Chance and Litigation

F.E. Guerra-Pujol, Barry University

Available at: https://works.bepress.com/f_e_guerra_pujol/18/
Abstract

Is the litigation game as random as a coin toss? In this paper, the author presents the results of his preliminary research regarding the randomness of litigation. Specifically, the author formulates and then tests his “random litigation hypothesis”: the conjecture that the litigation game is a random process with just two possible outcomes, like a coin toss, and that the litigants to a dispute are essentially playing a game of chance when they submit their dispute to a court for resolution.

Date: December 12, 2011.
JEL classification: C81, C83, K41.
Keywords: chance and randomness, coin toss, litigation game, random litigation hypothesis, relative frequency.
CHANCE AND LITIGATION

F.E. Guerra-Pujol

“The prophecies of what the courts will do in fact, and nothing more pretentious, are what I mean by the law.”

“Litigation is a crapshoot.”

1. Introduction

Is the “litigation game” a random process, like a coin toss? That is, is the process of adjudication nothing more than a game of pure chance, a game whose outcome is as uncertain and indeterminate as a crapshoot or the spin of a roulette wheel? The traditional or legal-formalist view of the “litigation game” posits that the outcome of litigation is based on formal logic, legal reasoning, the weight of the evidence, and other skill-based factors. The formalist approach to law and legal process thus assumes that judges and juries are capable of producing consistent and logical results based on reasoned deliberation. But is this formalist view consistent with the “actual situation,” to borrow a phrase from the economist Ronald Coase?

---

1. Introduction

Is the “litigation game” a random process, like a coin toss? That is, is the process of adjudication nothing more than a game of pure chance, a game whose outcome is as uncertain and indeterminate as a crapshoot or the spin of a roulette wheel? The traditional or legal-formalist view of the “litigation game” posits that the outcome of litigation is based on formal logic, legal reasoning, the weight of the evidence, and other skill-based factors. The formalist approach to law and legal process thus assumes that judges and juries are capable of producing consistent and logical results based on reasoned deliberation. But is this formalist view consistent with the “actual situation,” to borrow a phrase from the economist Ronald Coase?

---

1. Introduction

Is the “litigation game” a random process, like a coin toss? That is, is the process of adjudication nothing more than a game of pure chance, a game whose outcome is as uncertain and indeterminate as a crapshoot or the spin of a roulette wheel? The traditional or legal-formalist view of the “litigation game” posits that the outcome of litigation is based on formal logic, legal reasoning, the weight of the evidence, and other skill-based factors. The formalist approach to law and legal process thus assumes that judges and juries are capable of producing consistent and logical results based on reasoned deliberation. But is this formalist view consistent with the “actual situation,” to borrow a phrase from the economist Ronald Coase?
To explore this question mathematically, the author presents and tests the following “random litigation hypothesis”: The litigation game is a random process with just two possible outcomes, like a coin toss, and the litigants to a dispute are essentially playing a game of chance when they submit their dispute to a court for resolution. Accordingly, the remainder of this paper is organized as follows: Section 2 formally introduces the random litigation hypothesis and defines key terms, such as chance and randomness. Next, Section 3 describes the sample set of reported cases for testing this hypothesis, while Section 4 presents the results of this study and refines the random litigation hypothesis for future work. Lastly Section 5 concludes by discussing the potential significance of these findings.

2. Random litigation hypothesis; competing definitions of chance

The author’s initial or working hypothesis is that litigation is a game of pure chance, that the outcome of a litigation game is just as random as a coin toss. In essence, the intuition behind this idea is that, most of the time, the process of adjudication, jury trials especially, is merely an expensive and glorified state-run lottery. Accordingly, this conjecture shall be referred to as the “random litigation hypothesis” in the remainder of this paper.

To test the random litigation hypothesis, the author selected and studied a random sample of reported cases decided in the lower federal courts (see Section 3 below). But before proceeding, it is necessary to pause for a moment in order to define such key terms as “chance” and “randomness.” What does it mean to say that the outcome of a litigation game is a random or chance event? Some scholars equate randomness with uncertainty; on this view, an event is random when its outcome is uncertain. The problem with this simple definition, however, is that the concept of uncertainty, in turn, raises a whole new set of difficult questions. What, after all, makes an outcome uncertain or random?

In summary, there are two major approaches for addressing the problem of uncertainty. One way of approaching this question is to ask a seasoned gambler what chance or uncertainty means. To determine whether the outcome of a particular game in the abstract is produced by chance, a gambler needs to know two things, the total number of possible outcomes of the game and the probability (p) of each outcome occurring, where p is, by

7 The author qualifies this hypothesis, i.e. he says “most of the time,” because sometimes a particular litigation game is not a fair one, as when one of the parties has bribed a juror or destroyed crucial evidence.
8 See infra, Sections 3 and 4.
9 See, e.g., Deborah J. Bennett, RANDOMNESS 152-173 (1998).
10 Such a person may not be too hard to find, considering the prevalence of all forms of gambling in the United States. See, e.g., John Scarne, SCARNE’S NEW COMPLETE GUIDE TO GAMBLING 1-13 (1974) (explaining why gambling is “America’s biggest industry”).
definition, between 0 and 1. If all the outcomes have the same probability of occurring, then one may conclude that the outcomes are produced by chance. In contrast, the closer the probability of a given outcome is to 1, the more likely (i.e., the more certain) that outcome is.\textsuperscript{11} By the same token, the closer \( p \) is to 0, the less likely it is to occur. This approach might be called the “classical” or casino definition of chance.

A different approach for determining the probability of an uncertain outcome is to determine its “relative frequency” over time, that is, the proportion or number of times the outcome occurs in the long run. For example, imagine an experiment consisting of a series of random trials, such as a series of coin tosses or roulette wheel spins, with \( n \) elementary outcomes, \( X_1, X_2, X_3, \ldots X_n \). If this experiment is repeated many times,\textsuperscript{12} one would expect the proportions of elementary outcomes will, in fact, be governed by their actual probabilities. This empirical approach toward probability thus enables one to find the numerical weight of the probability (\( p \)) of each outcome. This process of repetition may be referred to as the “relative frequency” definition of chance.

In this paper, the author will rely on the relative frequency approach to randomness. Although the hypothesis to be tested in this paper is that litigation is like a coin toss, in reality the actual probability of a given outcome in litigation is unknown, since the parties to a dispute do not know \textit{ex ante} how often plaintiffs win or how often motions for summary judgement are granted.\textsuperscript{13} Accordingly, Section 3 below describes the sample of reported cases used in this paper to infer the true relative frequencies of outcomes in federal litigation games.

3. Selection of random sample of reported cases

If the random litigation hypothesis is correct—that is, if litigation is like a coin toss—then \textit{in the long run}, one would expect moving parties (plaintiffs) to win half of the time and responding parties (defendants) to win the other half. To be more precise, one would expect both possible litigation outcomes to have the same probability, or stated formally:

\[ P(\text{plaintiff wins}) = P(\text{defendant wins}) = 0.5 \]

where \( P \) is the relative frequency or long-run probability or a particular outcome. Thus the task in this paper is to find how close the true relative frequency of the plaintiff’s (or defendant’s) probability of prevailing in any given litigation game is to 0.5.

\textsuperscript{11} Stated formally, the closer \( p \) is to 1, or \( p \approx 1 \).
\textsuperscript{12} That is, assume that \( X_n \) is a large number.
\textsuperscript{13} In a future paper, the author will compare and contrast these empirical observations (i.e., outcomes of real-world litigation games) with a hypothetical coin-toss model.
The author wishes to concede at the outset, however, that without the aid of a computer or a large staff of research assistants, it is unfeasible for him to manually tally or measure the outcomes of all litigation games in the United States. The size of this population is too large. For example, to get an idea of how large, consider just the population of “reported cases” in the lower federal courts or district courts of the United States, that is, the subpopulation of litigation games whose outcomes were published in the First Series and Second Series of the Federal Supplement (F.Supp. and F.Supp.2d). For simplicity, assume that each volume of the Federal Supplement contains a total of 250 reported cases on average, and next, multiply the number of reported cases by the total number of volumes of the Federal Supplement published up to the present time. The subpopulation of reported cases thus consists of approximately 500,000 litigation games. Furthermore, if one turns to the total number of formal “case filings” instead of just “reported cases,” one sees at once that the entire universe or meta-population of litigation games in the lower federal courts is vastly larger than the number reported cases in the Federal Supplement.

Since it was not possible to manually measure the outcomes of all litigation games in the United States, the author has selected instead a random sample of reported cases decided by the lower federal courts. By selecting a small set of \( n \) objects from a large population of similar objects (i.e., reported cases), one will be able compare the results produced by the present sample of reported cases with the results predicted by the random litigation hypothesis and in this way accomplish the purpose of this paper, which is to test or falsify the random-litigation hypothesis.

At the same time, the author is also mindful that the selection of an appropriate sample is the single-most important factor for obtaining dependable and accurate results. If the quality of the sample is flawed, skewed, or biased in some way, no amount of fancy mathematics can cure this fatal flaw. Thus, as a general rule, in order to obtain statistically

---

14 In other words, imagine a sample space consisting of or coterminous with the entire universe or population of decided cases in the United States.


16 As of December 2011, the West Publishing Company has published over 1600 volumes of the Federal Supplement. For a full listing of the number of volumes in the Federal Supplement, First Series (999 volumes), and the Federal Supplement, Second Series (over 600 volumes to date), see http://en.wikipedia.org/wiki/Federal_Supplement (last visited December 3, 2011).

17 According to Judge Richard Posner, for example, there were no less than 283,688 total case filings (civil and criminal) in the lower federal courts during the year 1995 alone. See Richard A. Posner, THE FEDERAL COURTS: CHALLENGE AND REFORM 393 (rev. ed. 1996).
dependable results, one must choose the items of the sample at random from the population as whole; that is, the procedure used for selecting a set of \( n \) objects from a large population of similar objects must guarantee that all possible samples of \( n \) objects are equally likely.\(^{18}\) The immediate task, then, is to select a random sample, or a relatively small and randomly chosen subset of the total population of reported cases.

Specifically, the sample of reported cases selected by the author consists of a single volume of the Federal Supplement, in particular, volume 287, corresponding to the year 1968, the year in which the author was born. In summary, the sample contains a total of 190 decided cases.\(^{19}\) (Table 1 in Appendix 1 contains a general overview of the sample.) Before proceeding any further, however, the author wishes to note a potential problem with the sample and explain how this difficulty might be cured. In addition, the author will also explain why this relatively small sample is large enough and representative enough to enable one to perform a preliminary test on the random litigation hypothesis and construct a general mathematical model for all litigation games.

The author recognizes at the outset a potential problem with the sample. For a sample to be considered random, every item in the entire population of reported cases must have an equal chance of being included in the sample, but all the reported cases in our sample were drawn from a single year (1968). One way of correcting this deficiency is by expanding the sample to include several volumes of the Federal Supplement from each decade since, say, 1938, the year the United States Supreme Court decided the landmark case of Erie v. Tompkins.\(^{20}\) As the reader can well imagine, however, even this modest expansion in the size of the sample of reported cases will be an extremely time-consuming task (without the aid or a computer program), one requiring meticulous record-keeping and attention to detail.\(^{21}\) Consequently, one must consider the results published in this paper to be tentative or preliminary until the proposed additional sampling is completed.

In addition, the author also intends to change the nature of the sample in a future study of the litigation game. Instead of selecting a particular volume

\(^{18}\) The members of a sample must be drawn or selected at random in order for the sample to be representative of the population as a whole. See, e.g., Vijay K. Rohatgi and A. K. Md. Ehsanes Saleh, AN INTRODUCTION TO PROBABILITY AND STATISTICS 14, 23 (2d ed. 2001).

\(^{19}\) Statistically speaking, one can evaluate the size of the sample with the following formula: one divided by the square root of \( n \), where \( n \) is the number of observations in one’s sample. In summary, the closer the quotient of one divided by the square root of \( n \) is to 1, the more reliable the sample. With respect to the sample in this paper, the quotient is 0.0725 (one divided by the square of 190).

\(^{20}\) Erie R. Co. v. Thompkins, 304 U.S. 64, 78 (1938) (holding that Article III does not empower federal courts to make substantive law in federal diversity cases).

\(^{21}\) At present, the author is requesting funding from the National Science Foundation to conduct this additional work.
or number of volumes of the Federal Supplement, the author will select all
the reported cases within a single federal circuit (such as the First Circuit,
for example) during a specific time period (say, from the year 2000 to the
present). After collecting this data, the author will arrange the reported
cases in strict chronological order and count the number of consecutive losses
(slumps) and consecutive wins (streaks) of party plaintiffs and defendants in
order to determine whether these slumps and streaks resemble the runs of
heads or tails one gets when tossing a fair coin. This alternate method
should also enable one to test or falsify the random litigation hypothesis.

Although it must be conceded that the sample of reported cases in this paper
is relatively small compared to the entire universe of litigation games, the
author nevertheless considers this sample to be sufficiently large and
representative for present purposes (i.e., testing the random litigation
hypothesis) because the sample contains a broad cross-section of decided
cases from the different federal district courts around the United States.
Moreover, this sample also contains a wide variety of cases by subject matter
(e.g., criminal cases, bankruptcy cases, diversity cases, etc.). In all, the
sample contains no less than 17 separate categories of reported cases
corresponding to the subject matter of the litigation, although criminal cases
and diversity cases make up almost one-half of the total number of reported
cases in our sample (see Table 1 in Appendix 1).

Lastly, Tables 1a and 1b in Appendix 1 show just how geographically
representative the sample is. For example, Table 1b lists the number of cases
decided by state or territory.22 Out of a total of 50 states and five territories,
our sample contains reported cases from 40 states and two territories.
Likewise, Table 1a lists the number of decided cases by federal circuit.23 The
D.C. Circuit contains the fewest number of reported cases (only three
reported cases), while the Second Circuit contains the largest number (43
reported cases). If one excludes these two extremes, one notices that the
remaining ten circuits account for over three-quarters of the reported cases in
the sample.

4. Analysis of reported cases

The author began this research project by counting and classifying the
reported cases in the sample space, that is, the cases included in volume 287
of the Federal Supplement. As noted in Section 3 above, there are a total of
190 reported cases (i.e., 190 litigation games or litigation outcomes) in this

22 In 1968, the United States had five territories or possessions. See generally Title 48 of the United States
Code (“Territories and Insular Positions”).
23 Each federal district court belongs to a particular region or geographical circuit. See generally Title 28 of
the United States Code (“Federal Court Organization”).
sample space. In addition, for organization purposes, the author subdivided the sample of reported cases into the following three subcategories of cases:

(1) litigation games in which the government or other public agency is a party (government cases);

(2) litigation games involving diversity jurisdiction, including reported cases involving motions for removal or remand (diversity cases); and

(3) all other litigation games, that is, all non-diversity, non-government-party cases (other cases).

In the remainder of this paper, the author presents and discusses his preliminary findings regarding each of the three categories of cases as follows:

4.1. Government Cases

During the process of counting the outcomes of the reported cases in the sample space (i.e., volume 287 of the Federal Supplement), the author was immediately impressed by the government's success rate in all cases--criminal or civil--in which the government was a party, regardless of the subject matter of the case or the burden of proof involved. As a result, the author decided to group together, into a single catch-all category, all the cases in which the government was a party. This catch-all category of “government cases” includes not only (i) all federal criminal cases, including habeas corpus petitions, but also (ii) tax and customs cases, (iii) administrative law cases, and (iv) political cases (i.e., cases in which a party challenges the constitutionality of a law or an executive action).

In all, there are 109 government cases out of 190 decided cases in the sample. Out of these 109 government cases, the government won 92 of them at the pre-trial or trial stage, an astonishing 84% overall success rate. That the government wins more than four out of every five cases in which it is a party is remarkable. This result, though preliminary, is so vivid and lopsided that it gave the author pause and has made him question the validity of the random litigation hypothesis and question the fairness of the litigation game.

---

24 A global summary of the raw data in the sample used in this paper is set forth in Table 1 (Appendix 1).
25 See Table 2 (Appendix 2). Notice that the subcategory of “government cases” constitutes the largest chunk of the lower federal courts’ workload of reported cases (or almost 60% of the total number of reported cases in the sample used in this paper).
26 A summary of the reported cases in this category of government cases is set forth in Table 2a (Appendix 2).
27 The second column in Table 2a indicates the number of cases won by the government in each type of case (e.g., criminal, tax, customs, etc.).
Far from being uncertain or random, the process of litigation appears to be a one-sided game when the government is a player.\textsuperscript{28} The lack of an even playing field in government cases is probably due to a wide variety of factors, but this conclusion itself is not altered whatever its cause or causes are (e.g., selection bias, favoritism, etc.).

Accordingly, the author was forced at an early stage in his research to revise the random litigation hypothesis, at least with respect to the category of government cases. The refined hypothesis is that the outcome of a litigation game in which the government is a party is far from random. The government party will win, either at the pre-trial or trial stage, most of the time. The refined hypothesis, if true, should give pause to any attorney or law firm involved in litigation against a government party. Unless the expected value of the case is large enough to counterbalance the odds of losing, litigation against the government is a losing proposition.

4.2. Diversity Cases

As we have seen up to now, if the litigation game is indeed a crapshoot, the dice are apparently loaded in favor of the government. Nevertheless, the initial review of the non-government cases in the sample of reported cases seems to paint an entirely different picture, one in conformity with the random litigation hypothesis. For instance, as the author was tallying up the results of the 32 reported diversity cases within the second subsample of cases, he was astonished to see an almost overall 50-50 split in the outcomes of the various litigation games in this category of cases.

In the interest of precision, the author subdivided the litigation outcomes in diversity cases into the following three separate categories: (i) outcomes during the pre-trial stage (e.g., motions to dismiss, motions for summary judgements, motions for removal, motions to remand, etc.), (ii) outcomes during the trial stage (bench trials), and (iii) outcomes during the post-trial stage (e.g., motions for judgement n.o.v.).\textsuperscript{29}

Stated formally, where $n$ indicates the temporal stage of any given litigation game and $x$ the actual outcome of the game at each stage, these variables were subdivided into several subcategories. First, the $n$ variable was subdivided into three categories: $n_a$ being the number of decided cases involving pre-trial motions; $n_b$ the number of decided cases decided on the merits; and $n_c$ the number of decided cases involving post-trial motions. The

\textsuperscript{28} Or stated less formally, but more memorably, in the words of one of my former students, Fred Torres: “the house always wins.”

\textsuperscript{29} A summary of the litigation outcomes in the category of diversity cases is set forth in Table 2b (Appendix 2).
author then refined the $x$ variable in a similar manner: $x_a$ being the number of times the plaintiff won during the pre-trial stage; $x_b$ the number of times the plaintiff won when his case was decided on the merits; and $x_c$ the number of times the plaintiff won during the post-trial stage.

This analysis of diversity cases reveals a remarkable pattern: the plaintiff party won exactly half (four out of eight) of the litigation games that were decided on the merits as well as half of all reported pre-trial motions (excluding removal and remand motions). Of course, these findings are only preliminary because of the relatively small size of this subsample of diversity cases. In a future study, the author intends to collect and assemble a larger number of randomly-selected diversity cases, chosen from a larger number of volumes of the Federal Supplement, to better test or falsify the initial random litigation hypothesis (at least with respect to diversity cases).

Before proceeding, it is also worth asking whether the proportion of diversity cases in this sample reflects the actual proportion of all diversity cases in relation to the entire universe of reported cases. In the diversity sample, for example, diversity cases constitute almost 17% of the entire sample of reported cases. Does this value (17%) represent the true proportion of diversity cases in the lower federal courts? In reality, the true figure may be somewhat higher. For instance, according to Judge Richard Posner, there were a total of 79,200 case filings in the lower federal courts in 1960. Out of this number of case filings, only 17,048 were diversity case filings, or 21.5% of all case filings in the lower federal courts during 1960. Note that a “case filing” is not the same thing as a reported case (i.e., a case that generates a published opinion). Nevertheless, the preliminary results in this paper regarding the randomness of diversity cases appears to be intriguing and to merit further empirical work.

4.3. Other Cases

In addition to government cases and diversity cases, the sample of reported cases consisted of various types of private litigation games, such as admiralty cases, bankruptcy cases, intellectual property cases, etc. The author thus decided to classify and group together all these remaining reported cases into a single, catch-all category of “other cases” (i.e., non-government, non-diversity cases) to simplify the analysis of litigation games. By taking this step, the author soon found another remarkable pattern. In summary, the author noticed that, overall, defendants have a better chance of winning the

30 In other words, 32 out of 190 reported cases.
31 See Posner, supra note 17, at 57.
32 A summary of the reported cases in this third catch-all category of “other cases” is set forth in Table 2c (Appendix 2).
litigation game during the pre-trial stage (where the defendants won 17 out of 23 pre-trial motions in our subsample of other cases), but that plaintiffs have a higher than 50-50 chance of winning on the merits (16 out of 28, or about 57%) when they are able to survive the pre-trial stage.\textsuperscript{33}

For purposes of classifying a particular reported case as being within the pre-trial stage or the trial stage, the author considered those reported cases involving equitable relief (such as petitions for injunctions or preliminary injunctions, temporary restraining orders, declaratory judgements, etc.) as litigation games decided on the merits, that is, as litigation outcomes decided at the trial stage. In other words, the author did not make a distinction between law and equity. Also, as with the subsample of diversity cases,\textsuperscript{34} these findings with respect to this remaining category of cases (non-government, non-diversity cases) are preliminary until the number of cases in the sample is expanded. Nevertheless, these preliminary results are still useful in that they can serve as a benchmark for comparison later.\textsuperscript{35}

5. Conclusion

Towards the end of his landmark paper, \textit{The Problem of Social Cost}, Ronald Coase chided his fellow economists for basing their assumptions on “some kind of ideal world” and exhorted them to follow his lead by “start[ing] our analysis with a situation approximating that which actually exists.”\textsuperscript{36} Lawyers, judges, and law professors too are by no means immune from Professor Coase’s stinging rebuke. It seems that most legal professionals, including academics and judges, view the development of law as an incremental or cumulative process, similar to Thomas Kuhn’s description of the traditional view of scientific knowledge as “development-by-accumulation.”\textsuperscript{37} But how can this be the case if the process that produces the raw materials of legal knowledge in the Anglo-American legal system (precedents and \textit{stare decisis}) is itself governed by chance or is heavily stacked in favor of government parties? Accordingly, the author hopes that the application of probability theory to law will encourage other scholars to not only extend the modest results presented in this paper, but also begin thinking about the possibility of replacing the current model of litigation, which is terribly protracted and costly, with a more faster and cheaper way of playing the litigation game and resolving disputes.

\textsuperscript{33} These results are summarized in Table 2d.
\textsuperscript{34} See \textit{supra}, Section 4.2.
\textsuperscript{35} What about “other cases” decided at the post-trial stage? Unfortunately, the subsample of post-trial “other cases” was too small to make even a preliminary guess regarding the level of randomness at this stage of the litigation game, although one might suspect that judges are unlikely to overturn the outcome of a jury trial, let alone a bench trial, in the interest of finality.
\textsuperscript{36} Coase, \textit{supra} note 6, at 43.
\textsuperscript{37} See Thomas S. Kuhn, \textsc{The Structure of Scientific Revolutions} 2 (3d ed. 1996).