model with Probabilities and Endpoint Values



endpoints. Alternatively the parties could use an ADR technique called a high-low contract under which the parties agree in advance that the defendant will pay either a high amount, if liable, or a low amount, if not liable. A high-low contract guarantees a minimum payment to the plaintiff while also limiting the defendant's potential loss to a predetermined amount [Goldberg, Green and Sander, 1985, pp. 281-282].

Regardless of whether damage estimates are hard or soft, the accounting firm's attitude toward risk can be incorporated into the model. One way to accomplish this is to substitute the dollar amounts at the endpoints with values from the firm's utility function [Brown, Kahr and Peterson, 1974, pp. 47-48]. Based on a review of the literature and conversations with professional analysts, it appears that this technique is not used in legal decision analysis, and a detailed discussion of attitude toward risk in any event is beyond the scope of this article. Suffice it to note that if the technique is used, it is important to recognize that an attorney's attitude toward risk may be quite different from that of the client [Raiffa, 1982, p. 75].

USING THE DECISION TREE MODEL

Once developed, the use of the decision tree model to address the specific questions that relate to the accounting firm's settlement decision is fairly straightforward. First, the decision tree can be used to calculate, from the information provided by the attorneys, the plaintiff's overall probability of success. This is accomplished by multiplying the probabilities along the four paths that lead to a plaintiff victory (-16.3 M) and adding the results [Winkler, 1972, p. 34]. As indicated in Figure 4, these paths sum to 36 percent, which is plaintiff's overall probability of

success. In other words, there is a 64 percent chance that the defendant accounting firm will prevail.

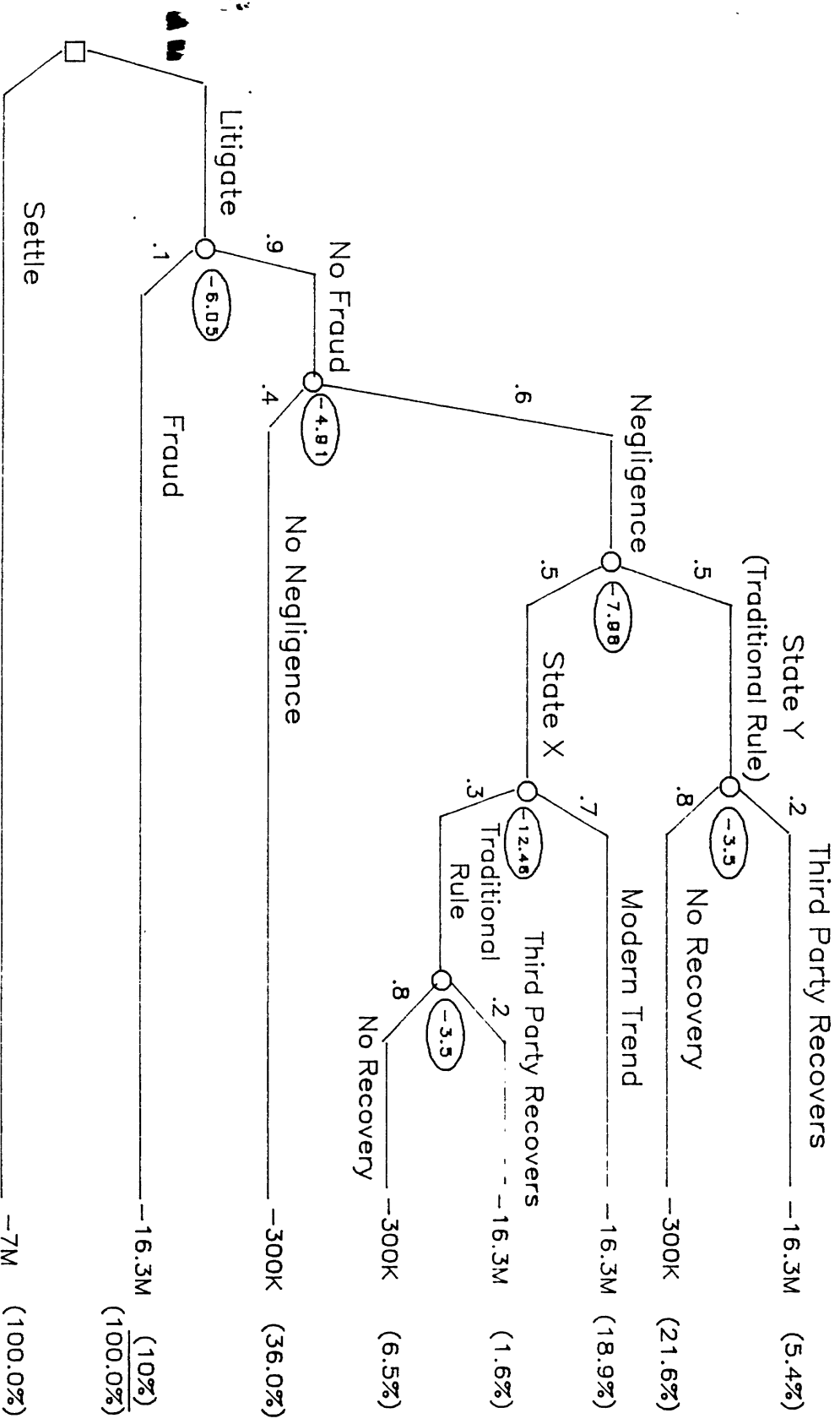
Second, the model will enable the firm to determine a settlement value for the case by calculating the expected value of a decision to continue with the litigation. The expected value is obtained by "folding back" the decision tree - that is, moving from right to left, calculating the weighted averages for each chance fork [Brown, Kahr and Peterson, 1974, pp. 11-15]. As shown in Figure 4, the expected value of the decision to continue with the litigation is -6.05. An accounting firm that played the averages and based its decision on the model would decide to continue with the litigation because a loss of \$6.05 million is preferred over paying the \$7 million settlement proposed by the plaintiff.

[Insert Figure 4 here.]

Third, if the firm decides to conduct further research before reaching a decision, it can use the model to decide where to focus its efforts, assuming financial and time constraints. For instance, suppose that the accounting firm's attorneys are divided with regard to the chances for success on both the fraud issue and the question of whether State X will follow the modern trend. Most of the attorneys agree with the analysis presented to the accounting firm (summarized above in the third section). However, a few attorneys are more pessimistic and think that there is a 20 percent chance (rather than a 10 percent chance) that the plaintiff will prove fraud and a 90 percent chance (rather than a 70 percent chance) that the court will adopt the modern trend (under which the accounting firm will be liable to the third party investor) if the law of State X is chosen. The accounting firm realizes that there is only time enough for further research on one of the

FIGURE 4

The Decision Tree Showing Expected Value and Overall Probabilities



two issues and is also concerned about the size of its legal bill. On which issue should the research focus?

A sensitivity analysis shows that the settlement decision is not sensitive to a change in the "modern trend" probability from 70 percent to 90 percent. The new expected value (-\$6.74) still represents less of a loss than the proposed \$7 million settlement. Thus, even if the pessimistic attorneys are correct, the accounting firm's expected value-based decision would not change. On the other hand, if the plaintiff's chances for success on the fraud issue are increased to 20 percent from 10 percent, the new expected value (-\$7.19) exceeds the settlement offer. Consequently, given its resource constraints, the firm should focus on the fraud issue.

Finally, if the accounting firm decides to continue with the litigation, the model will be useful in making other budgetary decisions. For example, suppose that the attorneys feel that, by hiring expert witnesses to testify during the trial, they can reduce the plaintiff's chances for success on the negligence issue from 60 percent to 50 percent. The attorneys, however, want guidance from the accounting firm with regard to budgetary limits on hiring these experts. The firm can establish a budgetary cap by recalculating the expected value using the 50 percent probability at the negligence chance fork. The new expected value of the firm's loss is \$5.36 million, which is \$690,000 less than the old expected value of the loss (\$6.05 million). Logically, the firm should pay the experts no more than the \$690,000 benefit anticipated from their testimony.

CONCLUSION

Decision tree modeling of auditor liability cases is a technique that, in clarifying the analysis of legal decisions, facilitates communication between attorneys and clients. Even if probabilities and endpoint values are

not incorporated into the model, the representation of a decision in a decision tree format is a useful process that enables attorney and client to visualize the relationship between various factual and legal issues involved in the litigation. The addition to the decision tree of probabilities and endpoint values, however, enhances the analysis by providing a valuable tool that can be used to address the specific questions discussed in the preceding section.

The argument can be made that the use of decision tree analysis is risky in that it might create a false sense of precision in the analysis of inherently uncertain legal issues. The law is not unique in this regard, however, as business decisions are no less uncertain. Furthermore, the alternative to a formal decision-making process - the consideration in an unstructured manner of issues analyzed in terms of undefined numerical probabilities - does not enable accounting firms to make the decisions that are important to the success of alternative dispute resolution processes.

While decision tree analysis is preferable to unstructured decision making, it is not suggested that law-related decisions should rest solely on the analysis. The survey of corporate attorneys cited in the introduction to this article concluded that most respondents who use decision analysis do not base their decisions entirely on the results of the analysis. The respondents did, however, conclude that the technique is useful in structuring problems, communicating with clients and identifying key issues through sensitivity analyses. Another advantage cited was the ability to calculate the overall probability of success and settlement values [Siedel, 1988, p. 139].

Beyond these benefits, the formalization of law-related decision making through decision tree analysis might enable the parties to avoid certain

decision-making errors that have been addressed in the behavioral literature. For example there is evidence [Siedel, 1988, p. 134] that parties involved in complex litigation overestimate their chances for success in a manner similar to a pattern observed by Tversky and Kahneman [1974, p. 1129]: "The general tendency to overestimate the probability of conjunctive events leads to unwarranted optimism in the evaluation of likelihood that a plan will succeed or that a project will be completed on time." Such "unwarranted optimism," which can act as a major deterrent to settlement, might be avoided through the use of decision tree analysis.

There is reason to believe that the complexity of auditor liability cases will increase in the future while, at the same time, the use of decision tree analysis will be simplified. The complexity will result from the internationalization of business, which means that business-related problems such as auditor liability litigation will often transcend national borders. Decision tree analysis is ideally suited to the resolution of international disputes because it provides a common language for parties with cultural and language differences. The simplification of the decision tree analysis process is provided through the increasing number of microcomputer packages now available [Henrion, 1985] and in use at large law firms [Blodgett, 1986]. For these reasons, in addition to the advantages cited above, it appears that decision tree analysis will gain increasing acceptance by the legal and business community.

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