Cover-ups

Francis Bloch and Rachel Kranton*

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Abstract: Cover-ups are a continual feature of the corporate and organizational landscape. This paper studies executives' optimal cover-up strategies in the face of penalties and strategic outside parties who investigate malfeasance. The analysis shows successful cover-ups beget future cover-ups, due to the rationally evolving beliefs of investigators. Unanticipated shocks such as #MeToo increase the likelihood of firing of a malfeasant employee, but (relatively) increase incentives to cover up in the future. Executives benefit from failed investigations, but they prefer facing prosecutors who do not know the investigation history when investigation costs are likely to be high, as with child victims.

*Bloch: Paris School of Economics and Université Paris 1 Panthéon Sorbonne, francis.bloch@psemail.eu; Kranton: Duke University, rachel.kranton@duke.edu. Kranton thanks the Economics Department of Sciences Po for its hospitality. We are grateful to seminar participants at Columbia and Duke Law School for their comments.

1 Introduction

Cover-ups are a continual feature of corporate and organizational landscapes. University athletic directors cover up sexual abuse by coaches and team doctors.[1] Leaders of the Catholic Church hide priests' pedophilia and reassign clergy to new parishes.[2] Automobile executives conceal software that beats emissions tests.[3] This paper formally studies executive decisions to cover up employee malfeasance in the face of legal or other external investigations over time.

The model captures the main features of cover-up scandals. In the first instance, a valuable employee commits an illegal or unethical act. The act harms third parties, but hiding the crime and continuing to employ the perpetrator benefits the organization. Executives who learn of the act decide how to proceed, and outside parties such as social workers, legal authorities, or the press who see signs of malfeasance decide whether or not to investigate. In many cases, the crime is repeated and decisions to cover up and decisions to investigate are made multiple times. In the cases cited above, the crime(s) and cover-up(s) are eventually discovered, and the organization's executives are punished.

The analysis of our model with rational *executives* and *prosecutors* sheds light on the dynamics of cover-ups and investigations. First, in any given period, organizational self-policing and external investigation are strategic substitutes; the greater the probability an executive reveals the crime, the lower is prosecutorial effort. Over time, an executive who covers up and whose cover-up is not discovered faces less skeptical investigators in

[1] See, e.g., Freeh (2012) for Gerald Sandusky at Penn State; Kirby (2018) and Kozlowski (2018) for Larry Nassar at Michigan State and USA Gymnastics .

[2] See, e.g., Rezendes (2002) for the Boston Archdiocese and Bonnefoy (2018) for Chile.

[3] See Leggett (2018) for details of the Volkswagen deception.

the future. Thus, successful cover-ups beget future cover-ups.

Second, several features of the environment alter these dynamics. Increasing penalties for multiple periods of cover-up and a finite time horizon (as, say, an employee approaches retirement) can reduce cover-ups relative to the baseline. Increased public approbation for turning a blind eye to abuse (such as #MeToo) leads to greater organizational self-policing. However, this tendency is attenuated by lower rates of current and future prosecutorial investigation.

Third, executives can have greater incentive to cover up when investigators do not know whether previous investigations have taken place. Often investigators such as prosecutors and parents who strive to prove abuse are not aware of others' previous efforts. For the the executive, there is actually a benefit from a commonly-known failed investigation; future investigators have lower belief that the executive is covering up a crime. But this benefit does not translate into lower likelihood of future investigation when low investigation costs are not likely, as when, say, victims are children. Thus executives are "effectively risk-averse," preferring ignorant future prosecutors, when investigation costs are more likely to be high than low.

The paper relates to several literatures. The paper contributes to the study of agency problems in organizations. In much work, an agent can take an action which harms the firm, and the principal constructs a contract to better align the agent's interests, possibly considering supervisor-agent collusion (see, e.g., Laffont and Martimort (2002) and Bolton & Dewatripont (2005) for reviews). In the present paper, the agent is a valuable employee whose action harms a third party.

Second, the model relates to theories of whistleblowing and of self-regulatory organizations (SRO's). A whistleblowing employee faces retaliation from peers or supervisors for revealing malfeasance to outside authorities (e.g., Friebel and Guriev (2012), Felli and Hortala-Vallve (2017)). An SRO signals to consumers its vigilance in monitoring member firms (Núñez (2007)). In the present paper, the firm's principal decides whether to reveal malfeasance and gains from hiding the evidence.[4]

Finally, the paper contributes to the law and economics discussion of the "escalating fines puzzle." In much of this literature, the probability of being caught is fixed and exogenous (e.g., Polinsky & Shavell (2007), Buehler & Eschenbaum (2019)). In Dana (2001), agents also have an "optimism bias" if they are not caught in the first period; escalating penalties counter this optimism. In the present paper, the executive and prosecutors are rational and strategic; the probability of detection is endogenous and beliefs evolve according to Bayes' rule. After a successful cover-up, future prosecutors are less likely to investigate and, absent increasing penalties, a rational executive has greater incentive to cover up.

The paper proceeds as follows: Section 2 models executive-prosecutor interaction, solves for the equilibrium, and studies shocks to the environment. Section 2.4 considers information structures. Section 4 applies the analysis to cover-up cases. The Conclusion outlines future research directions.

[4]The present paper's setting is also distinct from "inspection games," where a principal and an inspector play a discrete, simultaneous move stage game (violation/no violation, inspection/no inspection) with no dynamic evolution of beliefs. See e.g., Avenhaus, von Stengel and Shmuel Zamir (2002), and von Stengel (2016).

2 A Model of Cover-ups

2.1 Executive and Prosecutor Interaction and Payoffs

Consider time periods $t = 0, 1, 2, ..., T$, a series of short-lived period-t *prosecutors*, and a long-lived *executive* whose employee is possibly a *perpetrator*, i.e., someone who commits abuse, falsifies tests, or otherwise harms third parties. The ex ante probability the employee is a perpetrator is γ_0,[5] which, like all parameters, is common knowledge. In $t = 0$ the executive verifiably observes the employee is a perpetrator.

The Figure below illustrates the interaction between the executive and each prosecutor-t. In each period, the executive decides to report or to retain the employee, where retention involves covering up the crime. If the exective retains/covers up, he earns publicly known gains Ω_t and privately known gains which are a random variable $\widetilde{\omega}_t$ distributed over $(-\infty, +\infty)$ with continuously differentiable distribution R. The executive learns realization ω_t before making his decision. If the executive reports the employee, the executive earns zero in t and incurs "amnesty" penalty f_t^a for reporting in period t but covering up in the previous $t-1$ periods. We assume $f_1^a = 0$ and $f_t^a \geq f_{t-1}^a$.

Next, if the executive retains the employee, prosecutor-t decides whether to investigate. Prosecutors do not coordinate investigation strategies; however, prosecutor-t might know of previous investigations. Let $\iota_t \in \{0, 1\}$ be an indicator variable with $\iota_t = 1$ indicating an investigation occured in t and $\iota_t = 0$ otherwise. In the base case, prosecutor-t knows $(\iota_1, ...\iota_{t-1})$.

[5] The employee has a fixed type; we do not consider employee incentives to commit abuse.

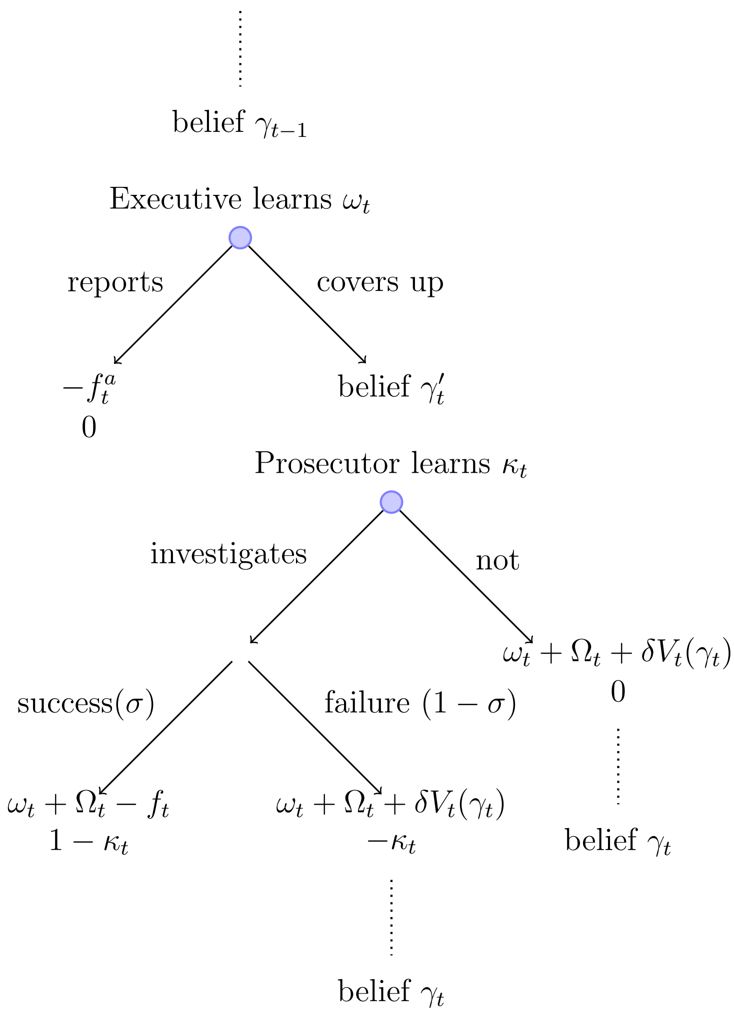

Figure: Period-t game

Prosecutor-t's decision rests on her beliefs at the beginning of period t, labeled γ_{t-1}, an updated belief upon seeing the employee remaining in the organization in t, labeled γ'_t, and her investigation cost. This cost is a random variable $\widetilde{\kappa}_t \in [0,1]$ with continuously differentiable distribution H capturing, say, the credibility of victims or witnesses. Given beliefs and the private realization κ_t, prosecutor-t decides whether or not to launch an investigation which reveals the crime and coverup of a perpetrator with probability σ. Prosecutor-t earns payoff normalized to 1 if an investigation uncovers a perpetrator and earns zero otherwise. The executive incurs penalty f_t if prosecutor-t discovers the crime/coverup. We assume $f_t \geq f_{t-1}$ so the executive faces higher penalties the longer he retains the employee. Furthermore, $f_t \geq f_t^a$.

The executive's payoffs are the discounted sum of payoffs obtained in $t = 1, 2, ..., T$, with discount factor $\delta \in (0,1)$.

2.2 Period-t Equilibrium

We solve for the perfect Bayesian equilibrium, henceforth simply "equilibrium," of the game between the executive and a period-t prosecutor. Section 2.3 derives the equilibrium of the T-period game, comparing finite and infinite time horizons.

Starting from the end of period t, let $V_t(\gamma_t)$ denote the executive's continuation value, which depends on γ_t. Assume, for the moment, that V_t decreases in γ, which will be the case in the unique equilibrium of the T-period game. We suppose that for all t, $f_t\sigma + \delta V_t(\gamma) - \delta(1-\sigma)V_t(\gamma\frac{1-\sigma}{1-\sigma\gamma}) > 0 \ \forall \ \gamma \in [0, \gamma_0]$, guaranteeing the executive prefers not to be caught by the prosecutor.

Consider prosecutor-t's decision, the last move in period t. For realized cost κ_t, prosecutor-t earns $\gamma_t'\sigma - \kappa_t$ from investigating and therefore investigates if and only if $\kappa_t \leq \gamma_t'\sigma$. Thus, prosecutor-$t$ has threshold cost

$$k_t \equiv \gamma_t'\sigma, \tag{1}$$

below which she investigates; the probability of investigation is $H(\gamma_t'\sigma)$.

Moving backward, consider the executive's period-t decision. If he fires the employee, the executive suffers penalty $-f_t^a$. If the executive covers up/retains the employee, the executive earns $\omega_t + \Omega_t$ and is investigated with probability $H(\gamma_t'\sigma)$. With probability σ, an investigation reveals the coverup, and the executive incurs penalty f_t. With probability $1-\sigma$, the cover-up is successful, and the executive earns $V_t(\gamma_t)$. If an investigation occurred but was not successful, by Bayes' rule $\gamma_t = \gamma_t' \frac{1-\sigma}{1-\sigma\gamma_t'}$. If no investigation occurred, $\gamma_t = \gamma_t'$. Altogether, the executive earns expected net payoffs from covering-up, denoted Π_{C_t}:

$$\Pi_{C_t} = \omega_t + \Omega_t - H_t(\gamma_t'\sigma)\sigma f_t + H_t(\gamma_t'\sigma)(1-\sigma)\delta V_t\left(\gamma_t' \frac{1-\sigma}{1-\sigma\gamma_t'}\right) + (1 - H_t(\gamma_t'\sigma))\delta V_t(\gamma_t').$$

The executive covers up in t if and only if $\Pi_{C_t} \geq -f_t^a$. Hence, the executive has an optimal cutoff revenue, denoted w_t, above which he covers up:

$$w_t \equiv -f_t^a - \Omega_t + H(\gamma_t'\sigma)\sigma f_t - H(\gamma_t'\sigma)(1-\sigma)\delta V_t\left(\gamma_t' \frac{1-\sigma}{1-\sigma\gamma_t'}\right) - (1 - H(\gamma_t'\sigma))\delta V_t(\gamma_t'). \tag{2}$$

Finally, prosecutor-t's belief γ_t' must be consistent with this cutoff according to Bayes' rule. Given prior γ_{t-1}, posterior γ_t' if the employee remains in the organization is

$$\gamma_t' = \frac{\gamma_{t-1}[1 - R(w_t)]}{1 - \gamma_{t-1}R(w_t)}. \tag{3}$$

Combining (1), (2), and (3), we solve for the best replies and the period-t equilibrium. With $k_t \equiv \gamma_t'\sigma$, substituting into beliefs (3) we write prosecutor-t's best reply as

$$k_t(w_t) = \frac{\sigma\gamma_{t-1}[1 - R(w_t)]}{1 - \gamma_{t-1}R(w_t)}. \tag{4}$$

This best reply gives the first strategic force behind the equilibria. The more an executive "self-polices," the less incentive prosecutor-t has to investigate; $k_t'(w_t)$ is decreasing in w_t. For the executive's best reply, write continuation value V_t where period-$t+1$ strategies and beliefs—w_{t+1}, k_{t+1}, and γ_{t+1}—all depend on γ_t:

$$\begin{aligned} V_t(\gamma_t) \quad = \quad & \int_{-\infty}^{w_{t+1}} -f_{t+1}^a dR(\omega) + \int_{w_{t+1}}^{\infty} [\omega + \Omega_{t+1} - H(k_{t+1})\sigma f_{t+1} \\ & + H(k_{t+1})(1-\sigma)\delta V_{t+1}\left(\gamma_{t+1}' \frac{1-\sigma}{1-\sigma\gamma_{t+1}'}\right) + (1 - H(k_{t+1}))\delta V_{t+1}(\gamma_{t+1}')]dR(\omega). \end{aligned}$$

With $k_t \equiv \gamma_t'\sigma$, $V_t(\gamma_t)$ is rewritten as

$$\begin{aligned} V_t(\gamma_t) \quad = \quad & \int_{-\infty}^{w_{t+1}} -f_{t+1}^a dR(\omega) + \int_{w_{t+1}}^{\infty} [\omega + \Omega_{t+1} + H(k_{t+1})\sigma f_{t+1} 5 \\ & + H(k_{t+1})(1-\sigma)\delta V_{t+1}\left(\frac{k_{t+1}(1-\sigma)}{\sigma(1-k_{t+1})}\right) + (1 - H(k_{t+1}))\delta V_{t+1}\left(\frac{k_{t+1}}{\sigma}\right)]dR(\omega). \end{aligned} \tag{1}$$

The executive's best reply, $w_t(k_t)$, is then simply

$$w_t(k_t) = -f_t^a - \Omega_t + H(k_t) f_t \sigma - H(k_t)(1-\sigma)\delta V_t \left(\frac{k_t(1-\sigma)}{\sigma(1-k_t)} \right) - (1 - H(k_t))\delta V_t \left(\frac{k_t}{\sigma} \right). \quad (6)$$

This best reply gives our second strategic force; the more a prosecutor investigates, the lower is the executive's cover-up incentive; $w_t(k_t)$ is increasing in k_t.

With one increasing and one decreasing continuous best replies, under appropriate boundary conditions, there exists a unique equilibrium in period t (w_t^*, k_t^*) :

Lemma 1 *If $V_t'(\gamma) < 0$ and $f_t\sigma + \delta V_t(\gamma) - \delta(1-\sigma)V_t(\gamma\frac{1-\sigma}{1-\sigma\gamma}) > 0 \ \forall \ \gamma \in [0, \gamma_0]$, there exists a unique t-period equilibrium.*

2.3 Cover-up and investigation over time

We analyze two dynamic games: (i) a benchmark, stationary environment with an infinite horizon, which reveals the fundamental driver of cover-ups over time, and (ii) a non-stationary environment with a finite horizon, which demonstrates possible brakes on those cover-ups.

2.3.1 Stationary Environment and Infinite Horizon

Suppose $T = \infty$ and all benefits and fines—Ω_t, f_t^a and f_t—are independent of t. We show the equilibrium of the game is unique and equilibrium cover-ups increase over time.

The updating of beliefs is at the heart of the cover-up path. As seen in (3) for γ_t' and $\gamma_t = \gamma_t' \frac{1-\sigma}{1-\sigma\gamma_t'}$, if an executive covers up in period $t-1$ and any $t-1$ investigation fails, prosecutor-t believes it is less likely the employee is a perpetrator. Prosecutor-t combines her prior belief with the likelihood the executive had high gains from retaining the employee and the likelihood the previous prosecutor had bad luck in her investigation. Since these events occur with strictly positive probability, γ_t is a strictly decreasing sequence t. Thus, a successful cover-up increases future cover-up incentives.

With time-invariant punishments, on the unique equilibrium path the executive covers up more over time and each prosecutor investigates less often than her predecessor.

Theorem 1 *If* $f\sigma + \delta V(\gamma) - \delta(1-\sigma)V(\gamma\frac{1-\sigma}{1-\sigma\gamma}) > 0 \ \forall \ \gamma \in [0, \gamma_0]$, *there exists a unique equilibrium of the stationary infinite horizon game;* $w_t^* < w_{t-1}^*$ *and* $k_t^* < k_{t-1}^* \ \forall \ t$.

Proof of Theorem 1. Under stationarity, V is independent of t except for γ_t. We show first there exists a finite time S such that $V'(\gamma_t) < 0$ for all equilibrium belief paths starting at any $t \geq S$.

Since (by Bayes' Rule and $\gamma_t \geq 0 \ \forall t$) γ_t is a strictly decreasing bounded sequence in $\Re$, it converges to some limit $\hat{\gamma}$ as $t \longrightarrow \infty$. $V(\hat{\gamma})$ is

$$V(\hat{\gamma}) = \int_{-\infty}^{\hat{w}} -f^a dR(\omega)) + \int_{\hat{w}}^{+\infty} [\omega + \Omega - H(\hat{k})\sigma f + (1 - H(\hat{k})\sigma)\delta V(\hat{\gamma})] dR(\omega). \tag{7}$$

and $\hat{k}$ and $\hat{\gamma}$ are

$$\hat{k} = \sigma\hat{\gamma}$$

and

$$\hat{w} = -f^a + \Omega + H(\hat{k})\sigma f - (1 - H(\hat{k})\sigma)\delta V(\hat{\gamma}).$$

Differentiating to find $V'_+(\hat{\gamma})$:

$$V'_+(\hat{\gamma}) = -[1 - R(\hat{w})]\sigma^2 H'_+(\sigma\hat{\gamma})[-f - \delta V(\hat{\gamma})] + (1 - H(\hat{k})\sigma)\delta V'_+(\hat{\gamma})$$

Rearranging,

$$H(\hat{k})\sigma\delta V'_+(\hat{\gamma}) = -[1 - R(\hat{w})]\sigma^2 H'_+(\sigma\hat{\gamma})[-f - \delta V(\hat{\gamma})].$$

By assumption, $f\sigma + \delta V(\gamma) - \delta(1-\sigma)V(\gamma\frac{1-\sigma}{1-\sigma\gamma}) > 0 \ \forall \ \gamma$, so $f + \delta V(\hat{\gamma}) > 0$. Also, as $H(\cdot)$ is continuously differentiable, $H'_+(\sigma\hat{\gamma}) > 0$, guaranteeing $V'_+(\hat{\gamma}) < 0$.

Next, as $H(\cdot)$ and $R(\cdot)$ are continuously differentiable, w_t^* and k_t^* are continuously differentiable in γ_{t-1}, $V(\cdot)$ is continuously differentiable in γ_t. This implies, as $\lim_{t\to+\infty}\gamma_t = \hat{\gamma}$ and $\lim_{\gamma\to\hat{\gamma}} V'(\gamma) < 0$, there exists an S such that, $\forall \ t \geq S$, $V'(\gamma_t) < 0$.

Now consider some $t \geq S$. We show (1) the dynamic game starting in t has a unique equilibrium and (2) $V'(\gamma_{t-1}) < 0$. Together these results establish, by induction, that the full dynamic game has a unique equilibrium.

(1) Consider prosecutor-t with initial beliefs γ_{t-1} and assume $f\sigma + \delta V(\gamma) - \delta(1-\sigma)V(\gamma\frac{1-\sigma}{1-\sigma\gamma}) > 0 \ \forall \ \gamma \in [0, \gamma_0]$. Substituting executive best reply (6) into prosecutor best reply (4):

$$k_t = \frac{\gamma_{t-1}[1 - R[H(k_t)f\sigma - H(k_t)(1-\sigma)\delta V_t(\frac{k_t(1-\sigma)}{\sigma(1-k_t)}) - (1 - H(k_t))\delta t(\frac{k_t}{\sigma}) - f^a - \Omega]]}{1 - \gamma_{t-1}R[H(k_t)f\sigma - H(k_t)(1-\sigma)\delta V(\frac{k_t(1-\sigma)}{\sigma(1-k_t)}) - (1 - H(k_t))\delta V(\frac{k_t}{\sigma}) - f^a - \Omega]}.$$

Hence, k_t^* solves

$$\Psi(k_t) = 0,$$

where

$$\Psi(k_t) \triangleq \psi(k_t) - k_t,$$

where

$$\psi(k_t) \triangleq \frac{\gamma_{t-1}[1 - R[H(k_t)f\sigma - H(k_t)(1-\sigma)\delta V\left(\frac{k_t(1-\sigma)}{\sigma(1-k_t)}\right) - (1-H(k_t))\delta V\left(\frac{k_t}{\sigma}\right) - f^a - \Omega]]}{1 - \gamma_{t-1}R[H(k_t)f\sigma - H(k_t)(1-\sigma)\delta V\left(\frac{k_t(1-\sigma)}{\sigma(1-k_t)}\right) - (1-H(k_t))\delta V\left(\frac{k_t}{\sigma}\right) - f^a - \Omega]}.$$

Now consider $\psi_t'(k_t)$. The sign of $\psi_t'(k_t)$ is the sign of

$$\begin{aligned} A &= -H'(k_t)\left[f\sigma - (1-\sigma)\delta V\left(\frac{k_t(1-\sigma)}{\sigma(1-k_t)}\right) + \delta V\left(\frac{k_t}{\sigma}\right)\right] \\ &+ (1-\sigma)H(k_t)\delta V'\left(\frac{k_t(1-\sigma)}{\sigma(1-k_t)}\right)\frac{1-\sigma}{\sigma(1-k_t)^2} + (1-H(k_t))\delta V'\left(\frac{k_t}{\sigma}\right)\frac{1}{\sigma}. \end{aligned}$$

The first term is negative by assumption; the second term is negative because $V'(\gamma_t) < 0$. Hence, $\psi(\cdot)$ and $\Psi(\cdot)$ are strictly decreasing functions of γ. In addition

$$\begin{aligned} \Psi(0) &> 0, \\ \Psi(\gamma_0) &< 0, \end{aligned}$$

so there exists a unique k_t^* in $(0, \gamma_0)$ such that $\Psi(k_t^*) = 0$.

By implicit differentiation

$$\frac{\partial k_t^*}{\partial \gamma_{t-1}} = -\frac{\frac{\partial \psi_t}{\partial \gamma_{t-1}}}{\Psi_t'(k_t)} = -\frac{1 - R(w_t)}{\Psi'(k_t)(1 - \gamma_{t-1}R(w_t))^2} > 0.$$

The unique equilibrium threshold w_t^* then solves either

$$k_t^* = \frac{\gamma_{t-1}[1 - R(w_t)]}{1 - \gamma_{t-1} R(w_t)} \tag{8}$$

or

$$w_t = H(k_t^*) f\sigma - H(k_t^*)(1-\sigma)\delta V\left(\frac{k_t^*(1-\sigma)}{\sigma(1-k_t^*)}\right) - (1 - H(k_t^*))\delta V\left(\frac{k_t^*}{\sigma}\right) - f^a - \Omega. \tag{9}$$

(2) Consider $V'(\gamma_{t-1})$. Using (1):

$$\begin{aligned}
V'(\gamma_{t-1}) \quad = \quad & [1 - R(w_t^*)]\left[-H'(k_t^*)\frac{\partial k_t^*}{\partial \gamma_{t-1}}\left[\sigma f - (1-\sigma)\delta V\left(\frac{k_t^*(1-\sigma)}{\sigma(1-k_t^*)}\right) + \delta V\left(\frac{k_t^*}{\sigma}\right)\right]\right] \\
& +[1 - R(w_t^*)]\left[\frac{\partial k_t^*}{\partial \gamma_{t-1}}(1-\sigma)H(k_t^*)\delta V'\left(\frac{k_t^*(1-\sigma)}{\sigma(1-k_t^*)}\right)\frac{1-\sigma}{\sigma(1-k_t^*)^2}\right] \\
& +[1 - R(w_t^*)]\left[(1 - H(k_t)^*)\delta V'\left(\frac{k_t^*}{\sigma}\right)\frac{1}{\sigma}\right]
\end{aligned}$$

Since $\frac{\partial k_t^*}{\partial \gamma_{t-1}} > 0$, and by supposition $t \geq S$ so $V'(\gamma_t) < 0$, we conclude

$$V'(\gamma_{t-1}) < 0.$$

Finally, $k_t^* = \sigma\gamma_t$ is strictly decreasing in t since γ_t is strictly decreasing in t, and in the period-t equilibrium, using (9), if $k_t^* > k_{t+1}^*$ then $w_t^* > w_{t+1}^*$.■

2.3.2 Non-Stationary Environment

We now consider fines that increase over time so the executive faces higher punishments each period he covers up. The horizon is also finite, as for an employee with a retirement date. The proof of equilibrium existence and uniqueness uses backward induction from T in a simple adaption of arguments above. In equilibrium, prosecutors' beliefs fall over time and each prosecutor investigates less than her predecessor. However, the executive's strategy w_t^* is not necessarily decreasing in t since penalties f_t and f_t^a are increasing and, with finite horizon, the continuation value of the employee's services falls over time.

Proposition 1 *If $f\sigma + \delta V(\gamma) - \delta(1-\sigma)V(\gamma\frac{1-\sigma}{1-\sigma\gamma}) > 0 \ \forall \ \gamma \in [0, \gamma_0]$, there exists a unique equilibrium of the non-stationary finite horizon game; $k_t^* < k_{t-1}^* \ \forall \ t$.*

The equilibrium sheds light on why an organization's leadership might rationally continue to cover up malfeasance despite the likelihood of high levels of future punishment. In any given period t, the executive prefers to escape prosecutor-t's scrutiny rather than be investigated; $\delta V_t(\gamma_t) \geq -f_t$. But there is no guarantee that continuation payoff $V_t(k_t)$ is positive. Reporting the employee in period t is also an admission of past coverup(s) for which the executive must pay the related fine. On net, then, the executive can be better off continuing to cover up.

2.4 Unanticipated Shocks

Here we study unanticipated shocks to the environment.[6] For example, a societal spotlight on child abuse can increase the period-t penalty an organization incurs for past cover-ups. This shock reduces coverup and investigation likelihoods in period t, but this effect is muted in the future, since less cover-up in period t leads to less skeptical future prosecutors.

Consider first shocks that affect prosecutor-t's best reply, such as an unanticipated increase in γ_{t-1} from, say, the revelation of malfeasance in a similar organization. This shock shifts up prosecutor-t's best reply (4) but does not affect the executive's best reply. Hence, in period t, the prosecutor is more likely to investigate and the executive less likely to cover up. However, subsequent prosecutors will be more skeptical and investigate more often, prompting the executive to cover up less in the future.

Proposition 2 *An unanticipated increase in γ_{t-1} increases k_t^* and w_t^* and increases k_s^* and w_s^* in periods $s = t+1, ..., T$.*

Proof of Proposition 2. By implicit differentiation as in the proof of Theorem 1:

$$\frac{\partial k_t^*}{\partial \gamma_{t-1}} = -\frac{\frac{\partial \psi_t}{\partial \gamma_{t-1}}}{\Psi_t'(k_t)} = \frac{1 - R(w_t)}{\Psi_t'(k_t)(1 - \gamma_{t-1} R(w_t))^2} > 0,$$

since $\Psi_t'(k_t) < 0$. Hence, an increase in γ_{t-1} increases k_t^*. In addition, using (9), w_t^*

[6] The online Appendix studies the complex comparative statics of anticipated changes in parameters. An anticipated change in period t affects period t actions therefore beliefs in t and future beliefs. The impact on continuation value V_{t-1}, in turn affects all equilibrium actions and continuation values in periods $s < t$.

increases. For all $s = t+1, .., T$

$$\frac{\partial k_s}{\partial \gamma_{t-1}} = \frac{\partial k_s}{\partial \gamma_{s-1}} \cdots \frac{\partial k_t}{\partial \gamma_{t-1}} > 0,$$

and

$$\frac{\partial w_s}{\partial \gamma_{t-1}} = \frac{\partial w_s}{\partial k(s)} \frac{\partial k_s}{\partial \gamma_{s-1}} \cdots \frac{\partial k_t}{\partial \gamma_{t-1}} > 0. \qquad \blacksquare$$

Next consider shocks that affect the executive's best reply in period t, such as a sudden decrease in Ω_t representing, for example, a drop in demand for the organization's product or services. This shock affects the executive's best reply (6) but not that of the prosecutor, resulting in an increase in w_t^* and a decrease in k_t^*. The shock to Ω_t has persistent effects on the cover-up path through the future beliefs γ_s for $s > t$. With a decrease in k_t, γ_t falls, resulting in a permanent shift down in the path γ_s, leading to subsequent decreases in k_s^* and w_s^*. That is, there is an inter-temporal substitution in the executive's cover-up decision. If the executive is less likely to cover up in period t, prosecutors' beliefs that the employee is perpetrator fall in all subsequent periods. Future prosecutors are less likely to investigate, giving the executive a greater future incentive to cover up.

Proposition 3 *An unanticipated increase in Ω_t results in a decrease in k_t^* and an increase in w_t^* and a decrease in k_s^* and w_s^* for all periods $s = t+1, ..., T$.*

Proof of Proposition 3. Since

$$\frac{\partial \psi_t}{\partial \Omega_t} = -\frac{\gamma_{t-1}(1-\gamma_{t-1})R'(w_t)}{(1-\gamma_{t-1}R(w_t))^2} < 0,$$

k_t^* decreases in Ω_t. Using (8), this implies w_t^* increases in Ω_t. Finally, for all $s = t-1, .., T$

$$\frac{\partial k_s}{\partial \Omega_t} = \frac{\partial k_s}{\partial \gamma_{s-1}} \cdots \frac{\partial k_t}{\partial \Omega_t} < 0,$$

and

$$\frac{\partial w_s}{\partial \Omega_t} = \frac{\partial w_s}{\partial \gamma_{s-1}} \cdots \frac{\partial k_t}{\partial \Omega_t} < 0. \blacksquare$$

Similar results hold for other shocks that affect only the executive's best reply, such as a distribution H_t' that is first-order stochastically dominated by initial distribution H_t.[7] Such as shift represents, for example, #MeToo, as victims become more willing to come forward, lowering investigation costs in t. Just like a decrease in Ω_t, this shock shifts down the executive's period-t best-reply. Unexpected shifts in f_t and f_t^a, representing, say, the election of a new attorney general, have the same effect and result in the same changes to w_t^* and k_t^* and subsequent intertemporal substitutions: In the short run, these shocks reduce executive incentives to cover up; in the long run, future prosecutors are less likely to investigate.

3 Information structures

We now consider (i) prosecutors who might not know whether past investigations have taken place, and (ii) investigations that produce different levels of evidence with future prosecutors having more or less knowledge of this evidence. In each case, for simplicity, we restrict attention to two-periods.

[7] Precisely, consider a parametrized family of distributions $H_t = H_t(\alpha)$ such $\frac{\partial H_t}{\partial \alpha} < 0 \ \forall \ \kappa \in (0,1)$.

3.1 Observed vs. not observed past investigations

First, we ask if the executive is better off with a prosecutor who is ignorant of past investigations. For $t = 1, 2$, consider prosecutor-2's investigation decision informed by her belief γ_1^ι, where $\iota \in \{0, 1\}$ indicates whether an investigation took place in $t = 1$. As in the baseline, an informed prosecutor-2 has beliefs $\gamma_1^0 = \gamma_1'$ if no investigation occurred and $\gamma_1^1 = \gamma_1' \frac{1-\sigma}{1-\sigma\gamma_1'}$ if an unsuccessful investigation occurred. An uninformed prosecutor-2 does not know whether an investigation occurred in $t = 1$ and holds the belief $\tilde{\gamma}_1 = \frac{1-H(k_1)}{1-\sigma H(k_1)}\gamma_1^0 + \frac{(1-\sigma)H(k_1)}{1-\sigma H(k_1)}\gamma_1^1$.

Does the executive prefer a prosecutor-2 with beliefs $\tilde{\gamma}_1$? When prosecutor-2 is informed, the executive's best outcome is an unsuccessful investigation, as prosecutor-2's beliefs are the lowest possible at γ_1^1. If these beliefs do not lead to sufficiently lower probability of an investigation in $t = 2$, however, the executive could be better off with an ignorant prosecutor-2. We say that the executive is effectively risk averse (risk loving) when the continuation value function $V_1(\gamma_1)$ is concave (convex) which in turn depends on the convexity of the distribution of investigation costs H. When H is convex, the executive can be risk-averse and prefer past investigations to be hidden, as shown below.

One interpretation of the shape of H is witness credibility, which reduces investigation costs. If most witnesses or victims cannot credibly relay their experiences, as in the case of children, the probabilities of low investigation costs are low and H is convex. An executive then prefers the prosecutor to not know of previous investigations. On the other hand, if most victims are credible, so the probability of low investigation costs is high, the executive prefers investigators know about previous investigations; in the event the past investigation is not successful, the next prosecutor's beliefs fall significantly so the executive is willing to "bet" on this outcome by covering up.

Proposition 4 *Suppose H is convex in κ and in equilibrium $1 - 2\gamma_1 + \gamma_1 R(w_2) < 0$. Then the executive is effectively risk averse, preferring a prosecutor ignorant of past investigations.*

Proof of Proposition 4. Differentiating $V_1(\gamma_1)$ and the Envelope Theorem yields

$$V_1'(\gamma_1) = -H'(k_2^*)\frac{\partial k_2^*}{\partial \gamma_1} f_2\sigma.$$

Differentiating again:

$$V_1''(\gamma_1) = -H''(k_2^*)\frac{\partial k_2^*}{\partial \gamma_1} f_2\sigma - H'(k_2^*)\frac{\partial^2 k_2^*}{\partial \gamma_1^2} f_2\sigma.$$

The sign of $V_1''(\gamma_1)$ depends on the sign of $H''(\cdot)$ and $\frac{\partial^2 k_2^*}{\partial \gamma_1^2}$. Straightforward computation shows that a sufficient condition for $\frac{\partial^2 k_2^*}{\partial \gamma_1^2} > 0$ is

$$\frac{-R'(w_2)w_2'(k_2)(1 - 2\gamma_1 + \gamma_1 R(w_2))}{(1 - \gamma_1 R(w_2))^3} > 0,$$

which is satisfied whenever

$$1 - 2\gamma_1 + \gamma_1 R(w_2) < 0.$$

since $R'(w_2) > 0$ and $w_2'(k_2) > 0$.■

3.2 Observed vs. unobserved levels of evidence

Suppose now investigations yield evidence: If the employee is a perpetrator, with probability σ an investigation yields $(H)igh$ evidence sufficient to convict the employee. With probability $1-\sigma$, the evidence is insufficient to convict, however with probability $\rho(1-\sigma)$ the evidence is $(M)edium$ and with probability $(1-\rho)(1-\sigma)$ the evidence is $(L)ow$ with $\rho > \frac{1}{2}$. If the employee is not a perpetrator, $High$ evidence is never produced, but $Medium$ evidence is produced with probability $1-\tau$ and Low evidence with probability τ, with $\tau > \frac{1}{2}$.

For $t = 1, 2$, consider the beliefs of prosecutor-2 who knows whether an investigation has occurred. If prosecutor-2 cannot observe the evidence level, her beliefs are γ_1' as in the baseline. However, if prosecutor-2 can observe the evidence, let γ_1^e be prosecutor-2's belief conditional on $e \in \{M, L\}$. By Bayes' Rule

$$\gamma_1^M = \frac{\gamma_1'\rho(1-\sigma)}{\gamma_1'\rho(1-\sigma) + (1-\gamma')(1-\tau)} \quad \text{and} \quad \gamma_1^L = \frac{\gamma_1'(1-\rho)(1-\sigma)}{\gamma_1'(1-\rho)(1-\sigma) + (1-\gamma')\tau}.$$

If $\rho(1-\sigma) > 1-\tau$ (it is more likely that M evidence is produced by a perpetrator), then $\gamma_1^M > \gamma_1'$; the belief that the employee is guilty *increases* if the investigation produces the $Medium$ level of evidence. Unlike the baseline model, the belief of the prosecutor is not necessarily decreasing over time.

A possibly more skeptical prosecutor-2, however, does not necessarily translate to lower executive cover-up incentives. Whether the executive has a higher or lower period-1 incentive to cover up again depends on the shape of the continuation value $V_1(\gamma_1)$.

If $V_1(\gamma_1)$ is concave, the executive has a higher period-1 incentive to cover up when prosecutor-2 cannot observe the evidence. Here, the best outcome for the executive is when an investigation occurs and the evidence is low. Prosecutor-2's beliefs are then the lowest level of γ_1^L. But if this lower belief does not sufficiently decrease the likelihood of investigation, the executive prefers prosecutor-2 to be ignorant of the evidence. As before, this likelihood depends on the convexity of the distribution H.

4 Case Studies

This section studies the prominent cover-up cases cited in the Introduction, showing how payoffs, information structure, passage of time, and belief shocks explain their trajectories.

4.1 Penn State

In 2012 Penn State's storied football coach Joe Paterno was fired and its Board of Trustees forced the president to resign in the wake of the discovery that Assistant Coach Jerry Sandusky had sexually abused boys on university property and in the football shower room since at least 1998. Applying the model reveals common features of college sports cover-ups: a culture that, in terms of the model, translates to high payoffs from covering up and low internalization of harm; investigative third parties with high costs; and passage of time with executives who strive to avoid the costly disclosure of past cover-ups.[8]

[8]Another well-known football-related cover-up occurred at Baylor University, where officials hid rape and abuse of female students (Baylor University (2016)). For the Nasser case, see https://www.sbnation.com/2018/1/19/16900674/larry-nassar-abuse-timeline-usa-gymnastics-michigan-state.

and https://www.indystar.com/story/news/2016/09/12/former-usa-gymnastics-doctor-accused-abuse/89995734/for the story of one of the first victims to file a criminal complaint, in 2016, twenty-four

First, in terms of our model, the value Ω_t reflects the substantial reputational, financial, and non-pecuniary returns of a successful and unsullied football program. The Freeh Report (Freeh (2012)), commissioned ex post by Penn State, concluded that "[a] culture of reverence for the football program [was] ingrained at all levels of the campus community (pg. 15)." The private net benefits from not revealing Sandusky's type were high, as he was the head coach's right-hand-man[9] and the executives put no weight on the harm to victims.[10] University leadership made several successive decisions to cover up Sandusky's actions. In each instance that administrators learned of an instance of abuse, they deliberated and decided not to report the abuse to outside authorities to avoid a "pandora's [sic] box" (Freeh (2012), pg 48).[11]

External investigators had low prior beliefs and faced high investigation costs. In the first reported instance in 1998, for example, κ_t was high, with no eye witness and only a young boy to describe his experience. While the victim's mother and psychologist reported their suspicions to the university police, and the outside counselor they consulted "identified some 'gray areas,' he did not find evidence of abuse and said he had never heard of a 52-year old "become a pedophile" (Freeh (2012), pg. 44). The abuse and cover-ups came to light only in 2008, when, in terms of the model, κ_t investigative costs were low; the state Attorney General launched an investigation based on the credible reports of a

years after his known first assault.

[9]See, e.g., Dosh (2011). Sandusky was Paterno's long time assistant; from 1998 to 2010, Penn State football participated in end-of-season bowl games, winning the Big Ten championship in 2005 and 2008.

[10]The Freeh (2012) report describes "the total and consistent disregard by the most senior leaders at Penn State for the safety and welfare of Sandusky's child victims. [...] Not once did any administrator at Penn State who learned of the abuse inquire about the welfare of the child victim" (pg.14).

[11]Athletic department administrators with knowledge of the 1998 incident did not report Sandusky. After the next incident they learned of, in 2001, they deliberated, recalling their decision in 1998, and chose (again) to deal with the matter by discussing it with Sandusky rather than contacting legal authorities (Freeh (2012)).

high-school age victim who had been abused since he was twelve years old.

4.2 Catholic Church Boston Diocese

In the cover-ups of sexual abuse in the Boston Diocese, the model highlights payoffs and the passage of time as well as the information structure. *Boston Globe* investigative reports starting January 2002 were one of the first major exposés of Church leaders who knew about abusive priests (Rezendes, Carroll, Pfeiffer, and Robinson (2002)). Rather than report abusers, the Church sent priests to rehabilitative programs and reassigned them to new parishes. In June 2002, the United States Council of Bishops formed its own National Review Board and commissioned the John Jay Report (2004) on the sexual abuse of minors by priests and deacons from 1950-2002.

Like in the Penn State scandal, central specifications of the model help explain the long-lasting cover-ups. First, the church was a well-ensconsed institution in the lives of parishioners and the community; Ω_t was high.[12] The Church did not recognize or internalize the harms of the abuse of the victims,[13] and the Church would have suffered losses in finances and reputation had the priests been revealed publicly, both implying high w_t. Indeed, the Church paid large amounts in private settlements to keep the actions of priests out of the public eye (Boston Globe (2002)). Second, investigation costs were consistently high, as almost three-quarters of victims were children age of 14 or younger (John Jay (2004), pg. 53), and only about one-quarter of accusations made were made

[12]For an example of communities' strong relationship with their parish churches, see Public Broadcasting Service (2007).

[13]Until the 1980's and 1990's the Church saw the abuse as due to an individual psychological disorder rather than a crime (John Jay (2004), pg. 99-101).

within ten years of the incident (John Jay (2004), pg. 94).

The model indicates how the evolution of beliefs and the information structure could lead to lengthy and on-going cover-ups. The prosectors here can be more widely understood to include parents and parishioners. Settling cases to keep past complaints out of the public eye, the Church ensured that these parties did not know of past investigations. In addition, thanks to policies of keeping personnel records private (Farragher (2012)), this wide set of prosecutors would know only calendar time and the fact that the Church had (re)assigned a priest to their parish. As the model shows, this information structure would have been most valuable to the Church, given most of the victims were children, so the probabilities of high investigation costs were relatively high.

4.3 Volkswagen

Applying the model to Volkswagen—a corporate cover-up—shows the impact of belief shocks and the incentive for executives to continually coverup after a previously successful cover-up decisions, despite arguably negative continuation values.[14] In 2009 Volkswagen began selling diesel cars with software designed to defeat new American stringent emissions tests. For five years, Volkswagen executives (either high level or lower level) did not reveal the subterfuge to authorities,[15] and on the regulators' side, investigation costs were high, as demonstrated by how exactly how discrepancies were discovered. In 2014 graduate students and research engineers at West Virginia University Center for Alternative Fuels,

[14] In 2016 Volkswagen settled with $26 billion for its fraud against the American public.

[15] It is not clear, as far as we can see from publicly available accounts, if the highest levels of Volkswagen management knew about the defeat device before May 2014, when a compliance officer included the report described below to the CEO in a memo, which the CEO does not admit reading.

Engines, and Emissions drove two VW diesel models and one BMW model more than 1500 miles each, up and down the US West coast to test the efficiency of diesel engines.[16] For the VW cars, the team found a large difference between on-the-road emission levels and test emission test levels and published a report (CAFEE (2014)). The report caught the attention of both Volkswagen and the California Air Resources Board (CARB), the regulatory agency who had tested the cars for the team.

In terms of the model, the report's publication was a positive shock to CARB's beliefs about the Volkswagen engineering team (the employee). Even though CARB's investigative costs remained high, they had a greater suspicion of malfeasance and began to investigate. For the executive, the current cost of revealing the malfeasance was high since VW had a large inventory of cars to be sold.[17] The expected continuation value of covering up was arguably negative, but still higher than the expected penalties from admitting past failures to reveal the defeat device. The first instance of cover-up worked, and CARB approved the next model year of cars for sale. A year-long coverup on the part of Volkswagen to explain the West Virginia findings ensued.[18] Eventually, under continued pressure from CARB to understand the findings and VW's failure to produce viable new software, VW finally admitted its defeat device in September 2015.

[16]The team received a grant of about $70,000 from the International Council on Clean Transportation (ICCT) to conduct on-the-road tests. While the dollar amount of the grant is not large, the time required to test the cars was.

[17]As reported by the *New York Times*, "The company was in the midst of applying for regulatory certification of a new generation of diesels for the 2015 model year. New cars were already piling up at American ports. Delays would be costly," Ewing (2017).

[18]An internal VW presentation discussed how to allay suspicions of authorities and in an email Oliver Schmidt, a VW's compliance official asked rhetorically, "It should be first decided whether we are honest." (Ewing (2017))

5 Conclusion

This paper builds a model of cover-up where a rational executive decides—in the face of possible investigation—whether or not to retain a malfeasant employee. The analysis indicates that successful cover-ups lead to greater incentives for future cover-ups. The longer the employee malfeasance is not revealed or discovered, the less a future investigator believes that malfeasance has occurred. Thus an executive is rationally "optimistic" after evading detection and covers up more and more as time passes. Cover-up incentives are enhanced when prosecutors cannot observe whether previous investigations have taken place or observe the evidence produced in past investigations in the case of investigations costs which are more likely to be high than low.

The model affords the study of environmental changes such as heightened social condemnation of those who hide abuse and strengthened penalties for cover-ups. The analysis indicates intertemporal effects that can lessen the impact of such shifts. When an organization covers up less often, the investigator is also less likely to investigate in that period and investigate less in future periods—due to rational updating of beliefs.

This paper is a jumping off point for the study of strategic cover-ups. Future research could consider the possibility that actors can commit to their strategies, which is not presently assumed. The Pope, for example, proposed recently that the Church do more "self-policing" (Horowitz (2019)), even as though it is not clear how this new effort would be internally or externally enforced. With commitment, the executive would be the first mover, and, as such, take into account the subsequent rational reply of prosecutors. For prosecutors as first movers, rules could specify that investigations proceed for costs below a certain fixed level. Other avenues for future study involve multiple organizations that share a similar "culture" or governing bodies (such as universities or sports leagues) where prosecutors update the probability of malfeasance by observing investigation of any one organization. Executives' actions then have externalities on other organizations which could prompt governing bodies to adopt internally enforced rules or codes of ethics to coordinate behavior. On the investigation side, prosecutors could coordinate or have different objectives such as maximizing overall welfare which would involve an accounting of the harm to victims.

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