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Correctly Using Risk Analysis to Calculate Discounted Settlement Value

Introduction

A recent article by Judge Wayne D. Brazil in Law360 examines the relationship between probability theory and the use of decision analysis as a tool in calculating settlement values of civil cases.[1] It was Judge Brazil's conclusion that decision analysis should not be used since it leads to "misevaluating cases".[2] That's a strong condemnation of a well-established analytical tool, and it merits further examination.

Judge Brazil criticizes decision analysis and probability theory broadly, noting that in his view "the results of decision analysis can be no better than the reliability of the estimates of each component of the formula"[3] and that "the formulae … do not take into account so many factors that should play significant roles …."[4] However, his condemnation is focused on what he viewed as two fundamental problems: decision analysis as used in settlement value estimation somehow violates fundamental assumptions of probability theory, and "it pursues answers to the kinds of question that triers of fact are generally not asked to address."[5]

We certainly agree that an analysis – any analysis – is only as good as the data and assumptions employed; it's the old adage, garbage in, garbage out. And we agree with the observation made by Judge Brazil that decision analysis, and more generally probability theory when used for forecasting purposes, requires great attention to "asking the right questions" and getting useful answers. Where we disagree with Judge Brazil, however, is in his conclusion that the tool itself – decision analysis – is inherently flawed. Decision analysis, when properly understood and constructed, can and should be used to assist counsel in calculating discounted settlement values.

Simple Example

Judge Brazil presents his arguments using a simplified example of a tort case. In the example, the decision analyst asks counsel to answer three primary questions:

- What is the likelihood that the plaintiff will prevail on causation?
- What is the likelihood that the plaintiff will prevail on fault?
- What is the range of possible damage awards?

The first two questions address the establishment of liability, while the third question addresses the amount of liability. In the example, counsel estimates that the plaintiff has a 60% likelihood of prevailing on causation, and a 60% likelihood of prevailing on fault. The range of potential damages awarded is high amount ($200,000) with 20% likelihood, a medium amount ($120,000) with 60% likelihood, or a low amount ($50,000) with 20% likelihood.

In order to receive damages, the Plaintiff must prevail on both causation and fault. Therefore, there is a 36% chance (60% x 60%) of establishing liability and being eligible to receive damages. If the Plaintiff receives damages, that amount will be between $50,000 and $200,000, with an expected value of

$122,000 (20% x $200K + 60% x $120K + 20% x $50K). Thus, the discounted settlement value of the case is calculated to be 36% x $122,000, or $43,920.

Judge Brazil concludes that this result of $43,920 is "dangerously misleading" due to two fundamental problems, each of which will be addressed in turn.

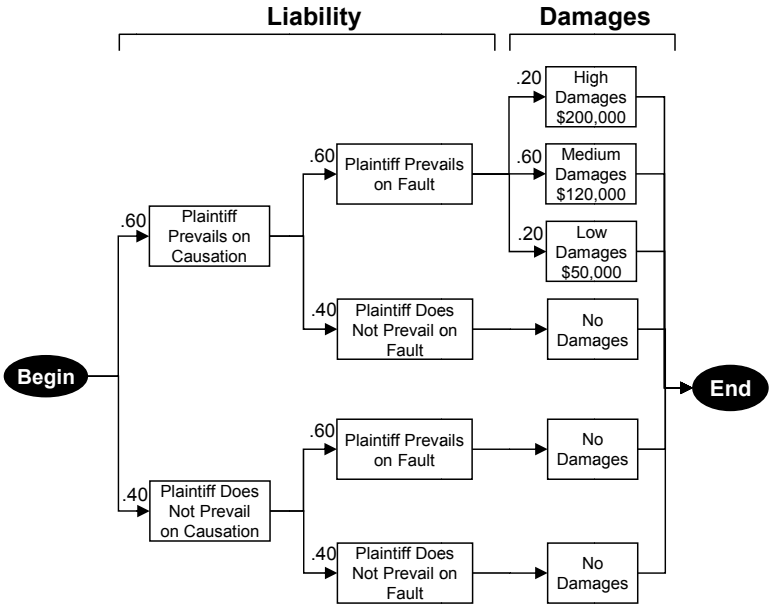
Violation of Probability Theory

The first purported problem is that the decision analysis presented above violates probability theory. The author argues that it is only appropriate to multiply the likelihood of events together (e.g., 60% x 60% x $122,000) when the events are independent; if there are dependencies between the events (as the author correctly identifies may be the case), he argues that one cannot multiply the likelihoods together.

Judge Brazil is correct in that dependencies may exist between events, and that not taking those dependencies into account will result in an erroneous conclusion. In the example, he points to the dependency between liability and damages; a jury that likes the plaintiff and rules for liability may also be likely to award a high damage amount. However, decision analysis is ideal for handling both independent and dependent events; where the author went astray was that he asked the wrong questions, and as a result constructed an analysis assuming independence.

In the simplified example, counsel was asked to estimate a range of damages, and returned $50,000 to $200,000. However, if we want to build in dependency as the author alludes to, we must ask a slightly different question – *What is the range of liability **if** the jury establishes liability?* By asking the question in this manner, we are explicitly accounting for the dependency between liability and damages.

When constructing a decision analysis that incorporates both dependent and independent events, it is often useful to express the questions at issue graphically in what is known as a "decision tree". An example decision tree is presented below:



From this tree, we can see a number of dependencies evident. Beginning with the bottom and moving up, if the Plaintiff does not prevail on either causation or fault, then there cannot be any damages awarded. Likewise, if the Plaintiff does not prevail on causation but does prevail on fault, or if the Plaintiff prevails on causation but not fault, there still cannot be any damages (recall earlier we stated that the Plaintiff must prevail on **both** causation and fault for there to be damages.

It is only if the Plaintiff prevails on both fault and causation that damages can occur. Thus, that is the question that should be asked of counsel – in the event that Plaintiff prevails on both (whether because the jury likes and believes the Plaintiff or other reason), what are the likely damages?

This type of analysis does not violate any rules of probability theory, as it allows for both dependent and independent events. In this example, causation and fault are independent events – regardless of whether the Plaintiff prevails on causation or not, the probability of prevailing on fault is still 60%. Liability and damages have both dependent and independent elements – non-zero damages are dependent on the establishment of liability, but the range of non-zero damages is independent of any other events.

Triers of Fact

Judge Brazil's second purported problem is that juries examine issues independently, and do not think of these issues in terms of net probability. Here, he appears to be confusing two different types of probabilities. On the one hand, there is the likelihood that the Plaintiff prevails on a particular issue; this is a yes-no decision, and probabilities can be used to determine how likely a yes decision is versus a no decision. On the other hand, there is the level of support required to establish liability in a jury's mind; this is a threshold issue, as once a jury considers that a particular issue is supported by the majority of the supporting evidence, he or she rules in favor of that particular issue.

Judge Brazil notes, "Instead of asking the jury to answer a question of probability theory, the law asks the jury to determine, for one central fact issue at a time, whether plaintiff's contention about that particular fact is supported by 51 percent of the persuasive power of the evidence." Yet this is not a fundamental problem of decision analysis; again, so long as the correct questions are asked, decision analysis captures this issue by design.

Let's return to the example of causation. It was previously determined that the Plaintiffs had a 60% likelihood of prevailing on causation. But what does that exactly mean? If we use the author's statement above, prevailing on causation means that a Jury has been convinced that causation is supported by 51% of the pervasive evidence (i.e., the majority). So the question that counsel must ask itself is what is the likelihood that the Jury believes causation is supported by a majority of the evidence? In our example, that answer is 60% of the time. Now that causation has been addressed, we then move onto the next issue (fault) and evaluate that in much the same way. Thus, a decision analysis that asks the correct questions to form its assumptions is supportive of the law and the way triers of fact think, not opposed to it.

Conclusion

Decision analysis is a tool to graphically illustrate and employ probability theory, and probability theory itself is basically mathematics. As such, it works as well as the inputs that it employs. Like any tool, probability theory and decision analysis is only of value if properly used. To argue that decision analysis

should never be used in calculating discounted settlement values, simply because the analysis was not properly understood or constructed, misses the point. The error is not in the tool, but rather how it is used. Here, the error is in asking and answering the "wrong questions" and thereby getting useless results. Done correctly, these tools offer great value, and answer the questions put to them. In the hands of a decision analyst who understands the issues and constructs the analysis appropriately, they can provide insight and value to counsel looking to determine discounted settlement values.

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[1] Brazil, Wayne D. "Don't Apply Risk Analysis to Discounted Settlement Value." Law360, February 3, 2014.

[2] Id. at 1.

[3] Id. at 1.

[4] Id. at 1.

[5] Id. at 1.