Open Access

Yasuhiro Ikeda* and Daisuke Mori

Can Decoupling Punitive Damages Deter an Injurer's Harmful Activity?

DOI 10.1515/rle-2014-0033

Abstract: This study theoretically analyzes the effect of decoupling punitive damages under the adversarial system. Decoupling means taking punitive award windfalls away from plaintiffs and placing them into state-administered funds. In particular, it aims to reveal the incentive structure of decoupling and examine how this affects human behaviors. Although some commentators argue that decoupling punitive damages effectively disgorges plaintiffs of any potential windfall without diminishing the deterrent effect of punitive damages, we demonstrate that decoupling actually reduces the deterrence effect under the adversarial system.

Keywords: decoupling, punitive damages, adversarial system, deterrence, split-recovery statute

JEL Classifications: D72, K13, K41

1 Introduction

This study analyzes the effect of decoupling punitive damages under the adversarial system. Decoupling means taking punitive award windfalls away from plaintiffs and placing them into state-administered funds, and the adversarial system means a procedural system where the trial process is party-controlled. We demonstrate that decoupling reduces the deterrence effect of punitive damages under the adversarial system. In particular, this study aims to reveal the incentive structure of decoupling and examine how this affects human behaviors.

Punitive damages, also called exemplary damages, are a form of damages sometimes awarded in addition to compensatory damages, which compensate plaintiffs for the harm they suffered owing to the defendant's activity. Punitive

*Corresponding author: **Yasuhiro Ikeda**, Kumamoto University, Faculty of Law, Kumamoto, Japan, E-mail: ikeyasu@kumamoto-u.ac.jp

Daisuke Mori, Kumamoto University, Faculty of Law, Kumamoto, Japan, E-mail: mdai@kumamoto-u.ac.jp

damages are a settled principle of common law, especially in the United States. However, they are a matter of state law, and thus differ in application nationwide.

A main rationale for the imposition of punitive damages is deterrence. Punitive damages are meant to punish the perpetrator of a tort and deter similar egregious conduct from occurring in the future. Law and economics scholars present more sophisticated rationales based on the theory of deterrence in economics (see, for example, Cooter, 1989; Polinsky and Shavell, 1998). They argue that punitive damages are necessary in some cases. For instance, when injurers who ought to be liable escape suit (because, for example, it is difficult for victims to identify them), their expected payments will be less than the expected harm they generate if they are made to pay only compensatory damages. In this case, in order to maintain the deterrence effect, damages must be raised above the level of harm, that is, punitive damages must be imposed.

However, in recent years, a number of criticisms have been leveled against the imposition of punitive damages, notably because of the huge amounts often gained by plaintiffs. Some courts and commentators have characterized such high punitive damages awarded as an unjustified “windfall” for the plaintiff. For instance, Justice Harlan stated in his dissent in *Rosenbloom v. Metromedia, Inc.*, “from the standpoint of the individual plaintiff, such [punitive] damage awards are windfalls” (1971:74).

To address such criticisms, many US states have enacted tort reform legislations. For example, decoupling punitive damages (Polinsky and Che, 1991), also known as “split-recovery” statutes, state that punitive damages be paid to the state rather than to the plaintiff. Indeed, in his dissent in *Smith v. Wade*, Chief Justice Rehnquist suggested that the windfall effect could be avoided by the confiscation of the entire amount awarded as punitive damages and observed “[e]ven assuming that a punitive ‘fine’ should be imposed after a civil trial, the penalty should go to the State, not to the plaintiff” (1983:59). The split-recovery statutes thus far enacted by states do not go this far, however. They only allocate a percentage of the punitive awards to the state.¹

Some commentators argue that decoupling effectively disgorges plaintiffs of any potential windfall without diminishing the deterrent effect of punitive damages since the amount the plaintiff can get reduces, whereas the amount the defendant must pay remains constant (Shores, 1992; Sloane, 1993). For example, Justice Shores, a member of the Alabama Supreme Court, argues that a split-recovery statute “retain[s] the benefits of punitive damages, punishment and deterrence of willful and wanton conduct, while eliminating their major limitation [which is the

¹ For example, in Georgia, the state treasury receives 75% of a plaintiff’s punitive damage award in product liability cases (Georgia Code § 51-12-5.1(e)(2) (2010)), while in Alaska, 50% of the award must be deposited into the general fund of the state (Alaska Statutes § 09.17.020(j) (2011)).

financial windfall]” (Shores, 1992:62). Similarly, Polinsky and Che (1991) argue that the decoupling liability system, in which the awards paid to plaintiffs are generally less than the liability imposed on defendants, is generally desirable because whenever plaintiffs’ recovery equals defendants’ damages, the same level of deterrence can be achieved at a lower social cost by lowering recovery and simultaneously raising damages. Kahan and Tuckman (1995) introduce lawyers into the model, but still conclude that decoupling can be used to reduce litigation costs while maintaining deterrence in the absence of agency problems in the plaintiff–lawyer relationship.

However, we dispute whether the decoupling liability system can actually serve as a device that both reduces the punitive damages awarded and maintains deterrence. Indeed, this study contrarily demonstrates that decoupling makes it easier for the defendant to carry out harmful activities. Moreover, even if the amount of punitive damages is raised in an attempt to set off the reduction in the deterrence effect on the defendant, we find that it has the opposite result to what was intended and leads to more reduction.

In this study, we introduce the adversarial system, a prevailing legal system in common law countries, into the economic model of decoupling. Under this system, two litigating parties present their arguments and evidence and an impartial person or group of people, usually a jury or judge, decides the winner. Notably, few studies have theoretically considered the deterrence of defendants’ activities and elimination of plaintiffs’ windfalls under the adversarial system. Although Choi and Sanchirico (2004) consider a similar situation, they focus on the social welfare of decoupling and their findings on the deterrence effect are ambiguous. That is, they argue that when the litigation effort is endogenous, increasing damages imposed on defendants could raise or lower deterrence. Moreover, while Landeo et al. (2007) analyze the deterrence effect of the decoupling system, they do not incorporate the adversarial system into their model.

By contrast, we demonstrate that the deterrence of defendants’ harmful activities and elimination of plaintiffs’ windfalls are incompatible under the adversarial system. By removing the possibility of plaintiffs benefitting from windfall awards, the decoupling liability system lowers plaintiffs’ economic stakes compared with those of defendants. This undermines plaintiffs’ incentives to compete with defendants and reduces the former’s probability of winning the case. Then, this leads to a decline in the number of lawsuits by plaintiffs, which results in the degradation of the deterrence effect.

The remainder of the paper is organized as follows. In Section 2, we present the decoupling liability system model. We divide the model’s timeline into four periods and analyze them in reverse order. In Section 3, we present our conclusions and suggest future areas of research.

2 The decoupling liability system model

Our model has one risk-neutral injurer (hereinafter, “defendant”) and many risk-neutral potential victims (hereinafter, “plaintiffs”). The following timeline, depicted in Figure 1, shows the timing of the model.

Figure 1: Timeline of the model.

In period 0, the legal authority announces a damages rule such as the decoupling liability rule. In period 1, the defendant (e.g., a manufacturer) chooses whether to engage in a certain activity.² If he chooses to engage, it brings benefits to him but causes harm to the plaintiffs. If he chooses not to, it causes no harm to them.³ We assume that this activity is subject to strict liability. In period 2, the plaintiffs decide whether to file suits. We assume that they file suits only when they suffer harm. In other words, there are no frivolous lawsuits in which the plaintiffs file suits when they suffer no harm. Period 3 is the trial phase.⁴ Each trial matches one of the plaintiffs with the defendant. The plaintiff and defendant choose the extent of effort they make to present evidence and persuade the jury or judge. Then, the court decides whether the plaintiff wins

² For simplicity, the level of the activity is assumed to be fixed. The defendant can only choose to engage in it or not.

³ It is assumed that the cases in our model are unilateral, which means the plaintiffs do not have a way in which to avoid harm, while the defendant has. For more details on unilateral and bilateral cases, see Shavell (1980).

⁴ It is assumed that all suits result in trials. We do not take account of settlements.

the case. If she wins, the defendant bears strict liability. The plaintiff obtains only compensatory damages, whereas the defendant must pay compensatory and punitive damages.

In the following subsections, we describe the details of the model in reverse order of the timeline and analyze them, solving the model by way of backward induction.

2.1 Period 3: the trial

Suppose that the defendant must pay both compensatory and punitive damages when the plaintiff wins the case. We define $R(>0)$ as the amount of compensatory damages, which is equal to the amount of harm the plaintiff suffered, and $\alpha(\geq 1)$ as the multiplier of punitive damages. In this case, the defendant's total payment is αR and the amount of punitive damages is $(\alpha - 1)R$. However, under the decoupling liability system, the plaintiff cannot receive the entire amount the defendant pays. For simplicity, we assume that the entire amount of punitive damages awarded is confiscated, as suggested by Chief Justice Rehnquist. This means the plaintiff receives only compensatory damages.

We further assume that the adversarial system is adopted at the trial. The adversarial system, previously modeled by Tullock (1975, 1980), Parisi (2002), and Froeb and Kobayashi (2012), is a procedural system where the trial process is party-controlled. The judges or jurors decide which parties win based on the evidence and arguments they present. This system contrasts with the inquisitorial system, where the judges independently search for the true facts in the case.⁵ While the procedural systems in most countries have elements of both systems, we adopt a pure version of the adversarial system to highlight its main feature. Further, we assume that the probability of prevailing in litigation is determined solely by the relative efforts of the parties at the trial.

Following the previous studies noted above, we model the adversarial system as follows. During the trial, the plaintiff and defendant present their arguments and evidence. The efforts expended on this task by the plaintiff and defendant are $x \geq 0$ and $y \geq 0$, respectively.⁶ Based on their efforts, the jury or judge decides the winning side. As a result, the plaintiff's probability of winning

⁵ The procedural systems in common law countries tend to be adversarial, whereas those in civil law countries are typically inquisitorial.

⁶ For simplicity, we assume that the marginal costs of both parties' efforts are constant and equal to one.

the case is determined by both parties' efforts.⁷ The probability function is defined as follows.⁸

$$p(x, y) = \begin{cases} \frac{x}{x+y} & \text{if } x+y > 0 \\ \frac{1}{2} & \text{if } x=y=0. \end{cases} \quad (1)$$

The plaintiff wins the case and the defendant bears strict liability with the probability of $p(x, y)$.⁹ We can easily obtain the derivatives of $p(x, y)$; $p_x > 0$, $p_{xx} < 0$, $p_y < 0$, and $p_{yy} > 0$ as well as the cross derivative $p_{xy} = (x - y)/(x + y)^3$.

Moreover, it is assumed that the plaintiff incurs fixed cost $k \in [0, \bar{k}]$.¹⁰ We assume that cost k is positive since it includes a variety of costs during the trial. For instance, it includes the opportunity costs of time for the plaintiff to file a suit and the psychological costs or mental burden on the plaintiff. It is also

⁷ The amount of damages awarded could also be determined by both parties' efforts.

⁸ This is called Tullock's contest success function, which has several types of derivations. First, this function has a stochastic foundation. Assume that the plaintiff wins the case when her effort x at the trial exceeds that of the defendant y . Let q_1 and q_2 be noises, which mean that the judges or jurors misperceive the efforts expended by the plaintiff and defendant. The noises q_1 and q_2 are assumed to be independent draws from an exponential distribution $F(q) = 1 - e^{-aq}$ where $a (> 0)$ is the parameter of the distribution. As Hirshleifer and Riley (1992) and Konrad (2009) demonstrate, we can derive Tullock's contest success function used in eq. (1) from this setting as follows. In the first step, we consider the conditional probability of the plaintiff winning for a given $\hat{q}_2$ and (x, y) , which can be written as $\text{prob}(q_1 x > \hat{q}_2 y) = 1 - \text{prob}(q_1 \leq \hat{q}_2 y/x) = e^{-a(\hat{q}_2 y/x)}$. We then consider the unconditional probability, which can be written as $p(x, y) = \text{prob}(q_1 x > q_2 y) = \int_0^\infty e^{-a(q_2 y/x)} f(y) dy = x/(x + y)$. For the extension of these derivations to the n -party setting, see Jia (2008). Second, Skaperdas (1996) provides the axiomatic foundations of Tullock's contest success function. Third, Stergios and Vaidya (2012) demonstrate that this function can be derived by linking evidence production and Bayesian inference.

⁹ Note that the probability $1 - p(x, y)$ can be regarded as the probability of the court making a "type-II" error. We assume that the activity in which the defendant engages is subject to strict liability. It follows that the truly guilty defendant escapes liability with this probability. Following the terminology of previous studies such as Mungan (2015) and Lando and Mungan (2015), we call this court error a "type-II" error, while the court error that truly innocent defendants are found liable is called a "type-I" error (cf. Polinsky and Shavell (1989) and Hylton (1990) define type-I and type-II errors the other way around). The occurrence of such court errors is inevitable under the pure adversarial system, where the court's decision is solely based on the efforts of both parties. However, the court cannot make a type-I error in our model because we assume that no harm is incurred by the plaintiffs when the defendant chooses not to engage in the activity and the plaintiffs file suits only when they suffer harm.

¹⁰ The defendant may also incur a fixed cost, but for simplicity, we assume that this is zero. As stated in footnote 16, our main result does not change even if this cost is positive.

assumed that $\bar{k} > 0$ and that k varies across plaintiffs. Further, k is uniformly distributed.¹¹

The plaintiff decides her effort level x to maximize her expected trial payoffs:

$$\max_x [p(x, y)R - x - k]. \quad (2)$$

Since the first-order condition is $p_x R - 1 = 0$, the plaintiff's reaction function is

$$x = -y + \sqrt{Ry}. \quad (3)$$

Likewise, the defendant's optimization problem and reaction function are as follows:

$$\min_y [p(x, y)aR + y], \quad (4)$$

$$y = -x + \sqrt{aRx}. \quad (5)$$

Figure 2 shows these two reaction functions.

Figure 2: Reaction curves of the plaintiff and defendant.

The reaction curves depicted in Figure 2 have distinctive shapes. They have not only strategic substitute parts, which means that the curves slope downward, but also strategic complement parts, which means that the curves slope upward. The Nash equilibrium, which is the intersection of the two curves, is located in

¹¹ This assumption is only for analytical simplicity and is not essential for this study's results. We obtain similar results even when we assume other distributions such as normal or triangular.

the strategic substitute part of the plaintiff's reaction curve and the strategic complement part of the defendant's reaction curve.¹²

We can find the following Nash equilibrium (x^*, y^*) by solving simultaneous eqs (3) and (5):

$$(x^*, y^*) = \left(\frac{\alpha R}{(1 + \alpha)^2}, \frac{\alpha^2 R}{(1 + \alpha)^2} \right). \quad (6)$$

We examine the comparative statics of this equilibrium. The defendant increases his effort as the multiplier rises since

$$y_a^* = \frac{2\alpha R}{(1 + \alpha)^3} > 0. \quad (7)$$

By contrast, the plaintiff reduces her effort as the punitive damages multiplier increases, where $\alpha > 1$, since

$$x_a^* = -\frac{(\alpha - 1)R}{(1 + \alpha)^3} < 0. \quad (8)$$

Thus, we can derive the following lemma:

Lemma 1 *Under the decoupling liability and the adversarial system, as the punitive damages multiplier rises, the defendant increases his efforts to present evidence and arguments, whereas the plaintiff reduces her effort.*

The rise in the punitive damages multiplier forces the defendant to expend more effort since he wants to avoid a huge amount of damages. This indirectly affects the plaintiff's effort level. That is, the increase in the defendant's effort level discourages the plaintiff from competing.

This holds because the cross derivative is negative ($p_{xy} = (x^* - y^*) / (x^* + y^*)^3 < 0$).¹³ It is negative because the defendant always expends more effort than the plaintiff in the equilibrium ($y^* > x^*$). Since the defendant's economic stake is greater than that of the plaintiff, y^* is greater than x^* .

¹² In Figure 2, the reaction curves appear to intersect on the coordinate origin. However, this is not a Nash equilibrium. Both parties have an incentive to deviate from this point unilaterally. If the plaintiff increases her effort slightly and the defendant's effort level remains zero, the probability of her winning jumps from 1/2 to 1. The same logic holds true for the defendant.

¹³ In previous studies such as Kahan and Tuckman (1995) and Choi and Sanchirico (2004), this cross effect does not exist, since $p_{xy} = 0$ is assumed.

We obtain the plaintiff's probability of winning the case in the equilibrium as follows:

$$p(x^*, y^*) = \frac{1}{1 + \alpha}. \quad (9)$$

We check the comparative statics of this equilibrium:

$$p_\alpha(x^*, y^*) = -\frac{1}{(1 + \alpha)^2} < 0. \quad (10)$$

Lemma 2 *Under the decoupling liability and the adversarial system, as the punitive damages multiplier rises, the plaintiff's probability of winning the case decreases.*

This lemma is the consequence of the adversarial system. As we show in Lemma 1, when the punitive damages multiplier rises, the defendant increases his efforts at the trial and this discourages the plaintiff from competing under the adversarial system. Thus, the plaintiff's probability of winning the case decreases.

2.2 Period 2: plaintiff's decision to sue

In period 2, the plaintiff anticipates the trial result (in period 3) and calculates her expected payoff of filing a suit. Based on these factors, she decides whether to sue. In our model, since her expected payoff of suing is $p(x^*, y^*)R - x^* - k$ and her payoff of not suing is zero, the plaintiff sues only when

$$T \equiv \left(\frac{1}{1 + \alpha} \right) R - \frac{\alpha R}{(1 + \alpha)^2} \geq k. \quad (11)$$

In condition (11), T is defined as the plaintiff's expected payoff of suing other than the fixed cost of the trial. Since k is assumed to be uniformly distributed from 0 to $\bar{k}$ and $T = R/(1 + \alpha)^2$ is greater than 0, the condition (11) can be depicted as shown in Figure 3.

Figure 3: Distribution of the cost of filing a suit.

As shown in Figure 3, if $T \leq \bar{k}$, then the plaintiffs of $k \in [0, T]$ file a suit, whereas those of $k \in (T, \bar{k}]$ do not. If $T > \bar{k}$, all the plaintiffs file suits. From now on, we focus on the situation when $T \leq \bar{k}$, because in the real world it is natural that at least some people would choose not to file a suit.

We analyze the relationship between T and α :

$$T_\alpha = -\frac{2R}{(1+\alpha)^3} < 0. \quad (12)$$

It follows that the number of plaintiffs who file suits decreases as the punitive multiplier rises.

2.3 Period 1: defendant's activity

In period 1, the defendant chooses whether to engage in a certain activity. This activity has a negative externality, which means it brings him a benefit β (> 0) but inflicts harm R on the plaintiffs.

By anticipating the results of periods 2 and 3, the defendant calculates the equilibrium expected cost of this activity, denoted by W . Since the rate of plaintiffs' suing is $T/\bar{k}$ when $T \leq \bar{k}$, the defendant calculates W as follows:

$$W \equiv \left(\frac{T}{\bar{k}}\right) \left(\left(\frac{1}{1+\alpha}\right) \alpha R + \frac{\alpha^2 R}{(1+\alpha)^2} \right). \quad (13)$$

The derivative of W with respect to α is as follows:

$$W_\alpha = -\frac{R^2(4\alpha^2 - \alpha - 1)}{\bar{k}(1+\alpha)^5}. \quad (14)$$

The sign of W_α is negative since $4\alpha^2 - \alpha - 1 > 0$ when $\alpha \geq 1$. This means that the expected cost W of the activity decreases as the punitive damages multiplier rises.¹⁴

As W continues to decrease, it is more likely that W becomes smaller than the benefit β from the activity. By contrast, when expected cost W is greater than

14 As mentioned earlier, we consider the situation when $T \leq \bar{k}$ in this subsection. Suppose $T > \bar{k}$, all the plaintiffs file suits and the defendant's equilibrium expected cost W becomes $\alpha(1+2\alpha)R/(1+\alpha)^2$. Since $W_\alpha = (1+3\alpha)R/(1+\alpha)^3$, the sign of W_α is positive. It follows that W increases as the punitive damages multiplier α rises, as opposed to the case when $T \leq \bar{k}$. However, note that T decreases as α increases, as we demonstrate in eq. (12). As a result, if α exceeds some threshold, the magnitude relation between T and $\bar{k}$ is reversed, and then the case becomes the one when $T \leq \bar{k}$.

benefit β , the defendant does not engage in the activity.¹⁵ Thus, we can state the following proposition.

Proposition 1 *Under the decoupling liability and the adversarial system, the defendant is more likely to engage in an activity that has negative externalities as the punitive damages multiplier rises.*

Although the deterrence effect is conventionally expected to increase to match the rise in the punitive damages multiplier, Proposition 1 reveals that the opposite is true under the decoupling liability and the adversarial system.¹⁶ As we show in Lemma 2, the adversarial system decreases the plaintiff's probability of winning the case as the punitive damages multiplier rises. This reduces the plaintiff's incentive to sue and increases the defendant's incentive to engage in a harmful activity.¹⁷

This proposition may have practical significance because some commentators point out that courts would impose higher damages on defendants if the state were to introduce the decoupling system.¹⁸ In other words, the courts are

15 Strictly speaking, we should assume $\beta \leq 3R^2/16$. This is because the maximum value of $W(\alpha)$ is $W(1) = 3R^2/16$. The defendant always engages in a harmful activity regardless of the value of α when his benefit β from the activity always exceeds his expected cost W of the activity.

16 As mentioned in footnote 10, we assumed that the defendant's fixed cost at the trial, which we call k_d , is zero. However, Proposition 1 holds true even when k_d is positive because the sign of W_α is negative. We can demonstrate this as follows. In this case, the equilibrium expected cost of this activity W is $(T/\bar{k})[(\alpha R)/(1+\alpha) + (\alpha^2 R)/(1+\alpha)^2 + k_d]$. The derivative of W with respect to α is $W_\alpha = -[R^2(4\alpha^2 - \alpha - 1) + 2Rk_d(1+\alpha)^2]/[\bar{k}(1+\alpha)^5]$. As with eq. (14), the sign of W_α in this case is negative because $4\alpha^2 - \alpha - 1 > 0$ when $\alpha \geq 1$. Thus, we can state that the defendant is more likely to engage in the activity as the punitive damages multiplier rises.

17 The incorporation of a certain type of noise into the model highlights the importance of the adversarial system to this result. We redefine the probability of the plaintiff winning the case shown in eq. (1) as $p(x, y) = (x + b)/(x + y + 2b)$, where $b > 0$. Amegashie (2006) explains that “ b ” in this function is a measure of the degree of noise, which captures how sensitive the probability of victory is to the players' efforts. In our setting, this can be interpreted as the extent to which the court system is adversarial. In other words, as b becomes large, the court finds it hard to respond to the efforts made by the parties. By using this new function, the defendant's equilibrium expected cost W becomes $(1/\bar{k})[R/(1+\alpha) - \alpha R/(1+\alpha)^2 + b]/[\alpha R/(1+\alpha) + \alpha^2 R/(1+\alpha)^2 - b]$ and $W_\alpha = R[3b(1+\alpha)^3 - (4\alpha^2 - \alpha - 1)R]/[\bar{k}(1+\alpha)^5]$. W_α becomes positive when b exceeds some threshold, while W_α becomes negative when b is small. This means that Proposition 1 holds when the court system is sufficiently adversarial.

18 For the reasons why courts impose higher damages, see Robbenolt (2002). First, if the punitive damages are awarded to the state, the jurors and judges might find some personal interests to award a higher amount. For example, they might believe that if the state receives

likely to raise the punitive damages multiplier in such cases, resulting in an (admittedly unintended) reduction in the deterrence effect, as we show in Proposition 1.

2.4 Period 0: comparison with other liability systems

Finally, we compare the decoupling liability system with the coupling system that allows the plaintiff to receive both compensatory and punitive damages. The latter is a normal system in most common law countries that have punitive damages but do not have split-recovery statutes. Since the derivation process is the same, we describe it only briefly.

Under the coupling system, in period 3, the plaintiff maximizes $p(x, y)aR - x - k$ and the defendant minimizes $p(x, y)aR + y$. By solving these optimization problems, we can derive a Nash equilibrium $(x^c, y^c) = (aR/4, aR/4)$. Based on the equilibrium, the plaintiff's probability of winning the case $p(x^c, y^c)$ is calculated as $1/2$. Thus, her expected gain from the trial is $p(x^c, y^c)aR - x^c - k = aR/4 - k$ and the defendant's expected cost for the trial is $p(x^c, y^c)aR + y^c = 3aR/4$.

In period 2, let T^c be the plaintiff's expected payoff of suing other than the fixed cost of the trial. T^c is calculated to be $p(x^c, y^c)aR - x^c = aR/4$. By comparing T^c with T in inequality (11), we can identify the system under which the plaintiff files a suit more easily. Since $\alpha \geq 1$, we can obtain $T^c \geq T$. Therefore, it is easier for the plaintiff to sue under the coupling system than under the decoupling liability system.

Under the coupling system, in period 1, we define W^c as the defendant's equilibrium expected cost to engage in the activity that has negative externalities. W^c is calculated to be $(T^c/\bar{k})(3aR/4)$. By taking the derivative of W^c with respect to α , we obtain $W_\alpha^c = 3aR^2/(8\bar{k}) > 0$. This result sharply contrasts with the one shown in Proposition 1. That is, the defendant's expected cost of engaging in a harmful activity increases as the punitive multiplier rises under the coupling system, whereas it decreases under the decoupling liability system.

By comparing W^c with W in expression (13), we can identify the liability system under which the defendant engages in a harmful activity more easily.

more money, it could improve projects in which it has an interest (Grube, 1993). Second, if punitive damages are awarded to the state, courts do not have to worry that the plaintiffs might receive a windfall. As a result, they would punish the defendant fully without hesitation (Developments in the Law, 1997). Finally, related to the second point, if the jurors and judges believe that the state would use the punitive damages for socially good purposes, they might be more willing to award higher amounts (Developments in the Law, 1997).

Since $\alpha \geq 1$, we have $W^c \geq W$. Based on this inequality and $W_\alpha^c > 0$, we can say that it is easier for the defendant to engage in a harmful activity under the decoupling liability system than under the coupling system. It follows that the deterrence effect of the decoupling liability is weaker than that of the coupling liability.

We can summarize these results as the following proposition.

Proposition 2 *Under the adversarial system, the defendant engages in an activity that has negative externalities more easily under the decoupling liability system than under the coupling liability system.*

In addition, the deterrence effect of the decoupling liability system is even weaker than that of the compensatory damages system adopted by civil law countries, where the defendant pays and the plaintiff receives only compensatory damages. This fact can be easily elicited since $\alpha = 1$ in our model of the decoupling system corresponds to the compensatory damages system and the deterrence becomes weaker as α increases, as shown in Proposition 1.

Proposition 3 *Under the adversarial system, the defendant engages in an activity that has negative externalities more easily under the decoupling liability system than under the system where only compensatory damages are imposed on the defendant.*

This proposition may be important for countries that have adversarial systems and impose only compensatory damages on defendants.¹⁹ By attempting to improve the deterrent effect without granting plaintiffs a windfall, such countries are likely to introduce a decoupling system. However, Proposition 3 notes that the introduction of a decoupling system may not improve the deterrent effect.

3 Conclusion

Several people have criticized punitive damages as simply providing windfalls to plaintiffs. As an alternative, decoupling, which deprives plaintiffs of punitive

¹⁹ An example here is Japan. Although Japan is categorized as a civil law country, it modified its Codes of Civil Procedure after World War II to create an adversarial system. Japan's current system is considered to be midway between the German model (active judge and non-adversarial parties) and US model (passive judge and adversarial parties). See Tanabe (1963) and Taniguchi (2008) for more details.

awards and rather places such damages in state-administered funds, is commonly considered to effectively disgorge plaintiffs of any potential windfall without diminishing the deterrent effect of punitive damages. However, in this study we demonstrate that decoupling makes it easier for the defendant to carry out harmful activities under the adversarial system. Moreover, even if the amount of punitive damages is raised in an attempt to set off the reduction in the deterrence effect on the defendant, we find that it has the opposite result to what was intended and leads to more reduction. Therefore, the elimination of windfalls and improvement in the deterrence effect are incompatible under the adversarial system. In addition, deterrence under the decoupling system is even weaker than that under the system where only compensatory damages are imposed on the defendant.

Since decoupling has not thus far been sufficiently addressed in other studies from this perspective, the results of this study have significant implications for legal authorities. However, several important issues have not been considered in this study. First, we analyzed only the extreme version of decoupling in this study, namely the complete confiscation of windfalls. By contrast, real-world statutes allocate only a proportion of the awarded punitive damages to the state. Second, the occurrence of frivolous litigations is excluded from our model.²⁰ Windfalls to plaintiffs are considered to give them incentives to pursue frivolous litigations and one of the advantages of decoupling is to reduce such incentives.²¹ In addition, our model does not include settlements, an important part of legal disputes.²² Extending the model to deal with these issues and testing it empirically would be important future research steps.

20 If we include frivolous litigations in the model, innocent defendants can be found to be liable. In other words, the court may make a type-I error, according to the definition in footnote 9. This possibility could reduce the defendant's expected gain from not engaging in the activity, which might thus discourage him from choosing not to engage and weaken the deterrence. Png (1986) and Mungan (2015) state that the type-I error could generally have such effects. Moreover, Lando (2006) and Lando and Mungan (2015) consider these effects further and distinguish between mistake of act and mistake of identity. As for the decoupling liability system, our assumption of the complete confiscation of windfalls might become important when we consider the effects of the type-I error on the deterrence. That is to say, plaintiffs would be more likely to file frivolous lawsuits when windfalls are only partially confiscated because their incentives to file such lawsuits are related to the total amount of damages they may receive.

21 See, for instance, Dodson (2000). In his dissent in *Smith v. Wade*, Chief Justice Rehnquist suggested that awarding punitive damages would cause a "torrent of frivolous claims."

22 For studies that address this issue, see Kahan and Tuckman (1995), Daughety and Reinganum (2003), and Landeo et al. (2007). These studies do not adopt the adversarial system modeled in this study.

Acknowledgement: We appreciate helpful comments and suggestions provided by the anonymous reviewer, Moriki Hosoe, Shozo Ota, Hideki Sato, Yoshinobu Zasu, Akira Miyaoka and participants at 2011 Spring Meeting of Japan Association for Applied Economics (June 2011), 2011 Institution and Economics International Conference (August 2011), 2012 International Conference on Law and Society (June 2012), Japan Law and Economics Association's Annual Meeting (July 2012), Annual Conference of Asian Law and Economics Association (July 2012), and Kumamoto University Workshop on Legal Studies (April 2013).

Funding: Japan Society for the Promotion of Science (Grant/Award Number: "No.15K03086").

References

- Alaska Statutes. 2011. §09.17.020(j).
- Amegashie, J.A. 2006. "A Contest Success Function with a Tractable Noise Parameter," 126 *Public Choice* 135–144.
- Choi, A., and C.W. Sanchirico. 2004. "Should Plaintiffs Win What Defendants Lose? Litigation Stakes, Litigation Effort, and the Benefits of Decoupling," 33 *Journal of Legal Studies* 323–354.
- Cooter, R.D. 1989. "Punitive Damages for Deterrence: When and How Much?," 40 *Alabama Law Review* 1143–1196.
- Daughety, A., and J. Reinganum. 2003. "Found Money? Split-Award Statutes and Settlement of Punitive Damages Cases," 5 *American Law and Economics Review* 134–164.
- Developments in the Law. 1997. "Jury Determination of Punitive Damages," 110 *Harvard Law Review* 1408–1536.
- Dodson, S. 2000. "Assessing the Practicality and Constitutionality of Alaska's Split-Recovery Punitive Damages Statute," 49 *Duke Law Journal* 1335–1369.
- Froeb, L.M., and B.H. Kobayashi. 2012. "Adversarial Versus Inquisitorial Justice," in C.W. Sanchirico, ed. *Procedural Law and Economics*. Cheltenham: Edward Elgar, 1–18.
- Georgia Code 2010. §51-12-5.1(e)(2).
- Grube, E.J. 1993. "Punitive Damages: A Misplaced Remedy," 66 *Southern California Law Review* 839–880.
- Hirshleifer, J., and J.G. Riley. 1992. *The Analytics of Uncertainty and Information*. New York: Cambridge University Press.
- Hylton, K.N. 1990. "Costly Litigation and Legal Error Under Negligence," 6 *Journal of Law, Economics and Organization* 433–452.
- Jia, H. 2008. "A Stochastic Derivation of the Ratio Form of Contest Success Functions," 135 *Public Choice* 125–130.
- Kahan, M., and B. Tuckman. 1995. "Special Levies on Punitive Damages: Decoupling, Agency Problems and Litigation Expenditures," 15 *International Review of Law and Economics* 175–185.

- Konrad, K.A. 2009. *Strategy and Dynamics in Contests*. Oxford: Oxford University Press.
- Landeo, C.M., M. Nikitin, and S. Baker. 2007. "Deterrence, Lawsuits, and Litigation Outcomes Under Court Errors," 23 *Journal of Law, Economics, and Organization* 57–97.
- Lando, H. 2006. "Does Wrongful Conviction Lower Deterrence?," 35 *Journal of Legal Studies* 327–337.
- Lando, H., and M.C. Mungan. 2015. "The Effect of Type-1 Error on Deterrence," FSU College of Law, Public Law Research Paper No. 687, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2441733.
- Mungan, M.C. 2015. "Wrongful Convictions and the Punishment of Attempts," 42 *International Review of Law and Economics* 79–87.
- Parisi, F. 2002. "Rent-Seeking Through Litigation: Adversarial and Inquisitorial Systems Compared," 22 *International Review of Law and Economics* 193–216.
- Png, I.P.L. 1986. "Optimal Subsidies and Damages in the Presence of Legal Error," 6 *International Review of Law and Economics* 101–105.
- Polinsky, A.M., and Y.-K. Che. 1991. "Decoupling Liability: Optimal Incentives for Care and Litigation," 22 *RAND Journal of Economics* 562–570.
- Polinsky, A.M., and S. Shavell. 1989. "Legal Error, Litigation, and the Incentive to Obey the Law," 5 *Journal of Law, Economics, and Organization* 99–108.
- Polinsky, A.M., and S. Shavell. 1998. "Punitive Damages: An Economic Analysis," 111 *Harvard Law Review* 869–962.
- Robbennolt, J.K. 2002. "Determining Punitive Damages: Empirical Insights and Implications for Reform," 50 *Buffalo Law Review* 103–203.
- Rosenbloom v. Metromedia, Inc.* 1971. 403 U.S. 29.
- Shavell, S. 1980. "Strict Liability Versus Negligence," 9 *Journal of Legal Studies* 1–25.
- Shores, J.L. 1992. "A Suggestion for Limited Tort Reform: Allocation of Punitive Damage Awards to Eliminate Windfalls," 44 *Alabama Law Review* 61–142.
- Skaperdas, S. 1996. "Contest Success Functions," 7 *Economic Theory* 283–290.
- Sloane, L.A. 1993. "The Split Award Statute: A Move Toward Effectuating the True Purpose of Punitive Damages," 28 *Valparaiso University Law Review* 473–512.
- Smith v. Wade*. 1983. 461 U.S. 30.
- Stergios, S., and S. Vaidya. 2012. "Persuasion as a Contest," 51 *Economic Theory* 465–486.
- Tanabe, K. 1963. "The Processes of Litigation: An Experiment with the Adversary System," in A.T. von Mehren, ed. *Law in Japan: The Legal Order in a Changing Society*. Cambridge, MA: Harvard University Press, 73–110.
- Taniguchi, Y. 2008. "The Development of an Adversary System in Japanese Civil Procedure," in D.H. Foote, ed. *Law in Japan: A Turning Point*. Seattle, WA: University of Washington Press, 80–98.
- Tullock, G. 1975. "On the Efficient Organization of Trials," 28 *Kyklos* 745–762.
- Tullock, G. 1980. *Trials on Trial*. New York: Columbia University Press.