Can the decoupling punitive damages deter injurer and aid victims ?

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May 20, 2012

Abstract

This article analyzes the effect of punitive damages rate and allocation on the deterrence of injurer's harmful activity and the incentives of victim. This article also considers a three-stage game between the plaintiff and defendant, and provides a comparative-static analysis of the effect of punitive damages and its allocation on players. In this article, we present that the system of decoupling punitive damages could not deter injurers from harmful activities and not aid the victims

1 Introduction

It is said that punitive damages, on the one hand, could give sanctions the malicious injurer and aid the victim. On the other hand, however, the punitive damages might compel the sound manufacturers to bear the fear of it and discourage them. Are these stereotyped ideas true at all? We try to show results different from stereotyped ones. That is, the decoupling punitive damages could weaken the victim the manufacturer could make defence and fight instead of chilling effects under the some conditions. Almost all the previous literatures do not refer to our indications.

Many legal scholars against the punitive damages point out that it is unreasonable as the public policy violation for the victim to accept more

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than the real damages. There are some opinions that some portion of the punitive damages should go to funds or notional treasury.

Our study presents the effects on the victim and injurer of the allocation of the punitive damages. Especially, following public policy, in our paper, it is obtained that the larger punitive damages rate, the injurer makes defense more and more, then the victim becomes to hesitate a suit, and finally the injurer continues to manufacture a product.

Precisely, we use the game theoretical method in our paper. The simple model is as follows. There are parties, the victim (plaintiff), and the injurer (defendant; manufacturer). Each party is risk neutral. The manufacturer produces a product, then obtaining the production payoff. At the same time, the production gives a harm to the victim.

The time line of the game is as follows. In 0-stage there exists a rule of the punitive damages allocating rule. In first stage, the manufacturer (defendant) produces a product or not. In second stage, the victim (plaintiff) files a suit or not. In third stage, the plaintiff and the defendant dispute in civil court (trial stage). Main results are as follows. In the system of decoupling punitive damages under small share of the punitive damages for the victim (plaintiff), raising the punitive damages rate compels the manufacturer (defendant) to make defence much more and the plaintiff's effort lesser in civil court, and then prevailing for the plaintiff goes down. Therefore, the portion of filing a suit by the victim becomes smaller. Anticipating this situation, the manufacturer could continue to manufacture a product. The punitive damages might not aid the victim and deter the injurer if smaller share for the plaintiff and highly punitive rate for defendant.

This article studies the effects of punitive damages. Different from the previous literatures (Choi and Sanchirico (2004) etc.), this article introduces

the probability of plaintiff victory as interdependent form, and specify that the punitive damages have not necessarily deterrence of defendant's torts.

2 The Model

The players are the victim (the plaintiff) and the injurer (the defendant, e.g. manufacturer) in this model. Both are risk neutral.The manufacturer engages a production and gain production payoff $\beta \geq 0$, doing actual harm $R > 0$ to the victim.

The time line of this game is as follows. In the zero period, there exist the allocation rule of punitive damages. In the first period, the producer produce a product or not. Then he does, there is the harm to the victim. In the second period the plaintiff (victim) bring a suit or not. In the third period, the plaintiff and the defendant are battle in civil court. The game is solved by way of the backward induction from the third period.

3 In the Third Stage

The plaintiff and the defendant dispute in civil court on the basis of each effort. The effort level for the plaintiff in civil court is $x \geq 0$, and $y \geq 0$ for the defendant. The cost of the effort level in civil litigation is $s(y) = y$ for the defendant, $c(x) = k + x$ for the plaintiff. The term k is fixed cost, where $k \in (0, \bar{k}]$. The population of k stands for various plaintiff. We assume the uniform distribution of k from 0 to the upper bound $\bar{k}$. Then the probability of the plaintiff victory is as follows,

$$p(x, y) = \begin{cases} \dfrac{\theta x}{\theta x + y} & for\ x > 0,\ y > 0 \\ \\ \dfrac{\theta}{\theta + 1} & for\ x = 0,\ y = 0 \end{cases} \tag{1}$$

This formation means that the probability of plaintiff victory depends on each effort level. The parameter θ stands for strength weighted for plaintiff's effort relative to defendant's effort. We assume $\theta \in (0, \infty)$. If $\theta \in (1, \infty)$, it means advantageous for plaintiff, and if $\theta \in (0, 1)$, disadvantageous for plaintiff.

If the plaintiff win, the defendant is imposed the punitive damages αR ($\alpha > 1$; α is punitive rate), and the plaintiff receives the award $R + \delta(\alpha - 1)R$. The parameter δ is the share of the punitive damages for the plaintiff. The remains of them, $(1 - \delta)(\alpha - 1)R$, goes to the funds or the national treasury. The plaintiff determines its own effort level x, maximizing the expected damages and the share of punitive damages minus its own effort cost (referred to the expected payoff, here after), that is, $p(x, y)(R + \delta(\alpha - 1)R) - c(x)$. The defendant also determines its own effort level y, minimizing the expected compensatory and punitive damages plus its own effort cost (referred to the expected cost, here after), that is $p(x, y)\alpha R + s(y)$.

We can form the plaintiff's maximizing problem at the following form.

$$\max_x \left[\left(\frac{\theta x}{\theta x + y} \right) (R + \delta(\alpha - 1)R) - x - k \right]. \tag{2}$$

Then, we solve this problem, and the plaintiff's reaction function can be obtained as follows.

$$x^* = \frac{-y + \sqrt{(1 + \delta(\alpha - 1))Ry\theta}}{\theta}. \tag{3}$$

Next, we can form the defendant's minimizing problem at the following form.

$$\min_y \left[\left(\frac{\theta x}{\theta x + y} \right) \alpha R + y \right] \tag{4}$$

Similarly, we can obtain the defendant's reaction function as follows.

$$y^* = -x\theta + \sqrt{\alpha R x \theta}. \tag{5}$$

It turns out that each player's reaction functions consists of the strategic substitute and complement part. Then, we can obtain each effort level of Nash equilibrium in third stage as follows.

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

3.1 Comparative Statics

We look at the relationship of plaintiff's effort x^* and share δ.

$$\frac{\partial x^*}{\partial \delta} = \frac{2(\alpha-1)(1+\delta(\alpha-1))\alpha^2 R\theta}{(\alpha + (1+\alpha+\delta(\alpha-1))\theta)^3} > 0 \quad (7)$$

The relationship of plaintiff's effort x^* and punitive damage rate α is as follows.

$$\frac{\partial x^*}{\partial \alpha} = \frac{R\theta(1+\delta(\alpha-1))((1-\delta)^2\theta + \alpha^2\delta(1+\delta\theta) + \alpha(1-\delta)(2\delta\theta-1))}{(\alpha + (1+\alpha+\delta(\alpha-1))\theta)^3} \quad (8)$$

The sign of this equation is ambiguous but it can be determined by the combination of δ, α, and θ.

Lemma 1

The greater share δ of plaintiff is, the larger effort plaintiff makes. And in the region of the smaller share δ, the greater rate α of punitive damages becomes, the lesser effort plaintiff makes.

In turn, we look at the relationship of plaintiff's effort y^* and share δ.

$$\frac{\partial y^*}{\partial \delta} = \frac{\alpha^2 R\theta(\alpha-1)(\alpha(1-\delta\theta) - \theta(1-\delta))}{(\alpha + (1+\delta(\alpha-1))\theta)^3} \quad (9)$$

The sign of this equation is ambiguous but it can be determined by the combination of δ, α, and θ.

The relationship of the plaintiff's effort x^* and punitive damage rate α is at the following form.

$$\frac{\partial y^*}{\partial \alpha} = \frac{\alpha R\theta(2(1-\delta)^2\theta + 3\alpha(1-\delta)\delta\theta + \alpha^2\delta(1+\delta\theta))}{(\alpha + (1+\delta(\alpha-1))\theta)^3} > 0 \tag{10}$$

Lemma 2

The bigger share δ of plaintiff, and the more effort the plaintiff makes, then defendant also makes more effort (does more defence). This effect is indirect one. The greater punitive rate α the more stakes the plaintiff seek, but the defendant makes effort (defence) more than the plaintiff makes.

3.2 Probability of Plaintiff Victory in the Equilibrium

We can show the probability of plaintiff victory in Nash-equilibrium in the following.

$$p(x^*, y^*) = \frac{(1+\delta(\alpha-1))\theta}{\alpha + (1+\delta(\alpha-1))\theta} \tag{11}$$

Then, Some properties can be obtained as follows.

$$\frac{\partial p(x^*, y^*)}{\partial \alpha} = \frac{-(1-\delta)\theta}{(\alpha + (1+\delta(\alpha-1))\theta)^2} \leq 0 \tag{12}$$

As punitive damages ratio goes up, the plaintiff make effort and defendant also does effort for defence. Then as the share of δ determines the plaintiff's position, the prevailing of the plaintiff goes down or a constant if punitive damages increases.

$$\frac{\partial p(x^*, y^*)}{\partial \delta} = \frac{\alpha(\alpha-1)\theta}{(\alpha + (1+\delta(\alpha-1))\theta)^2} > 0 \tag{13}$$

As the punitive damages rate is increased, the plaintiff's prevailing goes up because of the plaintiff's own share increasing.

4 In the Second Stage

The plaintiff has the incentives to sue as follows on anticipating of the third stage.

$$\left(\frac{(1+\delta(\alpha-1))\theta}{\alpha+(1+\delta(\alpha-1))\theta}\right)(1+\delta(\alpha-1)R)-\frac{(1+\delta(\alpha-1))^2\alpha R\theta}{(\alpha+(1+\delta(\alpha-1))\theta)^2}-k\geq 0 \quad (14)$$

We let T denote the difference of the first and the second term of of left side of this inequality. We refer T to the gross payoff for the plaintiff. Then we have the followings.

$$T\equiv\frac{(1+\delta(\alpha-1))^3R\theta^2}{(\alpha+(1+\delta(\alpha-1))\theta)^2}\geq k. \quad (15)$$

As the population of the plaintiff is in $k\in(0,\bar{k}]$, (i) whenever $\bar{k}\leq T$, all plaintiff sue. (ii) In $T\geq\bar{k}$, the plaintiff of $k\in(0,T]$ sue, whereas, them of $k\in(T,\bar{k}]$ leave to sue. (iii) In $T\leq 0$, then all the plaintiff does not sue.

Therefore, we look at the comparative analysis. The relationship of α, δ, and T is as follows.

$$\frac{\partial T}{\partial\delta}=\frac{R(\alpha-1)(1+\delta(\alpha-1))^2\theta^2((1-\delta)\theta+\alpha(\delta\theta+3))}{(\alpha+(1+\delta(\alpha-1))\theta)^3}\geq 0 \quad (16)$$

It is natural that the share of plaintiff goes up, the gross payoff in suit increase.

$$\frac{\partial T}{\partial\alpha}=\frac{R(1+\delta(\alpha-1))^2\theta^2((\alpha-1)\theta\delta^2+(\alpha+\theta+2)\delta-2)}{(\alpha+(1+\delta(\alpha-1))\theta)^3}$$

$$\frac{\partial T}{\partial\alpha}\gtreqless 0, \quad \text{if } \alpha\gtreqless\frac{\theta\delta^2-(\theta+2)\delta+2}{\delta(1+\delta\theta)} \quad (17)$$

Lemma 3
On the one hand, if punitive rate α is very small, and plaintiff's share δ is very small, that is $\alpha<\frac{\theta\delta^2-(\theta+2)\delta+2}{\delta(1+\delta\theta)}$, raising punitive rate δ makes plaintiff7s incentives to file a suit weaker. On the other hand, if $\alpha>\frac{\theta\delta^2-(\theta+2)\delta+2}{\delta(1+\delta\theta)}$, the greater punitive rate δ becomes, plaintiff's incentives to sue larger.

5 In the First Stage

Manufacturer activity gives production payoff β to a manufacturer, whereas harm R is accompanied by it.

Anticipating second stage, the expected cost for defendant when fraction of plaintiff filing a suit as follows.

$$\frac{T}{\bar{k}}\left[\left(\frac{(1+\delta(\alpha-1))\delta}{\alpha+(1+\delta(\alpha-1))\theta}\right)\alpha R+\frac{(1+\delta(\alpha-1))\alpha^2 R\theta}{(\alpha+(1+\alpha+\delta(\alpha-1))\theta)^2}\right] \tag{18}$$

By assumption of uniform distribution of k for the plaintiff's fixed cost, the condition of a manufacturer (defendant) producing a product as follows.

$$\beta \geq \frac{(1+\delta(\alpha-1))^4\alpha R^2\theta^3((1-\delta)\theta+\alpha(2+\delta\theta))}{\bar{k}(\alpha+(1+\delta(\alpha-1))\theta)^4} \equiv H \tag{19}$$

where, H is expected litigation cost for defendant with a product.

We look at the comparative statics of the relationship of H and α

$$\begin{aligned}\frac{\partial H}{\partial \alpha} = \frac{R^2\theta^3(1+\delta(\alpha-1))^3}{\bar{k}(\alpha+(1+\delta(\alpha-1))\theta)^5}&[(1-\delta)^3\theta^2+\alpha\theta(1-\delta)^2(1+4\delta\theta)\\ &+2\alpha^3\delta(2+3\delta\theta+\delta^2\theta^2)+\alpha^2(1-\delta)(5\theta^2\delta^2+7\theta\delta-4)]\end{aligned} \tag{20}$$

We denote A the second term of the right hand side of the equation above, and present the sign.

$$\frac{\partial H}{\partial \alpha} \lesseqgtr 0, \qquad \left(\text{if } A \lesseqgtr 0\right). \tag{21}$$

We can obtain the following the proposition from the above.

> Proposition
> If the plaintiff's share δ of punitive damages is very small and punitive damages rate α is very small, expected litigation cost for defendant goes down as punitive rate α increase. Then, defendant continues to produce a product with respect to expected payoff β. If the plaintiff's share δ is not small, the reverse situation will be obtained.

6 Conclusion

Under small share δ for the plaintiff of the punitive damages, decoupling punitive damages system compels defendant (manufacturer) to make a defense, in addition, the plaintiff will be effort lesser in civil litigation, then prevailing for plaintiff goes down. Then, portion of filing a suit by victims become smaller. Anticipating these second and third stage, manufacturer (defendant) may continue to produce a product. the system of decoupling punitive damages could not aid victims and not deter injurer from harmful activity if smaller share of punitive damages for the plaintiff .

7 Main References

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