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Law Enforcement with Compensation Statutes for Legal Error

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Abstract

This paper provides an inclusive framework for how law enforcers uncover legal errors for wrongful charges under their intrinsic motivation associated with reducing crimes and the extrinsic motivation associated with liability statutes, whereby law enforcers are responsible for compensating victims for legal errors. First, this paper demonstrates that compensation rules encourage or discourage law enforcers from investigating possible errors based on the fact that how they have crime-reducing motivations. Finally, this paper argues that compensation rules are determined in democratic processes to represent the interest of the majority of citizens, and shows that political competition distorts the use of enforcement liability rules. This implies that it can be difficult to fully internalize the interests of members of society with the use of compensation rules.

JEL: K42.

Keywords: Law Enforcement; Legal Error; Intrinsic Motivation; Extrinsic Motivation; Compensation; Wrongful Conviction

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1 Introduction

The criminal justice system has some flaws; there are legal errors, such as wrongful arrests and the convictions of innocent people. In the US, more than 2,800 men and women have been wrongfully convicted since 1989 according to the National Registry of Exonerations.[1] Innocent citizens may become suspects because they live in areas where many crimes occur, they belong to minority or immigrant groups, and they may have criminal histories, among other factors. Further, legal errors are caused by misconduct on the part of law enforcement in legal processes, e.g., witness tampering, misconduct in interrogations, fabricating evidence, and concealing exculpatory evidence (Gross et al. 2020).

For those who are wrongfully arrested and later set free, many jurisdictions have institutionalized compensation rules. For example, in the US, the federal government, the District of Columbia, and 37 states have compensation statutes of some form. [2] These rules stipulate that states are responsible for compensating those who are injured as a result of a state's legal system.

In this paper, we discuss relations between legal errors, such as wrongfully charging innocent citizens, compensation for victims of legal errors, and the deterrence of crimes. For this purpose, we consider interactions among several agents in the modern law enforcement process, e.g., citizens and members of law enforcement such as police officers and prosecutors, who are in charge of ensuring the accuracy of the law by reducing and uncovering legal errors. First, in the case of uncovering legal errors, law enforcers have to pay compensation to victims of legal errors. Second, in addition to the above liability rules, as an extrinsic motivation, law enforcers also respond to intrinsic motivation, such as by minimizing the rate of crimes.[3]

Additionally, we took a political economics approach and considered principal-agent relations between law enforcement executives and citizens who can become victims of legal errors. Citizens delegate the task of uncovering legal errors to law enforcement executives by setting compensation

[1] Please see https://www.law.umich.edu/special/exoneration/Pages/about.aspx.

[2] Please see the Innocence Project, Compensating the Wrongly Convicted (http://www.innocenceproject.org/compensating-wrongly-convicted/). Norris (2012) compiled an overview of state exoneree compensation statutes and indicated that these rules differ from state to state.

[3] This involves pro-social and punitive preferences regarding engaging in public services or punishing wrongdoers (Prendergast 2007, Besley and Ghatak 2005, 2008, 2018, Dharmapala et al. 2016, Friebel et al 2019, Dickinson et al. 2015), professionalism (White 1959), and personal preferences regarding characteristics such as gender or race (Donohue and Levitt 2001, Dedman and Latour 2003, Makowsky and Stratmann 2009, Makowsky et al. 2019).

rules, in addition to choosing to commit an offense, but also joining the law enforcement policy-making process. Hence, the interests of citizens, e.g., those who commit an offense or law-abiding citizens (i.e., victims of legal errors), can be represented in the political process for selecting which compensation rules will be implemented through voting behavior. At the same time, citizens can be taxpayers and have concerns about the fiscal burden of compensation.

We demonstrate that compensation rules encourage or discourage members of law enforcement from uncovering legal errors, depending on how executives are motivated to reduce crime rates, rather than uncovering legal errors. This is derived by two effects. First, more compensation makes choosing to commit an offense less attractive and lowers crime rates, which contributes to enhancing the enforcer's performance-based intrinsic motivation and complements the enforcer's activity to uncover legal errors. However, at the same time, introducing more compensation works as a sanction for the enforcer, and the executive is likely to have less incentive to uncover legal errors to avoid paying compensation. Then, if the first effect associated with performance-based intrinsic motivation is large, introducing compensation complements investigations, which results in higher deterrence. However, if the first effect is weak, compensation discourages the enforcer from investigating accuracy and weakens deterrence.

Based on the relationship between enforcers' behavior and compensation rules, we examined how citizens' interest affects the compensation rules in political processes. As long as compensation encourages the enforcer to carry out investigations, thereby contributing to lower crime rates, if social harm caused by offenses is small (i.e., minor crimes), potential offenders who are not victims of errors and prefer less strict deterrence are the majority and tend to have less incentive to demand compensation. Since our framework considers that compensation can be paid through taxes collected from citizens, those citizens prefer less fiscal burden by setting lower compensation, which implies undercompensation compared to the social welfare maximizing level. On the other hand, in the case where social harm caused by offenses is large (i.e., major crimes), law-abiding citizens who are also potential victims of legal errors are the majority and demand more compensation for harm and legal error reduction, which is overcompensation compared to the social welfare perspective.

If compensation discourages the enforcer's investigations and weakens deterrence, there is likely to be no conflict of interest among those who commit an offense and law-abiding citizens as potential victims of legal errors in the case of major crimes; they demand less compensation. This is because to have more deterrence for crimes; both of them have to give up introducing compensation, which is also consistent with social welfare viewpoints. However, in the case of minor crimes, those who choose to commit an offense are the majority and demand more compensation even if they are not victims of legal errors. This is because more compensation, as punishment for the enforcer, decreases uncovered legal errors and the total compensation payment as the fiscal burden, which can be overcompensation from the social welfare perspective.

Our paper makes contributions to the public law enforcement literature. First, in contrast to the optimal law enforcement theory, e.g., Garoupa (1997a) and Polinsky and Shavell (2000), our paper contributes to the literature that adopts the rent-seeking approach, in which enforcers do not always pursue social welfare enhancement.[4] In particular, there are some papers on the democratic voting process, such as Langlais and Obidzinski (2017), Mungan (2017), and Yahagi (2021). Our paper extends their research to consider the effects of legal errors and compensation for victims under democratic processes.

Our paper provides the most important contribution for studies about legal errors and compensation. [5] Fon and Schafer (2007) investigated wrongful convictions and state liability, and showed that compensation for wrongful conviction improves deterrence. Mungan (2020) employed rewards for accurate searches and liability for inaccurate searches to affect enforcers' behavior, and indicated that when enforcers' incentives can be altered via these extrinsic incentives, taste-based and statistical discrimination reduce deterrence. Mungan and Klick (2016) studied how exoneree compensation can be used to design mechanisms that achieve better separation of innocent and guilty individuals in the criminal justice system through plea bargaining. Friehe and Mungan (2020) considered how liability payment enforcers must pay in the case of a wrongful stop that

[4]Originally, Becker and Stigler (1974) argued that we should consider a private enforcement agency rather than a publicly motivated agent. This approach was extended by Friedman (1999), Dittmann (2006), Yahagi (2018), Rajabiun (2009), and Cooter and Garoupa (2014).

[5]The relation between legal errors and deterrence has been discussed in Png 1986; Garoupa (1997b); Kaplow and Shavell 1994; Ognedal 2005; Lando 2006; Garoupa and Rizzolli 2012; Rizzolli and Saraceno 2013; Lando and Mungan 2018, Garoupa 2017, Obidzinski and Oytana 2019.

does not result in a conviction, which can be chosen under the democratic voting process. They indicated that the liability level that results in a voting equilibrium is smaller than optimal, which suggests that excessive policing practices emerge in equilibrium. Obidzinski (2019) extended the work of Langlais and Obidzinski (2017) and revealed that an elected law enforcer may promote a lower level of accuracy (for crimes inducing moderate harm) or a higher level of accuracy (for crimes inducing extensive harm) than the socially optimal level. Our paper extends these previous works to consider how politically chosen compensation rules for victims of legal errors affect enforcers' activities for higher accuracy and uncovering error and deterrence for crimes.

Along with these papers, this may be helpful to understand the empirical work of Lin (2007) in that countries with a higher degree of democracy tend to show lower clearance rates for petty crimes, such as car theft or burglary, and higher rates for very serious crimes, such as homicide or serious assault compared to low democracy countries. McCannon (2013) showed that the popular election of prosecutors results in inaccurate sentences, wrongful convictions, and, consequently, successful appeals.

The remainder of the paper is organized as follows. In section 2, we provide a basic model on law enforcers with intrinsic motivation, and citizens who can choose to commit an offense or not. Section 3 discusses the political equilibrium of enforcement liability and compares the social welfare maximizing level. Finally, section 4 provides concluding remarks.

2 Model

We followed the basic law enforcement model, e.g., Garoupa (1997a) and Polinsky and Shavell (2000), and considered legal errors as in Kaplow and Shavell (1994). More importantly, we followed the law enforcement model with the democratic voting process proposed by Langlais and Obidzinski (2017) and Obidzinski (2019), and considered the interactions among law enforcement agencies (e.g., a police organization or prosecutors), citizens (e.g., voters), and political candidates (e.g., an elected official).

2.1 Citizens

Let us consider a population of risk-neutral citizens, the size of the population being normalized to 1. Each citizen chooses whether to engage in a legal activity (and earns 0) or to commit an offense that yields an illegal benefit b, which varies across the population and is distributed uniformly in the interval [0,1].

If citizens choose to commit an offense, they can be charged with probability $p \in [0, 1]$. We assume that offenders are always convicted in the case of being charged and have to pay monetary fines $f \in [0, 1]$. Thus, we do not consider legal errors for those who commit an offense.[6]

On the other hand, even if citizens do not commit an offense, they can be charged incorrectly with probability p. After being charged wrongfully, they can be convicted with probability $\epsilon(a) \in [0, 1]$, where a is the level of accuracy invested by the enforcer in criminal procedures assuming $\epsilon' < 0, \epsilon'' > 0$. Thus, those who do not commit an offense can be wrongfully convicted with $p\epsilon$ (Type-I error). This paper introduces compensation in the case of citizens who do not commit an offense and are wrongfully arrested but proven innocent later. If a charged individual is shown to be innocent, he/she can obtain monetary compensation σ.

We assume that introducing compensation also requires some cost, where the cost function is $d(\sigma)$ with $d_\sigma > 0$ and $d_{\sigma\sigma} > 0$. This refers to the costs of legal procedures for compensation and evaluating the amount of money that victims of legal errors receive. Let t be taxes paid by every citizen. We assume that total collected taxes and revenue from fines are used to finance the enforcer's payment and cost $d(\sigma)$, which is a similar assumption to Langlais and Obidzinski (2017) and Obidzinski (2019).

As we will demonstrate, the proportion of offenders, i.e., the crime rate, becomes $q = 1 - \bar{b}$, where $\bar{b}$ is the deterrence threshold. The negative externality on society when an offense occurs is $h \in [0, \bar{h}]$, where $\bar{h}$ is large enough. We assume that both offenders and non-offenders suffer from the externalities imposed by offenses, defined as hq.

[6]In this paper, we did not consider the probability that an individual who has committed an offense may erroneously escape the sanction (Type-II error). However, even if we consider a Type-II error, our main results do not change dramatically.

Finally, the utility of offenders is

$$u^o = b - pf - hq - t. \tag{1}$$

The utility of non-offenders becomes

$$u^{no} = -p\epsilon f + p(1-\epsilon)\sigma - hq - t. \tag{2}$$

In the following analysis, we focus on a as the only enforcement activity that the enforcer is responsible for, assuming p and f are given parameters.

2.2 The Law Enforcement Agency

The law enforcement agency is responsible for the accuracy level a with the cost function $c(a)$, where $c_a > 0$ and $c_{aa} > 0$. We assume that the enforcer has a responsibility regarding compensation for victims of uncovered legal errors. That is, the agency responds to the total amount of enforcement liability $-E\sigma$, where $E = (1-q)p(1-\epsilon)$ is the total number of individuals who are charged but not convicted. This can be interpreted as one kind of sanction for the enforcer in case mistaken charges are revealed.

We assume that the enforcer has a punitive intrinsic (non-monetary) motivation for reducing the number of offenses. Let $-mq$, where $m > 0$, be the intrinsic motivation function. This also responds to how the enforcer cares about legal errors compared to reducing crimes; if the enforcer cares about the amount of legal errors rather than reducing crimes, m tends to be small.

Finally, let w be the constant payment paid to the agency. This is financed by collected taxes and revenue from fines. This should be set to provide the enforcer with sufficient payoff that is at least more attractive than the outside options that provide utility revel k, which will be discussed later.

Finally, the objective function of the authority is

$$L = w - mq - E\sigma - c(a), \tag{3}$$

where $E = (1-q)p(1-\epsilon)$.

2.3 Political Candidates

Since we employed the political competition model proposed by Langlais and Obidzinski (2017) that extends the Downsian model (Downs 1957), there are two political candidates $i = 1, 2$; each candidate i proposes the rule σ_i as an electoral platform and attempts to maximize their probability of winning the election. All citizens are voters, and each voter votes for the candidate whose platform grants him/her the highest utility level. Then, it is important to know how the compensation rule is consistent with the interests of the majority (the median voter).

2.4 Timing of the Game

The law enforcement timing with political competition is as follows: After nature moves in stage 0 (choosing the type of voters b), each candidate i simultaneously announces each platform σ_1, σ_2 in stage 1. In stage 2, citizens choose between the two candidates. In stage 3, the elected politician implements the policy. In stage 4, the agency chooses a. Finally, in stage 5, citizens choose whether to abide by the law. Then, the law is enforced.

3 Analysis

3.1 Citizens' choice to commit an offense

We solve the game introduced in section 2.4 through backward induction. First, in stage 5, the condition for committing an offense is $u^o \geq u^{no}$, or $b \geq p(1-\epsilon)(f+\sigma)$. This indicates that those who have more illegal benefits are likely to commit an offense. The deterrence threshold $\bar{b}$ becomes $p(1-\epsilon)(f+\sigma)$; thus, the proportion of offenders in society, i.e., the crime rate, is $q = 1 - p(1-\epsilon)(f+\sigma)$.

3.2 The enforcer's choice of accuracy

In stage 4, the law enforcement agency implements accuracy level $\overline{a}$ to uncover legal errors for given suspects under compensation rule σ. Hence, the condition for the authority's optimal choice of $\overline{a}$ is

$$L_a = -mq_a - E_a\sigma - c_a = 0, \tag{4}$$

where

$$q_a = -\frac{\partial \overline{b}}{\partial a} = p(f+\sigma)\epsilon' < 0 \tag{5}$$

$$E_a = -q_a p(1-\epsilon) - (1-q)p\epsilon' = -2\overline{b}p\epsilon' > 0. \tag{6}$$

Thus, the enforcer's choice becomes $\overline{a} = \overline{a}(\sigma)$, satisfying (4).[7]

The condition (5) indicates that uncovering legal errors reduces crime rates because the utility of non-offenders is enhanced. Then, investigation efforts provide higher utility of the enforcer associated with intrinsic motivation ($-mq_a > 0$).

The condition (6) indicates that uncovering legal errors leads to more compensation that the agency has to pay. This is because for given suspects, uncovering legal errors for victims who are mistakenly arrested and receive compensation increases the agency's burden for compensation for legal errors ($-E_a\sigma < 0$).[8]

3.2.1 The relationship between accuracy and compensation

Before analyzing consequences in political competition, we examined the relationship between the enforcer's effort $\overline{a}$ and the compensation rule σ. According to the implicit function theorem, we have

$$\frac{\partial \overline{a}}{\partial \sigma} = -\frac{L_{a\sigma}}{L_{aa}} = -\frac{1}{L_{aa}}[-mq_{a\sigma} - E_a - E_{a\sigma}\sigma], \tag{7}$$

where

$$q_{a\sigma} = -\frac{\partial \overline{b}^2}{\partial a \partial \sigma} = p\epsilon' < 0 \tag{8}$$

[7] We assume that m is not too small to have $\overline{a} > 0$. We also assume the second order condition $L_{aa} < 0$.

[8] Even if we consider the endogenous choice of detection activities p, our main implications do not change because σ and p play a similar role in terms of deterrence. Then, while we focus only on σ, our analysis provides meaningful implications.

$$E_{a\sigma} = -q_{a\sigma}p(1-\epsilon) + q_\sigma p\epsilon' = -2p(1-\epsilon)p\epsilon' > 0. \tag{9}$$

Therefore, we have

$$\frac{\partial \overline{a}}{\partial \sigma} > 0 \leftrightarrow m - 2p(1-\epsilon)(f+2\sigma) > 0. \tag{10}$$

Lemma 1 If $m > 2p(1-\epsilon)(f+2\sigma)$, we have $\partial\overline{a}/\partial\sigma > 0$. If $m < 2p(1-\epsilon)(f+2\sigma)$, we have $\partial\overline{a}/\partial\sigma < 0$.

This indicates that the sign $\partial\overline{a}/\partial\sigma$ depends on, for example, the enforcer's intrinsic motivation associated with reducing crime rates (m). If the enforcer has an intrinsic motivation (large m), introducing higher compensation rules complements the effort to uncover legal errors ($\partial\overline{a}/\partial\sigma > 0$). On the other hand, if m is small, more compensation rules discourage the effort ($\partial\overline{a}/\partial\sigma < 0$). First, this is because compensation rules provide higher utility for non-offenders; thus, the choice to commit a crime is less attractive. This enhances the intrinsic motivation ($-mq_{a\sigma} > 0$) and complements the enforcer's effort. However, at the same time, more compensation rules can increase enforcers' payment, which discourages enforcers from uncovering legal errors ($-E_a - E_{a\sigma}\sigma < 0$); this means that compensation rules can work as a kind of sanction for enforcers.

3.2.2 The relationship between deterrence and compensation

In addition to the above investigation between accuracy and compensation, we examined the effects of compensation rules on the deterrence threshold $\overline{b} = p(1-\epsilon(\overline{a}))(f+\sigma)$. According to a simple calculation, we have

$$\frac{\partial \overline{b}}{\partial \sigma} = p\left[1 - \epsilon + (f+\sigma)(-\epsilon')\frac{\partial \overline{a}}{\partial \sigma}\right]. \tag{11}$$

This indicates that compensation rules have two effects. The first effect is that compensation rules make the utility of non-offenders increase; thus, choosing to commit an offense becomes less attractive (direct effect). This enhances deterrence with respect to $p(1-\epsilon) > 0$. On the other hand, as we observed before, compensation rules also have effects on enforcers" investigation behavior (indirect effects). If compensation rules encourage or do not strongly discourage the enforcer's efforts, the number of legal errors ϵ is lower and enhances deterrence ($\partial\overline{b}/\partial\sigma > 0$). However, if compensation rules strongly discourage the enforcer's efforts, the probability of legal errors ϵ is higher and deterrence becomes weak ($\partial\bar{b}/\partial\sigma < 0$).

Depending on direct and indirect effects, we have some mixed results in terms of the relation between deterrence and compensation. The condition (11) can be written as:

$$\frac{\partial\bar{b}}{\partial\sigma} > 0 \leftrightarrow \frac{\partial\bar{a}}{\partial\sigma} > \frac{(1-\epsilon)}{\epsilon'(f+\sigma)}. \tag{12}$$

Then, we have the following Lemma.

Lemma 2 If $\partial\bar{a}/\partial\sigma > (1-\epsilon)/\epsilon'(f+\sigma)$, we have $\partial\bar{b}/\partial\sigma > 0$. If $0 > (1-\epsilon)/\epsilon'(f+\sigma) > \partial\bar{a}/\partial\sigma$, we have $\partial\bar{b}/\partial\sigma < 0$.

According to Lemma 1, if the enforcer has more incentive to reduce crime rates (higher m), we are likely to have $\partial\bar{a}/\partial\sigma$ become large and $\partial\bar{b}/\partial\sigma > 0$. If the enforcer does not have such motivation (lower m), $\partial\bar{a}/\partial\sigma$ is likely to be negative and $\partial\bar{b}/\partial\sigma < 0$.

3.3 Best Rules for Offenders and Non-Offenders

Before solving the game, we examined best policies for citizens. First, we considered the budget constraint in society. Following the basic idea of Langlais and Obidzinski (2017) and Obidzinski (2019), collected taxes and revenue from fines are used to pay for enforcer w and the costs of legal procedures $d(\sigma)$, i.e., $t + R = w + d$, where total revenue from fines, $R = qpf + (1-q)p\epsilon f$.

The participation constraint for the law enforcement agent as we assume is

$$w - mq - E\sigma - c(\bar{a}) \geq k. \tag{13}$$

Then, w can be determined as $w = mq + E\sigma + c(\bar{a}) + k$.

For simplicity, we assume that $k = 0$. Thus, the budget constraint is

$$t + R = \underbrace{mq + E\sigma + c(\bar{a})}_{w} + d. \tag{14}$$

This indicates that regardless of offenders and non-offenders, citizens have to bear the cost of compensation $E\sigma$ through payment for the enforcer.

3.3.1 Offenders

For this section, we considered the best policy for an offender. Let σ^o be the best policy for an offender that maximizes u^o . Given the authority's action satisfying (4), the utility of an offender is $u^o = b - pf - hq - t$. Then, by incorporating the budget constraint $t = -R + w + d$, the utility of the offender is

$$u^o = -pf - hq + R - w - d, \tag{15}$$

where $w = mq + E\sigma + c(\overline{a})$. Then, the marginal effect of compensation rules for an offender becomes the following:

$$u^o_\sigma = -h\frac{\partial q}{\partial \sigma} + \frac{\partial R}{\partial \sigma} - \frac{\partial w}{\partial \sigma} - d_\sigma, \tag{16}$$

where

$$-h\frac{\partial q}{\partial \sigma} = h\frac{\partial \overline{b}}{\partial \sigma} \tag{17}$$

$$\frac{\partial R}{\partial \sigma} = -\frac{\partial \overline{b}}{\partial \sigma}p(1-\epsilon)f + \overline{b}pf\epsilon'\frac{\partial \overline{a}}{\partial \sigma} \tag{18}$$

$$-\frac{\partial w}{\partial \sigma} = m\frac{\partial \overline{b}}{\partial \sigma}\underbrace{-\overline{b}p(1-\epsilon) + \overline{b}p\epsilon'\frac{\partial \overline{a}}{\partial \sigma}\sigma - \frac{\partial \overline{b}}{\partial \sigma}p(1-\epsilon)\sigma}_{-\frac{\partial E\sigma}{\partial \sigma}} - c_a\frac{\partial \overline{a}}{\partial \sigma}. \tag{19}$$

Finally, we have

$$u^o_\sigma = (h - \overline{b} + m)\frac{\partial \overline{b}}{\partial \sigma} - (1-q)\frac{\partial \overline{b}}{\partial \sigma} - c_a\frac{\partial \overline{a}}{\partial \sigma} - d_\sigma. \tag{20}$$

These results mean that depending on the sign of $\partial\overline{b}/\partial\sigma$, the best compensation rules can differ. For example, if $\partial\overline{b}/\partial\sigma > 0$, offenders have a chance to reduce the negative effects of crimes ($h\partial\overline{b}/\partial\sigma > 0$) and save payment for the enforcer ($m\partial\overline{b}/\partial\sigma > 0$), but the effects on revenue from fines and compensation are complicated. Then, we consider two situations: $\frac{\partial \overline{b}}{\partial \sigma} > 0$ and $\frac{\partial \overline{b}}{\partial \sigma} < 0$.

3.3.2 Case $\frac{\partial \overline{b}}{\partial \sigma} > 0$

This case is likely to happen if the enforcer has more intrinsic motivation (high m) and is not discouraged by compensation rules ($\partial\overline{a}/\partial\sigma > (1-\epsilon)/\epsilon'(f+\sigma)$), which indicates that compensation rules help to lower crime rates. To highlight our results, we assume that there exists $h^o_1 \in [0, \overline{h}]$

thereby satisfying the following condition where $\sigma^o = 0$ can be optimal:

$$u^o_\sigma|_{\sigma=0} < 0 \leftrightarrow h < h^o_1 = [-m + \bar{b} + (1-q) + \frac{c_a \frac{\partial \overline{a}}{\partial \sigma} + d_\sigma}{\frac{\partial \bar{b}}{\partial \sigma}}]|_{\sigma=0}. \tag{21}$$

We assume that we have interior solutions satisfying $u^o_\sigma = 0$ in $h^o_1 < h \leq \overline{h}$, and the enforcer's best choice $\overline{a}$ with respect to (4) is also an interior solution. We have the following Lemma.

Lemma 3a In the case of $\partial\bar{b}/\partial\sigma > 0$; if $h < h^o_1$ and $\sigma^o = 0$ and if $h^o_1 < h \leq \overline{h}$, $\sigma^o > 0$ satisfying $u^o_\sigma = 0$.

This signals that offenders demand no compensation if social harm is small, because introducing compensation requires paying the costs of legal procedures, so they prefer no compensation. Further, more compensation decreases revenue from fines R caused by reducing the number of offenders, and the total payment of compensation in taxation $-E\sigma$ increases, which indicates the welfare-reducing effects of introducing compensation for offenders. This can be confirmed by the following calculation:

$$\frac{\partial(R - E\sigma)}{\partial \sigma} = -\bar{b}\frac{\partial \bar{b}}{\partial \sigma} - (1-q)\frac{\partial \bar{b}}{\partial \sigma} < 0. \tag{22}$$

As a result, if they do not care about social harm (small h), compensation will be lower. However, as h increases, they allow compensation to decrease crime rates ($\partial\sigma^o/\partial h > 0$).

3.3.3 Case $\frac{\partial \bar{b}}{\partial \sigma} < 0$

This case is likely to happen if the enforcer has less intrinsic motivation (low m) and is discouraged by compensation rules ($(1-\epsilon)/\epsilon'(f+\sigma) > \partial\overline{a}/\partial\sigma$), which suggests that compensation rules increase crime rates. To highlight our results, we assume that there exists $h^o_2 \in [0, \overline{h}]$ thus satisfying the following condition where $\sigma^o = 0$ can be optimal:

$$u^o_\sigma|_{\sigma=0} < 0 \leftrightarrow h^o_2 = [-m + \bar{b} + (1-q) + \frac{c_a \frac{\partial \overline{a}}{\partial \sigma} + c_\sigma}{\frac{\partial \bar{b}}{\partial \sigma}}]_{\sigma=0} < h. \tag{23}$$

Then, we assume that we have interior solutions satisfying $u^o_\sigma = 0$ in $h < h^o_2$, and the enforcer's best choice $\overline{a}$ with respect to (4) is also an interior solution. We have the following Lemma.

Lemma 3b In the case of $\partial\bar{b}/\partial\sigma < 0$, if $h < h^o_2$ and $\sigma^o > 0$ satisfy $u^o_\sigma = 0$ and if $h^o_2 < h \leq \overline{h}$,

$\sigma^o = 0$.

In contrast to Lemma 3a, offenders allow compensation if the social harm is small, because revenue from fines R increases and compensation payments in tax payments $-E\sigma$ decrease (i.e., $\partial(R - E\sigma)/\partial\sigma > 0$) since compensation discourages the enforcer from conducting an investigation and does not help to lower crime rates. This indicates welfare-enhancing effects for offenders. Then, offenders have an incentive to introduce compensation in case they do not care about social harm h. As h increases, they do not demand compensation to avoid discouraging the enforcer's activity to reduce crimes ($\partial\sigma^o/\partial h < 0$).

3.3.4 Non-offenders

In this section, we consider the best policy for a non-offender. Let σ^{no} be the best policy for an offender that maximizes u^{no} . Given the authority's action satisfying (4), the utility of an offender is $u^o = -p\epsilon f + p(1-\epsilon)\sigma - hq - t$. Then, by incorporating the budget constraint $t = -R + w + d$, the utility of the non-offender is

$$u^o = -p\epsilon f + p(1-\epsilon)\sigma - hq + R - w - d, \tag{24}$$

where $w = mq + E\sigma + c(\overline{a})$. Then, the marginal effect of compensation rules for a non-offender becomes the following:

$$u^{no}_\sigma = \frac{\partial[-p\epsilon f + p(1-\epsilon)\sigma]}{\partial\sigma} - h\frac{\partial q}{\partial\sigma} + \frac{\partial R}{\partial\sigma} - \frac{\partial w}{\partial\sigma} - d_\sigma. \tag{25}$$

The main difference from offenders is the effects of compensation rules σ on the costs of legal error and the benefits of receiving compensation:

$$\frac{\partial[-p\epsilon f + p(1-\epsilon)\sigma]}{\partial\sigma} = \frac{\partial\overline{b}}{\partial\sigma} \tag{26}$$

In particular, this marginal effect is equal to the effects of compensation rules on deterrence, i.e., $\partial\overline{b}/\partial\sigma$.

Finally, we have

$$u_\sigma^{no} = (h - \bar{b} + m)\frac{\partial \bar{b}}{\partial \sigma} + q\frac{\partial \bar{b}}{\partial \sigma} - c_a\frac{\partial \bar{a}}{\partial \sigma} - d_\sigma. \tag{27}$$

Following the previous analysis, we consider two situations: $\frac{\partial \bar{b}}{\partial \sigma} > 0$ and $\frac{\partial \bar{b}}{\partial \sigma} < 0$.

3.3.5 Case $\frac{\partial \bar{b}}{\partial \sigma} > 0$

To highlight our results, we assume that there exists $h_1^{no} \in [0, \overline{h}]$ thereby satisfying the following condition where $\sigma^{no} = 0$ can be optimal:

$$u_\sigma^{no}|_{\sigma=0} < 0 \leftrightarrow h < h_1^{no} = [-m + \bar{b} - q\frac{c_a\frac{\partial \bar{a}}{\partial \sigma} + d_\sigma}{\frac{\partial \bar{b}}{\partial \sigma}}]|_{\sigma=0}. \tag{28}$$

We assume that in $h_1^{no} < h \leq \overline{h}$, we have interior solutions satisfying $u_\sigma^{no} = 0$, and the enforcer's best choice $\overline{a}$ with respect to (4) is also an interior solution. We have the following Lemma.

Lemma 4a In the case of $\partial \bar{b}/\partial \sigma > 0$, if $h < h_1^{no}$ and $\sigma^{no} = 0$ and if $h_1^{no} < h \leq \overline{h}$, $\sigma^{no} > 0$ satisfying $u_\sigma^{no} = 0$.

Since introducing compensation rules requires costs in legal procedures, in the case of h that is too small, no compensation can be best for non-offenders. However, since compensation rules help to lower crime rates ($\partial \bar{b}/\partial \sigma > 0$), compensation rules have two positive effects: (1) reducing the negative effects of crime (lower hq), which refers to $\partial \sigma^{no}/\partial h > 0$, and (2) reducing the costs of legal errors and more compensation. However, $\partial \bar{b}/\partial \sigma > 0$ can occur under $\partial \overline{a}/\partial \sigma < 0$, which signals that non-offenders face a trade-off between more compensation and lower accuracy in terms of legal errors: In exchange for more compensation, they may give up on uncovering legal errors.

3.3.6 Case $\frac{\partial \bar{b}}{\partial \sigma} < 0$

To highlight our results, we assume that there exists $h_2^{no} \in [0, \overline{h}]$ thus satisfying the following condition where $\sigma^{no} = 0$ can be optimal:

$$u_\sigma^{no}|_{\sigma=0} < 0 \leftrightarrow h_2^{o} = [-m + \bar{b} - q\frac{c_a\frac{\partial \bar{a}}{\partial \sigma} + d_\sigma}{\frac{\partial \bar{b}}{\partial \sigma}}]_{\sigma=0} < h. \tag{29}$$

We assume that in $h < h_2^o$, we have interior solutions satisfying $u_\sigma^{no} = 0$, and the enforcer's best choice $\overline{a}$ with respect to (4) is also an interior solution. We have the following Lemma.

Lemma 4b In the case of $\partial\overline{b}/\partial\sigma < 0$, if $h < h_2^{no}$ and $\sigma^o > 0$ satisfy $u_\sigma^{no} = 0$ and if $h_2^{no} < h \leq \overline{h}$, $\sigma^{no} = 0$.

This implies that since compensation rules also discourage enforcers from conducting investigations and increase crime rates ($\partial\overline{b}/\partial\sigma < 0$), compensation rules have two negative effects: (a) causing more negative effects of crime (higher hq) and (b) increasing the costs of legal errors and less compensation. Then, non-offenders, as victims of legal errors, also have an incentive to demand fewer compensation rules. In this case, because $\partial\overline{b}/\partial\sigma < 0$ with $\partial\overline{a}/\partial\sigma < 0$, non-offenders give up on receiving more compensation to avoid discouraging enforcers from uncovering legal errors.

3.4 Comparison between the best rules of offenders and non-offenders

The main difference between offenders and non-offenders is the cost of legal errors and the benefits of compensation, i.e., $-p\epsilon f + p(1-\epsilon)\sigma$. Hence, depending on the effects of σ on $-p\epsilon f + p(1-\epsilon)\sigma$, offenders and non-offenders have different incentives for compensation. Then, we have Lemma 5.

Lemma 5 (1) In the case of $\partial\overline{b}/\partial\sigma > 0$, if $0 < h < h_1^{no}$, $\sigma^{no} = \sigma^o = 0$. If $h_1^{no} < h \leq \overline{h}$, $\sigma^o < \sigma^{no}$. (2) In the case of $\partial\overline{b}/\partial\sigma < 0$, if $0 < h < h_2^o$, $\sigma^{no} < \sigma^o$. In the case of $h_2^o < h \leq \overline{h}$, $\sigma^o = \sigma^{no} = 0$.

Proof. (1) In the case of $\partial\overline{b}/\partial\sigma > 0$, we have $h_1^{no} < h_1^o$. Then, according to Lemmas 3a and 3b and 4a and 4b, if $0 < h < h_1^{no}$, $\sigma^{no} = \sigma^o = 0$. If $h_1^{no} < h < h_1^o$, $\sigma^o = 0$ and $\sigma^{no} > 0$. If $h_1^o < h. \leq \overline{h}$, the first-order conditions indicate that:

$$u_\sigma^o = (h - \overline{b} + m)\frac{\partial\overline{b}}{\partial\sigma} - (1-q)\frac{\partial\overline{b}}{\partial\sigma} - c_a\frac{\partial\overline{a}}{\partial\sigma} - d_\sigma = 0. \tag{30}$$

$$u_\sigma^{no} = (h - \overline{b} + m)\frac{\partial\overline{b}}{\partial\sigma} + q\frac{\partial\overline{b}}{\partial\sigma} - c_a\frac{\partial\overline{a}}{\partial\sigma} - d_\sigma = 0. \tag{31}$$

Thus, we have $\sigma^{no} > \sigma^o$ in $h_1^{no} < h \leq \overline{h}$.

(2) In the case of $\partial\overline{b}/\partial\sigma < 0$, we have $h_2^{no} < h_2^o$. Then, according to Lemmas 3a and 3b and 4a and 4b, if $h_2^{no} < h < h_2^o$, $\sigma^{no} = 0$ and $\sigma^o > 0$. If $h_2^o < h \leq \overline{h}$, $\sigma^{no} = \sigma^o = 0$. If $h < h_2^o$, the first

order conditions indicate that:

$$u^o_\sigma = (h - \bar{b} + m)\frac{\partial \bar{b}}{\partial \sigma} - (1-q)\frac{\partial \bar{b}}{\partial \sigma} - c_a \frac{\partial \bar{a}}{\partial \sigma} - d_\sigma = 0. \tag{32}$$

$$u^{no}_\sigma = (h - \bar{b} + m)\frac{\partial \bar{b}}{\partial \sigma} + q\frac{\partial \bar{b}}{\partial \sigma} - c_a \frac{\partial \bar{a}}{\partial \sigma} - d_\sigma = 0. \tag{33}$$

Thus, we have $\sigma^{no} < \sigma^o$ in $h < h^o_2$. □

These results suggest that in the case of $\partial \bar{b}/\partial \sigma > 0$, since the main difference between u^o and u^{no} is $-p\epsilon f + p(1-\epsilon)\sigma$, it is likely that non-offenders, as victims of legal errors, will demand more compensation to reduce the total costs of legal errors than offenders ($\sigma^{no} > \sigma^o$). However, if they are less concerned about the negative effects of crimes, there may be no conflict of interest among them ($\sigma^{no} = \sigma^o = 0$) to avoid the costs of legal procedures.

On the other hand, in the case of $\partial \bar{b}/\partial \sigma < 0$, it is likely that non-offenders, as victims of legal errors, will demand less or zero compensation to avoid more legal errors than offenders ($\sigma^{no} < \sigma^o$) because of discouraging the enforcer from carrying out an investigation. However, if they are more concerned about the negative effects of crimes, offenders and non-offenders do not prefer to introduce compensation ($\sigma^{no} = \sigma^o = 0$) for not increasing crimes.

3.5 The Social Welfare Maximizing Rule

Before solving the above political competition model, we considered the social welfare maximizing rule σ^{sw}. The social welfare function is

$$SW = u^o + u^{no} + L = \int_{\bar{b}}^{1} (b-h)gdb - R - E\sigma - t + L. \tag{34}$$

Then, by incorporating $t + R = w + d$, we have

$$SW = u^o + u^{no} + L = \int_{\bar{b}}^{1} (b-h)gdb - mq - c - d. \tag{35}$$

Then, the marginal effects of σ are as follows:

$$SW_\sigma = (h - \overline{b} + m)\frac{\partial \overline{b}}{\partial \sigma} - c_a \frac{\partial \overline{a}}{\partial \sigma} - d_\sigma. \tag{36}$$

Following the previous analysis, we considered two situations: $\frac{\partial \overline{b}}{\partial \sigma} > 0$ and $\frac{\partial \overline{b}}{\partial \sigma} < 0$.

3.5.1 Case $\frac{\partial \overline{b}}{\partial \sigma} > 0$

In case $h < h_1^{sw}$, where $h_1^{sw} \in [0, \overline{h}]$, thereby satisfying the following condition, $\sigma^{sw} = 0$ can be optimal:

$$SW_\sigma|_{\sigma=0} < 0 \leftrightarrow h < h_1^{sw} = [-m + \overline{b} + \frac{c_a \frac{\partial \overline{a}}{\partial \sigma} + d_\sigma}{\frac{\partial \overline{b}}{\partial \sigma}}]|_{\sigma=0}. \tag{37}$$

We assume that in $h_1^{sw} < h \leq \overline{h}$, we have interior solutions satisfying $SW_\sigma = 0$, and the enforcer's best choice $\overline{a}$ with respect to (4) is also an interior solution. Then, we have the following Lemma.

Lemma 6a In the case of $\partial\overline{b}/\partial\sigma > 0$; if $h < h_1^{sw}$ and $\sigma^{sw} = 0$ and if $h_1^{sw} < h \leq \overline{h}$, $\sigma^{sw} > 0$ satisfying $SW_\sigma = 0$.

In sum, we can compare σ^o, σ^{no} and σ^{sw}.

Lemma 7a In the case of $\partial\overline{b}/\partial\sigma > 0$, if $0 < h < h_1^{no}$, $\sigma^{no} = \sigma^o = \sigma^{sw} = 0$. (1b) If $h_1^{no} < h < h_1^{sw}$, $\sigma^o = \sigma^{sw}(= 0) < \sigma^{no}$. (1c) If $h_1^{sw} < h, \leq \overline{h}$, $\sigma^o < \sigma^{sw} < \sigma^{no}$.

Proof. (1) In the case of $\partial\overline{b}/\partial\sigma > 0$, according to Lemmas 3a, 3b, 4a, 4b, 5 and 6a, we have $h_1^{no} < h_1^{sw} < h_1^o$. Then, if under interior solutions with $h_1^o < h$, the first order conditions indicate that:

$$u_\sigma^o = (h - \overline{b} + m)\frac{\partial \overline{b}}{\partial \sigma} - (1-q)\frac{\partial \overline{b}}{\partial \sigma} - c_a \frac{\partial \overline{a}}{\partial \sigma} - d_\sigma = 0. \tag{38}$$

$$u_\sigma^{no} = (h - \overline{b} + m)\frac{\partial \overline{b}}{\partial \sigma} + q\frac{\partial \overline{b}}{\partial \sigma} - c_a \frac{\partial \overline{a}}{\partial \sigma} - d_\sigma = 0. \tag{39}$$

$$SW_\sigma = (h - \overline{b} + m)\frac{\partial \overline{b}}{\partial \sigma} - c_a \frac{\partial \overline{a}}{\partial \sigma} - d_\sigma = 0. \tag{40}$$

Thus, we have $\sigma^{no} > \sigma^{sw} > \sigma^o$. If some of them become corner solutions, we have the following results; if $0 < h < h_1^{no}$, $\sigma^{no} = \sigma^o = \sigma^{sw} = 0$. If $h_1^{no} < h < h_1^{sw}$, $\sigma^o = \sigma^{sw}(= 0) < \sigma^{no}$. □

The main difference between SW and u^o is the revenue from fines R and compensation payment

$-E\sigma$ because these are just monetary transfers from a social welfare perspective. Therefore, as long as $\partial\bar{b}/\partial\sigma > 0$, we have $\partial(R - E\sigma)/\partial\sigma < 0$, which indicates that offenders demand less compensation rather than welfare maximizing levels. At the same time, although non-offenders, as victims of legal errors, care about the above $R - E\sigma$, they also respond to legal errors $-p\epsilon f + p(1-\epsilon)\sigma$. Since introducing compensation provides positive net benefits that can be confirmed by $\partial(R - E\sigma)/\partial\sigma + \partial[-p\epsilon f + p(1-\epsilon)\sigma]/\partial\sigma = q\partial\bar{b}/\partial\sigma > 0$, non-offenders demand more compensation compared to the social welfare maximizing level.

Let us discuss the effects on legal errors and realized crime rates. Let a^o, a^{no} and a^{sw} be the equilibrium efforts to reduce legal errors under σ^o, σ^{no} and σ^{sw}. Let q^o, q^{no} and q^{sw} be the equilibrium crime rates under σ^o, σ^{no} and σ^{sw}. Based on the above results, we have the following Lemmma.

Lemma 8a(1) In the case of $\partial\bar{b}/\partial\sigma > 0$ with $\partial\overline{a}/\partial\sigma > 0$; if $h < h_1^{no}$, $a^o = a^{no} = a^{sw}$ and$q^o = q^{no} = q^{sw}$. If $h_1^{no} < h < h_1^{sw}$, $a^o = a^{sw} < a^{no}$ and$q^{no} < q^o = q^{sw}$. If $h_1^{sw} < h \leq \overline{h}$, $a^o < a^{sw} < a^{no}$ and$q^{no} < q^{sw} < q^o$. (2) In the case of $\partial\bar{b}/\partial\sigma > 0$ with $(1-\epsilon)/\epsilon'(f+\sigma) < \partial\overline{a}/\partial\sigma < 0$, if $h < h_1^{no}$, $a^o = a^{no} = a^{sw}$ and$q^o = q^{no} = q^{sw}$. If $h_1^{no} < h < h_1^{sw}$, $a^{no} < a^{sw} = a^o$ and$q^{no} < q^o = q^{sw}$. If $h_1^{sw} < h \leq \overline{h}$, $a^{no} < a^{sw} < a^o$ and$q^{no} < q^{sw} < q^o$.

These results imply that in terms of investigation activities, the enforcer can be distorted in considering citizens' interests. In particular, as long as compensation encourages the enforcer's activity ($\partial\overline{a}/\partial\sigma > 0$), the quality of distortion is similar between σ and a. However, in the case of $\partial\overline{a}/\partial\sigma < 0$, there are different implications. Those who want to reduce and uncover legal errors, i.e., non-offenders, face a trade-off in that they have to give up higher accuracy in exchange for more compensation and reducing crime. In both cases, lower crime rates are likely to happen when non-offenders' interests are represented because reducing net legal error costs is consistent with reducing crime rates.

3.5.2 Case $\frac{\partial \bar{b}}{\partial \sigma} < 0$

In the case $h_2^{sw} < h$, where $h_2^o \in [0, \overline{h}]$, thus satisfying the following condition, $\sigma^{sw} = 0$ can be optimal:

$$SW_\sigma|_{\sigma=0} < 0 \leftrightarrow h_2^{sw} = [-m + \bar{b} + \frac{c_a \frac{\partial \bar{a}}{\partial \sigma} + d_\sigma}{\frac{\partial \bar{b}}{\partial \sigma}}]_{\sigma=0} < h. \tag{41}$$

We assume that in $h < h_2^{sw}$, we have interior solutions satisfying $SW_\sigma = 0$, and the enforcer's best choice $\overline{a}$ with respect to (4) is also an interior solution. We have the following Lemma.

Lemma 6b In the case of $\partial \bar{b}/\partial \sigma < 0$, if $h < h_2^{sw}$ and $\sigma^{sw} > 0$ satisfy $SW_\sigma = 0$ and if $h_2^{sw} < h \leq \overline{h}$, $\sigma^{sw} = 0$.

In sum, we can compare σ^o, σ^{no} and σ^{sw}.

Lemma 7b (1) In the case of $\partial \bar{b}/\partial \sigma < 0$, (1a) if $0 < h < h_2^{sw}$, $\sigma^{no} < \sigma^{sw} < \sigma^o$. (1b) If $h_2^{sw} < h < h_2^o$, $\sigma^{no} = \sigma^{sw} (= 0) < \sigma^o$. (1c) If $h_2^o < h \leq \overline{h}$, $\sigma^o = \sigma^{sw} = \sigma^{no} = 0$.

Proof. (1) In the case of $\partial \bar{b}/\partial \sigma < 0$, according to Lemmas 3a, 3b, 4a, 4b, 5 and 6a, 6b, we have $h_2^{no} < h_2^{sw} < h_2^o$. Then, if under interior solutions with $h < h_2^o$, the first order conditions indicate that:

$$u_\sigma^o = (h - \bar{b} + m)\frac{\partial \bar{b}}{\partial \sigma} - (1-q)\frac{\partial \bar{b}}{\partial \sigma} - c_a \frac{\partial \bar{a}}{\partial \sigma} - d_\sigma = 0. \tag{42}$$

$$u_\sigma^{no} = (h - \bar{b} + m)\frac{\partial \bar{b}}{\partial \sigma} + q\frac{\partial \bar{b}}{\partial \sigma} - c_a \frac{\partial \bar{a}}{\partial \sigma} - d_\sigma = 0. \tag{43}$$

$$SW_\sigma = (h - \bar{b} + m)\frac{\partial \bar{b}}{\partial \sigma} - c_a \frac{\partial \bar{a}}{\partial \sigma} - d_\sigma = 0. \tag{44}$$

Thus, we have $\sigma^{no} < \sigma^{sw} < \sigma^o$. If some of them become corner solutions, we have the following results; if $h_2^{sw} < h < h_2^o$, $\sigma^{no} = \sigma^{sw} (= 0) < \sigma^o$. If $h_2^o < h$, $\sigma^o = \sigma^{sw} = \sigma^{no} = 0$. □

In the case of $\partial \bar{b}/\partial \sigma < 0$, offenders demand more compensation rules to generate more revenue from fines and fewer compensation payments by discouraging the enforcer from conducting an investigation. Non-offenders demand less compensation to avoid discouraging the enforcer's efforts. As the social harm of crimes becomes large, they have the common interest of reducing crimes by supporting no compensation, which is also consistent with social welfare maximization.

Let us discuss the effects on legal errors and realized crime rates. Under the above results, we have the following Lemma.

Lemma 8b In the case of $\partial\bar{b}/\partial\sigma < 0$ with $\partial\bar{a}/\partial\sigma < 0$; if $h < h_1^{sw}$, $a^o < a^{no} < a^{sw}$ and $q^{no} = q^{sw} < q^o$. If $h_1^{sw} < h < h_1^o$, $a^{no} = a^{sw} < a^o$ and$q^o < q^{no} = q^{sw}$. If $h_1^o < h \leq \bar{h}$, $a^o = a^{sw} = a^{no}$ and$q^{no} = q^{sw} = q^o$.

3.6 Political Equilibrium

This section considers political equilibrium policies. In stage 2, given $\bar{a}$, citizens, depending on their type b, vote for their preferred policies that maximize their utility, which is consistent with their future behavior as to whether they commit an offense. In stage 1, each candidate $i = 1, 2$ proposes σ_i to maximize the winning probability in anticipating citizens' voting behavior. In this regard, following Langlais and Obidzinski (2017), which extends the Downsian model, the median voter's interest is important. That is, both candidates announce the same policy (e.g., $\sigma_1 = \sigma_2$) that the median voter prefers, which can represent political equilibrium such that neither of them have an incentive to deviate from that policy. Following the previous analysis, we examined two cases: $\partial\bar{b}/\partial\sigma > 0$ and $\partial\bar{b}/\partial\sigma < 0$.

3.6.1 Case $\frac{\partial\bar{b}}{\partial\sigma} > 0$

According to Lemma 5, in the case of $h < h_1^{no}$, $\sigma^{no} = \sigma^o = 0$. Therefore, each candidate announces $\sigma_1 = \sigma_2 = 0$. On the other hand, in the case of $h_1^{no} < h$, since σ^{no} and σ^o are different, we need to consider whether offenders or non-offenders are the majority. Without the loss of generality, let us assume that candidate 1 announces $\sigma_1 = \sigma^o$ and candidate 2 announces $\sigma_2 = \sigma^{no}$. Then, citizens who vote for candidate 1 are those for whom $u^o(\sigma^o) = b + \bar{u}^o \geq u^{no}(\sigma^{no})$, where $u^o(\sigma^o) = b + \bar{u}^o$ is an offender's utility that is separated between the illegal benefit b and other parts under σ^o and $u^{no}(\sigma^{no})$ is a non-offender's utility under σ^{no}. Let $\tilde{b}$ be the citizens who are indifferent between these two policies. Then, this condition can be written as $b \geq -\bar{u}^o + u^{no}(\sigma^{no}) = \tilde{b}$.

Those who are likely to have higher illegal benefits ($b \geq \tilde{b}$) vote for candidate 1, who proposes

σ^o. Thus, the expected vote share for candidate 1 is $1 - \tilde{b}$. Then, we have:

$$\frac{\partial \tilde{b}}{\partial h} = q^o - q^{no} > 0. \tag{45}$$

Thus, when h increases, the number of those who vote for σ^{no} will increase because under σ^{no}, lower crime rates are realized rather than σ^o.

Then, we consider some assumptions to highlight our important results. Let b_m be the median voter satisfying $b_m = 1/2$. Then, we assume that there exists h^* satisfying $\tilde{b} = b_m$. Therefore, when $h > h^*$, we have $\tilde{b} > b_m$, and both candidates propose σ^{no}. On the other hand, when $h^* > h$, we have $b_m > \tilde{b}$, and both candidates propose σ^o.

Further, we assume that $h_1^{no} < h_1^{sw} < h^* < h_1^o < \overline{h}$ and let σ^* be the voting equilibrium policy. Under the above assumptions, we have Proposition 1a.

PROPOSITION 1a Assume $h_1^{no} < h_1^{sw} < h^* < h_1^o < \overline{h}$. In the case of $\partial\overline{b}/\partial\sigma > 0$, if $h < h_1^{sw}$, $\sigma^* = 0 (= \sigma^{sw})$. If $h_1^{sw} < h < h^*$, $\sigma^* = \sigma^o (= 0 < \sigma^{sw})$. (1c) If $h^* < h < \overline{h}$, $\sigma^* = \sigma^{no} (> \sigma^{sw})$.

Let $a^*$and q^* be the equilibrium efforts to reduce legal errors and realized crime rates under the political equilibrium rule σ^*. and a^{sw} is the socially optimal effort level. Under the above results, we have Proposition 2a.

PROPOSITION 2a Assume $h_1^{no} < h_1^{sw} < h^* < h_1^o < \overline{h}$. In the case of $\partial\overline{b}/\partial\sigma > 0$, (1) if $h < h_1^{sw}$, $q^* = q^{sw}$. If $h_1^{sw} < h < h^*$, $q^* > q^{sw}$. If $h^* < h < \overline{h}$, $q^* < q^{sw}$. (2) In the case of $\partial\overline{a}/\partial\sigma > 0$, if $h < h_1^{sw}$, $a^* = a^{sw}$. If $h_1^{sw} < h < h^*$, $a^* < a^{sw}$. If $h^* < h \leq \overline{h}$, $a^* > a^{sw}$. (3) In the case of $\partial\overline{a}/\partial\sigma < 0$, if $h < h_1^{sw}$, $a^* = a^{sw}$. If $h_1^{sw} < h < h^*$, $a^* > a^{sw}$. If $h^* < h < \overline{h}$, $a^* < a^{sw}$.

This implies that if an offense causes less social harm ($h < h^{sw}$), there is no divergence between all citizens' interest and social welfare maximizing rules; there is no compensation to save unnecessary costs. If the social harm level is in the middle ($h_1^{sw} < h < h^*$), offenders are the majority, which signals undercompensation and lower crime rates compared to the social welfare maximizing level. However, in terms of uncovering legal errors, there can be different implications. In the case of $\partial\overline{b}/\partial\sigma > 0$ with $\partial\overline{a}/\partial\sigma > 0$, less accuracy is realized. However, in the case of $\partial\overline{b}/\partial\sigma > 0$ with $\partial\overline{a}/\partial\sigma < 0$, higher accuracy is realized. Finally, if an offense causes social harm ($h^* < h$), non-offenders are the majority, which suggests overcompensation and lower crime rates compared to the social welfare maximizing level. As based on previous implications, in the case of $\partial\bar{b}/\partial\sigma > 0$ with $\partial\overline{a}/\partial\sigma < 0$, non-offenders face a trade-off between less uncovered legal errors and higher compensation.

3.6.2 (2) $\frac{\partial\bar{b}}{\partial\sigma} < 0$

Following the proof in the previous section, according to Lemma 5, in the case of $h_2^o < h \leq \overline{h}$, $\sigma^{no} = \sigma^o = 0$. In the case of $h < h_2^o$, offenders and non-offenders have different interests. Thus, without the loss of generality, let us assume that candidate 1 announces $\sigma_1 = \sigma^o$ and candidate 2 announces $\sigma_2 = \sigma^{no}$. Then, citizens who vote for candidate 1 are those for whom $u^o(\sigma^o) \geq u^{no}(\sigma^{no})$. Then, the relation between the citizens who are indifferent between two policies ($\tilde{b}$) and social harm h is $d\tilde{b}/dh = q^o - q^{no} > 0$.

We assume that there exists h^{**} thereby satisfying $\tilde{b} = b_m$ and $h_2^{no} < h_2^{sw} < h^{**} < h_2^o < \overline{h}$. Then, in the case of $h < h^{**}$, each candidate announces the platform that acquires the majority voters; thus, the equilibrium is that both of them propose σ^o. On the other hand, when $h^{**} > h$, we have $b_m > \tilde{b}$, and both candidates propose σ^{no} We summarize the main results.

PROPOSITION 1b Assume $h_2^{no} < h_2^{sw} < h^{**} < h_2^o \leq \overline{h}$. In the case of $\partial\bar{b}/\partial\sigma < 0$, if $h < h^{**}$, $(\sigma^{sw} <)\sigma^* = \sigma^o$. If $h^{**} < h \leq \overline{h}$, $\sigma^* = 0 (= \sigma^{sw})$.

Since we have $0 > (1-\epsilon)/\epsilon'(f+\sigma) > \partial\overline{a}/\partial\sigma$, we have the following results in terms of uncovering legal errors and crime rates.

PROPOSITION 2b Assume $h_2^{no} < h_2^{sw} < h^{**} < h_2^o \leq \overline{h}$. In the case of $\partial\bar{b}/\partial\sigma < 0$ with $\partial\overline{a}/\partial\sigma < 0$, if $h < h^{**}$, $a^* < a^{sw}$ and $q^{sw} < q^*$. If $h^{**} < h \leq \overline{h}$, $a^* = a^{sw}$ and $q^* = q^{sw}$.

This indicates that as social harm becomes large, the divergence between the interest of majority citizens, i.e., offenders, and the socially optimal level becomes small. This is because although the majority of citizens demand more compensation to discourage the enforcer's efforts to escape the burden of compensation payments, they also give up on reducing social harm. Finally, if offense causes more social harm ($h^{**} < h$), non-offenders are the majority, and there seems to be no conflict between their interest and the socially optimal compensation level.

4 Concluding Remarks

This paper provides an inclusive framework of how law enforcers uncover legal errors for wrongfully charged suspects under their intrinsic motivation associated with reducing crimes, as well as extrinsic motivation with liability statutes whereby enforcers are responsible for compensating victims of legal errors. First, this paper shows that such compensation rules encourage or discourage enforcers' from uncovering errors based on how they have crime-reducing motivations. Compensation, which makes law-abiding choices more attractive, helps to reduce crimes and enhances intrinsic motivation. At the same time, more compensation implies a greater burden for enforcers, such as sanctions, and may discourage enforcers from uncovering legal errors. Then, as long as enforcers have more crime-reducing motivations, compensation complements their activities and contributes to higher deterrence.

Finally, we demonstrated that compensation rules are determined in democratic processes to represent the interests of the majority of citizens, and we showed that political competition distorts the use of enforcement liability rules. This means it can be difficult to fully internalize the interest of members of society with the use of compensation rules. In our framework, where citizens have to care about the cost of compensation payments through taxation, if compensation rules are consistent with encouraging the enforcer's investigation and reducing social harm, in case the social harm of crimes is small (i.e., minor crimes), those who commit offenses comprise the majority and prefer to avoid fiscal burdens rather than reduce social harm. This implies that their preferred policies involve undercompensation compared to the socially optimal level. If the social harm of crimes is large (i.e., major crimes), law-abiding citizens, who can be victims of legal errors, form the majority and demand higher compensation, which is an overcompensation rule compared to the socially optimal level.

On the other hand, if compensation rules discourage enforcers" from pursuing investigations and do not help lower crime rates, as long as the social harm of crimes is small (i.e., minor crimes), there can be distorted compensation rules in that the majority of citizens who commit offenses demand more compensation to avoid fiscal burdens; this is higher than the socially optimal level. However, citizens—including victims of legal errors, who care about reducing social harm—tend to give up on pursuing compensation in order not to discourage the enforcer from conducting an investigation, thus leading to higher deterrence and reducing the costs of legal errors. This can be consistent with the socially optimal level. This paper also provides new welfare implications for the use of enforcement liability rules for the detrimental effects of the modern criminal justice system, which involves several principal-agent relations.

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