The Effects of Litigants' Wealth and Stake Size on Litigation Outcomes*

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Abstract

We develop two models of litigation in which the probability of winning for a litigant depends on opposing attorneys' relative capacity and effort levels. In the models, money can buy high-capacity attorneys; the plaintiff's attorney works either under a contingent fee or under an hourly fee, but the defendant's attorney works under an hourly fee. We find: (i) a litigant's wealth contributes only a little to an increase in her expected payoff; (ii) as stake size increases, the increasing rate of effort of the plaintiff's attorney under the contingent fee exceeds that of himself under the hourly fee as well as that of the defendant's attorney; (iii) thus, if the stake size is big enough, the contingent-fee scheme brings the plaintiff a more payoff than the hourly-fee scheme. These findings are applied to the O.J. Simpson trial and to the recent tobacco litigation in the United States.

Keywords: Effects of wealth and stake size; Contingent and hourly fees; Attorneys' capacity; Tobacco litigation

JEL classification: K41; K13; D72

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1. Introduction

Does money buy justice in the United States justice system? The O.J. Simpson trial, often characterized as being the "Trial of the Century," may shed light on this question.[1] When it comes to criminal justice, the answer to the question is probably yes. Simpson's army of able attorneys, called the "Dream Team" in the media, made the criminal jury was unable to find beyond a reasonable doubt that he committed murder in the first degree. By contrast, it doesn't seem that the rich can buy civil justice. Simpson's legal team failed to stop the plaintiff's attorneys from convincing the civil jury by the preponderance of evidence that he was liable for the wrongful death of his former wife and her friend.

Why is there such discrepancy between the criminal and civil justice, as shown in the Simpson case? An obvious explanation for the discrepancy is due to the difference in the level of the burden of proof between criminal and civil cases. To prove allegations in criminal cases, the highest level of the burden of proof is required, called "proof beyond a reasonable doubt." In contrast, civil cases require the lowest level, called "by the preponderance of the evidence," which merely requires that the matter asserted seem more likely true than not. Thus, in February 1997, the civil jury could find Simpson liable for the wrongful death, whereas not guilty in the criminal court in October 1995.

This paper seeks another explanation for the discrepancy: in civil cases, stake size matters. In order to prevail in a civil case, it is important for a litigant to hire high-capacity attorneys. This is especially true in the adversarial system of litigation in the United States.[2] We argue that the bigger the stake size of the case, the greater the capacity of a plaintiff's attorney under a contingent-fee arrangement, though the plaintiff is poor. For instance, Simpson, the defendant in the civil court, was ordered to pay $33,500,000 in damages. Expectations of such damages could attract able attorneys to the plaintiff's side. This means that the advantage of high-capacity attorneys is not necessarily with a wealthy defendant if stake size is big enough.

To investigate the effects of wealth and stake size on civil litigants and their attorneys, we develop two contest models in which the probability of winning for a litigant depends on opposing attorneys' relative capacity and effort levels.[3] In the models, a litigant with more wealth has better access to the pool of high-capacity attorneys than her opponent with less wealth.[4] (Throughout the paper, we use "she" to refer to a litigant, and "he" to refer to an attorney.) We use logit-form probability-of-winning functions; thus, a litigant with a better attorney and higher effort is not guaranteed victory, but rather has a greater likelihood of victory.

We first consider a model – called the contingent-fee model – in which the plaintiff retains her attorney on a contingent-fee basis and the defendant does on an hourly-fee basis.[5] For simplicity, we assume complete information and risk neutrality for litigants and attorneys. To be more precise, our two-stage game runs as follows. In the first stage, each litigant hires her attorney, writing a contract with him. Specifically, litigant 1 writes a contract with attorney 1, which specifies attorney 1's contingent-fee fraction. Litigant 2 writes a contract with attorney 2, which specifies attorney 2's hourly-fee rate. Then, the litigants simultaneously announce their attorneys' capacity and their contracts. In the second stage, the attorneys exert their effort simultaneously and independently to win the case. The plaintiff's attorney under the contingent fee chooses his own effort level, while the defendant with the hourly fee calculates the effort level and has her attorney implement it. Unlike the plaintiff, therefore, the defendant may have to incur some monitoring costs. At the end of the second stage, the winner is determined, and each litigant pays compensation to her attorney according to the contracts written in the first stage.

We next consider another model – called the hourly-fee model – in which the plaintiff as well as the defendant adopts the hourly fee. We compare the equilibrium outcomes of the hourly-fee model with those of the contingent-fee model. We prove that, in the two models, litigants hire the best of the available attorneys they can afford.

Both models find that wealth effects on the litigants' expected payoffs are small. This finding seems to be counterintuitive because a wealthier litigant can hire a better attorney so that she can increase her probability of winning and expected payoff. We can explain this, using her strategic and payoff-maximizing behavior. It is true that the wealthier the litigant, the greater her probability of winning with the better attorney. But hiring the better attorney increases her litigation costs because of a higher hourly-fee rate which is increasing in his capacity. Moreover, it could make her opponent aggressive, which in turn lowers her expected payoff. Recognizing such costs and strategic interactions, when the wealthy litigant hires a high-capacity attorney, she makes him less aggressive by asking him to work less. We thus find that the wealth effects on the litigants' expected payoffs are not so great.[6]

Next, we vary stake size. Assuming that an increase in the stake size enhances a litigant's financial ability to hire a better attorney, we show that as the stake size increases, a contingent-fee scheme makes an attorney exert more effort than an hourly-fee scheme. This is because, by choosing the contingent fee, a litigant motivates her attorney more strongly to win her case. Thus, if an attorney's initial effort level under the contingent fee is lower than that under the hourly fee, then a reversal of the effort levels occurs as the stake size increases. This provides a theoretical foundation for Kritzer (1990) who conjectures such a reversal empirically, using hypothetical cases.

As we adopt logit-form probability-of-winning functions, the reversal of the effort levels leads to a reversal of a litigant's expected payoffs. Specifically, if a litigant's initial payoff with the contingent fee is less than that with the hourly fee, then a reversal of the payoffs occurs when the stake size increases. This throws light on the recent tobacco litigation in the United States (see Sloan, Trogdon and Mathews, 2005). Since private attorneys earned a huge amount of money in the litigation, the state governments – though able to afford salaried attorneys for the litigation – were blamed for hiring them with the contingent fee. The reversal of the payoffs in our analysis implies, however, that the governments' choice of the contingent fee should not be blamed if the public wanted the governments to maximize expected payoffs.

Before proceeding, we should note the relationship between this paper and the litigation literature on the advantage of the "haves" (the rich in our context). In his seminal work, Galanter (1974) proposes that the haves achieve more favorable outcomes in litigation. The haves in his paper, e.g. insurance companies, are financially and organizationally stronger parties, compared to the have-nots. The haves are repeat litigants in litigation, whereas the have-nots are one-shotters. Due to such merits, the haves tend to prevail in litigation, which is empirically supported by a number of scholars (see, e.g. Wheeler, Cartwright, Kagan and Friedman, 1987; Songer, Sheehan and Haire, 1999). We prove that, in accordance with Galanter's proposition, a wealthy litigant can maintain the advantage in terms of expected payoffs. Our numerical examples show, however, that the advantage is not so great. We conjecture that if our model could consider the issue of repeat litigants, the level of the advantage would become greater.

The paper proceeds as follows. Section 2 develops the contingent-fee model in which the plaintiff's attorney works under a contingent fee and the defendant's attorney works under an hourly fee. In Section 3, we consider the hourly-fee model in which both attorneys work under the hourly fee. Varying stake size, Section 4 compares the equilibrium outcomes from the two models. Section 5 offers our concluding remarks.

2. The contingent-fee model

Consider a tort litigation in which a plaintiff seeks compensation for damages from a defendant. If the plaintiff wins the lawsuit, she receives V from the defendant. On the other hand, if the plaintiff loses it – that is, if the defendant wins it – she receives nothing from the defendant. The litigants bear their own litigation costs, regardless of the outcome of the lawsuit.[7] We model this litigation as a contest in which the two litigants compete to win a prize of V.

The litigants each hire an attorney who exerts effort on her behalf. Let us call the plaintiff litigant 1, and the defendant litigant 2. The attorney hired by litigant 1 is called attorney 1, and the attorney hired by litigant 2 is called attorney 2. Reflecting typical compensation structures for tort cases in the United States, we assume in this section that attorney 1 is hired on a contingent-fee basis – so comes the title of the section – but attorney 2 is hired on an hourly-fee basis. More specifically, attorney 1 is paid a fee that is set as a fixed percentage of V if litigant 1 wins the lawsuit, and nothing if she loses it. On the other hand, attorney 2 is paid a fee which depends on his capacity and effort level, regardless of the outcome of the lawsuit.

Let x_i represent the effort level expended by attorney i, $i = 1, 2$. Effort levels are nonnegative and are measured in temporal units. Let p_i be the probability that attorney i (or litigant i) wins. Then we have $p_2 = 1 - p_1$. The litigation success function for attorney 1 is given by

$$p_1 = \begin{cases} \sigma_1 x_1 \big/ (\sigma_1 x_1 + \sigma_2 x_2) & \text{for } x_1 + x_2 > 0 \\ 1/2 & \text{for } x_1 + x_2 = 0, \end{cases} \tag{1}$$

where σ_i indicates attorney i's capacity (or ability) for the litigation. Function (1) implies two things.[8] First, the litigants have the same degree of fault (or presumption) regarding the case: if $x_1 = x_2$ and $\sigma_1 = \sigma_2$, then attorney 1's probability of winning equals one half. Second, $\sigma_i > \sigma_j$ implies that attorney i has more capacity than attorney j: if $x_1 = x_2$, then attorney i's probability of winning is greater than one half. (Throughout the paper, when we use i and j at the same time, we mean that $i \neq j$.) The attorneys' litigation success functions have the property that, given attorney j's positive effort level, attorney i's probability of winning is increasing in his effort level at a decreasing rate. They have also the property that, given his positive effort level, attorney i's probability of winning is decreasing in attorney j's effort level at a decreasing rate.

For each capacity level, there exist at least two attorneys of the capacity. The litigants know which attorney has what capacity. Litigant i hires an attorney whose capacity lies in the real interval $[1, \overline{\sigma}_i]$, where $\overline{\sigma}_i > 1$. That is, $\sigma_i \in [1, \overline{\sigma}_i]$. We assume that the upper bound of the interval, $\overline{\sigma}_i$, is determined by litigant i's financial ability: the richer litigant i, the greater the upper bound.

Attorney 1's contingent fee is $\beta_1 V$, where $0 < \beta_1 < 1$. The parameter β_1 is determined by the contract between litigant 1 and attorney 1. Attorney 2's hourly-fee rate is assumed to equal his capacity, σ_2. Litigant 1 does not monitor attorney 1's effort level. This is because the fee is paid only if she wins the lawsuit. But litigant 2 may have to incur some monitoring costs in order to deal with attorney 2's possible moral hazard. We assume that, if litigant 2 asks attorney 2 to expend an effort level of x_2, then she must expend a monitoring cost of δx_2, where $\delta > 0$. We assume that δ is exogenously given and publicly known. Note that, if litigant 2 asks attorney 2 to expend more effort, then she must incur more monitoring costs. Thus, if litigant 2 asks attorney 2 to expend an effort level of x_2, then she must expend a total amount of $(\sigma_2 + \delta)x_2$.

We assume that attorneys and the litigants are risk-neutral, and try to maximize their expected payoffs. Let π_i represent the expected payoff for attorney i, and Π_i the expected payoff for litigant i. Then the payoff function for attorney 1 is

$$\pi_1 = p_1 \beta_1 V - x_1.^{9} \tag{2}$$

The payoff function for attorney 2 of capacity σ_2 is $\pi_2 = (\sigma_2 - 1)x_2$. The payoff function for litigant 1 is

$$\Pi_1 = p_1(1 - \beta_1)V, \tag{3}$$

and that for litigant 2 is

$$\Pi_2 = (1 - p_1)V - (\sigma_2 + \delta)x_2. \tag{4}$$

We formally consider the following two-stage game. In the first stage, each litigant hires her attorney, writing a contract with him. Specifically, litigant 1 writes a contract with attorney 1, which specifies the contingent-fee parameter β_1. Litigant 2 writes a contract with attorney 2, which specifies attorney 2's hourly-fee rate. Then, the litigants simultaneously announce their attorneys' capacity and their contracts – that is, litigant 1 announces publicly the value of σ_1 and the value of β_1, and litigant 2 announces publicly the value of σ_2. In the second stage, attorney 1 and litigant 2 choose simultaneously the effort levels which attorneys 1 and 2 will expend, respectively. Then, the attorneys expend their effort. Note that, since attorney 2 is hired on an hourly-fee basis, it is litigant 2 who chooses attorney 2's effort level.[10] At the end of the second stage, the winner is determined, and each litigant pays compensation to her attorney according to the contracts written in the first stage.

Finally, we assume that all of the above is common knowledge among the litigants and attorneys. We employ subgame-perfect equilibrium as the solution concept.

2.1. The second stage of the game

To solve for a subgame-perfect equilibrium of the two-stage game, we work backwards. We begin by considering the second stage. In the second stage, values of σ_1, σ_2 and β_1 are publicly known. Attorney 1 seeks to maximize his payoff (2) over his effort level, taking attorney 2's effort level as given. Litigant 2 seeks to maximize her payoff (4) over attorney 2's effort level, taking attorney 1's effort level as given. Each maximization problem yields a reaction function. Using the two reaction functions, then, we obtain a unique Nash equilibrium in the second stage of the game. We denote it by $(x_1(\beta_1, \sigma_1, \sigma_2), x_2(\beta_1, \sigma_1, \sigma_2))$.

Lemma 1. *The Nash equilibrium in the second stage of the game is*
$x_1(\beta_1, \sigma_1, \sigma_2) = \beta_1^2(\sigma_2 + \delta)\sigma_1\sigma_2 V \big/ \{\beta_1(\sigma_2 + \delta)\sigma_1 + \sigma_2\}^2$ *and*
$x_2(\beta_1, \sigma_1, \sigma_2) = \beta_1\sigma_1\sigma_2 V \big/ \{\beta_1(\sigma_2 + \delta)\sigma_1 + \sigma_2\}^2$.

Let $p_1(\beta_1, \sigma_1, \sigma_2)$ be the probability that attorney 1 wins at the Nash equilibrium of the second stage. From expression (1) and Lemma 1, we obtain

$$p_1(\beta_1, \sigma_1, \sigma_2) = \beta_1(\sigma_2 + \delta)\sigma_1 \big/ \{\beta_1(\sigma_2 + \delta)\sigma_1 + \sigma_2\}. \tag{5}$$

Using expressions (3) and (5), we obtain the expected payoff of litigant 1 at the Nash equilibrium of the second stage:

$$\Pi_1(\beta_1, \sigma_1, \sigma_2) = \beta_1(1 - \beta_1)(\sigma_2 + \delta)\sigma_1 V \big/ \{\beta_1(\sigma_2 + \delta)\sigma_1 + \sigma_2\}. \tag{6}$$

Similarly, using expressions (4) and (5), we obtain the expected payoff of litigant 2 at the Nash equilibrium of the second stage:

$$\Pi_2(\beta_1, \sigma_1, \sigma_2) = \sigma_2^2 V \big/ \{\beta_1(\sigma_2 + \delta)\sigma_1 + \sigma_2\}^2. \tag{7}$$

2.2. The first stage of the game

Now consider the first stage in which each litigant hires her attorney, writing a contract with him. Specifically, in the first stage, litigant 1 chooses the value of σ_1 and the value of β_1, and litigant 2 chooses the value of σ_2. Taking a value of σ_2 as given, litigant 1 seeks to maximize her expected payoff over σ_1 and β_1. Maximizing $\Pi_1(\beta_1, \sigma_1, \sigma_2)$ from (6) over β_1 yields

$$\beta_1 = [\{\sigma_2^2 + (\sigma_2 + \delta)\sigma_1\sigma_2\}^{1/2} - \sigma_2]\big/\{(\sigma_2 + \delta)\sigma_1\}. \tag{8}$$

Partially differentiating $\Pi_1(\beta_1, \ \sigma_1, \ \sigma_2)$ from (6) with respect to σ_1, we obtain: $\partial\Pi_1\big/\partial\sigma_1 > 0$.

Similarly, litigant 2 seeks to maximize her expected payoff over σ_2, given a value of σ_1 and a value of β_1. Partially differentiating $\Pi_2(\beta_1, \sigma_1, \sigma_2)$ from (7) with respect to σ_2, we obtain: $\partial\Pi_2\big/\partial\sigma_2 > 0$.

Lemma 2 summarizes each litigant's choice of her attorney's capacity in equilibrium.

Lemma 2. *$\Pi_i(\beta_1, \sigma_1, \sigma_2)$ is monotonically increasing in σ_i: in terms of the mathematical symbols, we have $\partial\Pi_1(\beta_1, \sigma_1, \sigma_2)\big/\partial\sigma_1 > 0$ and $\partial\Pi_2(\beta_1, \sigma_1, \sigma_2)\big/\partial\sigma_2 > 0$. Therefore, in equilibrium, litigant 1 chooses an attorney of capacity $\overline{\sigma}_1$, and litigant 2 chooses an attorney of capacity $\overline{\sigma}_2$: in terms of the mathematical symbols, $\sigma_1^* = \overline{\sigma}_1$ and $\sigma_2^* = \overline{\sigma}_2$.*

The first part of Lemma 2 says that, given capacity of the opponent's attorney, each litigant's payoff increases as she hires an attorney of higher capacity. Our explanation is rather straightforward. Consider first litigant 1. Her payoff function can be written as $\Pi_1(\beta_1, \sigma_1, \sigma_2) = p_1(\beta_1, \sigma_1, \sigma_2)(1 - \beta_1)V$, which comes from expression (3). By hiring an abler attorney, she can lower the contingent-fee fraction and increase her probability of winning, which certainly increases her expected payoff. Next, from expression (4), litigant 2's payoff function is $\Pi_2(\beta_1, \ \sigma_1, \ \sigma_2) = \{1 - p_1(\beta_1, \ \sigma_1, \ \sigma_2)\}V - (\sigma_2 + \delta)x_2(\beta_1, \ \sigma_1, \ \sigma_2)$. Hiring an abler attorney increases litigant 2's probability of winning and thus her gross expected payoff, $\{1 - (\beta_1, \sigma_1, \sigma_2)\}V$. On the other hand, hiring an abler attorney either increases or decreases her costs, $(\sigma_2 + \delta)x_2(\beta_1, \sigma_1, \sigma_2)$. But the former positive effect on her expected payoff dominates the latter negative effect, if any. Therefore, litigant 2's expected payoff increases as she hires an abler attorney. Lemma 2 implies that, in order to maximize her expected payoff, each litigant has to hire the best of the available attorneys she can afford.

Knowing that litigant 1 hires an attorney of capacity $\overline{\sigma}_1$ and litigant 2 hires an attorney of capacity $\overline{\sigma}_2$ in equilibrium, we obtain the equilibrium contingent-fee parameter from expression (8):

$$\beta_1^* = [\{\overline{\sigma}_2^2 + (\overline{\sigma}_2 + \delta)\overline{\sigma}_1\overline{\sigma}_2\}^{1/2} - \overline{\sigma}_2] \big/ \{(\overline{\sigma}_2 + \delta)\overline{\sigma}_1\}. \tag{9}$$

Now, using Lemmas 1 and 2, and expressions (6), (7), and (9), we obtain Lemma 3. Lemma 3 reports the attorneys' effort levels and the litigants' expected payoffs which are specified in the subgame-perfect equilibrium of the two-stage game. Note that in the real world, a plaintiff (litigant 1) is often a credit-constrained individual, while a defendant (litigant 2) is usually a firm that has a deep pocket. Based on this fact, we assume that $\overline{\sigma}_1 \leq \overline{\sigma}_2$. For concise exposition, we let $\overline{\sigma}_1 = \overline{\sigma}$ and $\overline{\sigma}_2 = \alpha\overline{\sigma}$, where $\alpha \geq 1$.

Lemma 3. *In the subgame-perfect equilibrium, the effort levels of attorneys* 1 *and* 2 *are*
$x_1^* = [\{\alpha(\alpha + \alpha\overline{\sigma} + \delta)\}^{1/2} - \alpha]^2 V \big/ \{(\alpha\overline{\sigma} + \delta)(\alpha + \alpha\overline{\sigma} + \delta)\}$ *and*
$x_2^* = [\{\alpha(\alpha + \alpha\overline{\sigma} + \delta)\}^{1/2} - \alpha] V \big/ \{(\alpha\overline{\sigma} + \delta)(\alpha + \alpha\overline{\sigma} + \delta)\}$,
and the expected payoffs of litigants 1 *and* 2 *are*
$\Pi_1^* = \{(\alpha + \alpha\overline{\sigma} + \delta)^{1/2} - \alpha^{1/2}\}^2 V \big/ (\alpha\overline{\sigma} + \delta)$ *and* $\Pi_2^* = \alpha V \big/ (\alpha + \alpha\overline{\sigma} + \delta)$.

3. The hourly-fee model

We assume in this section that both attorney 1 and attorney 2 are hired on an hourly-fee basis.[11] That is, each attorney is paid a fee which depends on his capacity and effort level, regardless of the outcome of the lawsuit. In this hourly-fee model, we look at the following two-stage game. In the first stage, each litigant hires her attorney, writing a contract with him. Specifically, each litigant writes a contract with her attorney, which specifies the attorney's hourly-fee rate. Then, the litigants simultaneously announce their attorneys' capacity and their contracts. In the second stage, litigants 1 and 2 choose simultaneously the effort levels which attorneys 1 and 2 will expend, respectively. Then, the attorneys expend their effort. At the end of the second stage, the winner is determined, and each litigant pays compensation to her attorney according to the contracts written in the first stage.

Let $\hat{\Pi}_i$ represent the expected payoff for litigant i. Then, the payoff function for litigant 1 is

$$\hat{\Pi}_1 = p_1 V - (\sigma_1 + \delta)x_1, \tag{10}$$

where p_1 is defined as in expression (1), and that for litigant 2 is the same as in expression (4): $\hat{\Pi}_2 = (1 - p_1)V - (\sigma_2 + \delta)x_2$.

To solve for a subgame-perfect equilibrium of the two-stage game, we need to work backwards. Since the analysis of this game is very similar to that in Section 2, we here report only the Nash equilibrium and its outcomes in each stage of the game, omitting the derivation process.

Lemma 4. *The Nash equilibrium in the second stage of the game is*
$\hat{x}_1(\sigma_1, \sigma_2) = (\sigma_2 + \delta)\sigma_1\sigma_2 V / \{2\sigma_1\sigma_2 + \delta(\sigma_1 + \sigma_2)\}^2$ *and*
$\hat{x}_2(\sigma_1, \sigma_2) = (\sigma_1 + \delta)\sigma_1\sigma_2 V / \{2\sigma_1\sigma_2 + \delta(\sigma_1 + \sigma_2)\}^2$.

As in Lemma 2, $\hat{\Pi}_i(\sigma_1, \sigma_2)$ is monotonically increasing in σ_i: $\partial\hat{\Pi}_1(\sigma_1, \sigma_2)/\partial\sigma_1 > 0$ and $\partial\hat{\Pi}_2(\sigma_1, \sigma_2)/\partial\sigma_2 > 0$. Thus, litigant 1 chooses the attorney of $\overline{\sigma}$ and litigant 2 the one of $\alpha\overline{\sigma}$ in equilibrium. Using this and Lemma 4, we obtain Lemma 5.

Lemma 5. *In the subgame-perfect equilibrium, the effort levels of attorneys* 1 *and* 2 *are*

$\hat{x}_1^* = \alpha(\alpha\overline{\sigma} + \delta)V / \{2\alpha\overline{\sigma} + (\alpha + \delta)\}^2$ *and* $\hat{x}_2^* = \alpha(\overline{\sigma} + \delta)V / \{2\alpha\overline{\sigma} + (\alpha + \delta)\}^2$,
and the expected payoffs of litigants 1 *and* 2 *are* $\hat{\Pi}_1^* = [(\alpha\overline{\sigma} + \delta) / \{2\alpha\overline{\sigma} + (1 + \alpha)\delta\}]^2 V$ *and* $\hat{\Pi}_2^* = [\alpha(\overline{\sigma} + \delta) / \{2\alpha\overline{\sigma} + (1 + \alpha)\delta\}]^2 V$.

4. The effects of wealth and stake size on equilibrium outcomes

We first investigate how an increase in α (the wealth parameter) affects the litigants' equilibrium payoffs in the contingent-fee and the hourly-fee model.

Proposition 1. *Fix the level of* $\overline{\sigma}$ *and* δ. *Then,* $\Pi_1^*(\alpha)$ *and* $\hat{\Pi}_1^*(\alpha)$ *are monotonically decreasing in* α, *and* $\Pi_2^*(\alpha)$ *and* $\hat{\Pi}_2^*(\alpha)$ *are monotonically increasing in* α. *The rate of decrease and increase is small, which means that the wealth effects on the litigants' equilibrium payoffs are small.*

Proposition 1 is illustrated in Figures 1 and 2.[12] (Throughout the paper, most decimal fractions are rounded off to two decimals, but some decimal fractions to four decimals if necessary.) The figures show how an increase in α affects $\Pi_i^*(\alpha)$ and $\hat{\Pi}_i^*(\alpha)$ when $\overline{\sigma} = 2$ and $\delta = 0.1$.[13] Specifically, as the value of α increases five times, the litigants' expected payoffs show only a small change of $0.01V$. It is easy and intuitive to see that $\partial\Pi_1^*(\alpha)/\partial\alpha < 0$ and $\partial\hat{\Pi}_1^*(\alpha)/\partial\alpha < 0$, and $\partial\Pi_2^*(\alpha)/\partial\alpha > 0$ and $\partial\hat{\Pi}_2^*(\alpha)/\partial\alpha > 0$. But the reason why the rate of decrease and increase is so small needs an explanation. Our explanation is based on the litigants' strategic and payoff-maximizing behavior. Expression (1) implies that an increase in α enhances litigant 2's probability of winning and thus her gross expected payoff, $(1 - p_1)V$ in (4). At the same time, however, it also raises her costs because the hourly-fee rate is equal to her attorney's capacity and is increasing in α (see (4) and Lemma 2). Moreover, it could make attorney 1 in the contingent-fee model or litigant 1 in the hourly-fee model aggressive, which in turn may lower litigant 2's expected payoff. Realizing such costs and strategic interactions, in equilibrium, litigant 2 with a high α makes attorney 2 less aggressive by asking him to work less. In the meantime, a decrease in attorney 1's effort level is small. Let's take some numerical examples. When $\overline{\sigma} = 2$ and $\delta = 0.1$, for instance, $\hat{x}_2^* = 0.0807V$ with $\alpha = 1$ and $\hat{x}_2^* = 0.0167V$ with $\alpha = 5$. That is, as the value of α increases five times, attorney 2's equilibrium effort level decreases by about 80%. But there is only a small decrease in attorney 1's effort level. Specifically, $\hat{x}_1^* = 0.0807V$ with $\alpha = 1$ and $\hat{x}_1^* = 0.0802V$ with $\alpha = 5$. Because of such strategic consideration, the wealth effects on the litigants' expected payoffs are not so great.

How does litigant 1's choice of a fee arrangement change the wealth effect on herself? In terms of absolute values, her choice produces little difference. When $\overline{\sigma} = 2$ and $\delta = 0.1$, for instance, $\Pi_1^*(\alpha = 1) - \Pi_1^*(\alpha = 5) = 0.0061V$ and $\hat{\Pi}_1^*(\alpha = 1) - \hat{\Pi}_1^*(\alpha = 5) = 0.0097V$. The two numerical values show, however, the wealth effects in the contingent-fee model are relatively greater than those in the hourly-fee model. This can be explained as follows. When α increases, by adopting the contingent fee, litigant 1 can drive attorney 1 more strongly to win the lawsuit so that she can reduce the gap in the payoffs.

Until now, we have assumed that the amount at stake, V, is fixed. We now vary the value of V. It is very likely that $\overline{\sigma}$ and $\alpha\overline{\sigma}$ rise in proportion to the size of V. This is because an increase in V raises the litigants' expected payoffs, which in turn enhances their financial ability to hire better attorneys. For the sake of analytical simplicity, we assume a linear relationship between V and $\overline{\sigma}$: to be specific, $\overline{\sigma} = sV$, where s is a positive constant. We also assume that α is independent of V.[14] Substituting $\overline{\sigma}/s$ for V in Lemmas 3 and 5, we obtain Proposition 2.

Proposition 2. *Fix the level of α, δ and s. Then, as V goes up, the increasing rate of attorney 1's effort under the contingent fee exceeds that of himself under the hourly fee as well as that of attorney 2's. Thus, if the initial effort level of attorney 1 under the* *contingent fee is lower than that of himself under the hourly fee or that of attorney* 2, *then a reversal of the effort levels occurs as V increases.*

Proposition 2 is illustrated in Figures 3 and 4.[15] In Figure 3, $\alpha = 2$ and $\delta = 0.1$, and in Figure 4, $\alpha = 1$ and $\delta = 0.1$. The figures show how an increase in *V* changes the attorneys' equilibrium effort levels in units commensurate with *V*. First, in the hourly-fee model, given α and δ, we have $\partial \hat{x}_i^* / \partial \overline{\sigma} > 0$: as in Katz (1988), it is intuitive that given *s*, an increase in $\overline{\sigma}$ (via an increase in *V*) leads both attorneys to increase their effort levels.

Second, in the contingent-fee model, given α and δ, we have $\partial x_1^* / \partial \overline{\sigma} > 0$, which is also intuitive. But it is somewhat counterintuitive that the sign of $\partial x_2^* / \partial \overline{\sigma}$ is indeterminate. As shown in Figure 3, for instance, x_2^* is initially increasing in *V* but very slowly compared with the increase in x_1^*; it reaches its maximum 0.12*V* at 3.13*V*; then it is very slowly decreasing in *V*. Why does this happen? Recall that, in the contingent-fee model, litigant 1 adopts incentive delegation with the contingent fee, whereas litigant 2 instructive delegation with the hourly fee. Given attorney 1's effort level, if litigant 2 has attorney 2 with a higher $\overline{\sigma}$ put more effort, her winning probability goes up and so does her gross expected payoff. At the same time, however, it raises her expenses of hourly fees which are increasing in $\overline{\sigma}$ and in x_2^*. Moreover, the increase in x_2^* may make attorney 1 under the contingent fee more aggressive. Considering such cost effects and strategic interactions, litigant 2 determines attorney 2's effort level in order to maximize her expected payoff. This results in x_2^* in Figure 3.

Figure 3 shows a reversal of the effort levels caused by a different increasing rate of effort of the two attorneys when *V* increases. Figure 4 also shows a similar reversal of attorney 1's effort levels caused by the different fee schemes. To see such a reversal empirically, Kritzer (1990, pp. 118-120) takes hypothetical cases and systematically varies the level of stakes. Figure 8-1 in Kritzer (1990) shows that the reversal occurs at about \$40,000, though he does not distinguish between the contingent-fee and the hourly-fee model. We conjecture, however, that Figure 4 fits his idea better than Figure 3 does. This is because Figure 4 deals with a difference in the same attorney's effort levels when the fee scheme is changed and when there is no wealth effect. If this is the case, 1.67*V* in Figure 4 corresponds to about $40,000 in Kritzer (1990). On the other hand, Figure 3 deals with a difference in the effort levels of the two different attorneys under the different fee schemes. We thus conclude that Proposition 2 with Figure 4 may provide a theoretical foundation for the reversal of the effort levels in Kritzer (1990). Our explanation for the rationale utilizes the fact that when V increases, the contingent fee makes attorney 1 more aggressive than the hourly fee does.

Next, we investigate how an increase in V affects the litigants' equilibrium payoffs in each model. Together with the probability-of-winning function (1), Proposition 2 leads to Corollary 1.

Corollary 1. *Fix the level of α, δ and s. Then, as V goes up, the increasing rate of litigant* 1*'s expected payoff with the contingent fee exceeds that of herself with the hourly fee as well as that of litigant* 2*'s. Thus, if litigant* 1*'s initial payoff with the contingent fee is less than that of herself or that of litigant* 2*'s, then a reversal of the payoffs occurs as V increases.*

Corollary 1 is illustrated in Figures 5 and 6. In Figure 5, $\alpha = 2$ and $\delta = 0.1$, which corresponds to Figure 3, and in Figure 6, $\alpha = 1$ and $\delta = 0.1$, which corresponds to Figure 4. As V increases, the equilibrium effort ratio x_1^*/x_2^* or $x_1^*/\hat{x}_1^*$ increases, shown in Proposition 2. This means that litigant 1's probability of winning with the contingent fee increases. And consequently, as V increases, the increasing rate of Π_1^* exceeds that of Π_2^* or that of $\hat{\Pi}_1^*$.

Corollary 1 implies that when stake size becomes bigger, litigant 1's choice of the contingent fee becomes a better choice, compared with her choice of the hourly fee.[16] In

Figure 6, for example, litigant 1's expected payoff with the contingent fee exceeds her payoff with the hourly fee at 1.68*V*. Our analysis has an important policy implication for the recent tobacco litigation in the United States. The states as plaintiffs filed lawsuits against tobacco companies seeking reimbursement for medical expenses paid by government insurance agencies attributed to tobacco-related illness. In November 1998, the four major tobacco companies (Philip Morris, R.J. Reynolds, Lorillard and Brown & Williamson) and the attorney general reached the Master Settlement Agreement, under which the companies agreed to pay 46 states about $206 billion over the next 25 years.[17] In doing so, the states retained private attorneys under the contingent fee, though they were able to afford salaried attorneys for the litigation. As the contingent-fee attorneys earned $10 or 20 billion, criticism against the state governments has arisen. Corollary 1 with Figure 6 says, however, that the governments' choice of the contingent fee should not be criticized if the public wanted the governments to maximize the reimbursement.

5. Concluding remarks

We have modeled civil litigation as contests with delegation. In order to describe tort cases in the United States, we first have considered the contingent-fee model in which the plaintiff hires her attorney on a contingent-fee basis, but the defendant does on an hourly-fee basis. Then we have considered the hourly-fee model where both attorneys work under the hourly fee, which fits cases of divorce and contract disputes. We have assumed that the probability of winning for a litigant depends on two opposing attorneys' relative capacity and effort levels.

We have found that, in the two models, each litigant hires the best of the available attorneys she can afford; thus, the wealthier a litigant, the abler her attorney. Because of strategic interactions, however, the defendant's wealth contributes only a little to an increase in her expected payoff. Moreover, as stake size increases, the plaintiff can take advantage of the contingent fee which motivates her attorney more strongly to win the case. This explains how O.J. Simpson's legal team could not prevail in the relevant civil case where the amount at stake was $33,500,000.

We have also found that, as the stake size increases, the contingent fee drives the plaintiff's attorney to put more effort than the hourly fee; thus, the contingent fee may give the plaintiff a more expected payoff than the hourly fee. This finding relieves the state governments of being blamed for hiring private attorneys on a contingent-fee basis in the recent tobacco litigation. To be specific, their choice of the contingent fee in such mass tort litigation would bring them more expected payoffs, compared with their choice of the hourly fee.

Some extensions of our model seem interesting: (i) considering the case in which litigants have different perceptions about the amount at stake; (ii) reflecting different degrees of fault for litigants in calculating a litigant's probability of winning; and (iii) allowing the defendant to choose between the contingent and the hourly fee. We leave these extensions for future research.

Footnotes

1. Hunt (1999) provides a comprehensive review of the O.J. Simpson trial.

2. Critics of the adversarial system worry that a litigant's probability to prevail in a lawsuit may rely more upon the capacity of his or her attorney than on the facts of the case and thus, the rich can buy justice, as compared to the inquisitorial system where a presiding judge dominates the trial. See Parisi (2002) for the difference between the adversarial and the inquisitorial system.

3. A contest is defined as a situation in which litigants compete with one another by expending irreversible effort to win a prize. A contest model is appropriate for a description of litigation since a plaintiff side and a defendant side expend irreversible litigation effort to prevail in their case. Moreover, a contest model allows us to investigate strategic interactions between the two sides. Because of such merits, contest models have long been considered to analyze legal disputes. Examples include Plott (1987), Katz (1988), Farmer and Pecorino (1999), Bernado, Talley and Welch (2000), Wärneryd (2000), Hirshleifer and Osborne (2001), Baik (2007), Baik and Kim (2007a, b), and Baik (2008).

4. A novelty of this paper is an introduction of attorneys as delegates. See Baik and Kim (1997), Wärneryd (2000), Konrad, Peters and Wärneryd (2004), Katz (2006) , Baik (2007), Baik and Kim (2007a, b), and Baik (2008) for delegation in contests.

5. In the United States, most tort plaintiffs file suit under a contingent-fee arrangement. According to a survey in Kritzer (1990), 87 percent of individual plaintiffs in torts retain their lawyers on a contingent-fee scheme. On the other hand, most plaintiffs in divorce adopt an hourly-fee scheme. Defendants' attorneys both in torts and divorce are usually paid under an hourly fee (see Bebchuk and Guzman, 1996; Emons, 2007). Many law and economics scholars study contingent fees. Examples include Danzon (1983),

Dana and Spier (1993), Rubinfeld and Scotchmer (1993), Miceli (1994), Hay (1997), Choi (2003), Chen and Wang (2007), and Wang (2008).

6. This finding hinges critically on the assumption that both litigants can afford to hire their own attorneys. If a litigant is too poor to hire an attorney with the hourly fee or if no attorney is interested in her case with the contingent fee, then she is obliged to give up the suit. In that case, the wealth effect is extremely great since her opponent wins the case by exerting almost zero effort.

7. This is called the American fee-shifting rule. In contrast, under the English (or British) rule, the loser bears the winner's litigation costs.

8. The logit-form probability-of-winning functions are widely used in the litigation contest literature. See, for example, Posner (1973), Plott (1987), Katz (1988), Farmer and Pecorino (1999), Bernado, Talley and Welch (200), Hirshleifer and Osborne (2001), Parisi (2002), Baik (2007), Baik and Kim (2007a, b), and Baik (2008). Katz (1987) reports that in the United States, legal fees of plaintiffs on average are about one fourth of the amount at stake. Interestingly, Baik and Kim (2007a, b) and our model with the logit-form probability-of-winning functions show that, in equilibrium, a litigant's legal fee is about one fourth of *V*.

9. We assume that an attorney incurs a real cost of 1 per unit of his effort, regardless of his capacity.

10. Fershtman and Kalai (1997) distinguish between two types of delegation: incentive delegation and instructive delegation. According to their classification, litigant 1 adopts incentive delegation, while litigant 2 adopts instructive delegation.

11. This compensation structure is used in the United States for civil cases such as divorce and contract disputes.

12. The values of Π_1^* and Π_2^* are increasing and decreasing in $\overline{\sigma}$, respectively. If $\overline{\sigma} \geq 2.29$, the initial value of Π_1^* at V becomes to exceed that of Π_2^* (refer Figure 1).

13. Throughout the paper, in numerical examples, we set $\delta = 0.1$. We may interpret δ as a possible overcharge rate. To be specific, attorney i could overcharge his hourly-fee by an amount of δx_i, exploiting his informational advantage on x_i. Interestingly, Kritzer (1990, pp. 135-61) reports that, on average, hourly-fee attorneys spent 49.5 hours and contingent-fee attorneys 45.7 hours in civil litigation in the United States. If we interpret the difference in hours spent as the overcharge, then $\delta = (49.5 - 45.7)/45.7 = 0.08$, which is close to 0.1.

14. It is not clear whether α in reality is increasing or decreasing in V. We, thus, assume its independence here for simplicity.

15. In Proposition 2 and Corollary 1, and Figures 3, 4, 5 and 6, we use V instead of $\overline{\sigma}/s$, though we obtain the results by substituting $\overline{\sigma}/s$ for V. This is possible because both the independent and dependent variables in Proposition 2 and Corollary 1 include $\overline{\sigma}/s$ and thus, we re-substitute V for $\overline{\sigma}/s$.

16. A natural question is then, unlike litigant 1, why litigant 2 sticks to the hourly-fee scheme even when the contingent-fee scheme looks more lucrative. One possible explanation is that in a repeated game, the hourly-fee scheme could bring a litigant more payoffs than the contingent-fee scheme. Note that our model is a one-shot game. In the real world, a corporate defendant, e.g. an auto insurance company as a liability insurer, is involved in many similar litigations over time. Thus, the corporate defendant as a repeat litigant can easily acquire the "know-how" of keeping attorneys under the hourly fee, whereas the individual plaintiff as an one-shotter may not.

17. The companies settled separately with the four remaining states (Florida, Minnesota, Mississippi, and Texas). See Sloan, Trogdon and Mathews (2005) who provide a succinct review of the recent wave of tobacco litigation.

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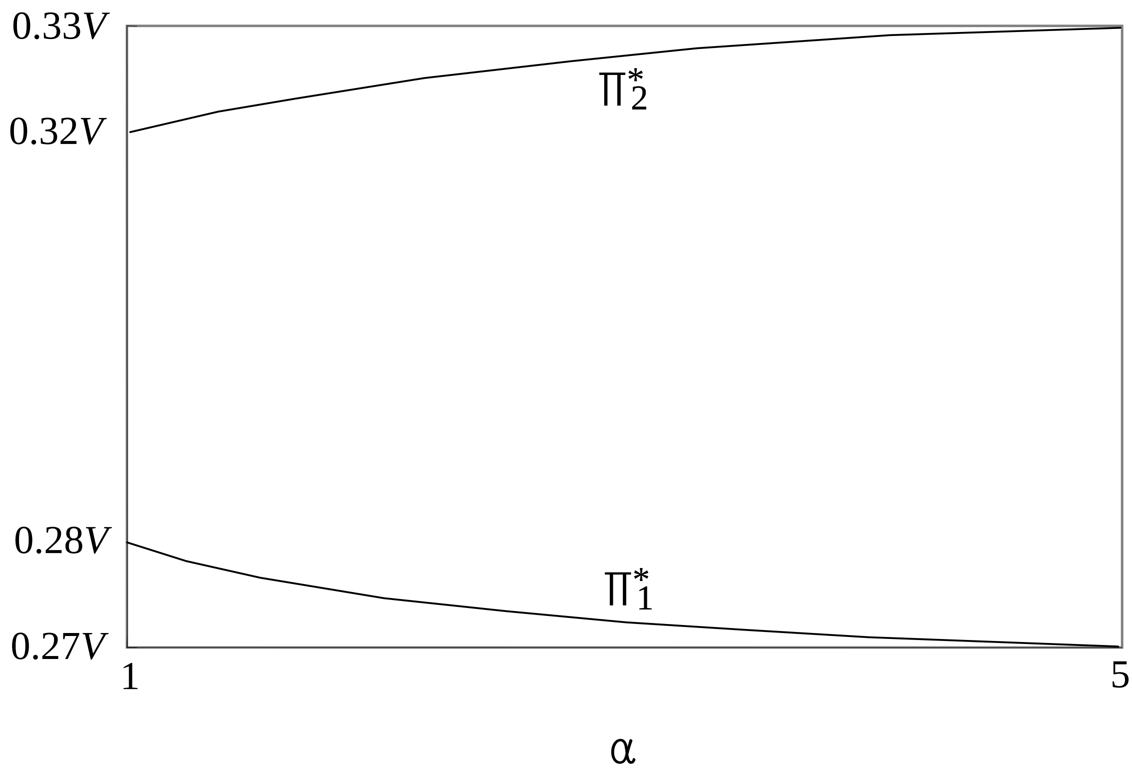

Figure 1. The wealth effects on Π_i^* in the contingent-fee model when $\overline{\sigma} = 2$.

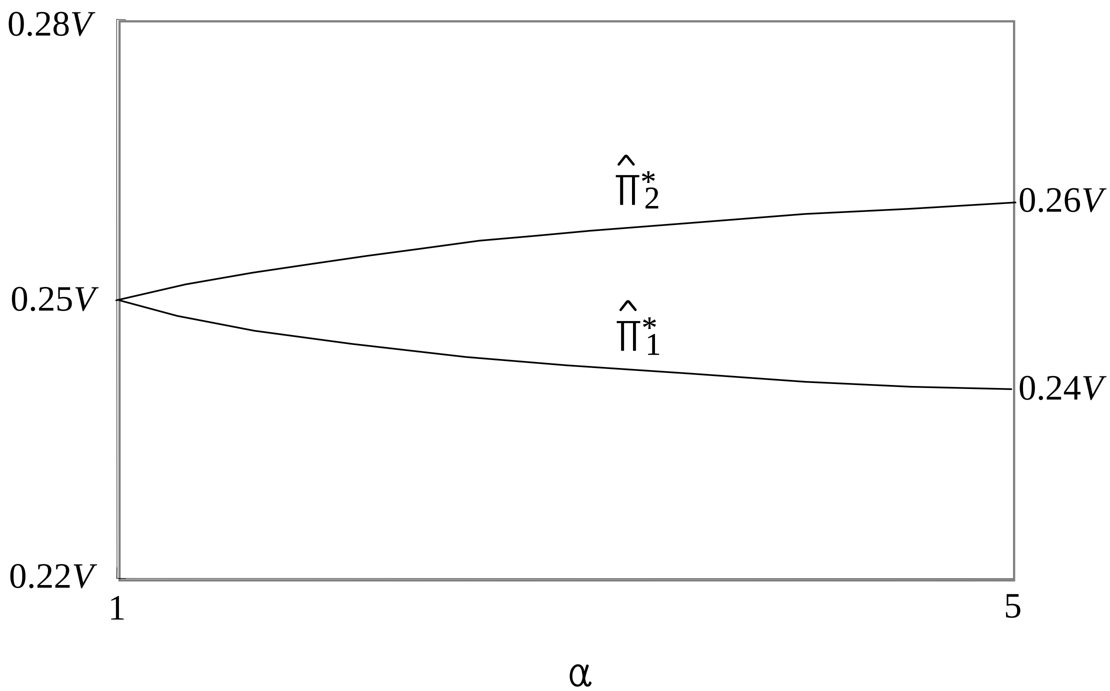

Figure 2. The wealth effects on $\hat{\Pi}_i^*$ in the hourly-fee model when $\overline{\sigma} = 2$.

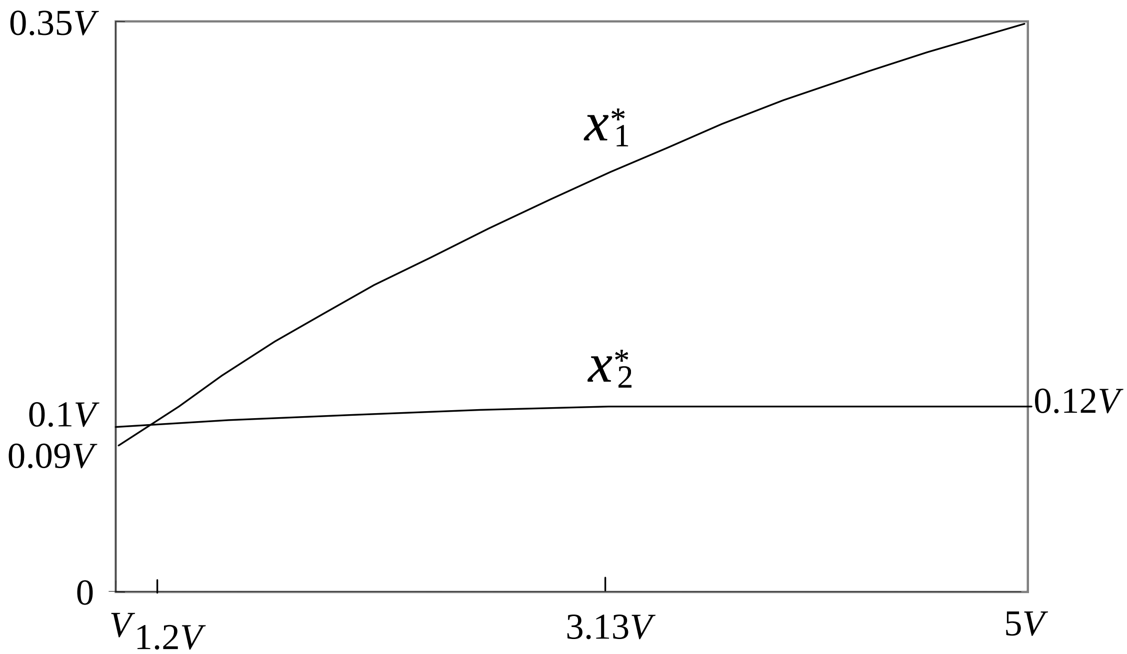

Figure 3. A reversal of effort levels in the contingent-fee model when $\alpha = 2$.

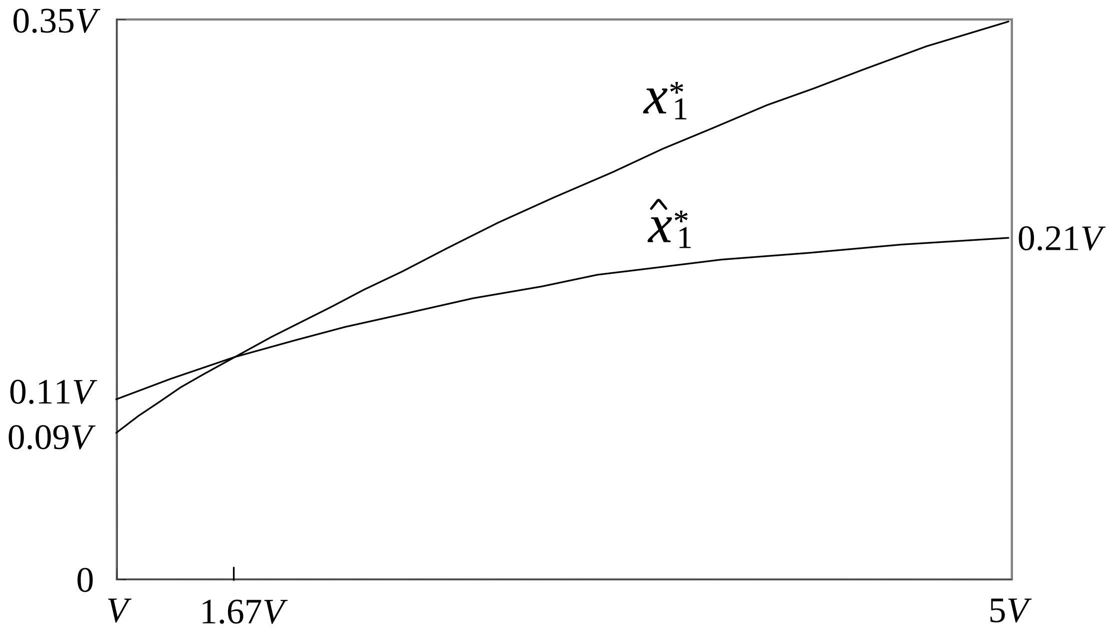

Figure 4. A reversal of attorney 1's effort levels in the two models when $\alpha = 1$.

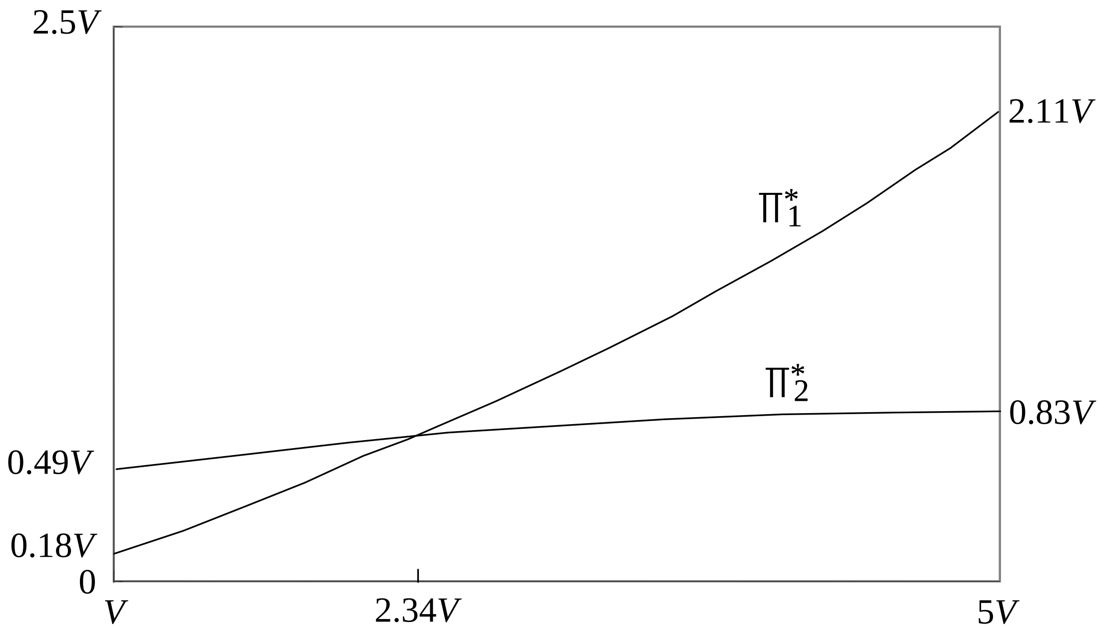

Figure 5. The effects of stake size on Π_i^* in the contingent-fee model when $\alpha = 2$.

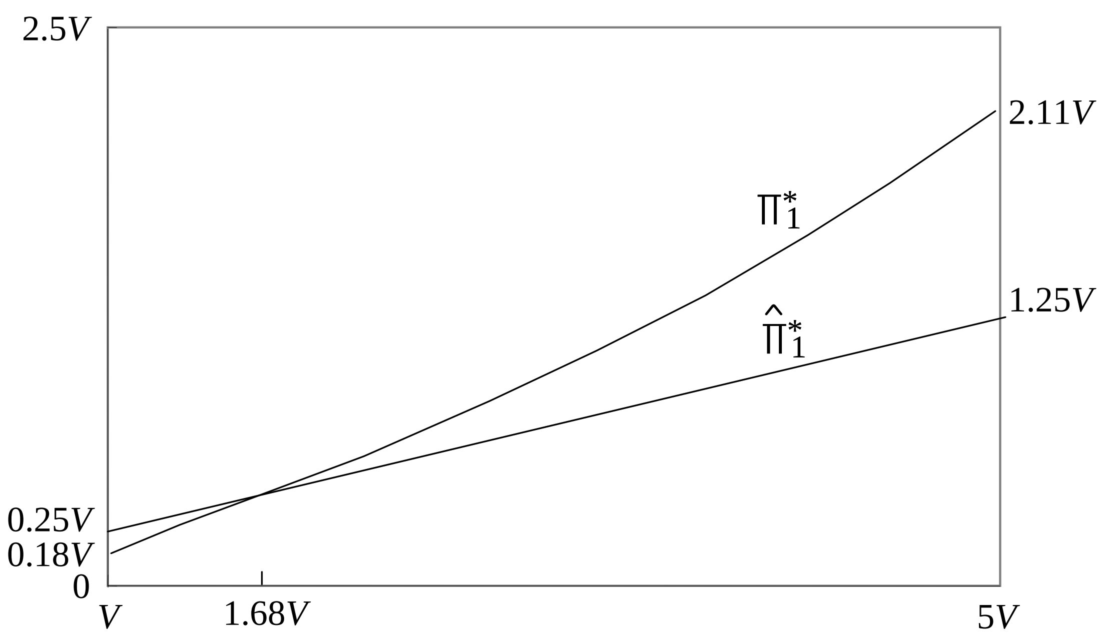

Figure 6. The effects of stake size on Π_1^* and $\hat{\Pi}_1^*$ when $\alpha = 1$.