# Incentives of Corporate Fraud and Whistleblowing

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## Abstract

The False Claims Act (FCA) allows individuals to notify the government if they have evidence of someone committing fraud. Currently, the FCA can charge the fraudster three times the damages incurred as well as other fees. The purpose of this paper is to first develop and examine a model where the owner of a firm and the agent (employee) form a coalition to commit fraud. The firm owner offers the agent a "hush money" transfer in order to keep him quit. The government provides the incentive to an agent to whistleblow by allowing an agent to collect some of the recovery amount. In this model, I show that an agent that is at the end of his tenure at a firm has more incentive to whistleblow. I also show that the lower bound of hush money transfers (i.e. money to keep the agent from whistleblowing) increases over time, and thus a firm owner may be less likely to commit fraud near the end of the agent's tenure.

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# Contents

# 1 Introduction

The False Claims Act (FCA) was first enacted in 1863 in an effort to deter suppliers of goods from defrauding the Union Army during the Civil War. Those who were caught committing fraud were liable for double the government's damages plus a penalty of $2,000 for each false claim. This law also contained the qui tam[1] provision, which has since been amended multiple times. In 1986, congress made several changes to the act, including: increasing damages from double damages to treble[2] damages, raising the penalties from $2,000 to a range of $5,000 to $10,000, and increasing the qui tam incentive (Department of Justice, 2017). A person violates the FCA if they have submitted a false claim with knowledge of the falsity. The Department of Justice (DoJ) has defined knowledge of falsity as any of the following:

1. actual knowledge
2. deliberate ignorance of the truth or falsity of the information
3. reckless disregard of the truth or falsity of the information

Since the FCA was amended in 1986, the DoJ has recovered almost $38 billion in settlements and judgments (Department of Justice, 2016). Figure 1 shows that the number of whistleblower cases as well as the total amount recovered by the government has grown substantially over time (Engstrom, 2012). In the last few years, there has been an increase in studies done on whistleblowing; however, the majority of these papers have a law focus (Engstrom, 2012, 2014), with very few actually analyzing the economic effects.

Friebel and Guriev (2012) present a two-period model where a firm manager offers a worker a contract $w \in \{w_0, w_1\}$ based on a worker's output $y \in \{0, 1\}$. The firm manager can misreport the output to the investors, thereby increasing the market value of the firm which benefits the firm manager. The model found that managers who misreport earnings in the first period have a stronger incentive to misreport earnings in the second period. Givati (2016) presents a similar two-period model where an employer chooses an amount to report to the government in the first period, and the employee chooses whether or not to report the employer to the government in the

[1] Qui tam means that a private individual who assists a prosecution can receive all or part of any penalty imposed.
[2] Treble means triple.

second period. If the employer misreports to the government, he has the choice of bribing the employee to keep him quiet. The study finds that an employer's bribe is influenced by the reward amount offered as well as the probability of getting caught if reported. Although these models factor in whistleblowing incentives, neither of these papers is able to show how the problem faced by a potential whistleblower or an employer's bribes vary over time.

The purpose of this study is to develop a principal-agent model that models the incentive of an employer to misreport services performed as well as the employee's incentive to expose their employer's misreporting through whistleblowing. I wish to answer the following questions:

1. When in an agent's tenure at the firm does he have more of an incentive to whistleblow?
2. In relationship to an agent's tenure, when is an employer more likely to misreport the agent's output?
3. How do hush money offers (i.e. the money paid to agent to keep him quiet) evolve over time?
4. How is an agent's effort affected by hush money?

I hypothesize that:

1. An agent is more likely to whistleblow at the end of his tenure.
2. The firm owner is more likely to misreport an agent's output during the beginning of an agent's tenure.
3. If an agent has more incentive to whistleblow at the end of his tenure, then the lower bound of the set of possible hush money offers will increase over time.
4. An agent's effort will decrease when he expects hush money.

This study contributes to the whistleblowing literature by extending the model to look at long run interactions between a potential whistleblower and his employer. When compared Friebel and Guriev (2012) and Givati (2016), this gives a more realistic view of the problem faced by a whistleblower as well as how an employer chooses to bribe a potential whistleblower. I am also able to look at how the distribution of hush money transfers changes over time, and how this change affects the agent's choice of the amount of effort to exert. The results presented in the paper may also have policy implications since it shows which agents are more likely to whistleblow and when in an agent's tenure an employer is more likely to consider misreporting.

In section 2, I present a principal-agent model similar to the one presented by Tirole (1986)[3]. The government offers to compensate a firm for each service the firm performs. The owner of the firm offers contracts with the agent in order to maximize profits. In subsection 2.2, I add the ability of the owner to misreport services performed. The agent and owner enter a collusion coalition where the owner offers the agent hush money, and thus both parties are better off. In subsection 2.3, the agent is able to whistleblow on the owner. The model is extended to multiple periods and the results of the model are studied. In the conclusions section I present the results found and compare them with my hypotheses. I then discuss what further modifications can be done to extend or generalize this model.

## 2 The Theory

In subsection 2.1, I present a model where the government offers monetary transfers to the firm for each service the firm provides. The firm owner, which is the principal in this model[4], offers a wage contract to the employee[5]. There are two states: high and low, which are further explained in subsection 2.1. I characterize the optimal effort exerted by the agent, the number of services he provides, the wage contracts, and the profits earned in each state.

In subsection 2.2, the model is extended by adding the ability of the firm owner to misreport services that the agent has performed. The firm owner offers the agent a "hush money" transfer. Optimal effort exerted by the agent, the number of services he provides, the wage contracts, and the profits earned in each state are again characterized, and compared with the results in subsection 2.2.

In subsection 2.3, the model is extended by adding the ability of the agent to whistleblow, or in other words the ability of the agent to report the firm owner to a regulatory body if the firm owner has misreported services administered. The model is further extended to multiple periods,

[3] I have included a look at Tirole's model in appendix B.

[4] In this model, the firm owner is the principal, and the employee working under the firm owner is the agent. The government can also be seen as a principal as it offers the firm transfers to compensate the firm for services administered.

[5] In this model, the employee shall be called the agent.

where I explore the optimal effort exerted by the agent, the number of services he provides, the wage contracts, and the profits earned in each state and compare them with the results found in subsections 2.1 and 2.2.

## 2.1 Principal Agent Problem - No Misreporting

I first present a modified principal agent model where the government offers to pay a firm for services performed[6]. I will present the time line of this model, which is also found in figure 2. The government offers a flat payment of $t$ for every service that an agent performs. In this paper, I assume that $t$ is exogenous.[7] Number of services performed ($\eta$) is a function of an agent's effort ($e$) he exerts. Revenue ($\pi$) is a function of how many services a firm has performed multiplied by the amount the government pays per service performed:

$$\pi = \eta(e)t \tag{1}$$

The owner of the firm offers the wage contract $\{W_i\}_{i\in I}$ to the agent. After the principal presents the agent with the contract, the agent draws a level of productivity, $\theta_i$. The agent then chooses effort to maximize his expected utility:

$$\max_{e_i} EU\left(W_i - g(e_i, \theta_i)\right) \tag{2}$$

where $g$ is the disutility from working. Disutility from working is higher for agents with low productivity, or in other words: $g(e, \underline{\theta}) \geq g(e, \bar{\theta})$, $\forall e \in [\underline{e}, \bar{e}]$ where $\underline{\theta} < \bar{\theta}$. The firm owner fully observes the agent's productivity and effort[8].

The owner, who is risk neutral, has the following objective function:

$$\max_{e_i, W_i} E\left(\pi(e_i) - W_i\right) \tag{3}$$

[6]These services could include: medical services, police services, etc.

[7]In this model, the government and firm owner can both be thought of as principals and the worker who works under the firm owner is the agent. In this paper, I do not explore how the government sets their transfer amount. Taking $t$ as given is a reasonable assumption as there are a large number of firms participating in government programs.

[8]The solution to the model where the owner does not observe $\theta_i$ is characterized in Mas-Colell et al. (1995).

Combining all these objective functions, the owner's objective function is:

$$\max_{W_i,e_i} E\left(\pi(e_i) - W_i\right) s.t.\ EU\left(W_i - g(e_i,\theta_i)\right) \geq \bar{U} \tag{4}$$

The agent accepts the contract if the expected utility from working is greater than his reservation utility ($\bar{U}$). To make calculations easier, I normalize $\bar{U}$ such that $\bar{U} = 0$.

Suppose that the agent draws a $\theta \in \{\theta_L, \theta_H\}$ where $\theta_H > \theta_L$ and the probability of being in a high state is $\alpha$. The agent has a von Neumann-Morgenstern utility $v$ with the following attributes: $v$ is strictly increasing, strictly concave, and $v(0) = 0$. I now characterize the solution to this problem for $i = L, H$.

$$\max_{W_i,e_i} \alpha\left[\pi(e_H) - W_H\right] + (1-\alpha)\left[\pi(e_L) - W_L\right] \tag{5}$$

$$s.t.\ \alpha\left[v(W_H - g(e_H,\theta_H))\right] + (1-\alpha)\left[v(W_L - g(e_L,\theta_L))\right] \geq 0 \tag{6}$$

The first order conditions are:

$$\frac{\partial\mathcal{L}}{\partial W_L} : -(1-\alpha) + \gamma\left[(1-\alpha)v'(W_L^* - g(e_L^*,\theta_L))\right] = 0 \tag{7}$$

$$\frac{\partial\mathcal{L}}{\partial W_H} : -\alpha + \gamma\left[\alpha v'(W_H^* - g(e_H^*,\theta_H))\right] = 0 \tag{8}$$

$$\frac{\partial\mathcal{L}}{\partial e_L} : (1-\alpha)x_e(e_L^*) - \gamma(1-\alpha)v'(W_L^* - g(e_L^*,\theta_L))g_e(e_L^*,\theta_L) = 0 \tag{9}$$

$$\frac{\partial\mathcal{L}}{\partial e_H} : \alpha x_e(e_H^*) - \gamma\alpha v'(W_H^* - g(e_H^*,\theta_H))g_e(e_H^*,\theta_H) = 0 \tag{10}$$

Combining (7) and (8), we see that:

$$v'(W_H^* - g(e_H^*,\theta_H)) = v'(W_L^* - g(e_L^*,\theta_L)) \tag{11}$$

Since $v$ is strictly increasing and strictly concave, we see that $W_H^* - g(e_H^*,\theta_H) = W_L^* - g(e_L^*,\theta_L)$. This implies that $v(W_H^* - g(e_H^*,\theta_H)) = v(W_L^* - g(e_L^*,\theta_L))$, or in other words, the agent's utility is equalized across states.

Combining (7) with (10), and (8) with (9) it can be shown that for $i = L, H$:

$$\pi_e(e_i^*) = g_e(e_i^*, \theta_i) \tag{12}$$

Now, (11) combined with the fact that $g_{e\theta}(e, \theta) < 0$, $x_{ee}(e) < 0$, and $g_{ee}(e\theta) > 0$ implies that $e_H^* > e_L^*$. Therefore, $\eta(e_H^*) > \eta(e_L^*)$ and $\pi(e_H^*) > \pi(e_L^*)$.

From here on out, $\eta_i^* = \eta(e_i^*)$, $\pi_i^* = \pi(e_i^*)$, and $W_i^*$ are the optimal allocations from the model presented in this section, and will be referenced in other sections.

## 2.2 Principal Agent Problem - Misreporting

I now extend the model to include misreported services reported by an owner. I now assume that the government knows the possible outcomes of $\theta$, the functional form of $\eta$, and the problem the agent faces. Thus, the owner can only report $r \in \{\eta_L^*, \eta_H^*\}$. The revenue the firm receives is thus:

$$\pi = rt \tag{13}$$

Suppose that there is a cost, $c(m)$ of misreporting $m$ services[9]. This cost function is increasing in $m$, strictly convex, and $c(0) = 0$. This cost function can be thought of as either a literal cost function, meaning the cost of creating the false reports, or as an owner's expected penalty fee of getting caught (i.e. probability of getting caught times the penalty fee). I assume that the agent always knows if the owner has falsified reports. After receiving the transfer from the government, the owner then gives the agent a transfer, $h$, as "hush money." If there is no chance of getting caught and both the owner and the agent don't get disutility from committing fraud, then both parties gain from a coalition only if:

$$(r - \eta_i)t - c(r - \eta_i) > 0 \tag{14}$$

This says that the extra revenue generated by misreporting does not exceed the cost of doing so. If (14) holds, the owner receives $\{\pi(r) - h(r - \eta_i) - c(r - \eta_i)\}$ and the agent receives $\{W(\eta_i) + h(r - \eta_i)\}$

[9]Notice that $m = r - \eta(e_i)$

where $h(r-\eta_i) \in (0, (r-\eta_i)t - c(r-\eta_i)]$. Therefore, the owner will want to report $\eta_H^*$ when (14) holds. The amount of $h$ depends on the bargaining power of each party. Bargaining power is not introduced here, so I cannot accurately predict hush money transfers using this model.

If the high state is realized (i.e. $\theta = \theta_H$), I assume that the owner prefers not to do any misreporting[10]. Thus, no hush money is paid in the high state and $\hat{W}_H = W_H^*$. If the low state is realized, then the owner will offer hush money. Since $h > 0$, then $\hat{e}_L < e_L^*$, but $\hat{W}_L + h - g(\hat{e}_L) > W_L^* - g(e_L^*)$[11]. Thus, the agent is strictly better off in the low state when he accepts hush money.

### 2.3 Principal Agent Problem - Whistleblowing

I now extend the model to include the ability of an agent to whistleblow. If the government catches the firm owner submitting false reports, the owner is required to pay $\psi mt$, where $m$ is the number of false reports submitted, and $\psi > 1$.

Suppose that the government provides the agent with an incentive to whistleblow by offering the agent a percentage ($\phi \in (0,1)$) of the fee the owner pays if he gets caught. If the agent reports the owner to government, the owner fires the agent and the agent does not receive payment from the firm. The time line (outlined in figure 2) shows when the hush money offers as well as the opportunity to whistleblow take place. The agent whistleblows if and only if:

$$v(\hat{W}_L + h - g(\hat{e}_L, \theta_L)) < \rho v(\phi\psi(\eta_H^* - \eta(\hat{e}_L))t) \tag{15}$$

where $\rho$ is the probability of winning the lawsuit and $\rho \in (0,1)$[12]. Thus, $h \in [\underline{h}, \bar{h}]$ where $\bar{h} = (\eta_H^* - \eta(\hat{e}_L))t - c(\eta_H^* - \eta(\hat{e}_L))$ and $\underline{h}$ is the solution to $v(\hat{W}_L + h - g(\hat{e}_L, \theta_L)) = \rho v(\phi\psi(\eta_H^* - \eta(\hat{e}_L))t)$.

Now, suppose the agent works for $N$ periods and has a discount factor of $\beta$. The agent can only submit a claim about the false reports that occur in the current period. Recall that the firm

[10] There exists a lot of rationales for why this may be the case. One rationale could be that the firm owner is trying to fulfill a quota and thus misreports only when the low state is realized. This rationale works better with a three layer principal/supervisor/agent model presented by Tirole (1986).

[11] Obviously, $W_L^* + h - g(e_L^*) > W_L^* - g(e_L^*)$, thus, there exists an $e_L$ such that $W_L + h - g(e_L) > W_L^* - g(e_L^*)$.

[12] Notice that there is a probability $1-\rho$ of receiving no reward money. Thus the agent would have a utility of $v(0) = 0$.

owner colludes only if:

$$(\eta_H^* - \eta(\hat{e}_{L,n}))t - c(\eta_H^* - \eta(\hat{e}_{L,n})) > 0 \tag{16}$$

Given the agent draws $\theta_L$ in period $n$ and the owner decides to misreport, the agent whistleblows if and only if:

$$\begin{aligned} v(\hat{W}_{L,n} + h_n - g(\hat{e}_{L,n}, \theta_L)) + &\sum_{j=n+1}^{N} EU\left(\hat{W}_{i,j} - g(\hat{e}_{i,j}, \theta_i), h_j\right) \\ &< \rho v(\phi\psi(\eta_H^* - \eta(\hat{e}_{L,n}))t) \end{aligned} \tag{17}$$

In other words, the expected utility from reporting the firm's misdeeds to the government (and receiving a payoff) is greater than the expected utility from staying at the firm. Observe that as $n$ increases, the set of possible hush transfers will shrink, or in other words: $[\underline{h}_n, \bar{h}_n] \subset [\underline{h}_{n-1}, \bar{h}_{n-1}]$. This is the case since $\underline{h}_n$ is the solution to

$$\begin{aligned} v(\hat{W}_{L,n} + h_n - g(\hat{e}_{L,n}, \theta_L)) + &\sum_{j=n+1}^{N} EU\left(\hat{W}_{i,j} - g(\hat{e}_{i,j}, \theta_i), h_j)\right) \\ &= \rho v(\phi\psi(\eta_H^* - \eta(\hat{e}_{L,n}))t) \end{aligned} \tag{18}$$

and $\sum_{j=n+2}^{N} EU\left(\hat{W}_{i,j} - g(\hat{e}_{i,j}, \theta_i), h_j)\right) < \sum_{j=n+1}^{N} EU\left(\hat{W}_{i,j} - g(\hat{e}_{i,j}, \theta_i), h_j)\right)$[13]. Thus, $\underline{h}_{n+1} > \underline{h}_n$.

**Now, I make the assumption that the agent expects the lowest amount of hush money ($\underline{h}_n$) every period when deciding his level of effort given he hasn't decided to whistleblow. With this assumption, his effort over time decreases. This is the case since future expected utility is not influenced by the agent's decision today[14] (assuming he does not whistleblow). Thus, for every $\tilde{e}_L$:**

$$v(W_L + h_{n+1} - g(\tilde{e}_L, \theta_L)) > v(W_L + h_n - g(\tilde{e}_L, \theta_L)) \tag{19}$$

[13]Since $\sum_{j=n+2}^{N} EU\left(\hat{W}_{i,j} - g(\hat{e}_{i,j}, \theta_i), h_j)\right) < \sum_{j=n+1}^{N} EU\left(\hat{W}_{i,j} - g(\hat{e}_{i,j}, \theta_i), h_j)\right)$, then $v(\hat{W}_{L,n+1} + h_{n+1} - g(\hat{e}_{L,n+1}, \theta_L)) > v(\hat{W}_{L,n} + h_n - g(\hat{e}_{L,n}, \theta_L))$. Recall that $v$ is a strictly increasing, concave function, therefore $\underline{h}_{n+1} > \underline{h}_n$.

[14]Notice that this and (17) imply that the agent has more incentive to whistleblow later on during his tenure.

**Therefore, $\hat{e}_{L,n+1} < \hat{e}_{L,n}$. Since effort in the low state (when the owner misreports) decreases over time, the upper bound of the possible hush money offers, $\bar{h}$, also decreases as $c$ is a strictly increasing, strictly convex function. Since the set of possible hush money offers is shrinking, the owner would misreport less and less later on in an agent's tenure.**

## 3 Conclusion

In the model presented, I showed how employees and employers could benefit from forming a coalition in order to commit fraud. Introducing the ability for the employee to whistleblow into the model, I was able to prove that my hypotheses were correct. Namely, I showed that:

1. An agent has more incentive to whistleblow at the end of his tenure
2. The firm owner is more likely to misreport an agent's output during the beginning of an agent's tenure
3. The lower bound of the set of possible hush money offers increases.[15]
4. An agent's effort decreases when he expects hush money.

Intuitively, most of these results are to expected. A rational agent will only whistleblow if his expected personal benefit is larger than not whistleblowing. An agent with a lower tenure runs the risk of not winning the whitleblower case, and losing out on future wages from the prosecuted firm. Thus, a tenured agent will have less "cost" of reporting the firm to the government. Therefore, hush money (or at least the set of possible hush money offers) should increase. In turn, agents receiving this cash increase will have less of an incentive to work hard. Firms will find it less and less profitable to misreport, and thus will be less likely to misreport later on in an agent's tenure.

This model can be modified and extended to look at a number of different issues. Let's first focus on the agent. In this model, the agent only submits a claim if the firm owner has committed fraud. For a model to fit with real-world data, the agent needs to be able to submit a false claim. One could also account for the costs of submitting claims (whether they be false or true). Lastly,

[15] Also, with the assumption that the agent expects the lowest amount of hush money before bargaining, then the upper bound of the set of possible hush money offers decreases.

I assumed that the agent was immune from charges even though he could have participated in the coalition to commit fraud with the owner.

This paper only looks at one type of fraud. Other types of fraud, such as kickbacks and misreporting of a good or service's attributes, would have similar models as well as similar results. It would still be valuable to look into modeling these types of fraud. This model only focuses on the whistleblowing incentive scheme that the US has in place right now. Further studies can be done to analyze other incentive schemes that could minimize false reporting.

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# 4 Models and Figures

Figure 1: Qui Tam Filings by Case Type and Total Recoveries

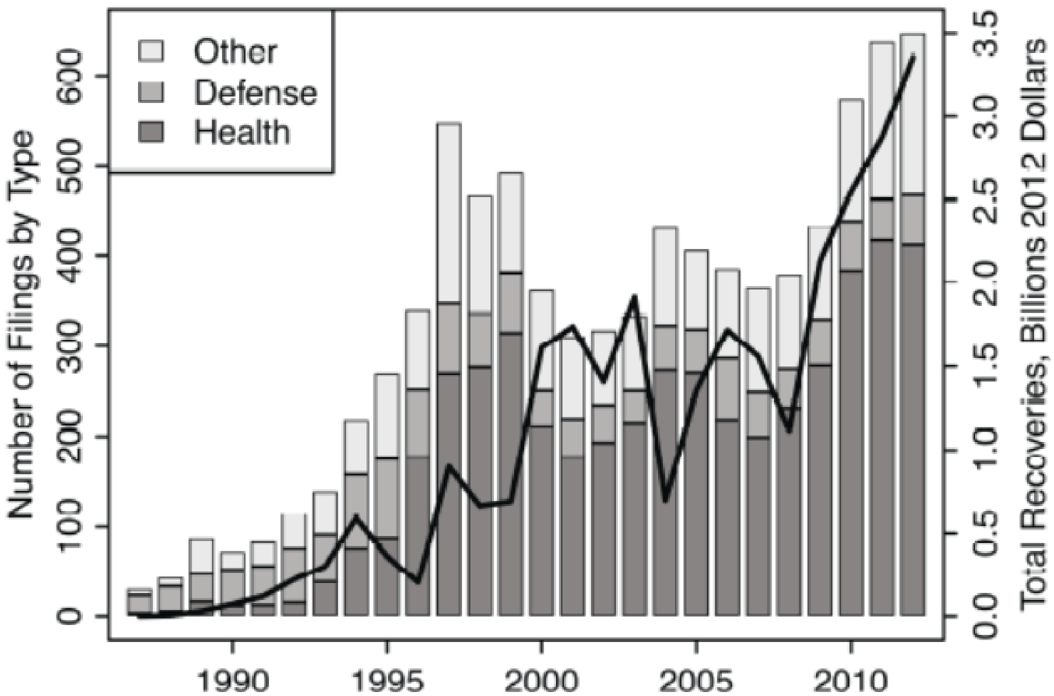
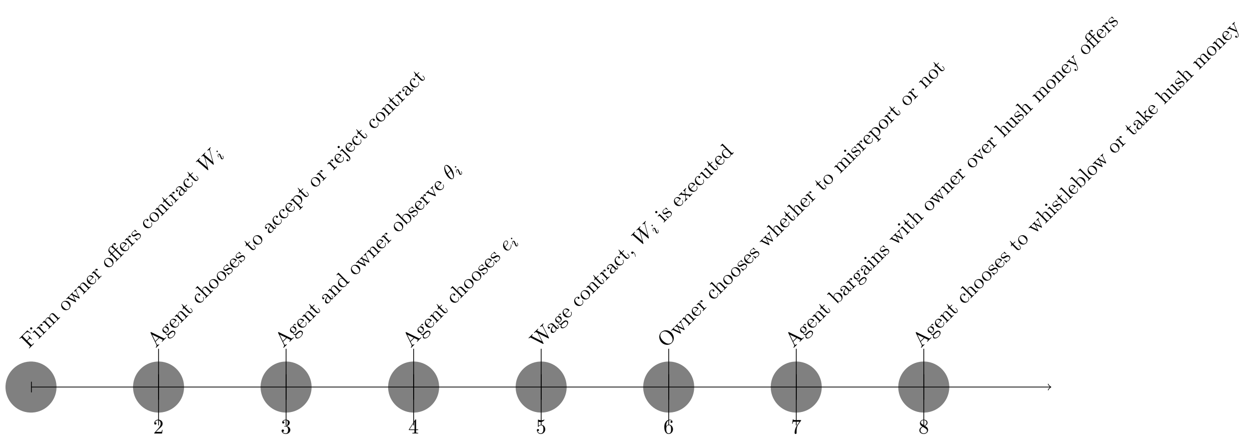



Figure 2: Timeline



# 5 Appendices

## 5.1 Appendix A

Now, consider the case where productivity type is not observed. The owner's problem is now:

$$\max_{W_i, e_i} \alpha \left[x(e_H) - W_H\right] + (1-\alpha)\left[x(e_L) - W_L\right] \tag{20}$$

$$s.t.\; w_L - g(e_L, \theta_L) \geq v^{-1}(\bar{u}) \tag{21}$$

$$w_H - g(e_H, \theta_H) \geq v^{-1}(\bar{u}) \tag{22}$$

$$w_L - g(e_L, \theta_L) \geq w_H - g(e_H, \theta_L) \tag{23}$$

$$w_H - g(e_H, \theta_H) \geq w_L - g(e_L, \theta_H) \tag{24}$$

Notice that (21) and (22) are participation constraints, and (23) and (24) are incentive compatibility constraints. Mas-Colell et al. (1995) show that only (22) and (24) are binding, and that an optimal contract yields $e_L \geq e_L^*$ and $e_H = e_H^*$

## 5.2 Appendix B

Tirole (1986) presented a three-layer hierarchy principal/supervisor/agent model. The agent is endowed with a productivity parameter $\theta \in \{\underline{\theta}, \bar{\theta}\}$, and exerts effort $e > 0$ to create profit $x$:

$$x = \theta + e \tag{25}$$

The disutility the agent gets from exerting effort is $g(e)$ where $g$ is an increasing function, strictly convex, and $g(0) = g'(0) = 0$. The principal only observes the profit $x$ (and not the effort $e$ exerted), and gives the agent a wage $W$. Thus the agent's expected utility is $EU[W - g(e)]$. Suppose that the agent's reservation wage is $W_0$, and has a reservation utility of $\bar{U} = U(W_0)$. Therefore, the agent's participation constraint is

$$EU[W - g(e)] \geq \bar{U} \tag{26}$$

The supervisor exerts no effort, receives a wage $S$ from the principal, and has an increasing, differentiable, and strictly concave Von Nueman-Morgenstern utility function $V$. He has a reservation wage of $S_0$ and a reservation utility of $\bar{V} = V(S_0)$. Thus, the supervisor's participation constraint is

$$EV \geq \bar{V} \tag{27}$$

The risk-neutral principal offers contracts to the supervisor and the agent. His expected utility is $E(x - S - W)$.

The agent first observes his productivity, $\theta$ before choosing effort, $e$. The supervisor does not observe $e$, but may or may not observe $\theta$. If the supervisor observes $\theta$, then $s = \theta$; otherwise, if the supervisor does not observe $\theta$, then $s = \emptyset$. The supervisor then reports $r \in \{\theta, \emptyset\}$. If $\theta$ is observed, he can only report the true value of $\theta$ or lie and report he did not observe the $\theta$. The agent knows if the supervisor does or does not observe $\theta$. Based on $x$ and $r$, the principal pays the supervisor a transfer of $S(x, r)$, and the agent a transfer of $W(x, r)$.

This is the basic setup of Tirole (1986). See the paper for more information as well as the results coming from a coalition between the supervisor and the agent.