Argumentation Quantity and Quality: A Litigation Success Function

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Abstract

Arguments are statements used to persuade someone or in support of a claim. However, these are not perfect and part are be exploited by the opponent to build its own argumentation. In this paper we present a litigation success function (LSF) that considers the quality of the plaintiff and defendant arguments and preserves the flexibility and analytical characteristics of the "rent-seeking" contest success function. On the contrary to the existent literature, the proposed LSF can be applied to the English fee shifting system, and to model criminal and civil proceedings.

JEL: C72, D72, D74, K41.

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1 Introduction

The decision by the plaintiff to bring a case, and the decision by the defendant to defend it depends crucially on the legal system, the values under dispute, the objective merits of the case, the quality of arguments and the involved costs. Clearly, the more resources an individual spend to produce arguments more likely he/she is to influence the court’s decision in its favor. This observation allows to establish the link between the litigation process

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and the Tullock’s (1980) type "rent-seeking" literature (Katz, 1988). Furthermore, this methodology allows an easy incorporation in the analysis of other multiple aspects common to legal disputes. For instance, Robson and Skaperdas (2008) introduce bias, argumentation costs and stakes differences in a problem in which property rights are ambiguously defined. Bernardo et al. (2000) study several types of legal presumptions (e.g., pro-defendant or pro-plaintiff bias), and extend their analysis to include a beliefs assessment about the effect of effort on the final outcome. De Mot (2013) analyses litigation expenditures under comparative and contributory negligence. Angenendt and Robledo (2015) consider an application to patent litigation.

However, there is a qualitative dimension in the plaintiff and defendant argumentation that has been ignored by the litigation literature that employs the "rent-seeking" contest type function. Arguments are statements, which may include witnesses and actual testimonies (among others), used to persuade someone or in support of a claim. However, these are not perfect and part can be exploited by the opponent to build its own argumentation; a dynamic process in which each side persuasion builds on own and on the weaknesses of the others arguments.  

In this paper we present a litigation success function that considers the quality of the plaintiff and defendant arguments, and it is flexible enough to accommodate litigation specific aspects as bias and other merits (e.g., pro-defendant or pro-plaintiff bias, etc.), argumentation technologies (e.g., access to better lawyers), cost and stakes differences, among others. In addition, we want to capture the judge position, which does not know the truth but has to deliver a verdict based on arguments and allegation.

Since our objective is to present a baseline theory we consider the worldwide accepted presumption of innocence in favor of the defendant. We introduce this effect through an asymptotic approach that preserves the analytical characteristics of the classical "rent-seeking" contest function. The suggested approach can be extended to analyze cases (e.g., civil proceedings) in which there is no presumption of innocence and both sides carry the burden of proof.

Another crucial aspect for the individuals’ strategic decisions is how fees are allocated.

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1 There is a variety of areas of economics and other social sciences in which contests are applied. Corchón (2007) and Konrad (2009) surveys this literature and its extensions. In this paper we focus on the litigation use, see Parisi and Luppi (2015) for a survey.

2 An alternative branch of the literature employs Bayesian models to capture the qualitative dimension of the persuasion process, see Daughety and Reinganum (1999) for a discussion in the context of economics and law, and Skaperdas and Vaidya (2012) for an approach with roots in the "rent-seeking" literature. Baye et al. (2005) present an auction approach to litigation.
among the involved parties. Under the American rule, each party bear their own legal costs, while under the English rule, the losing party at trial pays the fees of the winning party. This distinction is important for several reasons as we will discuss throughout the paper. Now, we highlight an inconsistency of the classical contest function pointed by Farmer and Pecorino (1999) that no case reaches litigation under the English rule. This limitation it is particularly robust and does not disappears even for varying argumentation technologies or bias directions, as in Bernardo et al. (2000), Hirshleifer and Osborne (2001), and Kobayashi and Lott (1996), among others. Therefore, limiting in a great extent its generalized application and questioning whether the "rent-seeking" approach to litigation is the most appropriated. This issue gains even more relevance because the English rule is the most common fee shifting mechanism. The litigation success function in the present paper solves this problem.

We also found that under the English rule, the argumentation quality plays a more important role in the litigation decision. Since individuals have no control over the other’s production of arguments, an individual with weak quality arguments is less likely to participate in an "English type dispute" because it may end up paying the other litigation costs.

The paper is organized as follows. Section 2 presents the litigation success function. Section 3 and 4 analysis the American and English rules, respectively. Section 5 concludes with some comparisons.

2 The litigation success function

In litigation it is not indifferent the identity of the individuals. The plaintiff is somebody that is not happy with a given status quo payoff $\pi_x$ (the subscripts $x$ and $y$ denote the plaintiff and defendant, respectively). Consequently, she files a claim in a court of law in an attempt to change it to a better outcome $\pi_x > \pi_y$. In other words, she claims a loss $\Delta_x = \pi_x - \pi_y$.

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3See Braeutigam et al. (1984) for an early general game theoretical approach to fee shifting systems. They conclusions are limited by their generality, for that reason they stress the need to restrict the mathematical formulation of a legal system. See Katz and Sanchirico (2011) for a complete survey of the fee shifting literature.

4Perhaps the closest paper to this one is Hirshleifer and Osborne (2001). They propose a litigation success function with some prior assumption about innocence or guilt; parties differ in terms of "degree of fault". We do not make such assumption. Actually, once a dispute is initiated what is relevant is the quality of their arguments. This is what a third party (e.g., a judge) can observe.

5One way to deal with this difficulty is to consider a limited fee shifting system in which the winner costs are only partially reimbursed. This approach is followed by Luppi and Parisi (2012), and Carbonara and Parisi (2012). In spite that their assumption is not unrealistic, their LSF cannot deal with the [full fee shifting] English rule as we know it (see also Farmer and Pecorino, 2012).
as a result of the defendant’s actions. On the contrary, the defendant is satisfied with the status quo \( \pi_y \), and does not want to change it to \( \pi_x < \pi_y \), where \( \Delta_y = \pi_y - \pi_x \).\(^6\)

**Litigation success function (LSF)** - Once the case arrives at trial, \( x \) and \( y \) are legal expenditures by the plaintiff and defendant, respectively, which depending on some argumentation technology converts expenditures into legal arguments. The cost is assumed linear and equal one. The probability that the plaintiff prevails at trial is:

\[
p(x, y) = \frac{a x^{\alpha_x} + (1 - b) y^{\alpha_y}}{m + x^{\alpha_x} + y^{\alpha_y}},
\]

which is a simple mathematical representation of a legal system (Hirshleifer and Osborne, 2001; Katz, 1988).

The parameter \( m \in \mathbb{R}_+ \) measures the bias towards the defendant and establishes the presumption of innocence common to many types of formal proceedings; the proof is the burden of the accuser.\(^7\) We further discuss it below, see also Remark 3.

The parameters \( \alpha_x \) and \( \alpha_y \) measure the relevance of the effort with respect to randomness in the final outcome. They are associated with the argumentation technology. For instance, in our context, \( \alpha_x > \alpha_y \) can be interpreted as if the plaintiff is represented by a more skilled lawyer or law firm than the defendant. In order to simplify, we assume parties have access to the same legal technology, i.e., \( \alpha_x = \alpha_y = 1 \).

The parameters \( a, b \in (1/2, 1] \), introduce the qualitative dimension into the plaintiff and defendant argumentation, respectively, which has been ignored in the litigation literature that employs the "rent-seeking" contest success function.

They are motivated by the fact that arguments are statements used to persuade someone or in support of a claim. However, these are not perfect and part can be exploited by the opponent to build its own defense and argumentation. In other words, litigation argumentation is a dynamic process in which each side persuasion builds on own arguments and on the weaknesses of the other arguments. The parameters \( a \) and \( b \) capture this process.

For instance, \( a = 0.9 \) is the fraction of the plaintiff argumentation that is "solid", well-founded and persuasive. The remaining fraction, \( 1 - a = 0.1 \), fails to achieve this objective and can be exploited by the defendant to build or in support of its own arguments. Similarly,

\(^6\)We assume asymmetric stakes but symmetric argumentation costs. There is some equivalence between these two. For instance, an increase in an individual cost is qualitatively equivalent to a decrease in the stakes.

\(^7\)The introduction of a constant parameter in the denominator of the contest success function appear in Blavatskyy (2010) and Dasgupta and Nti (1998). However, the interpretation is associated with the possibility of a “draw”. Other forms of bias specifications, commonly applied into the "rent-seeking" contest function, can be incorporated in (1).
$b = 0.8$ means that a fraction, $1 - b = 0.2$, of the argumentation presented by the defendant is weak and can be used by the plaintiff in its own benefit.

Therefore, from the total argumentation $x^\alpha$ and $y^\beta$ produced by the plaintiff and defendant, respectively, each party actual persuasion is $ax^\alpha + (1 - b)y^\beta$ and $(1 - a)x^\alpha + by^\beta$, respectively.

These effects turns the effort choice more selective and strategic, by reducing the emphasis in the quantity dimension, as part of it may spillover to the opponent.

**Properties of the litigation success function** - If neither the plaintiff nor the defendant spend any argumentation efforts, $x = y = 0$, then $p(0, 0) = 0$. In other words, the winning probability of the plaintiff is zero if there is no trial.

Note also that $p(x, 0) = ax^\alpha/(m + x^\alpha)$ with $\lim_{x \to \infty} ax^\alpha/(m + x^\alpha) = a$ implying that in the best scenario the plaintiff can get at most $a \in (0, 1)$ winning probability. It expresses that even with an infinity amount of arguments it might be impossible for the plaintiff to prove a claim beyond "a reasonable doubt" and obtain a sure win. Therefore, in expected terms the defendant always obtains a strictly positive profit.\(^8\)

The justice system is not perfect, as there is no possibility of absolute proof. A not guilty verdict means that the standard for rejecting innocence was not met. It does not mean the individual is really innocent.

Note also that the "rent-seeking" contest success function is a particular case of (1), for $a = b = 1$ and $m = 0$.

Finally note that, after deriving the equilibrium expressions we let $m \downarrow 0$. In this way, the presumption of innocence bias effect is passed to the defendant through a better outside option. In other words, before trial the defendant is innocent, but at trial there are no innocence or guilt assumptions. The argumentation process together with some exogenous stochastic factors associated with the judgement technology (1) determine the outcome.

### 3 The American rule

Fee-shifting rules determine the allocation of lawyer expenses between the parties. Under the American rule, each litigant bear its own legal costs.

**The Problem** - The plaintiff chooses $x^{am}$ to maximize the expected trial payoff conditional on obtaining more than $\pi_x$ (the superscript $am$ denotes the American rule). The normalized

\(^8\)In our setting, the case $x = 0$ and $y > 0$ has no meaning. If the plaintiff files no claim the defendant optimal strategy is to set $y = 0$ because $p(0, 0) = 0$. 

objective function can be written as:

\[ \Pi_x^{am} = p^{am} \Delta_x - x^{am}, \]  

subject to the normalized participation constraint \( \Pi_x^{am} > 0 \). In other words, if the plaintiff does no file a claim, she obtains the zero \textit{status quo} normalized payoff. Similarly, the defendant chooses \( y^{am} \) to maximize the expected trial payoff conditional on obtaining more than \( \pi_y \) plus the no argumentation payoff. Therefore, the normalized objective function can be written as:

\[ \Pi_y^{am} = (1 - p^{am}) \Delta_y - y^{am}, \]  

subject to the normalized participation constraint \( \Pi_y^{am} > (1 - a) \Delta_y \). In other words, the defendant has some winning chances even if decides to not incur in costly argumentation. These winning prospects are bounded by the quality weaknesses of the plaintiff’s arguments.

\textbf{Argumentation Effort} - The first order conditions imply the following unique solution:

\[ x^{am} = \frac{r(a + b - 1)}{(1 + r)^2} \Delta_x, \]  

and

\[ y^{am} = \frac{r(a + b - 1)}{(1 + r)^2} \Delta_y, \]

where \( r \equiv \Delta_y / \Delta_x \in (0, \infty) \) measures the dispute defendant/plaintiff relative value. The values \( x^{am} \) and \( y^{am} \) are strictly positive for \( a, b \in [1/2, 1] \).

In terms of comparative statics, observe that both parties argumentation efforts increase with the own and other argumentation quality (as well as with the individual value under dispute). Such is due to the non-cooperative nature of the problem that implies an escalade in the intensity of mutual argumentation.

However, an increase in the opponent’s valuation, increases the argumentation effort of the plaintiff (respectively, defendant) if \( r < 1 \) (respectively, \( r > 1 \)). Consequently, the highest levels of mutual effort occur when both parties’ argumentation quality and valuation are high and similar.

\textbf{Participation Constraint} - The plaintiff and defendant participation constraints are always satisfied. In other words, the plaintiff always files a claim and both parties incur in costly active argumentation. The reason is that under the American rule both parties have full control over their argumentation costs.

Note that the plaintiff and defendant expected payoffs are obtained by plugging (4) and
(5) into (2) and (3), to obtain,

\[ \Pi_{x}^{am} = \frac{a + 2(1 - b)r + (1 - b)r^2}{(1 + r)^2} \Delta_x, \]

and

\[ \Pi_{y}^{am} = \frac{1 - a + 2(1 - a)r + br^2}{(1 + r)^2} \Delta_y, \]

respectively. The plaintiff and defendant participation constraints are straightforwardly satisfied, i.e., \( \Pi_{x}^{am} > 0 \) always, and \( \Pi_{y}^{am} > (1 - a)\Delta_y \) for \( b > 1 - a \), respectively.

Note also that both individuals payoffs increase with the quality of own arguments and valuation. However, they decrease with the quality of the opponents’ arguments and valuation.

We aggregate the information from the proceeding discussion in the following result, which the proof follows from the discussion.

**Proposition 1** Under the American rule; in equilibrium there is always active argumentation.

The interior equilibrium is very convenient, in particular if the focus of the analysis is the trade-off between argumentation efforts and winning prospects.

### 4 The English rule

The English rule is meant to force the involved parties to internalize some of the negative externalities associated with the decision to bring suit (e.g., on the taxpayers, on the legal institutions, among others). However, the increase on the expected costs has implications on the individuals’ incentives to file and contest lawsuits (Katz and Sanchirico, 2011).

**The Problem** - Similarly, the plaintiff chooses \( x^{en} \) to maximize the expected trial payoff conditional on obtaining more than \( \bar{x} \) (the superscript \( en \) denotes the English rule). In brief, since the loser in court pays the other party’s costs from litigation, the normalized objective function can be written as:

\[ \Pi_{x}^{en} = p^{en} \Delta_x - (1 - p^{en})(x^{en} + y^{en}), \]  

(6)
subject to $\Pi_x^{en} > 0$. Similarly, the defendant chooses $y^{en}$ to maximize the expected normalized trial payoff,

$$\Pi_y^{en} = (1 - p^{en})\Delta_y - p^{en}(x^{en} + y^{en}),$$

subject to $\Pi_y^{en} > (1 - a)\Delta_y$.

**Argumentation Effort** - The first order conditions from this problem imply the following unique solution,

$$x^{en} = \frac{(1 - b)(a + b - 1)r}{(1 - b + (1 - a)r)^2}\Delta_x,$$

and

$$y^{en} = \frac{(1 - a)(a + b - 1)r}{(1 - b + (1 - a)r)^2}\Delta_y,$$

where, $x^{en}$ and $y^{en}$ are strictly positive for $a, b \in (1/2, 1]$.

A simple analysis of comparative statics shows that both parties argumentation efforts increase with the quality of the own arguments and valuation. Moreover, an increase in the quality of the defendant (respectively, plaintiff) arguments, increases the plaintiff (respectively, defendant) effort when the value of the dispute is sufficiently important for her (respectively, him) that justifies participation.\(^9\)

Note also that an increase in the opponent’s valuation, increases the argumentation effort of the plaintiff (respectively, defendant) if $r < (1 - b)/(1 - a)$ (respectively, $r > (1 - b)/(1 - a)$), the converse otherwise.

In comparison with the American rule, under the English rule, the argumentation quality plays a more important role in the effort choices. In other words, since individuals have low control over the others production of arguments, an individual with weak arguments is less likely to participate in an "English dispute" because it may end up paying the other litigation costs.

**Participation Constraint** - An interior solution with active argumentation requires the simultaneous satisfaction of both participation constraints. On the contrary to the American rule, under the English rule participation may bind. For instance, it happens when the plaintiff obtains a negative expected profit if decides to file a lawsuit. In this case, the no participation payoff (status quo) would be better for her. However, as we will discuss below, neither of these two positions corresponds to an equilibrium.

In order to verify the satisfaction of these conditions we must compute the plaintiff and defendant equilibrium expected profits, which is done by replacing (8) and (9) into (12) and

\(^9\)It can be shown that if $\partial x^{en}/\partial b < 0$ (respectively, $\partial y^{en}/\partial a < 0$) the constraint (12) (respectively, (13)) must be failing.
(7), to obtain,
\[
\Pi_x^{en} = \frac{a(1-b)^2 + 2(1-a)(1-b)^2r - (1-a)(a+b^2-1)r^2}{(1-b + (1-a)r)^2} \Delta_x, \tag{10}
\]
and
\[
\Pi_y^{en} = \frac{(1-a)^2br^2 + 2(1-a)^2(1-b)r - (1-b)(a^2 + b - 1)}{(1-b + (1-a)r)^2} \Delta_y, \tag{11}
\]
respectively.

Note that the plaintiff (respectively, defendant) expected profit increases with the quality of the own arguments if \( r < \frac{(1-b)}{(1-a)} \) (respectively, \( r > \frac{(1-b)}{(1-a)} \)), i.e., when the plaintiff (respectively, defendant) arguments are relatively stronger and the value under dispute sufficiently important to her (respectively, him). Otherwise, they decrease. Note also that the plaintiff (respectively, defendant) profit decreases with the defendant (respectively, plaintiff) argumentation quality and valuation.

The plaintiff participation constraint, \( \Pi_x^{en} > 0 \), is satisfied if
\[
0 < r < r_x \equiv \frac{a(1-b)}{(a+b-1)(1-a)^{1/2} - (1-b)(1-a)}, \tag{12}
\]
while the defendant participation constraint, \( \Pi_y^{en} > (1-a)\Delta_y \), is satisfied if
\[
r_y \equiv \frac{a^{1/2}(1-b)^{1/2}}{1-a} < r < \infty. \tag{13}
\]

The constraints are more likely to be satisfied when the relative value of the dispute (\( r \)) is sufficiently important for the respective individual. The presumption of innocence creates a bias tendency towards the defendant and disincentives argumentation by raising the cutoff value \( r_y \).\(^{10}\) These relations depend on the relative difference between \( a \) and \( b \) in a nonlinear way.

**Sequential Structure and Equilibrium Existence** - With respect to the American rule, under the English rule there is an additional interest on whether the plaintiff has or not incentives to proceed with the claim through the legal system and whether or not the defendant finds in its best interest to prepare a costly defense.

In technical terms, when either or both participation constraints (12) and (13) fail, the equilibrium fails to exist. In order to deal with this difficulty, Farmer and Pecorino (1999) suggest passing from a simultaneous into a Stackelberg structure, in which the party with satisfied participation constraint becomes the leader. However, in line with our argumenta-

\(^{10}\)In both cases there is another strictly negative root without meaning in our setting.
tion, we consider a different strategy, in which the plaintiff is always the first mover. In our view this is the most natural approach in lawsuit, because she is the one that decides whether or not to file a lawsuit. Moreover, since the proof is always the burden of the plaintiff, if she wants to change the status quo, she must do something. In that sense, the plaintiff must move first. The same position on this issue is shared by Hirshleifer and Osborne (2001). We consider the following sequential structure:11

Stage 1 (lawsuit): The plaintiff decides whether or not to file the lawsuit, i.e., $x^{en} > 0$ or $x^{en} = \emptyset$, respectively. In the latter case the game ends with the status quo [normalized] payoffs, $\Pi_x^{en} = 0$ and $\Pi_y^{en} = \Delta_y$. Otherwise, the case proceeds to the defense stage 2.

Stage 2 (defense): The defendant decides whether or not to prepare a costly defense in response to the plaintiff allegations, i.e., $y^{en} > 0$ or $y^{en} = 0$, respectively. In the latter case, there is no active argumentation and the game ends with the expected payoffs, $\Pi_x^{en} = a\Delta_x$ and $\Pi_y^{en} = (1 - a)\Delta_y$. Otherwise, in the former scenario, the case proceeds to the argumentation stage 3.

Stage 3 (trial): It corresponds to a situation of active trial argumentation in which both the plaintiff and defendant simultaneously spend costly effort to produce arguments, i.e., $x^{en} > 0$ and $y^{en} > 0$, respectively. The game ends with the expected payoffs, $\Pi_x^{en} \in (0, a\Delta_x)$ and $\Pi_y^{en} \in ((1 - a)\Delta_y, \Delta_y)$, given by expressions (10) and (11), respectively.

This sequential structure is solved by backwards induction. For instance, if in stage 3 the plaintiff participation constraint fails. The defendant in stage 2 chooses to prepare a costly defense if he anticipates that his participation constraint is satisfied in stage 3 (scenario a), and not otherwise (scenario b).

Scenario a: If the plaintiff anticipates the former scenario, she does not file the claim in stage 1, and the parties obtain the payoffs, $\Pi_x^{en} = 0$ and $\Pi_y^{en} = \Delta_y$.

Scenario b: However, if the plaintiff anticipates the latter scenario, she files the claim but the defendant in stage 2 finds in its best interest to not produce arguments. The plaintiff best responds with minimum arguments, i.e., $x^{en} \downarrow 0$. Intuitively, the plaintiff cannot do better; at this stage the allegations have been presented and without a defendant response, she cannot do anything else other than wait for the judge decision. In this case, the parties obtain the

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11Our approach is simple but sufficiently realistic and serves the practical purpose of not leaving any range of parameters without equilibrium. Other sequential structures can solve the existence problem but with [potentially] different implications in the individuals’ behavior. A similar sequential structure appears in Carbonara and Parisi (2012).
expected payoffs, \( \Pi_x^{en} = a \Delta_x \) and \( \Pi_y^{en} = (1 - a) \Delta_y \). The same payoffs are obtained if in stage 3 the plaintiff participation holds but the defendant participation fails.

The following result aggregates this information. The proof follows from the discussion.

**Proposition 2**  
Under the English rule;

- For \( 0 < r < r_y \), there is an equilibrium in which the plaintiff file the claim but there is no active argumentation.
- For \( r_y < r < r_x \), there is an equilibrium in which the plaintiff file the claim and there is active argumentation.
- Otherwise, in equilibrium the plaintiff does not file the claim.

In the first region the plaintiff file a lawsuit but the defendant prefers to not spend costly effort because the dispute is not sufficiently important for him. In the second region both the plaintiff and the defendant actively spend efforts to produce arguments. In the third region, the plaintiff does not file a lawsuit because of the trade-off between high costs and winning prospects.

A necessary and sufficient condition for the existence of an equilibrium with active argumentation is the non-emptiness of the interval \((r_y, r_x)\), i.e., for \( a \in (1/2, 4(1 - b)/(2 - b)^2) \). Therefore, the inconsistency of the "rent-seeking" contest function pointed by Farmer and Pecorino (1999) that no trial occurs under the English rule for any parametrization disappears. Some extensions of the LSF (1) can widen or shrink the existence region.\(^{12}\)

**Remark 3**  
Note that if the defendant participation constraint would be \( \Pi_y^{en} > 0 \) rather than \( \Pi_y^{en} > (1 - a) \Delta_y \), we would have,

\[
\tilde{r}_y = \frac{(a + b - 1)(1 - b)^{1/2} - (1 - b)(1 - a)}{b(1 - a)} < r < \infty,
\]

which is a less restrictive constraint than (13).\(^{13}\) Under this perspective there is a grim of arguments between parties competing for a resource.\(^{14}\) There is no established status quo

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\(^{12}\)Several types of trial specific bias have been reported in the literature: pro-plaintiff, pro-defendant, hindsight and selection bias, among others. For instance, Priest and Klein (1984) suggest the existence of a selection bias in the cases that end in trial. These cases are the ones in which the plaintiff is optimistic about its winning prospects. Waldfogel (1995) shows a prevalence of pro-plaintiff bias in economic disputes, i.e., contracts and property rights, but not in tort cases.

\(^{13}\)In this case, the existence of an equilibrium with active argumentation requires non-emptiness of the interval \((\tilde{r}_y, r_x)\) and \( r_x > 0 \), which is guaranteed for \( a \in (1 - b^2, 2(1 - b)^{1/2} - (1 - b)) \).

\(^{14}\)See Hirshleifer and Osborne (2001) for a brief discussion about the probabilistic all-or-nothing and the proportional division interpretation of the LSF.
or presumption of innocence, and no side carries the burden of the proof. Therefore, the participation constraint \( \Pi_y^{en} > 0 \) is the most adequate to model [English law] civil proceedings (e.g., divorce or breach of contract) in which there is no presumption of innocence. The LSF suggested in the present paper extends to those cases. Note that under the American rule, this particular variation on the defendant’s participation constraint has no implications.

5 Final comments and comparisons

Now, we compare the joint implications of Proposition 1 and 2.

We start by noting that under the English rule both parties provide greater effort than under the American rule.\(^{15}\)

**Proposition 4** In the interior equilibrium \( x^{en} > x^{am} \) and \( y^{en} > y^{am} \).

In the proof it suffices to show that failures in the first or second inequalities of Proposition 4 necessarily imply failures in the plaintiff or defendant participation constraints, respectively.

The comparison makes sense when there is active argumentation, i.e., in the interval \( r_y < r < r_x \). Outside this region there is no production of arguments under the English rule, but there is active argumentation under the American rule. A corollary is the factual observation that under the English rule, disputes are less likely to end up in trial with active litigation. Therefore, supporting the argument in favor of a selection bias (Priest and Klein, 1984). Another consequence is that payoffs must be higher under the American rule. These observations are compatible with the empirical evidence.

In a nutshell, the English rule discourages nuisance suits and reduces the legal system costs but increases the spending on those cases that proceed to trial. These countervailing effects lead to ambiguous conclusions in terms of social welfare.

In terms of winning probabilities we have the following result.

**Proposition 5** In the interior equilibrium \( p^{en} > 1/2 \) and \( p^{am} > 1/2 \) if

\[
r < \frac{1 - b}{1 - a} \frac{2a - 1}{2b - 1}, \text{ and } r < \frac{2a - 1}{2b - 1},
\]

respectively. Furthermore, \( p^{en} > p^{am} \) if \( a > b \).\(^{16}\)

\(^{15}\)The discussion dates back to the 18th century; see for instance, Braeutigam et al. (1984) and the references therein for an early economic perspective on these issues. See Katz and Sanchirico (2011) for a survey.

\(^{16}\)The proof employs simple algebraic computations. Note that \( p^{am} = (a + (1 - b)r)/(1 + r) \) and \( p^{en} = (1 - b)(a + (1 - a)r)/(1 - b + (1 - a)r) \).
The individual with better quality arguments and/or higher relative valuation strives from an higher winning probability. In terms of winning probability, the plaintiff has higher chances under the English rule if she has better quality arguments. Otherwise, she prefers the American rule. The relative differences in terms of argumentation quality play a more active role in the individuals’ decisions under the English than under the American rule.

As pointed by Hirshleifer and Osborne (2001) there is no "correct" way to represent litigation. Social interactions are too far complex to be captured by any expression. Nonetheless, the LSF (1) can be enriched with a set of additional and realistic considerations, pro-defendant and pro-plaintiff bias (among other merits), argumentation technologies through better or worst lawyers, different [sunk] fixed costs of bringing suit, and other aspects common in legal disputes. Those can be easily incorporated in the analysis without imposing great computational complexity while preserving the analytical characteristics of the "rent-seeking" type approach. In this respect, notable extensions to the original model can be considered; for instance, Parisi (2002) compares the adversarial with the inquisitorial procedure using rent-seeking, or Farmer and Pecorino (2012) that consider that litigation costs are an increasing function of the judgment at trial.

In our approach we have reduced the emphasis given to the quantity of arguments. Otherwise, or if we would have modeled the individuals’ endowment, the rich would tend to win over the poor. These considerations may have empirical support but we do not consider them in the baseline model. This aspect further motivates the inclusion of a qualitative dimension in the litigation success function but also more research in this area.

Finally, we have presented a technical biased and always short approach to litigation. Most of these issues have also been analyzed from a strictly political, law or behavioral perspectives; we refer the reader to Posner (1999).

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