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Compliance, Liability and Corporate Criminal Law

A Setup for a Three-Player Inspection Game

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Compliance, Liability and Corporate Criminal Law

- A Setup for a Three-Player Inspection Game

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Zusammenfassung / Abstract:

We propose to model corporate crime as a three-player inspection game. We find that the liability regime mainly affects the distribution of the players´ monitoring effort: a higher punishment for the misbehaving employee reduces control effort by both the management and authorities, higher punishments on the corporation save prosecutorial effort.

Schlagworte / Keywords: inspection game; corporate liability

1. INTRODUCTION

Is Lady Justice "turning a blind eye to white-collar crime" (Politico, 07.23.2021)? Whenever the public attention is drawn to corporations that violate laws and cause public harm, the common outrage appears to fade away eventually and is followed by the impression that criminal proceedings will not be able to nail the wrongdoers. Compliance of managers and employees to laws and corporate rules is a persistent topic for lawmakers.

Since the landmark article of Becker (1968), the economics of crime have contributed significantly to our understanding of (corporate) criminal activity and non-compliant behavior of employees and managers. What makes corporate crime distinct from criminal activity outside the corporation is, generally put, the involvement of three parties instead of two: the wrongdoer, the victim, and the (owner of the) corporation. In this perspective, Garoupa (2000) interprets corporate crime as an agency cost. Other law and economics scholars have argued that such criminal activity usually is not in the interest of the owner (see, e.g. Alexander and Cohen 1999), so firm owners are expected to incentivize their agents not to try to get rich on the owner´s assets or damage the economic future of their corporation. A second characteristic of corporate crime is that firms have an advantage in monitoring their employees and revealing criminal activity compared to an outside authority (see Kraakman 1983, Baysinger 1991), given that the unlawful behavior is usually carried out with the company´s own resources. Ever since, researchers have addressed the questions of penalty reduction for firms (see Arlen 1994) to incentivize self-disclosure, a composite liability regime where both employees and owners are punished (see Polinsky and Shavell 1993, Garoupa 2000, Arlen 2012) and gains through whistleblowing (see Friebel and Guriev, 2012).

However, Tsebelis (1991) was the first to demonstrate that the focus on the agency problem of corporate crime must not neglect the strategic interaction between the wrongdoer and the law-enforcing authority in order to derive valid policy implications. This led to the application of '*inspection games*' from game theory. An inspection game describes a strategic conflict between an inspector and an inspectee, the inspectee wants to break the law without being caught and the inspector wants compliance without the need for costly effort to verify the true behavior of the inspectee. Inspection games typically assume a benevolent inspector and a perfect revelation of the true behavior when the inspector decides to monitor the inspectee. Usually, such models predict that perfect deterrence cannot be achieved (see Kirstein 2014).

As corporate criminal behavior is essentially described by the strategic interaction of three parties, we apply a three-person inspection game in this paper to study how deterrence of unlawful (corporate) behavior can be improved and how different liability regimes can affect the level of compliance and internal control procedures in firms. To the best of our knowledge, the work of Fandel and Trockel (2013) comes closed to our research design. In their paper, the authors describe the interaction between a manager, a controller who is to audit the manager´s decisions and the top management of the same firm. In our game, the two inspectors are of different entities (e.g., the firm´s management versus local authorities) and thus have different preferences. Furthermore, authorities are dependent on internal control effort by the management to reliably prosecute the illegal behavior with certainty; otherwise, the case may stay unnoticed with positive probability. Furthermore, in an extreme scenario, authorities ('Lady Justice') may be able to impose punishments but cannot verify true behavior of the agents at all. In section 2, we describe the model assumption. A normative perspective is applied in section 3, and all equilibria of the game are determined in section 4. We extent our basic model to a blind 'Lady Justice' in section 5, and section 6 discusses our main findings.

2. A COMPLIANCE GAME

Consider an inspection game with three players: the *employee (E)* of a corporation as "inspectee", the *manager (M)* of this corporation as "lower-level inspector" and *authorities (A)* as "higher-level inspector". (Corporate) laws define what kind of action is regarded as unlawful and specify fines in case of violation, which eventually lead to a punishment of non-compliant employees, corporations, or both.

Inside the corporation, the employee E can commit an unobservable and illegal action that generates a private utility of b to her, but a damage to society of x with $x > b$. Let us further specify that the illegal activity may also cause a financial loss to the corporation, which is a part of the total damage to society, and we denote the loss for the corporation through the illegal action as γx and $0 \leq \gamma < 1$. Such an illegal activity could be a financial fraud where E deprives other persons of money or financial assets of value b, and the occurrence of fraud also reduces favorable transactions in the economy. Another example could be that E ignores environmental laws, but this non-compliance generates excessive damage to the environment. Assume that if E behaves illegally and is caught by authorities, she will be subject to fine f_E with $f_E \geq b$.

The violation of legal rules can be detected inside or outside the corporation:

Inside the firm, the manager M can exert costly effort cost c_M to inspect the behavior of E and learn with certainty whether rules were violated.[1] However, when M does not care to inspect E and authorities learn eventually about a violation of rules by her employee, then the manager receives the fine f_M. If she did inspect and thus reported the illegal behavior of E, then the fine f_M^* is imposed on the manager. This allows us to capture that firms and management often benefit in legal proceedings when they applied internal controls with care and cooperate with authorities, and this would imply $f_M^* < f_M$ holds.

Outside the corporation, authorities A are the higher-level inspector of the game. If a case is indeed brought to attention, then A can inspect the situation with effort costs c_A. Again, an inspection reveals the true behavior of E with certainty. If a criminal behavior is determined, then authorities rightfully impose fines upon E and M. Let A be motivated to avoid an outcome where non-compliant behavior remains unpunished.[2] Thus, in case of a correct decision, she receives a utility of zero, and $-d$ otherwise. This implies that the incentive problem for the higher-level inspector is perfectly solved. This allows us to focus on the application of internal control measures and compliance in the corporation when

[1] Detecting non-compliance of E by own internal controls and audits can be beneficial to the company irrespective of the laws. To capture this, simply consider c_M as the net-effect of the manager´s inspection effort. $c_M > 0$ must hold in our setup, otherwise 'inspection' is the dominant strategy for M, i.e. the ideal world where internal controls are always applied as the strategic dilemma of the inspection game dissolves.

[2] Note that this is identical to the avoidance of decision errors in general, given that the inspection effort always reveals the true behavior of E with certainty.

authorities are only motivated to enforce the law. Given that the head of a public authority is usually nominated by the government, we can imagine that A´s preferences should be aligned (to some extent) to the preferences of society. Lastly, inspections are always preferred to enforcement errors, i.e. $c_A < d$ always holds.

However, authorities A have a disadvantage in information acquisition in the field of corporate crime. We try to capture this with the following two specifications. First, authorities may hardly learn about a crime when M does not report it, and false accusations might distract authorities' attention. We thus assume that, given M does not file a report, A receives the case only with positive probability by an unknown source (e.g., the media, a whistle blower, a witness, or a victim). If E committed a crime and M did not report, then A learns of that behavior with probability $(1-\beta)$. If E followed the rules and M did not report, A receives a (wrongful) allegation with probability α. Only then, A can inspect the situation with effort costs c_A, and potentially penalize wrongdoers. Second, we assume that it is easier for the corporation itself to identify non-compliance within the firm than it is for outsiders. To account for this disadvantage, we stylize the effort costs for inspecting the employee to be higher for authorities, thus $c_A > c_M$ applies.

Furthermore, we assume that all players are risk-neutral and are inclined to maximize their expected payoffs. All this is common knowledge.

The non-cooperative game is depicted in *Fig. 1* and consists of three stages: the employee decides whether to comply with the law or behave illegally at stage 1. Then, unable to observe the behavior of the employee directly, the manager as lower-level inspector can decide at stage 2 whether to examine the behavior of the employee. When the manager applies these internal control measures, the game ends, and a non-compliant employee is reported to authorities. If the manager does not monitor the employee´s behavior, then the case is brought to the attention of authorities with positive probability (stage 3). Authorities as higher-level inspectors decide whether to exert costly effort and examine the case. Only in the case of investigations do they impose sanctions for the revealed non-compliant behavior.

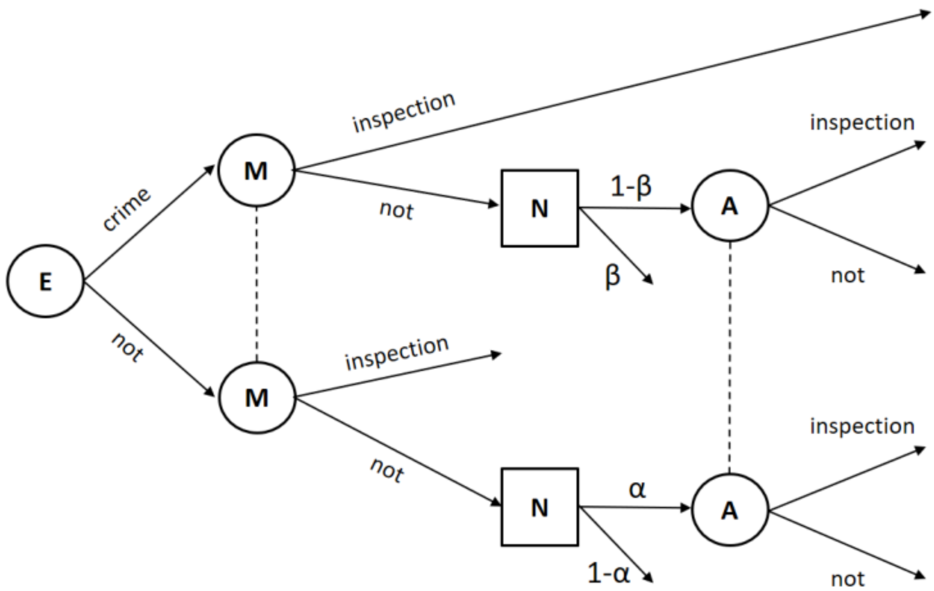

Figure 1. The Timing of the Game.

3. NORMATIVE ANALYSIS AND INTERNAL CONTROLS

In the following, we study this three-player inspection game from a normative perspective to derive some first implications for legal policy. In particular, we seek to determine under what conditions it is desirable for society that M applies internal controls and thus exerts costly inspection effort. This finding would then explain the negligence-standard for a corporate liability regime. Under such a regime, the corporation should only be liable for the criminal behavior of its employee if it had not applied the required control measures even though this would have been beneficial for society. In order to apply the normative perspective on this three-player game in which "*crime*" implies a (partial) externality, we make the following assumptions: (i) Given the higher inspection costs, it can never be desirable for society that A inspects instead of M. Furthermore, M represents the "agent of society" in the prosecution of crime, and should (ideally) be incentivized accordingly. In this regard, we will not consider A´s individual payoffs for the normative analysis.

(ii) For society, the social loss through crime is fully compensated if and only if the criminal action is detected and punished. If the crime remains unobserved, social damage remains $-x$. Given these considerations, this leads to the following social outcome, as displayed by *Fig. 2*.

		Employee	
		crime	not
Manager	inv	$-c_M$	$-c_M$
	not	$-x$	0

Figure 3. Normative Analysis.

In the line with the standard findings in the inspection game literature, the outcome *(not, not, not)*, i.e. where the law is obeyed and no inspection costs are required, is efficient.[3] However, as such a combination of strategies will usually not be a Nash equilibrium in inspection games, we are concerned with outcomes where crime occurs with a positive

[3] Be reminded that $b < x$ always applies.

probability $\phi_E > 0$. Internal inspections by M are then desirable for society if only the condition $-c_M \geq \phi_E(-x)$ holds. Trivially, internal controls should be applied if

$$\phi_E \geq \frac{c_M}{x} \tag{1}$$

Inequality (1) implies that the desirability of inspections by M are dependent on the inspection costs c_M, and the social cost of crime x.[4] The interpretation is clearly reminiscent of the *Learned Hand-formula*[5]: effort is desirable for society, when monitoring costs (c_M) are lower than the expected costs of damage ($\phi_E \cdot x$). Consequently, condition (1) defines the minimum probability of crime (or crime rate) where society would want M to apply internal controls. This implies that a failure to monitor the employee, i.e. "inspect" is not played although (1) is fulfilled, could then be interpreted as negligent behavior by the corporation.

3. EQUILIBRIA AND CORPORATE LIABILITY

We now look at the equilibria of the inspection game.[6] In the following, we apply the concept of perfect Bayesian equilibrium (PBE) as follows: a PBE consists of the strategies $\{s_E; s_M; s_A\}$, with the strategy sets $s_E \in ["crime"; "not\ crime"]$, $s_M \in$

[4] If we ignored the externality of crime and simply considered the costs of error d, then the condition would simply change to $\phi_E \geq \frac{c_M}{d}$. However, we think that the above mentioned assumptions (i) and (ii) are more appropriate for the normative perspective and to derive a negligence standard.

[5] See *United States vs. Caroll Towing Co* (1947). As a notable distinction, the Learned Hand-formula studies under what condition is effort to prevent a damage desirable.

[6] See Annex 1 for the normal form of the 2x2x2 game.

$["inspect"; "not\ inspect"]$ and $s_A \in ["inspect"; "not\ inspect"]$, and the players´ beliefs $\mu_M = prob("crime")$ and $\mu_A = prob("crime" \,|"not\ inspect")$ about the probability that the employee committed a crime "such that, at any stage of the game, strategies are optimal given the beliefs, and the beliefs are obtained from the equilibrium strategies and observed action using Bayes´ rule" (FUDENBERG/TIROLE 1999, p. 326). The Three-player inspection game has one equilibrium in pure strategies and one equilibrium in mixed strategies.

Proposition 1. *Strategies* $\{"crime"; "not\ inspect"; "inspect"\}$ *and beliefs* $\mu_M = 1$ *and* $\mu_A = 1$ *constitute a PBE if* $b > (1-\beta)f_e$ *and* $c_M \geq (1-\beta)f_M - f_M^*$ *apply.*

This pure-strategy equilibrium means that the employee always violates the rules, M remains inactive and authorities inspect (and punish) the employee whenever the case is brought to their attention. For the non-compliant employee, this can only be favorable when the expected punishment is lower than the private benefit of crime. As authorities may not notice E's criminal behavior with probability β, the punishment f_E may be insufficient to incentivize E to follow the rules when β is large. For the corporation, "not inspect" is favorable despite the inspection by authorities if monitoring costs for the manager exceed the expected punishment discount via self-reporting, adjusted for the lower probability of trial when remaining silent and not reporting the crime.

In addition to this equilibrium in pure strategies, this inspection game shows potential equilibria in mixed strategies, i.e. when the players choose each of their pure strategies with positive probability. We thus specify as follows: E commits a crime with positive probability ϕ_E, M inspects this behavior with positive probability ϕ_M, and A inspects a report with positive probability ϕ_A (if her information set is reached). We begin with the following corollary.

Corollary. A mixed strategy equilibrium where either (i) M always monitors E, (ii) where A never investigates the case or where (iii) E choose a pure strategy cannot exist.

The reasoning is straightforward: when M always monitors, E receives a certain punishment when choosing "*crime*". Given $f_E \geq b$ holds by assumption, she will play the pure strategy "*no crime*", and a mixed strategy outcome cannot exist. If A never investigates a case, M will never be punished if criminal behavior within the corporation is not reported to authorities. Thus, M will strictly prefer the costless pure strategy "*not inspect*", and again, the third player cannot randomize between her pure strategies. Similarly, if E always chooses to comply with the rules, neither A nor M are inclined to inspect the case. If the pure strategy "*crime*" is chosen in equilibrium, then Proposition 1 must apply. To identify the mixed strategy equilibria, we further make the following considerations:

Authorities are made indifferent between "*inspect*" and "*not inspect*" if the manager randomizes between inspecting and not inspecting the employee, and the employee randomizes between crime and compliance to the law such that the condition $-\phi_E(1-\phi_M)[(1-\beta)c_A+\beta d]-(1-\phi_E)(1-\phi_M)\alpha c_A=-\phi_E(1-\phi_M)d$ holds. Solving for ϕ_E defines the probability of E choosing "*crime*" to make A indifferent in equilibrium, and this gives

$$\phi_E^* = \frac{\alpha c_A}{(1-\beta)d-(1-\alpha-\beta)c_A} \tag{2}$$

In other words, equation (2) yields the probability of crime in equilibrium.[7] Remarkably, the behavior of the employee in equilibrium is not affected by the (expected) strategic choices of the other two players. The probability of "*crime*" increases when inspection costs are higher for authorities or when more false allegations are reported and decreases with the authority´s sensitivity to enforcement errors and when more cases are reported correctly to authorities.

The manager is made indifferent between "*inspect*" and "*not inspect*" if the probability of committing a crime and the probability of inspections by authorities enable $\phi_E(\gamma x + c_M + f_M^*) + (1-\phi_E)c_M = \phi_E(\gamma x + \phi_A(1-\beta)f_M)$ to hold. Solving for ϕ_A, we find the probability of inspections by authorities that turn the manager indifferent, as

$$\phi_A^*(\phi_E) = \frac{\phi_E f_M^* + c_M}{\phi_E(1-\beta)f_M} \tag{3}$$

Evidently, authorities will have to inspect more cases in equilibrium if monitoring costs for the manager are high and sanction discounts for monitoring managers are low (i.e., f_M^* is high and close to f_M). A higher probability of observing unreported cases and higher sanctions for careless managers reduce the required inspection effort by A. Furthermore, the equilibrium probability is between zero and one, if and only if

$$c_M < \phi_E[(1-\beta)f_M - f_M^*]. \tag{4}$$

Condition (4) is reminiscent of the requirement for the pure strategy outcome: the manager will have only an incentive to monitor her employee if the (expected) benefit of

[7] The probability is between zero and one as $d > c_A$ always holds in our model.

reporting non-compliant employee exceeds certain effort costs. As crime only occurs with positive probability, this condition is more likely to hold when the crime rate ϕ_E is higher. Otherwise, managers always stay silent.

Lastly, the employee is made indifferent between "*crime*" or "*no crime*" if both inspectors randomize between monitoring the behavior and applying no control effort, as $\phi_M(b - f_e) + (1 - \phi_M)\phi_A(b - (1 - \beta)f_e) + (1 - \phi_M)(1 - \phi_A)b = 0$ holds. Thus, the combination of monitoring probabilities by the two inspectors, ϕ_M and ϕ_A, also has to satisfy this condition in equilibrium. Rearranging for ϕ_M, we find E to be indifferent for

$$\phi_M = \frac{b - \phi_A(1-\beta)f_E}{f_E - \phi_A(1-\beta)f_E} \tag{5}$$

Given the probability of internal inspections by M, ϕ_M, we can derive a further requirements for the three-player mixed-strategy outcome: For (5) to be between zero and one, a non-negative numerator requires the condition

$$b > \phi_A(1 - \beta)f_E \tag{6}$$

to hold. This implies that the employee would always choose the pure strategy "*crime*" if only authorities inspected the behavior with positive probability, ϕ_A, and the expected punishment were too low compared to the private gains. Consequently, $\phi_M > 0$ has to apply in equilibrium when (6) holds.

Using conditions (3) and (5), we can now determine the probability that the manager monitors her employee in equilibrium as

$$\phi_M = \frac{\phi_E(bf_M - f_E f_M^*) - f_E c_M}{\phi_E(f_E f_M - f_E f_M^*) - f_E c_M} \quad (7)[8]$$

Given these considerations, we can identify the following mixed strategy outcomes where all three players randomize.

Proposition 2. *The following mixed strategy equilibria exist:*

(2.1) $\phi_E^{2.1} = \frac{\alpha c_A}{(1-\beta)d-(1-\alpha-\beta)c_A}$, $\phi_M^{2.1} = \frac{\phi_E(bf_M - f_E f_M^*) - f_E c_M}{\phi_E(f_E f_M - f_E f_M^*) - f_E c_M}$ *and* $\phi_A^{2.1} = \frac{\phi_E f_M^* + c_M}{\phi_E(1-\beta)f_M}$, *which requires* $c_M < \phi_E[(1-\beta)f_M - f_M^*]$ *and* $c_M < \phi_E\left[\frac{b}{f_E} f_M - f_M^*\right]$.

(2.2) $\phi_E^{2.2} = \frac{\alpha c_A}{(1-\beta)d-(1-\alpha-\beta)c_A}$, $\phi_M^{2.2} = 0$ *and* $\phi_A^{2.2} = \frac{b}{(1-\beta)f_E}$ *which requires the conditions* $b < (1-\beta)f_E$ *and* $c_M > \phi_E\left[\frac{b}{f_E} f_M - f_M^*\right]$ *hold.*

(2.3) $\phi_E^{2.3} = \frac{c_M}{(1-\beta)f_M - f_M^*}$, $\phi_M^{2.3} = \frac{b-(1-\beta)f_E}{\beta f_E}$ *and* $\phi_A^{2.3} = 1$ *if the conditions* $b > (1-\beta)f_E$, $c_M < (1-\beta)f_M - f_M^*$ *and* $\phi_E^{2.3} > \phi_E^{2.1}$ *holds.*

Plainly, a mixed strategy outcome exists where all there players randomize, while in the other two outcomes either A always chooses "*inspect*" or M never does. It is insightful to distinguish the occurrence of these equilibria from the pure strategy outcome. Consider *Proposition 1* and allow its second precondition to fail, i.e. $c_M < (1-\beta)f_M - f_M^*$ applies instead. In other words, the monitoring costs c_M are lower than the gain from self-disclosure for M. This leads to equilibrium (2.3) where A always investigates cases and stipulates punishments in case of "crime". However, given the strong incentive for "crime" of A, the pure strategy of A is not sufficient to turn the employee indifferent, and thus M play "*inspect*" with positive probability. If we departed *Proposition 1* by allowing its first precondition to fail instead, i.e. $b < (1-\beta)f_E$, this would lead to equilibrium (2.2). Then,

[8] Note that ϕ_M can never equal one given $b < f_E$.

monitoring costs are too high for M to pay off, so M does never report "*crime*". Given the lower private gains through non-compliance for E, however, it is sufficient that A (E) randomizes to make E (A) indifferent between pure strategies. Only when monitoring costs c_M are sufficiently low will equilibrium (2.1) occur where all three players randomize.

As we seek to study the effort coordination between the manager and authorities, we will focus on the mixed strategy outcome (2.1) where all three players randomize. The comparative statics (see Fig. 4) tells us then how the equilibrium efforts of the two inspectors react to changes in sanctions and effort costs. Given our normative findings, it is intended to shift inspection effort to M. This now implies that higher sanctions on M (or higher sanction discounts for M for applied controls) and lower managerial control costs lead to a higher rate of managerial inspections. Be reminded that changes in the sanction does not affect the equilibrium rate of crime in the equilibrium (2.1) when all players randomize, as any increase or decrease in punishment will be fully internalized by changes in the monitoring probability of the two inspectors. In contrast to standard inspection games where the rate of criminal behavior is independent in equilibrium from stipulated punishments, our analysis shows that this does not necessarily carry over to three-player inspection games and our setup of corporate criminal behavior. If equilibrium (2.3) occurs due to high private value of criminal action, $b > (1 - \beta)f_E$, then a higher benefit from self-disclosure by M or lower effort costs do indeed reduce the crime rate in equilibrium. Furthermore, a sufficiently high punishment for E ensures that the pure strategy outcome and equilibrium (2.3), both featuring a higher crime rate, do not occur. In addition, reducing court errors (α, β) leads to better deterrence of crime, c.p. relieves the monitoring M and makes the effort of A more effective. Higher punishments for E save effort costs from the other players, who completely internalize the behavioral effect of the more severe sanction.

	α	β	f_E	f_M	f_M*	c_A	c_M
ϕ_E	+	+	0	0	0	+	0
ϕ_M	+	+	-	+	-	+	-
ϕ_A	-	-	-	-	+	-	+

Figure 4. Comparative Statics when all players randomize.

4. EXTENSION: 'JUSTICE IS BLIND'

So far, we have considered a three-person inspection game where corporate management and public authorities are able both to uncover a criminal action, but authorities suffer from a disadvantage in investigation costs and their limited ability to select potential cases on their own. Now consider the stronger restriction that authorities can still enforce criminal law on all economic agents but are unable to uncover the truth without the help of the corporation. For our setup, authorities are no longer an inspector in the tradition of inspection games, but a mere enforcer who only chooses between the strategies "*punish*" and "*not punish*" at the game. Being benevolent by assumption, A still cares about decision errors. Nevertheless, note that a corporation that applies control measures and thus reports crime to authorities still receives a correct decision by A. In this modified game, there are two equilibria in pure strategies, although only one equilibrium is credible.[9]

[9] See Annex 3 for the normal form of the amended game.

Proposition 3. (i) *Strategies* $\{"crime"; "not\ inspect"; "punish"\}$ *and beliefs* $\mu_M = 1$ *and* $\mu_A = 1$ *constitute a PBE if* $b > (1-\alpha-\beta)f_E$ *and* $c_M \geq (1-\beta)f_M - f_M^*$ *apply.* (ii) *Strategies* $\{"not\ crime"; "inspect"; "punish"\}$ *and beliefs* $\mu_M = 0$ *and* $\mu_A = [0,1]$ *constitute a PBE if* $c_M \leq \alpha f_M$ *apply. This PBE is not sequentially rational.*

Evidently, the impact of authority´s inability to verify corporate crime on the pure strategy outcome is limited: the requirements for the inefficient strategy set $\{"crime"; "not\ inspect"; "punish"\}$ are only marginally changed compared to the basic model. A second PBE has to be discarded, as it is never credible that authorities will punish the employee who chooses to comply to the rules.

Proposition 4. *The following mixed strategy equilibria exist:*

(4.1) $\phi_E^{4.1} = \frac{\alpha}{1-\beta+\alpha}$, $\phi_M^{4.1} = \frac{bf_M[\phi_E^*(1-\alpha-\beta)+\alpha]-(\phi_E^* f_M^* + c_M)(1-\alpha-\beta)f_E}{f_E f_M[\phi_E^*(1-\alpha-\beta)+\alpha]-(\phi_E^* f_M^* + c_M)(1-\alpha-\beta)f_E}$ *and* $\phi_A^{4.1} = \frac{\phi_E^* f_M^* + c_M}{(\phi_E^*(1-\alpha-\beta)+\alpha)f_M}$, *which requires* $c_M < \phi_E[(1-\alpha-\beta)f_M - f_M^*] + \alpha f_M$.

(2.2) $\phi_E^{4.2} = \frac{\alpha}{1-\beta+\alpha}$, $\phi_M^{4.2} = 0$ *and* $\phi_A^{4.2} = \frac{b}{(1-\alpha-\beta)f_E}$ *which requires the conditions* $b < (1-\alpha-\beta)f_E$ *and* $c_M > \phi_E[(1-\alpha-\beta)f_M - f_M^*] + \alpha f_M$ *hold.*

(2.3) $\phi_E^{4.3} = \frac{c_M - \alpha f_M}{(1-\alpha-\beta)f_M - f_M^*}$, $\phi_M^{4.3} = \frac{b-(1-\alpha-\beta)f_E}{(\alpha+\beta)f_E}$ *and* $\phi_A^{4.3} = 1$ *if the conditions* $b > (1-\alpha-\beta)f_E$, $c_M < (1-\beta)f_M - f_M^*$ *and* $\phi_E^{4.3} > \phi_E^{4.1}$ *holds.*

The equilibrium in mixed strategies shows several interesting features: first, the rate of crime is now fully determined by the relative probabilities of errors and no longer contingent on authority´s distaste for error. This means that the higher the probability of false accusations relative to all reports filed, the higher the crime rate. Second, the probability of punishment by authorities is lower c.p. compared to the rate of investigations by authorities who can inspect a case. However, now both types of court errors occur with positive probability. Third, the probability of internal controls by the management c.p. is higher when 'Lady Justice' is blind. This is not surprising, given that in the extended model, the firm can suddenly suffer from false allegations and punishments (type I errors). The only way to avoid such costs is to increase the level of internal controls.

5. DISCUSSION

Our analysis yields some relevant insights:

First, only a composite liability regime where both the employee and the (inactive) management are punished can reduce crime rates. If there were no punishment for the non-compliant employee, crime would always occur. Furthermore, it is not sufficient to simply punish firms for corporate crime, but to reduce penalties in case of internal control measures and self-disclosure. Otherwise, firms are not incentivized to disclose information to authorities, and the gain of internal control measures might be too low to be pursued.

Second, we find that a negligence rule for corporate liability is superior to strict liability when the crime rate is significant. As monitoring effort by the management is only justified if the expected costs of crime are sufficiently high, only a negligence rule provides proper incentives. When monitoring is desirable for society, self-disclosing firms who cooperate with authorities should reduce significant penalty reductions, and this motivates internal control effort to the fullest extent. However, when crime is a rare event, the social effect becomes more ambiguous. Even though the increase (reduction) of penalties on the firm can induce higher (lower) control effort, this effect will always be compensated by the monitoring behavior of authorities in equilibrium. That is, if the monitoring effort by the management is reduced, the more costly effort by authorities will increase, and the crime rate is unaffected by this.

Third, a scenario where authorities who cannot verify corporate crime without the help of the firm itself, might actually lead to higher monitoring effort by firms. Clearly, such a blind 'Lady Justice' also generates additional costs through court errors, and the net effect for society stays ambiguous. Furthermore, this finding rests on the assumption that authorities, even though unable to reveal the agent´s true behavior, can still impose the punishment in legal proceedings. It is rather doubtful whether this is plausible for proceedings in many democratic countries. Nevertheless, this scenario still illustrates that the informational disadvantage of the enforcer can to some extend also pose a credible threat for inactive managements.

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ANNEX 1

Normal form of the 2x2x2 game:

Employee: ***crime***		**Authorities**	
		inspect	not
Manager	inspect	0 $b - f_E$ $-\gamma x - c_M - f_M^*$	0 $b - f_E$ $-\gamma x - c_M - f_M^*$
	not	$-(1-\beta)c_A - \beta d$ $b - (1-\beta)f_E$ $-\gamma x - (1-\beta)f_M$	$-d$ b $-\gamma x$

Employee: ***not***		**Authorities**	
		inspect	not
Manager	inspect	0 0 $-c_M$	0 0 $-c_M$
	not	$-\alpha c_A$ 0 0	0 0 0

ANNEX 2

<u>Proof Proposition 1.</u> Given the strategies of the other players, E prefers "crime" to "not crime" if $b - (1-\beta)f_e \geq 0$. This can be rearranged to $b \geq (1-\beta)f_e$. Furthermore, A must prefer "inspect" over "not inspect, given the other players´ strategies. The equation $-(1-\beta)c_A - \beta d \geq -d$ is always fulfilled under the assumption $d > c_A$. Lastly, M must prefer "not inspect" over "inspect", which applies if $-(1-\beta)f_M \geq -c_M - f_M^*$, which is rearranged to $c_M \geq (1-\beta)f_M - f_M^*$. ■

<u>Proof Proposition 3.</u> (i) Given the strategies of the other players, E prefers "crime" to "not crime" if $b - (1-\beta)f_e \geq -\alpha f_E$. This can be rearranged to $b \geq (1-\alpha-\beta)f_e$. Furthermore, A must prefer "punish" over "not punish, given the other players´ strategies. The always holds for $\beta > 0$. Lastly, M must prefer "not inspect" over "inspect", which applies if $-(1-\beta)f_M \geq -c_M - f_M^*$, which is rearranged to $c_M \geq (1-\beta)f_M - f_M^*$. (ii) M prefers "inspect" to "not inspect" if $-c_M \geq -\alpha f_M$, which gives $c_M \leq \alpha f_M$. A is indifferent between her strategies. E will always choose "not crime" for $b < f_E$ by assumption. Beliefs of A are not defined by the concept of PBE, because her information set is never reached in equilibrium. It is however straightforward to see A would never choose "punish" if the case was reported, due E played "not crime". This strategy combination is thus not sequentially rational. ■

ANNEX 3

Normal form of the 2x2x2 game when 'authorities are blind':

Employee: ***crime***		**Authorities**	
		punish	not punish
Manager	inspect	0 $b - f_E$ $-\gamma x - c_M - f_M^*$	0 $b - f_E$ $-\gamma x - c_M - f_M^*$
	not	$-\beta d$ $b - (1-\beta) f_E$ $-\gamma x - (1-\beta) f_M$	$-d$ b $-\gamma x$

Employee: ***not***		**Authorities**	
		punish	not punish
Manager	inspect	0 0 $-c_M$	0 0 $-c_M$
	not	$-\alpha d$ $-\alpha f_e$ $-\alpha f_M$	0 0 0

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