Optimal Rule Enforcement*

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Most recent draft here.

Abstract

Although rules are often viewed as rigid, their enforcement can be flexible. We develop a model to study the optimal enforcement of rules in an employment relationship, identifying two approaches to counter organizational declines: the manager-led approach and the worker-led approach. The manager-led approach, which involves cycles of rule enforcement, is optimal when enforcement costs are low. The worker-led approach, used when enforcement costs rise and patience increases, relies on worker self-regulation, with the threat of termination motivating effort. A subcategory of the worker-led approach emerges when enforcement costs are moderate, where the manager initially enforces rules to build trust before transitioning to worker autonomy. We further show that allowing the manager to enforce rules after the worker's participation can reduce her payoff and increase the reliance on rule enforcement.

Keywords: rule enforcement, relational contract, managerial discretion

JEL Codes: C73, D23, D82, D87, M12

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> "Knowing when to bend the rules is one of the hallmarks of an experienced decision maker."
>
> — James G March, 1994. *A Primer on Decision Making*.

1 Introduction

The management literature is littered with criticisms of rules. They lead to rigidity, stifle innovation, and create unnecessary bureaucracy. Reed Hastings, the founder of Netflix, went so far as to famously advocate for a no-rule-rule approach, suggesting that abolishing rules unleashes creativity and autonomy within organizations (Hastings and Meyer, 2020).[1] Despite the criticisms, rules persist in most organizations because they fulfill essential functions. Rules provide structure, ensure consistency, and create a framework that aligns actions with organizational goals. Without rules, organizations risk descending into disorder (Turco, 2016).

Although rules are often thought of as rigid and hard constraints, in practice they are often more flexible than they appear. The enforcement of rules is rarely automatic or uniform; rather, it is carried out by managers who exercise discretion in deciding when and how to apply them. Importantly, enforcing rules involves both tangible and intangible costs. Managers must deploy resources to monitor and ensure compliance and often face psychological and relational costs when disciplining employees. Any parent who has enforced a rule with their children can attest to the emotional toll involved.

The dilemma that managers (or any rule enforcers) face is that they prefer not to enforce the rule as long as the workers provide good behavior. But if the rule is not enforced, then the workers have incentive to shirk and lower their performance. The key challenge is to exercise discretion (to lower the enforcement cost) while maintaining a functioning organizational environment.

The classic work of Gouldner (1954) illustrates selective rule enforcement in a mining company. The company's "no-floating around" rule required workers to stay at their workplace except for essential needs. Managers enforced this rule flexibly, allowing workers to socialize when performance was satisfactory but invoking it when productivity declined. As Gouldner notes, "formal rules gave supervisors something with which they could 'bargain' in order to secure informal cooperation from workers" (Gouldner, 1954, p. 173), highlighting how rule enforcement emerges from relational contracts.

[1] An earlier famous example of minimal rules is Nordstrom, which states in its employee handbook that "Rule #1: Use good judgment in all situations. There will be no additional rules" (Spector and McCarthy, 2012).

In this paper, we formally examine rule enforcement through a repeated interaction between a middle manager (she) and a worker (he). At the beginning of each period, the manager can enforce a rule requiring worker effort. However, enforcing the rule comes at a cost to the manager[2]. Without rule enforcement, the worker freely chooses his effort level based on his privately observed effort cost, which fluctuates over time. Finally, each party can terminate the relationship at the end of each period.

We characterize the optimal relational contracts, which fall into two distinct categories. The first category, the "manager-led" approach, involves active management through cyclical rule enforcement. When worker performance deteriorates, the manager imposes strict rules. After a period of enforcement, rules are relaxed, allowing the worker to exert effort only when his privately observed effort cost is low. Over time, the worker's performance will naturally decline again due to the stochastic nature of the effort cost, causing the manager to enforce the rule. Thus, under the manager-led approach, the relationship cycles between periods of strict rule enforcement, which limits flexibility and adaptability, and periods of relaxed enforcement, during which the worker may slack off. This cyclical pattern reflects the inherent trade-off between maintaining control through rules and allowing for adaptation and discretion.

This cyclical enforcement aligns with organizational observations. In Gouldner (1954)'s mining company study, managers enforced rules only after performance declined, allowing flexibility until intervention became necessary. Similar patterns appear in China's governance model, where scholars document "campaign-style mobilization" - periodic intensification of enforcement followed by relaxation (Zhou, 2022).

Although scholars have long criticized this pattern, described in Chinese as *yi-guan-jiu-si*, *yi-fang-jiu-luan*, meaning "control leads to stagnation, freedom leads to disorder", these patterns are simply unavoidable. Enforcing rules too rigidly stifles flexibility, while relaxing them too much leads to disorder. The adherence to either strict control or relaxed flexibility is difficult to maintain over the long run, but this cyclical approach may, in fact, be the best that managers or governments can achieve under the constraints they face. The cyclical pattern thus reflects an ongoing negotiation between these two extremes, allowing for a dynamic, if imperfect, equilibrium.

The second category of relational contracts is the "worker-led" approach. Here, managers maintain order not through rule enforcement but through the threat of termination, or *exit*. This possibility of being fired serves as a disciplinary tool, motivating workers to self-manage without constant oversight.

[2]A familiar example for many readers might be that a professor displays a "No Phones Allowed" slide at the start of each class.

Under this approach, the worker may initially avoid effort when costs are high, knowing there is short-term tolerance. However, after a period of lower effort, the worker begins to exert effort again, even with high costs, understanding that continued slacking risks termination. The fear of exit thus drives self-regulation and proactive effort.

The worker-led approach creates a more hands-off dynamic. Workers internalize the consequences of sustained underperformance by incorporating the long-term value of the relationship into their daily decision-making. The relationship operates through an implicit understanding: continued employment depends on maintaining adequate effort, even in challenging circumstances. Workers balance current effort costs against future termination risks, eliminating the need for frequent managerial intervention.

Our analysis allows us to clearly delineate when each of the two approaches—manager-led and worker-led—comes into play. When the cost of enforcing rules is relatively low, the manager-led approach is more likely to be used. Specifically, we show that there exists a cutoff enforcement cost: the manager-led approach is employed if and only if the enforcement cost falls below this threshold, as the benefits of improved worker effort outweigh the enforcement cost.

When the enforcement cost exceeds this threshold, the worker-led approach is used. Our analysis reveals two distinct subcategories within the worker-led approach, depending on the size of the enforcement cost. When the enforcement cost is sufficiently high—above a second, higher threshold—the manager never enforces the rules throughout the relationship. The cost of enforcing effort is prohibitively expensive, so the manager relies entirely on the threat of termination to motivate the worker. The relationship is thus governed purely by the exit mechanism.

Interestingly, when the enforcement cost lies between the two thresholds, a different dynamic emerges within the worker-led approach. The manager enforces rules initially for a limited period, even though this enforcement is not necessarily optimal for the overall long-term value of the relationship. This initial use of enforcement reflects the manager's own short-term incentive: she prefers that the worker puts in effort.

This feature of early enforcement relates to deferred rewards in the dynamic game literature. By enforcing rules at the outset, the manager effectively increases the worker's future payoff. Once the initial enforcement period ends, the worker gains more flexibility to withhold effort when costs are high. The initial phase of rule enforcement thus functions as a way to build up the worker's "credit" or trust within the relationship, where high effort early on is effectively "paid" in exchange for later autonomy and flexibility.

In addition to enforcement costs, we show that the worker-led approach is more likely to be adopted when players are more patient, or equivalently, when there is greater surplus

in the relationship. Patience means both parties value future payoffs more highly relative to immediate rewards. For the worker, this creates a stronger incentive to maintain the relationship, making the threat of exit more potent and encouraging self-discipline even when effort is costly.

As a result, the management of the relationship increasingly relies on worker self-regulation rather than direct rule enforcement. Motivated by preserving the long-term relationship, the worker takes responsibility for meeting performance expectations without strict supervision. This shift in responsibility reflects a deeper trust, where workers manage their effort based on the understanding that their future within the organization depends on it.

This finding is consistent with management literature, which shows that rules and strict enforcement are used less in high-performing organizations–those with greater surplus (see Gibbons and Henderson, 2012, for instance, and see Ichniowski and Shaw, 2003 for review). In such organizations, workers receive more autonomy as the focus shifts from rigid rule enforcement to self-management. This cultivates a culture of accountability and self-motivation, where workers maintain the relationship without constant oversight. However, this autonomy has a price: workers must sometimes make short-term sacrifices, exerting effort even when costs are high, to maintain their long-term role in the organization.

Our analysis extends beyond the baseline framework to consider important variations that reflect real-world complexities. First, we examine how the timing of the manager's enforcement decision affects relationship dynamics. In our baseline model, the manager commits to her enforcement decision before the worker's participation. However, managers in practice may face credibility issues when promising not to enforce rules. They might initially promise flexibility to attract workers, only to implement stricter enforcement after securing participation.

To understand this issue, we analyze an alternative timeline where the manager decides on rule enforcement after the worker's participation. Counter-intuitively, this increased managerial discretion actually undermines the manager's payoff from the relationship. In our baseline model, the worker exerts initial effort with the expectation of future autonomy. However, when the manager can enforce rules after participation, her promises of future flexibility lose credibility. Consequently, the manager must rely more heavily on the manager-led approach to regulate worker's behavior, resulting in lower overall payoff.

We further explore how information structure affects rule enforcement by examining the scenario where the worker's effort cost becomes public information. Under private information, the worker must receive sufficient information rent to incentivize effort. When effort cost becomes public, this information rent is no longer necessary, allowing the worker

to exert effort even with lower payoffs than under information asymmetry. This change makes the worker-led approach more attractive to managers. Paradoxically, improved information technology that makes effort costs more transparent may lead to less rule enforcement, as managers can rely more effectively on worker's self-regulation.

2 Related Literature

It is widely acknowledged that ultimate decisions should be made by those who can adapt their actions to local information without strict control from rules (Hayek, 1945). There is a growing literature studying the cost of control. The empirical study by Falk and Kosfeld (2006) shows that workers respond negatively to rule enforcement and perceive that as lack of trust and limitation of autonomy. Following their study, there are some theoretical models explaining the hidden cost of control from the perspective of signaling (Sliwka, 2007; Ellingsen and Johannesson, 2008) or reciprocity (Von Siemens, 2013). Li, Mukherjee and Vasconcelos (2023) study a dynamic setting where the rule cannot be taken away once established and show that the adoption of new rules will incur a dynamic cost and make organizations more rigid over time. Despite the cost of rules, the economics and the management literature still provide the reasons for the wide-spread use of rules in practice. Rule serves as the bargaining chip for management to induce desired outcome (Gouldner, 1954). Work routines can help organizations to achieve less misunderstanding and better coordination (Nelson and Winter, 1985). Sticking to rules can help transaction parties to preserve trust and maintain reputation in unforeseen circumstances (Kreps et al., 1990). Relatedly, there are some papers studying how to motivate lower managers to acquire local information and truthfully report to top management (Alonso, Dessein and Matouschek, 2008, Rantakari, 2008, Rantakari, 2012, also see Gibbons, Matouschek and Roberts, 2013 for a survey).

In contrast to Li, Mukherjee and Vasconcelos (2023), we study a setting where the rule can be enforced or ignored in every period. We contribute to this literature by investigating when should the manager enforce the rule to regulate the worker and how this is affected by enforcement cost. We highlight how enforcement cost can affect the manager's choice between the manager-led approach and the worker-led approach. In particular, when the cost is sufficiently high, it is optimal for the manager not to implement the rule at all and use the threat of exit instead.

The literature of rule is closely related to the incomplete contracting literature on delegation. There are two fundamentally different control systems: ex post performance control and ex ante action planning (Mintzberg, 1989). Both rule and delegation can be a

format of ex ante action planning. Starting from the seminal work by Aghion and Tirole (1997), most of the literature on delegation assumes principals can commit to various allocations of control rights through contracts and examines the formal allocation of those control rights (see, e.g., Dessein, 2002, and, for a survey, Bolton and Dewatripont, 2013). However, typically courts do not enforce contracts when transaction parties are in the same organization (see, e.g., Bolton and Dewatripont, 2013, and Aghion, Bloom and Van Reenen, 2014). Given this fact, there are some papers studying the informal allocation of control rights when top management commits through noncontractual means (see, e.g., Aghion and Tirole, 1997, Baker, Gibbons and Murphy, 1999 and Alonso and Matouschek, 2007). A closely related work is Li, Matouschek and Powell (2017), which models power as a relational contract and explores a setting where the optimal allocation of power is not stationary. We follow this paper in studying a relational contract with dynamic setting. In contrast to it, however, we introduce the rule by modeling it as an instruction for the worker to strictly follow and explore how manager's decision on rule enforcement changes over time.

Another element of our paper that aligns with the delegation literature is that we rule out monetary transfer. In our setting, middle manager will not pay the worker. Instead, the worker is paid a fixed wage by the firm. Usually middle managers do not have the discretion to pay the workers. The literature on mechanism design without transfers explores the optimal design of contracts when parties among the same organization are constrained by managerial or legal issues (see Holmström, 1984, Melumad and Shibano, 1991, and, in a dynamic context, Guo and Hörner, 2015 and Lipnowski and Ramos, 2020).

Our paper is also related to the growing literature on the economics of relationships; see Samuelson (2006) and Mailath and Samuelson (2006) for reviews. Many papers have shown that relationships can improve over time (Ghosh and Ray, 1996; Kranton, 1996; Watson, 1999; Mailath and Samuelson, 2001; Watson, 2002; Chassang, 2010; Yang, 2013; Halac, 2014). However, relationships may also deteriorate because of a worsening production environment (Garrett and Pavan, 2012; Halac and Prat, 2016) or limited allocation of authority constrained by past promises (Li, Matouschek and Powell, 2017). Finally, relationships can cycle between reward and punishment phases in the long run when parties have private information (Padró i Miquel and Yared, 2012; Li and Matouschek, 2013; Zhu, 2013; Fong and Li, 2017).[3] In our model, the relationship also oscillates between

[3]There is a growing literature on dynamic games with one-sided private information; see Mailath and Samuelson (2006) for a general review and Malcomson (1999) and Malcomson (2013) for surveys of applications in labor and organizational economics. In some models, long-run dynamics do not cycle between reward and punishment phases. Instead, they involve termination of the relationship or convergence to an efficient steady (see, e.g., Clementi and Hopenhayn, 2006; Biais et al., 2007; DeMarzo and Fishman, 2007).

reward and punishment phases when players are sufficiently patient. Our focus is that during the punishment phase, the manager can choose between the manager-led action and the worker-led action.

Finally, our paper is also broadly related to the literature on the interaction between formal and informal incentives (see, e.g., Baker, Gibbons and Murphy, 1994; Schmidt and Schnitzer, 1995; Che and Yoo, 2001). This literature assumes that an agent's private action is reflected by both verifiable and non-verifiable signals.[4] Hence, the optimal incentive scheme should combine both formal and informal incentives, and the two forms of incentives can be substitutes as well as complements. We consider a setting where formal contracts are not available. When the rule is not enforced, the worker is driven by informal incentives through repeated interactions. When the rule is enforced, the manager can force the worker to exert effort instead of using continuation payoff to motivate him.

3 A Model of Dynamic Rule Enforcement

Consider a long-term relationship between a manager and a worker. Time is discrete and denoted as $t \in \{1, 2, \ldots, \infty\}$. In each period, the manager and the worker play a stage game characterized by three components: *technology*, *actions* and *payoffs*.

Technology: The worker chooses an effort level $e_t \in \{0, 1\}$. If $e_t = 1$, he generates an output of $Y_t = y$. If $e_t = 0$, the output is zero. Both effort and output are publicly observable. However, the cost of effort is private information. It depends on an underlying state $\theta_t \in \{G, B\}$, known only by the worker, and is given by $c(e_t = 1) = c\mathbf{1}_{\theta_t=G} + C\mathbf{1}_{\theta_t=B}$. Assume that $c < C$ so that the effort cost is lower in the good state (G) than in the bad state (B).[5] The state is independently drawn in each period with $\mathbf{P}(\theta_t = G) = p \in (0, 1)$.

Actions: At the beginning of each period, the manager decides whether to enforce a rule, which requires the worker to exert effort. Denote the announcement on rule enforcement as $\gamma_t \in \{0, 1\}$. If $\gamma_t = 1$, the worker is forced to make $e_t = 1$, regardless of the state θ_t. In contrast, if $\gamma_t = 0$, the worker is free to choose the effort level conditional on the state. To enforce the rule, the manager incurs a cost $D \geq 0$, which can represent either the physical expense of close monitoring or the mental cost arising from the tension between the manager and the worker. After the announcement, both the manager and the worker

[4] Note that an exception is Kvaløy and Olsen (2009), who study a setting with endogenous verifiability.

[5] From the firm's perspective, a more interesting setting would be $c < y < C$, so that production is only efficient in the good state. Here we focus on the middle manager, who does not care about total efficiency. Hence, we do not compare the output with the worker's effort cost.

decide whether to participate in production.[6] Denote their decisions as $d_t^m, d_t^w \in \{0, 1\}$, where 0 indicates no participation and 1 indicates participation.

Given that both parties participate ($d_t^m d_t^w = 1$), there are four pure actions that the manager and the worker can choose in the stage game:

1. Forced Effort (F): The manager enforces the rule, compelling the worker to exert effort regardless of the state.
2. Proactive Effort (P): The manager does not enforce the rule, but the worker still exerts effort in all states.
3. Adaptive Effort (A): The manager does not enforce the rule, and the worker exerts effort only in the good state.
4. Shirking (S): The manager does not enforce rule, and the worker makes no effort.

Alternatively, either party can opt out ($d^m = 0$ or $d^w = 0$), which is referred to as Outside Option and denoted as O. Note that we exclude the case in which the manager does not enforce the rule and the worker exerts effort only in the bad state, as this is not incentive-compatible for the worker.

Payoffs: In each period, if the players do not engage in the stage game, this period ends with both parties receiving their outside option payoffs $(\underline{u}, \underline{\pi})$. We normalize $\underline{u}$ to zero for simplicity. Instead, if they enter the stage game, production occurs according to the previously specified technology. The worker receives a fixed wage w, while the manager obtains the output. To focus on the dynamics of rule enforcement, we abstract from monetary incentives by assuming that the wage is exogenous and not paid by the manager. This setup reflects scenarios where middle managers have limited control over wage-setting. Taking production, the worker's effort cost, and the manager's enforcement cost into account, we express their stage payoffs as follows:

$$\hat{u}_t = d_t^m d_t^w \mathbb{E}_{\theta_t}[w - c(e_t)], \text{ and } \hat{\pi}_t = d_t^m d_t^w \mathbb{E}_{\theta_t}[Y_t - \gamma_t D].$$

At the end of each period, the manager and the worker observe the realization $x_t \in [0, 1]$ of a public randomization device. Assume that at the beginning of the first period, they can also observe a realization of the randomization device, which is denoted as x_0. The randomization device guarantees that the set of equilibrium payoffs is convex, which is commonly used in the literature. The timing of the stage game is summarized in Figure 1.

The stage game repeats in each period, with the manager and the worker sharing a common discount factor $\delta \in (0, 1)$. Thus, at the beginning of any period t, the expected

[6] Section 6.1 considers the setup where the manager announces the rule after the worker's participation decision.

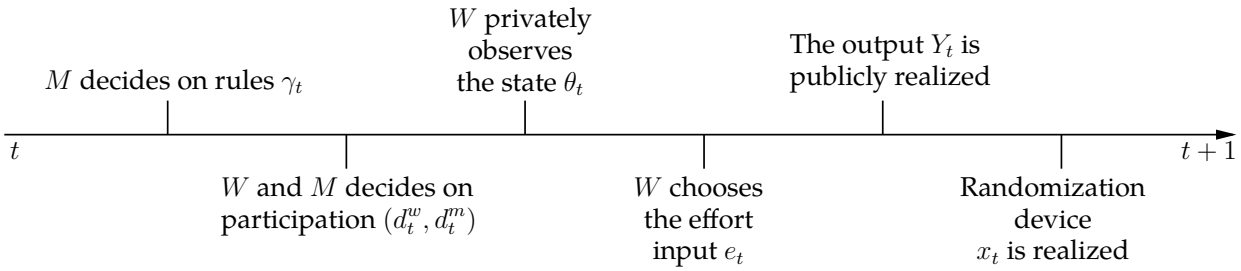

Figure 1: Timeline of the Stage Game

payoffs for the worker (u_t) and the manager (π_t) are given by

$$u_t = (1-\delta)\sum_{\tau=t}^{\infty}\delta^{\tau-t}\hat{u}_\tau, \text{ and } \pi_t = (1-\delta)\sum_{\tau=t}^{\infty}\delta^{\tau-t}\hat{\pi}_\tau.$$

These payoffs are normalized to per-period average values through multiplication by $1-\delta$.

Following Levin (2003), we define a relational contract as a pure strategy Perfect Public Equilibrium (henceforth PPE). This restriction is without loss of generality because our game has only one-sided private information, and is therefore a game with product monitoring structure. In this case, every sequential equilibrium outcome is also a PPE outcome (see Mailath and Samuelson, 2006, p. 330).

Formally, denote the public history at the beginning of period t as h_t, where $h_t := \{d_\tau^m, \gamma_\tau, d_\tau^w, e_t, x_t\}_{\tau=1}^{t-1}$. For each t, let $\mathcal{H}_t$ be the set of all such histories. Note that $\mathcal{H}_1 = \phi$. A public strategy of the manager is a sequence of functions $\{D_t^m, \Gamma_t\}_{t=1}^{\infty}$, where $D_t^m : \mathcal{H}_t \to \{0,1\}$ and $\Gamma_t : \mathcal{H}_t \to \{0,1\}$. Similarly, a public strategy of the worker is a sequence of functions $\{D_t^w, E_t\}_{t=1}^{\infty}$, where $D_t^w : \mathcal{H}_t \cup \{d_t^m, \gamma_t\} \to \{0,1\}$, and $E_t : \mathcal{H}_t \cup \{d_t^m, d_t^w, \gamma_t, \theta_t\} \to \{0,1\}$. These strategies form a PPE if they compose a Nash Equilibrium given any public history $h_t \in \mathcal{H}_t$.

Among all possible relational contracts, one is called *optimal* if it maximizes the manager's expected payoff π_1 at the beginning of the relationship. Our goal is to characterize the set of optimal relational contracts.

4 Preliminaries

This section outlines how we characterize the set of PPE payoffs, denoted as $\mathcal{E}$. Following Abreu, Pearce and Stacchetti (1990), any equilibrium payoff pair $(u, \pi) \in \mathcal{E}$ can be supported either by pure actions or by randomization among equilibrium payoff pairs generated by pure actions. When a pure action is used, the players receive the flow payoffs from that

action in the current period and the corresponding continuation payoffs in the future. Alternatively, when an equilibrium payoff pair is supported by randomization, the players select a pure action after observing the realization of the randomization device at the end of the previous period. We begin by introducing the constraints required for a pure action to support an equilibrium payoff, and then formulate the maximization problem that characterizes the frontier of $\mathcal{E}$.

Constraints. Any action $j \in \{O, F, P, A, S\}$ supporting an equilibrium payoff must satisfy three constraints:

1. Promise-keeping constraint: The equilibrium payoff pair decomposes into a pair of flow payoffs and a pair of continuation payoffs. The continuation payoffs represent the discounted value of future actions.
2. No-deviation constraint: The worker is willing to exert effort in line with the action.
3. Self-enforcing constraint: The pair of continuation payoffs must belong to the PPE payoff set. Combined with the no-deviation constraint, this ensures that the supported payoff is indeed an equilibrium payoff.

The details of these constraints can be found in Appendix **??**.

The Maximization Problem. Now we formulate our maximization problem that characterizes the frontier of $\mathcal{E}$. Define the PPE payoff frontier as

$$\pi(u) := \max\{\pi' : (u, \pi') \in \mathcal{E}\}.$$

This frontier is well defined as $\mathcal{E}$ is compact (Abreu, Pearce and Stacchetti, 1990). In addition, since the players can randomize their behavior with the randomization device $\{x_t\}$, $\mathcal{E}$ is convex. This implies that $\pi(u)$ is a concave function.

Suppose that a payoff pair $(u, \pi(u))$ on the PPE frontier is supported by a pure action. To identify this specific action, we need to know the highest equilibrium payoff the manager can achieve with each action. For each pure action $j \in \{F, P, A, S, O\}$, let $f_j(u)$ denote the manager's highest equilibrium payoff. The worker's promise-keeping constraint indicates that

$$u = (1 - \delta)u_j + \delta \mathbf{E}[u_j(u)],$$

where u_j denotes the worker's flow payoff from action j, and $u_j(u)$ denotes the realization of the worker's continuation payoff. The following lemma establishes a key property that facilitates the characterization of the manager's continuation payoff.

Lemma 1. *For any $(u, \pi(u))$ on the PPE payoff frontier, the continuation payoffs of the worker and the manager are also on the PPE payoff frontier. If $(u, \pi(u))$ is supported by a pure action $j \in \{F, P, A, S, O\}$, then the manager's continuation payoff is realized as $\pi(u_j(u))$.*

Lemma 1 shows that for any payoffs on the PPE payoff frontier, the associated continuation payoffs also stay on the frontier. This is because the manager's actions are publicly observable, and there is no need to punish her by moving below the frontier (see, e.g., Spear and Srivastava, 1987; Levin, 2003). We can therefore trace out the entire equilibrium action sequences on the frontier without worrying about payoffs below the frontier. In particular, we can decompose $f_j(u)$ as

$$f_j(u) = (1-\delta)\pi_j + \delta \mathbf{E}[\pi(u_j(u))],$$

where π_j denotes the manager's flow payoff from action j.

Now, observe that the PPE payoff frontier is the highest payoff the manager can achieve by using a pure action or randomizing between different pure actions. Thus, it can be characterized by the following constrained maximization problem:

$$\pi(u) = \max_{\alpha_j \geq 0, u_j \in [0,\overline{u}]} \sum_{j \in \{F,P,A,S,O\}} \alpha_j f_j(u_j)$$

$$s.t. \sum_{j \in \{F,P,A,S,O\}} \alpha_j = 1, \text{ and } \sum_{j \in \{F,P,A,S,O\}} \alpha_j u_j = u.$$

If any of the weight α_j equals one, the manager's payoff $\pi(u)$ is supported by action j. Otherwise, $\pi(u)$ is generated by randomization. We will characterize the PPE payoff frontier by choosing these weights. For our analysis, we make the following assumptions.

Assumption 1. $c < w < pc + (1-p)C$.

Assumption 2. $\delta > C/(w+C)$.

Assumption 3. (i) $\underline{\pi}/y < c/[pc+(1-p)C]$; (ii) $\underline{\pi}/y < \max\{\delta p/(1+\delta p), [\delta(w+C)-C]/[\delta pc + \delta(1-p)C]\}$.

Assumption 4. (i) $c \leq w(1-p)/\left[\left(\frac{w}{C}+1\right)^2 - p\frac{w}{C}\right]$; (ii) $p \leq w/(w+C)$.

Assumption 1 indicates that the manager cannot simply repeat enforcing rules, as the worker's payoff from forced effort is lower than his outside option. In contrast, the worker's payoff from adaptive effort is greater than the outside option. Assumption 2 is a necessary condition for proactive effort to be chosen within the relational contract. Assumption 3

simplifies our analysis on the part of the PPE payoff frontier supported by shirking. Finally, the necessity of Assumption 4 will become clear as we proceed to characterize the optimal relational contract; see the discussion following Definition 1 in the next section.

5 Optimal Relational Contract

This section characterizes the optimal relational contract by solving the maximization problem in the previous section. There are two approaches that the manager can utilize to deal with unsatisfactory performance from the worker, which affects the dynamics of the relationship. We first present some general properties of the optimal relational contract. Then, we analyze the different dynamics when different approaches are adopted. Finally, the effect of the discount factor is examined.

5.1 General Pattern of Optimal Relational Contract

The following lemma characterizes the PPE payoff frontier when the worker's continuation payoff is sufficiently large.

Lemma 2. *There exist three cutoffs, $\overline{u} \in (w-c, w)$, $\underline{u}^A := w - c$, and $\overline{u}^A \in (w-c, \overline{u})$, such that:*

(*i*) *For $u \in [\underline{u}^A, \overline{u}^A]$, the PPE payoff frontier is supported by adaptive effort. The worker's continuation payoff satisfies $u_{A,h}(u) = \frac{1}{\delta}u - \frac{1-\delta}{\delta}(w-c) \geq u$ if he exerts effort (the inequality only binds at $u = \underline{u}^A$), and $u_{A,l}(u) = \frac{1}{\delta}u - \frac{1-\delta}{\delta}w < u$ if he does not exert effort.*

(*ii*) *For $u \in (\overline{u}^A, \overline{u}]$, the PPE payoff frontier is supported by randomization between the payoff pairs $(\overline{u}^A, \pi(\overline{u}^A))$ and $(\overline{u}, \underline{\pi})$. When $(\overline{u}, \underline{\pi})$ is realized, the worker shirks, and his continuation payoff satisfies $u_S(\overline{u}) = \frac{1}{\delta}\overline{u} - \frac{1-\delta}{\delta}w \in (\overline{u}^A, \overline{u})$.*

Lemma 2 shows that the PPE payoff frontier under the optimal relational contract contains an adaptive region $[\underline{u}^A, \overline{u}^A]$ and a rewarding region $(\overline{u}^A, \overline{u}]$. In the rewarding region, the worker still receives wages without exerting effort. As he continues to receive these rewards, his continuation payoff drops and eventually moves into the adaptive region, where adaptive effort is required. In this adaptive region, the worker exerts effort only when the effort cost is low. If he continues to exert effort, he eventually returns to the rewarding region, where he may then shirk. This future reward motivates the worker's effort, which is a common feature of relational contracts with limited transfer and private information (see, e.g., Padró i Miquel and Yared, 2012; Li and Matouschek, 2013; Fong and Li, 2017). However, if the worker fails to deliver satisfactory performance, his continuation payoff

drops. To prevent organization decline, the manager then must take actions to discipline the worker. Our model proposes the following two approaches, and the manager's choice between them forms the central focus of our paper.

First, the manager can enforce rules, which guarantees output by requiring the worker to exert effort regardless of the state. However, because forced effort imposes negative flow payoffs on the worker, the manager cannot rely on rule enforcement over extended periods. After several periods of forced effort, the worker's continuation payoff rises, and he must be allowed to resume adaptive effort or even shirk. If performance again declines, the manager will resort to enforcing rules, and the cycle restarts. We refer to this cyclical pattern of rule enforcement as the *manager-led approach*.

Second, the manager can refrain from enforcing rules and instead rely on the worker to self-discipline. We refer to this approach as the *worker-led approach*. In this approach, the worker also exerts effort regardless of the state. The key difference from the manager-led approach is that the manager does not enforce rules if the worker fails to deliver output with adaptive effort. Instead, the manager relies on the threat of termination, prompting the worker to manage his own behavior and proactively exert effort.

Recall from Lemma 2 that in the adaptive region, the worker's continuation payoff decreases if does not exert effort because of high cost. In that case, his continuation payoff eventually moves into $[0, \underline{u}^A)$. Below, we formally define the two approaches based on the actions that support the PPE payoff frontier in this region.

Definition 1. The optimal relational contract adopts the manager-led approach if the PPE payoff frontier is not supported by proactive effort for any $u \in [0, \underline{u}^A)$, and adopts the worker-led approach if the PPE payoff frontier is supported by proactive effort for some $u \in [0, \underline{u}^A)$.

We now explain Assumption 4. Recall that $\underline{u}^A = w - c$. Part (i) of the assumption indicates that c is sufficiently small, making $\underline{u}^A$ large enough so that the worker's continuation payoff after adaptive effort is not too low. This condition ensures that proactive effort is feasible following unsatisfactory performance of the worker. Part (ii) of the assumption ensures that the payoff from adaptive effort is sufficiently low, so the optimal relational contract does not begin with this action. Under these assumptions, we characterize the conditions under which the manager prefers one of the two approaches.

Lemma 3. *There exists $\underline{D}(\delta) \in [0, y)$ such that:*

(*i*) *When $D < \underline{D}(\delta)$, it is optimal for the manager to adopt the manager-led approach.*

(*ii*) *When $D \geq \underline{D}(\delta)$, it is optimal for the manager to adopt the worker-led approach.*

Lemma 3 shows that there exists a threshold $\underline{D}(\delta)$ such that the manager-led approach is adopted in the optimal relational contract if and only if the rule enforcement cost is below $\underline{D}(\delta)$.[7] Intuitively, the optimal choice between the manager-led and worker-led approaches is determined by the rule enforcement cost, following a cutoff strategy. When the enforcement cost is sufficiently low, the manager prefers to actively enforce rules to counter organizational declines. In contrast, when the enforcement cost is high, the manager allows the worker to take the lead to preempt organizational declines. This lemma provides the foundation for a detailed examination of the two approaches, elaborated as follows.

5.2 Manager-led Approach

We begin by investigating the manager-led approach. The following proposition characterizes the PPE payoff frontier and the optimal relational contract when $D < \underline{D}(\delta)$.

Proposition 1. *Suppose $D < \underline{D}(\delta)$. Then, the following hold:*

(*i*) *For $u \in [0, \underline{u}^A)$, the PPE payoff frontier is supported by randomization between the payoff pairs $(0, \pi(0))$ and $(\underline{u}^A, \pi(\underline{u}^A))$. When $(0, \pi(0))$ is realized, the players engage in forced effort, and the worker's continuation payoff satisfies $u_F(0) = \frac{1-\delta}{\delta}[pc + (1-p)C - w] > 0$.*

(*ii*) *The optimal relational contract starts with the equilibrium payoff pair $(0, \pi(0))$, where the players engage in forced effort. In subsequent periods, their actions and payoffs are determined by what region the worker's continuation payoff is in.*

Proposition 1, together with Lemma 2, characterizes the PPE payoff frontier and the optimal relational contract under the manager-led approach. In addition to the adaptive region for adaptive effort and the rewarding region for shirking (as established in Lemma 2), Part (i) of the proposition introduces a rule-enforced region $[0, \underline{u}^A)$, where the worker is required by rules to exert effort regardless of the state.

To understand how the relationship moves from adaptive region to rule-enforced region, suppose that the players are using adaptive effort so that the worker will not exert in the bad state. After several periods of bad state, the worker's continuation payoff drops below the threshold $\underline{u}^A$. Then, the relationship enters the rule-enforced region, where the forced effort is used. Given that the forced effort generates a negative flow payoff for the worker, the worker's continuation payoff must increase. This gradually moves the relationship back into the adaptive region or rewarding region.

Furthermore, this proposition shows that the optimal relational contract begins with players using forced effort. In particular, the worker's equilibrium payoff is zero. This

[7] We favor the worker-led approach in cases of a tie between the two approaches.

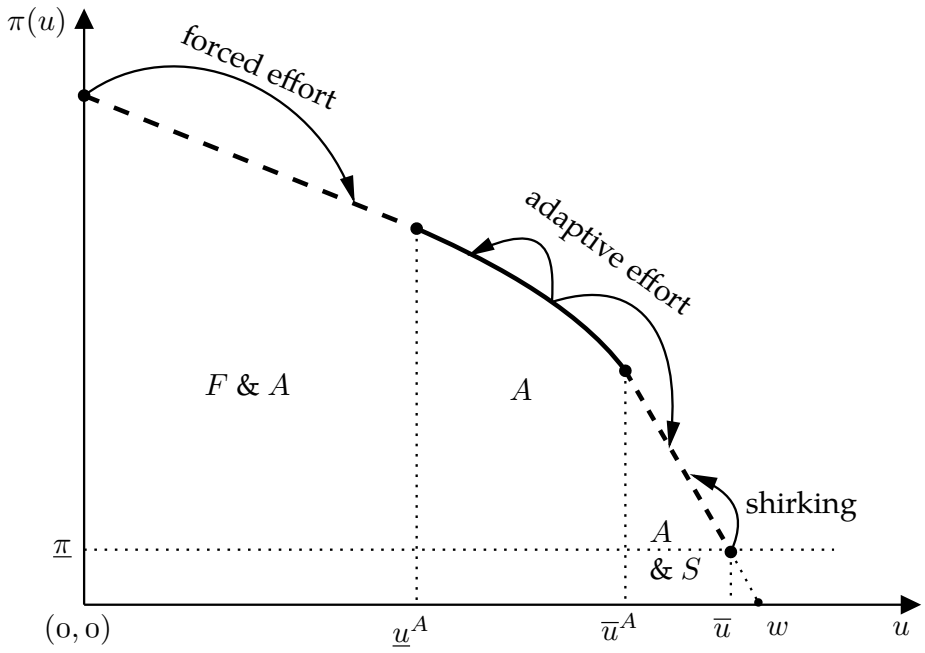

Figure 2: PPE Payoff Frontier: $D < \underline{D}(\delta)$

highlights rules as a critical tool for rent extraction: by enforcing rules, the manager can compel the worker to exert effort without worrying about any incentive-related concerns. As long as the worker's payoff remains not lower than his outside option, he will exert effort in both good and bad states. As a result, the worker's payoff can be pushed down to his outside option, which is normalized to zero in our model.

Notice that the proactive effort is not adopted to support the frontier. Both forced effort and proactive effort will deliver the same output as the worker will exert effort regardless of the state. To use proactive effort, sufficient rent must be allowed for the worker. However, with forced effort, the manager can extract rent from the worker and push his payoff to zero. Hence, the enforcement cost has substantial influence on the manager's choice between forced effort and proactive effort. When the enforcement cost is sufficiently small, the benefit of forced effort dominates. As a result, proactive effort will not be used to support the frontier.

Figure 2 illustrates the PPE payoff frontier and the evolution of the worker's continuation payoff. A natural question that arises is where this relationship will settle in the long run. This is addressed by the following corollary.

Corollary 1. *Suppose $D < \underline{D}(\delta)$. There exists $\delta^F \in (\frac{C}{w+C}, 1)$ such that if $\delta < \delta^F$, the optimal relational contract alternates among forced effort, shirking, and adaptive effort, with the worker's continuation payoff $u \in [0, \overline{u}]$; and if $\delta \geq \delta^F$, the optimal relational contract alternates only between*

forced effort and adaptive effort, with the worker's continuation payoff $u \in [0, \underline{u}^A]$.

Corollary 1 shows that the long-run outcome in our model is not absorbing. Rather, it follows a cyclical pattern of using forced effort and adaptive effort, and shirking is also involved given certain parameters.[8] Since forced effort imposes negative flow payoffs on the worker, the manager must compensate him by allowing periods of adaptive effort or even shirking afterward. However, neither shirking nor adaptive effort is self-enforcing. Hence, the relationship eventually reverts to forced effort when the worker fails to deliver output over extended periods.

Additionally, this corollary also indicates that if both players are sufficiently patient ($\delta \geq \delta^F$), the optimal relational contract avoids shirking entirely. In this case, the worker's continuation payoff is below the threshold $\underline{u}^A$ after the first period. By randomization, the players will engage in either forced effort with payoff $(0, \pi(0))$ or adaptive effort with payoff $(\underline{u}^A, \pi(\underline{u}^A))$. If adaptive effort is chosen, the worker's continuation payoff drops again below $\underline{u}^A$ in bad states while stays at $\underline{u}^A$ in good states. Therefore, in the long run, the worker's continuation payoff is trapped in $[0, \underline{u}^A]$, restricting the optimal relational contract to alternate between using only forced effort and adaptive effort.

In contrast, when players are less patient ($\delta < \delta^F$), shirking is involved in the optimal relational contract. After the first period, the worker's continuation payoff surpasses the threshold $\underline{u}^A$, moving the play into the adaptive region. With positive probability, there will be several consecutive periods of good state. In that case, the worker's continuation payoff keeps increasing until it surpasses the threshold $\overline{u}^A$. Then, the worker is rewarded with shirking, and his continuation payoff will drop. Therefore, in the long run, the optimal relational contract will alternate between using forced effort, adaptive effort and shirking.

As we mentioned previously in Section 1 (Introduction), this cyclical pattern of rule enforcement is closely aligned with observations from various organizational settings. For example, in the mining company studied by Gouldner (1954), managers selectively enforced rigid rules only after observing the worker's performance deteriorated. This approach to management, where rules are imposed when productivity or behavior slides, mirrors the "manager-led" pattern we describe. Organizations typically maintain flexibility until performance falls below acceptable levels, at which point stricter rule enforcement becomes necessary to restore productivity.

This pattern extends beyond individual organizations to broader governance systems,

[8] In the long run, the relationship is essentially determined by the dynamics of the worker's continuation payoff. It ends up with termination or a steady state in some models (see, e.g., Clementi and Hopenhayn, 2006; Biais et al., 2007; DeMarzo and Fishman, 2007; Li, Matouschek and Powell, 2017), while oscillates between reward and punishment phases in others (see, e.g., Padró i Miquel and Yared, 2012; Li and Matouschek, 2013; Zhu, 2013; Fong and Li, 2017).

particularly in China's economic management. In the example of "campaign-style mobilization" in China, the state periodically mobilizes resources and intensifies enforcement (Zhou, 2022). These mobilization periods can roughly be understood as periods of strict rule enforcement, followed by phases of relaxation.Brandt and Zhu (2000) presents an empirical study on the "boom-bust" feature of Chinese economy since 1978, showing how government's cyclical control on credit allocation shapes economic outcomes. During financial decentralization, state-owned banks divert resources to more productive private sectors, with the government financing through money creation. The resulting inflation forces the government to return to centralization and reassert control over credit allocation. Brandt and Zhu (2001) develops a macro-dynamic model to explain this cyclical pattern of Chinese economy. Much like in organizational settings, this ebb and flow of enforcement in governance reflects an adaptation to fluctuating circumstances.

5.3 Worker-led Approach

We now turn to the worker-led approach. As noted in the introduction, the worker-led approach comprises subcategories, distinguished by the actions used at the beginning of the relationship. To address this distinction, we first analyze the PPE payoff frontier and then characterize the optimal relational contract when $D \geq \underline{D}(\delta)$.

5.3.1 General Pattern of Worker-led Approach

The following lemma characterizes the general pattern of PPE payoff frontier when the worker-led approach is adopted.

Lemma 4. *Suppose $D \geq \underline{D}(\delta)$. Then, there exists $\underline{u}^P := (1-\delta)[w + p(C-c)]$ such that for $u \in [\underline{u}^P, \underline{u}^A)$, the PPE payoff frontier is supported by randomization between the payoff pairs $(\underline{u}^P, \pi(\underline{u}^P))$ and $(\underline{u}^A, \pi(\underline{u}^A))$. When $(\underline{u}^P, \pi(\underline{u}^P))$ is realized, the players engage in proactive effort, and the worker's continuation payoff satisfies $u_P(\underline{u}^P) = \frac{1-\delta}{\delta}C > \underline{u}^P$.*

Lemmas 4 and 2 characterize the PPE payoff frontier for $u \geq \underline{u}^P$. It introduces a 'preemptive region' to the left of the adaptive region where workers exert proactive effort. When a worker's continuation payoff falls below $\underline{u}^A$ due to shirking in the adaptive region, the worker-led approach diverges from the manager-led approach by avoiding rule enforcement. Instead, termination threats motivate effort provision regardless of the state. After sufficient proactive effort in the preemptive region, the worker's continuation payoff increases, transitioning back to either the adaptive region (for adaptive effort) or the rewarding region (for shirking).

Proactive effort generates strictly positive payoffs for the worker due to incentive constraints: in bad states with high effort costs, workers only exert effort when guaranteed sufficient compensation ($u \geq \underline{u}^P > 0$). This fundamentally differentiates proactive effort from forced effort, where workers can be compelled to exert effort even with zero payoff. The distinction reflects a core tradeoff in relational contracts - while forced effort offers complete rent extraction, it requires costly rule enforcement. Proactive effort avoids these enforcement costs but demands credible promises of future compensation to sustain worker motivation.

5.3.2 Difference in Initial Action

The distinction mentioned above critically impacts the manager's maximum equilibrium payoff. Since proactive effort requires positive worker compensation, it inherently constrains the manager's rent extraction abilities. The following section analyzes these constraints and their implications for optimal contract design.

Lemma 5. *Suppose $D \geq \underline{D}(\delta)$. Then, there exists $\overline{D}(\delta) \in (\underline{D}(\delta), y)$ such that:*

(*i*) *When $D \geq \overline{D}(\delta)$, the manager's highest equilibrium payoff is given by $\pi(\underline{u}^P)$ and supported by proactive effort.*

(*ii*) *When $D < \overline{D}(\delta)$, the manager's highest equilibrium payoff is given by $\pi(0)$ and supported by forced effort.*

Lemma 5 reveals a threshold $\overline{D}(\delta)$ that further divides the worker-led approach into two subcategories. When the rule enforcement cost is at least $\overline{D}(\delta)$, the manager's payoff is maximized at $u = \underline{u}^P$, with the equilibrium payoff pair supported by proactive effort.[9] In contrast, when the rule enforcement cost is below $\overline{D}(\delta)$, the manager's payoff is maximized at $u = 0$, with the equilibrium payoff pair supported by forced effort. This distinction arises because rule enforcement enhances the manager's ability to extract rents from the worker. Lemma 3 suggests that the worker-led approach is preferred for disciplining the worker when $D \geq \underline{D}(\delta)$. However, to maximize her gains, the manager may still choose to begin the relationship by enforcing rules when the cost is in an intermediate range, i.e., $D \in [\underline{D}(\delta), \overline{D}(\delta))$.

The following proposition fully characterizes the PPE payoff frontier and the optimal relational contract for each subcategory of worker-led approach.

Proposition 2. *Suppose $D \geq \underline{D}(\delta)$.*

[9] We favor the proactive effort in cases of a tie between proactive effort and forced effort.

(*i*) *If* $D \in [\overline{D}(\delta), \infty)$*, the optimal relational contract starts with the equilibrium payoff pair* $(\underline{u}^P, \pi(\underline{u}^P))$*, where the players engage in proactive effort.*

(*ii*) *If* $D \in [\underline{D}(\delta), \overline{D}(\delta))$*, the optimal relational contract starts with the equilibrium payoff pair* $(0, \pi(0))$*, where the players engage in forced effort.*

The actions and payoffs in subsequent periods are determined by what region the worker's continuation payoff is in:

(*i*) *For* $u \in [0, \underline{u}^P)$*, the PPE payoff frontier is supported by randomization between the payoff pairs* $(0, \pi(0))$ *and* $(\underline{u}^P, \pi(\underline{u}^P))$*. Once the worker's continuation payoff is weakly greater than* $\underline{u}^P$*, it will never enter* $[0, \underline{u}^P)$*.*

(*ii*) *For* $u \in [\underline{u}^P, \underline{u}^A)$*, the PPE payoff frontier is supported by randomization between the payoff pairs* $(\underline{u}^P, \pi(\underline{u}^P))$ *and* $(\underline{u}^A, \pi(\underline{u}^A))$*.*

(*iii*) *For* $u \in [\underline{u}^A, \overline{u}^A]$*, the PPE payoff frontier is supported by adaptive effort.*

(*iv*) *For* $u \in (\overline{u}^A, \overline{u}]$*, the PPE payoff frontier is supported by randomization between the payoff pairs* $(\overline{u}^A, \pi(\overline{u}^A))$ *and* $(\overline{u}, \underline{\pi})$*.*

Proposition 2 shows that, under the worker-led approach, the optimal relational contract begins either in the rule-enforced region $[0, \underline{u}^P)$ or the preemptive region $[\underline{u}^P, \underline{u}^A)$, depending on the rule enforcement cost. This result follows directly from Lemma 5. When the rule enforcement cost is sufficiently high ($D \geq \overline{D}(\delta)$), the contract starts in the preemptive region, where the rule is not enforced, and the worker exerts effort voluntarily. In contrast, when the rule enforcement cost is moderate ($\underline{D}(\delta) \leq D < \overline{D}(\delta)$), the contract begins in the rule-enforced region. In this case, the rule is enforced for rent extraction, and the worker is compelled to exert effort.

Despite these differences, Proposition 2 shows that the optimal relational contract is essentially the same across both subcategories within the worker-led approach, as illustrated in Figure 3. While contracts may initiate in the rule-enforced region, the worker's continuation payoff gradually increases until the relationship exits this region. Notably, once the continuation payoff exceeds $\underline{u}^P$, it remains at least as high as $\underline{u}^P$ thereafter, preventing re-entry into the rule-enforced region.

This dynamic structure optimally balances rule enforcement as a rent extraction tool and its absence as an incentive mechanism. The manager may initially enforce rules to extract greater rents, but this phase is necessarily temporary to ensure the worker's participation constraint is satisfied. The worker accepts initial rule enforcement precisely

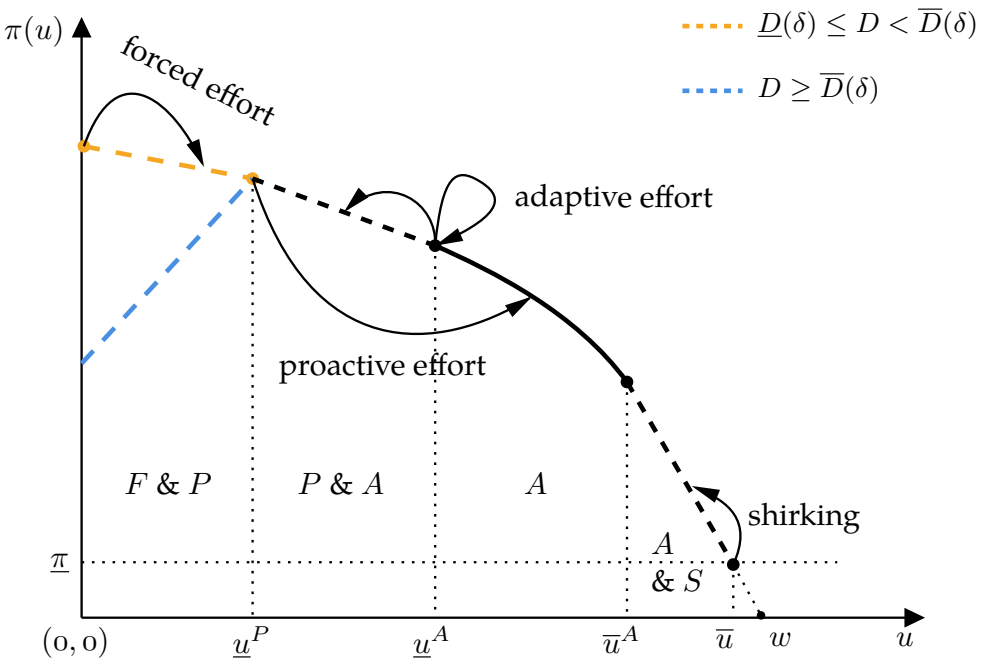

Figure 3: PPE Payoff Frontier: $D \geq \underline{D}(\delta)$

because the manager commits to future leniency - effectively trading early compliance for later autonomy.

Therefore, under the worker-led approach, the optimal relational contract contains three main regions: the preemptive region $[\underline{u}^P, \underline{u}^A)$, the adaptive region $[\underline{u}^A, \overline{u}^A]$, and the rewarding region $(\overline{u}^A, \overline{u}]$. In the preemptive region, the manager does not enforce rules; instead, the worker disciplines himself to exert effort out of fear of termination. As the worker continues proactive effort, his continuation payoff increases and eventually moves into the adaptive or rewarding region. In these regions, the worker earns positive flow payoffs either through adaptive effort or shirking, leading his continuation payoff to gradually decrease. When the worker is required to make adaptive effort but fails to deliver output over enough periods, his continuation payoff shifts back into the preemptive region, restarting the cycle of self-discipline.

Corollary 2. *Suppose that $D \geq \underline{D}(\delta)$. Then, there exists a random variable τ with $\mathbf{P}[\tau < \infty] = 1$ such that the optimal relational contract does not involve forced effort or outside option for all $t > \tau$.*

By Definition 1, a relational contract adopts the worker-led approach if proactive effort supports the PPE payoff frontier at some $u \in [0, \underline{u}^A)$. Corollary 2 strengthens this characterization: the worker-led approach not only features proactive effort but also ensures the relationship eventually evolves without rule enforcement. This result follows directly from Proposition 2, as the manager credibly commits to future autonomy in exchange for

possible initial rule compliance. Because the manager has commitment power over rule enforcement, her promise is ultimately honored.

5.4 Effects of the Discount Factor

Lemma 3, Proposition 1, and Proposition 2 have shown how the rule enforcement cost determines the disciplinary approach and the dynamics of the optimal relational contract. The following proposition presents the comparative statics with respect to the discount factor.

Proposition 3. *Suppose $\delta \geq \delta^F$. Then, both $\underline{D}(\delta)$ and $\overline{D}(\delta)$ (weakly) decrease in δ. In particular, $\underline{D}(\delta) = 0$ when $\delta \geq \frac{C}{w+C-c}$.*

Proposition 3 shows that a larger discount factor makes the manager less likely to enforce rules in the optimal relational contract. Specifically, as $\underline{D}(\delta)$ decreases in δ, the manager becomes less inclined to adopt the manager-led approach to discipline the worker. Furthermore, even under the worker-led approach, as $\overline{D}(\delta)$ also decreases in δ, the manager is less likely to establish the relationship by enforcing rules in the initial periods. Consequently, the worker enjoys more autonomy when both players are more patient.

This result reflects the enhanced effectiveness of termination threats when players value future payoffs more heavily. Higher patience strengthens these self-enforcing incentives, enabling the worker-led approach to generate superior payoffs for the manager. Given the rule enforcement cost, the manager-led approach becomes less appealing. In particular, when δ is sufficiently large, the manager-led approach is never optimal.

Within both subcategories of the worker-led approach, a higher discount factor also reduces the likelihood of initial rule enforcement. Since proactive effort generates identical output to forced effort without enforcement costs, increased worker patience diminishes the rent extraction benefits of rule enforcement. This reduces the manager's incentive to enforce rules even in the initial periods.

6 Discussion

6.1 Ex-post Rule Enforcement

Our model has assumed that managers can commit to rule enforcement announcements before workers decide to participate. In practice, however, managers often lack such commitment power. They might initially promise a flexible working environment with

minimal rules, but later reverse course and implement strict regulations after workers have already joined the organization.

To better reflect this real-world challenge, we modify our model by changing the timing of decisions. The manager's rule enforcement decision (γ_t) now follows the worker's participation decision (d_t^w), as illustrated in Figure 4. We distinguish this *ex-post rule enforcement* setup from the *ex-ante rule enforcement* framework analyzed previously. The following lemma reveals how this seemingly subtle change in timing significantly affects the manager's payoff.

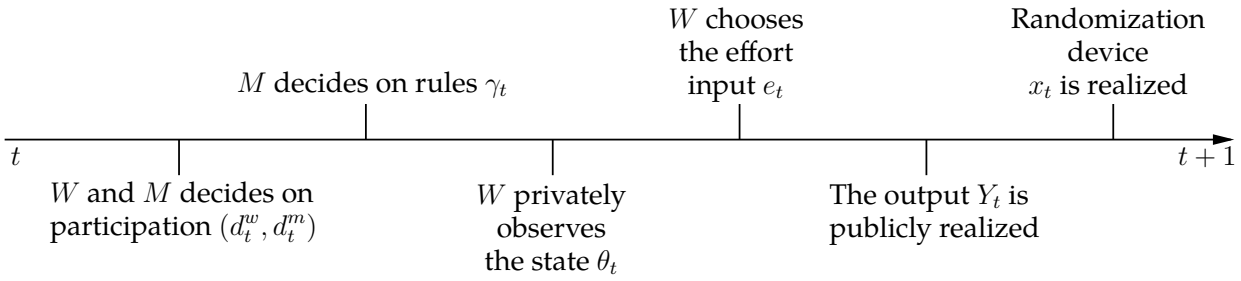

Figure 4: Timeline of the Stage Game with Ex-post Rule Enforcement

Lemma 6. *Under ex-post rule enforcement, the manager's payoff on the PPE payoff frontier satisfies* $\pi(u) \geq (1-\delta)(y-D)$ *whenever it is supported by a pure action other than the outside option.*

Lemma 6 demonstrates that without commitment power, the manager can secure a minimum payoff of $(1-\delta)(y-D)$ whenever choosing any pure action besides the outside option. This lower bound emerges from the manager's ability to enforce rules after securing worker participation, which guarantees output y at enforcement cost D. The option to impose ex-post rule enforcement thus creates a floor on the manager's equilibrium payoffs.

In the following, we investigate the optimal relational contract under ex-post rule enforcement. To ensure that the worker-led approach remains feasible, we make an additional assumption:

Assumption 5. $w \geq \max\{\frac{1-\delta}{\delta}C + (1-\delta)[pc + (1-p)C], \frac{1-\delta}{\delta}[\frac{1-\delta}{\delta}pc + (p - \frac{1-p}{\delta})C]\}$.

Notice that this assumption can be satisfied as long as δ is sufficiently large. Under this assumption, we show how ex-post rule enforcement affects the managerial approach adopted by the manager.

Proposition 4. *Suppose that Assumption 5 holds, and* $\delta \geq \delta^F$. *Under ex-post rule enforcement, there exists* $D'(\delta)$ *such that it is optimal for the manager to adopt the worker-led approach if and only if* $D \geq D'(\delta)$. *In particular, the following hold:*

(*i*) *Compared with ex-ante rule enforcement, ex-post rule enforcement decreases the manager's payoff from the optimal relational contract.*

(*ii*) $D'(\delta) > \underline{D}(\delta)$.

Proposition 4 establishes a threshold structure analogous to the ex-ante case: under ex-post rule enforcement, the optimal relational contract follows the worker-led approach if and only if $D \geq D'(\delta)$. However, this threshold strictly exceeds its ex-ante counterpart, revealing that diminished commitment power reduces the viability of worker-led approaches. This higher threshold reflects how the manager's inability to commit to future autonomy systematically erodes worker autonomy in equilibrium.

To understand the intuition behind Part (ii), we must first consider Part (i) of the proposition. It shows that ex-post rule enforcement harms the manager. Recall from our previous results that, under ex-ante rule enforcement, the optimal relational contract features cyclical patterns of actions, alternating between disciplinary actions, such as forced or proactive effort, and rewarding actions, such as adaptive effort or shirking. In particular, the worker is willing to be disciplined - either by rules or self-discipline - in the initial periods only because the manager credibly promises future rewards in later periods. However, ex-post rule enforcement disrupts these future rewards, thereby undermining the value of the relationship.

In the adaptive region, promising higher worker continuation payoffs necessarily reduces manager payoffs (see Figures 2 and 3). Since the manager's payoff is bounded below by $(1-\delta)(y-D)$, ex-post rule enforcement restricts the range of continuation payoffs available to the worker. As a result, a payoff previously supported by adaptive effort may now need to be supported by shirking or by randomization involving shirking. This restriction diminishes the manager's payoff on the PPE payoff frontier.

Given this result, it is natural that the manager is more likely to choose the manager-led approach under ex-post rule enforcement than under ex-ante rule enforcement. When rules can be enforced on an ex-post basis, the manager's ability to credibly promise future rewards is severely hindered by her discretion in enforcing rules, which reduces the worker's motivation. Perhaps ironically, the manager then has to rely more on formal rules to discipline the worker. The next result shows how the organization can remedy this motivation problem.

Proposition 5. *Suppose that Assumption 5 holds, and $\delta \geq \delta^F$. Under ex-post rule enforcement, when $D \geq D'(\delta)$, the manager's payoff from the optimal relational contract increases in D.*

Proposition 5 shows that under ex-post rule enforcement, the manager can actually benefit from a higher enforcement cost of rules. A sufficiently high enforcement cost can

serve as a commitment device, discouraging the manager from enforcing rules. As the manager regains commitment power over rule-related announcements, her credibility in honoring future rewards is restored, allowing the value of the relationship to recover to the level shown in Section 5.

An important takeaway from the discussion on ex-post rule enforcement is that constraints on the manager's discretion can benefit the manager herself. This insight complements our analysis of the relationship between selective rule enforcement and organizational performance. While our main results in Section 5 demonstrate that selective rule enforcement fosters a more effective organization than blind rule enforcement, Propositions 4 and 5 suggest that managerial discretion should still be limited to prevent the manager from reneging on rule-related announcements.

6.2 Public Information

So far, we have assumed that the effort cost is the worker's private information. This assumption is particularly relevant in industries where effort costs fluctuate due to turbulent environments (e.g., see the mining firm studied by Gouldner 1954). However, advancements in information technology now provide the manager with better opportunities to estimate these effort costs by analyzing relevant data. It remains unclear how they influence rule enforcement in the manager-worker relationship. This subsection considers the scenario where effort costs are public information and examine the changes in the dynamics.

Proposition 6. *Suppose that the worker's effort cost is public information, and $\delta \geq \delta^F$. Then, there exists a cutoff $D'(\delta)$ such that it is optimal for the manager to adopt the worker-led approach if and only if $D \geq D'(\delta)$. In particular, $D'(\delta) \leq \underline{D}(\delta)$.*

Proposition 6 shows that when the effort cost is public information, there exists a threshold such that the manager prefers the worker to lead the relationship whenever the rule enforcement cost exceeds this threshold. Notably, this threshold is lower than the one under private information. Therefore, public information makes the worker-led approach more appealing and promotes worker autonomy.

Recall that two critical actions under the worker-led approach are proactive effort and adaptive effort. To enforce these actions, the manager must ensure that the worker receives a strictly positive payoff when the effort cost is privately known to the worker. In other words, the worker must gain a rent in addition to the value of his outside option. The rent is an "information rent"—compensation the manager effectively pays due to the worker's informational advantage. However, if the manager observes the worker's effort cost, this

information rent becomes unnecessary. Consequently, the worker-led approach is more valuable for the manager, and the manager favors it unless the rule enforcement cost is exceptionally low ($D < D'(\delta) \leq \underline{D}(\delta)$).

7 Conclusion

This paper explores the optimal enforcement of rules in employment relationships. Optimal relational contracts fall into two categories: manager-led approach and worker-led approach. When enforcement costs are low, the manager-led approach is used, characterized by cycles of rule enforcement and relaxation. In this setting, the manager plays an active role in maintaining the worker's performance by enforcing the rule when necessary to ensure effort. However, as enforcement costs increase and the surplus of the relationship grows, the worker-led approach will be chosen. Here, the threat of termination serves as the motivator, causing the worker to self-regulate and maintain effort without managerial supervision in the long run.

Furthermore, we identify a subcategory within the worker-led approach where rules are enforced at the beginning of the relationship. This temporary enforcement helps establish future flexibility. Our findings align with empirical studies that suggest that high-performing organizations, which typically have greater surplus, rely less on rigid rules and more on worker autonomy.

Our analysis of variations to the baseline model yields additional insights into rule enforcement dynamics. Managers face a dilemma when they make enforcement decisions after workers join the organization. Instead of benefiting from this additional flexibility, managers actually end up worse off because they cannot credibly promise future autonomy to workers. We also find that information structure significantly affects enforcement strategies. Paradoxically, when effort costs become public information, managers are less likely to enforce rules, as the worker-led approach becomes more appealing. This suggests that improved information technologies might lead to more flexible organizational structures rather than increased monitoring and control.

For future research, it would be valuable to explore how managerial characteristics, which influence enforcement costs, interact with the production environment and the surplus of the relationship. This could provide further insight into when and how organizations transition between different enforcement strategies, potentially linking management styles to specific industry or market conditions.

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