Spite in Litigation*

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March 6, 2024

This paper studies how litigation and settlement behavior is affected by agents motivated by spiteful preferences under the American compared to the English fee-shifting rule. We conduct an experiment and find that litigation expenditures are overall higher under the English rule compared to the American – even for low-merit cases – while there is no difference for settlement requests. Spiteful participants exhibit overall higher expenditures and settlement requests, with a more pronounced increase in litigation expenditures under the American fee-shifting rule and a similar increase in settlement requests under both rules. Consequently, both rules induce roughly the same behavior for players who are motivated by spiteful preferences. Being spiteful comes at a cost. The expected payoff is lower for more spiteful litigants – especially under the American rule – independent of facing a less or more spiteful opponent. Additionally, being matched with a more spiteful litigant reduces the expected payoff similarly under both rules. We conclude that the English rule can protect spiteful players from themselves, but cannot reduce the harm they inflict upon others – at the cost of inducing higher litigation expenditures for less spiteful players compared to the American rule.

Keywords: Spite; Litigation; Settlement; Experiment; English rule; American rule
JEL: K41, C72, C91, D91

*We thank Kathryn Spier, Oliver Kirchkamp, Henrik Orzen, Jonathan Klick, Sven Höppner, Serhiy Kandul, Olexandr Nikolaychuk, Leonard Hoeft, Benedikt Werner and Christoph Engel for helpful comments. We appreciate comments from participants of the IMPRS Thesis Workshop, the Econometric Society European Meeting in Manchester, the Ghent Law & Econ Seminar, the Jena Econ-Seminar, the YEM in Brno, the 8th Annual Conference on "Contests: Theory and Evidence" in Reading, and the HeiKaMaxY in Mannheim. We gratefully acknowledge funding from the Max Planck Society through the IMPRS-Uncertainty. Support by the German Research Foundation (DFG) through CRC TR 224 (Project A01) is gratefully acknowledged. This work was supported by the University of Mannheim's Graduate School of Economic and Social Sciences.

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1. Introduction

It is well known that some plaintiffs sue defendants not only to seek justice but also out of malice, spite, and pure anger. Malicious and spiteful litigants are suing and going to court just to harm and punish the opponent. They derive utility from the harm inflicted upon others, either because they are inherently spiteful, or because spitefulness is triggered by the situation.

Such malicious litigation is a very popular and a regularly recurring theme in TV shows about law and medicine. Yet, this pattern is not only fictional but also has a very real match in legal practice: the "Vexatious Litigant", which is typically defined as follows:

> "[...]Vexatious litigation is meant to bother, embarrass, or cause legal expenses to the defendant.[...]"[1]

Vexatious litigants are people who go to court, mostly malicious and without a good case, to harm and bother the defendant. Very often, they file frivolous lawsuits. Frivolous lawsuits – lawsuits typically filed by a party who is aware that the case is without merit – waste time, money, and in particular judicial resources.[2] Subjects who repeatedly engage in vexatious litigation might, in some jurisdictions, be added to the list of vexatious litigants. In Great Britain, for example, this means that one is forbidden from starting a civil case without court permission.[3]

Malicious and spiteful litigation is not uncommon[4] and often found for example between disputing neighbors, alienated partners, angry siblings, and business rivals.[5] Divorces and malpractice suits are particularly prone to malicious litigation.[6] But malicious litigation can also occur between mere acquaintances.[7] These examples underline that spiteful litigation can occur either because agents are inherently spiteful, or because their spitefulness is triggered by the situation, such as one party perceiving the other as unreasonable, or by the behavior of the

[1] See Legal Information Institute (2018).

[2] See the argument in Anderson (1997), Post (2011), and Yago (1999).

[3] For a list of vexatious litigants in Great Britain see https://www.gov.uk/guidance/vexatious-litigants.

[4] Similar arguments are made by Chen and Rodrigues-Neto (2023); Guha (2016); Kisner (1976); Philippi (1983).

[5] There are several examples of malicious litigation: Singleton v Singleton, 68 Cal. App. 2nd , 699 (1945) represents a case of malicious litigation between siblings; GRAHAM v. GRIFFIN, 66 Cal. App. 2nd, 116 (1944) is a case of malicious litigation between neighbors. Singleton v Perry, 45 Cal. 2nd 492 (1955) and more so Davey v. Dolan, 453 F. Supp. 2d 749 (2006) show cases of spiteful litigation towards estranged partners and their families. Crowley v. Katleman, Cal. P. 2nd 1083 (1994) presents a case of former friends engaging in malicious litigation. CSC (Contemporary Services Corporation) v Staff Pro Inc, 152 Cal. App. 4th 1043 (2007) shows a fascinating case of several rounds of malicious litigation. Silver v. Gold, 211 Cal. App. 3d, 17 (1989) shows a case of malicious prosecution between business rivals and Cantu v. Resolution Trust Corp., 4 Cal. App. 4th, 857 (1992) and Casa Herrera, Inc. v. Beydoun, 32 Cal. 4th, 336 (2004) show cases of malicious prosecution of people in business. Bertero v. National General Corp. , 13 Cal. 3d, 43 (1974) depicts a case of malicious prosecution of employer and employee.

[6] See Kisner (1976) and Philippi (1983). One such example of a malicious malpractice suit is Lackner v Lacroix, 25 Cal 3rd, 747 (1979). Many more examples can be found in Kisner (1976) footnote 11 and footnote 8. See also Philippi (1983) footnote 6 for several examples of malicious litigation in malpractice suits and footnote 11 refers to a study arguing that most medical malpractice suits are without merit.

[7] For example, Drainville v. Vilchez, 2014 ONSC 4060 (CanLII) presents a case of malicious litigation between two truck drivers in Canada.

other party that led to litigation in the first place. Excessive litigation expenditures that come with such spitefulness do not only waste resources for the litigant, it also forces the defendant to increase legal expenses to maintain the same chances of winning the case. Therefore, the question arises: How can a legal system be designed to decrease such wasteful litigation behavior driven by spitefulness?

One such possible way is the choice of the fee-shifting rule, which determines who (the defendant or the plaintiff) has to pay for whose legal costs. Which of the rules should be implemented remains an important question that is still discussed today. Lawyers, as well as judges, create substantial costs in the litigation process and it seems plausible that the loser of litigation should at least pay for her own lawyers. Therefore, the core question of the fee-shifting debate is whether and how much the loser has to pay for the winner's lawyer.

Two common approaches are typically discussed in the literature: the American and the English rule. Under the American fee-shifting rule, everybody has to pay their own expenses. Hence, under this rule, there are no additional costs for losing. Under the English rule, the loser has to pay the legal expenditures of the winner – up to a certain amount. This way, frivolous lawsuits are hoped to be discouraged. In the theoretical literature, it was argued that the English rule reduces the number of lawsuits filed by plaintiffs with such low-merit cases, with the downside that the total number of lawsuits increases compared to the American rule (see Spier, 2007).

It is not obvious how spiteful preferences impact litigation behavior under both rules. It seems plausible that spite increases litigation expenses, however only up to a certain point dependent on the merit of the case. Under the American rule, there is a trade-off between harming the opponent and harming oneself as for very high-merit cases any additional dollar has to be bared by the "attacker" and does not improve the own chances substantially (similarly under very low-merit cases). Under the English rule, it seems plausible to harm the other especially if the merit is high (as the chances of harming are high), but for low merit, any spite would almost inevitably backfire as winning chances are low. Hence, spite might have differential effects depending on the merit and the fee-shifting rule.

The goal of this paper is to study how litigation predictions of the two fee-shifting rules change if agents are not purely self-interested but also motivated by spiteful preferences. We go one step further and additionally ask how spite affects pre-trial settlement requests under the shadow of (spiteful) litigation. Finally, we address whether one of the rules is better suited to protect agents from the harm caused by excessive spiteful litigation expenses. To answer these questions, we first build a theoretical model to derive predictions, which we then test with the help of an experiment.

Our theory predicts that litigation expenditures are overall higher under the English rule compared to the American – but with lower expenditures for frivolous low-merit cases under the English rule. Litigation expenditures are overall higher for spiteful agents compared to non-spiteful agents. This spite-induced increase is the same between the two fee-shifting rules, however, there are differential effects depending on the merit of the case. Under the Ameri-

can rule, there is a proportional increase for all merit levels, whereas under the English rule, spite increases a specific range of low-merit cases only. This is because the English rule incentivizes agents to either spend all resources up to the value of the winner's prize or none at all. Consequently, spite can only increase those (low-merit) cases, where agents do not spend all of their resources yet – but only up to a specific merit as any additional expenses in cases with almost no merit would most likely backfire.We also show that spiteful preferences only affect settlement behavior under the American but not under the English rule. This distinction arises from the interplay of two spite-induced countervailing forces. First, spite influences the bargaining power by changing the expected litigation outcome and associated utility. Second, spite affects the utility from the bargaining outcome itself, as spiteful players receive additional disutility from any concession to their opponent. Under the American rule, the force from the expected litigation utility is more pronounced, but perfectly attenuated under the English rule by the force from the settlement stage.

To test these theoretical predictions, we run an experiment, where we can exogenously vary not only the fee-shifting rule, but also the merit of the case. The controlled environment of an experiment also allows us to elicit both settlement requests and litigation expenditures for all participants, and hence to shut down the selection effect for litigation expenditures. Additionally, we can explicitly measure subjects' spitefulness via two different measures.

With our results, we can confirm part of the theoretical predictions. In particular, we find that first, the English rule leads to overall higher expenditure for all merit levels, including low-merit cases. Unlike theory would predict, we do not find that the English rule discourages frivolous (low-merit) law suits. Instead, we find that the English rule encourages any kind of law suits, including frivolous ones. Concerning settlement requests, we do not find any significant differences between the two rules, leading to the same litigation probabilities across the two fee-shifting rules.

Second, subjects exhibiting more spiteful preferences spend more on litigation and request higher settlement amounts than those with lower spiteful preferences under both rules. This increase in litigation expenditures is more pronounced under the American compared to the English fee-shifting rule, driven by a constant increase for all merit levels under the American rule compared to an increase for low-merit cases only under the English rule, like our predictions suggest. There is no such differential effect depending on the rule on settlement request. Consequently, the English rule seems to be more robust towards spiteful preferences, driven, however, by overall higher litigation expenditures for less spiteful players.

Third and finally, we show that being spiteful does not pay off, as the expected payoff is lower for more spiteful subjects independent of being matched only with either more or less spiteful subjects. This decrease is more pronounced under the American rule. The harm of being matched with a spiteful player, however, is similar across the two rules. As a consequence, the English rule can help to protect spiteful players from the harm they inflict on themselves. The harm they inflict upon others, however, can not be decreased by the choice of the fee-shifting rule.

The contribution of this paper is threefold. First, we contribute to the empirical (Snyder and Hughes, 1990; Hughes and Snyder, 1995; Fenn et al., 2017; Helland and Yoon, 2017; Helmers et al., 2021) and experimental literature (Main and Park, 2000, 2002; Inglis et al., 2005; Gabuthy et al., 2021; Massenot et al., 2021) that studies the differences of the two fee-shifting rules for litigation or settlement behavior. While the existing literature suggests that the English rule leads to higher litigation expenditures overall, this paper is the first to provide (experimental) evidence of the influence of the merit of the case under the two fee-shifting rules for litigation and pre-trial bargaining.[8] Importantly, we shut down the selection effect of bargaining on litigation and therefore can speak directly to the influence of the fee-shifting rule and merit on litigation expenditures. We show that the English rule leads to higher litigation expenditures for *all* merit levels compare to the American rule, while there is no difference in settlement requests. Hence, the English rule seems not to be better suited to deter frivolous low-merit lawsuits, on the contrary, it even leads to higher expenditures for such lawsuits.

Second and most importantly, we provide consistent evidence that litigation and settlement behavior is sensitive to spiteful preferences and that this effect depends on the fee-shifting rule. The current experimental investigations of the fee-shifting rules do not account for spiteful preferences and studies litigation and settlement (Gabuthy et al., 2021; Massenot et al., 2021) or settlement only (Coursey and Stanley, 1988; Main and Park, 2000, 2002; Inglis et al., 2005). Eisenkopf et al. (2019) accounts for the impact of negative emotions such as anger, yet not inherent spiteful preferences, and focuses on the American fee-shifting rule only. We show that spiteful preferences are consistently associated with higher litigation expenditures and settlement requests. The increase in litigation expenditures is particularly pronounced under the American rule, making the two rules similar for more spiteful players. Additionally, by combining both litigation and pre-trial negotiations, we can compare the expected costs of spitefulness between the two rules. Whereas the harm done to others is similar under both rules, the English rule can protect spiteful players from themselves, as it is more robust towards spiteful preferences. The English rule, however, comes at the cost of overall higher litigation expenditures, driven by less spiteful players. Which fee-shifting rule to implement therefore depends both on the distribution of spite and merit in the relevant population.

Third, we also contribute to the recent theoretical literature on spiteful preferences in litigation and settlement. Most importantly, we contribute to the theoretical work of Chen and Rodrigues-Neto (2023), who show that the effect of negative relational emotions on litigation expenditures depend on the merit of the case and on the rule. We also contribute to the theoretical works of Guha, who studies the effects of malice (i.e., spiteful preferences) on litigation Guha (2016) or on pre-trial bargaining under the shadow of litigation, however with an exogenous (and unaffected by malice) litigation outcome (Guha, 2019). We provide evidence

[8] We acknowledge that the experimental work on litigation of Gabuthy et al. (2021) exogenously varies the merit of the case, however, it enters the performance function as an additive constant component only. Consequently, the merit of a case does not influence the marginal effectiveness of effort and thus doesn't change equilibrium choices.

for some of the theoretical effects of spiteful preferences on litigation and settlement behavior. Additionally, we extend the theoretical literature by studying the effects of spite on pre-trial bargaining (Nash-Demand game), when both the settlement outcomes *and* disagreement outcomes (i.e., expected litigation payoffs) are shaped by spiteful preferences, the merit of the case, and the fee-shifting rule.

The remainder of the paper is structured as follows: In Section 2, we briefly summarize the relevant literature. Section 3 presents the model. In Section 4, we explain the design of the experiment. Section 5 shows the results of the experiment and in Section 6, we conclude.

2. Literature

This current paper is related to several strands of literature. In particular, it relates to the literature on litigation and settlement in the law and economics literature, as well as to the literature on social and in particular spiteful preferences.

2.1. Litigation literature

A core issue in the theoretical law and economics literature is to model litigation and to compare different legal systems. One such way is to model litigation as an all-pay auction (e.g. Baye et al., 2005, 2012), where those who present the best arguments win the dispute with certainty. Typically, arguments are modeled as a function of efforts, which can be considered investing time and money in the search for the best arguments but also an investment into better lawyers and other judicial resources.

The alternative approach, most commonly used in the literature, is to model the litigation process as a Tullock contest. Here – different from the all-pay approach – the best argument wins with a certain probability. One of the earliest approaches to do so was by Plott (1987), later refined to include the merit of the case and to allow weighting of arguments (see for example Hirshleifer and Osborne, 2001).[9]

One important feature of a legal system is the fee-shifting rule, which determines, who has to bear the costs of litigation. The first to study fee-shifting in litigation in a general framework are Braeutigam et al. (1984), later extended by Baumann and Friehe (2012a). Baye et al. (2012) study a general model with spillovers and apply it to a litigation setting not only under the American and the English rule but also intermediate rules like the Marshall rule – where the winner is paying all legal costs – and the Quayle rule – where the loser has to pay the costs of the winner, but only up to the same amount spend by the loser. Carbonara et al. (2015) study limited fee-shifting in a Tullock contest, where the loser only has to pay up to a certain threshold. Chen and Wang (2007) studies the interaction of the fee-shifting rule with contingency fees. For an informative overview of the (early) litigation literature, see Spier

[9] Other extensions include, for example, incorporating the benefits (Choi and Sanchirico, 2004) or comparing the adversarial and inquisitorial systems (Parisi, 2002).

(2007) and Katz and Sanchirico (2010) for an overview of the (early) literature on fee-shifting in litigation.

However, the question in the literature is not only how to model and design litigation. The literature also asks what conditions result in litigants going to court at all. To tackle this question, the literature has intensely studied models of settlement. One of the first who studied litigation and settlement under two-sided incomplete information was Schweizer (1989). Spier (1994, 1992) extended the model to dynamic pretrial negotiation models and also discussed how settlement changes under different legal rules. Similarly Reinganum and Wilde (1986) and Hause (1989) studied how settlement changes under different litigation costs (fee-shifting). For a good overview of the settlement literature see Spier (2007, pp. 268-282).

The overall findings in the theoretical examinations, in particular concerning fee-shifting, are threefold: the English rule compared to the American changes 1) filing decisions, 2) litigation expenditures and, 3) settlement rates (see Spier, 2007, pp.300-303). Firstly, under the English rule, plaintiffs with low-merit cases (presented as a contest success function in their opponent's favor) are less likely to file a lawsuit, while plaintiffs with high-merit cases are more likely to file. Second, under the English rule, legal expenditures are higher as the marginal benefits have increased, and the marginal costs have decreased compared to the American rule. Third, under the English rule litigation rates are rising.

Several papers use public data to evaluate these theoretical predictions empirically. For example, Snyder and Hughes (1990) and Hughes and Snyder (1995) used a change in legislation in Florida to study the effect of the fee-shifting rule on the plaintiff's probability to win, jury awards, and out-of-court settlements.[10] Similarly, Fenn et al. (2017) and Helmers et al. (2021) studied litigation expenditures in England and Wales after fee-shifting reforms in 2000 and 2010. Overall, the literature finds that the English rule increases plaintiff success rates, average jury awards, out-of-court settlements, and average litigation expenditures. The authors argue that these results indicate that the English rule successfully deters low-merit cases from being filed. However, (Helland and Yoon, 2017) corrects the results of (Snyder and Hughes, 1990; Hughes and Snyder, 1995) for selection effects and reconfirms that the English rule only increases out-of-court settlements, however finds mixed effects for trial awards and litigation expenditures. These mixed findings call for an experimental investigation. In this paper, we not only exogenously vary the fee-shifting rule and merit of the case, but we also shut down the selection effect, by eliciting litigation expenditures independent of participant's settlement outcomes. We, therefore, contribute to the empirical discussion of fee-shifting conditional on the merit of the case.

In addition to the sparse empirical papers studying fee-shifting, there have been a few experimental approaches to study fee-shifting. For example, Dechenaux and Mancini (2008) conducted an experimental test of the all-pay auction model of litigation by Baye et al. (2005), while Gabuthy et al. (2021) and Massenot et al. (2021) experimentally compared the English

[10] In most of the US, the American rule is used. Florida, however, adopted from 1980 until 1985 the English rule for medical malpractice cases.

and the American rule in a Tullock model. Main and Park (2000) and also Massenot et al. (2021) investigated pretrial bargaining under the American and English rules.[11] Overall, the experimental literature finds that legal expenditures are higher under the English rule, especially for high-merit cases. The evidence for the proportion of cases filed for litigation, however, is mixed. Dechenaux and Mancini (2008) finds that under the English rule less cases go to trial, while Massenot et al. (2021) does not find any difference between the two fee-shifting rules. Gabuthy et al. (2021) even finds a higher proportion of filed suits under the English rule, especially so for low-merit cases. Unlike Massenot et al. (2021) and Dechenaux and Mancini (2008), we also exogenously vary the merit of the case. Unlike Gabuthy et al. (2021), we vary the merit of the case not as an additive component to the performance function, but as an interaction with own effort levels, making the merit of the case decisive for equilibrium choices. Unlike the existing experimental work, we also study the interaction of the fee-shifting and merit with spiteful preferences both for litigation expenditures and settlement requests.

Notably, many of the theoretical papers assume plaintiffs and defendants to be self-interested and without any biases or social preferences.[12] These assumptions, however, are strongly contrary to the findings in experimental economics as outlined below.

2.2. Literature on spiteful preferences

An extensive experimental literature has provided evidence that subjects do not merely selfishly maximize their own payoffs, but also care about others' payoffs and thus exhibit social preferences (for an overview, see Cooper and Kagel, 2016). Not only positive (Andreoni, 1989) but also negative social preferences have been shown to influence behavior. For example, Andreoni et al. (2007), Cooper and Fang (2008), Herrmann and Orzen (2008), Kimbrough and Reiss (2012), Bartling et al. (2017), and Kirchkamp and Mill (2021) used experiments to show that subjects have spiteful preferences and that these lead to more competitive behavior. Similarly, Abbink and Sadrieh (2009), Abbink and Herrmann (2011), and Bauer et al. (2023) show in experiments that subjects display nasty and antisocial behavior. A key insight from this literature is that spiteful preferences influence behavior in many economic settings.

Consequently, the theoretical literature started to incorporate the influence of spiteful preferences in litigation (Guha, 2016; Chen and Rodrigues-Neto, 2023), standard bargaining (Montero, 2008; Guha, 2018), and pre-trial bargaining settings (Guha, 2019).[13] For instance, Guha (2016) studies the effect of malicious preferences on litigation behavior. She develops an own model of litigation and models malicious preferences as additional utility coming from the

[11] Other papers study the 50 percent rule in the lab (Thomas, 1995), pretrial bargaining with a shadow of the future (Coursey and Stanley, 1988; Main and Park, 2000), and negotiations and conflict under the shadow of the future (Main and Park, 2002; McBride and Skaperdas, 2014; McBride et al., 2017).

[12] For an exception see Heyes et al. (2004), who assume agents to be risk-averse, Baumann and Friehe (2012b) model agents to have emotions, and Guha (2016, 2019) and Chen and Rodrigues-Neto (2023) who assume malicious agents.

[13] In auction settings, Morgan et al. (2003), Mill (2017), Bartling et al. (2017), and Kirchkamp and Mill (2021) used theoretical means to show that spiteful preferences lead to overbidding.

payment endured by the defendant. In a later study, Guha (2019) incorporates spitefulness in dynamic pretrial settlement under the threat of litigation. Here, she introduces malice as utility coming from the opponent's litigation costs *and* costs of waiting for a resolution. Additionally, the utility from the disagreement outcome is influenced by the degree of malice. The outcome itself, however, is exogenous and unaffected by malice. Unlike Guha (2016) and Guha (2019), we use a rather standard model of litigation (Hirshleifer and Osborne, 2001) and bargaining (i.e., a Nash demand game), vary the merit of a case, and study not only the American but also the English fee-shifting rule. Different to the models of malicious preferences of Guha (2016) and Guha (2019), our model of spiteful preferences focuses on the final payoffs and not only on the costs endured. Importantly, unlike Guha (2019), we model settlement with an endogenous disagreement outcome – the expected litigation outcome – which is determined in equilibrium and shaped by the players' level of spite, the merit of the case, and the fee-shifting rule.

Chen and Rodrigues-Neto (2023) study the interaction of emotions and the fee-shifting rule in litigation settings. Litigants obtain additional emotion-based utility depending on the final payoff of the opponent, which can be either positive or negative. They define a generic model that captures, among several others, the Tullock contest success function.[14] They find that negative emotions amplify the costs of fee-shifting – this implies that the increase in litigation costs due to negative emotions is higher under the English rule compared to the American. Unlike Chen and Rodrigues-Neto (2023), we also study spiteful preferences and the interaction with the fee-shifting rule for pretrial bargaining under the threat of (spiteful) litigation.

Finally, this paper is also related to the theoretical contest literature with spillovers (Chowdhury and Sheremeta, 2011a,b; Baye et al., 2012; Betto and Thomas, 2024). When opponents are motivated by spiteful preferences, own choices create spillovers for the opponent's utility, and vice versa. Thus, we provide experimental evidence that spite-driven spillovers influence behavior in litigation settings.

We are not aware of any experimental study, which investigates the impact of spiteful preferences in a litigation or settlement setting. Most closely is the study of Eisenkopf et al. (2019), which focuses on the impact of emotions in a litigation setting. They do not find any impact of emotions on litigation expenditures. The authors induce emotions through a pre-litigation stage, where players can steal money from their opponent. Instead of studying the impact of emotions, we focus on inherent antisocial preferences. Furthermore, unlike relying on non-incentivized self-reports of emotions, we primarily rely on an incentivized behavioral spite task. Lastly, we also investigate the interaction of spite with the fee-shifting rule and the merit of the case.

Overall, we add to the literature by providing a thorough (experimental) investigation of how spitefulness interacts with the American and English rule with an exogenous variation in the

[14] To ensure an interior solution under the English rule, the authors asumme the exponent of the CSF to be smaller than 1. We, instead, rely on the most commonly used Tullock model, the lottery contest, where the exponent equals 1. We ensure a (corner) solution by constraining the litigation expenditures upwards to the winning prize.

merit of the case. We do this both for litigation litigation behavior and pre-trail bargaining under the shadow of endogenous spiteful litigation.

3. Model

In this section, we build a theoretical model to derive predictions in order to guide the interpretation of our experimental results. Our aim is not to present an all-encompassing model of litigation but rather to provide some intuition for what could be expected in our experiment. Despite this modest aim, the model generally provides valuable insights into litigation and settlement behavior when agents have spiteful preferences.

We model both litigation and settlement behavior under the American and English fee-shifting rules and vary the merit of the case. We incorporate spiteful preferences both for litigation expenditures (in section 3.1) and settlement requests (in section 3.2).

3.1. Litigation model

To model litigation, we use a model similar to Hirshleifer and Osborne (2001). To model spiteful preferences, we build on Morgan et al. (2003).[15]

We assume two litigants, i and j, who denote the defendant and the plaintiff, respectively. Both litigants make a decision upon their effort for litigation $e_k \in [0, \overline{e}]$ with $k \in \{i, j\}$. The litigation effort represents the cumulative effort invested in the litigation process and aims to reflect the quality of the argument brought forward in court. The litigation effort includes – among other things – the personal effort in finding and providing evidence, the cost for the lawyer, and the time invested in making the arguments.

Both i and j litigate for a prize of common value $W \in \mathbb{R}$. We further assume that litigants are spending at most the value of the prize, i.e., $\overline{e} = W$.[16] We assume risk-neutral and spiteful agents.

In court, the judge makes a decision to whom to assign the prize, based on the arguments and also based on the commonly known merit of the plaintiff's case $q \in [0, 1]$. The merit of the case can be interpreted as the general tendency of a particular judge to rule in favor of the plaintiff. It can also be considered as argument weighting due to fairness and it might be construed to reflect who "truly" deserves the object (in a world with perfect information).

In particular, we use the following contest success function for player i, which is a special case of the contest success function suggested by Hirshleifer and Osborne (2001):

$$p_i(e_i, e_j, q) \colon = \frac{(1-q) \cdot e_i}{q \cdot e_j + (1-q) \cdot e_i}$$

[15] See also Bartling et al. (2017), Mill (2017), Mill and Morgan (2018), and Kirchkamp and Mill (2021) for the use of this model.

[16] Introducing this upper bound guarantees the existence of a Nash equilibrium under the English fee-shifting rule. Constraining the litigant's expenditures also reflects reality in that they cannot spend infinite resources.

and correspondingly the probability of player j to win the argument is denoted by $1-p_i(e_i, e_j, q)$. Several aspects of this simple contest success function are worth pointing out:

- If either one of both players drops out of litigation (i.e., $e_k = 0$), the probability to win will be 1 for the other player
- If both players provide equally good arguments (i.e., $e_i = e_j$), the probability to win for player j depends solely on the merit of the plaintiff's case q.
- If the merit of the plaintiff's case is zero (i.e., there is absolutely no merit to the case), player i (the defendant) wins with certainty.
- Correspondingly, if the merit of the defendant's case is zero (i.e., the judge is purely in favor of the plaintiff), player j wins with certainty.

After the judge's ruling, the winner obtains the prize W and the loser does not. Under the American rule, the winner and loser each have to pay their effort costs. Under the English rule, the loser has to pay his own costs and compensate for the entire effort costs of the winner.

Moreover, we assume that agents exhibit external preferences, i.e., their utility is influenced by the payoff of the other litigant. We use a model suggested by Morgan et al. (2003), where agents receive additional disutility from the opponent's payoff and hence additional utility from the opponent's negative payoff (i.e., costs).[17] We define $\alpha \in (0, 1)$ and the opponent's payoff ϕ_j, which results in the agent's additional utility $\nu_i(\alpha_i, \phi_j) = -\alpha_i \cdot \phi_j$. For simplicity, we assume that $\alpha_i = \alpha_j$. Hence, the overall utility (u_i) of litigation of agent i can be written as:

$$u_i(e_i, e_j, q, \alpha) = \underbrace{p_i(e_i, e_j, q)}_{\text{Probability of winning}} \cdot \underbrace{\left(\underbrace{W - \mathbb{1}_{American} e_i}_{\text{Payoff}} \underbrace{-\alpha \cdot (-e_j - \mathbb{1}_{English} e_i)}_{\text{Disutility due to spite}} \right)}_{\text{Utility in case of winning the case}} \tag{1}$$

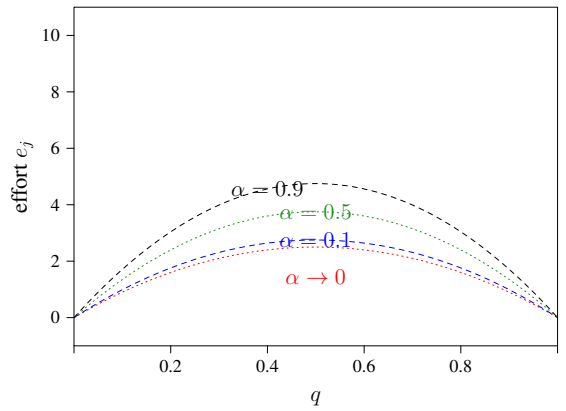
$$+ \underbrace{(1 - p_i(e_i, e_j, q))}_{\text{Probability of losing}} \cdot \underbrace{\left(\underbrace{-e_i - \mathbb{1}_{English} e_j}_{\text{Payoff}} \underbrace{-\alpha \cdot (W - \mathbb{1}_{American} e_j)}_{\text{Disutility due to spite}} \right)}_{\text{Utility in case of losing the case}}$$

Similarly, the utility (u_j) of litigation of agent j is $u_j(e_j, e_i, q, \alpha) = u_i(e_j, e_i, 1 - q, \alpha)$. We assume that both litigants simultaneously maximize their utility and simultaneously decide on their litigation expenditures conditional on their opponent's best response (Nash equilibrium).[18] In the following, we refer to the plaintiff (player j). Hence, we speak of low merit when q is small and of high merit when q is high.

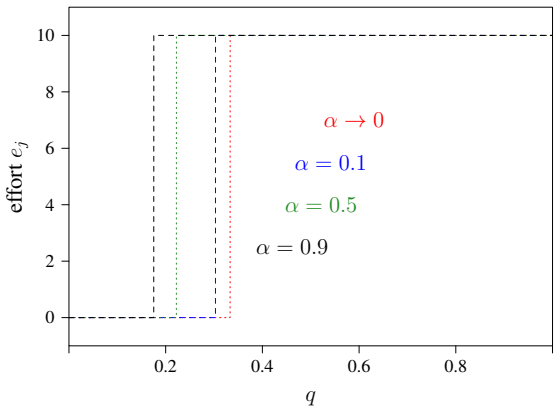
[17] Note that this definition of the spite motive builds on the absolute payoff of the opponent and not on the payoff differences. Hence, it is distinct from disutility coming from inequality aversion.

[18] The utility function (including the spillover parameters) under the American rule satisfies the conditions Chowdhury and Sheremeta (2011b) lay out for the existence of a unique symmetric equilibrium. We show the existence of a unique equilibrium under the English rule in Appendix A.2.2.

Figures 1a and 1b each depicts the static symmetric equilibrium expenditures under the American or English fee-shifting rule for player j. Formal propositions and their derivation can be found in Appendix A.1.1. In the following, we describe the equilibrium expenditures and derive the theoretical predictions (see Appendix A.2.5 for the formal derivations, where necessary).



(a):
Equilibrium litigation expenditures under the American fee-shifting rule for spiteful litigants.



(b):
Equilibrium litigation expenditures under the English fee-shifting rule for spiteful litigants.

Figure 1: Equilibrium predictions.
Equilibrium litigation expenditures (e) under the American (left) and English (right) fee-shifting rule with $W = 10$ for different merits q and different spite levels α (see Proposition (1) and (2) in Appendix A.1.1). Note that the vertical lines in the right panel are presented just for illustration purposes (i.e., 0 and 10 are optimal but not the values in between).

Under the American rule, players have to bear their own litigation costs, independent of the litigation outcome. Therefore, litigation expenditures are highest, when none of the players has a relative advantage, i.e., when both players have the same merit $q = 0.5$. This is because for low-merit cases ($q < 0.5$), there is a smaller chance to win and thus it does not pay off to spend much money on litigation. Moreover, for high-merit cases ($q > 0.5$), winning probabilities are already high – also because the opponent does not invest much – and thus less own expenditures are needed.

Under the English rule, players do not have to bear their own expenditures in case of winning, and thus the expected litigation expenditures are low if winning chances are high. Yet, if winning chances are low, expected costs are high because the loser additionally has to bear the winner's expenditures. Therefore, if the prospects of winning are good enough, players fully invest into litigation. However, if the prospects of winning are too low, players are incentivized to at least save their own litigation expenditures, and reduce their spendings to zero.

The benefit of winning is higher under the English rule compared to the American since the loser has to pay all the costs. Therefore, overall, agents spend more resources under the English compared to the American fee-shifting rule:

Hypothesis 1.1. *The average litigation expenditures of all merit levels q are higher under the English fee-shifting rule than under the American fee-shifting rule.*

Being spiteful introduces additional disutility from losing and utility gains from winning. Hence, spite widens the prize gap and thus litigation expenditures increase. Under the American rule, expenditures increase proportionally depending on the merit. Under the English rule, expenditures can only increase, if they are not already at the maximum. Thus, spite influences expenditures only for merit levels, where agents do not fully invest yet, and shifts this threshold to ever lower merit cases. Consequently, only low-merit cases are affected by spite under the English rule[19]. Aggregated over all merit levels q, average litigation expenditures are higher for more spiteful agents.

Hypothesis 1.2. *Under the American fee-shifting rule, average litigation expenditures are higher for more spiteful agents. This increase is driven by an increase at every merit level.*

Hypothesis 1.3. *Under the English fee-shifting rule, average litigation expenditures over all merit levels q are higher for more spiteful agents. This increase is driven by an increase at a specific range of low-merit levels only while there is no increase at high-merit levels.*

Next, we study whether this increase in litigation expenditures for more spiteful agents is more pronounced under the American or English fee-shifting rule. To get a benchmark prediction, we compare the average expenditure of a fully spiteful agent ($\alpha \to 1$) to the average expenditure of a fully non-spiteful agent ($\alpha \to 0$) over all merit levels q. In this specific case, there is no difference in the average increase for being spiteful compared to not being spiteful between the two rules.

Hypothesis 1.4. *There is no difference in the increase of the average litigation expenditure over all q between the English and American fee-shifting rule for a non-spiteful ($\alpha \to 0$) compared to a fully spiteful ($\alpha \to 1$) agent.*

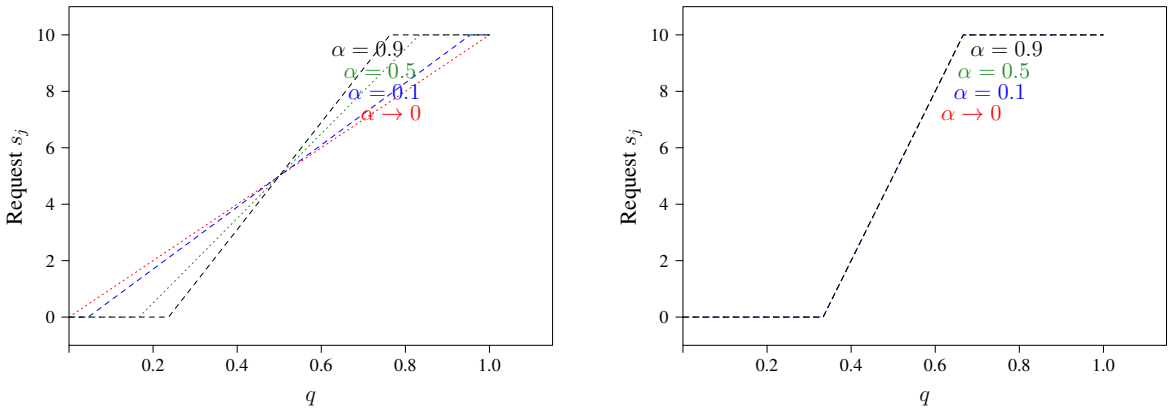
3.2. Settlement model

In some cases, agents may not want to litigate.[20] To avoid litigation, agents can also settle the dispute. We model settlement behavior as a standard Nash-Demand game: Two agents make a suggestion of how to split a good W by requesting a certain amount of this good (s_k with $k \in \{i, j\}$). If both the requests of i and j sum to W, i.e., $s_i + s_j = W$, the requests are granted. If both the requests are in sum less than W, i.e., $s_i + s_j < W$, both obtain their request plus half of the leftover as their payoff, i.e., $\Phi_i = s_i + \frac{W - s_i - s_j}{2}$. If, however, the sum of both the requests exceeds W, i.e., $s_i + s_j > W$, then no settlement is reached, and agents have to litigate for W.

[19] A more detailed explanation of the incentives under the English rule can be found in Appendix A.1.1.

[20] For instance, under the English fee-shifting rule, litigation leads to negative payoffs for not high enough merit levels for one of the parties.

Spiteful preferences affect the utility function both in case the settlement is successful and when it is not. When settlement is successful, player i receives utility from her share s_i of the pie. Additionally, due to spite, she receives disutility from player j's share of the pie. This settlement utility is described by $u_i^{settlement}(s_i, s_j, \alpha) = s_i - \alpha s_j$ and for player j by $u_j^{settlement}(s_i, s_j, \alpha) = s_j - \alpha s_i$. If the settlement is not successful, agents have to litigate for W. The expected payoffs from the litigation stage are called the disagreement values $d_i(e_i^*, e_j^*, q, \alpha)$ and $d_j(e_i^*, e_j^*, q, \alpha)$. Note that both the disagreement value and the settlement utility are directly affected by the spite parameter α.



(a):
Equilibrium settlement requests under the American fee-shifting rule for spiteful litigants.

(b):
Equilibrium settlement requests under the English fee-shifting rule for spiteful litigants.

Figure 2: Equilibrium predictions.
Equilibrium settlement requests (s) under the American (left) and English (right) fee-shifting rule with $W = 10$ for different merits q and different spite levels α (see Proposition (3) and (4)).

We rely on the Nash-Demand solution (Nash, 1950), and more specifically, on the efficient pure-strategy Nash equilibrium, where we maximize the function $f = (u_i^{setllement} - d_i)(u_j^{settlement} - d_j)$ under the constraints that $s_i + s_j = W$ and $s_i, s_j \in (0, W)$.[21] Figure 2b shows the static symmetric equilibrium settlement requests for player j under the American and English fee-shifting rules. In the following, we describe the equilibrium settlement requests and derive the theoretical predictions (see Appendix A.2.6 for the formal derivations, where necessary).

In the Nash-Demand Game, settlement request are determined by the players' bargaining power. Under both rules, bargaining power is shaped by the expected litigation outcomes and therefore directly by the merit of the case. Consequently, requested settlement amounts increase in the merit. Whenever the expected payoff of litigation is negative, the requested amounts are zero, where the opponent would then request the full amounts. In the efficient pure-strategy Nash equilibrium, all resources are allocated without waste among the two players. Therefore,

[21] While this approach does not yield any settlement failures, it nonetheless provides useful comparative statics with respect to spiteful preferences and its interaction with the fee-shifting rule and merit.

there are no differences in the average settlement requests over all merits q under the American and the English fee-shifting rule.

Hypothesis 2.1. *There is no difference in the average settlement requests over all merits q between the American and the English fee-shifting rule.*

When players have spiteful preferences, both their expected utility from litigation – and hence their expected disagreement outcomes – and their utility from the settlement outcomes are influenced. In the litigation stage, spite further widens the gap of the winning and losing utility and hence the changes in the expected litigation utilities depend on the winning probabilities. Winning probabilities are directly shaped by the merit of the case (and in the symmetric equilibrium unaffected by the players' level of spite). Consequently, for low-merit cases ($q < 0.5$), spite decreases the expected utility even further, whereas for high-merit cases ($q > 0.5$), spite increases the expected utility of litigation. Therefore, more spiteful players demand more for high-merit cases and less for low-merit cases, which is reinforced by the opponent's requests, who has the 'opposite' merit $1 - q$.

In the settlement stage, any concession to the opponent reduces the own utility due to spite. In the symmetric spite case, both players receive the same disutility from their opponent's share. As a consequence, the player, who allows the opponent to have a greater part of the good W, receives more disutility. Thus, for low-merit cases ($q < 0.5$), the disutility is higher for the disadvantageous player and consequently spite increases the requested amount. For high-merit cases ($q > 0.5$), the player anticipates that a spiteful opponent will not want to give her much, and thus spite decreases her demand. This works as a direct attenuating effect to the effect of spite on the expected litigation utility. Under the American rule, the effect of spite on the disagreement outcome in the litigation stage prevails, while under the English rule, these effects are perfectly attenuated by spite's effects in the settlement stage.

Hypothesis 2.2. *Under the American fee-shifting rule, the average settlement requests for low merits ($q < 0.5$) are lower for more spiteful agents, while for high merits ($q > 0.5$) they are higher.*

Hypothesis 2.3. *Settlement requests under the English fee-shifting rule are the same for more spiteful and less spiteful agents.*

Finally, there is no difference in the average influence of spite on the settlement requests over all merits q, because all resources are always allocated without waste in the efficient Nash-Demand game solution.

Hypothesis 2.4. *There is no difference in the change of average settlement requests over all merits q between the English and American rule for non-spiteful compared to spiteful agents.*

4. Experiment

In this section, we describe the design of the litigation experiment (in section 4.1), our measures of spiteful preferences (in section 4.2), subject recruitment (in section 4.3), payment (in section 4.4), and the procedure of the experiment (in section 4.5).

4.1. Litigation experiment

To test the theoretical predictions, we manipulated the fee-shifting rule, which was either *American* or *English*, as well as the merit of the case. The fee-shifting factor was implemented in a within-subjects design, i.e., every subject made all decisions both for the American and the English fee-shifting rule. To cope with order effects, we counterbalanced the order of the fee-shifting rule: Half the participants made decisions under the American regime first and then under the English one whereas the other half of participants made decisions under the English regime first and then under the American one.[22]

To have a clear design and to exclude effects of winning/losing (e.g., hedging effects or retaliative motives), the experiment was conducted as a one-shot game. This means that subjects made all their decisions only once and that there was no feedback between any decision.

In addition to the litigation decisions, we also elicited settlement behavior.[23] Thus, subjects had to make two decisions: the litigation and the settlement decision. The litigation stage was played under each regime first, and only then subjects were instructed and asked to make the decision for the settlement stage. This has three advantages: 1) it ensures that subjects do indeed follow backward inductions, 2) it ensures that litigation behavior is not impacted by the mere failure of the settlement stage, i.e., subjects are not driven by anger due to a failed settlement and more importantly, 3) it ensures the experiment not to have a selection bias – i.e., all subjects litigate and not only those who fail settlement. So, subjects made a litigation decision first and then they were asked to settle the dispute under the shadow of litigation – i.e., if the settlement stage was payoff-relevant and they settled successfully, this settlement represented their payoff. However, if they failed to settle, the outcome of the litigation stage would be payoff-relevant. No information regarding the other players' choices was provided between the two stages. Thus, all observations are statistically independent.

The settlement was designed as a standard two-player Nash-Demand game as described in the model section 3.2. The litigation stage was played as a standard two-player Tullock-contest. To ensure that subjects do not end up with a negative payoff, they were always endowed with 10 tokens. In addition, subjects competed in the litigation stage for a prize of 10 tokens and no subject was endowed with the litigated object to reduce biases due to loss-aversion (Kahneman and Tversky, 1984; Tversky and Kahneman, 1992), an endowment effect (Kahneman et al., 1990; Plott and Zeiler, 2007), and more generally reference-dependent preferences (Kőszegi

[22] Appendix B.2.1 provides evidence of the absence of an order effect.

[23] To ensure incentive compatibility, we only paid either the resulting payoffs of the litigation or the settlement stage. For a more detailed description of the payment procedure, see section 4.4.

and Rabin, 2006).

Furthermore, all subjects had to make five decisions in each stage – settlement and litigation – under each regime – English and American. The decisions differed only by the parameter q – representing the merit of the case from the plaintiff's point of view – where low merit corresponds to a low q and high merit to a high q. The five chosen levels of q were $q \in \{0.1, 0.3, 0.5, 0.7, 0.9\}$. To cope with order effects, the order of the presented qs was randomized by subject. Figure 11 and 12 in Appendix B.4 show the interface for the litigation and settlement decision under the English rule for q of .5, respectively. As subjects did not get any feedback between the decisions – in fact subjects were informed about the outcome of all tasks only after a day – the decisions represent a strategy method approach (Selten, 1967). Overall, subjects made 2 (Regime: English, American) x 2 (Stage: Settlement, Litigation) x 5 (Merit $q \in \{0.1, 0.3, 0.5, 0.7, 0.9\}$) = 20 decisions.[24]

To reduce experimenter demand effects, we instructed subjects on an abstract level, i.e., we did not use words like litigation, settlement, court, American, English, plaintiff, defendant, etc. Instead, the litigation stage was presented as "Task A," and the settlement stage was presented as "Task B". Subjects were instructed in the litigation stage as typically done in contest experiments and in the settlement stage, they were instructed as usually done in Nash-Demand experiments (see also the instructions in Appendix C.1).

4.2. Spiteful preferences measures

After the litigation experiment we elicited spiteful preferences via two different methods.[25] Specifically, we used the *Spite-Task* (Mill and Morgan, 2021; Kirchkamp and Mill, 2021), and the *Spite-Questionnaire* (Marcus et al., 2014). Additionally, we employed the *SVO-Task* (Murphy et al., 2011; Murphy and Ackerman, 2014) to elicit prosocial preferences, which we use as a robustness check for the effects of spiteful preferences.

Spite-Task: We use the Spite-Task (Mill and Morgan, 2021) to measure spiteful preferences towards the opponent in the experiment, which is similar to the SVO-Slider measure (Murphy et al., 2011). In the Spite-Task (see Table 1), subjects make three money distribution decisions. While the allocation that maximizes their opponent's payoff also maximizes their own, subjects can intentionally reduce the payoff of their opponent. Depending on the allocation decision, this reduction is either costless or comes with a personal cost. Therefore, when subjects choose to reduce their opponent's payoff, they do so because they actively want to harm the other

[24] Our setting encourages cold decision-making rather than hot decision-making, which may make it more difficult to identify emotion-based spite effects. However, we argue that we can still identify inherent preference-based spitefulness in our setting. Further, the cold-decision making makes our design cleaner as other factors associated with hot decision-making could have confounded our results (such as other emotion-based social preferences).

[25] Additionally, we aimed to manipulate the extent of spite by excluding social preferences altogether. For this purpose, participants were either matched with a computer or another human participant. The manipulation, however, seems not to have worked as the manipulation was too weak. We present the results of the manipulation in Appendix B.3 and provide a detailed discussion on why we believe the manipulation failed.

player. Consequently, we interpret any deviation from the payoff-maximizing allocations as spitefulness. We made participants aware that it was randomly determined whether their own or their opponent's allocation decision would be implemented.

Table 1: Spite measure.

You receive	70	70	70	70	70	70	70	70	70
	○	○	○	○	○	○	○	○	○
Other receives	100	98	96	94	92	91	89	87	85
You receive	70	68	65	62	60	58	55	52	50
	○	○	○	○	○	○	○	○	○
Other receives	100	96	92	89	85	81	78	74	70
You receive	100	100	100	100	100	100	100	100	100
	○	○	○	○	○	○	○	○	○
Other receives	100	98	96	94	92	91	89	87	85

The table depicts the three allocation decisions in the Spite-Task, where the players decides among nine possible allocations in each. The upper rows show the own payoff for the deciding player, while the bottom rows show their opponent's payoff.

In the Spite-Task, the *spite score* indicates how much the player reduced the payoff of their opponent relative to the maximally possible amount. Players can reduce their opponent's payoff from 0 and 60 points in all three decisions combined and, therefore, the spite score ranges between 0 and 1.

Spite-Questionnaire: The additional measure of spitefulness is a non-behavioral questionnaire. In the questionnaire by Marcus et al. (2014) participants are asked to rate 17 statements. Here are two examples:[26]

- I would be willing to take a punch if it meant that someone I did not like would receive two punches.
- I would be willing to pay more for some goods and services if other people I did not like had to pay even more.

Participants were asked to indicate their agreement on a scale between 1 and 5. Higher scores on the scale indicate more spitefulness. This task's measure of spitefulness is the average agreement with the statements.

SVO-Task: To measure prosocial preferences, we used the 6-items primary scale of the SVO Slider Task (Murphy et al., 2011; Murphy and Ackerman, 2014). The primary scale of the SVO-task consists of six distribution-decisions among nine possible allocations. Table 2 shows these six decisions with all the possible allocations per decision. Based on these answers, a continuous variable is calculated (i.e., the SVO-angle). This variable represents a participant's

[26] All questions are shown in Appendix C.4.

prosocial preference and ranges from -16.26° to 61.39°, where a higher value represents more prosocialness.

Table 2: SVO-Task.

You receive	85	85	85	85	85	85	85	85	85
	○	○	○	○	○	○	○	○	○
Other receives	85	76	68	59	50	41	32	24	15
You receive	85	87	89	91	92	94	96	98	100
	○	○	○	○	○	○	○	○	○
Other receives	15	19	24	28	32	37	41	46	50
You receive	50	54	59	63	68	72	76	81	85
	○	○	○	○	○	○	○	○	○
Other receives	100	98	96	94	92	91	89	87	85
You receive	50	54	59	63	68	72	76	81	85
	○	○	○	○	○	○	○	○	○
Other receives	100	89	79	68	58	47	36	26	15
You receive	100	94	88	81	75	69	62	56	50
	○	○	○	○	○	○	○	○	○
Other receives	50	56	62	69	75	81	88	94	100
You receive	100	98	96	94	92	91	89	87	85
	○	○	○	○	○	○	○	○	○
Other receives	50	54	59	63	68	72	76	81	85

The table depicts the nine allocation choices in each of the six decisions of participants in the primary scale of the social value orientation (SVO) measure by Murphy et al. (2011). For each choice, the upper row denotes the payoff in experimental currency units for the deciding participants, while the bottom rows each denote the payoff for the other player.

4.3. Subject recruitment and selection

The experiment was conducted online and subjects were recruited via Amazon's Mechanical Turk (mTurk).[27] We use a mTurk sample, because they are typically more diverse in terms of age, ethnicity, education, and geographical location, and therefore tend to better represent the US population than usual student samples (Buhrmester et al., 2011; Berinsky et al., 2012; Paolacci et al., 2010). Several studies show that the data obtained in mTurk is very reliable and very similar to data typically obtained in laboratory experiments (Paolacci et al., 2010; Buhrmester et al., 2011; Horton et al., 2011; Berinsky et al., 2012; Arechar et al., 2018).

An additional advantage of employing an online design is that participants' anonymity can be sufficiently ensured, as we only have access to their mTurk-ID. This anonymity might enhance the reliability of results regarding subjects' litigation and settlement behavior and especially regarding their spiteful preferences. Furthermore, we minimize reciprocity concerns because participants do not meet each other in the online context, and we do not communicate the identity of their matched partner. Finally, through this anonymity, we can also exclude social tie and peer effects by conducting the experiment online.

[27] The platform is frequently used by economists (e.g., DellaVigna and Pope, 2018; Horton et al., 2011) and other social scientists (e.g., Jordan et al., 2016, 2017; Peysakhovich et al., 2014; Rand et al., 2014; Suri and Watts, 2011; Mao et al., 2017).

One obvious disadvantage of such an online setting, is that subjects might pay less attention. To tackle this potential issue, and to ensure a high-qualitative sample, we restrict recruitment to US-based individuals[28], which have an approval rate of at least 97% and more than 500 approved HITs. Additionally, subjects had to answer incentivized control questions after reading the instructions.[29]

4.4. Payment

To ensure that all decisions are incentive-compatible we paid out one decision only.[30] Subjects were told that only one scenario (q) of one stage – i.e., either the litigation or the settlement stage – under one fee-shifting rule would be paid out. The matching of players was randomly performed after all decisions were made. As all subjects had to indicate their decisions for all scenarios (q), we assigned each randomly matched pair one q, and each subject was randomly assigned the role of either the plaintiff (i.e., the decision for q was payoff-relevant) or the defendant (i.e., the decision for $1 - q$ was payoff-relevant). The payment was executed a day after all subjects had made their decisions.

4.5. Procedure

Subjects were recruited to this experiment via Amazon Mechanical Turk and were directed to an external survey-link. As soon as subjects arrived at our platform, they were asked for their individual MTurk-ID to ensure payment at the end of the experiment. After giving consent to participating in the experiment, subjects were asked to answer several socio-demographic questions, i.e., age, gender, education, and ethnicity. Thereafter, subjects were instructed with the experimental task and had to answer incentivized control questions (each control question gave additional 5 dollar-cents). After making all decisions of the litigation experiment, subjects were instructed for the SVO-Task and the Spite-Task. They stayed in the same pairs as in the litigation-experiment. Some participants also took part in the risk-task (which we explain and discuss in Appendix B.2.4). After answering the Spite-Questionnaire, subjects were directed back to Amazon Mechanical Turk. The procedure is depicted in figure 13 in the appendix.

[28] Subjects' location is verified through their IP addresses. Requesters can review the work done by mTurkers and decide to approve or reject the work. Approved work is paid as indicated in the contract, and rejected work is not paid. Hence, higher approval rates of workers indicate a higher quality of work.

[29] In a second wave, we further excluded subjects who used a VPN from outside the US, subjects on mobile devices, and bots. Additionally, every participant had to answer the control questions correctly before being able to proceed with the experiment. In the second wave, we also elicited risk aversion (discussed in Appendix B.2.4) and find that it does not interact with the influence of spiteful preferences. The overall results of the two waves are qualitatively comparable (see Appendix B.2.3).

[30] See Azrieli et al. (2018) for a detailed argument.

5. Results

We conducted the experiment in two waves: The first wave took place in November 2017, and the second wave in January 2021. We recruited 1635 participants and the experiment was implemented using the online survey tool Qualtrics. The entire experiment lasted for about 30 ($SD = 17.96$) minutes. Median earnings of participants were $ 2.90 (including a show-up fee of $1) resulting in an average hourly wage of $ 7.13, which is more than the median hourly income of a typical MTurker. We had 51 % female participants, participants' age ranged from 18 to 81, and 78 % of participants reported to have at least a college degree.

Throughout this entire results section, we present the results based on the plaintiff's view of merit, where low merit corresponds to a low q and high merit to a high q. Since all subjects had to indicate their decision based on this view, we can classify all subjects using the same merit classification. To derive the observed behavior from the defendant's view of merit, q can be swapped with $(1 - q)$ in all the results and figures.

5.1. American vs. English fee-shifting

We start with studying differences in litigation and settlement behavior between the American and English fee-shifting rules. The left part of figure 3 shows litigation expenditures and settlement requests for both fee-shifting rules conditional on the merit q, while the right part shows the decisions for both regimes as an average over all possible (uniformly distributed) merits q.

As a first step, we focus on litigation expenditures. We find that subjects invest on average 4.87 tokens in litigation under the American regime and 5.64 tokens under the English regime. A paired t-test reveals that they invest significantly more under the English regime compared to the American regime ($t(1634)$= -13.2, $p < 0.001$), as hypothesis 1.1 suggests. Not only on average, but for any merit level, subjects significantly invest more under the English rule, including for low-merit cases. This suggests that the English fee-shifting rule does not help in preventing frivolous (low-merit) litigation, as theory would predict. On the contrary, the English rule seems to lead to higher investments in the litigation process for cases with little merit. We report on the regression analysis of the differences between the English and American rule as a function of the merit q in Appendix B.1.1.

Overall, neither the functional theoretical predictions (see figures 1a and 1b) of the American nor the English rule are fully born out by the behavior of subjects in the experiment (see figure 3). For instance, under the English rule, subjects invest more for low-merit cases than predicted and less for high-merit cases. This behavior might be explained by prospect theory (Tversky and Kahneman, 1992): Subjects underestimate their winning chances for high-merit cases and hence are more careful in their litigation expenditures, while they overestimate their winning chances for low-merit cases and thus invest more, even though they likely have to carry their own (and opponent's) costs. This probability distortion may especially matter for the English rule, because the incentives to win are higher, which leads to a higher (perceived) marginal

increase in expected utility of an additional unit spent for low-merit cases compared to the American fee-shifting rule. Under the American rule, even though there is an apparent increase in litigation effort from low to medium merit, there is no decrease from medium to high merit. The absence of this decrease might be explained by joy of winning (Cooper and Fang, 2008) or anticipated regret (Filiz-Ozbay and Ozbay, 2007, 2010; March and Sahm, 2017), where subjects anticipate to regret not having invested more if they could have won.

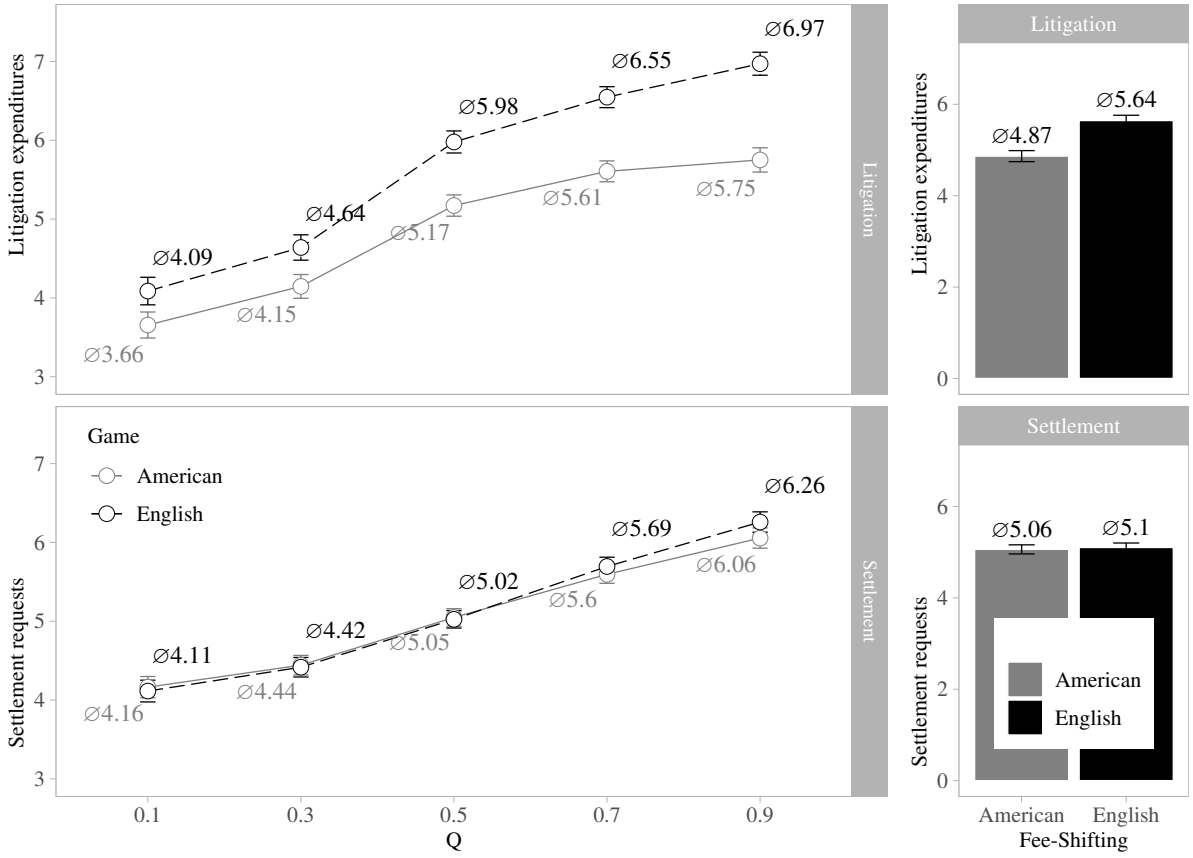


Figure 3: Litigation expenditures and settlement requests.
The figures to the left depict the litigation expenditures and settlement requests by fee-shifting rule as a function of q, while the figures to the right depict the aggregates. The panels on the top depict the litigation effort, while the panels on the bottom illustrate the settlement requests. Grey solid lines depict the behavior under the American fee-shifting rule, while black dashed lines indicate the response under the English fee-shifting rule in each panel. The error bars indicate the 95% confidence intervals.

Next, we compare how settlement requests, on average, differ between the English and American fee-shifting rule. We find that subjects request on average 5.06 tokens for settlement under the American regime and 5.10 tokens under the English regime. A paired t-test does not indicate a significant difference between these requests ($t(1634)$= -1.3, $p\geq$ 0.05). Once again, this non-difference seems to be the case not only on average but for all merit levels individually. The lack of a meaningful statistical difference can be interpreted as supportive evidence of hypothesis 2.1, denoting that there is no difference in the average settlement requests between the American and the English rule.

Concerning the theoretical functional form of settlement requests (see figure 3), we can confirm that requests are increasing in the merit of the case. Theory, however, would predict a

more steep increase, especially under the English rule. One potential explanation for the less pronounced increase is that participants under-exploit their bargaining position, and hence are relatively insensitive to merit-induced differences in the disagreement outcomes. This argument goes in line with the literature, who find that participants are relatively insensitive to changes in their disagreement values in the Nash-Demand game (Fischer et al., 2007; Anbarci and Feltovich, 2013), even if the bargaining position is earned through a preceding real-effort task (Anbarci and Feltovich, 2018).

Our key findings for the overall differences between the American and English rule are as follows. First, litigation expenditures are overall higher under the English rule compared to the American, including for low-merit cases. Second, there is no significant difference in settlement requests between the fee-shifting rules.

5.2. The effect of spite

In this subsection, we study how spiteful preferences affect litigation expenditures and settlement requests under both regimes and depending on the merit. For this, we first show that we find consistent effects of spite on litigation and settlement behavior across all our spite measures. Then, we study how spite interacts with the fee-shifting rule and the merit of the case.

5.2.1. Measures of spite and effect on litigation and settlement

First, we take a look at our measures of spiteful and prosocial attitudes. We find that the two spite measures are correlated positively and significantly ($r = 0.524$, $p<0.001$). Additionally, we see that our measure of prosocial behavior (SVO-Measure) is negatively correlated with our spite measure ($r = -0.132$, $p<0.001$) and with the Spite-Questionnaire ($r = -0.13$, $p<0.001$), providing plausibility for our measures of spiteful preferences.

Now we study the effect of spite on both litigation expenditures and settlement requests. As a first step, we correlate our measures of spiteful and prosocial preferences with litigation expenditures and settlement requests. Table 3 shows how litigation expenditures and settlement requests are changing with increased spite behavior (Spite-Task), increased scores on the Spite-Questionnaire (SpiteQ), and increased social value orientation (SVO). Higher scores on the Spite-Task indicate stronger preferences for destruction of wealth of the opponent, higher scores on the Spite-Questionnaire indicate more spitefulness, while increased social value orientation scores indicate more prosocial behavior. All independent variables are z-scored.

It can be seen that increasing spite scores (Spite-Task), as well as increasing spitefulness on the Spite-Questionnaire, are associated with higher legal expenditures and higher settlement requests. We also see that higher prosociality (SVO) is associated with lower settlement requests. An increase in the spite measures by one standard deviation influences legal expenditures and settlement requests more than a one standard deviation increase in prosociality. This indicates that antisocial preferences play a more prominent role in describing behavior than prosocial

preferences.[31]

Table 3: Regression of the average litigation expenditures and settlement requests by social-preferences measures.

	Litigation / Settlement					
	L	S	L	S	L	S
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	5.26***	5.08***	5.26***	5.08***	5.26***	5.08***
	(0.05)	(0.05)	(0.05)	(0.04)	(0.05)	(0.05)
Spite-Task	0.65***	0.68***				
	(0.05)	(0.05)				
SpiteQ			0.71***	0.83***		
			(0.05)	(0.04)		
SVO					−0.03	−0.11**
					(0.05)	(0.05)
Litigation	✓	×	✓	×	✓	×
Observations	1,635	1,635	1,635	1,635	1,635	1,635
R^2	0.09	0.12	0.11	0.18	0.0002	0.003
Adjusted R^2	0.09	0.12	0.11	0.18	−0.0004	0.003
Residual Std. Error (df = 1633)	2.03	1.83	2.01	1.76	2.13	1.95
F Statistic (df = 1; 1633)	167.07***	223.63***	202.54***	366.95***	0.39	5.28**
Note:						+p<0.1;*p<0.05;**p<0.01;***p<0.001;

Models (1), (3), and (5) estimate the litigation expenditures. Models (2), (4), and (6) estimate the settlement requests. Standard errors are shown in parenthesis.

5.2.2. Interaction of spite with the fee-shifting rule

In the following, we classify subjects as spiteful if their spite score is higher than the median spite score and as non-spiteful otherwise,[32] to obtain a deeper insight into the relationship between spite and litigation and settlement behavior depending on the fee-shifting rule and the merit of the case. Figure 4 shows the litigation expenditures and the settlement requests for more/less spiteful subjects by the fee-shifting rule and the merit of the case (q).[33] To study these behavioral patterns formally we use a mixed-effects regression for the aggregate legal expenditures and settlement requests by the median splits of the spiteful preference measures

[31] Note that the SVO measure also contains aspects of antisocial preferences. To deal with this issue, we can also use only a subset of the SVO task to obtain a measure of efficiency preferences. However, efficiency preferences are highly correlated with the SVO measure (>0.9). Further, all the results presented for the SVO measure also hold for the efficiency-preference-measure. Specifically, efficiency preferences have – similar to the SVO measure – little predictive power for both the litigation as well as the settlement behavior.

[32] We caution that having a higher score than the median does not necessarily make a subject spiteful in absolute terms. However, we decided for this classification to have two balanced sets of subjects: one with subjects with rather spiteful preferences and one with subjects with less spiteful preferences.

[33] In Appendix B.1.2 and B.1.3, we also show the settlement requests and the litigation expenditures for more/less spiteful subjects identified through the Spite-Questionnaire in Figure 6 and for more/less prosocial subjects in Figure 7.

and the fee-shifting rule (reported in Appendix B.1.2) and the merit of the case q (see Appendix B.1.3). We find that using median splits on the aggregate legal expenditures and settlement requests yield insights similar to the ones obtained from Table 3.[34] The following deductions from the figure are supported by the formal econometric analysis.

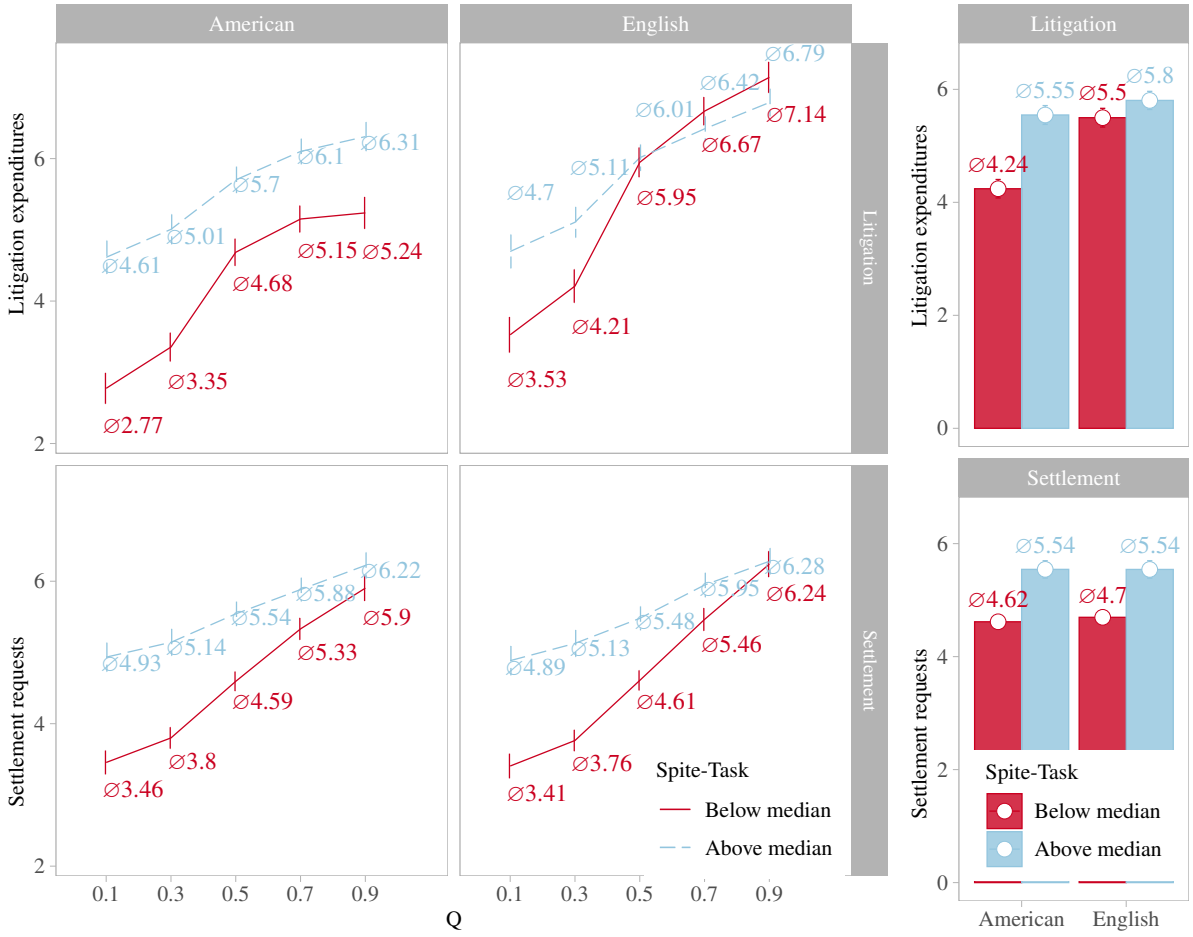


Figure 4: Litigation effort and settlement request under the American and English fee-shifting rule as a function of q for more/less spiteful subjects.

The figures to the left depict the litigation expenditures and settlement request by fee-shifting rule for more and less spiteful subjects as a function of q, while the figures to the right depict the aggregates. The panels on the top depict the litigation effort, while the panels on the bottom illustrate the settlement requests. Red solid lines depict the behavior of less spiteful subjects (i.e., subjects with below-median spite scores on the Spite-Task), while blue dashed lines indicate the response of more spiteful subjects. The error bars indicate the 95% confidence intervals.

Both under the English and American fee-shifting rule, we find that subjects with above-median spite scores (on both spite measures), on average, invest significantly more into litigation, as Hypothesis 1.2 and 1.3 suggest. Concerning settlement requests, we find that subjects with above-median spite scores, on average, request significantly higher settlement concessions under both rules.

When examining the interaction of spitefulness with the fee-shifting rule, we observe that the increase in litigation expenditures for more spiteful subjects is more pronounced under the

[34] We also present the main results with continuous measures of social preferences in Appendix B.1.3. The results are essentially identical.

American rule compared to the English rule. Thus it appears that the American fee-shifting rule is more prone to distortions driven by spiteful preferences. As a consequence, litigation expenditures are relatively similar for more spiteful subjects under both rules. When examining this increase depending on the merit q, we see that the increase is relatively constant over all merit levels under the American rule, while under the English rule, it appears that more spiteful subjects exhibit substantially higher litigation expenditures for low-merit levels only. For high-merit levels, more and less spiteful subjects exhibit about the same litigation expenditures under the English rule. This goes tentatively in line with the functional predictions (see figure 4), where, under the American rule, we predict a proportional increase for more spiteful agents for all merit levels, whereas under the English rule, we predict an increase for a specific range of low-merit cases only.

Interestingly, we see no interaction effect between spiteful preferences and the fee-shifting rule for settlement requests. This indicates that social preferences play roughly the same role under both fee-shifting rules with regard to settlement requests. However, we do observe differential effects of spite depending on the merit of the case. We see that more spiteful subjects request substantially more than less spiteful subjects for low merits, and this difference decreases as the merit of the case increases. This pattern is found for both fee-shifting rules alike, and different to the theoretical functional predictions. For settlement request, theory predicts no influence of spite under the English rule and an increase in litigation expenditures for high-merit cases and a decrease for low-merit cases.

This increase in settlement request for both rules, with a decreasing difference, is consistent with the effects spite has in the bargaining stage. As pointed out in section 5.1, literature tells us, that subjects systematically under-exploit their bargaining position (Fischer et al., 2007; Anbarci and Feltovich, 2013, 2018). This indicates that the effects of spite from the litigation stage, and thus from the disagreement outcomes, may receive less importance in the decision-making process. Consequently, effects of spite in the bargaining stage may receive more importance, where any concession to the opponent creates additional disutility. Higher concessions create more spite-induced disutility, and thus, for low-merit cases, spite increases the disutility of the bargaining outcome more for the disadvantaged player compared to their opponent. Consequently, settlement requests increase. For high-merit cases, the concessions to the opponent are low, but one could anticipate the spiteful opponent wanting to concede less. Hence, in order to reach a settlement, the high-merit player has to decrease the requests. At the same time, the high-merit player wouldn't mind too much to litigate and consequently still increases the request – but to a smaller extend than the low-merit player. This could explain, why we observe higher requests for low-merit cases, and only smaller increases for high-merit cases due to spite.

This reasoning is also underlined by the fact that the overall steepness of the settlement request with respect to the merit q is less pronounced for players with above-median spite scores compared to players with below-median spite scores. In fact, with the observed requests and our explanation of the effects of spite in the settlement outcome, we can partially explain, why

it generally *seems* that players under-exploit their bargaining position: because they receive spite-related disutility directly from the bargaining outcomes, which attenuates the influence of their bargaining power.

The key findings of this section are: First, spiteful preferences are consistently associated with higher litigation expenditures and settlement requests under both rules. The increase in litigation expenditures is more pronounced under the American compared to the English rule, while for settlement requests there is no such differential effect depending on the fee-shifting rule. Consequently, the rules are relatively similar for more spiteful subjects, while for less spiteful subjects, the overall differences in litigation expenditures between the fee-shifting rules is more pronounced. Additionally, spiteful preferences seem to matter more for the bargaining outcome than for the disagreement outcomes, when settlement requests are formed.

5.3. The costs of spite

In this section, we focus on the welfare implications of spitefulness depending on the fee-shifting rule and merit. In particular, we compare the difference in the expected payoffs for more spiteful subjects compared to less spiteful subjects under the two fee-shifting regimes. We additionally differentiate between being matched with either more or less spiteful subjects. The expected payoff is the payoff a subject with a given merit q is expected to obtain prior to bargaining and litigation. We focus on the expected payoff and not on expected utility to measure the monetary costs that spitefulness bears to society.[35]

Figure 5 depicts the empirical ex-ante expected payoffs of less and more spiteful subjects when matched with any kind of subject of the entire experiment's population under both fee-shifting rules. It additionally shows the expected payoffs for being matched either with only more or only less spiteful subjects. We find that being spiteful comes with a considerable cost. Prior to bargaining and litigation, less spiteful subjects are expected to have an average payoff of 2.69 compared to an average payoff of 1.62 for more spiteful subjects under the American rule, and 2.22 compared to 1.30 under the English fee-shifting rule, respectively. Both differences are highly significant using t-tests: $t(1633)= 13.3$, $p < 0.001$ and $t(1633)= 12.0$, $p < 0.001$.

[35] Additionally, we deem it weird to speak of welfare, when it would incorporate subjects' additional utility that comes from their spiteful preferences.

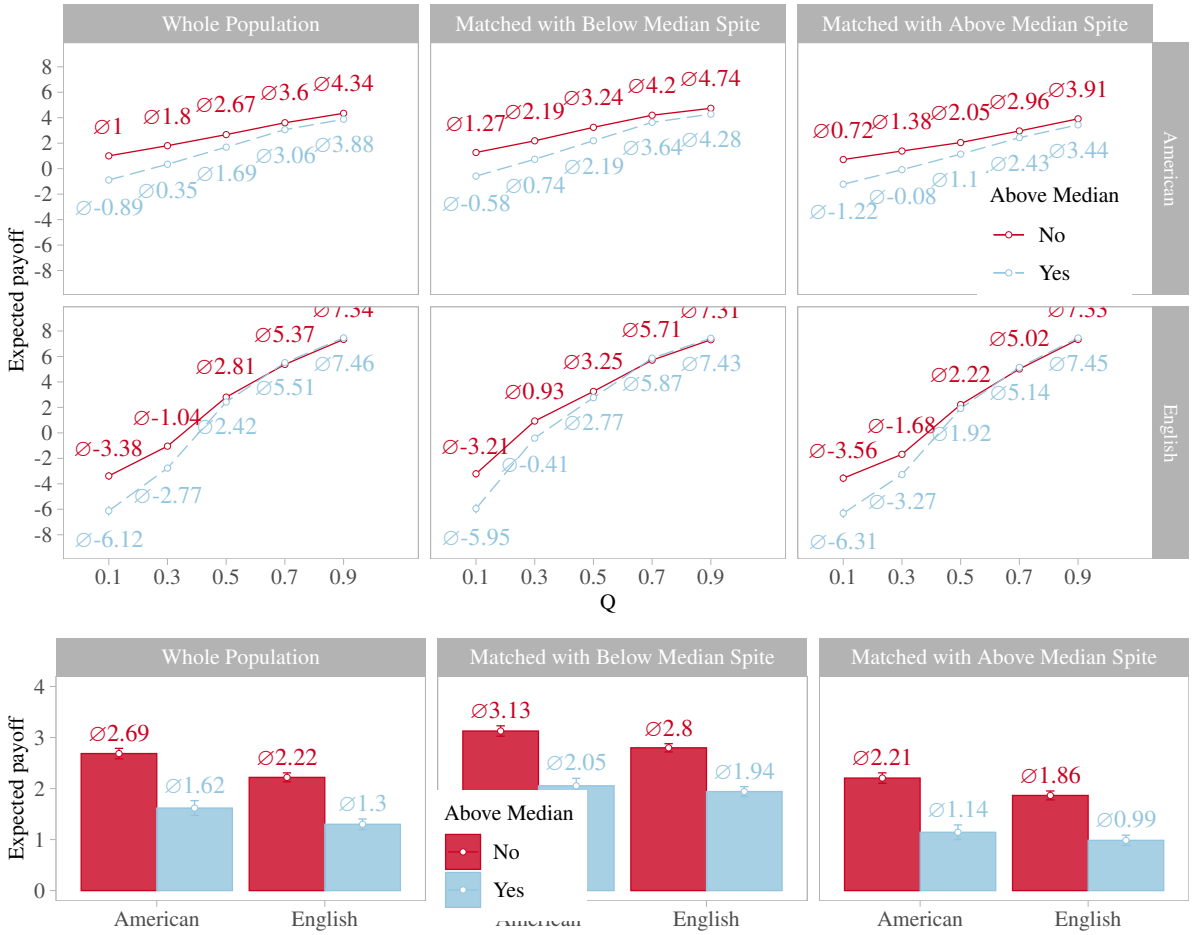


Figure 5: Expected payoff by fee-shifting rule as a function of q.
The panels on the top depict the expected payoff by fee-shifting rule as a function of q, while the panels on the bottom show the aggregates. The panels in the first and second columns show the expected payoff of less and more spiteful societies (i.e., where less (more) spiteful subjects were matched with other less (more) spiteful subjects), according to the Spite-Task and the Spite-Questionnaire, respectively. Red solid lines depict the behavior of less spiteful societies, while blue dashed lines indicate the behavior of more spiteful societies. The panels in the third column show the expected payoff of less (red solid lines) and more (blue dashed lines) prosocial societies according to the SVO-Measure. The error bars indicate the 95% confidence intervals.

This decrease in expected payoffs for more spiteful subjects is independent of who they are matched with. The bar charts of figure 5 show that the empirical ex-ante expected payoffs of more spiteful subjects is always lower compared to less spiteful subjects, both when they are matched only with above median spite subjects or only with below median spite subjects. All shown differences are highly significant at the 0.1% level using t-tests. As a consequence, it does not pay off to be spiteful.

Next, we compare the difference in this decrease between the American and English fee-shifting rule. For being matched with the entire population, the decrease in the expected payoffs for being spiteful is more pronounced under the American compared to the English fee-shifting rule (-1.07 vs. -0.92). This difference in the strength of the penalty is driven by differential effects of the fee-shifting rule depending on the merit of the case. Under the American rule, being more spiteful comes at a cost for all merit cases, whereas under the English rule, more spiteful subjects obtain lower expected payoffs for low-merit cases only. Again, these dynamics

are independent of being matched either to below or above median spite subjects, or with the entire experiment's population. See appendix B.1.4, table 9 for the regression results. In most models, the difference in the decrease is significantly (at least at the 10% level) more pronounced under the American rule.

But not only more spiteful subjects obtain lower expected payoffs. The existence of spiteful subjects is detrimental for non-spiteful subjects, too. The average expected payoff of below-median-spite subjects is 3.13 and 2.80 when being matched with other non-spiteful subjects under the English and American rule, respectively, whereas it significantly decreases to 2.21 and 1.86 when matched with above median spite subjects ($t(3268)= 19.3$, $p < 0.001$ and $t(3268)= 13.9$, $p < 0.001$). This difference in the expected payoff is not significantly different between the two fee-shifting rules (see appendix B.1.4, regression table 10).

We conclude that spitefulness is not only detrimental for subjects displaying spiteful behavior, but also for non-spiteful subjects, who are matched with spiteful participants. Additionally, the English rule protects spiteful subjects more from decreasing their expected payoffs compared to the American rule. The harm that is being done to non-spiteful subjects does not significantly differ between the rules.

6. Discussion and Conclusion

In this paper, we study how spiteful preferences change behavior in litigation settings under the American compared to the English fee-shifting rules. We show theoretically that spiteful preferences lead to higher litigation expenditures under both rules. For settlement requests, spite matters only under the American fee-shifting rule, where it increases requests for low-merit cases and decreases requests for high-merit cases.

Using an online experiment, we provide empirical evidence for some of these predictions. In the experiment, subjects had to make litigation and settlement decisions under the American and English fee-shifting rules. We elicited spiteful preferences via two measurements, namely through 1) a behavioral incentivized distribution-decision task and 2) a non-behavioral questionnaire.

We find that litigation expenditures are overall higher under the English than under the American fee-shifting rule. This goes in line with the experimental results of Dechenaux and Mancini (2008), Gabuthy et al. (2021), and Massenot et al. (2021). We extend their finding by exogenously varying the merit of a case. In the theoretical literature, is often argued that the English rule has the advantage of deterring low-merit frivolous law-suits (Spier, 2007). We do not find any evidence for this claim. Instead, we even observe higher litigation expenditures under the English rule for all merit levels, including for low-merit ones. This result goes in line with Gabuthy et al. (2021), who find that the English rule can increase low-merit cases. Unlike Dechenaux and Mancini (2008) and Gabuthy et al. (2021), but similar to Massenot et al. (2021), we find no difference in settlement requests and rates between the two fee-shifting rules. As

a consequence, the English fee-shifting rule does not seem to deter low-merit cases, but rather increases litigation expenditures for such frivolous law-suits. Not only for frivolous law-suits, but also overall, the English fee-shifting rule leads to the use of more judicial resources compared to the American rule, which may lead to welfare losses as those resources can not be used otherwise. This conclusion, however, depends on whether litigants exhibit spiteful preferences, gaining additional utility from inflicting harm on their opponents.

The main insight of this paper is that litigation and settlement expenditures are higher under both fee-shifting rules if subjects exhibit such spiteful preferences – with a more pronounced increase under the American rule compared to the English rule. Consequently, litigation expenditures – and thus the use of judicial resources – are only slightly higher under the English rule. For less spiteful subjects, however, the earlier conclusion prevails, as the English rule leads to substantially higher litigation expenditures for all merit levels. The degree, to which the English rule leads to the use of more judicial resources compared to the American thus depends on the fraction of spiteful litigants.

The more pronounced increase in litigation expenditures under the American rule goes in contrast to the theoretical results of Chen and Rodrigues-Neto (2023), who show that negative relational emotions amplify the cost-shifting effect, yet in a slightly different theoretical model. We find that this more pronounced increase is driven by a constant increase due to spite under the American rule for all merits, whereas under the English rule, there is an increase for low-merit cases only. This goes in line with our theoretical model, which predicts only an increase for a specific range of low-merit levels, and no difference for more spiteful agents for high-merit levels.

Concerning pre-trial bargaining, we find that more spiteful subjects demand higher settlement request under both rules. This increase is not significantly different between the two rules, and hence spite seems to not have a stronger influence between the two fee-shifting rules, as our prediction suggests. Unlike our predictions, spite does not have a differential effect depending on the rule *and* an opposite effect depending on the merit of the case. Instead, spite increases settlement requests for all merit levels, yet less for high-merit cases. This indicates, that subjects do not (fully) exploit their bargaining power, which is shaped by the expected litigation outcomes. This is in line with earlier experimental work, who find that subjects are relatively insensitive to changes in the disagreement values (Fischer et al., 2007; Anbarci and Feltovich, 2013, 2018). These results could be indicative that the impact spite has on the bargaining outcome seems to outweigh spite's impact on the bargaining power. Theoretically, from the bargaining outcome, spiteful players receive additional disutility from any concession to their opponent, and therefore they demand higher shares – especially if their initial demand is low. This is the case, when the bargaining power is low, which is when the merit is low. Hence, increases in requests are higher for low-merit cases compared to higher merit cases. In fact, in equilibrium (without settlement failures), requests should even decrease for high-merit cases. We, however, observe an increase over all merit levels for spiteful subjects – with a less pronounced increase for high-merit cases – which could be interpreted as supporting evidence

that spiteful players rely more on their bargaining outcome than on their disagreement litigation outcome when deciding how much to demand in the settlement stage. Finally, overall higher demands lead to more settlement failures. Consequently, law suits, including frivolous ones, are more likely to go to court, where players motivated by spiteful preferences also invest more in litigation.

By showing an overall increase in litigation expenditures and settlement requests for more spiteful subjects under both rules, we complement the experimental literature (Kimbrough and Reiss, 2012; Cooper and Fang, 2008; Bartling et al., 2017; Andreoni et al., 2007; Kirchkamp and Mill, 2021), which shows that spiteful preferences lead to more competitive behavior and to the results of Eisenkopf et al. (2019), who do not find any impact of emotions on litigation expenditures. This could indicate that in case of litigation, antisocial preferences matter more than "hot" negative emotions.

We also study the harm that is caused because of spitefulness. For that we compare the expected payoff of more spiteful compared to less spiteful subjects. We find that it does not pay off to be spiteful, as the expected payoff is lower for more spiteful subjects independent of being matched with either only less or more spiteful subjects. This decrease in the expected payoff is more pronounced under the American compared to the English rule. The English rule, therefore, protects spiteful players better from themselves. The harm inflicted on others, however, does not differ between the two rules. As a consequence, the fee-shifting rule can not be used to mitigate the harm that players suffer from being matched with a spiteful opponent.

We conclude that spiteful preferences are shown to be bad news – not only are litigation expenditures and settlement request higher for more spiteful preferences, the expected payoffs are both lower for spiteful players and their matched partners. Neither of the fee-shifting rules can protect the harm that spiteful players inflict on others. The English rule, however, can decrease the penalty that spiteful players receive – yet at the cost of yielding overall higher litigation expenditures especially for less spiteful player, including an increase in expenditures for low-merit cases. The choice of the fee-shifting rule hence depends on the distribution of spiteful players and the merits of the case.

As usual, there are some limitations of the study, which the reader should take into account. First of all, we choose a specific simplified version of spite in our theoretical model. While we rely mostly on the existing literature to formulate spiteful preferences, there are many possible alternative ways of modeling spite. Future research might want to tackle this limitation by focusing on broader models of spiteful preferences.

Second, we rely on one-shot interactions in our experiment setting. This approach does not leave room for learning. In many experimental contest settings, learning plays a crucial role in behavior changes over time (see e.g. March and Sahm (2017)). At the same time, experiments with repeated interactions might fail to attribute changes in behavior to preferences. We cannot answer how participants would learn and how this learning would interact with spite and the fee-shifting rule. We can, however, show that participants with higher spiteful preferences differ already substantially from participants with less spiteful preferences in a one-shot setting.

Thus, it would seem plausible that our results would even exacerbate over time.

Third, we elicit litigation expenditures for all subjects independent of whether they settle or actually have to litigate. Hence, we shut down selection effects for the litigation stage. In reality, there exists a selection effect, in the sense that only subjects that fail (or don't want) to settle, litigate. We purposefully excluded this selection effect to keep our results clean. A selection effect most likely would even magnify our results (as the more spiteful litigants would be less likely to settle) and thus, it seems plausible that the effect of spite is even stronger in real settings of litigation.

Finally, even though the comparison between the American and English rules is causal (due to an exogenous treatment manipulation), we do not exogenously manipulate spite. We, instead, rely on correlational evidence on the influence of spite on behavior. The main reason for not exogenously varying spiteful preferences is that we are not aware of any manipulation which cleanly targets only spiteful preferences while keeping other preferences and beliefs constant. Thus, our experimental design delivers only second-best results. However, we tackle this issue throughout the paper.[36] To prevent the results from being driven by measurement error, we elicit spiteful preferences via two different methods. Throughout the paper, we consistently show that all our results prevail using either measure of spiteful preferences (see also Appendix B.1.2 and B.1.3). Further, we tackle a potential omitted-variable bias problem by running robustness checks with risk preferences, social value orientation, and other controls that may be correlated both with the spite measurement and litigation expenditures and settlement requests (see Appendix B.2). The results remain robust for these additional model specifications. Even though all these results make us rather confident that spiteful preferences indeed change litigation and settlement behavior, we cannot exclude the possibility of reversed-causality or omitted-variable bias. Thus, future research might want to find ways of cleanly manipulating only spiteful preferences to be able to provide causal evidence to our research question.

All in all, we consistently find that spiteful preferences are associated with higher litigation expenditure and settlement requests, which result in welfare losses. We find that the English fee-shifting rule is more robust towards spiteful preferences and thus protects spiteful litigants more from decreasing their expected payoffs compared to the American rule. The harm inflicted on others, however, is not different between the two rules. Additionally, the English rule leads to higher litigation expenditures overall, including for frivolous low-merit lawsuits. Therefore, the American rule seems to be welfare-improving compared to the English rule, as we find that it leads to the use of less judicial resources including for frivolous low-merit law-suits – especially so when players are only little motivated by spiteful preferences.

Future research might want to find other mechanisms robust to spiteful preferences in the litigation setting. For instance, ìt could be studied whether the negative effects of spiteful preferences on litigation and settlement can be mitigated by lawyers and contingency fees, or potential cool-off periods. Moreover, future research should figure out whether the English

[36] See Appendix B.3 for a discussion of causality.

rule is really better suited to deter low-merit cases, as we provide contradicting evidence (i.e., higher litigation costs and no difference in settlement demands). Finally, as we observe that the overall effect of the fee-shifting rule seems to depend on the distribution of spitefulness and merit of cases, future research should try to quantify the distribution of spitefulness in the relevant populations, and consequently its overall effect on (excessive) litigation spendings under the English compared to the American rule.

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A. Appendix

A.1. Propositions

A.1.1. Litigation Model Proposition

Proposition 1. *The symmetric litigation expenditures under the American fee-shifting rule for spiteful agents are given by:*

$$e^{*(\mathrm{Am})}(W, q, \alpha) = (1 - q) \cdot q \cdot W \cdot (\alpha + 1)$$

The proof of Proposition 1 is shown in Appendix A.2.1.

The equilibrium litigation expenditures under the English fee-shifting rule are given below.

Proposition 2. *The litigation expenditures under the English fee-shifting rule for spiteful agents are given by:*

$$e_i^* = \begin{cases} W & \textit{if } q \leq \overline{q}(\alpha) \\ 0 & \textit{else} \end{cases} \qquad \textit{with } \overline{q}(\alpha) = \tfrac{1}{3}\tfrac{3\alpha+2}{(\alpha+1)},$$

$$e_j^* = \begin{cases} 0 & \textit{if } q \leq (1 - \overline{q}(\alpha)) \\ W & \textit{else} \end{cases} \qquad \textit{and } (1 - \overline{q}(\alpha)) = \tfrac{1}{3}\tfrac{1}{(\alpha+1)}$$

The proof of Proposition 2 is shown in Appendix A.2.2. Figure 1b shows the equilibrium behavior for player j for different levels of α.

Litigation expenditures under the English fee-shifting rule are characterized by the bang-bang property. For low merits, it is optimal to incur no expenditures, and after a certain threshold, it is optimal to incur full expenditures. For more spiteful agents, this threshold is shifted towards lower merit levels. More spiteful agents, thus, incur full expenditures at lower merit levels than less spiteful agents.

A rough interpretation is the following: Under the English fee-shifting rule, the loser has to carry the costs from both parties. Therefore, the disutility from losing and the utility of winning is augmented compared to the American rule. Hence, for high-merit cases, it is optimal to incur full expenditures because they very likely do not have to be paid by the winning party. This decreases the winning probabilities for low-merit cases further and hence, it is optimal to reduce own expenditures to the minimum as they have to be carried almost certainly by oneself. At the threshold, the augmented incentives to win outweighs the costs of potentially paying the own expenditures.[37] After the threshold, it is optimal to incur full expenditures.[38]

[37] Due to the convex form of the utility function, which has the minimum utility level in between 0 and W expenditures, only a switch to full expenditures maximizes the expected utility. A partial increase in the expenditures would not increase the probability of winning enough to counterbalance the increased costs.

[38] This bang-bang property can be illustrated best with an example: Suppose that $q = \frac{1}{3}$ and $W = 10$. At this merit level, a non-spiteful player ($\alpha = 0$) is indifferent between spending 0 and 10 because the expected payoff is the same. For exerting 0, the player loses with certainty, and the utility is $u_j = -10$ because of the opponent's expenditures of 10. Spending 10, while the opponent also spends 10, leads to a winning probability of $\frac{1}{3}$ for the prize of 10. Hence, the expected utility is $E[u_j] = \frac{1}{3} * 10 - \frac{2}{3} * (-20) = -10$. If the merit level is

More spiteful agents have even more augmented incentives to win since they receive additional disutility from losing (since the opponent has a positive payoff) and additional utility from winning (since the opponent has to carry all the costs). Therefore, the threshold to switch from no expenditures to full expenditures moves to lower merit levels. Note that for small enough merit levels $q < (1 - \overline{q}(\alpha))$, the expected utility of a player is negative since losing means carrying both costs (either W or 2W) and winning means receiving W. Therefore, having to litigate under the English fee-shifting rule is bad news if the own merit is not high enough.

A.1.2. Settlement Model Proposition

Spite shapes this equilibrium outcome simultaneously through the settlement stage and the litigation stage. There are two countervailing forces. First, in the litigation stage, spite influences the disagreement values (i.e., the expected payoffs). If one of the players wins the litigation, spite increases her utility of litigation. If this player loses, spite lowers her utility. In the equilibrium outcome, for low-merit levels ($q < 0.5$), player j has a winning probability of less than 0.5. Therefore, spite decreases player j's expected utility further compared to player i's. Subsequently, a spiteful player j is less eager to litigate than a spiteful player i in the low-merit case, and hence, player j's bargaining power decreases. More spiteful agents then request less in the settlement stage for low-merit casesthan less spiteful agents. Due to symmetry, requests are higher for high-merit cases ($q > 0.5$).

Second, in the settlement stage, spite interacts with the opponent's demands and creates a countervailing force. For low-merit levels ($q < 0.5$), player j's expected utility of the litigation stage is smaller than player i's, and hence she has a smaller bargaining power than player i. Subsequently, player i's demands are higher than player j's. Higher demands of the opponent are associated with a higher disutility due to spite. Hence, a more spiteful player j has a higher disutility due to spite for low-merit cases than a less spiteful player. Therefore, player j is less eager for settling at these conditions and her bargaining power increases compared to player i's. Subsequently, requests in the settlement stage are higher for more spiteful agents for low-merit levels ($q < 0.5$). Correspondingly, requests are lower for high-merit levels ($q > 0.5$) because of symmetry.

Whether the first or second effect prevails depends on the payoff structure and environment that is determined either by the American or English fee-shifting rule.

Proposition 3. *Under the American fee-shifting rule, the requests of players i and j are characterized by the following functions:*

$$s_i^* = W - s_j^* = \begin{cases} W & \text{if } q \leq \frac{1}{2}\frac{\alpha}{\alpha+1} \\ W(\alpha(\frac{1}{2} - q) + (1 - q)) & \text{if } \frac{1}{2}\frac{\alpha}{\alpha+1} < q < \frac{1}{2}\frac{\alpha+2}{\alpha+1} \\ 0 & \text{if } q \geq \frac{1}{2}\frac{\alpha+2}{\alpha+1} \end{cases}$$

slightly below $\frac{1}{3}$, spending 0 maximizes the expected utility. If it is slightly above $\frac{2}{3}$, spending 10 maximizes the expected utility.

The proof can be found in Appendix A.2.3. Figure 2a shows the equilibrium settlement requests for player j under the American rule. For non-spiteful agents, there is a linear and constant increase in the requests with increasing merit of the case ($\lim_{\alpha \to 0} s_j^* = Wq$) since the outside value and hence the bargaining power increases. For relative lower merit levels ($q < 0.5$), more spiteful agents request less, whereas, for higher merit levels ($q > 0.5$), more spiteful agents request more. This is because more spiteful agents want to prevent litigation if their merit is low and wouldn't mind litigating when their merit is high since the outside values are augmented. Therefore, under the American rule, spite in the disagreement values outweighs the effect of spite in the settlement requests.

Proposition 4. *Under the English fee-shifting rule, the requests of player i and j are characterized by the following functions:*

$$s_i^* = W - s_j^* = \begin{cases} W & \text{if } q \leq \frac{1}{3} \\ (2-3q)W & \text{if } \frac{1}{3} < q < \frac{2}{3} \\ 0 & \text{if } q \geq \frac{2}{3} \end{cases}$$

The proof can be found in appendix A.2.4. Figure 2b depicts the equilibrium settlement requests under the English fee-shifting rule. Requests start at 0 for low-merit cases, then increase after the merit is at $q = \frac{1}{3}$ until $q = \frac{2}{3}$, where they stay at the maximum request W. Notice that requests are the same for all spite levels. This is because the opposing effects of spite in the disagreement values and spite in the settlement requests cancel each other out.

A.2. Proofs

A.2.1. Proof of Proposition 1

As a reminder, the utility of player i looks as follows (equation 1):

$$u_i(e_i, e_j, q, \alpha) = \underbrace{p_i(e_i, e_j, q)}_{\text{Probability of winning}} \cdot \underbrace{\left(\underbrace{W - \mathbb{1}_{American} e_i}_{\text{Payoff}} \underbrace{-\alpha \cdot (-e_j - \mathbb{1}_{English} e_i)}_{\text{Disutility due to spite}} \right)}_{\text{Utility in case of winning the case}}$$

$$+ \underbrace{(1 - p_i(e_i, e_j, q))}_{\text{Probability of losing}} \cdot \underbrace{\left(\underbrace{-e_i - \mathbb{1}_{English} e_j}_{\text{Payoff}} \underbrace{-\alpha \cdot (W - \mathbb{1}_{American} e_j)}_{\text{Disutility due to spite}} \right)}_{\text{Utility in case of losing the case}}$$

Proof of Proposition 1 Differentiating the above equation with respect to e_i gives:

$$\frac{\partial u_i(e_i, e_j, q, \alpha)}{\partial e_i} = \frac{\left(\left((\alpha+1)\mathbb{1}_{English} - 1\right) {e_i}^2 - 2e_j \left((\alpha+1)\mathbb{1}_{English} - 1\right) e_i - e_j \left(\left(1 + (\alpha+1)\mathbb{1}_{English}\right) e_j + W(\alpha+1)\right)\right) q^2}{((e_i - e_j)q - e_i)^2} \tag{2}$$

$$+ \frac{\left(2\left((\alpha+1)\mathbb{1}_{English} - 1\right) e_i (e_j - e_i) + e_j (\alpha+1)\left(\mathbb{1}_{English} e_j + W\right)\right) q + \left((\alpha+1)\mathbb{1}_{English} - 1\right) {e_i}^2}{((e_i - e_j)q - e_i)^2}$$

The second derivative is given by:

$$\frac{\partial \frac{\partial u_i(e_i,e_j,q,\alpha)}{\partial e_i}}{\partial e_i} = 2\frac{(\alpha+1)e_j(q-1)q\left((2\mathbb{1}_{English}e_j+W)q-\mathbb{1}_{English}e_j-W\right)}{\left((e_i-e_j)q-e_i\right)^3} \tag{3}$$

Rearranging yields the best response for agent i given a merit q, a good W, spite α and the litigation expenditures of j:

$$e_i^*(e_j,q,\alpha,\mathbb{1}_{English},W) = \frac{1}{1-q}\left(-qe_j \pm \sqrt{\frac{qe_j\ (\alpha+1)\left((-1+q)\,W+(2\,q-1)\,e_j\,\mathbb{1}_{English}\right)}{-1+(\alpha+1)\,\mathbb{1}_{English}}}\right) \tag{4}$$

Again $e_j^*(e_i,q,\alpha,W) = e_i^*(e_i,1-q,\alpha,W)$

From the best response function, we can derive the equilibrium behavior. As we know that the best response of j is given by $e_j^*(e_i,q,\alpha,W) = e_i^*(e_i,1-q,\alpha,W)$, we insert the best response of j into the best response of i. We obtain:

$$e_i^{*(\mathrm{Am})}(e_j,q,\alpha,W) = (1-q)\cdot q\cdot W\cdot(\alpha+1)$$

The second derivative (Equation 3) yields:

$$\frac{\partial \frac{\partial u_i((1-q)\cdot q\cdot W\cdot(\alpha+1),(1-q)\cdot q\cdot W\cdot(\alpha+1),q,\alpha)}{\partial e_i}}{d\,e_i} = \frac{-2}{W(\alpha+1)q}$$

which is negative and hence, the solution is maximizing the utility of i. ■

A.2.2. Proof of Proposition 2

Proof of Proposition 2 The utility function under the English fee-shifting rule can be rewritten as follows:

$$U_i = \frac{(1-q)e_i}{(1-q)e_i+qe_j}[(1+\alpha)e_i+(1+\alpha)e_j+(1+\alpha)W] - e_i - e_j - \alpha W \tag{5}$$

Unlike under the American fee-shifting rule, there are self-generated spillovers under the English regime because own expenses increase the value of the own winning prize by generating spite generated utilities, which are determined by the spite parameter α. In an unconstrained optimization and best response equilibrium, both infinite expenses and negative expenses are employed. Therefore, we employ a constrained optimization. With the constraints, we restrict the possible resources spent and prevent the agents to spend infinite and negative resources. Additional to guaranteeing mathematical solvability, constraining effort levels also reflects reality since agents do not have infinite resources and cannot exert negative efforts. We set $\overline{e} = W$, i.e., agents are spending at most the value of the prize.

The constrained optimization problem looks as follows:

$$\max_{e_i} U_i \tag{6a}$$

$$\text{s.t. } e_i \leq W \tag{6b}$$

$$e_i \geq 0 \tag{6c}$$

The point (e_i^*, μ^*) is called a Karush-Kuhn-Tucker (KKT) point if the following equations hold:

$$\frac{\partial U_i(e_i^*)}{\partial e_i} - \mu_1(\frac{\partial g_1(e_i^*)}{\partial e_i^*}) - \mu_2(\frac{\partial g_2(e_i^*)}{\partial e_i^*}) = 0 \tag{7a}$$

$$g_1(e_i^*) = -e_i^* \leq 0 \tag{7b}$$

$$g_2(e_i^*) = e_i^* - W \leq 0 \tag{7c}$$

$$\mu_1 \geq 0 \tag{7d}$$

$$\mu_2 \geq 0 \tag{7e}$$

$$\mu_1 g_1(e_i^*) = 0 \tag{7f}$$

$$\mu_2 g_2(e_i^*) = 0 \tag{7g}$$

We obtain the following points that may satisfy the KKT conditions for specific values of the parameters.

$$(e_i^* = 0, \mu_1 = \frac{e_j q - e_j(1-q)(1+\alpha) - W(1-q)(1+\alpha)}{q e_j}, \mu_2 = 0) \tag{8}$$

$$(e_i^* = W, \mu_1 = 0, \mu_2 = \frac{e_j^2 q(1-q)(1+\alpha) - e_j^2 q^2 + e_j q W(3\alpha+1)(1-q) + W^2\alpha(1-q)^2}{((1-q)10 + q e_j)^2}) \tag{9}$$

$$(e_i^* = \frac{1}{1-q}(-e_j q + \sqrt{\frac{q e_j(\alpha+1)[(-1+q)W + (-1+2q)e_j]}{\alpha}}), \mu_1 = \mu_2 = 0) \tag{10}$$

$$(e_i^* = \frac{1}{1-q}(-e_j q - \sqrt{\frac{q e_j(\alpha+1)[(-1+q)W + (-1+2q)e_j]}{\alpha}}), \mu_1 = \mu_2 = 0) \tag{11}$$

The optimization problem $e_j(q)$ equals the optimization problem for $e_i(1-q)$ and all the following conditions also apply to the optimization problem for player j. The sets $e_i \in [0, W]$ described by $g_1(e_i^*)$ and $g_2(e_i^*)$ are convex. Furthermore, the functions $g_1(e_i^*)$ and $g_2(e_i^*)$ are linear and affine. Therefore, they satisfy the linearity constraint qualification and thus all regularity conditions. The parameters are defined as before as $a \in (0,1), q \in [0,1], W \in (0,\infty)$ and $e_j \in [0, W]$. There is a region for a specific range of q, α and W, where the points (8) and (9) are feasible, since both $\mu_1, \mu_2 \geq 0$ in (8) and $\mu_1, \mu_2 \geq 0$ in (9). Points (10) and (11) always satisfy $\mu_1, \mu_2 \geq 0$, yet there are some conditions on the parameters for the squareroot to be non-negative and e_i to be non-negative.

First, note that for $q = 0$, only points (10) and (11) are feasible and yield the optimal solution of $e_i = 0$. In the following, we analyze the optimal solution for $q \in (0, 1]$.

For $q \leq 0.5$, the maximum is at $e_i^* = W$. Point (8) is not feasible, since $\mu_1 < 0$ for $q \in (0, 0.5]$ and hence the necessary condition for an extreme point is not met. For $q \leq 0.5$ point (9) is feasible, since $\mu_1, \mu_2 \geq 0$ for $q \in (0, 0.5]$ and all the other parameters in their domain. Additionally, $\frac{\partial U_i}{\partial e_i} > 0$, $\forall q \in (0, 0.5]$ and all the other parameters in their domain and $\forall e_i \in [0, W]$, giving a sufficient condition

for $e_i = W$ to be a maximizer for $q \leq 0.5$. This can be seen by the following;

$$\frac{\partial U_i}{\partial e_i} = \frac{(1-q)((1+\alpha)e_i + (1+\alpha)e_j + (1+\alpha)W)}{(1-q)e_i + qe_j} -$$
$$\frac{(1-q)^2 e_i((1+\alpha)e_i + (1+\alpha)e_j + (1+\alpha)W)}{((1-q)e_i + qe_j)^2} + \frac{(1-q)e_i(1+\alpha)}{((1-q)e_i + qe_j)} - 1 > 0$$

After some algebra it becomes:

$$qe_j(1-q)[2e_i\alpha + (1+\alpha)e_j + (1+\alpha)W] + (1-q)^2 e_i^2\alpha - q^2 e_j^2 > 0 \tag{12}$$

Note that the first and second term are always positive and the third term always negative. Further, the third term is always smaller than the first one for $q \in (0, 0.5]$. Therefore, for $q \leq 0.5$, more effort is always better and hence, the maximum effort possible, $e_i = W$, the optimal solution.

Since $e_j^*(q) = e_i^*(1-q)$, the best response from player j is always W independent of player i's action for $q \geq 0.5$. With that knowledge, we now describe the best responses of player i for $q > 0.5$, knowing that player j always exerts effort of W.

With that knowledge, point (11) is never feasible, since for $q < \frac{2}{3}$, the square root is negative, and further the point always yields $e_i < 0$ for $q > 0.5$ and the respective $e_j^* = W$. Similarly, Point (10) is also not feasible for $q < \frac{2}{3}$, however, for $q \geq \frac{2}{3}$, there exist combinations of the parameters that yield a feasible solution.

The first region is for $q \in (0, \overline{q}_{\mu_1}(\alpha))$, where the point (9) is feasible and where the point (8) is just not feasible yet. $\overline{q}_{\mu_1}(\alpha)$ follows from setting $\mu_1 = 0$ from the point (8):

$$\overline{q}_{\mu_1}(\alpha) = \frac{2(\alpha+1)}{2\alpha+3} \in (\frac{2}{3}, \frac{4}{5})_{|\alpha\in(0,1)}$$

In this region both point (9) and (10) are feasible. Since $\frac{\partial U_i}{\partial e_i} > 0$, $\forall q \in (0, \overline{q}_{\mu_1}(\alpha)], \forall e_i \in [0, W]$ and $e_j^* = W_{|q\geq 0.5}$, $e_i^* = W$ is the local maximizer for the whole first region.

The second region is for values of $q \in [\overline{q}_{\mu_1}(\alpha), \overline{q}_{\mu_2}(\alpha)]$, where the points (8),(9) and (10) are feasible. $\overline{q}_{\mu_2}(\alpha)$ is the threshold where the point (9) is just still feasible, so where $\mu_2 = 0$ from the point (5):

$$\overline{q}_{\mu_2}(\alpha) = \frac{1}{3}\frac{(\alpha+1) + \sqrt{4\alpha^2 + 5\alpha + 1}}{(\alpha+1)} \in (\frac{2}{3}, 0.86)_{|a\in(0,1)}$$

At this region, the utility function is convex in e_i. We compare the utility of the feasible points to get the local maximum of the region. Note, that by the convexity of the function in this region, one of the points is the minimum. By comparing the values, we find that point (10) is the minimum in this region. Further, $U_i(e_i = W, e_j = W, \alpha, q = \overline{q}_{\mu_1}(\alpha), W) > U_i(e_i = 0, e_j = W, \alpha, q = \overline{q}_{\mu_1}(\alpha), W)$ and $U_i(e_i = W, e_j = W, \alpha, q = \overline{q}_{\mu_2}(\alpha), W) < U_i(e_i = 0, e_j = W, \alpha, q = \overline{q}_{\mu_2}(\alpha), W)$, indicating that throughout the region the best response changes from $e_i^* = W$ to $e_i^* = 0$. Because of the convexity of the utility function in this region, we find the bang-bang property, meaning that there exists a threshold $\overline{q}(\alpha)$, where the best response jumps from W to 0. We compute this threshold by equalizing the utilities from the two points: $U_i(e_i = W, e_j = W, \alpha, q, W) = U_i(e_i = 0, e_j = W, \alpha, q, W)$ and receive:

$$\overline{q}(\alpha) = \frac{1}{3}\frac{3\alpha+2}{\alpha+1} \in (\frac{2}{3}, \frac{5}{6})_{|a\in(0,1)}$$

We therefore showed that $e_i^* = W$ for $q \in (0, \overline{q}(\alpha)]$ and $e_i^* = 0$ for $q \in [\overline{q}(\alpha), \overline{q}_{\mu_2}(\alpha)]$ are local maximizers.

For the third region, $q \in (\overline{q}_{\mu_2}(\alpha), 1]$, it remains to show that $e_i^* = 0$ is a local maximizer. Note that for this region, the points (9) and (10) are feasible. Since, $\frac{\partial U_i}{\partial e_i} < 0, \forall q > \overline{q}_{\mu_2}(\alpha), \forall e_i \in [0, W]$, $e_j^* = W$ and all parameters in their domain, $e_i^* = 0$ is the optimum. Hence, $e_i^* = 0$ for $q \in [\overline{q}(\alpha), 1]$ is a local maximizer.

Since for $q \leq 0.5$, the best response of player i is always W, independent of the effort level of player j and when $q \geq 0.5$, the best response of player j is always W, independent of the effort level of player i, there exists an equilibrium $\forall a, q, W$. The equilibrium can be described by the following two best responses:

$$e_i^* = \begin{cases} W & \text{if } q \leq \overline{q}(\alpha) \\ 0 & \text{else} \end{cases}$$

$$e_j^* = \begin{cases} 0 & \text{if } q \leq (1 - \overline{q}(\alpha)) \\ W & \text{else} \end{cases}$$

■

A.2.3. Proof of Proposition 3

Proof of Proposition 3 We assume risk-neutral and spiteful players. Hence, the utilities from a successful settlement are the following: $U_i^{settlement} = s_i - \alpha s_j$ and $U_j^{settlement} = s_j - \alpha s_i$ and $d_i = U_i^{litigation}(e_i^*, e_j^*, q, \alpha)$ and $d_j = U_j^{litigation}(e_j^*, e_i^*, q, \alpha)$. We find the Nash bargaining solution by maximizing the function $f(s_i, s_j) = [(U_i^{settlement} - d_i)(U_j^{settlement} - d_j)]$ and solving the following optimization problem:

$$\max_{s_i, s_j} [(U_i^{settlement} - d_i)(U_j^{settlement} - d_j)] \tag{13a}$$

$$\text{s.t. } s_i + s_j = W \tag{13b}$$

$$s_i, s_j \geq 0 \tag{13c}$$

$$s_i, s_j \leq W \tag{13d}$$

In the following, we use the KKT conditions to solve the optimization problem. The following KKT conditions have to be satisfied for a maximum. Note that $f(s_i, s_j)$ is concave, the inequality constraints convex and the equality constraint affine, such that the KKT conditions are both necessary and sufficient. Let $h(s_i, s_j)$ denote the equality constraint and g_l the inequality constraints.

$$\frac{\partial f(s_i, s_j)}{\partial s_i} - \lambda \frac{\partial h(s_i, s_j)}{\partial s_i} - \sum_{l=1}^{4} \mu_l \frac{\partial (g_l)}{\partial s_i} = 0 \tag{14a}$$

$$\frac{\partial f(s_i, s_j)}{\partial s_j} - \lambda \frac{\partial h(s_i, s_j)}{\partial s_j} - \sum_{l=1}^{4} \mu_l \frac{\partial (g_l)}{\partial s_j} = 0 \tag{14b}$$

$$h(s_i, s_j) = s_i + s_j - W = 0 \tag{14c}$$

$$\mu_l(g_l(s_i, s_j)) = 0, \forall l = 1, ..., 4 \tag{14d}$$

$$g_l(s_i, s_j) \leq 0, \forall l = 1, ..., 4 \tag{14e}$$

$$\mu_l \geq 0, \forall l = 1, ..., 4 \tag{14f}$$

To determine the optimal requests, we first calculate the disagreement values. The equilibrium litigation behavior under the American fee-shifting rule is symmetric and is described by the following: $e_i^* = e_j^* = (1-q)qW(\alpha+1)$. Inserting these in the utility functions yields the expected utility of the respective players and hence the respective disagreement values:
$d_i = U_i^{litigation}(e_i^*, e_j^*, q, \alpha) = (1 + (1-\alpha^2)q^2 - (2-\alpha^2+\alpha)q)W$ and
$d_j = U_j^{litigation}(e_j^*, e_i^*, q, \alpha) = ((1-q)(q\alpha^2 - \alpha) + q^2)W$.

We solve the optimization problem and find the following three points:

$$(s_i^* = W, s_j^* = 0, \lambda = Wa^2q^2 - W\alpha^2 q + W\alpha q - Wq^2 + 2Wq + \mu_3,$$
$$\mu_1 = 0, \mu_2 = -2W\alpha q + W\alpha - 2Wq - \mu_3, \mu_3 = \mu_3, \mu_4 = 0,)$$

$$(s_i^* = -W\alpha q + \frac{1}{2}W\alpha - qW + W, s_j^* = Waq - \frac{1}{2}W\alpha + qW,$$
$$\lambda = W\alpha^2q^2 - W\alpha^2 q - Wq^2 + qW + \frac{1}{2}W\alpha, \mu_1 = 0, \mu_2 = 0, \mu_3 = 0, \mu_4 = 0)$$

$$(s_i^* = 0, s_j^* = W, \lambda = W\alpha^2q^2 - W\alpha^2 q + W\alpha q - Wq^2 + 2Wq - W - \mu_4,$$
$$\mu_1 = 2W\alpha q - W\alpha + 2Wq - 2W - \mu_4, \mu_2 = 0, \mu_3 = 0, \mu_4 = \mu_4)$$

The solutions are feasible within a specific region of q. First, we analyze the first point. Note that the solution allows for any value of $\mu_3 \geq 0$. Therefore, we put $\mu_3 = 0$ to get the threshold, where the first point is either just feasible or just not feasible anymore. We need to find the region where μ_2 is non-negative. Since $\frac{\partial \mu_2}{\partial q} = -2W\alpha - 2W \leq 0, \forall \alpha, W$ and $\mu_{2|q=0,\mu_3=0} > 0$, the first point is feasbile until a certain threshold. We find this threshold by finding the root of μ_2. Hence, we put $-2W\alpha q + W\alpha - 2Wq = 0$ and solve it for q which yields: $q = \frac{1}{2}\frac{\alpha}{\alpha+1}$.

The analysis of the third point follows the same pattern. The third point is feasible after the threshold of $q = \frac{1}{2}\frac{\alpha+2}{\alpha+1}$.

Finally, we analyze point 2. Note that for this point all conditions $g_l(s_i, s_j) \leq 0$ are met for $q \in (\frac{1}{2}\frac{\alpha}{\alpha+1}, \frac{1}{2}\frac{\alpha+2}{\alpha+1})$.

Hence, the Nash bargaining solution in the American case can be described by the following function:

$$s_i^* = \begin{cases} W & \text{if } q \leq \frac{1}{2}\frac{\alpha}{\alpha+1} \\ W(a(\frac{1}{2}-q)+(1-q)) & \text{if } \frac{1}{2}\frac{\alpha}{\alpha+1} < q < \frac{1}{2}\frac{\alpha+2}{\alpha+1} \\ 0 & \text{if } q \geq \frac{1}{2}\frac{\alpha+2}{\alpha+1} \end{cases}$$ ■

A.2.4. Proof of Proposition 4

Proof of Proposition 4 We find the Nash bargaining solution by maximizing the function

$$f(s_i, s_j) = [(U_i^{settlement} - d_i)(U_j^{settlement} - d_j)]$$

and solving the optimization problem described in Appendix A.2.3. The equilibrium litigation behavior is described by three zones:

1) $q < (1 - \overline{q}(\alpha))$ with $\overline{q}(\alpha) = \frac{1}{3}\frac{3\alpha+2}{\alpha+1} \in (\frac{2}{3}, \frac{5}{6})_{|\alpha\in(0,1)}$ from the litigation solution: In this region, $e_i^* = W$ and $e_j^* = 0$, which yield the following utilities: $d_i = U_i^{litigation} = (1+\alpha)W$ and $d_j = U_j^{litigation} = -(1+\alpha)W$. Solving the optimization problem yields the following KKT point:

$$(s_i^* = W, s_j^* = 0, \lambda = W\alpha^2 + W - \mu_2, \mu_1 = 0, \mu_2 = \mu_2, \mu_3 = W\alpha^2 + 2W\alpha + W - \mu_2, \mu_4 = 0)$$

This point is always feasible, because we can find a positive μ_2 for which μ_3 also becomes positive. Thus, in this region ($s_i^* = W$, $s_j^* = 0$).

2) $(1-\overline{q}(\alpha)) < q < \overline{q}(\alpha)$: In this region: $e_i^* = e_j^* = W$ and the following utilities: $d_i = U_i^{litigation} = 3(1-q)(1+\alpha)W - 2W - \alpha W$ and $d_j = U_j^{litigation} = 3q(1+\alpha)W - 2W - \alpha W$. Solving the optimization problem (9) yields the three following points:

$$(s_i^* = W, s_j^* = 0, \lambda = 3W\alpha^2 q + 6W\alpha q - 4W\alpha + 3Wq + \mu_3,$$
$$\mu_1 = 0, \mu_2 = -6W\alpha^2 q + 2Wa^2 - 12W\alpha q + 4W\alpha - 6Wq + 2W - \mu_3, \mu_3 = \mu_3, \mu_4 = 0)$$

$$(s_i^* = (2-3q)W, s_j^* = (3q-1)W, \lambda = W\alpha^2 - 2W\alpha + W, \mu_1 = 0, \mu_2 = 0, \mu_3 = 0, \mu_4 = 0)$$

$$(s_i^* = 0, s_j^* = W, \lambda = 3W\alpha^2 q - W\alpha^2 + 6W\alpha q - 6W\alpha + 3Wq - W - \mu_4,$$
$$\mu_1 = 6W\alpha^2 q - 4W\alpha^2 + 12W\alpha q - 8W\alpha + 6Wq - 4W - \mu_4, \mu_2 = 0, \mu_3 = 0, \mu_4 = \mu_4)$$

We check the KKT conditions for the three points. We start with the first point. Note that the solution allows for any value of $\mu_3 \geq 0$. Therefore, we put $\mu_3 = 0$ to get the threshold where the first point is either just feasible or just not feasible anymore. Since $\frac{\partial \mu_2}{\partial q} < 0, \forall \alpha, W$ and $\mu_{2|q=0,\mu_3=0} > 0$, we find the root of μ_2, which is the threshold $q = \frac{1}{3}$ until which the first point is feasible.

Now, we analyze point 2. All conditions and the condition $g_l(s_i, s_j) \leq 0$ are met for $q \in [\frac{1}{3}, \frac{2}{3}]$. Finally, we consider the third point. First, we set $\mu_4 = 0$. Since $\frac{\partial \mu_1}{\partial q} > 0, \forall a, W$ and $\mu_{1|q=1,\mu_4=0=0} > 0$, we find the root of μ_1, which is the threshold $q = \frac{2}{3}$ from which on the third point is feasible.

3) $q > \overline{q}(\alpha)$: In this region $e_i^* = 0$ and $e_j^* = W$, which yields disagreement values of $d_i = U_i^{litigation} = -(1+\alpha)W$ and $d_j = U_j^{litigation} = (1+\alpha)W$. Note that by symmetry of the Nash Bargaining solution, solving the optimization problem and checking the KKT conditions yield the same but mirrored solution as in region 1): $(s_i^* = 0, s_j^* = W)$

Hence, we get the following solution:

$$s_i^* = \begin{cases} W & \text{if } q \leq \frac{1}{3} \\ (2-3q)W & \text{if } \frac{1}{3} < q < \frac{2}{3} \\ 0 & \text{if } q \geq \frac{2}{3} \end{cases}$$

■

A.2.5. Formal Derivations Hypotheses Litigation

Hypothesis 1.1: The average litigation expenditures of all merit levels q are higher under the English fee-shifting rule than under the American fee-shifting rule.

Proof In order to compare the average litigation expenditures, it suffices to compare the aggregate expenditures. First, we calculate the aggregate litigation expenditures under the American rule:
$\int_0^1 e_j^{Am} dq = \int_0^1 q(1-q)W(\alpha+1)dq = \frac{1}{6}W(\alpha+1)$
The aggregate litigation expenditures under the English rule are as follows:
$\int_0^1 e_j^{Eng} dq = \int_0^{1-\overline{q}(\alpha)} 0 dq + \int_{1-\overline{q}(\alpha)}^1 W dq = \frac{1}{3}\frac{3\alpha+2}{\alpha+1}W$
Now, suppose the English expenditures are higher:

$$\begin{aligned} &\frac{1}{3}\frac{3\alpha+2}{\alpha+1}W > \frac{1}{6}W(\alpha+1) \\ \iff &3\alpha+2 > \frac{1}{2}(\alpha+1)^2 \\ \iff &4\alpha+3 > \alpha^2 \end{aligned}$$

which always holds true for $\alpha \in (0,1)$. ■

Hypothesis 1.2: Under the American fee-shifting rule, average litigation expenditures are higher for more spiteful agents. This increase is driven by an increase at every merit level.

Proof The litigation expenditures under the American fee-shifting rule are given by: $e^{*(\mathrm{Am})}(W,q,\alpha) = (1-q)\cdot q \cdot W \cdot (\alpha+1)$ The derivative with respect to spite is as follows:

$$\frac{\partial e^{*(\mathrm{Am})}}{\partial \alpha} = (1-q)qW > 0 \forall \alpha \in (0,1) \text{ and } q \in (0,1)$$

As a consequence, spite always increases $e^{*(\mathrm{Am})}$ at every $\alpha \in (0,1)$ and $q \in (0,1)$. Hence, average expenditures over all merit levels q are also higher, independent of the distribution of α or q. ■

Hypothesis 1.3: Under the English fee-shifting rule, average litigation expenditures over all merit levels q are higher for more spiteful agents. This increase is driven by an increase at low-merit levels while there is no increase at high-merit levels.

Proof In order to compare average litigation expenditures, it suffices to compare aggregate litigation expenditures. Since $\frac{\partial(1-\overline{q}(\alpha))}{\partial a} = -\frac{1}{(3\alpha+3)^2} < 0$, the threshold $(1-\overline{q}(\alpha))$ to switch from spending 0 to W decreases for more spiteful litigants. Aggregated over all merit levels, litigation expenditures are the following:

$$\begin{aligned}\int_0^1 e_j^{*Eng} dq &= \int_0^{1-\overline{q}(\alpha)} 0 dq + \int_{1-\overline{q}(\alpha)}^1 W dq \\ &= W - \frac{1}{3(\alpha+1)} W\end{aligned}$$

Further, the aggregated expenditures increase in the spite level since

$$\frac{\partial(W - \frac{1}{3(\alpha+1)}W)}{\partial \alpha} = \frac{3}{(3\alpha+3)^2} W > 0$$

.

■

Hypothesis 1.4: There is no difference in the increase of the average litigation expenditure over all q between the English and American fee-shifting rule for a non-spiteful ($\alpha \to 0$) compared to a fully spiteful ($\alpha \to 1$) agent.

Proof First, we compute the aggregate litigation expenditures over all merits q (assuming a uniform distribution) and then compute the difference between a non-spiteful ($\alpha \to 0$) and fully spiteful ($\alpha \to 1$) agent. For the American rule this is:

$$\begin{aligned}\int_0^1 e^{*(Am)} dq = \int_0^1 (1-q) q W(\alpha+1) dq &= \frac{1}{6} W(\alpha+1) \\ \int_0^1 e^{*(Am)}(\alpha \to 0) dq &= \frac{1}{6} W \\ \int_0^1 e^{*(Am)}(\alpha \to 1) dq &= \frac{2}{6} W \\ \int_0^1 e^{*(Am)}(\alpha \to 1) dq - \int_0^1 e^{*(Am)}(\alpha \to 0) dq &= \frac{1}{6} W\end{aligned}$$

For the English rule this is:

$$\begin{aligned}\int_0^1 e_j^{*Eng} dq = \int_0^{1-\overline{q}(\alpha)} 0 dq + \int_{1-\overline{q}(\alpha)}^1 W dq &= W - \frac{1}{3(\alpha+1)} W \\ \int_0^1 e^{*(Eng)}(\alpha \to 0) dq &= \frac{2}{3} W \\ \int_0^1 e^{*(Eng)}(\alpha \to 1) dq &= \frac{5}{6} W \\ \int_0^1 e^{*(Eng)}(\alpha \to 1) dq - \int_0^1 e^{*(Am)}(\alpha \to 0) dq &= \frac{1}{6} W\end{aligned}$$

■

A.2.6. Formal Derivations Hypotheses Settlement

Hypothesis 2.1: There is no difference in the average settlement requests over all merits q between the American and the English fee-shifting rule.

Proof In order to compare the average settlement requests, it suffices to compare the aggregate requests. The aggregate settlement requests under the American rule are given by:

$$\begin{aligned}
\int_0^1 s_j^{Am} dq &= \int_0^{\frac{1}{2}\frac{\alpha}{\alpha+1}} 0dq + \int_{\frac{1}{2}\frac{\alpha}{\alpha+1}}^{\frac{1}{2}\frac{\alpha+2}{\alpha+1}} W(a(q-\frac{1}{2})+q)dq + \int_{\frac{1}{2}\frac{\alpha+2}{\alpha+1}}^1 W dq \\
&= [\frac{1}{2}Wq^2(\alpha+1) - \frac{1}{2}W\alpha q]\Big|_{\frac{1}{2}\frac{\alpha}{\alpha+1}}^{\frac{1}{2}\frac{\alpha+2}{\alpha+1}} + [Wq]\Big|_{\frac{1}{2}\frac{\alpha+2}{\alpha+1}}^1 \\
&= [\frac{1}{2}W(\frac{1}{2}\frac{\alpha+2}{\alpha+1})^2(\alpha+1) - \frac{1}{2}W\alpha\frac{1}{2}\frac{\alpha+2}{\alpha+1}] - [\frac{1}{2}W(\frac{1}{2}\frac{\alpha}{\alpha+1})^2(\alpha+1) - \frac{1}{2}W\alpha\frac{1}{2}\frac{\alpha}{\alpha+1}] \\
&\quad + W - \frac{1}{2}\frac{\alpha+2}{\alpha+1}W \\
&= \frac{1}{8}W\frac{\alpha^2+4\alpha+4}{\alpha+1} - \frac{1}{4}W\frac{\alpha^2+2\alpha}{\alpha+1} - \frac{1}{8}W\frac{\alpha^2}{\alpha+1} + \frac{1}{4}W\frac{\alpha^2}{\alpha+1} + W - \frac{1}{2}W\frac{\alpha+2}{\alpha+1} \\
&= \frac{1}{8}W\frac{4\alpha+4}{\alpha+1} - \frac{1}{4}W\frac{2\alpha}{\alpha+1} + W - \frac{1}{2}\frac{\alpha+2}{\alpha+1} \\
&= \frac{1}{4}W\frac{2}{\alpha+1} + W - \frac{1}{4}W\frac{2\alpha+4}{\alpha+1} \\
&= W - \frac{1}{4}W\frac{2\alpha+2}{\alpha+1} \\
&= \frac{1}{2}W
\end{aligned}$$

The aggregate settlement requests under the English rule are given by:

$$\begin{aligned}
\int_0^1 s_j^{Eng} dq &= \int_0^{\frac{1}{3}} 0dq + \int_{\frac{1}{3}}^{\frac{2}{3}} (3q-1)Wdq + \int_{\frac{2}{3}}^1 W dq \\
&= [\frac{3}{2}q^2W - qW]\Big|_{\frac{1}{3}}^{\frac{2}{3}} + [Wq]\Big|_{\frac{2}{3}}^1 \\
&= \frac{2}{3}W - \frac{2}{3}W - \frac{1}{6}W + \frac{1}{3}W + W - \frac{2}{3}W \\
&= \frac{1}{2}W
\end{aligned}$$

■

Hypothesis 2.2: Under the American fee-shifting rule, the average settlement requests of low merits ($q < 0.5$) are lower for more spiteful agents, while for high merits ($q > 0.5$) they are higher.

Proof First, note that $s_j^{*Am} = \begin{cases} 0 & \text{if } q \leq \frac{1}{2}\frac{\alpha}{\alpha+1} \\ W(\alpha(q-\frac{1}{2})+q) & \text{if } \frac{1}{2}\frac{\alpha}{\alpha+1} < q < \frac{1}{2}\frac{\alpha+2}{\alpha+1} \\ W & \text{if } q \geq \frac{1}{2}\frac{\alpha+2}{\alpha+1} \end{cases}$

First of all, for $q < \frac{1}{2}$, $s_j^* \in \{0, W(\alpha(q-\frac{1}{2})+q)\}$ and for $q > \frac{1}{2}$, $s_j^* \in \{W(\alpha(q-\frac{1}{2})+q), W\}$

Since $\frac{\partial \frac{1}{2}\frac{\alpha}{\alpha+1}}{\partial \alpha} = \frac{1}{2}\frac{1}{(\alpha+1)^2} > 0$, the threshold to switch from requesting 0 to $W(\alpha(q-\frac{1}{2})+q)$ increases for more spiteful agents for $q < 0.5$. Additionally, requests are lower after this threshold since $\frac{\partial W(\alpha(q-\frac{1}{2})+q)}{\partial \alpha} = W(q-\frac{1}{2}) < 0$ for $q < 0.5$. Hence, more spiteful agents, on average over low merits $q < 0.5$, request less for $q < 0.5$.

Since $\frac{\partial \frac{1}{2}\frac{\alpha+2}{\alpha+1}}{\partial \alpha} = -\frac{1}{2}\frac{1}{(\alpha+1)^2} < 0$, the threshold to switch from requesting $W(\alpha(q-\frac{1}{2})+q)$ to W decreases for more spiteful agents. Additionally, request are higher before that threshold since $\frac{\partial W(\alpha(q-\frac{1}{2})+q)}{\partial \alpha} = W(q-\frac{1}{2}) > 0$ for $q > 0.5$. Hence, for $q > 0.5$, more spiteful agents, on average over high merits $q > 0.5$, request more. ■

Hypothesis 2.3 Settlement requests under the English fee-shifting rule are the same for more spiteful and less spiteful agents.

Proof This follows immediately from the equilibrium settlement requests, which are independent of the parameter α:

$$s_i^* = \begin{cases} W & \text{if } q \leq \frac{1}{3} \\ (2-3q)W & \text{if } \frac{1}{3} < q < \frac{2}{3} \\ 0 & \text{if } q \geq \frac{2}{3} \end{cases}$$

■

Finally, as in the efficient Nash-Demand game solution all resources are always allocated without waste, there is no difference in the average influence of spite on the settlement requests over all merits q.

Hypothesis 2.4 There is no difference in the change of average settlement requests over all merits q between the English and American rule for non-spiteful compared to spiteful agents.

Proof This follows immediately from the condition of the efficient Nash-Demand game solution, where $s_i + s_j = W$ for all q. Therefore, there is no difference in the average settlement requests over all merit q between the English and American rule independent of the spite level α.

■

B. Additional analyses

B.1. Main regressions

B.1.1. American vs. English fee-shifting rule

To formally study the differences between the English and American rule, we use the following mixed-effects model with controls C_1 and C_2:[39]

$$\begin{aligned} D_{i,q} =& \beta_0 + \beta_1 q + \nu_i + \epsilon_{i,q} + C_M \\ C_1 =& 0 \\ C_2 =& \beta_3 \mathbb{1}_{Fee=Eng} + \beta_4 \mathbb{1}_{Fee=Eng} \times q \end{aligned} \tag{15}$$

where ν_i is a random effect for subject i, and $\epsilon_{i,q}$ is the residual. D is the dependent variable, which is either the litigation expenditure e or the settlement request s. $\mathbb{1}_{Fee=Eng}$ denotes a dummy with value one if the fee-shifting rule is English and zero otherwise. Table 4 shows the estimation results. Models (1) and (3) estimate the litigation expenditures under the American and English fee-shifting rules, respectively. Models (2) and (4) estimate the settlement requests under the American and English fee-shifting rule, respectively. Models (5) and (6) estimate Equation 15 with Control C_2, i.e., the effect of fee-shifting on litigation expenditures and settlement requests, respectively.

It can be seen that both litigation expenditures and settlement requests are increasing significantly in merit q, giving support for the theory-derived functional form of the settlement request. For litigation expenditures, the observed behavior only follows tentatively the theoretical functional form. It can also be seen that under the English fee-shifting regime, both settlement requests and litigation expenditures are increasing significantly more compared to the American fee-shifting rule.

[39] We use a simple linear model assuming linearity in q. A look at Figure 3 confirms the assumption of linearity to be plausible.

Table 4: Mixed-effects regression of the litigation expenditures and settlement requests by fee-shifting rule as a function of q.

	American		English		Comparison	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	3.74***	4.07***	4.11***	3.99***	3.74***	4.07***
	(0.07)	(0.06)	(0.07)	(0.06)	(0.07)	(0.06)
Q	2.26***	1.97***	3.07***	2.23***	2.26***	1.97***
	(0.06)	(0.05)	(0.07)	(0.05)	(0.07)	(0.05)
Eng					0.37***	−0.09*
					(0.06)	(0.05)
Q x Eng					0.81***	0.25***
					(0.10)	(0.08)
Litigation	✓	×	✓	×	✓	×
Observations	8,175	8,175	8,175	8,175	16,350	16,350
Log Likelihood	−18,909.75	−17,378.36	−19,707.34	−17,700.21	−39,030.08	−34,235.02
Akaike Inf. Crit.	37,827.50	34,764.72	39,422.68	35,408.43	78,072.17	68,482.04
Bayesian Inf. Crit.	37,855.54	34,792.75	39,450.72	35,436.46	78,118.38	68,528.26
Note:						$^{+}$p<0.1;*p<0.05;**p<0.01;***p<0.001;

Models (1), (3), and (5) estimate the litigation expenditures following Equation 15. Models (2), (4), and (6) estimate the settlement requests following Equation 15. Models (1), (2), (3) and (4) estimate Equation 15 with C_1. Models (5) and (6) estimate Equation 15 with C_2. Standard errors are shown in parenthesis. *NumQ* indicates the merit of the case while *Eng* denotes a dummy with value one for the English rule and zero for the American rule.

B.1.2. Spiteful preferences

Table 5 reports on the mixed-effects regression for the aggregate legal expenditures and settlement requests by measure of social preference.

Table 5: Mixed-effects regression of the litigation expenditures and settlement requests by measure of social-preferences.

	Litigation/Settlment					
	American		English		Both	
Panel A: Above/below median spiteful subjects (via Spite-Task)						
Constant	4.24^{***}	4.62^{***}	5.50^{***}	4.70^{***}	5.50^{***}	4.70^{***}
	(0.08)	(0.07)	(0.08)	(0.07)	(0.08)	(0.07)
MedianSpite	1.31^{***}	0.93^{***}	0.31^{***}	0.85^{***}	0.31^{***}	0.85^{***}
	(0.12)	(0.10)	(0.12)	(0.10)	(0.11)	(0.10)
American					-1.26^{***}	-0.08^{*}
					(0.06)	(0.04)
American:MedianSpite					1.00^{***}	0.08
					(0.08)	(0.06)
Panel B: Above/below median spiteful subjects (via Spite-Questionnaire)						
Constant	4.40^{***}	4.58^{***}	5.39^{***}	4.64^{***}	5.39^{***}	4.64^{***}
	(0.08)	(0.07)	(0.08)	(0.07)	(0.08)	(0.07)
MedianSpiteQ	0.95^{***}	0.98^{***}	0.53^{***}	0.94^{***}	0.53^{***}	0.94^{***}
	(0.12)	(0.10)	(0.12)	(0.10)	(0.11)	(0.10)
American					-0.99^{***}	-0.06
					(0.06)	(0.04)
American:MedianSpiteQ					0.43^{***}	0.04
					(0.08)	(0.06)
Panel C: Above/below median prosocial subjects (via SVO-Measure)						
Constant	4.83^{***}	5.15^{***}	5.73^{***}	5.17^{***}	5.73^{***}	5.17^{***}
	(0.09)	(0.07)	(0.08)	(0.07)	(0.08)	(0.07)
MedianSVO	0.07	-0.18^{*}	-0.16	-0.14	-0.16	-0.14
	(0.12)	(0.10)	(0.12)	(0.10)	(0.11)	(0.10)
American					-0.90^{***}	-0.02
					(0.06)	(0.04)
American:MedianSVO					0.24^{***}	-0.04
					(0.08)	(0.06)
Litigation	✓	×	✓	×	✓	×
Observations	8,175	8,175	8,175	8,175	16,350	16,350
Note:						$^{+}$p<0.1;*p<0.05;**p<0.01;***p<0.001;

Models (1), (3), and (5) estimate the litigation expenditures. Models (2), (4), and (6) estimate the settlement requests. Models (1) and (2) estimate behavior under the American fee-shifting rule. Models (3) and (4) estimate under the English fee-shifting rule. Models (5) and (6) additionally estimate the interaction between both fee-shifting rules. Standard errors are shown in parenthesis. *American* denotes a dummy with value one for the American rule and zero for the English rule. *MedianSpite*/*MedianSpiteQ*/*MedianSVO* denotes a dummy with value one if the subject displays above-median preferences in the respective measure of social preferences.

Table 6 reports on the mixed-effects regression for the aggregate legal expenditures and settlement requests by a continuous measure of social preference.

Table 6: Mixed-effects regression of the litigation expenditures and settlement requests by a continuous measure of social-preferences.

	Litigation/Settlment					
	American		English		Both	
Panel A: Spiteful subjects (via Spite-Task)						
Constant	4.87***	5.06***	5.64***	5.10***	5.64***	5.10***
	(0.06)	(0.05)	(0.06)	(0.05)	(0.05)	(0.05)
ContinuousSpite	0.88***	0.69***	0.42***	0.66***	0.42***	0.66***
	(0.06)	(0.05)	(0.06)	(0.05)	(0.05)	(0.05)
American					−0.78***	−0.04
					(0.04)	(0.03)
American:ContinuousSpite					0.46***	0.03
					(0.04)	(0.03)
Panel B: Spiteful subjects (via Spite-Questionnaire)						
Constant	4.87***	5.06***	5.64***	5.10***	5.64***	5.10***
	(0.06)	(0.05)	(0.06)	(0.05)	(0.05)	(0.05)
ContinuousSpiteQ	0.87***	0.85***	0.54***	0.82***	0.54***	0.82***
	(0.06)	(0.05)	(0.06)	(0.05)	(0.05)	(0.05)
American					−0.78***	−0.04
					(0.04)	(0.03)
American:ContinuousSpiteQ					0.33***	0.03
					(0.04)	(0.03)
Panel C: Prosocial subjects (via SVO-Measure)						
Constant	4.87***	5.06***	5.64***	5.10***	5.64***	5.10***
	(0.06)	(0.05)	(0.06)	(0.05)	(0.06)	(0.05)
ContinuousSVOMeasure	−0.005	−0.12**	−0.06	−0.10**	−0.06	−0.10**
	(0.06)	(0.05)	(0.06)	(0.05)	(0.06)	(0.05)
American					−0.78***	−0.04
					(0.04)	(0.03)
American:ContinuousSVOMeasure					0.06	−0.02
					(0.04)	(0.03)
Litigation	✓	×	✓	×	✓	×
Observations	8,175	8,175	8,175	8,175	16,350	16,350
Note:					+p<0.1;*p<0.05;**p<0.01;***p<0.001;	

Models (1), (3), and (5) estimate the litigation expenditures. Models (2), (4), and (6) estimate the settlement requests. Models (1) and (2) estimate behavior under the American fee-shifting rule. Models (3) and (4) estimate under the English fee-shifting rule. Models (5) and (6) additionally estimate the interaction between both fee-shifting rules. Standard errors are shown in parenthesis. *American* denotes a dummy with value one for the American rule and zero for the English rule. *ContinuousSpite*/*ContinuousSpiteQ*/*ContinuousSVOMeasure* denotes the z-scored preferences in the respective measure of social preferences.

B.1.3. The effect of spite as a function of merit

To study the effect of spite as a function of merit more formally we use the following mixed-effects model with controls C_1, C_2, and C_3:

$$
\begin{aligned}
D_{i,q} =& \beta_0 + \beta_1 \mathbb{1}_{spite>median} + \nu_i + \epsilon_{i,q} + C_M \qquad (16)\\
C_1 =& 0\\
C_2 =& \beta_3 q + \beta_4 \mathbb{1}_{spite>median} \times q\\
C_3 =& C_2 + \beta_5 \mathbb{1}_{Fee=Am} + \beta_6 \mathbb{1}_{Fee=Am} \times q + \beta_7 \mathbb{1}_{Fee=Am} \times \mathbb{1}_{spite>median}\\
&+ \beta_8 \mathbb{1}_{Fee=Am} \times q \times \mathbb{1}_{spite>median}
\end{aligned}
$$

where ν_i is a random effect for subject i, and $\epsilon_{i,q}$ is the residual. D is the dependent variable, which is either the litigation expenditure e or the settlement request s. $\mathbb{1}_{Fee=Am}$ denotes a dummy with value one if the fee-shifting rule is American and zero otherwise. $\mathbb{1}_{spite>median}$ denotes a dummy with value one if the subject is more spiteful, i.e., if the subject scored higher than the median in the spite measurement. Table 5 shows the estimation for litigation expenditures and settlement requests of Equation 16 with control C_1, i.e, the effect of more spiteful vs. less spiteful subjects. Table 7 shows the estimation of Equation 16 with control C_2 and C_3, i.e the effect of more spiteful vs. less spiteful subjects as function of merit q. Furthermore, Table 8 replicates the result by using continuous measures of social preferences.

Table 7: Mixed-effects regression of the litigation expenditures and settlement requests by measure of social-preferences as a function of q.

	Litigation/Settlment					
	American		English		Both	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Above/below median spiteful subjects (via Spite-Task)						
Constant	2.90***	3.33***	3.56***	3.22***	3.56***	3.22***
	(0.09)	(0.08)	(0.10)	(0.08)	(0.09)	(0.08)
NumQ	2.69***	2.57***	3.87***	2.95***	3.87***	2.95***
	(0.09)	(0.07)	(0.10)	(0.07)	(0.10)	(0.07)
MedianSpite	1.75***	1.55***	1.14***	1.60***	1.14***	1.60***
	(0.13)	(0.11)	(0.14)	(0.11)	(0.13)	(0.11)
NumQ:MedianSpite	−0.90***	−1.24***	−1.68***	−1.50***	−1.68***	−1.50***
	(0.12)	(0.10)	(0.14)	(0.11)	(0.15)	(0.11)
American					−0.67***	0.11*
					(0.09)	(0.06)
NumQ:American					−1.18***	−0.38***
					(0.14)	(0.10)
American:MedianSpite					0.61***	−0.05
					(0.13)	(0.09)
NumQ:American:MedianSpite					0.78***	0.26*
					(0.21)	(0.15)
Panel B: Above/below median spiteful subjects (via Spite-Questionnaire)						
Constant	3.03***	3.38***	3.53***	3.32***	3.53***	3.32***
	(0.09)	(0.08)	(0.10)	(0.08)	(0.09)	(0.08)
NumQ	2.75***	2.41***	3.71***	2.66***	3.71***	2.66***
	(0.09)	(0.07)	(0.10)	(0.08)	(0.10)	(0.08)
MedianSpiteQ	1.46***	1.43***	1.18***	1.38***	1.18***	1.38***
	(0.14)	(0.11)	(0.14)	(0.11)	(0.13)	(0.11)
NumQ:MedianSpiteQ	−1.01***	−0.89***	−1.31***	−0.88***	−1.31***	−0.88***
	(0.12)	(0.10)	(0.14)	(0.11)	(0.15)	(0.11)
American					−0.51***	0.06
					(0.09)	(0.07)
NumQ:American					−0.96***	−0.25**
					(0.15)	(0.11)
American:MedianSpiteQ					0.27**	0.04
					(0.13)	(0.09)
NumQ:American:MedianSpiteQ					0.31	−0.01
					(0.21)	(0.15)
Panel C: Above/below median prosocial subjects (via SVO-Measure)						
Constant	3.78***	4.12***	4.28***	4.03***	4.28***	4.03***
	(0.10)	(0.08)	(0.10)	(0.08)	(0.09)	(0.08)
NumQ	2.10***	2.07***	2.89***	2.28***	2.89***	2.28***
	(0.09)	(0.07)	(0.10)	(0.08)	(0.10)	(0.08)
MedianSVO	−0.09	−0.09	−0.34**	−0.09	−0.34**	−0.09
	(0.14)	(0.11)	(0.14)	(0.11)	(0.13)	(0.11)
NumQ:MedianSVO	0.32**	−0.19*	0.35**	−0.10	0.35**	−0.10
	(0.12)	(0.10)	(0.14)	(0.11)	(0.15)	(0.11)
American					−0.50***	0.08
					(0.09)	(0.07)
NumQ:American					−0.79***	−0.21*
					(0.15)	(0.11)
American:MedianSVO					0.25**	0.004
					(0.13)	(0.09)
NumQ:American:MedianSVO					−0.03	−0.09
					(0.21)	(0.15)
Litigation	✓	×	✓	×	✓	×
Observations	8,175	8,175	8,175	8,175	16,350	16,350
Note:						+p<0.1;*p<0.05;**p<0.01;***p<0.001;

Models (1), (3), and (5) estimate the litigation expenditures. Models (2), (4), and (6) estimate the settlement requests. Models (1) and (2) estimate behavior under the American fee-shifting rule. Models (3) and (4) estimate under the English fee-shifting rule. Models (5) and (6) additionally estimate the interaction between both fee-shifting rules. Standard errors are shown in parenthesis. *NumQ* indicates the merit of the case while *American* denotes a dummy with value one for the English rule and zero for the American rule. *MedianSpite*/*MedianSpiteQ*/*MedianSVO* denotes a dummy with value one if the subject displays above-median preferences in the respective measure of social preferences.

Table 8: Mixed-effects regression of the litigation expenditures and settlement requests by a continuous measure of social-preferences as a function of q.

	Litigation/Settlment					
	American		English		Both	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Above/below median spiteful subjects (via Spite-Task)						
Constant	3.74***	4.07***	4.11***	3.99***	4.11***	3.99***
	(0.07)	(0.05)	(0.07)	(0.05)	(0.06)	(0.05)
NumQ	2.26***	1.97***	3.07***	2.23***	3.07***	2.23***
	(0.06)	(0.05)	(0.07)	(0.05)	(0.07)	(0.05)
ContinuousSpite	1.18***	1.05***	0.95***	1.06***	0.95***	1.06***
	(0.07)	(0.05)	(0.07)	(0.05)	(0.06)	(0.05)
NumQ:ContinuousSpite	−0.60***	−0.72***	−1.06***	−0.81***	−1.06***	−0.81***
	(0.06)	(0.05)	(0.07)	(0.05)	(0.07)	(0.05)
American					−0.37***	0.09*
					(0.06)	(0.05)
NumQ:American					−0.81***	−0.25***
					(0.10)	(0.08)
American:ContinuousSpite					0.23***	−0.01
					(0.06)	(0.05)
NumQ:American:ContinuousSpite					0.46***	0.09
					(0.10)	(0.08)
Panel B: Above/below median spiteful subjects (via Spite-Questionnaire)						
Constant	3.74***	4.07***	4.11***	3.99***	4.11***	3.99***
	(0.07)	(0.05)	(0.07)	(0.05)	(0.06)	(0.05)
NumQ	2.26***	1.97***	3.07***	2.23***	3.07***	2.23***
	(0.06)	(0.05)	(0.07)	(0.05)	(0.07)	(0.05)
ContinuousSpiteQ	1.24***	1.16***	1.04***	1.15***	1.04***	1.15***
	(0.07)	(0.05)	(0.07)	(0.05)	(0.06)	(0.05)
NumQ:ContinuousSpiteQ	−0.74***	−0.63***	−1.00***	−0.65***	−1.00***	−0.65***
	(0.06)	(0.05)	(0.07)	(0.05)	(0.07)	(0.05)
American					−0.37***	0.09*
					(0.06)	(0.05)
NumQ:American					−0.81***	−0.25***
					(0.10)	(0.08)
American:ContinuousSpiteQ					0.20***	0.01
					(0.06)	(0.05)
NumQ:American:ContinuousSpiteQ					0.26**	0.02
					(0.10)	(0.08)
Panel C: Above/below median prosocial subjects (via SVO-Measure)						
Constant	3.74***	4.07***	4.11***	3.99***	4.11***	3.99***
	(0.07)	(0.06)	(0.07)	(0.06)	(0.07)	(0.06)
NumQ	2.26***	1.97***	3.07***	2.23***	3.07***	2.23***
	(0.06)	(0.05)	(0.07)	(0.05)	(0.07)	(0.05)
ContinuousSVOMeasure	−0.10	−0.11*	−0.18**	−0.12**	−0.18***	−0.12**
	(0.07)	(0.06)	(0.07)	(0.06)	(0.07)	(0.06)
NumQ:ContinuousSVOMeasure	0.19***	−0.02	0.23***	0.04	0.23***	0.04
	(0.06)	(0.05)	(0.07)	(0.05)	(0.07)	(0.05)
American					−0.37***	0.09*
					(0.06)	(0.05)
NumQ:American					−0.81***	−0.25***
					(0.10)	(0.08)
American:ContinuousSVOMeasure					0.08	0.02
					(0.06)	(0.05)
NumQ:American:ContinuousSVOMeasure					−0.04	−0.07
					(0.10)	(0.08)
Litigation	✓	×	✓	×	✓	×
Observations	8,175	8,175	8,175	8,175	16,350	16,350
Note:						+p<0.1;*p<0.05;**p<0.01;***p<0.001;

Models (1), (3), and (5) estimate the litigation expenditures. Models (2), (4), and (6) estimate the settlement requests. Models (1) and (2) estimate behavior under the American fee-shifting rule. Models (3) and (4) estimate under the English fee-shifting rule. Models (5) and (6) additionally estimate the interaction between both fee-shifting rules. Standard errors are shown in parenthesis. *NumQ* indicates the merit of the case while *American* denotes a dummy with value one for the English rule and zero for the American rule. *ContinuousSpite*/*ContinuousSpiteQ*/*ContinuousSVOMeasure* denotes the z-scored preferences in the respective measure of social preferences.

The econometric estimations roughly confirm our visual inspections. Litigation expenditures and settlement requests increase with merit.

More spiteful subjects (measures by both measures of spite) start off with a substantially higher settlement request and substantially higher litigation expenditures. However, with increasing merit, the difference between more and less spiteful subjects in litigation expenditures and settlement requests decreases (as β_4 is significantly negative). Yet, the difference remains always positive under the American fee-shifting rule. Thus, we find further support for Hypothesis 1.2, stating that under the American fee-shifting rule, litigation expenditures are higher for more spiteful agents at every level of merit. Further, we see that more spiteful subjects re-

quest more than less spiteful subjects for all merit levels (under both fee-shifting rules). Thus, we find no support for the first part of Hypothesis 2.2 – stating that under the American fee-shifting rule, more spiteful subjects request less than less spiteful subjects for low-merit cases – no support for Hypothesis 2.3 – claiming no difference in settlement requests under the English fee-shifting rule between more and less spiteful subjects – and some support for the second part of Hypothesis 2.2 – stating that under the American fee-shifting rule, more spiteful subjects request more than less spiteful subjects for high-merit cases.

We further find that the difference between more and less spiteful subjects is more pronounced under the American fee-shifting rule compared to the English fee-shifting rule (as β_7 is significantly positive and β_8 is also positive). We find only little evidence for such a difference in the fee-shifting rules for the settlement request between more and less spiteful subjects.

The following figures illustrate the effect of spite as a function of merit and fee-shifting rule for the Spite-Questionnaire and the SVO-Measure.

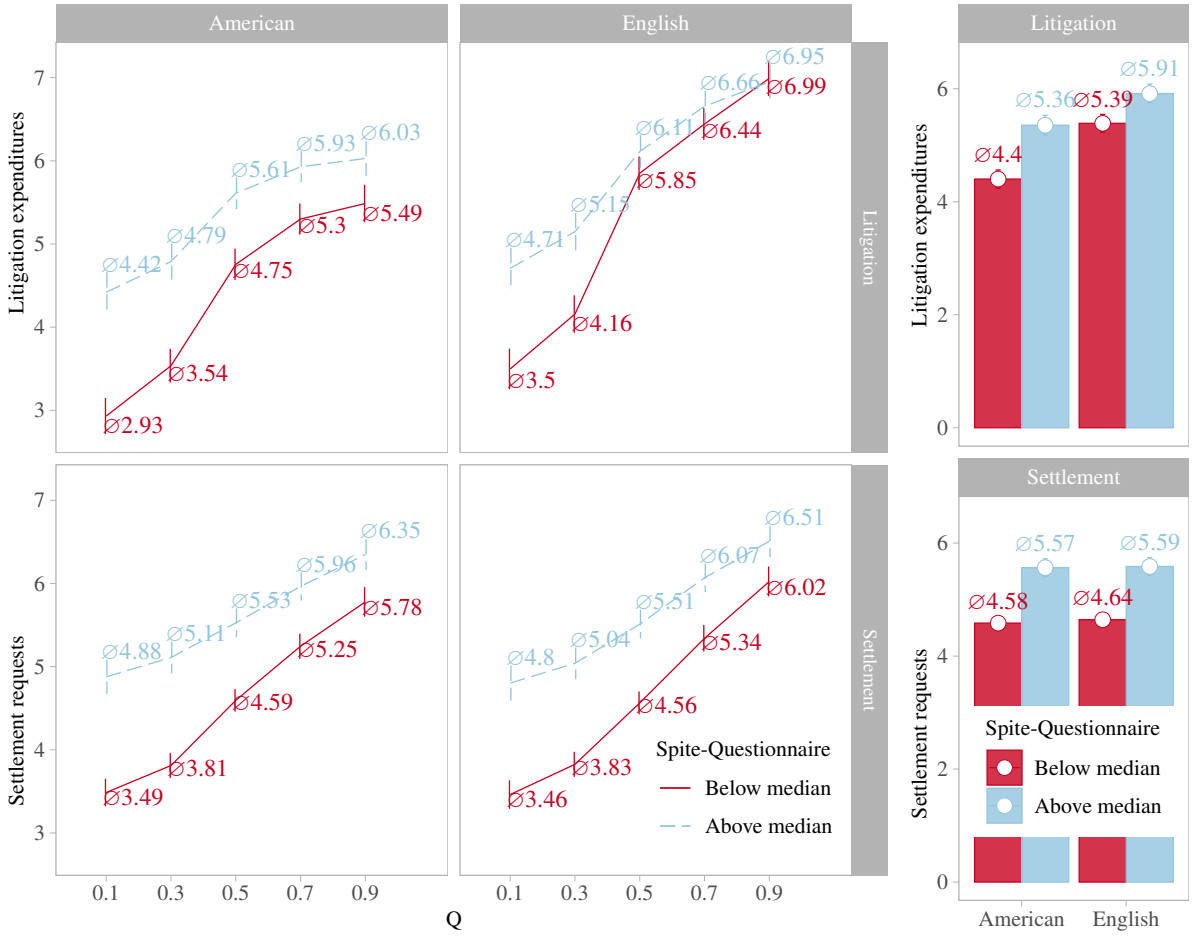


Figure 6: Litigation effort and settlement request under the American and English fee-shifting rule as a function of q for more/less spiteful subjects.

The figures to the left depict the litigation expenditures and settlement request by fee-shifting rule for more and less spiteful subjects as a function of q, while the figures to the right depict the aggregates. The panels on the top depict the litigation effort, while the panels on the bottom illustrate the settlement requests. Red solid lines depict the behavior of less spiteful subjects (i.e., subjects with below-median spite scores on the Spite-Questionnaire), while blue dashed lines indicate the response of more spiteful subjects. The error bars indicate the 95% confidence intervals.

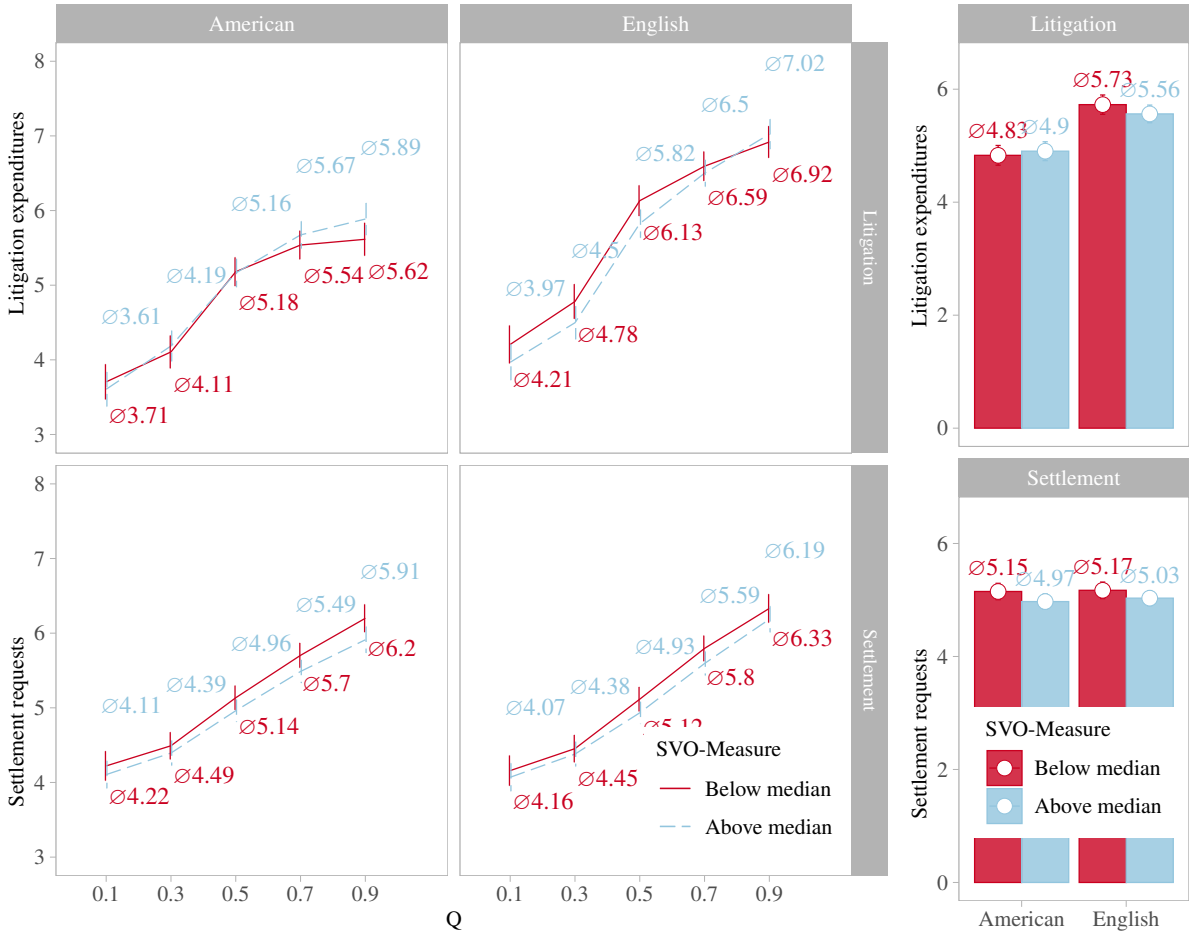


Figure 7: Litigation effort and settlement request under the American and English fee-shifting rule as a function of q for more/less prosocial subjects.

The figures to the left depict the litigation expenditures and settlement request by fee-shifting rule for more and less prosocial subjects as a function of q, while the figures to the right depict the aggregates. The panels on the top depict the litigation effort, while the panels on the bottom illustrate the settlement requests. Red solid lines depict the behavior of less prosocial subjects (i.e., subjects with below-median SVO-scores on the SVO-Measure), while blue dashed lines indicate the behavior of more prosocial subjects. The error bars indicate the 95% confidence intervals.

B.1.4. The costs of spite

Table 9: Mixed-effects regression of the expected payoff by fee-shifting rule and spiteful preferences

	Expected Payoff Matched with Whole Population			Expected Payoff Matched with Below Spite			Expected Payoff Matched with Above Spite		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	2.22***	−1.96***	−4.08***	2.80***	−1.20***	−3.06***	1.86***	−2.32***	−4.55***
	(0.07)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)	(0.06)	(0.06)
American	0.47***	0.47***	4.71***	0.33***	0.33***	4.04***	0.34***	0.34***	4.79***
	(0.09)	(0.06)	(0.06)	(0.08)	(0.05)	(0.06)	(0.09)	(0.06)	(0.06)
MedianSpite	−0.92***	−0.92***	−0.92***	−0.86***	−0.86***	−0.86***	−0.88***	−0.88***	−0.88***
	(0.10)	(0.08)	(0.08)	(0.09)	(0.08)	(0.08)	(0.10)	(0.08)	(0.08)
NumQ		8.35***	12.60***		8.00***	11.71***		8.38***	12.82***
		(0.06)	(0.07)		(0.06)	(0.06)		(0.06)	(0.07)
American:MedianSpite	−0.15	−0.15+	−0.15*	−0.22+	−0.22**	−0.22***	−0.18	−0.18*	−0.18**
	(0.13)	(0.08)	(0.07)	(0.12)	(0.08)	(0.06)	(0.13)	(0.08)	(0.07)
American:NumQ			−8.48***			−7.43***			−8.89***
			(0.09)			(0.09)			(0.09)
Observations	16,350	16,350	16,350	16,350	16,350	16,350	16,350	16,350	16,350
Log Likelihood	−46,353.44	−39,891.05	−36,578.25	−45,626.28	−39,098.95	−36,391.78	−46,446.19	−40,097.05	−36,503.79
Akaike Inf. Crit.	92,718.87	79,796.09	73,172.49	91,264.57	78,211.90	72,799.56	92,904.39	80,208.10	73,023.59
Bayesian Inf. Crit.	92,765.08	79,850.01	73,234.11	91,310.78	78,265.82	72,861.17	92,950.60	80,262.02	73,085.20

Note: +p<0.1;*p<0.05;**p<0.01;***p<0.001;

Models (1), (2), and (3) estimate the expected payoff when being matched with the whole population of the experiment. Models (4), (5), and (6) estimate the expected payoff when being matched only with below median spite subjects. Models (7), (8), and (9) estimate the expected payoff when being matched only with above median spite subjects. *NumQ* indicates the merit of the case while *American* denotes a dummy with value one for the English rule and zero for the American rule. *MedianSpite* denotes a dummy with value one if the subject displays above-median spite. All models estimate the interaction between the fee-shifting rules and above-median spite. Models (2), (5), and (7) additionally control for the merit of the case, while models (3), (6), (8) further control for the interaction of the merit and the fee-shifting rule. Standard errors are shown in parenthesis.

Table 10: Mixed-effects regression of the expected payoff by fee-shifting rule and being matched with above or below spite opponents

	Expected Payoff								
	Matched with Whole Population			Matched with Below Spite			Matched with Above Spite		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	1.94***	−2.73***	−4.96***	2.80***	−0.76***	−2.63***	1.94***	−2.73***	−4.96***
	(0.08)	(0.08)	(0.07)	(0.06)	(0.06)	(0.05)	(0.08)	(0.08)	(0.07)
American	0.11	0.11+	4.56***	0.33***	0.33***	4.07***	0.11	0.11+	4.56***
	(0.10)	(0.06)	(0.07)	(0.07)	(0.05)	(0.05)	(0.10)	(0.06)	(0.07)
MatchedSpiteAbove	−0.96***	−0.96***	−0.96***	−0.93***	−0.93***	−0.93***	−0.96***	−0.96***	−0.96***
	(0.10)	(0.06)	(0.05)	(0.07)	(0.05)	(0.04)	(0.10)	(0.06)	(0.05)
NumQ		9.34***	13.79***		7.12***	10.86***		9.34***	13.79***
		(0.06)	(0.07)		(0.05)	(0.05)		(0.06)	(0.07)
American:MatchedSpiteAbove	0.05	0.05	0.05	0.01	0.01	0.01	0.05	0.05	0.05
	(0.14)	(0.09)	(0.07)	(0.10)	(0.07)	(0.05)	(0.14)	(0.09)	(0.07)
American:NumQ			−8.90***			−7.48***			−8.90***
			(0.10)			(0.08)			(0.10)
Observations	15,660	15,660	15,660	17,040	17,040	17,040	15,660	15,660	15,660
Log Likelihood	−45,622.91	−38,641.72	−35,402.61	−45,544.96	−38,727.08	−35,057.76	−45,622.91	−38,641.72	−35,402.61
Akaike Inf. Crit.	91,257.81	77,297.45	70,821.21	91,101.92	77,468.17	70,131.52	91,257.81	77,297.45	70,821.21
Bayesian Inf. Crit.	91,303.77	77,351.06	70,882.48	91,148.38	77,522.37	70,193.47	91,303.77	77,351.06	70,882.48

Note: $^{+}$p<0.1;*p<0.05;**p<0.01;***p<0.001;

Models (1), (2), and (3) estimate the expected payoff for the whole population of the experiment. Models (4), (5), and (6) estimate the expected payoff only for below median spite subjects. Models (7), (8), and (9) estimate the expected payoff only for above median spite subjects. *NumQ* indicates the merit of the case while *American* denotes a dummy with value one for the English rule and zero for the American rule. *MatchedSpiteAbove* denotes a dummy with value one if the subject is matched only with above-median spite subjects. All models estimate the interaction between the fee-shifting rules and above-median spite. Models (2), (5), and (7) additionally control for the merit of the case, while models (3), (6), (8) further control for the interaction of the merit and the fee-shifting rule. Standard errors are shown in parenthesis.

B.2. Further regressions

B.2.1. Order effects

In this subsection, we show that there is no order effect of the fee-shifting rule. In particular, Figure 8 shows the litigation expenditures and settlement requests as a function of the merit under the American and the English fee-shifting rule both if the American fee-shifting rule is played first and if the English fee-shifting rule is played first. Table 11 provides the corresponding regression. No order-effect can be found.

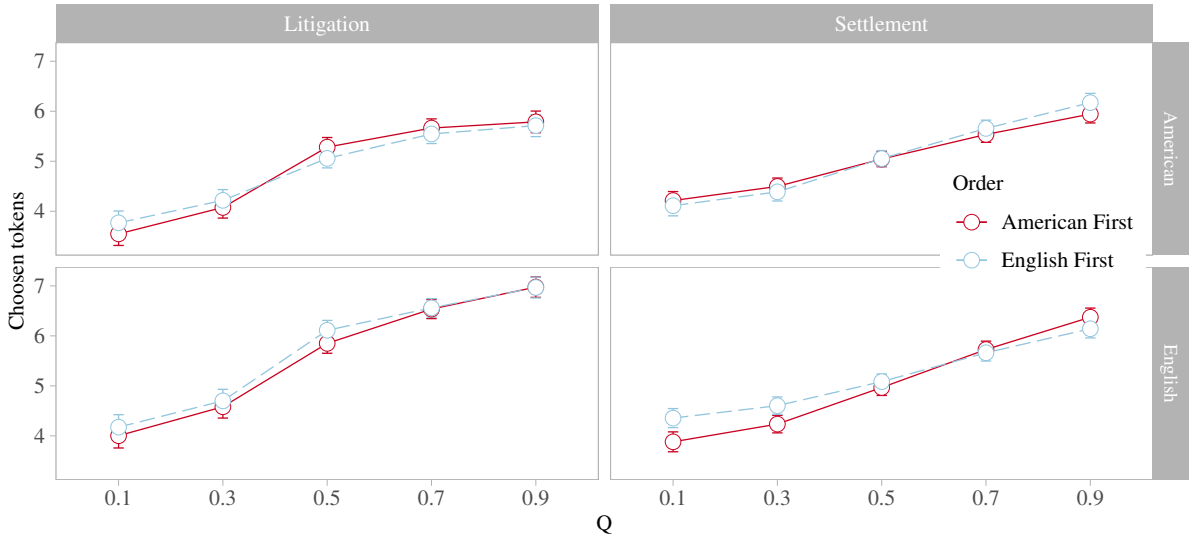


Figure 8: Order effects on litigation expenditures and settlement requests under both fee-shifting rules.

The panels on the left depict the litigation effort, while the panels on the right illustrate the settlement requests. The panels on top show the behavior under the American rule, while the panels on the bottom show the behavior under the English rule. Red solid lines depict the behavior if the American rule was played first, while blue dashed lines indicate the response if the English rule was played first in each panel.

Table 11: Mixed-effects regression of order effects on litigation expenditures and settlement requests under both fee-shifting rules.

	English rule first			
	American		English	
	(1)	(2)	(3)	(4)
Constant	4.87***	5.05***	5.59***	5.04***
	(0.09)	(0.07)	(0.08)	(0.07)
EnglishFirst	−0.01	0.03	0.11	0.13
	(0.12)	(0.10)	(0.12)	(0.10)
Litigation	✓	×	✓	×
Observations	8,175	8,175	8,175	8,175
Log Likelihood	−19,509.13	−18,036.70	−20,527.36	−18,444.68
Akaike Inf. Crit.	39,026.26	36,081.41	41,062.72	36,897.36
Bayesian Inf. Crit.	39,054.30	36,109.44	41,090.76	36,925.39
Note:				$^{+}$p<0.1;*p<0.05;**p<0.01;***p<0.001;

Models (1) and (3) estimate the litigation expenditures. Models (2) and (4) estimate the settlement requests. Models (1) and (2) estimate behavior under the American fee-shifting rule. Models (3) and (4) estimate under the English fee-shifting rule. Standard errors are shown in parenthesis. *EnglishFirst* denotes a dummy with value one if the English rule was played first and zero if the American rule was played first.

B.2.2. Additional Controls

In this section, we employ a robustness check by running models that include controls (age, gender, and educational attainment) and risk preferences (see section B.2.4 for a discussion of

the measure). Table 12 shows the results of these regressions. We observe that all main findings remain robust to these alternative model specifications.

Table 12: Main mixed-effects regression with controls

	Litigation/Settlment											
	American		English		Both		American		English		Both	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Above/below median spiteful subjects (via Spite-Task)												
Constant	2.72***	3.59***	4.09***	3.60***	3.74***	3.54***	1.67***	2.48***	3.21***	2.66***	2.79***	2.54***
	(0.23)	(0.19)	(0.23)	(0.19)	(0.20)	(0.18)	(0.34)	(0.30)	(0.35)	(0.29)	(0.31)	(0.28)
NumQ	2.69***	2.57***	3.87***	2.95***	3.87***	2.95***	2.85***	2.61***	3.97***	2.87***	3.97***	2.87***
	(0.09)	(0.07)	(0.10)	(0.07)	(0.10)	(0.07)	(0.12)	(0.10)	(0.14)	(0.11)	(0.14)	(0.11)
MedianSpite	1.76***	1.55***	1.14***	1.59***	1.14***	1.59***	2.33***	2.02***	1.75***	1.94***	1.75***	1.94***
	(0.13)	(0.11)	(0.14)	(0.11)	(0.13)	(0.11)	(0.18)	(0.16)	(0.19)	(0.16)	(0.18)	(0.16)
American					−0.67***	0.11*					−0.70***	0.06
					(0.09)	(0.06)					(0.12)	(0.09)
NumQ:American					−1.18***	−0.38***					−1.12***	−0.27*
					(0.14)	(0.10)					(0.20)	(0.15)
bretrisk							0.02***	0.02***	0.02***	0.02***	0.02***	0.02***
							(0.003)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)
NumQ:MedianSpite	−0.90***	−1.24***	−1.68***	−1.50***	−1.68***	−1.50***	−1.59***	−1.68***	−2.42***	−1.77***	−2.42***	−1.77***
	(0.12)	(0.10)	(0.14)	(0.11)	(0.15)	(0.11)	(0.16)	(0.14)	(0.19)	(0.15)	(0.19)	(0.15)
American:MedianSpite					0.61***	−0.05					0.58***	0.08
					(0.13)	(0.09)					(0.17)	(0.13)
NumQ:American:MedianSpite					0.78***	0.26*					0.83***	0.09
					(0.21)	(0.15)					(0.28)	(0.21)
Panel B: Above/below median spiteful subjects (via Spite-Questionnaire)												
Constant	2.57***	3.39***	4.01***	3.47***	3.55***	3.39***	1.51***	2.32***	2.99***	2.42***	2.54***	2.30***
	(0.25)	(0.20)	(0.24)	(0.20)	(0.22)	(0.19)	(0.35)	(0.30)	(0.36)	(0.30)	(0.32)	(0.29)
NumQ	2.75***	2.41***	3.71***	2.66***	3.71***	2.66***	2.95***	2.46***	4.01***	2.80***	4.01***	2.80***
	(0.09)	(0.07)	(0.10)	(0.08)	(0.10)	(0.08)	(0.12)	(0.11)	(0.14)	(0.11)	(0.15)	(0.11)
MedianSpiteQ	1.47***	1.37***	1.03***	1.30***	1.11***	1.31***	2.29***	1.98***	1.93***	2.05***	1.94***	2.06***
	(0.14)	(0.11)	(0.14)	(0.11)	(0.14)	(0.11)	(0.19)	(0.16)	(0.20)	(0.16)	(0.19)	(0.16)
American					−0.51***	0.06					−0.57***	0.15
					(0.09)	(0.07)					(0.13)	(0.09)
NumQ:American					−0.96***	−0.25**					−1.07***	−0.33**
					(0.15)	(0.11)					(0.21)	(0.15)
bretrisk							0.02***	0.02***	0.02***	0.02***	0.02***	0.02***
							(0.003)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)
NumQ:MedianSpiteQ	−1.01***	−0.89***	−1.31***	−0.88***	−1.31***	−0.88***	−1.71***	−1.35***	−2.40***	−1.56***	−2.40***	−1.56***
	(0.12)	(0.10)	(0.14)	(0.11)	(0.15)	(0.11)	(0.16)	(0.14)	(0.19)	(0.15)	(0.20)	(0.15)
American:MedianSpiteQ					0.27**	0.04					0.33*	−0.08
					(0.13)	(0.09)					(0.17)	(0.13)
NumQ:American:MedianSpiteQ					0.31	−0.01					0.70**	0.20
					(0.21)	(0.15)					(0.28)	(0.21)
Panel C: Above/below median prosocial subjects (via SVO-Measure)												
Constant	3.71***	4.40***	4.77***	4.43***	4.49***	4.37***	2.94***	3.54***	4.32***	3.66***	3.95***	3.54***
	(0.23)	(0.19)	(0.22)	(0.19)	(0.20)	(0.18)	(0.35)	(0.30)	(0.34)	(0.30)	(0.31)	(0.29)
NumQ	2.10***	2.07***	2.89***	2.28***	2.89***	2.28***	1.86***	1.82***	2.52***	2.07***	2.52***	2.07***
	(0.09)	(0.07)	(0.10)	(0.08)	(0.10)	(0.08)	(0.12)	(0.10)	(0.13)	(0.10)	(0.14)	(0.10)
MedianSVO	−0.05	−0.02	−0.25*	−0.02	−0.28**	−0.02	0.15	0.13	−0.38**	0.16	−0.37**	0.15
	(0.14)	(0.11)	(0.14)	(0.11)	(0.13)	(0.11)	(0.19)	(0.16)	(0.19)	(0.16)	(0.19)	(0.16)
American					−0.50***	0.08					−0.64***	0.11
					(0.09)	(0.07)					(0.12)	(0.09)
NumQ:American					−0.79***	−0.21*					−0.66***	−0.25*
					(0.15)	(0.11)					(0.20)	(0.15)
bretrisk							0.02***	0.02***	0.02***	0.02***	0.02***	0.02***
							(0.003)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)
NumQ:MedianSVO	0.32**	−0.19*	0.35**	−0.10	0.35**	−0.10	0.30*	−0.21	0.35*	−0.26*	0.35*	−0.26*
	(0.12)	(0.10)	(0.14)	(0.11)	(0.15)	(0.11)	(0.17)	(0.14)	(0.19)	(0.15)	(0.20)	(0.15)
American:MedianSVO					0.25**	0.004					0.52***	−0.02
					(0.13)	(0.09)					(0.17)	(0.13)
NumQ:American:MedianSVO					−0.03	−0.09					−0.05	0.05
					(0.21)	(0.15)					(0.28)	(0.21)
Litigation	✓	×	✓	×	✓	×	✓	×	✓	×	✓	×
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	8,175	8,175	8,175	8,175	16,350	16,350	4,110	4,110	4,110	4,110	8,220	8,220
Note:												$^{+}$p<0.1;*p<0.05;**p<0.01;***p<0.001;

Models (1), (3), (5), (7), (9), and (11) estimate the litigation expenditures. Models (2), (4), (6), (8), (10), and (12) estimate the settlement requests. Models (1), (2), (7), and (8) estimate behavior under the American fee-shifting rule. Models (3), (4), (9), and (10) estimate behavior under the English fee-shifting rule. Models (5), (6), (11), and (12) additionally estimate the interaction between both fee-shifting rules. Models (7), (8), (9), (10), (11), and (12) additionally control for risk-aversion (bretrisk). Standard errors are shown in parenthesis. *NumQ* indicates the merit of the case while *American* denotes a dummy with value one for the American rule and zero for the English rule. *MedianSpite*/*MedianSpiteQ*/*MedianSVO* denotes a dummy with value one if the subject displays above-median preferences in the respective measure of social preferences. All models account for age, gender, and educational attainment.

B.2.3. Wave Effects

In this section, we analyze whether behavior between the two waves significantly differs. Table 15 and Table 16 report on the mixed-effects regressions comparing the two waves. We see a general tendency to request more in the second wave in the settlement stage. We also see that litigation expenditures are higher in the second wave. Further, we find some small effects in the function of Q between the two waves. More importantly, however, we find no interaction effect between the wave and the fee-shifting rule.

Table 13: Mixed-effects regression of the litigation expenditures and settlement requests for the first and second wave.

	Litigation/Settlment					
	American		English		Both	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	4.59***	4.75***	5.41***	4.82***	5.41***	4.82***
	(0.09)	(0.07)	(0.08)	(0.07)	(0.08)	(0.07)
American					−0.82***	−0.07*
					(0.06)	(0.04)
Wave	0.55***	0.62***	0.46***	0.56***	0.46***	0.56***
	(0.12)	(0.10)	(0.12)	(0.10)	(0.11)	(0.10)
American:Wave					0.09	0.07
					(0.08)	(0.06)
Litigation	✓	×	✓	×	✓	×
Observations	8,175	8,175	8,175	8,175	16,350	16,350
Log Likelihood	−19,499.17	−18,017.73	−20,520.21	−18,430.16	−40,231.93	−35,591.84
Akaike Inf. Crit.	39,006.35	36,043.46	41,048.43	36,868.31	80,475.86	71,195.69
Bayesian Inf. Crit.	39,034.38	36,071.50	41,076.46	36,896.35	80,522.07	71,241.90

Note: $^{+}$p<0.1;*p<0.05;**p<0.01;***p<0.001;
Models (1), (3), and (5) estimate the litigation expenditures. Models (2), (4), and (6) estimate the settlement requests. Models (1) and (2) estimate behavior under the American fee-shifting rule. Models (3) and (4) estimate under the English fee-shifting rule. Models (5) and (6) additionally estimate the interaction between both fee-shifting rules. Standard errors are shown in parenthesis. *American* denotes a dummy with value one for the American rule and zero for the English rule. *Wave* denotes a dummy with value one if the behavior of the second wave is depicted and zero otherwise.

Table 14: Mixed-effects regression of the litigation expenditures and settlement requests as a function of q for the first and second wave.

	Litigation/Settlment					
	American		English		Both	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	3.33***	3.63***	3.69***	3.56***	3.69***	3.56***
	(0.10)	(0.08)	(0.10)	(0.08)	(0.09)	(0.08)
NumQ	2.51***	2.23***	3.45***	2.52***	3.45***	2.52***
	(0.09)	(0.07)	(0.10)	(0.08)	(0.11)	(0.08)
American					−0.35***	0.07
					(0.09)	(0.07)
Wave	0.80***	0.88***	0.84***	0.84***	0.84***	0.84***
	(0.14)	(0.11)	(0.14)	(0.11)	(0.13)	(0.11)
NumQ:American					−0.94***	−0.29***
					(0.15)	(0.11)
NumQ:Wave	−0.51***	−0.51***	−0.76***	−0.58***	−0.76***	−0.58***
	(0.12)	(0.10)	(0.14)	(0.11)	(0.15)	(0.11)
American:Wave					−0.04	0.03
					(0.13)	(0.09)
NumQ:American:Wave					0.25	0.07
					(0.21)	(0.15)
Litigation	✓	×	✓	×	✓	×
Observations	8,175	8,175	8,175	8,175	16,350	16,350
Log Likelihood	−18,893.89	−17,349.83	−19,687.65	−17,673.43	−39,003.90	−34,195.94
Akaike Inf. Crit.	37,799.78	34,711.65	39,387.29	35,358.85	78,027.80	68,411.88
Bayesian Inf. Crit.	37,841.83	34,753.71	39,429.35	35,400.91	78,104.82	68,488.89

Note: $^{+}$p<0.1;*p<0.05;**p<0.01;***p<0.001;
Models (1), (3), and (5) estimate the litigation expenditures. Models (2), (4), and (6) estimate the settlement requests. Models (1) and (2) estimate behavior under the American fee-shifting rule. Models (3) and (4) estimate under the English fee-shifting rule. Models (5) and (6) additionally estimate the interaction between both fee-shifting rules. Standard errors are shown in parenthesis. *NumQ* indicates the merit of the case while *American* denotes a dummy with value one for the American rule and zero for the English rule. *Wave* denotes a dummy with value one if the behavior of the second wave is depicted and zero otherwise.

B.2.4. Risk Preferences

In the second wave, participants performed the bomb risk elicitation task (Crosetto and Filippin, 2013). In this task, subjects are presented with an interface that consists of 100 boxes. One of these boxes contains a bomb. Subjects are asked to choose how many boxes to select. If one of the chosen boxes contains the bomb, their earnings are zero. Otherwise, they earn 1 point for every box that they choose to open. In this task, a risk-neutral subject would choose 50 boxes.

Higher values are indicative of risk-seeking preferences and lower values as risk-aversion. We use the number of boxes chosen by the participants as their preferences to take risk.

Here, we look at how litigation expenditures and settlement requests are related to risk preferences. As before, we employ median splits. We classify subjects as risk-seeking if their score is higher than the median risk score and non-risk-seeking (risk-averse) otherwise. Table 15 and Table 16 report on the mixed-effects regressions and Figure 9 illustrates the results. Consistent with the literature, we see that higher levels of risk are related to higher litigation expenditures and settlement requests. However, we do not find any statistically significant differences in this relationship between the American and the English fee-shifting rule. We further find that the influence of risk decreases with increasing merit.

Table 15: Mixed-effects regression of the litigation expenditures and settlement requests with median risk splits.

	Litigation/Settlment					
	American		English		Both	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	4.62***	4.88***	5.41***	4.91***	5.41***	4.91***
	(0.12)	(0.11)	(0.12)	(0.10)	(0.11)	(0.10)
American					−0.79***	−0.03
					(0.07)	(0.06)
MedianRisk	1.06***	1.00***	0.96***	0.96***	0.96***	0.96***
	(0.17)	(0.15)	(0.17)	(0.15)	(0.16)	(0.15)
American:MedianRisk					0.11	0.04
					(0.11)	(0.08)
Litigation	✓	×	✓	×	✓	×
Observations	4,110	4,110	4,110	4,110	8,220	8,220
Log Likelihood	−9,602.42	−9,001.19	−10,126.92	−9,130.35	−19,784.71	−17,614.26
Akaike Inf. Crit.	19,212.84	18,010.38	20,261.84	18,268.70	39,581.42	35,240.53
Bayesian Inf. Crit.	19,238.12	18,035.67	20,287.13	18,293.98	39,623.51	35,282.61

Note: $^{+}$p<0.1;*p<0.05;**p<0.01;***p<0.001;
Models (1), (3), and (5) estimate the litigation expenditures. Models (2), (4), and (6) estimate the settlement requests. Models (1) and (2) estimate behavior under the American fee-shifting rule. Models (3) and (4) estimate under the English fee-shifting rule. Models (5) and (6) additionally estimate the interaction between both fee-shifting rules. Standard errors are shown in parenthesis. *American* denotes a dummy with value one for the American rule and zero for the English rule. *MedianRisk* denotes a dummy with value one if the subject displays above-median risk-seeking preferences.

Table 16: Mixed-effects regression of the litigation expenditures and settlement requests with median risk splits as a function of q.

	Litigation/Settlment					
	American		English		Both	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	3.42***	4.01***	3.93***	3.87***	3.93***	3.87***
	(0.13)	(0.12)	(0.13)	(0.12)	(0.13)	(0.12)
NumQ	2.41***	1.74***	2.96***	2.08***	2.96***	2.08***
	(0.12)	(0.10)	(0.13)	(0.10)	(0.14)	(0.10)
American					−0.51***	0.14
					(0.12)	(0.09)
MedianRisk	1.47***	1.02***	1.23***	1.10***	1.23***	1.10***
	(0.19)	(0.17)	(0.19)	(0.16)	(0.19)	(0.17)
NumQ:American					−0.55***	−0.34**
					(0.20)	(0.15)
NumQ:MedianRisk	−0.82***	−0.03	−0.55***	−0.29*	−0.55***	−0.29*
	(0.17)	(0.14)	(0.19)	(0.15)	(0.20)	(0.15)
American:MedianRisk					0.24	−0.08
					(0.17)	(0.13)
NumQ:American:MedianRisk					−0.27	0.25
					(0.28)	(0.21)
Litigation	✓	×	✓	×	✓	×
Observations	4,110	4,110	4,110	4,110	8,220	8,220
Log Likelihood	−9,324.59	−8,740.67	−9,773.33	−8,820.72	−19,243.78	−17,051.98
Akaike Inf. Crit.	18,661.18	17,493.33	19,558.66	17,653.43	38,507.55	34,123.96
Bayesian Inf. Crit.	18,699.10	17,531.26	19,596.59	17,691.36	38,577.70	34,194.11

Note: $^{+}$p<0.1;*p<0.05;**p<0.01;***p<0.001;
Models (1), (3), and (5) estimate the litigation expenditures. Models (2), (4), and (6) estimate the settlement requests. Models (1) and (2) estimate behavior under the American fee-shifting rule. Models (3) and (4) estimate under the English fee-shifting rule. Models (5) and (6) additionally estimate the interaction between both fee-shifting rules. Standard errors are shown in parenthesis. *NumQ* indicates the merit of the case while *American* denotes a dummy with value one for the American rule and zero for the English rule. *MedianRisk* denotes a dummy with value one if the subject displays above-median risk-seeking preferences.

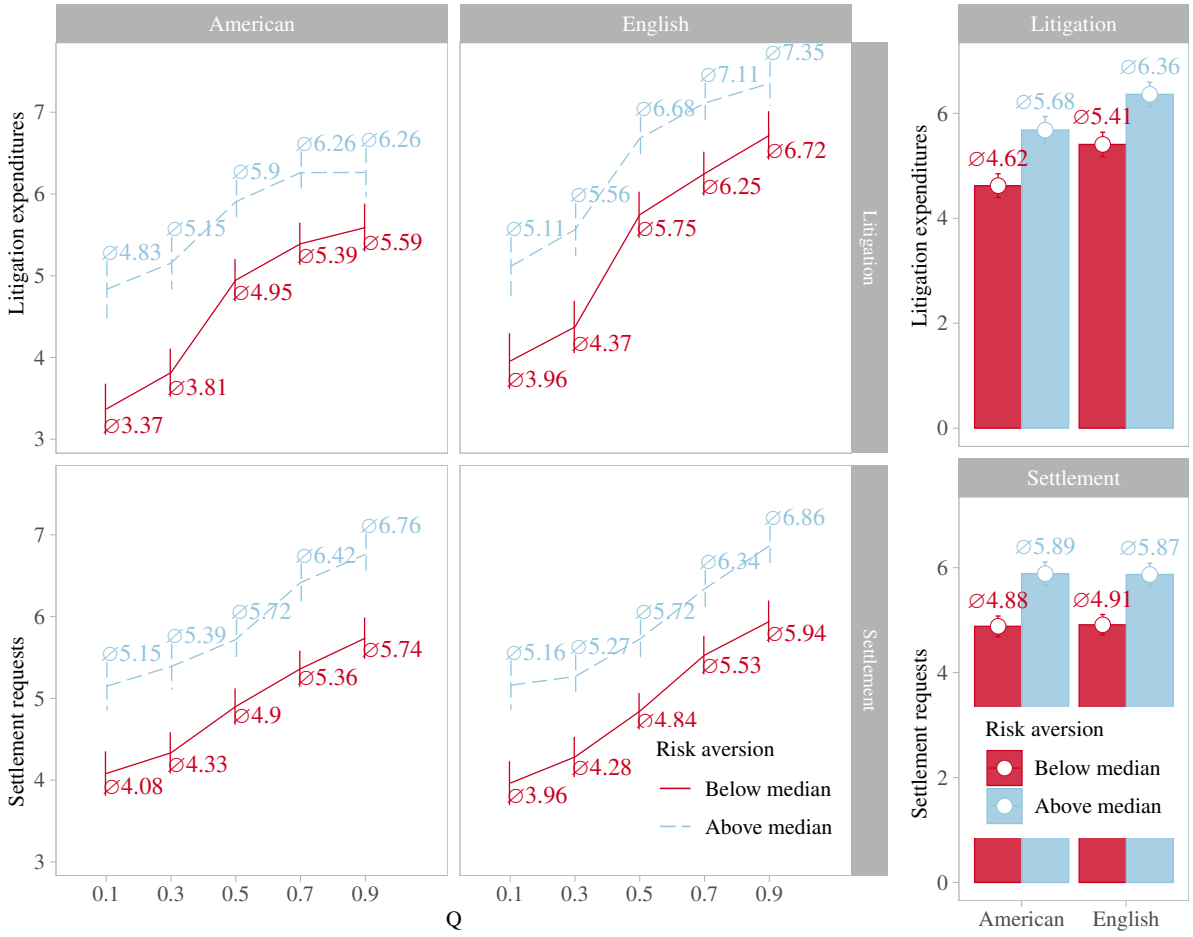


Figure 9: Litigation effort and settlement request under the American and English fee-shifting rule as a function of q for risk-seeking/ risk-averse subjects.

The figures to the left depict the litigation expenditures and settlement request by fee-shifting rule for risk-seeking and risk-averse subjects as a function of q, while the figures to the right depict the aggregates. The panels on the top depict the litigation effort, while the panels on the bottom illustrate the settlement requests. Red solid lines depict the behavior of risk-averse subjects (i.e., subjects with below-median scores in the Bomb-task), while blue dashed lines indicate the response of risk-seeking subjects (i.e., subjects with above-median scores in the Bomb-task). The error bars indicate the 95% confidence intervals.

B.3. Causality

In this paper, we provide correlational evidence for a relationship between subjects with spiteful preferences and higher litigation expenditures and settlement requests. However, social-preferences are not exogenously assigned to subjects. To deal with this issue, we tried to manipulate spite exogenously.

To do so, we conducted the following additional treatments: In the baseline treatment, subjects were competing with a fellow participant. As we are not aware of any way to directly manipulate spiteful preferences, we decided to exclude social preferences altogether. To exclude social preferences, we matched subjects with a computer player. Matching subjects with a computer player changes, however, two aspects: 1) social preferences are excluded – as subjects arguably cannot have preferences over payoffs of a computer – and 2) beliefs. Beliefs are changed as subjects might anticipate the computer player to be more rational or, alterna-

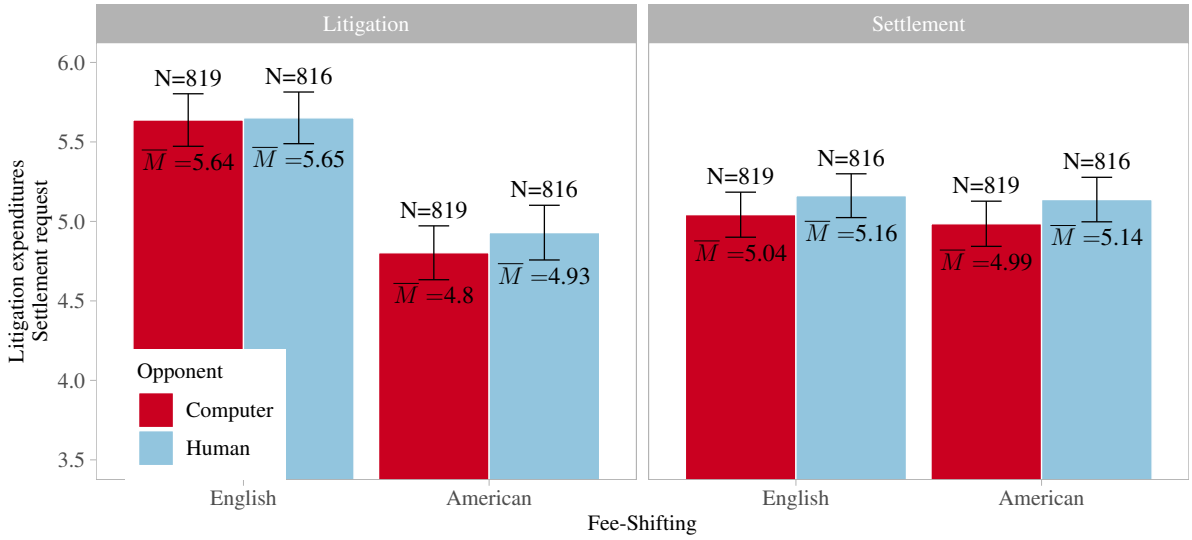


Figure 10:
Average litigation expenditures and settlement requests in each treatment.
The panel on the left depicts the litigation effort, while the panel on the right illustrates the settlement requests. The left two bars in each panel indicate the behavior under the English fee-shifting rule, while the two bars on the right indicate the response under the American fee-shifting rule in each panel. Red bars show the response if the opponent is a computer player, while blue bars show the response if the opponent is a human player. The error bars indicate the confidence intervals with the sample size on top and the mean below.

tively, subjects might believe the computer to be more random in its decisions. To exclude the second aspect and to ensure that subjects' choices are driven only by social preferences and not beliefs, they were informed that computer players were imitating the behavior of other subjects. This means that the actions of the computer players were random draws from the set of human players' actions. This way, only social preferences should be impacted. However, a major downside of this controlled-belief manipulation is that the manipulation is very weak, as the spiteful preferences of the opponent are kept constant between treatments. The factor Opponent was realized via between-subjects design, i.e., subjects either interacted with a human player or a computer player imitating a human player.

Figure 10 depicts the aggregate results. We see that both litigation expenditures and settlement requests are higher if participants compete against a fellow human compared to a computer. However, these differences do not rise to the required significance levels, and consequently, we find no statistically significant differences in the litigation expenditures nor in the settlement requests. On average, subjects invest 5.29 tokens in litigation against fellow humans, compared to 5.22 tokens in litigation against computers. The difference is statistically not significantly different from zero ($t(1633)$= -0.7, $p\geq$ 0.05). Concerning the settlement requests, we find that subjects request on average 5.15 tokens in case the litigation is born out against a human, compared to 5.01 tokens in the computer treatment. Again, we do not find a significant effect, using a t-test: $t(1632.4)$= -1.4, $p\geq$ 0.05. Also, using a mixed-effect regression, reported in Table 17, does not show any significant difference between the two treatments, even though the effect of the human-treatment is consistently positive.

Table 17: Mixed-effects regression of the litigation expenditures and settlement requests by opponent as a function of q.

	C_1		C_2		C_3			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	5.22***	5.01***	4.80***	4.99***	3.86***	3.98***	3.66***	4.02***
	(0.07)	(0.07)	(0.08)	(0.07)	(0.08)	(0.07)	(0.09)	(0.08)
Human	0.07	0.14	0.13	0.15	0.13	0.11	0.15	0.10
	(0.11)	(0.10)	(0.11)	(0.10)	(0.12)	(0.10)	(0.13)	(0.11)
English			0.84***	0.06			0.40***	−0.09
			(0.06)	(0.04)			(0.09)	(0.07)
Human:English			−0.11	−0.03			−0.04	0.01
			(0.08)	(0.06)			(0.13)	(0.09)
NumQ					2.72***	2.07***	2.29***	1.92***
					(0.08)	(0.05)	(0.10)	(0.08)
Human:NumQ					−0.12	0.06	−0.05	0.10
					(0.11)	(0.08)	(0.15)	(0.11)
NumQ:English							0.88***	0.30***
							(0.15)	(0.11)
Human:NumQ:English							−0.14	−0.09
							(0.21)	(0.15)
Litigation	✓	×	✓	×	✓	×	✓	×
Observations	16,350	16,350	16,350	16,350	16,350	16,350	16,350	16,350
Log Likelihood	−40,424.41	−35,606.87	−40,242.84	−35,610.28	−39,274.18	−34,239.05	−39,032.83	−34,239.41
Akaike Inf. Crit.	80,856.82	71,221.74	80,497.68	71,232.56	78,560.36	68,490.10	78,085.66	68,498.82
Bayesian Inf. Crit.	80,887.63	71,252.55	80,543.89	71,278.77	78,606.57	68,536.31	78,162.68	68,575.84

Note: $^{+}$p<0.1;*p<0.05;**p<0.01;***p<0.001;
Models (1), (3), and (5) estimate the litigation expenditures. Models (2), (4), and (6) estimate the settlement requests. Models (1) and (2) estimate the average effect of the manipulation on behavior. Models (3) and (4) estimate the average interaction effect of the manipulation and the merit of the case. Models (5) and (6) estimate the interaction effect of the manipulation, the merit of the case, and the fee-shifting rule. Standard errors are shown in parenthesis. *NumQ* indicates the merit of the case while *Eng* denotes a dummy with value one for the English rule and zero for the American rule. *Human* denotes a dummy with value one if the opponent is a human player and zero if the opponent is a computer player.

We provide several explanations for why we do not find any significant differences between the human treatment and the computer treatment:

First, we conduct the experiment online. However, in online experiments, social preferences might not be as salient as in laboratory experiments. Participants have no way of meeting the other participants, nor do they feel very connected to them. Thus, social preferences might have paid already a relatively small role. This, in turn, might diminish the scope for the effects of spite between the treatments.

Second, we exclude social preferences altogether. That, however, also means we exclude not only spiteful preferences but also prosocial preferences and other social preferences like inequality aversion. These potentially counteracting preferences might cancel each other out and substantially undermine the overall effect of spite on the observed behavior. Thus, other

social preferences might mask the effect of spite. Even though we find that the results have the right tendency, indicating that spite matters, the missing significance might be due to other social preferences, resulting in a weak manipulation.

Third, we keep the beliefs about the behavior of the opponent constant across the human and the computer treatment. While this design choice seems to be essential to make the experiment clean, it also substantially reduces the scope of the manipulation. An optimal treatment would exclude the spiteful preferences of all participants in one treatment and retain them in the other. We, however, only exclude the social preferences of the decision-makers, while we keep the social preferences of the opponents constant. However, subjects are expected to change their behavior 1) due to their spiteful preferences and 2) due to the best response to the spiteful preferences of the opponents. By keeping the behavior of the opponent constant, we factually exclude the second channel. Thus, the scope of the manipulation is substantially reduced as we can only observe behavioral responses due to the first channel.

Overall, there are multiple arguments why our manipulation might not have been working or might have only a very limited effect on behavior. Still, even though we find no significant differences between the treatments, the consistent tendency of the results provides further support for the impact of spite on litigation and settlement behavior.

B.4. Further figures

Please decide upon a contribution.

Scenario:
You are in scenario 3 (q=0.50). Hence: If you and your opponent contribute the same amount your chance of winning is 50% (5 out of 10 times you would win).
Here you can see the winning probabilities for each of your decisions dependent on the decision of your opponent.

Your Contribution \ Others Contribution	0	1	2	3	4	5	6	7	8	9	10
0	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	1.00	0.50	0.33	0.25	0.20	0.17	0.14	0.12	0.11	0.10	0.09
2	1.00	0.67	0.50	0.40	0.33	0.29	0.25	0.22	0.20	0.18	0.17
3	1.00	0.75	0.60	0.50	0.43	0.38	0.33	0.30	0.27	0.25	0.23
4	1.00	0.80	0.67	0.57	0.50	0.44	0.40	0.36	0.33	0.31	0.29
5	1.00	0.83	0.71	0.62	0.56	0.50	0.45	0.42	0.38	0.36	0.33
6	1.00	0.86	0.75	0.67	0.60	0.55	0.50	0.46	0.43	0.40	0.38
7	1.00	0.88	0.78	0.70	0.64	0.58	0.54	0.50	0.47	0.44	0.41
8	1.00	0.89	0.80	0.73	0.67	0.62	0.57	0.53	0.50	0.47	0.44
9	1.00	0.90	0.82	0.75	0.69	0.64	0.60	0.56	0.53	0.50	0.47
10	1.00	0.91	0.83	0.77	0.71	0.67	0.62	0.59	0.56	0.53	0.50

Your bonus payoff, if this task is determined payoff-relevant, is:
IF YOU WIN: Endowment + Prize.
IF YOU LOSE: Endowment -your contribution - your opponent's contribution.

The prize is worth 10 tokens.
Your endowment is 10 tokens.

Please choose a contribution.

Next

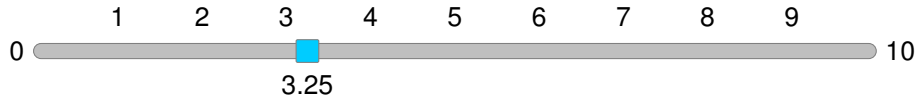
Figure 11: Interface for the litigation expenditures under the English rule with $q = .5$.

Please decide upon a request.

Scenario:
You have to choose a request. If the amount you and your opponent request sums up to less than (or equal to) 10 tokens, you receive, the amount you asked for + your endowment of 10 tokens as your payment. If both your requests are smaller than 10 you will get in addition half of the "leftover".

If the sum of your amounts exceeds 10 tokens, your payoff will be determined by the outcome from task A of **scenario 3**. Hence: If in task A you and your opponent contribute the same amount, your chance of winning is 50% (5 out of 10 times you would win).

Please choose a request.



Next

Figure 12: Interface for the settlement requests under the English rule with $q = .5$.

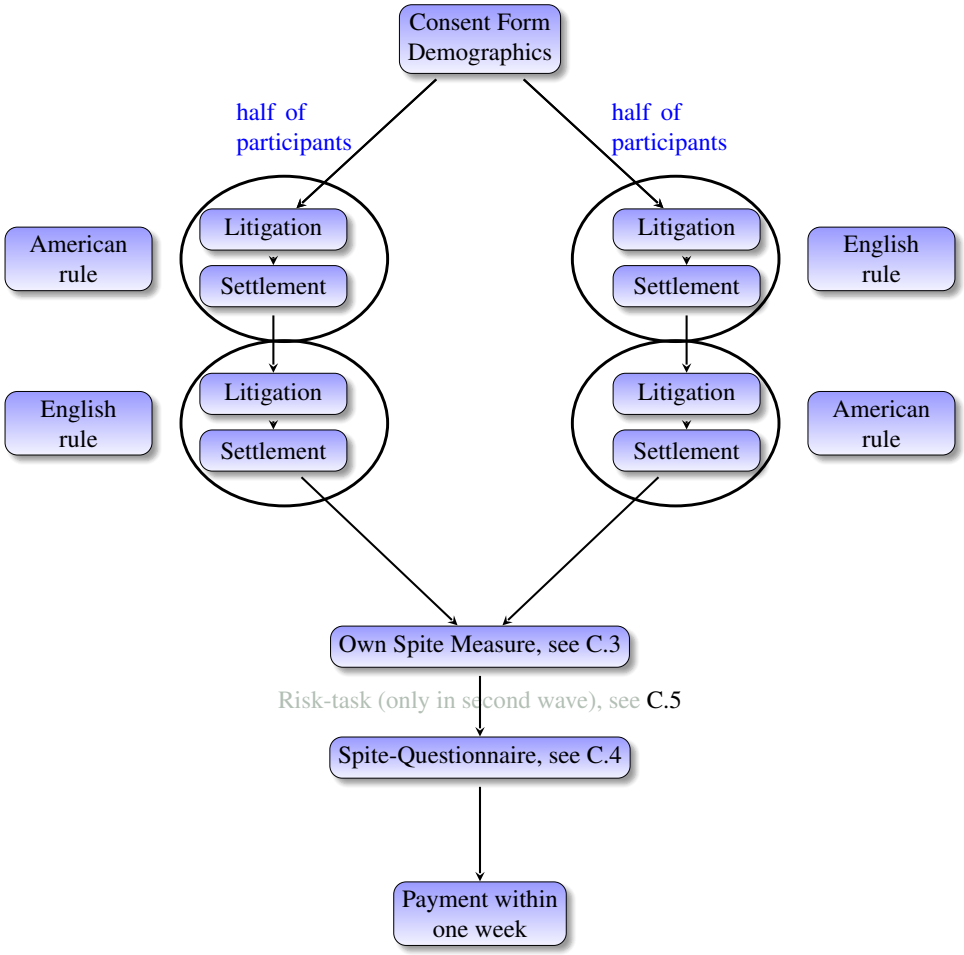


Figure 13: Experimental procedure

C. Instructions and control questions

In the following, we show the instructions and control questions used in this experiment.

C.1. Instructions

The following depicts the instructions used in the experiment:

Welcome to this experiment in the economics of decision making.

If you follow these instructions carefully and make good decisions you will earn a considerable amount of money that will be paid to you within a few days to your MTurk account.

We ask that you pay close attention to the instructions.

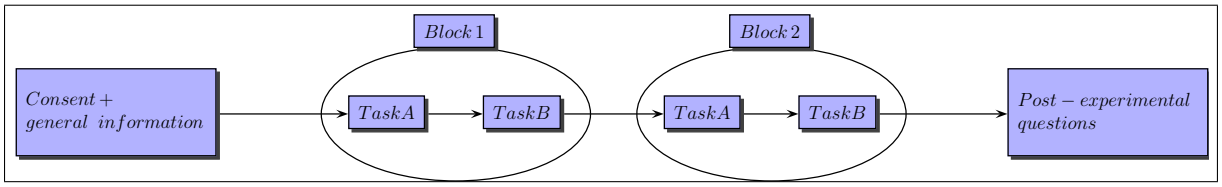
Note that during the experiment we will have several control question to see whether you read the instructions properly. If you read the instructions properly the control questions are very easy to answer. For every correctly answered control question, you will receive 5 cents in addition to your reward and your bonus payment from your decisions.

However, if you fail more than half of the control questions you will be excluded from all bonus payments and the experiment!

In the experiment today you will take decisions in two **blocks**.

Each **block** consists of two **tasks**. In both blocks you will need to make the same decisions; however, the blocks will differ in several aspects, which will be explained later in detail. The two tasks are either TASK A or TASK B. For each task, you will be instructed separately. Each task entails 5 decisions. Hence, overall you are going to make 5 (decisions per task) * 2 (tasks per block) * 2 (blocks) = 20 decisions.

The following graph illustrates the procedure of the experiment:



In the end, only one of the decisions (5 decisions in each task), from one of the tasks (two tasks in each block), from one of the blocks (two blocks) will be selected randomly.

Only this one selected decision will determine your payoff. Which one will be paid out was randomly determined when you agreed to take part in the study. However, you do not know which one will be payoff-relevant for YOU. Hence, you have to pay attention in each of the decisions as from your point of view any of the decision can be payoff-relevant for you.

Experimental Currency is used in the experiment. Your decisions and earnings will be recorded in tokens. Within a few days after the end of the experiment, you will be paid the bonus.

Tokens earned from the experiment will be converted to Dollars at a rate of:
1 token to 10 Dollar-cents ($0.10).

At the beginning of the experiment you are endowed with 10 tokens.
Any additional earning will be added to these tokens.
Any costs you encounter during your decisions will be deducted from the 10 tokens.

All tokens will be translated to dollars at the end of the experiment and paid as a bonus to you within a few days.

You have been assigned an opponent at the beginning of the experiment.
This opponent will stay your opponent for the duration of the whole experiment.
Importantly, the decisions of your opponent might influence your payoff.

[[in Computer treatment]]
Your opponent, however, is a computer player. This computer player will just copy the decisions of a real human player from a previous setting. Hence, the decisions of your opponent are implemented by a computer, but are copied from a human player. Your decisions can therefore **NOT** influence the payoff of your opponent, as the opponent is a computer player.

[[in Human treatment]]
All your decisions might also influence the payoff of your opponent, who is also a Mturker.

[[Instructions for the Litigation stage:]]

TASK A

In this task you are making a decision to win a prize worth 10 tokens. Your decision will influence your probability of winning this prize and hence your bonus payment.

Probability

For that purpose, you decide upon a contribution.
The higher your contribution the higher your chance of winning the prize. The higher the contribution of your opponent the lower your chance of winning the prize.

In addition: your chance of winning the prize does additionally depend on the scenario. The scenario describes your probability of winning the prize if both you and your opponent contribute the same amount.

Specifically, your chance of receiving the prize is given by your contribution divided by the sum of your contribution and your opponent's contribution as well as the scenario (q):

Chance of receiving the prize =

$$\frac{q \cdot (\text{your contribution})}{q \cdot (\text{your contribution}) + (1-q) \cdot (\text{your opponent's contribution})} \tag{17}$$

Where q represents the scenario and is a number between 0 and 1. The scenario describes your probability of winning the reward if both you and your assigned partner contribute the same amount. Hence, it indicates whether the odds are in your favor.
Put differently: the scenario represents how much your contribution, relative to the contribution of your opponent, is weighted.

For example: if you and your opponent contribute the exact same amount and if the scenario is q = 0.5 then your chance of winning the reward is the same as your opponent's chance of winning. It also means, that your contribution has the same weight as the contribution of your opponent.

If however, you and your opponent contribute the exact same amount and the scenario is q = 0.9 then your chance of winning is 90 % and your opponent's chance of winning is 10 %, hence, the odds are in your favor. Put differently: your contribution is weighted 9 times more than the contribution of your opponent.

Another example: if you and your opponent contribute the exact same amount and if the scenario is q = 0.3 then your chance of winning is 30 % and your opponent's chance of winning is 70 %, hence, the odds are not in your favor. It also means, that one token of your contribution is weighted less than half (30/70) of one token of your opponent's contribution.
Put again differently: to get the same odds of winning as your opponent, if your opponent contributes 3 tokens, you have to contribute 7 tokens.

Accompanying each scenario, you will see a simple table indicating your chance of winning in the respective scenario for possible contributions by you and your opponent.

The table will look like the following, which is an example table for scenario q = 0.90:
Note that you can choose any amount and for purpose of illustration we just pick integer (full numbers).

Your Contribution \ Others contribution	0	1	2	3	4	5	6	7	8	9	10
0	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	1.00	0.90	0.82	0.75	0.69	0.64	0.60	0.56	0.53	0.50	0.47
2	1.00	0.95	0.90	0.86	0.82	0.78	0.75	0.72	0.69	0.67	0.64
3	1.00	0.96	0.93	0.90	0.87	0.84	0.82	0.79	0.77	0.75	0.73
4	1.00	0.97	0.95	0.92	0.90	0.88	0.86	0.84	0.82	0.80	0.78
5	1.00	0.98	0.96	0.94	0.92	0.90	0.88	0.87	0.85	0.83	0.82
6	1.00	0.98	0.96	0.95	0.93	0.92	0.90	0.89	0.87	0.86	0.84
7	1.00	0.98	0.97	0.95	0.94	0.93	0.91	0.90	0.89	0.88	0.86
8	1.00	0.99	0.97	0.96	0.95	0.94	0.92	0.91	0.90	0.89	0.88
9	1.00	0.99	0.98	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89
10	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90

The columns represent your opponent's contributions and the rows represents your possible contributions.
The numbers in this table represent your chances of winning, given yours and your opponent's contributions.
This table represents your winning probabilities in scenario q = 0.90.

For example: if both you and your opponent choose to contribute 2, your chance of winning is .90 (90 percent).
For example: if your contribution is 2 and your opponent's contribution is 6 your chance of winning is .75 (75 percent probability of winning the reward).

You will have to make a decision for each scenario.

There will be 5 scenarios.
The scenarios will be shown in random order.

Scenario1 (q = 0.10): If you and your opponent contribute the same amount your chance of winning is 10 % (you would win one out of 10 times)

Scenario2 (q = 0.30): If you and your opponent contribute the same amount your chance of

winning is 30 % (you would win three out of 10 times)

Scenario3 (q = 0.50): If you and your opponent contribute the same amount your chance of winning is 50 % (you would win five out of 10 times)

Scenario4 (q = 0.70): If you and your opponent contribute the same amount your chance of winning is 70 % (you would win seven out of 10 times)

Scenario5 (q = 0.90): If you and your opponent contribute the same amount your chance of winning is 90 % (you would win nine out of 10 times)

Which scenario is relevant for your payoff was already determined before the experiment. However, you do not know which one will be payoff-relevant for YOU. Hence, you have to pay attention in each scenario as from your point of view any of the decisions can be payoff-relevant for you.

YOUR PAYOFF:

[[American rule]]	*[[English rule]]*
If you win you receive the prize and you will have to pay your contribution. If you lose you will have to pay your contribution and you will NOT receive the prize.	If you win you receive the prize and you will not have to pay anything. If you lose you will have to pay your contribution and you will have to pay the contribution of your opponent and you will NOT receive the prize.

Hence your payoff is:

[[American rule]]	*[[English rule]]*
IF YOU WIN: Endowment + prize -you contribution **IF YOU LOSE: Endowment - your contribution**	**IF YOU WIN: Endowment + prize** **IF YOU LOSE: Endowment - your contribution - your opponent's contribution**

Remember:
Your endowment at the beginning of the experiment was 10 tokens.
The prize is also worth 10 tokens.
Example:
Imagine, at the beginning of the experiment the first task was randomly selected to be payoff-relevant for you.
Imagine, of the first task the third scenario (q=.50) was randomly selected to be relevant for

you.
Hence, your payoff is determined by your decision in this task, the decision of your opponent and a random draw. The third scenario is the scenario where your chance of winning the prize, if both you and your opponent contribute the same amount, is 50%.

The table explaining your winning probabilities given possible contributions of you and possible contributions of your opponent is given by:

Your Contribution \ Others contribution	0	1	2	3	4	5	6	7	8	9	10
0	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	1.00	0.50	0.33	0.25	0.20	0.17	0.14	0.12	0.11	0.10	0.09
2	1.00	0.67	0.50	0.40	0.33	0.29	0.25	0.22	0.20	0.18	0.17
3	1.00	0.75	0.60	0.50	0.43	0.38	0.33	0.30	0.27	0.25	0.23
4	1.00	0.80	0.67	0.57	0.50	0.44	0.40	0.36	0.33	0.31	0.29
5	1.00	0.83	0.71	0.62	0.56	0.50	0.45	0.42	0.38	0.36	0.33
6	1.00	0.86	0.75	0.67	0.60	0.55	0.50	0.46	0.43	0.40	0.38
7	1.00	0.88	0.78	0.70	0.64	0.58	0.54	0.50	0.47	0.44	0.41
8	1.00	0.89	0.80	0.73	0.67	0.62	0.57	0.53	0.50	0.47	0.44
9	1.00	0.90	0.82	0.75	0.69	0.64	0.60	0.56	0.53	0.50	0.47
10	1.00	0.91	0.83	0.77	0.71	0.67	0.62	0.59	0.56	0.53	0.50

Imagine now that your opponent's contribution is one token and your contribution is one token. Hence, your chance of winning is 50%.

If you win (which happens in half of the cases) your payoff is:

[[American rule]]
Your Endowment + Prize -your contribution= 10+ 10 -1= 19 tokens

[[English rule]]
Your Endowment + Prize = 10+ 10 = 20 tokens

If you lose (which happens in half of the cases) your payoff is:

[[American rule]]
Your Endowment -your contribution = 10 -1 = 9 tokens

[[English rule]]
Your Endowment -your contribution -your opponent's contribution= 10 -1 -1 = 8 tokens

Imagine now that your opponent's contribution is three tokens and your contribution is one token. Hence, your chance of winning is 25%. Hence, in three out of four cases you would lose and in one out of four cases you would win.

If you win (which happens in 1 out of 4 cases) your payoff is:

[[American rule]]	*[[English rule]]*
Your Endowment + Prize -your contribution= 10+ 10 -1= 19 tokens	Your Endowment + Prize = 10+ 10 = 20 tokens

If you lose (which happens in 3 out of 4 cases) your payoff is:

[[American rule]]	*[[English rule]]*
Your Endowment -your contribution = 10 -1 = 9 tokens	Your Endowment -your contribution -your opponent's contribution= 10 -1 -3 = 6 tokens

Imagine now that your opponent's contribution is one token and your contribution is nine tokens. Hence, your chance of winning is 90%. Hence, in 9 out of 10 cases you would win and in 1 out of 10 cases you would lose.

If you win (which happens in 9 out of 10 cases) your payoff is:

[[American rule]]	*[[English rule]]*
Your Endowment + Prize -your contribution= 10+ 10 -9= 11 tokens	Your Endowment + Prize = 10+ 10 = 20 tokens

If you lose (which happens in 1 out of 10 cases) your payoff is:

[[American rule]]	*[[English rule]]*
Your Endowment -your contribution = 10 -9 = 1 token	Your Endowment -your contribution -your opponent's contribution= 10 -9 -1 = 0 tokens

[[Instructions for the Settlement stage:]]

TASK B

In the second task you will still be playing with the person assigned to you at the beginning of the experiment.

DECISION:
You and your opponent both can ask for a fraction of a prize. The prize is worth 10 tokens, just as in task A.

Payoff:
If the amount you and your opponent ask for sums up to less than (or equal to) 10 tokens, you receive, as payment, the amount you asked for. Hence, if the sum of both of your requests is smaller or equal to 10 tokens you will receive this requested amount as your payment plus

your endowment. If both your requests are smaller than 10 you will get in addition half of the "leftover".

If the sum of your amounts exceeds 10 tokens, your payoff will be determined by the outcome from task A.

Hence, you will have to make again 5 decisions in the second task. Each decision is an amount you request from the 10 tokens. If both your requests are in sum less or equal to 10 this will be your payoff + half of the "leftover" + your endowment. If both your requests sum to more than 10 your payoff is determined by the result of task A.

EXAMPLES:
Imagine you request 3 tokens and your opponent requests 3 tokens. The sum is 6 and obviously smaller than 10. Hence, you will get as payoff your request (3 tokens) + half of the leftover (the leftover is 4 tokens) which is 2 + your endowment. Therefore, your total payoff equals to 15 tokens.

Imagine you request 3 tokens and your opponent requests 7 tokens. The sum is 10. Hence, you will get as payoff your request (3 tokens) + half of the leftover (the leftover is 0 tokens) which is 0 + your endowment. Therefore, your total payoff equals to 13 tokens.

Imagine you request 7 tokens and your opponent requests 7 tokens. The sum is 14. Hence, your payoff will be determined by the respective scenario from task one. Note that the range of total payoffs from the task A is 0 to 20 tokens.
For example, assume that the relevant scenario is q=0.10, assume also that you contributed in the first task 4 tokens and that your opponent contributed 4 tokens.

[[American rule]]
In case you win in task A (which would be the case in 1 of 10 cases given your contributions) your total payoff will be: your endowment + the prize - your contribution= 16 tokens.
In case you lose in task A your total payoff will be: your endowment - your contribution = 6 tokens.

[[English rule]]
In case you win in task A (which would be the case in 1 of 10 cases given your contributions) your total payoff will be: your endowment + the prize= 20 tokens.
In case you lose in task A your total payoff will be: your endowment - your contribution - your opponent's contribution= 2 tokens.

Before each decision, you will be told which scenario (q is either 0.1 or 0.3 or 0.5 or 0.7 or 0.9) from task one would be payoff-relevant if both your requests exceed 10 tokens.

C.2. Control Questions

The following control questions have been asked after the instructions of the litigation and the settlement decision.[40]

Litigation

Assume that task A (the task you just have been instructed to) has been randomly selected to be payoff-relevant for you.

Who is your opponent:

- (a) A fellow Mturker
- (b) A random computer
- (c) A computer imitating the choices of a previous participant
- (d) A fellow Mturker imitating the choices of a previous participant
- (e) Was not mentioned

Assume that your contribution is 5 tokens and your opponent's contribution is 3 tokens and you win. What would be your total payoff?:

[[American rule:]]

- (a) 15 tokens
- (b) 10 tokens
- (c) 5 tokens
- (d) 25 tokens
- (e) 20 tokens

[[English rule:]]

- (a) 20 tokens
- (b) 10 tokens
- (c) 2 tokens
- (d) 25 tokens
- (e) 15 tokens

Assume that your contribution is 5 tokens and your opponent's contribution is 3 tokens and you lose. What would be your total payoff?:

[40] Note: in the second wave participatns were told that they would be able to proceed only if they answer all the questions correctly.

[[American rule:]]

- (a) 15 tokens
- (b) 10 tokens
- (c) 5 tokens
- (d) 25 tokens
- (e) 20 tokens

[[English rule:]]

- (a) 20 tokens
- (b) 10 tokens
- (c) 2 tokens
- (d) 25 tokens
- (e) 15 tokens

Assume that your contribution is 1 tokens and your opponent's contribution is 3 tokens and you lose. What would be your total payoff?:

[[American rule:]]

- (a) 11 tokens
- (b) 9 tokens
- (c) 13 tokens
- (d) 19 tokens
- (e) 21 tokens

[[English rule:]]

- (a) 11 tokens
- (b) 6 tokens
- (c) 13 tokens
- (d) 20 tokens
- (e) 19 tokens

Assume that your contribution is 1 tokens and your opponent's contribution is 3 tokens and you win. What would be your total payoff?:

[[American rule:]]

- (a) 11 tokens
- (b) 9 tokens
- (c) 13 tokens
- (d) 19 tokens
- (e) 21 tokens

[[English rule:]]

- (a) 11 tokens
- (b) 6 tokens
- (c) 13 tokens
- (d) 20 tokens
- (e) 19 tokens

Imagine the payoff-relevant scenario for you is the third scenario (q=.50). Hence, your winning probabilities for receiving the prize are described by the following table:

Your Contribution \ Others contribution	0	1	2	3	4	5	6	7	8	9	10
0	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	1.00	0.50	0.33	0.25	0.20	0.17	0.14	0.12	0.11	0.10	0.09
2	1.00	0.67	0.50	0.40	0.33	0.29	0.25	0.22	0.20	0.18	0.17
3	1.00	0.75	0.60	0.50	0.43	0.38	0.33	0.30	0.27	0.25	0.23
4	1.00	0.80	0.67	0.57	0.50	0.44	0.40	0.36	0.33	0.31	0.29
5	1.00	0.83	0.71	0.62	0.56	0.50	0.45	0.42	0.38	0.36	0.33
6	1.00	0.86	0.75	0.67	0.60	0.55	0.50	0.46	0.43	0.40	0.38
7	1.00	0.88	0.78	0.70	0.64	0.58	0.54	0.50	0.47	0.44	0.41
8	1.00	0.89	0.80	0.73	0.67	0.62	0.57	0.53	0.50	0.47	0.44
9	1.00	0.90	0.82	0.75	0.69	0.64	0.60	0.56	0.53	0.50	0.47
10	1.00	0.91	0.83	0.77	0.71	0.67	0.62	0.59	0.56	0.53	0.50

Suppose your opponent contributed 3 tokens. Suppose further that you contributed 7 tokens. What is your probability of winning the prize?

- (a) .50 (50% probability)
- (b) .70 (70% probability)
- (c) .84 (84% probability)
- (d) .88 (88% probability)
- (e) .90 (90% probability)

Suppose the same scenario is still payoff-relevant for you.
Suppose your opponent contributed 1 token. Suppose further that you contributed 1 token. What is your probability of winning the prize?

- (a) .50 (50% probability)
- (b) .70 (70% probability)
- (c) .84 (84% probability)
- (d) .88 (88% probability)
- (e) .90 (90% probability)

Settlement

Assume that task B (the task you just have been instructed to) has been randomly selected to be payoff-relevant for you.

Assume that your request is 5 tokens and your opponent's request is [[First question: 3]][[Second question: 5]][[Third question: 7]] tokens. Assume further that the relevant scenario is q=0.10. What would be your total payoff?

- (a) 16 tokens
- (b) 10 tokens
- (c) The payoff will be determined by the outcome from task A from scenario q=0.1
- (d) 15 tokens
- (e) 20 The payoff will be determined by the outcome from task A from scenario q=0.3

C.3. Own spite measure

In this task, you are still paired with your opponent from the previous tasks, whom we will refer to as the opponent. All of your choices will be confidential. After you take your decisions this task will not be repeated and there is no further interaction with your opponent.

You will be making a series of decisions about allocating resources between you and your opponent. For each of the following questions, please indicate the distribution you prefer most by selecting the button below the payoff allocations. You can only make one selection for each question. Your decisions will yield money for both yourself and your opponent.

Each point shown is worth 0.2 cents (100 points = 20 cents).

In the example below, a person has chosen to distribute the payoff so that he/she receives 50 points (=10 cents), while his opponent receives 40 points (=8 cents).

There are no right or wrong answers, this is all about personal preferences. After you have made your decision, select the resulting distribution of money by clicking on the button below your choice. As you can see, your choices will influence both the amount of money you receive as well as the amount of money your opponent receives.

At the end of the experiment, a computer program will randomly pick either you or your opponent as the payoff-relevant decision maker.

Only one of the following decisions will be payoff relevant. Which decision will be paid will be determined by a random process at the end of the experiment. Hence, you have to take all decisions seriously as any of those can be chosen by the random process with equal probability.

Your payment of this task will be added to your payment of the previous task.

Please indicate your choice for each of the following distributions.
Note: These decisions are payoff relevant and will influence your payment!

[[Participants had to make choices as shown in Table 1]]

C.4. Spite-Questionnaire

The questions of the questionnaire according to Marcus et al. (2014) included the following questions:

- I would be willing to take a punch if it meant that someone I did not like would receive two punches.
- I would be willing to pay more for some goods and services if other people I did not like had to pay even more.
- If I was one of the last students in a classroom taking an exam and I noticed that the instructor looked impatient, I would be sure to take my time finishing the exam just to irritate him or her.
- If my neighbor complained about the appearance of my front yard, I would be tempted to make it look worse just to annoy him or her.
- It might be worth risking my reputation in order to spread gossip about someone I did not like.
- If I am going to my car in a crowded parking lot and it appears that another driver wants my parking space, then I will make sure to take my time pulling out of the parking space.
- I hope that elected officials are successful in their efforts to improve my community even if I opposed their election. (reverse scored)
- If my neighbor complained that I was playing my music too loud, then I might turn up the music even louder just to irritate him or her, even if meant I could get fined.
- I would be happy receiving extra credit in a class even if other students received more points than me. (reverse scored)
- Part of me enjoys seeing the people I do not like fail even if their failure hurts me in some way.
- If I am checking out at a store and I feel like the person in line behind me is rushing me, then I will sometimes slow down and take extra time to pay.
- It is sometimes worth a little suffering on my part to see others receive the punishment they deserve.
- I would take on extra work at my job if it meant that one of my co-workers who I did not like would also have to do extra work.
- If I had the opportunity, then I would gladly pay a small sum of money to see a classmate who I do not like fail his or her final exam.
- There have been times when I was willing to suffer some small harm so that I could punish someone else who deserved it.

- I would rather no one get extra credit in a class if it meant that others would receive more credit than me.
- If I opposed the election of an official, then I would be glad to see him or her fail even if their failure hurt my community.

C.5. Risk task

Here is a second short mini-experiment!
Another opportunity to earn money...

On this screen you will see a field composed of 100 boxes. Behind one of these boxes a bomb is hidden; the remaining 99 boxes are empty. You do not know where the bomb is. You only know that it can be in any place with equal probability.

Your task is to choose how many boxes to select. The position of the bomb will only be revealed after you made all your choices.

If you happen to have selected the box in which the bomb is located you will earn zero. If the time bomb is located in a box that you did not select you will earn 1 cent for each box you have chosen.

Below you will be asked to indicate which boxes you would like to select. You confirm your choice by hitting the next button. The position of the bomb will be revealed on the subsequent screen.

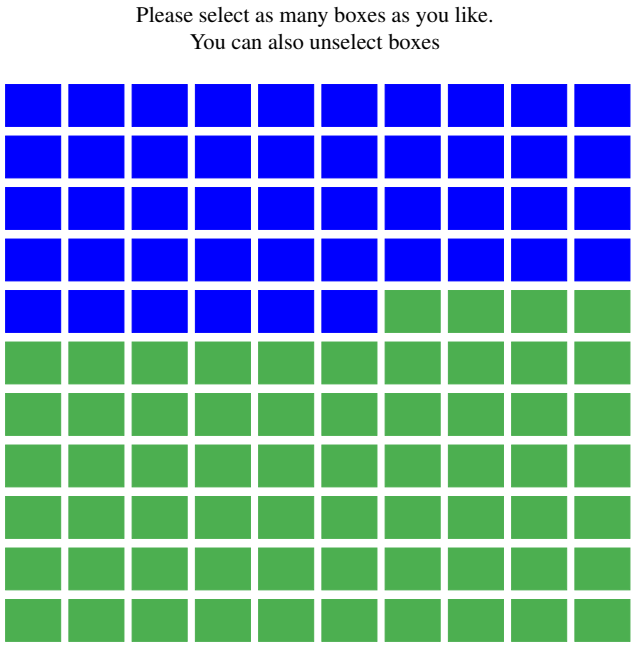


Figure 14: Interface of the bomb task.