Litigation as a Tournament

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May 29, 2014

Abstract

This paper analyzes civil litigation between a plaintiff and a defendant who exert costly effort in a tournament game. In the unique Nash equilibrium the litigant with the stronger case is more likely to win, but there is distortion in the sense that the equilibrium probability of success is closer to 0.5 than the prior is. A cost-shifting rule determines the proportion of the winner’s costs recoverable from the loser. An increase in the proportion of recoverable costs reduces distortion to the inherent strength of the case, but it also reduces the total welfare of the litigants because it increases litigation costs. In a modified litigation game with judicial management, a judge chooses the optimal cost-shifting rule to minimize both private costs spent on litigation and distortion to inherent strength of the case. In the unique subgame perfect equilibrium, the judge’s choice of optimal proportion of recoverable costs increases with the relative weight which she assigns to distortion and with the weight given to the inherent strength of the case. Litigation is less likely to take place as the relative weight which the judge assigns to distortion increases.

Keywords: Tournament Theory, Litigation Process, Legal Dispute.

JEL Classification: C72, C79, K41.

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*We acknowledge the comments given by Ted Bergstrom, Richard Cornes, Simona Fabrizi, Tim Kam, Steffen Lippert, Maria Racionero, Martin Richardson, James Taylor and seminar participants at the 32nd Australasian Economic Theory Workshop at the Australian National University. All mistakes are our own.

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1 Introduction

A typical civil lawsuit involves two opposing parties: a plaintiff who seeks vindication of legal rights or reliefs from the judicial system at the expense of a defendant. Participation in litigation is costly for all parties involved. Such costs include paying for lawyers, conducting discovery of evidence, research the law, preparing and making submissions, and other costly activities taken to maximize the litigant’s own chance of success. The amount of costs involved in running a lawsuit is a major concern to litigants and the society at large. A plaintiff who has a strong case under the law may not seek redress from the judicial system if doing so would be too expensive. A recent survey shows that about half of US or UK companies respondents spent more than USD $1 million per year on litigation.\(^1\) In Australia, discovery of evidence costs more than USD $2 million for any significant commercial dispute.\(^2\) The protection of rights and enforcement of obligations under substantive laws, such as property law, contracts and torts, are dependent on the ability of the judicial system to operate fairly and efficiently. Understanding the economics of civil litigation is therefore fundamental to the functioning of a society governed by the rule of law.

The rule which governs the allocation of costs spent on litigation affects the strategic interaction between litigants and the types of cases which would proceed to court. This “cost-shifting rule” would also affect whether the final outcome of a case accurately reflects its inherent strength. On one end of the cost-shifting spectrum is the default cost-shifting rule in American jurisdictions under which litigants bear their own costs. On the other end is the traditional English rule which requires that the loser pay the winner’s costs. Most jurisdictions operate somewhere in between (Reimann [18]). Analysing cost-shifting rules with tournament games is the objective of this paper.

The first model has a plaintiff and a defendant who exert costly effort to maximize their own payoff. A novel feature is the characterization of the applicable cost-shifting rule by an exogenous parameter which determines the proportion of the winner’s costs recoverable from the loser. Characterizing the applicable cost-shifting rule as a fixed proportion of recoverable costs captures those cost-shifting rules which make recoverable either all or none of the winner’s costs and those which operate somewhere in between. A contest success function determines the plaintiff’s probability of winning. It takes the form of a weighted average of an exogenous

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\(^2\)See, for instance, the speech of the Hon J J Spigelman AC, former Chief Justice of New South Wales, at Opening of Law Term Dinner, Sydney, 31 January 2011.
prior, which represents the inherent strength of the plaintiff’s case, and her share of the total level of effort.

The two-player litigation model has a unique Nash equilibrium. In equilibrium, the plaintiff’s payoff is increasing with the proportion of recoverable costs if and only if both the proportion and the prior are sufficiently large. The defendant’s payoff is increasing with the proportion of recoverable costs if and only if the proportion is sufficiently large and the prior is sufficiently small. Intuitively, a litigant whose case is weak suffers from a generous cost-shifting rule because both her chance of losing and associated liability for the winner’s costs are high.

Define welfare as the sum of the litigants’ payoffs. In equilibrium, welfare is decreasing with the proportion of recoverable costs and increasing with the weight given to the prior in the contest success function. The intuition is that litigants collectively spend more on litigation as the cost-shifting rule becomes more generous. The party with the relatively stronger prior will also make more effort.

Define distortion to be the impact of the litigants’ effort on the difference between the prior and the equilibrium probability of success for the plaintiff. Distortion captures the phenomena that litigants exert effort not to improve the accuracy of deciding a case according to its inherent strength but to maximize their own payoffs. Distortion is decreasing with the weight given to the prior and with the proportion of recoverable costs. A cost-shifting rule which allows for full (respectively, no) recovery of the winner’s costs minimizes (maximizes) distortion. A cost-shifting rule reduces distortion if and only if it reduces welfare.

Intuitively, an increase in the proportion of recoverable costs raises the stakes of litigation because it widens the difference in monetary outcome between winning and losing. The loser has to pay more of the winner’s costs as the proportion of recoverable costs increases. Unless a party has very poor prospects, her equilibrium effort is increasing with the proportion of recoverable costs given the marginal cost of exerting effort is constant. However, an increase in equilibrium effort reduces welfare because the judgment sum remains the same. This is a typical situation in tournaments: if all players make more effort while the prize remains constant, then the players are collectively worse off.

As a variation of the two-player model, Section 5 introduces a third player, the judge, to choose the applicable cost-shifting rule endogenously. Here the judge choose the cost-shifting rule after litigation commences, but before litigants choose their effort levels. The varied model captures the recent development in Australian and English jurisdictions where the traditional cost-shifting rule which allows for full recovery of costs is abandoned in favor of empowering the judge to modify court rules so as to facilitate fair and efficient resolution of lawsuits. The
judge balances the competing goals of minimizing distortion and minimizing expenditure on litigation. This game has a unique subgame perfect equilibrium. In equilibrium, the optimal proportion of recoverable costs, as chosen by the judge, is increasing with the relative weight which she assigns to distortion and with the weight given to the prior. However, the equilibrium cost-shifting rule never allows for full recovery. A policy implication is that jurisdictions which continue to provide for full recovery should reduce the proportion of recoverable costs to the optimal.

Section 6 explores which cost-shifting rules can deter cases from proceeding to litigation. Relatively low exogenous priors may characterize cases with low inherent merits or may capture prejudice. A cost-shifting rule which allows for full recovery of the winner’s costs deters more weak cases than a cost-shifting rule which allows for no recovery does. Where the optimal cost-shifting rule found in Section 5 is applicable, litigation is less likely to take place as the relative weight which the judge assigns to distortion increases.

Existing economic literature have only analyzed the advantages and disadvantages of cost-shifting rules which take the extreme forms. Braeutigam et al [4] first undertook an economic analysis of cost-shifting rules in litigation. In a model with the defendant having private information about the strength of the plaintiff’s case, Bebchuk [2] showed that the likelihood of settlement is greatest under the American rule and lowest under the English rule. Bebchuk and Chang [3] established that when plaintiffs cannot accurately predict the outcome of litigation: (i) neither the American rule nor the English rule would induce optimal decisions to sue; (ii) a rule that based on the identify of the winner and the court’s perception of the strength of the case can induce plaintiffs to sue if and only if they believe their cases are sufficiently strong. Gürler and Kräkel [13] considered a principal-agent model and found that the threat of litigation may induce first-best efforts and the settlement solution in general does not depend on whether the applicable cost-shifting rule is the American rule or the English rule. Katz [15] exposed microeconomic foundations for analyzing civil litigation with the rent-seeking model in which a Tullock contest success function with litigants’ respective expenses as variables would determine the outcome of the case. Farmer and Pecorino [10] adopted a similar Tullock contest model to analyze and compare English and American cost-shifting rules, where the former shift all costs whereas the latter shifts none. They found the relative merits of those rules to be dependent on the parameter describing the merits of the case. Carbonara and Parisi [5] undertook a similar comparative study by refining the English rule to shift a limited amount of the winner’s costs to the loser. Compared to the American rule, they found that the limited form of the English rule had the advantages of reducing overall litigation costs and promoting
the litigation of those cases which would establish clarity and certainty in the law. Under the
assumption that litigants were to bear their own costs, Parisi [16] applied the Tullock contest
model to expose the impact of judicial involvement in the fact-finding process on litigation ex-
model to show that being asset-constrained was advantageous to defendants in litigation, also
under the assumption that litigants were to bear their own costs.

The above English-American dichotomy in cost-shifting is over-simplistic from the perspec-
tive of comparative and historical legal scholarship. Cost-shifting in civil litigation should be
described as a broad spectrum with most jurisdictions spreading across it (Reimann [18], 9-10).
Historically, the English rule should be described as shifting to the loser the winner’s costs
which were absolutely necessary to conducting litigation; such costs would not necessarily rep-
resent all costs incurred by the winner. A detailed procedure conducted by a court officer would
determine what costs were necessarily to conducting litigation in each case.³ The cost-shifting
rules applied by the English courts in the time of the American Revolution were influential in
the thinking of colonial American courts. Most courts in early colonial America had initially
allowed the recovery of costs, but statutes had imposed caps on amounts recoverable. Explan-
nations for American courts’ eventual departure from the English position include: (i) failure
to increase statutory caps on amounts recoverable to keep pace with inflation; (ii) distrust and
hostility towards lawyers in early America; or (iii) a more philosophical argument in favor of
individualism and fair play. The general rule in American jurisdiction that litigants bear own
costs is subject to exceptions including bad faith proceedings which are considered unwarranted,
baseless or vexatious, and contempt proceedings which the winner invokes to enforce a judg-
ment against the loser.⁴ Federal and state statutes have provided for shifting of attorney’s fees
in a broad range of cases such as those involving a public interest element (Vargo [21], 1588).
Subject to exceptions, the Federal Rules of Civil Procedure provide for shifting of costs other
than attorney’s fees (Fed R Civ P 54d). There is also legislative proposal to allow recovery of
costs including attorney’s fees in patent litigation (Rader et al [17]).

Furthermore, the role of judges in civil litigation may be influential. In Australian and
English courts, judges now have discretion to modify the applicable cost-shifting rules. Although
Australian courts generally allow for full recovery, judges have discretion to depart from the
usual practice. This “case management model” of civil litigation gives judges discretion to

³See, for instance, Kaplan et al [14], 39; Vargo [21], 1606; Goodhart [12], 854-6; the German system also
shifts the costs necessarily incurred in conducting litigation: Kaplan et al [14], 136-137.
a historical analysis of cost-shifting in English courts.
frame cost allocation rules, and regulate the conduct of proceedings generally, in order to facilitate efficient and just disposal of proceedings.\textsuperscript{5} A recent development in English courts is the requirement that litigants in large claims prepare detailed costs budgets to be approved or modified by the judge. This procedure allows judges to limit recoverable costs to the budgets approved.\textsuperscript{6} In civil law jurisdictions such as France and Italy, judges by their own motion may order enquiries to search for evidence (Kaplan et al [14], 63-4). Parisi [16] studied judicial involvement in the fact-finding process. Judicial control of private spending on litigation is unexplored in economic literature.

Tournament theory has been applied to analyze rent-seeking activities taken by litigants in a lawsuit. Tullock [20] laid foundation in the formulation of the “contest success function” under which a contestant’s probability of success is given by the ratio of her own effort to the aggregate effort of all contestants. Cornes and Hartley refined the Tullock contest model to incorporate loss aversion, risk aversion, general technologies, and asymmetries therein (Cornes and Hartley [7], [8] and [9]). They studied and developed the “share correspondence” by which multi-dimensional mapping of best replies, which naturally characterizes Nash equilibria, may be reduced to unidimensional. Existing literature which analyze civil litigation with the Tullock model have not explored the power of the “share correspondence” approach.

This paper is important on the following grounds. First, it makes explicit and quantifies all strategic aspects of civil litigation. Secondly, it provides an economic analysis of all cost-shifting rules, exogenous or endogenous, including those applied in the vast majority of jurisdictions in which the applicable cost-shifting rule does not take the extreme form of making either all or none of the costs recoverable. Thirdly, the models establish the existence of a direct trade-off between welfare and distortion. A policy implication is that the only way to maximize welfare and minimize distortion simultaneously is to give less weight to the litigants’ effort in determining the outcome of the case. Only changing the cost-shifting rule is not enough. Fourthly, the varied model in Section 5 predicts that introducing judicial discretion optimizes the applicable cost-shifting rule; that optimal rule never allows for full recovery of costs but may require no recovery. Furthermore, we prove that letting the judge choose the applicable cost-shifting rule before the plaintiff commits to proceeding on with the case results in maximum deterrence of lawsuits.

\textsuperscript{5}For example, the court rules in New South Wales Civil Procedure Act 2005 (NSW) s 56; English judges also have this broad discretion to determine procedural rules so as to dispose cases justly and efficiently: Civil Procedure Rules 1998 (UK) SI 1998/3132, Part 1.

Section 2 constructs a two-player Litigation Game, finds and analyzes the unique Nash equilibrium thereof. Section 3 applies the Litigation Game to calculate welfare of the litigants and their spending on litigation. Section 4 identifies distortion to inherent strength of cases caused by cost-shifting rules. Section 5 builds a three-player Judicial Management Game, proves the unique subgame perfect equilibrium therein and finds the optimal cost-shifting rule. Section 6 varies the Judicial Management Game to discover which cost-shifting rules deter cases from proceeding to litigation. Section 7 concludes. Appendix A contains all proofs.

2 Litigation Game

2.1 Setup

The Litigation Game is a simultaneous-move game of complete information characterized by two players named Plaintiff and Defendant, their common set of actions \( \mathbb{R}_+ \), and Plaintiff and Defendant’s respective payoff functions \( u_P, u_D : \mathbb{R}_+^2 \rightarrow \mathbb{R} \). All exogenous parameters and the players’ payoff functions are common knowledge. Each player’s payoff captures her expected monetary outcome in litigation; the implicit assumption is that the players are risk neutral.\(^7\)

Section 5 analyzes a variation of the model which includes a third player, Judge. Plaintiff and Defendant respectively exert \( e_P, e_D \geq 0 \) levels of effort at the constant marginal cost of 1. “Effort” means conducting discovery, researching the law, making lawyerly arguments, and all other costly activities to run a lawsuit. Given a pair \((e_P, e_D)\), the judicial process determines whether, under the law, a judgment sum normalized to 1 should be transferred from Defendant to Plaintiff. This transfer takes place with probability given by the weighted Tullock contest success function \( \theta : \mathbb{R}_+^2 \rightarrow [0, 1] \):

\[
\theta = \begin{cases} 
0, & \text{if } e_P = 0; \\
\eta \mu + (1 - \eta) \frac{e_P}{e_P + e_D}, & \text{otherwise},
\end{cases}
\]

where \( 0 < \mu, \eta < 1 \) are exogenous parameters.

The variable \( \mu \) represents the prior probability that Plaintiff is to succeed. In other words, \( \mu \) characterizes the inherent strength of Plaintiff’s case. The common stock of knowledge about the case within the community and the legal profession determines the prior. The effort of litigants do not affect the prior. The variable \( \eta \) represents the weight given by the judicial system to the prior. The judicial process gives the complementary weight \( 1 - \eta \) to Plaintiff’s relative effort.

\(^7\)For simplicity, by assumption, there are no agency costs and each player represents the stakeholder together with her lawyer or legal team. A extension of the Litigation Game, which is beyond the scope of this paper, may model the principal-agent relations between each litigant and her lawyers.
Remark 1. In the real world, there are institutional factors in the judicial process over which the litigants have no control but nonetheless affect the outcome of the case. The exogenous prior and exogenous weight assigned to it represent those institutional factors. The prior captures the phenomena that to decide a case a judge may rely on her own personal and professional experience, which the litigants have no control whatsoever. The judge may also have a particular view of the law which the litigants must take as given; this view may be biased against the plaintiff, or the defendant. However, the judge by seeing the evidence offered by the litigants and hearing their arguments must attribute some weight to their effort. She cannot assign no weight to the litigants’ effort because in an adversarial system of civil litigation, which this paper assumes, greater constitutional and moral principles mandate that litigants be given an opportunity to present their case and have their arguments heard. The judge also has to give adequate reasons.\(^8\) The respective weights given to the prior and the effort of the litigants are exogenous to capture the idea that these weights depend on factors beyond their control.

Assuming there is no risk of default, a parameter \(0 \leq \lambda \leq 1\) characterizes the applicable cost-shifting rule. This exogenous variable represents the proportion of the winner’s costs recoverable from the loser. Important instances of all cost-shifting rules are the extremes. The full recovery rule, \(\lambda = 1\), allows for full recovery of the winner’s costs from the loser. The no recovery rule, \(\lambda = 0\), allows for no recovery of the winner’s costs from the loser. The full recovery rule represents the default cost-shifting rule in Australian, English and German jurisdictions. American jurisdictions typically apply the no recovery rule (Cheek [6] and Vargo [21]).

Plaintiff and Defendant, respectively, have payoff functions \(u_P, u_D : \mathbb{R}_+^2 \to \mathbb{R}\) given by:

\[
\begin{align*}
    u_P &= \theta(1 - (1 - \lambda)e_P) - (1 - \theta)(e_P + \lambda e_D); \\
    u_D &= -\theta(1 + e_D + \lambda e_P) - (1 - \theta)(1 - \lambda)e_D.
\end{align*}
\]

Plaintiff’s payoff \(u_P\) is the weighted average of her monetary outcome in the event that she wins, \(1 - (1 - \lambda)e_P\), and her monetary outcome in the event that she loses, \(-(e_P + \lambda e_D)\). Weights \(\theta\) and \(1 - \theta\) are Plaintiff’s probabilities of winning and losing respectively.

\(^8\)An early constitutional protection of procedural fairness principles was clause 39 of the Magna Carta 1215; modern constitutional protections include the Fifth Amendment and section 1 of the Fourteenth Amendment to the United States Constitution, and articles 6 and 45 of the European Convention on Human Rights and Fundamental Freedoms; protection also comes from the common law: see the cases of Ridge v Baldwin [1964] AC 40 (House of Lords), Kioa v West (1985) 159 CLR 550 (High Court of Australia) and Pettitt v Dunkley (1971) 1 NSWLR 376 (New South Wales Court of Appeal).
Defendant’s payoff $u_D$ is the weighted average of her monetary outcome in the event that she loses, $-(1 + e_D + \lambda e_P)$, and her monetary outcome in the event that she wins, $-(1 - \lambda)e_D$. Weights $\theta$ and $1 - \theta$ are respectively her probabilities of losing and winning.

2.2 Equilibrium

The solution concept is Nash equilibrium. Denote the equilibrium value of each variable by adding a star superscript; for instance, equilibrium levels of effort are $e_P^*$ and $e_D^*$, while equilibrium payoffs are $u_P^*$ and $u_D^*$. Define the bottom-line prior $\underline{\mu}$ by:

$$\underline{\mu} = \left( \frac{1 - \eta}{\eta} \right) \left[ \frac{-(2 - \eta)\lambda^2 + 3\lambda - 1}{(2 - \eta)\lambda^2 - (5 - \eta)\lambda + 4} \right]. \quad (4)$$

The next result characterizes the Nash equilibrium of the Litigation Game and proves that Plaintiff’s equilibrium payoff is positive if and only if the prior $\mu > \underline{\mu}$. Appendix A contains all proofs.

**Proposition 1.** Fix a prior $0 < \mu < 1$, a weight $0 < \eta < 1$ given to the prior, and a cost-shifting rule which allows for $0 \leq \lambda \leq 1$ proportion of recoverable costs. The Litigation Game has a unique Nash equilibrium $(e_P^*, e_D^*)$ which is given by:

$$e_P^* = \frac{(1 - \eta)(1 - \lambda + \lambda\eta\mu)}{(2 - \lambda(2 - \eta))^2}; \quad (5)$$

$$e_D^* = \frac{(1 - \eta)(1 - \lambda + \lambda\eta(1 - \mu))}{(2 - \lambda(2 - \eta))^2}. \quad (6)$$

In equilibrium, Plaintiff wins with probability:

$$\theta^* = \mu + \frac{(1 - \lambda)(1 - \eta)(1 - 2\mu)}{2 - \lambda(2 - \eta)}. \quad (7)$$

Defendant’s payoff in equilibrium, denoted $u_D^*$, is always negative, $u_D^* < 0$. Plaintiff’s payoff in equilibrium is positive, zero or negative according to:

$$u_P^* > 0 \iff \mu > \underline{\mu};$$

$$u_P^* = 0 \iff \mu = \underline{\mu};$$

$$u_P^* < 0 \iff \mu < \underline{\mu}.$$
values of \( \lambda \) and \( \eta \). The proportion of recoverable cost is sufficiently small if and only if \( u_p^* > 0 \), for all \( \mu > 0 \). More precisely:

\[
\mu < 0 \iff u_p^* > 0, \text{ for all } \mu > 0 \iff \lambda < \frac{3 - \sqrt{1 + 4\eta}}{4 - 2\eta} \iff \eta < \frac{(1 - \lambda)(1 - 2\lambda)}{\lambda^2}.
\]

In particular, \( \mu > 0 \) implies \( \lambda < 0.5 \).

For every applicable cost-shifting rule, including where it allows for full recovery, Proposition 1 proves the existence and uniqueness of a Nash equilibrium of the Litigation Game. Due to differences in formulation of the contest success function, Proposition 1 differs from a finding in previous literature that a Nash equilibrium does not exist under full recovery (Carbonara and Parisi [5], 8).

A case characterized by the prior \( \underline{\mu} \) is bottom-line because it gives Plaintiff an equilibrium payoff of zero. Any other claim characterized by another prior \( \mu \) gives her a positive payoff if and only if that prior is greater than the bottom-line prior (\( \mu > \underline{\mu} \)). From now on, we assume litigation takes place. That is, Plaintiff’s case has a prior which is greater than the bottom-line prior; \( \mu > \underline{\mu} \).

Equations (5) and (6) reveal that the equilibrium effort of Plaintiff is greater than that of Defendant (\( e_p^* > e_D^* \)) if and only if Plaintiff’s case is relatively strong; more precisely, her prior \( \mu > 0.5 \). This conclusion does not depend on the cost shifting rule (\( \lambda \)) or the weights (\( \eta \) and \( 1 - \eta \)) given to the prior and to the relative effort of Plaintiff. This is a desirable feature of the judicial system; it attracts more effort from the party with the stronger prior.

### 2.3 Comparative Statics

The next result analyzes how equilibrium levels of effort change with parameters.

**Proposition 2.** Consider the Nash equilibrium of the Litigation Game. Ceteris paribus:

1. An increase in the prior in favor of Plaintiff induces more effort from Plaintiff, and less effort from Defendant. Formally:
   \[
   \frac{\partial e_P^*}{\partial \mu} > 0, \quad \frac{\partial e_D^*}{\partial \mu} < 0.
   \]

2.1 If \( \mu \geq (4 - \eta)^{-1} \), then the equilibrium effort of Plaintiff is always an increasing function of the proportion \( \lambda \) of recoverable costs on the entire domain \( \lambda \in [0, 1] \); that is, \( \partial e_P^*/\partial \lambda > 0 \).

2.2 If \( \mu < (4 - \eta)^{-1} \), then the equilibrium effort of Plaintiff increases first, and then decreases with the proportion \( \lambda \) of recoverable costs. The maximum level of effort for Plaintiff...
occurs at $\lambda = \lambda^*_P < 1$, where:

$$\lambda^*_P = \frac{2(1 - \eta + \eta \mu)}{(2 - \eta)(1 - \eta \mu)}.$$  

(3.1) If $\mu \leq (3 - \eta)/(4 - \eta)$, then the equilibrium effort of Defendant is always an increasing function of the proportion $\lambda$ of recoverable costs on the entire domain $\lambda \in [0, 1]$; that is, \(\partial e^*_D/\partial \lambda > 0\).

(3.2) If $\mu > (3 - \eta)/(4 - \eta)$, then the equilibrium effort of Defendant increases first, and then decreases with the proportion $\lambda$ of recoverable costs. The maximum level of effort for Defendant occurs at $\lambda = \lambda^*_D < 1$, where:

$$\lambda^*_D = \frac{2(1 - \eta \mu)}{(2 - \eta)(1 - \eta + \eta \mu)}.$$  

(4) An increase in the weight assigned to the prior induces less effort from both Plaintiff and Defendant. Formally:

$$\frac{\partial e^*_P}{\partial \eta} < 0, \quad \frac{\partial e^*_D}{\partial \eta} < 0.$$  

Part (1) of Proposition 2 establishes that Plaintiff makes more effort and Defendant makes less effort if the prior becomes more favorable to Plaintiff. Part (2) proves that Plaintiff makes more effort as the proportion of recoverable costs increases, unless the case has very poor prospects for Plaintiff, in the sense that the prior $\mu$ is sufficiently small, the weight of the prior $\eta$ is sufficiently large and the proportion of recoverable costs is sufficiently high. Part (3) states that Defendant makes more effort as the proportion of recoverable costs increases, unless the case has very poor prospects for the Defendant, in the sense that the prior $\mu$ is sufficiently large, the weight given to the prior $\eta$ is sufficiently large and the proportion of recoverable costs is sufficiently high.

Figure 1 depicts the equilibrium effort levels of the players as functions of the proportion of recoverable costs given the prior $\mu = 0.2$ and its weight $\eta = 0.4$.

Intuitively, an increase in the proportion of recoverable costs raises the stakes of litigation because it widens the difference in monetary outcome between winning and losing; that is, the judgment sum remains the same but the loser has to pay more of the winner’s costs as the proportion of recoverable costs increases. It is not surprising that parts (2) and (3) of Proposition 2 prove unless a party has very poor prospects, her equilibrium effect is increasing with the proportion of recoverable costs given the marginal cost of exerting effort is constant. However, as Section 3 will elaborate, an increase in equilibrium effort reduces the collective welfare of the litigants.

Part (4) of Proposition 2 proves that both Plaintiff and Defendant make less effort if the weight assigned to the prior increases. According to equation (1) this is not surprising because,
as the weight $\eta$ of the prior increases, the relative effort of each party becomes relatively less influential to determining the posterior probabilities of success.

Let the variables $\tilde{\lambda}_P, \tilde{\lambda}_D$ be:

$$\tilde{\lambda}_P = \frac{2(1 + \eta - 3\mu\eta)}{(2 - \eta)(1 - \mu\eta)}; \quad \tilde{\lambda}_D = \frac{2(1 - 2\eta + 3\mu\eta)}{(2 - \eta)(1 - \eta + \mu\eta)}.$$

The next result considers the effect of the prior and the cost-shifting rule on equilibrium payoffs.

**Proposition 3.** Consider the Nash equilibrium of the Litigation Game. Ceteris paribus:

1. The payoff of Plaintiff is an increasing function of the prior. Mathematically:
   $$\frac{\partial u^*_P}{\partial \mu} > 0.$$

2. The payoff of Defendant is a decreasing function of the prior. Mathematically:
   $$\frac{\partial u^*_D}{\partial \mu} < 0.$$

3. The payoff of Plaintiff is an increasing function of the proportion of recoverable costs if and only if the proportion $\lambda$ is sufficiently large; more precisely, $\lambda > \tilde{\lambda}_P$:
   $$\frac{\partial u^*_P}{\partial \lambda} > 0 \iff \lambda > \tilde{\lambda}_P.$$
Moreover, for all values of the parameters, the variable $\tilde{\lambda}_P$ is always a decreasing function of the prior $\mu$:

$$\frac{\partial \tilde{\lambda}_P}{\partial \mu} < 0.$$  

Plaintiff’s payoff is increasing with the proportion of recoverable costs if and only if both $\lambda$ and $\mu$ are sufficiently large.

(4) The payoff of Defendant is an increasing function of the proportion of recoverable costs if and only if the proportion $\lambda$ is sufficiently large:

$$\frac{\partial u^*_D}{\partial \lambda} < 0 \iff \lambda > \bar{\lambda}_D.$$  

Moreover, for all values of the parameters, the variable $\tilde{\lambda}_D$ is always a increasing function of the prior $\mu$:

$$\frac{\partial \tilde{\lambda}_D}{\partial \mu} > 0.$$  

Defendant’s payoff is increasing with the proportion of recoverable costs if and only if $\lambda$ is sufficiently large and $\mu$ is sufficiently small.

Figure 2 depicts the respective equilibrium payoff levels of the players as functions of the proportion of recoverable costs $\lambda$. Fix the prior $\mu = 0.2$ and its weight $\eta = 0.4$.

Remark 2. In a case which proceeds to litigation, Defendant’s payoff is increasing with the proportion of recoverable costs $(\lambda)$ if and only if the proportion is sufficiently large and the
prior ($\mu$) is sufficiently small. However, as Corollary 8 will make apparent, a small increase in the proportion $\lambda$ might transform Plaintiff’s payoff in litigation ($u^*_P$) from positive into negative. In that case Plaintiff does not proceed to litigation and Defendant’s payoff increases to zero.

The next result analyzes how Plaintiff’s probability of success in equilibrium changes with parameters.

**Proposition 4.** Consider Plaintiff’s equilibrium probability of success $\theta^*$ which is given by equation (7):

1. The equilibrium probability $\theta^*$ increases with the prior $\mu$ because an increase (respectively, a decrease) in $\mu$: directly increases (decreases) $\theta^*$ through the positive weight $\eta$; and indirectly increases (decreases) Plaintiff’s relative effort in equilibrium, that is:

   $$\frac{\partial}{\partial \mu} \left( \frac{e^*_P}{e^*_P + e^*_D} \right) > 0.$$

   (2.1) The prior favors Plaintiff, that is, $\mu > 0.5$, if and only if the equilibrium probability $\theta^*$ increases with the proportion of recoverable costs and with the weight assigned to the prior. Formally:

   $$\mu > 0.5 \iff \frac{\partial \theta^*}{\partial \lambda} > 0 \iff \frac{\partial \theta^*}{\partial \eta} > 0.$$

   (2.2) The prior is neutral, that is, $\mu = 0.5$, if and only if the equilibrium probability $\theta^*$ does not vary with the proportion of recoverable costs and with the weight assigned to the prior. Formally:

   $$\mu = 0.5 \iff \frac{\partial \theta^*}{\partial \lambda} = 0 \iff \frac{\partial \theta^*}{\partial \eta} = 0.$$

   (2.3) The prior favors Defendant, that is, $\mu < 0.5$, if and only if the equilibrium probability $\theta^*$ decreases with the proportion of recoverable costs and with the weight assigned to the prior. Formally:

   $$\mu < 0.5 \iff \frac{\partial \theta^*}{\partial \lambda} < 0 \iff \frac{\partial \theta^*}{\partial \eta} < 0.$$

Part (1) of Proposition 4 proves that a change in the prior $\mu$ not only directly changes the equilibrium probability $\theta^*$ in the same direction, but it also does so indirectly by changing the relative effort of Plaintiff in the same direction. Part (2) implies that $\theta^*$ changes with the proportion of recoverable costs $\lambda$ (and with the weight assigned to the prior) in favor of the player who the prior favors. A closer analysis of the parties’ equilibrium probabilities of success is in Section 4.
3 Private Welfare and Private Spending

Recall the unit cost assumption which implies a litigant’s spending on litigation is equal to her level of effort. Define private spending and private welfare as follows. **Private spending** (in equilibrium), denoted $E$, is the sum of Plaintiff and Defendant’s respective equilibrium effort levels in litigation:

$$E = e^*_P + e^*_D.$$  

**Private welfare** (in equilibrium), denoted $V$, is the sum of Plaintiff and Defendant’s respective equilibrium payoffs in litigation:

$$V = u^*_P + u^*_D.$$  

Private spending is “private” because it only represents the costs of litigation borne by the litigants. It does not include the public costs borne by the judicial system or the society, such as the costs of providing judges to adjudicate cases, running and maintaining courts and enforcing judgments. Likewise, private welfare is “private” because it sums the litigants’ payoffs arising from engaging in litigation only. The society’s interests in seeing justice served and cases adjudicated fairly do not enter into the calculation of private welfare. We postpone to Section 5 an analysis of the society’s interests.

Private welfare is the negative of private spending, $V = -E$. The judgment sum might be transferred from Defendant to Plaintiff, but such transfer, if it takes place, would be cancelled out in the computation of $V = u^*_P + u^*_D$. Players become worse off collectively the more effort they make. Corollary 1 expresses private welfare and private spending as functions of exogenous parameters. Private spending is always positive whereas private welfare is always negative.

**Corollary 1.** Consider the Nash equilibrium of the Litigation Game.

1. **Private spending** is given by:

$$E = \frac{1 - \eta}{2 - \lambda(2 - \eta)}. \tag{12}$$  

2. **Private welfare** is given by:

$$V = \frac{-(1 - \eta)}{2 - \lambda(2 - \eta)}.$$  

By Corollary 1, as the cost-shifting rule $\lambda$ approaches 1 and the weight $\eta$ given to the prior approaches 0, private spending $E$ always approaches infinity ($\infty$) and private welfare approaches
negative infinity (\(-\infty\)). In this limit case, litigants will collectively spend an enormous amount on litigation to their own detriment.

For parameters \((\mu, \eta, \lambda) \in (0, 1) \times (0, 1) \times [0, 1]\), let \(E(\mu, \eta, \lambda)\) and \(V(\mu, \eta, \lambda)\) respectively denote private spending and private welfare. The next result establishes how these variables change with parameters.

**Corollary 2.** Consider the Litigation Game.

(1) Fix parameters \(\mu\) and \(\lambda\). Then, private spending decreases and private welfare increases with the weight assigned to the prior. Mathematically, for any two weights \(0 < \eta_1, \eta_2 < 1\):

\[
\eta_1 < \eta_2 \iff E(\mu, \eta_1, \lambda) > E(\mu, \eta_2, \lambda) \iff V(\mu, \eta_1, \lambda) < V(\mu, \eta_2, \lambda).
\]

(2) Fix parameters \(\eta\) and \(\lambda\). Then private spending and private welfare do not depend on the prior. For any two priors \(0 < \mu_1, \mu_2 < 1\):

\[
\mu_1 < \mu_2 \implies \begin{cases} 
E(\mu_1, \eta, \lambda) = E(\mu_2, \eta, \lambda) \\
V(\mu_1, \eta, \lambda) = V(\mu_2, \eta, \lambda).
\end{cases}
\]

(3.1) Fix parameters \(\mu\) and \(\eta\). Then private spending increases and private welfare decreases with recoverable cost. Formally, for any two cost-shifting rules characterized by \(0 \leq \lambda_1, \lambda_2 \leq 1\):

\[
\lambda_1 < \lambda_2 \iff E(\mu, \eta, \lambda_1) < E(\mu, \eta, \lambda_2) \iff V(\mu, \eta, \lambda_1) > V(\mu, \eta, \lambda_2).
\]

(3.2) As an immediately consequence of part (3.1), the full recovery rule uniquely minimizes private welfare and maximizes private spending. The no recovery rule uniquely maximizes private welfare and minimizes private spending.

Part (1) of Corollary 2 proves that private welfare (respectively, spending) is strictly increasing (decreasing) with the weight \(\eta\) given to the prior. This is an intuitive result because if the judicial process gives less weight \(1 - \eta\) to the litigants’ effort, then they would spend less on litigation. However, the positive correlation between private welfare and the weight \(\eta\) is surprising because it implies that if the judicial process gives a lower weight \(1 - \eta\) to the effort of the litigants, then their collective welfare increases.

Part (2) of Corollary 2 proves that private spending \(E\) and the private welfare \(V\) do not vary with the prior. As the prior increases, the payoff gain for Plaintiff exactly matches the loss to Defendant.

Part (3.1) of Corollary 2 proves that private welfare (respectively, private spending) is decreasing with the proportion of recoverable costs \(\lambda\). Private spending \(E\) increases with a
lower proportion of recoverable costs. Collectively, litigants prefer judicial systems with the proportion of recoverable costs which is as low as possible. In cases which proceed to litigation, part (3.2) Corollary 2 confirms the argument from existing economic and legal literature that the application of the full recovery rule induces strictly more spending on litigation than the no recovery rule does (Farmer and Pecorino [10], 285). Moreover, the full recovery rule uniquely minimizes private welfare, while the no recovery rule uniquely maximizes it.

Insofar as the costs of litigation for the whole judicial system is concerned, the full recovery rule does not necessarily induce more costs than the no recovery rule does because not all cases proceed to litigation. By assumption, only those claims which give Plaintiff a positive payoff in equilibrium would proceed to litigation. Whether the judicial system as a whole would experience a lower level of costs as the proportion of recoverable costs decreases is dependent on the distribution of the strength of cases. It is beyond the scope of this paper to explore that distribution.

4 Distortion to Inherent Strength

This section analyzes distortion in Plaintiff’s probability of success caused by cost-shifting rules. Plaintiff’s probability of success given by equation (7) can be rewritten as:

\[ \theta^* = (1 - \delta)\mu + \delta \frac{\delta}{2}, \]  

where:

\[ \delta = \frac{2(1 - \lambda)(1 - \eta)}{2 - \lambda(2 - \eta)}. \]  

Equation (13) is equivalent to:

\[ \theta^* = \mu + \delta(0.5 - \mu). \]  

Because the weight given to the prior \( \eta > 0 \), it is always true that distortion \( \delta < 1 \). Hence, equation (13) shows that equilibrium probability \( \theta^* \) is an increasing and affine function of the prior \( \mu \). As the inherent strength of Plaintiff’s case (as represented by the prior \( \mu \)) becomes stronger, she is more likely to succeed in litigation. Now, fixing all other parameters, if the full recovery rule applies \( (\lambda = 1) \) or the parties’ cases are equally strong \( (\mu = 0.5) \), then the equilibrium probability is equal to the prior \( (\theta^* = \mu) \).

The result that Plaintiff’s equilibrium probability of success is equal to the prior \( (\theta^* = \mu) \) also holds in the limit when the weight \( \eta \) given to the prior converges to 1. This is the case of the limit, as the judicial system approaches one which completely disregards the effort of the players.
Now, suppose the proportion of recoverable costs $\lambda < 1$ and the prior $\mu \neq 0.5$. As $\eta$ converges to 0, the equilibrium probability $\theta^*$ approaches 0.5. This is expected because if the judicial system approaches one in which only the effort levels of the litigants matter and the inherent strength of the case is irrelevant, then both players win the case with probabilities equal to their relative effort. In this sense, they are in a symmetric position. Hence, they face identical incentives to fight for one extra unit of payoff, and both Plaintiff’s equilibrium level of effort $e^*_P$ and Defendant’s equilibrium level of effort $e^*_D$ converge to $1/(4(1 - \lambda))$.

If $0 < \mu < 0.5$, then $0 \leq \theta^* < 0.5$. If $\mu = 0.5$, then $\theta^* = 0.5$. Whereas if $0.5 < \mu < 1$, then $0.5 < \theta^* < 1$. The party who has a relatively stronger case will always be more likely to succeed in litigation.

Plaintiff’s equilibrium probability is larger than the prior (i.e., $\theta^* > \mu$) if and only if her case is relatively weak in the sense that $\mu < 0.5$. However, Plaintiff’s case is relatively strong in the sense that $\mu > 0.5$ if and only if the judicial system leads to a decrease in the probability of giving judgement to her.

Motivated by these observations, define a function $\delta : [0, 1] \times (0, 1) \rightarrow \mathbb{R}$, named distortion (caused by the litigants’ effort), at each pair $(\lambda, \eta)$ implicitly by equation (14).

Without full recovery ($\lambda < 1$), Plaintiff’s probability of winning and the prior are related by the following equivalence:

$$\theta^* > \mu \iff \mu < 0.5.$$ 

Equation (13) reveals that the probability $\theta^*$ is a weighted average (a convex combination) of the prior $\mu$ and 0.5. The weight given to the prior is $1 - \delta(\lambda, \eta)$. The distortion $\delta(\lambda, \eta)$ is simply the weight of the constant 0.5. Distortion becomes greater as the deviation from the prior becomes larger. Distortion does not depend on the prior, is always non-negative and it is strictly positive if and only if $\lambda < 1$.

Corollary 3 proves that distortion is weakly increasing with the difference between $\theta^*$ and $\mu$. To make the dependency of $\theta^*$ on the parameters clear, write $\theta^*$ as $\theta^*(\mu, \eta, \lambda)$.

**Corollary 3.** Fix a prior $0 < \mu < 1$ and a weight $0 < \eta < 1$ given to the prior. Let $\theta^*(\cdot)$ denote Plaintiff’s equilibrium probability of success as a function of $(\mu, \eta, \lambda)$. For any two cost-shifting rules characterized by $0 \leq \lambda_1, \lambda_2 \leq 1$:

$$\delta(\lambda_1, \eta) \geq \delta(\lambda_2, \eta) \iff |\theta^*(\mu, \eta, \lambda_1) - \mu| \geq |\theta^*(\mu, \eta, \lambda_2) - \mu|.$$ 

Corollary 3 also proves the mean reversion effort of the distortion function. When the prior $\mu < 0.5$, the value $\delta(\lambda, \eta)$ weights 0.5 to lift the final probability $\theta^*$ closer to 0.5. The opposite is true when $\mu > 0.5$. 

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Corollary 4. Consider the Nash equilibrium of the Litigation Game.

(1) Distortion decreases with the proportion of recoverable costs. Formally, if $\mu, \eta$ are fixed, then for any two cost-shifting rules characterized by $0 \leq \lambda_1, \lambda_2 \leq 1$:

$$\lambda_1 < \lambda_2 \iff \delta(\lambda_1, \eta) > \delta(\lambda_2, \eta).$$

(2) Distortion decreases with the weight assigned to the prior. In other words, distortion is an increasing function of the weight $1 - \eta$ which the judicial system assigns to effort. Formally, if $\mu, \lambda$ are fixed, then for any two weights $0 < \eta_1, \eta_2 < 1$ given to the prior:

$$\eta_1 < \eta_2 \iff \delta(\lambda, \eta_1) > \delta(\lambda, \eta_2).$$

Part (1) of Corollary 4 proves a higher proportion of recoverable costs causes less distortion. Part (2) states a larger weight ($\eta$) given to the prior causes less distortion.

Figure 3 depicts Plaintiff’s equilibrium probability of success as a function of the prior $\mu$. Fix the weight assigned to the prior $\eta = 0.4$ and consider a reduction in the proportion of recoverable costs from $\lambda = 0.7$ to $\lambda = 0.01$. As distortion increases, the segment rotates clockwise around the point $(\mu, \theta^*) = (0.5, 0.5)$. 
If the prior is given the interpretation that it represents the inherent merits of the case, then part (1) of Corollary 4 implies the desirability of allowing for a high proportion of recoverable costs because it causes less distortion to the merits of the case than a low proportion of recoverable costs does.

**Remark 3.** The prior may have the alternative interpretation of capturing prejudice of the judicial system. Suppose the prior is given by:

$$\mu = \mu_0 + \epsilon$$

where $\mu_0 \in (0,1)$ represents the inherent merits of the case and $\epsilon \in (-\mu_0, 1 - \mu_0)$ represents prejudice. A positive (respectively, negative) prejudice favors Plaintiff (Defendant). Suppose further that it is desirable to minimize the difference between Plaintiff’s equilibrium probability of success and merits, that is, $\min |\theta^* - \mu_0|$. From equation (13), some algebra establishes the following minimization problem:

$$\min_{\delta} |\epsilon + \delta(0.5 - \mu_0 - \epsilon)|.$$ 

If the parameters satisfy $\mu_0 + \epsilon = 0.5$, then every level of distortion $\delta$ is equally desirable. The following deals with the other cases.

It is desirable to minimize distortion if: $\epsilon$ and $(0.5 - \mu_0 - \epsilon)$ are both positive or both negative; or, $\epsilon = 0$. These scenarios include cases where the prejudice favors Plaintiff (respectively, Defendant) and the case has sufficiently low (high) merits, more precisely, $\mu_0 < 0.5 - \epsilon$ ($\mu_0 > 0.5 - \epsilon$). They also include cases where there is no prejudice.

There exists an optimal level of distortion given below if: one of $\epsilon$ and $(0.5 - \mu_0 - \epsilon)$ is positive and the other is negative; and, $|\epsilon| < |0.5 - \mu_0 - \epsilon|$:

$$\delta = \frac{\epsilon}{\mu_0 + \epsilon - 0.5}.$$ 

It is desirable to maximize distortion if: one of $\epsilon$ and $(0.5 - \mu_0 - \epsilon)$ is positive and the other is negative; and, $|\epsilon| \geq |0.5 - \mu_0 - \epsilon|$. This includes the case where $\mu_0 = 0.5$ so the case has neutral merits.

In sum, depending on parameters, when there is prejudice, it may be desirable to maximize or minimize distortion or to set distortion to an optimal intermediate level.

As an immediate consequence of Corollaries 2 and 4, there is a direct trade-off between distortion to the inherent strength of a case and private welfare. Any cost-shifting rule which reduces distortion also reduces private welfare and vice versa. A policy implication is that
changing the applicable cost-shifting rule alone cannot simultaneously reduce distortion and increase private welfare. The only way to reduce distortion and increase private welfare simultaneously is to increase the weight (η) given to the prior.

Figure 4 depicts distortion, private spending and private welfare as functions of the proportion of recoverable costs λ, given the prior μ = 0.7 and its weight η = 0.4. Figure 5 depicts distortion, private spending and private welfare as functions of η, given μ = λ = 0.7.

Corollary 5 proves the full recovery rule is uniquely the best rule in so far as minimizing the size of distortion is concerned. The no recovery rule is uniquely the worst according to the same criterion. This result confirms the argument in existing legal literature that the full recovery rule better serves the cause of justice (Cheek [6], 1222).

**Corollary 5.** Consider the Litigation Game. Fix a prior 0 < μ < 1 and a weight 0 < η < 1 given to the prior.

1. The no recovery rule is the unique cost-shifting rule which causes maximum distortion.
2. The full recovery rule is the unique cost-shifting rule which causes no distortion.

**Example 1.** Under the full recovery rule (λ = 1), equilibrium probability θ*, distortion, effort, aggregate effort, payoffs and private welfare are:

\[ \theta^* = \mu, \quad \delta = 0; \]
\[ e^*_P = \frac{(1 - \eta)\mu}{\eta}, \quad e^*_D = \frac{(1 - \eta)(1 - \mu)}{\eta}, \quad E = \frac{1 - \eta}{\eta}; \]
Figure 5: Distortion, private spending and private welfare as functions of the weight assigned to the prior $\eta$. Fix the prior $\mu = 0.7$ and proportion of recoverable costs $\lambda = 0.7$.

$$
\begin{align*}
  u^*_P &= \frac{\eta + \mu - 1}{\eta}, & u^*_D &= -\frac{\mu}{\eta}, & V &= -\frac{(1 - \eta)}{\eta}.
\end{align*}
$$

Example 1 proves that the full recovery rule has some desirable properties. First, equilibrium probability accurately reflects the strength of the case because it is equal to the prior ($\theta^* = \mu$). A litigant’s effort level also perfectly reflects the strength of her case. For example, the strength of Plaintiff’s case is measured by the prior $\mu$ and if her case is stronger than that of Defendant ($\mu > 1 - \mu$), then she spends more on litigation than Defendant does. The opposite is true if the strength of Defendant’s case as measured by $1 - \mu$ is stronger than that of Plaintiff ($\mu < 1 - \mu$). Plaintiff and Defendant exert equal levels of effort if and only if $\mu = 0.5$. Furthermore, Plaintiff has a positive payoff if and only if the sum of the prior and the weight given to it ($\mu + \eta$) is sufficiently large; more precisely, $\mu + \eta > 1$. This means litigation gives Plaintiff a positive payoff if and only if the strength of her case is sufficiently strong and the judicial system gives sufficient weight to the inherent strength of cases. Defendant always has a negative payoff ($u^*_D = -\mu/\eta$) which accurately reflects the reality that one cannot profit from being sued. There is no distortion under the full recovery rule, although private welfare is lower compared to that under the no recovery rule.

Example 2. Under the no recovery rule ($\lambda = 0$), equilibrium probability $\theta^*$, distortion, effort, aggregate effort, payoffs and private welfare are:

$$
\begin{align*}
  \theta^* &= \frac{1 + \eta(2\mu - 1)}{2}, & \delta &= 1 - \eta;
\end{align*}
$$
Example 2 proves that the no recovery rule has some undesirable properties. First, equilibrium probability does not reflect accurately the strength of the case ($\theta^* \neq \mu$) if the prior $\mu \neq 0.5$. Plaintiff and Defendant exert equal levels of effort regardless of the strengths of their case (respectively represented by $\mu$ and $1 - \mu$). Furthermore, Plaintiff always has a positive payoff ($u_P^* > 0$) regardless of the strength of her case or the weight given by the judicial system to the inherent strength of cases. This means Plaintiff profits from conducting litigation whether she has a strong case or not. Defendant always has a negative payoff ($u_D^* < 0$). Private welfare is maximized under the no recovery rule, although distortion is higher than that under the full recovery rule.

Furthermore, Corollary 6 compares the players’ preferences for the full recovery rule and the no recovery rule. It is never the case that both litigants simultaneously strictly prefer the full recovery rule to the no recovery rule.

**Corollary 6.** Consider the full recovery rule and the no recovery rule:

1. If the prior is sufficiently favorable to Plaintiff, more precisely, $\mu > (4 + \eta)/(4(1 + \eta))$, then Plaintiff strictly prefers the full recoverable rule to the no recovery rule and Defendant strictly prefers the no recovery rule to the full recovery rule.

2. If the prior is sufficiently favorable to Defendant, more precisely, $\mu < 3\eta/(4(1+\eta))$, then Plaintiff strictly prefers the no recoverable rule to the full recovery rule and Defendant strictly prefers the full recovery rule to the no recovery rule.

3. For intermediate priors, more precisely, those satisfying $3\eta/(4(1 + \eta)) < \mu < (4 + \eta)/(4(1 + \eta))$, both Plaintiff and Defendant strictly prefer the no recoverable rule to the full recovery rule.

4. For intermediate priors, more precisely, those satisfying $3\eta/(4(1 + \eta)) < \mu < (4 + \eta)/(4(1 + \eta))$, both Plaintiff and Defendant extort more effort under the full recovery rule than under the no recovery rule.

Parts (1) and (3) of Corollary 6 prove that a litigant strictly prefers the full recovery rule to the no recovery rule if and only if her case is sufficiently strong. This is intuitive because a risk-neutral litigant who has a sufficiently high likelihood of success strictly prefers to recover all of her costs if she wins than to pay for her own costs.
Where no litigant has a sufficiently strong case, part (2) of Corollary 6 proves that both litigants strictly prefer the no recovery rule to the no recovery rule. In this intermediate region, both litigants exert more effort under the full recovery rule than under the no recovery rule. Both litigants prefer to avoid the inefficiency generated by higher effort from them.

5 Judicial Management Game

This section analyzes judicial discretion in choosing the applicable cost-shifting rules. In a variation of the standard model, a third player, Judge, is introduced to choose the applicable cost-shifting rule to balance private welfare and the difference between the prior and the equilibrium probability of success. Judge conditions the cost-shifting rule on the exogenous prior and the exogenous weight given the prior.

5.1 Setup

The Judicial Management Game is an extensive game of complete information with three players: Judge, Plaintiff and Defendant. Plaintiff first chooses whether to litigate. If she chooses not to litigate, then the game ends. If she chooses to litigate, then Judge costlessly chooses and announces the applicable cost-shifting rule $\lambda$, with $0 \leq \lambda \leq 1$. Upon observation of the cost-shifting rule, Plaintiff and Defendant simultaneously choose their respective litigation effort levels, $e_P, e_D$. All exogenous parameters and the players’ payoff functions are common knowledge.

Due process principles which make the prior and the weight assigned to it exogenous in the Litigation Game in Section 2 also make them exogenous in the new game. Although Judge may choose the application cost-shifting rule, greater constitutional or moral considerations mandate that the litigants be afforded an opportunity to present their case and have their arguments heard. An implication is that Judge is prevented from arbitrarily giving all weight to the prior and no weight to the effort of the litigants.

Plaintiff and Defendant have the same payoff functions $u_P, u_D : [0, 1] \times \mathbb{R}_+^2 \to \mathbb{R}$ as in the Litigation Game; that is, payoff functions $u_P$ and $u_D$ are defined in equations (2) and (3). Let the society’s interests in seeing justice served and cases decided fairly and efficiently be represented by the policy objectives of minimizing the difference between the prior and the equilibrium probability of success, $|\theta^* - \mu|$, and of minimizing private spending. Suppose that the objective of Judge is to serve the society’s interest.

\footnote{Parisi [16] explores judicial involvement in obtaining evidence directly.}
Maximising private welfare $V$ is equivalent to minimizing private spending, $E$.\textsuperscript{10} Let $\phi > 0$ be an arbitrary constant measuring the relative importance of the goal of minimizing the difference between the prior and Plaintiff’s equilibrium probability of success. Formally, the payoff function of Judge is:

$$u_J = -(E^2 + \phi|\theta^* - \mu|^2).$$

(18)

This specification captures the idea that Judge is willing to increase private spending $E$ by a relatively large amount in order to reduce the difference $|\theta^* - \mu|$ by one unit if $|\theta^* - \mu|$ is relatively large. However, if $|\theta^* - \mu|$ is relatively small, Judge is willing to increase $E$ by just a relatively small amount in order to reduce $|\theta^* - \mu|$ by one unit.

Another way to describe Judge’s relative preferences is that the cost for her increases quadratically with increments in each of the variables $E$ and $|\theta^* - \mu|$; an increase in one of the variables, $E$ or $|\theta^* - \mu|$, is more costly to Judge when the other variable is relatively large than a same-sized increase when the other variable is relatively smaller.

Because $\phi$ and $\mu$ are exogenous and observable, from equation (15), conveniently express Judge’s payoff in terms of private spending and distortion:

$$u_J = -E^2 - \phi(0.5 - \mu)^2\delta^2.$$  

(19)

The function $(E, \delta) \mapsto u_J$ is strictly quasiconcave because its upper contour sets $\{(E, \delta) \mid u_J \geq u_0\}$, whenever $u_0 > 0$, are strictly convex sets. If Plaintiff chooses not to litigate, then she and Defendant get zero payoffs ($u_P = u_D = 0$). In this case, Plaintiff’s equilibrium probability of success is zero ($\theta^* = 0$), and Judge’s payoff is given by: $u_J = -\phi\mu^2$.

Equation (19) reveals that the specification of Judge’s payoff has a desirable quality of capturing a relative preference for litigation of cases which are not strongly in favor of either side. As the prior $\mu$ becomes closer to 0.5, the merits of the case becomes less clear, and Judge becomes more willing to reduce private spending $E$ which in turn increases private welfare in litigation $V$ (by Corollaries 2 and 4). Conversely, as the prior $\mu$ becomes closer to 0 or 1, the merits of the case becomes more decisive, and Judge becomes more willing to increase $E$ which in turn decreases $V$.

5.2 Equilibrium

The solution concept is the subgame perfect equilibrium (SPE). If Plaintiff sues, then for every choice of a proportion of recoverable costs, the resulting subgame is identical to the (original)

\textsuperscript{10}For example, the New South Wales Civil Procedure Act 2005 (NSW) s 56 which requires the rules of court facilitate the “just, quick and cheap” resolution of disputes.
Litigation Game. By backwards induction, there is a unique SPE if Judge has a unique $\lambda$ which maximizes her payoff. When choosing her optimal action, Judge knows the other players will observe her action and assumes they will play the unique Nash equilibrium of the resulting subgame.

There is a trade-off for Judge. By Corollary 2, part (3.1), private spending is an increasing function of the proportion of recoverable costs. However, by part (1) of Corollary 4, distortion is a decreasing function of the proportion of recoverable costs. Hence, Judge must balance these effects by choosing the proportion of recoverable costs optimally.

Define the variables $\hat{\lambda}, \lambda^*$ by:

$$\hat{\lambda} = \begin{cases} 1 - \frac{2 - \eta}{4\phi(0.5 - \mu)^2}, & \text{if } \mu \neq 0.5; \\ 0, & \text{otherwise.} \end{cases}$$

$$\lambda^* = \max\{0, \hat{\lambda}\}.$$  (20)

It is always true that a cost-shifting rule which allows for $\hat{\lambda}$ proportion of recoverable costs is not the full recovery rule (that is, $\hat{\lambda} < 1$). It is possible for $\hat{\lambda}$ to be negative, so we introduce the variable $\lambda^*$ to truncate $\hat{\lambda}$. The next result solves the payoff maximization problem of Judge and proves that the Judicial Management Game has a unique SPE.

**Proposition 5.** The Judicial Management Game has a unique SPE given by:

1. (1.1) Plaintiff chooses not to litigate if the prior $\mu$ is no larger than the bottom-line prior $\mu$ evaluated at $\lambda^*$ (that is, $\mu \leq \mu(\lambda^*)$), where the bottom-line prior is defined in equation (4).

2. (1.2) Plaintiff chooses to litigate if the prior $\mu$ is larger than the bottom-line prior $\mu$ evaluated at $\lambda^*$ (that is, $\mu > \mu(\lambda^*)$), where the bottom-line prior is defined in equation (4).

3. (2) If Plaintiff chooses to litigate, then Judge’s optimal choice of cost-shifting rule in litigation is $\lambda^*$.

4. (3) If Plaintiff chooses to litigate, then Plaintiff and Defendant’s respective effort levels in litigation are given by:

   $$e^*_P = \frac{(1 - \eta)(1 - \lambda^* + \lambda^*\eta\mu)}{(2 - \lambda^*(2 - \eta))^2};$$

   $$e^*_D = \frac{(1 - \eta)(1 - \lambda^* + \lambda^*\eta(1 - \mu))}{(2 - \lambda^*(2 - \eta))^2}.$$

5. (4) If Plaintiff chooses to litigate, Judge’s payoff increases with the proportion of recoverable costs ($\lambda$), if $\lambda < \hat{\lambda}$; and $u_J$ decreases with $\lambda$ for all $\lambda > \hat{\lambda}$. Given $\hat{\lambda}$ may be negative when $\eta$ or $\phi$ are relatively small, Judge’s payoff $u_J$ is maximized at the choice of $\lambda^* = \max\{0, \hat{\lambda}\}$.

5. (5.1) If Plaintiff chooses to litigate, then Judge and Defendant’s respective payoffs in equilibrium, respectively denoted $u_J^*$ and $u_D^*$, are always negative, $u_J^* < 0$ and $u_D^* < 0$. Plaintiff’s payoff in equilibrium, denoted $u_P^*$, is always positive if she chooses to litigate, $u_P^* > 0$. 25
(5.2) If Plaintiff chooses not to litigate, then Plaintiff and Defendant’s respective payoffs in equilibrium, are always equal to zero, $u^*_p = 0$ and $u^*_D = 0$. Judge’s payoff in equilibrium is always negative if Plaintiff chooses not to litigate, $u^*_J < 0$.

Judge’s equilibrium choice cost-shifting rule $\lambda^*$ has desirable qualities. If the prior $\mu$ becomes closer to 0.5, then $\lambda^*$ decreases until it becomes 0. This implies where the merits of the case (which the prior $\mu$ represents) is not strongly in favor of either side, the loser only has to pay a small share of the winner’s costs. Conversely, if the merits of the case is strongly in favor of one side, the loser has to pay a large share of the winner’s costs. As Corollary 8 will explore further, Judge’s optimal choice of cost-shifting rule encourages litigation of intermediate and strong cases but discourages weak cases from proceeding to litigation.

### 5.3 Comparative Statics

Proposition 5 proves that Judge’s optimal choice of cost-shifting rule in equilibrium can be the no recovery rule ($\lambda = 0$), but it will never be the full recovery rule ($\lambda = 1$). Before the introduction of judicial discretion over the applicable cost-shifting rules in Australian and English jurisdictions, the default cost-shifting rule was the full recovery rule.\(^{11}\) The introduction in these jurisdictions of judicial discretion over the applicable cost-shifting rule is desirable because it allows Judge to replace the full recovery rule with the optimal cost-shifting rule ($\lambda^* = \max\{0, \hat{\lambda}\}$) which balances the competing goals of minimising distortion ($\delta$) to the inherent strength of cases and minimising private spending on litigation ($E$). A jurisdiction which applies the full recovery rule should also introduce judicial discretion over the applicable cost-shifting rule, or reduce the proportion of recoverable costs to the optimal.

An intuitive explanation of why the optimal cost-shifting rule is never the full recovery rule ($\lambda^* < 1$) even when $\mu \neq 0.5$ follows from taking the derivative in equation (19) which gives Judge’s payoff:

$$\frac{\partial u_J}{\partial \lambda} = -2E \frac{\partial E}{\partial \lambda} - 2\phi(0.5 - \mu)^2 \delta \frac{\partial \delta}{\partial \lambda}.$$

Corollaries 2 and 4 prove that $\partial E/\partial \lambda > 0$ and $\partial \delta/\partial \lambda < 0$. As depicted in Figure 4, a unit increase in the proportion of recoverable costs ($\lambda$) gives Judge the marginal benefit of $\partial \delta/\partial \lambda$ units of reduction in distortion (\(\delta\)) times the rate $2\phi(0.5 - \mu)^2 \delta$, and the marginal cost of $\partial E/\partial \lambda$ units of increase in private spending ($E$) times the rate $2E$. As $\lambda$ increasingly approaches 1 (that is, full recovery), the rate $2\phi(0.5 - \mu)^2 \delta$ assigned to reduction in distortion diminishes to

\(^{11}\)For the United Kingdom, see the case of Garnett v Bradley [1878] 3 AC 944 per Lord Blackburn; for Australia, see the case of Knight v FP Special Assets Ltd (1992) 174 CLR 189 per Mason CJ.
0 (according to part (2) of Corollary 6) whereas the rate $2E$ remains positive. Hence $\lambda^* < 1$ because the marginal benefit of letting $\lambda$ approach 1 is strictly smaller than the marginal cost. Formally:

$$\lim_{\lambda \uparrow 1} \left(-2\phi(0.5 - \mu)^2 \frac{\partial \delta}{\partial \lambda}\right) = 0 < \lim_{\lambda \uparrow 1} \left(2E \frac{\partial E}{\partial \lambda}\right).$$

The next result analyzes how the optimal cost-shifting rule varies with parameters.

**Corollary 7.** Consider Judge’s choice of optimal cost-shifting rule $\lambda^* = \max\{0, \hat{\lambda}\}$ in the SPE of the Litigation Game with Judicial Management.

1. If $\eta$, or $\phi$ or $(0.5 - \mu)^2$ is relatively large in the sense that $\hat{\lambda} > 0$, then the optimal proportion of recoverable costs is an increasing function of both: the weight given to the distortion according to Judge’s preferences ($\phi$); and the weight given to the prior ($\eta$). Formally:

$$\frac{\partial \hat{\lambda}}{\partial \phi} > 0, \quad \frac{\partial \hat{\lambda}}{\partial \eta} > 0, \quad \frac{\partial \hat{\lambda}}{\partial \mu} = 0.$$

2.1) If $\eta$, or $\phi$ or $(0.5 - \mu)^2$ is relatively large in the sense that $\hat{\lambda} > 0$, then the optimal proportion of recoverable costs increases with the prior ($\mu$) if and only if the prior favors Plaintiff, that is, $\mu > 0.5$:

$$\frac{\partial \hat{\lambda}}{\partial \mu} > 0 \quad \Leftrightarrow \quad \mu > 0.5.$$

2.2) If $\eta$, or $\phi$ or $(0.5 - \mu)^2$ is relatively large in the sense that $\hat{\lambda} > 0$, then the optimal proportion of recoverable costs decreases with the prior ($\mu$) if and only if the prior favors Defendant, that is, $\mu < 0.5$:

$$\frac{\partial \hat{\lambda}}{\partial \mu} < 0 \quad \Leftrightarrow \quad \mu < 0.5.$$

3) If $\hat{\lambda} = 0$, the optimal proportion of recoverable costs is zero; and does not change with infinitesimal changes in the parameters.

Figure 6 depicts Judge’s choice of optimal proportion of recoverable costs as a function of the weight assigned to the prior $\eta$ given the prior $\mu = 0.8$ and different weights assigned to distortion $\phi = 0.5, \phi = 1$ and $\phi = 5$. It is intuitive that if Judge cares more about distortion or the judicial system assigns a higher weight to the prior, then she is more likely to choose a higher proportion of recoverable costs.

Figure 7 depicts Judge’s choice of optimal proportion of recoverable costs as a function of the prior $\mu$ given its weight $\eta = 0.8$ and different weights assigned to distortion $\phi = 0.5, \phi = 1$ and $\phi = 5$. Intuitively, if $\mu$ becomes further away from 0.5, then distortion weights more in Judge’s payoff, so she is more likely to choose a higher proportion of recoverable costs to reduce distortion.
Figure 6: Judge’s choice of optimal proportion of recoverable costs as a function of the weight \( \eta \) assigned to the prior given the prior \( \mu = 0.8 \) and different weights assigned to distortion \( \phi = 0.5, \phi = 1 \) and \( \phi = 5 \).

Figure 7: Judge’s choice of optimal proportion of recoverable costs as a function of the prior \( \mu \) assigned to the prior given its weight \( \eta = 0.8 \) and different weights assigned to distortion \( \phi = 0.5, \phi = 1 \) and \( \phi = 5 \).
6 Deterrence of Lawsuits

This section applies a variation of the Judicial Management Game to analyze which cost-
shifting rules can deter relatively weak cases from proceeding to litigation. We continue to
assume that Plaintiff chooses to litigate if and only if her payoff in litigation is positive. Under
this assumption, Proposition 1 establishes that Plaintiff chooses to litigation if and only if the
prior is greater than the bottom-line prior.\textsuperscript{12}

6.1 When Will Litigation Occur?

Corollary 8 motivates the analysis in this section. To facilitate the presentation which follows,
define $\lambda$ and $\eta$ as follows:

\[\lambda = \frac{3 - \sqrt{2 - \eta^2}}{2 - \eta}, \quad \eta = 1 + \frac{\sqrt{2(\sqrt{129} - 9)}}{3^{2/3}} - \frac{2^{5/3}}{3^{2/3}(\sqrt{129} - 9)}.\]  

(21)

For a fixed weight assigned to the prior, the bottom-line prior evaluated at $\lambda$ is given by:

\[\mu(\lambda) = \left(\frac{1 - \eta}{\eta}\right) \left(\frac{-2(2 - \eta) + 3\sqrt{2 - \eta}}{2(2 - \eta) - (1 + \eta)\sqrt{2 - \eta}}\right).\]  

(22)

As Corollary 8 will elaborate, the bottom-line prior increases (respectively, decreases) with
the proportion of recoverable costs when the proportion is less (greater) than the variable $\lambda$.
Furthermore, if the proportion of recoverable costs is equal to $\lambda$ and the weight assigned to
the prior is no larger than the variable $\eta$, then no prior can give Plaintiff a positive payoff in
litigation. A direct computation reveals that $\lambda \geq 1$ if and only if $\eta \geq (\sqrt{13} - 3)/2$. The variable
$\eta$ is approximately 0.15 and $\eta < (\sqrt{13} - 3)/2$.

\textbf{Corollary 8.} Consider the Litigation Game.

1. The no recovery rule does not deter any case. Indeed, if $\lambda = 0$, then $\mu \leq 0$, which
   implies that $\mu > \mu$ and $u^*_P > 0$.

2. The full recovery rule deters litigation if and only if $\mu \leq 1 - \eta$. Indeed, when $\lambda = 1$,
   then $\mu = 1 - \eta$. In this case, $\mu > 1 - \eta \Leftrightarrow u^*_P > 0$.

\textsuperscript{12}Because their collective welfare in litigation is strictly negative, Plaintiff and Defendant may settle prior to
commencing litigation. A comprehensive treatment of settlement negotiation is beyond the scope of this paper.
Assuming that Plaintiff settles if she is indifferent between settling or litigating, the lower bound of the range
of (positive) acceptable settlement offers occurs when Defendant makes a take-it-or-leave it offer which is equal
to Plaintiff’s equilibrium payoff in proceeding to litigation. The upper bound occurs when Plaintiff makes a
take-it-or-leave-it offer which is equal to the magnitude of Defendant’s equilibrium payoff in litigation. The
range of mutually acceptable settlement offers is the closed interval $[u^*_P, -u^*_D]$. Settlement is possible only if
Plaintiff’s equilibrium payoff in litigation is positive, so she would actually have the incentives to litigate. The
threat of litigation is non-credible when Plaintiff’s case is inherently weak.

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(3) If $\eta \geq (\sqrt{13} - 3)/2$, then $\Lambda \geq 1$ and the bottom-line prior increases with the proportion of recoverable costs for every $\lambda \in [0, 1]$. The worst scenario for Plaintiff is the full recovery rule because it maximizes the bottom-line prior.

(4) If $\eta < \eta < (\sqrt{13} - 3)/2$, then $\Lambda < 1$. In this case, the bottom-line prior $\mu$ is an increasing function of the proportion of recoverable costs when $0 \leq \lambda < \Lambda$ and a decreasing function of the proportion of recoverable costs when $\Lambda < \lambda \leq 1$. Hence, this function $\lambda \mapsto \mu(\lambda)$ is maximized at $\lambda = \Lambda$. Plugging $\lambda = \Lambda$ into equation (4), results in:

$$\mu(\Lambda) < 1, \quad \text{for all } \eta < \eta < (\sqrt{13} - 3)/2.$$  

(5) If $\eta \leq \eta$, then $\Lambda < 1$. In this case, the bottom-line prior $\mu$ is an increasing function of the proportion of recoverable costs when $0 \leq \lambda < \Lambda$ and a decreasing function of the proportion of recoverable costs when $\Lambda < \lambda \leq 1$. The function $\lambda \mapsto \mu(\lambda)$ is maximized at $\lambda = \Lambda$. Furthermore:

$$\mu(\Lambda) \geq 1, \quad \text{for all } \eta \leq \eta.$$  

Consequently, $\mu < \mu$ and $u^*_P < 0$ when $\lambda = \Lambda$ and $\eta \leq \eta$. No prior can lead Plaintiff to a positive payoff in litigation in this instance.

A counter-intuitive result following from Corollary 8 is the ability of a cost-shifting rule to deter weak cases is capped by the weight ($\eta$) given to the prior. Recall the prior characterizes the strength of Plaintiff’s case. A higher weight given to the prior means the judicial process gives less weight to the litigants’ effort. For example, the arguments of lawyers have less influence on the outcome of the case if the weight given to the prior is higher. Where the weight given to the prior is sufficiently high (more precisely, $\eta \geq (\sqrt{13} - 3)/2$), then cost-shifting rules can only deter claims sufficiently weak (more precisely, those characterised by $\mu < 1 - \eta$) because, mathematically, the variable $\lambda \geq 1$ and the bottom line prior $\mu$ increases with $\lambda$ for every $\lambda \in [0, 1]$ (part (3) of Corollary 8). Ironically, where the weight given to the prior is sufficiently small (more precisely, $\eta \leq \eta$), then under the cost-shifting rule characterized by $\Lambda$ all cases are deterred because no prior can lead Plaintiff to a positive payoff; mathematically, the function $\mu(\Lambda) \geq 1$ (part (4) of Corollary 8).

Parts (1) and (2) of Corollary 8 together imply that the full recovery rule deters strictly more cases than the no recovery rule does. Part (2) in particular confirms the argument from existing economic and legal literature that the application of the full recovery rule better serves the cause of justice because only cases strong enough would proceed to litigation (Cheek [6], 1222). Part (1) implies jurisdictions which apply the no recovery rule are litigious because any case, however weak, would give Plaintiff positive payoff in litigation.\(^\text{13}\)

\(^{13}\)Consistent with Carbonara and Parisi [5], 6 Proposition 1; and Farmer and Pecorino [10], 285.
Figure 8: The bottom-line prior $\mu$ as a function of the proportion of recoverable costs $\lambda$, given the weight given to the prior $\eta = 0.1$ (the black curve), $\eta = 0.25$ (the blue curve) or $\eta = 0.6$ (the red curve).

Figure 8 depicts the bottom-line prior $\mu$ as a function of the proportion of recoverable costs $\lambda$, fixing the weight given to the prior $\eta$. Where $\eta = 0.6$, which satisfies part (3) of Corollary 8, $\mu$ as represented by the red curve increases with $\lambda$ for all $0 < \lambda < 1$. Where $\eta = 0.25$ (respectively, $\eta = 0.1$), which satisfies part (4) (part (5)) of Corollary 8, $\mu$ as represented by the blue (black) curve increases with $\lambda$ for all $0 < \lambda < \lambda^*$ and decreases with $\lambda$ for all $\lambda < \lambda < 1$. Where $\eta = 0.1$ which satisfies part (5) of Corollary 8, no prior can give Plaintiff a positive payoff in litigation if $\lambda = \lambda^*$.

**Corollary 9.** Consider the Judicial Management Game. Judge’s equilibrium choice of cost-shifting rule $\lambda^* < \lambda$, where $\lambda^*$ is given by equation (20). Consequently, the bottom-line prior $\mu$ is an increasing function of the proportion of recoverable costs when $\lambda = \lambda^*$.

Corollary 9 proves that if the applicable cost-shifting rule is Judge’s choice of optimal cost-shifting rule $\lambda^*$, then the bottom-line prior increases as $\lambda^*$ becomes larger. Together with part (1) of Corollary 7, an application of the chain rule implies that with $\lambda^*$ in place, litigation is less likely to take place as the weight given to distortion according to Judge’s preferences ($\phi$) increases.

Figure 9 plots in the $(\eta, \mu)$ space: the bottom-line prior $\mu$ defined at $\lambda$; $\mu$ defined at $\lambda^*$ given
Figure 9: $\mu(\lambda)$ and $\mu(\lambda^*)$ in the $(\eta, \mu)$ space, given $\phi = 10$ or $\phi = 40$. Where $\phi = 10$ (respectively, $\phi = 40$), Plaintiff’s payoff in litigation is negative only in region A (regions A or B).

$\phi = 10$; and $\mu$ defined at $\lambda^*$ given $\phi = 40$. Where $\phi = 10$, litigation takes place everywhere except in region A, where the prior $\mu$ is sufficiently small and the weight $\eta$ assigned to the prior is sufficiently large. Where $\phi = 40$, litigation takes place everywhere except in regions A or B; the region in which litigation does not take place has expanded.

Remark 4. In reality, lawmakers often delegate the task of designing civil procedural rules such as cost-shifting rules to a rules committee of judges or mainly judges. Such a rules committee consists of judges only in the case of the United States federal courts (Rules Enabling Act of 1934, 28 USC §§2071-2077), or mainly judges and some legal practitioners in the case of New South Wales (Civil Procedure Act 2005 (NSW) s 8). The English rules committee includes judges, civil servants, legal practitioners and lay persons (Civil Procedure Act 1997 (UK) c12, s 2). Judges who are members of rules committees may influence the design of cost-shifting rules.

However, a judge cannot observe the merits of a case unless the case has proceeded to litigation. Suppose the desirability of a particular case proceeding to litigation depends on its merits. It would be unrealistic to formulate a sequential game that allows the judge by choosing the applicable cost-shifting rule deter litigation, without first allowing the parties initiate litigation and thereby reveal the merits of the case to the judge.
7 Conclusion

A Tullock tournament model of litigation analyzes the strategic interaction between litigants and welfare effects under different rules governing the allocation of costs spent on litigation. Sections 2 and 3 develop a two-player model which Section 4 applies to establish prove a direct trade-off between welfare of litigants and distortion to inherent strength of cases. In the unique equilibrium of the Litigation Game, a player’s payoff and posterior probability of success are increasing with her prior. The plaintiff’s payoff is increasing with the proportion of recoverable costs if and only if the proportion and the prior are sufficiently large. The defendant’s payoff is increasing with the proportion of recoverable costs if and only if the proportion is sufficiently large and the prior is sufficiently small. A cost-shifting rule which increases welfare must increase distortion to the inherent strength of the case and vice versa.

Section 5 analyzes a variation of the standard model which empowers the judge to choose the applicable cost-shifting rule endogenously. Here the judge chooses the cost-shifting rule after the plaintiff chooses to litigate. This Judicial Management Game captures the recent reform in Australian and English jurisdictions where judges are given discretion to conduct proceedings to facilitate just and efficient disposal of cases. In its unique equilibrium, the optimal proportion of recoverable costs, as chosen by the judge, is increasing with the weight given to the prior and the relative weight which she assigns to the difference between the prior and the plaintiff’s equilibrium probability of success. However, the optimal cost-shifting rule never allows for full recovery.

Section 6 explores which cost-shifting rules can deter cases from proceeding to litigation. In particular, where the optimal cost-shifting rule found in Section 5 is applicable, litigation is less likely to take place as the relative weight which the judge assigns to distortion increases.

Future research may introduce divergence in the litigants’ valuation of the judgment sum. In this case, the judge must decide the winner of the case and the magnitude of the judgment sum. Letting the litigants have different litigation technologies may also be fruitful. Increasing the number of litigants may capture bankruptcy or succession cases in which more than two litigants compete for the division of assets.

References


