Employment and Community: Socioeconomic Cooperation and Its Breakdown*

Daron Acemoglu
MIT

Alexander Wolitzky
MIT

July 24, 2024

Abstract

We propose a model of the interplay of employment relationships and community-based interactions among workers and managers. Employment relations can be either *tough* (where workers are monitored intensively and obtain few rents, and managers do not provide informal favors for their workers) or *soft* (where there is less monitoring, more worker rents, and more workplace favor exchange). Both workers and managers also exert effort in providing community benefits. The threat of losing access to community benefits can motivate managers to keep employment soft; conversely, the threat of losing future employment or future workers' trust can motivate workers and managers to exert effort in the community. Improvements in monitoring technologies; automation, outsourcing, and offshoring; declines in the minimum wage; and opportunities for residential segregation or for privatizing community-provided services can make both workers and managers worse-off by undermining soft employment relations and community cooperation.

Keywords: employment, community, incentives, monitoring, efficiency wages, cooperation, favor exchange, multi-activity contact, inequality.

JEL Classification: C73, D23, J00, P00

*We thank Nageeb Ali, David Autor, Ben Golub, Sanjeev Goyal, Mark Granovetter, Bryony Reich, Michael Sandel, Enrico Spolaore, and Jean Tirole for very useful discussions; seminar participants at Chicago, ESSET, Glasgow, MIT, NBER Culture and Institutions, NBER Organizational Economics, NYU Abu Dhabi, Oxford, THReD, and VSET for helpful comments; and Andrew Koh, Austin Lentsch, Julia Regier, and Can Yeşildere for superb research assistance. We also gratefully acknowledge generous financial support from the Hewlett Foundation.

Berbey: "In Austin [Minnesota], worker and management took each others' kids to school. They sat in the same pews at church. In other disputes, like if you were Ronald Reagan or the CEO of Chrysler or American Airlines..."

Hardy: "You didn't have to worry about going to church and having somebody spit on the back of your head."

—Journalist Gabrielle Berbey and Rayce Hardy, the son of a Hormel meatpacker, discussing the 1985 Hormel strike (*The Atlantic*, February 10, 2022).

1 Introduction

Informal, community-based interactions and formal economic interactions such as employment relationships interact in myriad ways. One of the most celebrated findings of economics sociology is the importance of weak ties—information and recommendations from community members—in job finding (Granovetter 1973, 1985; Montgomery 1991; Calvo-Armengol and Jackson 2004). It is also well-recognized that community ties shape people's motivations and opportunities.[1] A literature dating back to Polanyi (1944) emphasizes the socially embedded nature of economic exchange and employment, while Solow (1990) calls for viewing the labor market as "a social institution." Conversely, the impacts of (un)employment and economic inequality on communities are no less important: these have been proposed as root causes of various social problems, including crime, teenage pregnancy, underperformance in schools, and the dissolution of families (Wilson 1996, Putnam 2000, 2016, Murray 2012, Rajan 2019). Indeed, several recent works report evidence showing that large negative economic shocks have a major impact on social outcomes (Black, McKinnish, and Sanders 2005; Autor, Dorn, and Hanson 2019).

Consistent with the interdependence between community and employment interactions, many economic and social indicators follow each other in the US time-series. Putnam (2020) documents that measures of civic participation, trust, and social cohesion improved from the 1940s onward, when economic opportunities expanded and inequality declined. For example, data from the National Opinion Research Center indicate that the fraction of Americans who said that most people can be trusted increased from around 69% in 1948 to 79% in 1964 (Erskine 1964). Recent decades, on the other hand, have shown the opposite pattern. Real wages for non-college workers have stagnated or even declined since 1980, while managerial and professional workers have seen rapid improvements in their labor market outcomes (Acemoglu and Autor 2011; Autor 2019). At the same time, there has been a notable deterioration in

1. Community-level factors are important for education (e.g., Chetty et al. 2018) and the broader socialization of the youth (e.g., Boyd and Richerson 1985), and there is a growing appreciation that community relations and social connections affect economic mobility (e.g., Chetty, Hendren, and Katz 2016, Chetty and Hendren 2018, Chetty et al. 2022).

civic participation, trust and community ties. According to the General Social Survey (GSS), around 1980 more than 75% of Americans spent at least one social evening during the year with someone in their neighborhood; by 2019, before the pandemic, this share had fallen to less than 70%. The GSS also indicates that the share of Americans with no membership in any non-religious civic association increased from around 35% in the early 1980s to over 45% in 2004,[2] while the share of Americans who said that most people can be trusted dropped precipitously from around 40% in 1975 to just above 20% in 2022.[3] These weakening civic ties are reflected in how much Americans appear to be willing to sacrifice for the good of others as measured by blood donations per capita, which have declined from the early 1990s by about one third (Wallace et al. 1998; Free et al. 2023). Other measures of the health of American communities are also in decline: the fraction of out-of-wedlock births and single-parent households have increased (Kearney 2023), "deaths of despair" have risen (Case and Deaton 2020), and other dimensions of civic life have weakened (Rainie and Perrin 2019). The same period has also witnessed changes in the internal organization and management strategies of firms, with evidence suggesting both a shift toward less worker-friendly management practices (Stansbury and Summers 2020; Acemoglu, He, and Maire 2023) and more intensive worker monitoring (Gordon 1996).

The experiences of several US communities can illustrate these patterns and give us clues about the underlying mechanisms. The meat-processing company Hormel, mentioned in the opening quote, was a mainstay of the town of Austin, Minnesota. Hormel provided well-paid jobs for workers, and its owners and managers were thoroughly enmeshed in local civic life (Hage and Klauda 1989). When the company started automating and offshoring jobs and reducing wages in the 1980s, this had major effects on social life and cohesion in Austin. A similar case is the role of glass-maker Anchor Hocking in sustaining community relations in Lancaster, Ohio (Alexander 2017). Well-paid jobs at Anchor Hocking were an integral part of Lancaster's economy and a bedrock of the community, where managers and workers interacted closely, and their disappearance following cost-cutting efforts at Anchor Hocking eroded community cooperation. Similar examples abound throughout the US, Europe, and elsewhere. Significantly, the close social connections between Hormel and Anchor Hocking's managers and workers appear to have complicated these companies' restructuring efforts. The opening quote underscores that the prospect of losing their standing in the community was a major consideration for Hormel's managers when they started contemplating wage and job cuts. In the Anchor Hocking case, radical restructuring had to await the arrival of outside, venture capital-backed managers. In addition to the effects of community ties on managerial strategies illustated by Hormel and Anchor Hocking, the available evidence also suggests that workers'

2. This question was discontinued in the GSS in 2004. The World Values Survey asks a similar question, which indicates that civic participation has remained at this low level since 2004.

3. These numbers are all authors' calculations from the GSS. The trust numbers from the National Opinion Research Center and the GSS are based on different methodologies and are not directly comparable.

community standing influences their job prospects. For example, Putnam (2000) describes how participating in civic or religious activities is critical for community standing and, via this channel, for economic opportunities. The statistical evidence in Topa (2001) and Smith (2005) is also consistent with this interpretation.

Our Contribution As a step toward a more systematic understanding of the interplay between social and economic relations, this paper develops and analyzes a model of community-employment interactions. Reflecting the above evidence, our model features two forms of "embedding" of employment relations in local communities: the threat of being excluded or ostracized in the community motivates managers to treat their workers better (as in the Hormel and Anchor Hocking cases), and the threat of losing future employment opportunities through the loss of community standing or "weak ties" motivates workers to contribute to the community (along the lines of Wilson 1996 and Putnam 2000).[4] The key feature of our framework is that the severities of both of these threats are endogenous and mutually determined: the severity of the threat of community exclusion depends on the level of community benefits being provided by workers and managers; and the severity of the threat of losing future employment depends on the size of the economic surplus ("rents") generated by employment and the distribution of this surplus between workers and managers. Our main finding is that this interdependence can overturn important neoclassical predictions regarding labor market performance and social welfare. In particular, we demonstrate that many apparently efficiency-enhancing technological and institutional changes—such as improvements in workplace monitoring technologies; automation, offshoring, or outsourcing; declines in the minimum wage; and opportunities for residential segregation or for privatizing community-provided services—can all induce a shift from more-trusting to less-trusting employment relations and reduce community coooperation, which can leave both workers and managers worse off.

More formally, we model repeated interactions between two types of agents—managers and workers—in workplaces and communities. Workplace and community interactions alternate, with the former in odd periods and the latter in even periods (e.g., weekdays and weekends). Our model is thus one of *multi-activity contact* (Bernheim and Whinston 1990).

In the community, both managers and workers exert costly effort to provide community benefits (e.g., local public goods), which benefit all community members. This effort is observable and can be motivated by the threat of social ostracism and exclusion from future community benefits. For workers, it is additionally motivated by the threat of exclusion from future employment opportunities, because workers who are not in good standing in the community may not receive job recommendations from fellow community members. In our full model, managers are also motivated by the threat of losing workers' trust in future employment relations. Thus,

4. As discussed below, our full model also features a third form of embedding: the threat of losing future workers' trust in employment relations further motivates managers to behave well in both employment relations and community interactions.

the rents that workers and managers earn in the labor market motivate them to take actions that contribute to others' welfare in the community.

In workplaces, managers choose between low-intensity and high-intensity worker monitoring, and in our full model they additionally have the opportunity to treat their workers well by doing costly but socially valuable favors for them (e.g., providing job flexibility or workplace amenities). Crucially, managers who mistreat their workers—either by monitoring them excessively or by reneging on expected favors—can be excluded from the community. If workers trust that managers will treat them well, worker effort is motivated by both wages and favor exchange, and managers choose low-intensity monitoring, which leaves workers with high rents. This is what we call the *soft management regime*. In contrast, when workers believe that they will not receive favorable treatment, worker effort must be motivated purely by wages, and managers choose high-intensity monitoring to reduce the required wage payments. This is the *tough management regime*. While worker rents are always higher in the soft regime, manager rents (profits) can be higher in either regime: in the soft regime, managers must provide higher worker rents, but worker rents are less costly to deliver due to favor exchange, and managers also save on monitoring costs. Tough management is always an equilibrium, while soft management is an equilibrium only if the threat of community exclusion is sufficiently severe for managers.

Overall welfare—taking into account both employment rents and community benefits—is typically higher for workers in a soft equilibrium, and can also be higher for managers in a soft equilibrium, even when managers' profits are higher in a tough equilibrium. This is due to a *tough management externality*: when a manager is tough, this reduces worker rents and thereby discourages workers from contributing to the community, which adversely affects other managers as well as workers.[5]

Theoretically, our model is a multi-player, continuous-action prisoner's dilemma alternating with a "rent-shifting game" (where managers influence the distribution of rents within the employment relationship and can renege on promises). The interplay of these two-game theoretic settings appears to be novel and drives our main results, which concern how changes in on- and off-path payoffs in each game affect each party's maximum cooperation level in the prisoner's dilemma, behavior in the rent-shifting (employment) game, and overall payoffs.

Our most noteworthy results are as follows. First, technological changes that make intensive monitoring more informative or less expensive can make everyone worse off by encouraging managers to adopt intensive monitoring, which undermines the soft equilibrium and reduces community cooperation. Second, expanded opportunities for automation, offshoring, or outsourcing can make everyone worse off by reducing worker employment rents and hence reducing community cooperation. Third, a higher minimum wage can benefit everyone by discourag-

5. On the other hand, when managers' profits increase, they contribute more to the community, which counteracts and can even reverse this negative externality.

ing managers from deviating from the soft equilibrium by adopting intensive monitoring and reducing wages. Fourth, while in general improvements in workplace productivity can favor either a soft or tough equilibrium, they favor a tough equilibrium in the realistic case where a larger workforce creates economies of scale in monitoring and diseconomies of scale in favor exchange. Fifth, an improvement in managers' ability to opt out of community interactions—e.g., by forming segregated residential enclaves or sending their children to private schools—can also make everyone worse off. Interestingly, this happens even when managers do not actually opt out, because the mere presence of outside options for managers lessens the threat of exclusion, which both depresses their equilibrium community contributions and reduces the community's ability to deter them from adopting tough management.

Related Literature. We contribute to a number of social science literatures on the interaction between employment relations, community structure, and social norms. Seminal sociological works on the social embedding of economic interactions include Malinowski (1922), Polanyi (1944), and Thompson (1971). Within economics, related issues are discussed in the efficiency wage and gift exchange literatures (Akerlof 1982; Weisskopf et al. 1983; Shapiro and Stiglitz 1984; Akerlof and Yellen 1986; Solow 1990; Falk 2007), but this literature mostly does not consider the broader social embeddedness of employment and does not contain results on the relationship between community and employment interactions. More closely related is Acemoglu and Newman (2002), who observe that, as in our model, managers have socially excessive incentives to monitor workers in order to shift efficiency wage rents from workers to themselves. Acemoglu and Newman and Gordon (1996) also emphasize the role of increased monitoring in the slowdown of US worker wage growth. Acemoglu and Wolitzky (2011) make a related point in a model where employment relations are "coercive," in that workers' employment rents are negative (i.e., they are compelled to accept contracts that they would otherwise reject). In Acemoglu and Newman (2002) and the current paper, managers take socially inefficient actions to shift rents from workers, but these actions are not coercive because they still leave workers with non-negative rents. None of these works consider the interaction between employment and community relations.

Another related literature, following Kandori (1992), studies dynamic cooperation in communities. A major question in this literature is whether market-based and community- or relationship-based interactions are substitutes (Arnott and Stiglitz 1991; Baker, Gibbons, and Murphy 1994; Kranton 1996; Dixit 2003; Greif and Tabellini 2017; Gagnon and Goyal 2017) or complements (Bernheim and Whinston 1990; Acemoglu and Wolitzky 2020; Balmaceda 2023; Jackson and Xing 2021). A theme of the "substitutes" papers is that, since markets often serve as outside options for community interactions, improved market efficiency can reduce welfare by undermining trust within communities. A theme of the "complements" papers is that information can flow between markets and communities, and consequently the threat of losing rents in each type of relationship can motivate cooperation in the other. Our paper builds on ideas from both strands. On the one hand, rents in each type of relationship support cooperation in the other, as in the complements papers. On the other hand, we show that apparently efficiency-enhancing changes in employment relations—such as improved monitoring or a reduction in worker effort costs—can trigger a breakdown of cooperation in the community, because they change the distribution of employment rents, which are critical for supporting community effort. Hence, in our model employment and community interactions are complements overall, but are "substitutes at the margin"—in the sense that efficiency gains in employment can undermine communities by altering the distribution of rents. Our focus on how the distribution of rents between two groups in one type of interaction affects the sustainability of cooperation in another type of interaction is central to our analysis and, to the best of our knowledge, is novel to the repeated games literature.

Our framework and comparative statics also provide a theoretical interpretation for some recent evidence on corporate culture and worker–manager relations. Guiso, Sapienza, and Zingales (2015) find that firm performance is better when workers view top managers as trustworthy, and that this trust is harder to sustain in public firms; while Daniele Amore, Bennedsen, and Larsen (2022) estimate that firms with locally-residing CEOs have higher employee satisfaction, especially when the CEOs' and employees' children attend the same school. As discussed below, these findings are consistent with our comparative statics. In addition, Acemoglu, He, and Maire (2023) find that wages and the labor share are lower, and worker quits are higher, in firms run by CEOs with business degrees. This is consistent with our framework, presuming that CEOs with business degrees are more likely to adopt tough management (though this paper does not find evidence of more intensive monitoring by these managers).

A final relevant literature concerns residential segregation and neighborhood relations. Theoretical work in this area includes Benabou (1993, 1996), Durlauf (1994), Fernández and Rogerson (2001), and Fogli and Guerrieri (2019), while the empirical literature includes the works cited in footnote 1. This literature emphasizes the inequality and social mobility consequences of residential segregation, but it does not link employment and community relations. Our paper contributes to this literature by highlighting novel interactions and making new predictions regarding the relationship between labor market rents, organizational form, and community relations.

Organization. The rest of the paper is organized as follows. Section 2 covers a simplified version of our model, which transparently presents its key features. Section 3 introduces workplace favor exchange into this stripped-down model. The resulting model is rich enough to yield our main welfare and comparative statics results. Section 4 allows managers to opt out of the community, while Section 5 allows managers to decide the level of employment (i.e., firm size). Section 6 concludes.

2 A Model of Employment and Community Relations

This section presents our baseline model of employment and community interactions. The baseline model is simplified by excluding three elements of our overall framework: favor-exchange in employment relationships; outside alternatives to community interactions; and firm size choice by managers. These are studied in Sections 3, 4, and 5, respectively.

2.1 Model Preliminaries

The economy consists of a mass $\beta > 1/2$ of identical workers and a mass $1 - \beta$ of identical managers. All agents are infinitely lived and discount future payoffs with a common discount factor $\delta \in (0, 1)$.

In odd periods, workers and managers match to engage in a one-shot, bilateral employment relationship. Matching is random, except that each manager can place any subset of workers on her "blacklist," which means that she will never match with them. To preview, blacklisting will not occur in equilibrium, and, since $\beta > 1/2$, along the equilibrium path each manager always matches with a worker, but some workers do not find employment.[6] This last feature will make blacklisting credible in equilibrium, as employers who blacklist some workers still find matches. The timing and payoffs in an employment relationship are described in the next subsection.

In even periods, all agents choose how much community effort to exert. This effort is a public good that benefits everyone, except that each agent can choose to "exclude" (at no cost) any subset of the others from benefitting from her contributions. Like blacklisting from employment opportunities, exclusion in community interactions will not occur along the equilibrium path, so in equilibrium community effort is a pure public good.

An agent's overall payoff is the discounted sum of her employment payoffs (in odd periods) and her community payoffs (in even periods). We assume that the game starts in period 1, so each agent's total payoff is a weighted average of her employment and community payoffs with weights $1/(1 + \delta)$ and $\delta/(1 + \delta)$, respectively.

While the model and equilibrium concept will end up being relatively simple, describing them fully takes a few steps. Section 2.2 describes the timing and payoffs in employment interactions, and Section 2.3 does the same for community interactions. Section 2.4 describes agents' information and defines an equilibrium. Section 2.5 derives incentives in employment interactions, and Section 2.6 does the same for community interactions. Crucially, these incentives interact: future payoffs in each type of interaction affect incentives in the other. Finally, Section 2.7 characterizes the equilibria of the model.

6. The key feature of the matching process is that it is uniformly random among non-blacklisted workers. From an empirical perspective, blacklisting by managers can be viewed as resulting from a lack of job recommendations from community members.

2.2 Employment Relations: Timing and Payoffs

The timing of an employment relationship between a matched worker and manager is as follows:

1. The manager offers the worker a *contract*. This consists of a choice of monitoring intensity—low or high—and a wage $w \geq 0$, which is paid to the worker if the worker is not caught shirking. Choosing high-intensity ("intensive") monitoring costs the manager $k > 0$.

2. The worker observes the contract and decides whether to accept or reject it. If the worker rejects the contract, both parties get payoff 0 in the current period.

3. If the worker accepts the contract, he decides whether to exert effort or shirk. Effort costs the worker $c > 0$ and provides an expected benefit of $y > c$ to the manager. The cost and benefit of shirking are normalized to 0.

4. If the worker shirks, he is caught with probability p under low monitoring and with probability $q > p$ under high monitoring. If the worker is not caught shirking (either because he worked or because he shirked but did not get caught), he is paid w. Otherwise, he is paid 0.

In sum, the manager's payoff from an employment relationship is

$$\Pi^M = \mathbf{1}\{\text{worker works}\}\, y - \mathbf{1}\{\text{worker not caught shirking}\}\, w - \mathbf{1}\{\text{high monitoring}\}\, k,$$

where $\mathbf{1}\{\cdot\}$ is the indicator function, while the worker's payoff is

$$\Pi^W = \mathbf{1}\{\text{worker not caught shirking}\}\, w - \mathbf{1}\{\text{worker works}\}\, c.$$

In this section, we say that a manager who chooses low monitoring is *soft*, while a manager who chooses high monitoring is *tough*.

To focus on the most interesting parameter region, we assume that

$$y - \frac{c}{q} - k \geq \max\left\{y - \frac{c}{p}, 0\right\}. \tag{1}$$

Inequality (1) will ensure that in our simplified model the profit of a tough manager is greater than that of a soft manager and is non-negative.

We also define the constant

$$\rho = \frac{q-p}{pq}c,$$

which will equal the difference in a worker's rent between low and high monitoring. Inequality (1) implies that $\rho \geq k$. Thus, it is profitable for the manager to pay a cost of k to shift a rent of ρ from the worker to herself.

Overall, an employment interaction is a simple efficiency wage game as in Shapiro and Stiglitz (1984), where managers can increase monitoring in order to reduce workers' rents as in Acemoglu and Newman (2002).

2.3 Community Interactions: Payoffs

In a community interaction, each agent (worker or manager) chooses a community effort level $a \geq 0$ at a cost of a, and also decides whether to exclude any subset of the other agents from the benefits of her effort. The interpretation is that excluded agents are ostracized from community activities. In practice, community effort includes keeping the neighborhood clean and safe; participating in local civic or religious activities; sharing useful information; and providing informal insurance.

If workers and managers exert effort a^W and a^M, respectively, community benefits are

$$B\left(a^W, a^M\right) = \beta \alpha b\left(a^W\right) + (1-\beta)\,\alpha b\left(a^M\right),$$

where $b : \mathbb{R}_+ \to \mathbb{R}_+$ is an increasing and concave function satisfying $b(0) = 0$ and the Inada conditions $\lim_{a \to 0} b'(a) = \infty$ and $\lim_{a \to \infty} b'(a) = 0$, and $\alpha > 0$ is a parameter measuring the importance of community benefits. The payoffs from community interactions for workers and managers are given by:[7]

$$V^W\left(a^W, a^M\right) = B\left(a^W, a^M\right) - a^W \qquad \text{and} \qquad V^M\left(a^W, a^M\right) = B\left(a^W, a^M\right) - a^M. \tag{2}$$

Overall, a community interaction is a continuum-agent, continuous-action prisoner's dilemma, with the possibility of excluding some agents.

2.4 Observability and Equilibrium

Incentives in employment and community interactions depend on the observability of the actions taken in these settings. Our observability assumptions encode the view that information about community interactions and manager employment practices are shared reasonably well within communities, while individual workers' employment terms and outcomes are more private.

Specifically, we assume that all manager decisions except the wage offer w are publicly observed. The assumption that individual wage offers are unobserved is a natural starting point given the anonymous nature of employment relations. It also simplifies the analysis, as otherwise wages could be influenced by repeated game considerations and hence would be

7. In general, the payoff for an agent who exerts effort a and is excluded by fraction μ^W of workers and μ^M of managers is $\beta\left(1-\mu^W\right)\alpha b\left(a^W\right) + (1-\beta)\left(1-\mu^M\right)\alpha b\left(a^M\right) - a$. Along the equilibrium path, $\mu^W = \mu^M = 0$, so workers' and managers' payoffs are given by (2).

largely indeterminate. In particular, the assumption that wages are unobserved ensures that managers set wages "myopically," subject to worker incentive constraints.

For workers, we assume that only the community effort decision a is publicly observed. In particular, workplace effort and contract acceptance or rejection are unobserved. This implies that a worker cannot be blacklisted by future employers or ostracized in the community for shirking in an employment relationship or for accepting or refusing employment.[8]

We can now define strategies and introduce our equilibrium concept. The *public history* of the game describes all publicly available information: the past actions of each manager except for her wage offers, and the past community effort of each worker. We consider *public strategies*, where all decisions depend only on the public history, with the exception that a worker's behavior in an employment relation can also depend on the current wage offer. Thus, a public strategy for a manager specifies, as a function of the public history, (1) which workers (if any) to blacklist; (2) what contract (monitoring intensity and wage) to offer her worker; and (3) how much community effort to exert and which agents to exclude from community benefits. Similarly, a strategy for a worker specifies, as a function of the public history, (1) for any contract, whether to accept employment, and if so whether to shirk; and (2) how much community effort to exert and which agents to exclude.[9] We also restrict attention to *symmetric* strategy profiles, where all managers and all workers use the same strategy. A *perfect public equilibrium* is a profile of symmetric public strategies that forms a Nash equilibrium starting from any public history.

We focus on perfect public equilibria where, on path, all workers work, no one is blacklisted or excluded from community benefits, and the community effort levels a^W and a^M are set to their maximum incentive compatible levels. We will see in Section 2.6 that all Pareto efficient perfect public equilibria lie in this class, provided that the discount factor δ is below a threshold $\bar{\delta}$.[10] Henceforth, we simply refer to a perfect public equilibrium in this class as an *equilibrium.*

An equilibrium is fully described by the prevailing management regime (soft or tough), the wage level w, and the community effort levels a^W and a^M. We call an equilibrium soft or tough after the prevailing regime.

We first derive incentives in employment relations (which determine w as a function of the

8. This feature simplifies the model by ruling out "second-order punishments," wherein managers are deterred from being tough by the threat that workers will not work for them, because workers who work for blacklisted firms can themselves be blacklisted. Alternative observability assumptions—for example, where wages are affected by repeated game concerns, or where workers who are caught shirking are blacklisted by all managers—could be studied in future work. Note that our assumptions imply that a worker who is caught shirking is not paid, but this is not observed by the community. An interpretation is that workers are anonymous in employment relations, but when a worker is caught shirking, the manager obtains verifiable evidence of shirking and can publicly present it to a court. Workers then do not object to having their wages garnished when they are caught shirking, and the manager is not compelled to present the evidence.

9. If all other agents use public strategies, an agent always has a best response in public strategies, as there is no benefit to conditioning one's behavior on past wage offers or past worker actions when others do not.

10. If instead $\delta > \bar{\delta}$ (contrary to what we will assume), community effort can be above the first-best level.

management regime), then analyze incentives in community interactions (which determine a^W and a^M as a function of w and the management regime), and finally determine the conditions for the existence of an equilibrium with each management regime (which, by the preceding observations, determines w, a^W, and a^M, and hence completely specifies the equilibrium).

To preview, an equilibrium will involve two synergies between employment and community interactions. First, managers can be excluded from community benefits if they deviate from the prescribed regime, and in particular if they deviate from soft to tough management. The Hormel example in the Introduction illustrates this mechanism. Second, workers who provide insufficient community benefits can be blacklisted. This mechanism captures the pattern discussed in the Introduction where workers who are not in good community standing can miss out on valuable job recommendations.

2.5 Employment Relations: Wages and Worker Incentives

Since wage offers and worker behavior within an employment relationship are not publicly observed, the wage in each management regime is uniquely determined as the lowest wage that motivates the worker to exert effort. We now characterize these wages and the resulting payoffs in each management regime.

Soft regime: If a manager chooses low monitoring and offers wage w, the worker's expected payoff is $w-c$ if he works and $(1-p)\,w$ if he shirks. The lowest wage that induces work is thus

$$w = \frac{c}{p}.$$

Payoffs (or "rents") in the employment relation for the worker and manager, respectively, are then given by

$$\Pi_S^W = w - c = \frac{1-p}{p}c \qquad \text{and} \qquad \Pi_S^M = y - \frac{c}{p},$$

and the total employment surplus is given by $\bar{\Pi}_S = \Pi_S^W + \Pi_S^M = y - c$.

Tough regime: If a manager chooses high monitoring and offers wage w, the worker's expected payoff is $w-c$ if he works and $(1-q)\,w$ if he shirks. The lowest wage that induces work is thus

$$w = \frac{c}{q},$$

and employment rents and surplus are given by

$$\Pi_T^W = w - c = \frac{1-q}{q}c, \qquad \Pi_T^M = y - \frac{c}{q} - k, \qquad \text{and} \qquad \bar{\Pi}_T = \Pi_T^W + \Pi_T^M = y - c - k.$$

Note that the difference in manager profits between the tough and soft regimes is $\rho - k$, which is non-negative by (1):

$$\Pi_T^M - \Pi_S^M = \rho - k \geq 0.$$

Worker and manager employment rents and total employment surplus can be ranked across the management regimes as follows:

$$\Pi_S^W > \Pi_T^W > 0, \qquad \Pi_T^M \geq \max\left\{\Pi_S^M, 0\right\}, \qquad \text{and} \qquad \bar{\Pi}_S > \bar{\Pi}_T > 0.$$

These inequalities are intuitive. Worker rents are higher in a soft equilibrium and are lower—but still positive—in a tough equilibrium. Manager rents are higher in a tough equilibrium, by (1). Total employment surplus is higher in a soft equilibrium, which economizes on the cost of intensive monitoring.

2.6 Community Interactions: Incentives for Community Effort

A pair of community effort levels a^W for workers and a^M for managers can be sustained in equilibrium if and only if they are enforced by the threat of the most severe possible punishments in future employment and community interactions. It is thus without loss to assume that:

- If a worker fails to exert community effort a^W, he is excluded from all future community benefits and is blacklisted by all managers. His continuation payoff is therefore 0 in every period.
- If a manager fails to exert community effort a^M, she is excluded from all future community benefits. However, she can continue to hire workers and obtain employment rent Π_T^M.[11] Her continuation payoff is therefore 0 in even periods and Π_T^M is odd periods.

A pair of community effort levels $\left(a^W, a^M\right)$ is thus *incentive compatible* if

$$a^W \leq \frac{\delta}{1-\delta^2}\frac{1-\beta}{\beta}\Pi^W + \frac{\delta^2}{1-\delta^2}V^W\left(a^W, a^M\right) \qquad \text{and} \tag{3}$$

$$a^M \leq \max\left\{\frac{\delta}{1-\delta^2}\left(\Pi^M - \Pi_T^M\right) + \frac{\delta^2}{1-\delta^2}V^M\left(a^W, a^M\right), 0\right\}. \tag{4}$$

In these inequalities, $\Pi^W \in \left\{\Pi_S^W, \Pi_T^W\right\}$ and $\Pi^M \in \left\{\Pi_S^M, \Pi_T^M\right\}$ are determined according to the equations in the previous subsection, depending on the equilibrium management regime. To derive these inequalities, note that the best deviation for a worker is taking 0 community effort, which saves an effort cost of a^W but incurs a future utility loss of $\frac{1-\beta}{\beta}\Pi^W$ in odd periods (as a non-blacklisted worker finds employment with probability $\frac{1-\beta}{\beta}$) and $V^W\left(a^W, a^M\right)$ in even periods. Similarly, the best deviation for a manager is taking 0 community effort, which saves

11. A deviant manager can still profitably hire workers because managers are always in short supply ($\beta > 1/2$) and employment relations are anonymous. If we extended the model by letting workers blacklist managers (as well as the other way around), it would not be credible for them to do so, because a worker strictly prefers to work for a tough manager rather than remaining unemployed.

an effort cost of a^M but incurs a future utility loss of $\Pi^M - \Pi_T^M$ in odd periods and $V^M\left(a^W, a^M\right)$ in even periods.[12]

When a^W and a^M are the maximum incentive compatible community efforts, (3) and (4) both hold with equality.[13] Substituting for $V^W\left(a^W, a^M\right)$ and $V^M\left(a^W, a^M\right)$ using (2) and isolating a^W and a^M gives

$$a^W = \delta \frac{1-\beta}{\beta} \Pi^W + \delta^2 B\left(a^W, a^M\right) \quad \text{and} \tag{5}$$

$$a^M = \max\left\{\delta\left(\Pi^M - \Pi_T^M\right) + \delta^2 B\left(a^W, a^M\right), 0\right\}. \tag{6}$$

The following lemma says that there exists a component-wise largest pair $\left(a^W, a^M\right)$ that satisfies (5) and (6); it displays monotone comparative statics with respect to Π^W and $\Pi^M - \Pi_T^M$; it Pareto dominates any other incentive compatible pair $\left(\tilde{a}^W, \tilde{a}^M\right)$ whenever the discount factor is below a threshold $\bar{\delta}$; and it involves higher community effort from workers than managers.

Lemma 1

1. *For any Π^W, Π^M, Π_T^M, and δ, there exists a unique pair $\left(a^W, a^M\right)$ satisfying* (5) *and* (6) *such that $\left(a^W, a^M\right) \geq \left(\tilde{a}^W, \tilde{a}^M\right)$ for any incentive compatible pair $\left(\tilde{a}^W, \tilde{a}^M\right)$.*

2. *a^W is strictly increasing in Π^W and δ, and is increasing in $\Pi^M - \Pi_T^M$, strictly so when $a^M > 0$.*

3. *a^M is increasing in Π^W, $\Pi^M - \Pi_T^M$, and δ, strictly so when $a^M > 0$.*

4. *There exists $\bar{\delta} > 0$ such that, for any $\delta < \bar{\delta}$, the pair $\left(a^W, a^M\right)$ Pareto dominates any incentive compatible pair $\left(\tilde{a}^W, \tilde{a}^M\right)$. That is,*

$$0 \leq B\left(\tilde{a}^W, \tilde{a}^M\right) - \tilde{a}^W \leq B\left(a^W, a^M\right) - a^W \quad \text{and} \quad 0 \leq B\left(\tilde{a}^W, \tilde{a}^M\right) - \tilde{a}^M \leq B\left(a^W, a^M\right) - a^M.$$

5. *Workers exert greater community effort than managers: $a^W > a^M$.*

The intuition for the first four parts of the lemma is that community effort choices are intertemporal strategic complements (managers are willing to exert more effort today when workers are expected to exert more effort in the future, and vice versa), and when $\delta < \bar{\delta}$ the maximum incentive compatible community effort levels are below first-best. As a result, $V^W\left(a^W, a^M\right)$ and $V^M\left(a^W, a^M\right)$ are both positive and increasing in a^W and a^M; a maximal

12. In (4), there is a maximum with 0 because the first term on the right-hand side is negative in a soft equilibrium, where $\Pi^M = \Pi_S^M < \Pi_T^M$.
13. Otherwise, at least one of a^W or a^M could be increased without violating (3)–(4).

pair $\left(a^W, a^M\right)$ exist; and any incentive compatible pair of effort levels is Pareto dominated by the maximal one. We henceforth assume that $\delta < \bar{\delta}$.[14]

The last part of the lemma follows because $\Pi^W > 0$ but $\Pi^M - \Pi^M_T \leq 0$, which implies that $a^W > \delta^2 B\left(a^W, a^M\right) \geq a^M$. Intuitively, workers who deviate in the community lose future employment rents, while managers who deviate in the community obtain *greater* rents in future employment interactions by switching to tough management, so the maximum incentive compatible community effort level is higher for workers than managers. However, this comparison can be overturned once we introduce favor exchange in employment relations in Section 3.

2.7 Equilibrium Characterization

We now determine the conditions under which soft and tough equilibria exist. An equilibrium with a given management regime exists if and only if a manager cannot profitably deviate to the other regime. Whenever an equilibrium with a given management regime exists, the equilibrium wage is determined as in Section 2.5, and the equilibrium community effort levels are then determined as in Section 2.6.

Soft equilibrium: A soft equilibrium exists if and only if it is unprofitable for a soft manager to deviate by adopting high monitoring. We have shown that a soft manager's equilibrium payoff, starting in an employment period, is $\left(\Pi^M_S + \delta V^M_S\right)/(1+\delta)$, where $V^M_S = V^M(a^W_S, a^M_S)$ and (a^W_S, a^M_S) is the maximum incentive compatible community effort pair (i.e., the largest solution to (5) and (6), with $\Pi^W = \Pi^W_S$ and $\Pi^M = \Pi^M_S$). If a soft manager deviates to high monitoring, her payoff is $\Pi^M_T/(1+\delta)$. Hence, this deviation is unprofitable if and only if

$$\Pi^M_T \leq \Pi^M_S + \delta V^M_S \quad \iff \quad \rho - k \leq \delta V^M_S. \tag{7}$$

Thus, a soft equilibrium exists if and only if $\rho - k$ (the difference between manager profits in a tough and soft equilibrium) is less that δ times a manager's payoff from community interactions.

Tough equilibrium: By assumption (1), a tough manager cannot gain by deviating to low monitoring. Hence, a tough equilibrium always exists .

We next compare welfare between soft and tough equilibria. Recall that each agent's total payoff is a weighted average of her employment and community payoffs with weights $1/\left(1+\delta\right)$ and $\delta/\left(1+\delta\right)$, respectively. Hence, an agent of type $i \in \{W, M\}$ is better off in the soft equilibrium if and only if

$$\Pi^i_S + \delta V^i_S \geq \Pi^i_T + \delta V^i_T. \tag{8}$$

Since community effort levels can be higher in a soft equilibrium (due to workers' higher employment rents), this condition is satisfied for many parameters, in which case the tough equilibrium

14. A similar lattice structure, where the maximum incentive compatible effort levels for each of two groups form a Pareto optimal equilibrium, arises in our earlier papers, Acemoglu and Wolitzky (2020) and Acemoglu and Wolitzky (2021).

is Pareto dominated. This Pareto inefficiency is due to a *tough management externality*: when a manager introduces high monitoring, this reduces worker rents and thus worker community effort, negatively affecting the welfare of all other managers and workers. However, while the tough management externality is present in the current version of the model, an important subtlety is that it cannot unravel the soft equilibrium when the soft equilibrium is Pareto dominant.[15] In contrast, once we introduce workplace favor exchange in Section 3, the tough management externality can destroy the soft equilibrium even when it is Pareto dominant.

An illustrative case where the soft equilibrium is Pareto dominant arises when k is only slightly below ρ, so that Π_S^M is only slightly below Π_T^M. In this case, manager profits are slightly lower in a soft equilibrium (i.e., lower by $\rho - k \approx 0$), while worker employment rents are considerably higher (i.e., higher by $\rho > 0$). By equations (5) and (6), this implies that community effort levels and benefits are considerably higher in a soft equilibrium. These benefits more than offset managers' slightly lower profits, leaving all agents strictly better off.

The following proposition summarizes these results.

Proposition 1

1. *A tough equilibrium always exists.*

2. *A soft equilibrium exists if and only if the manager incentive constraint* (7) *holds, where* $V_S^M = V^M(a_S^W, a_S^M)$*, with* $\left(a_S^W, a_S^M\right)$ *given by the largest solution to* (5) *and* (6) *when* $\Pi^W = \Pi_S^W$ *and* $\Pi^M = \Pi_S^M$*.*

3. *There exists* $k^* < \rho$ *such that the soft equilibrium Pareto dominates the tough equilibrium whenever* $k \in (k^*, \rho)$ *(even though managers make higher profits in the tough equilibrium).*

4. *If* (8) *holds for both workers and managers (so that, if the soft equilibrium exists, it is Pareto dominant), then the soft equilibrium exists.*

We next give some simple comparative statics for when a soft equilibrium exists, as well as for welfare in a soft equilibrium. We say that the soft equilibrium is "favored" by an increase in a parameter ζ if, for any fixed values of the other parameters and any parameter values $\zeta < \zeta'$, whenever the soft equilibrium exists for parameter value ζ, it also exists for parameter value ζ'.

Proposition 2 *The existence of a soft equilibrium is favored by an increase in* δ*,* α*, or* k*, by a decrease in* q*, or by a simultaneous increase in* p *and* c *that keeps worker rents* $\frac{1-p}{p}c$ *constant. Moreover, in a soft equilibrium all agents' utilities are increasing in* α *and* k *and are decreasing in* q*.*

15. To see this, note that a manager is better-off in the soft equilibrium if and only if $\rho - k \leq \delta(V_S^M - V_T^M)$. Since $V_T^M \geq 0$, this inequality is harder to satisfy than (7). Thus, if managers are better-off in the soft equilibrium, they do not have a profitable deviation.

In sum, a soft equilibrium tends to exist when agents are more patient, when community benefits are more valuable, when high monitoring is more expensive or less precise, or (holding worker rents fixed) when low monitoring is more precise.[16] These results are all intuitive once we recall that a soft equilibrium exists if and only if it is unprofitable for a manager to deviate by adopting high monitoring, at the cost of exclusion from future community benefits. Finally, the welfare comparative statics for k and q work through the incentive constraints that determine the maximum community effort levels, (5) and (6). Namely, making intensive monitoring more costly or less accurate increases welfare in a soft equilibrium, as it makes deviating to intensive monitoring less attractive for managers, and hence increases the maximum incentive compatible community effort levels in a soft equilibrium.

3 Workplace Favor Exchange

We now introduce favor exchange in employment relations. We assume that an employment relation consists of the four stages described in Section 2.2, followed by a fifth stage:

5. If the worker is not caught shirking, the manager decides whether or not to do a favor for the worker. The favor costs the manager $e > 0$ and provides a benefit $d \in (e, c)$ to the worker. The manager's decision whether to do a favor is publicly observed.[17]

Favors can capture workplace amenities, flexibility in job terms, well-paid overtime work, on-the-job training, or recommendations for future jobs. Favors are non-contractable but are a more efficient way of transferring a limited amount of utility to workers than increasing the contracted wage. In other words, because $e < d < c$, it is efficient to motivate effort through a mix of wages and a promised favor, rather than wages alone. However, providing favors may not be credible—if the manager is not trusted to reward the worker via favors, she must rely on wages alone to induce effort.

Introducing favor exchange let us make three new points:

- *Higher manager profits in soft equilibrium; tough management externality can destroy the efficient equilibrium:* With favors, soft management (where the manager chooses low monitoring and does favors for workers who are not caught shirking) can yield higher manager profits than tough management (where the manager chooses high monitoring and does not do favors) even if $\rho > k$, because soft managers are able to monetize the net value of favors, $d - e$ by reducing wages. Specifically, manager profits are now higher in the tough regime if and only if

$$\tau = \rho - k - d + e \geq 0. \tag{9}$$

16. The effect of an increase in p for a fixed effort cost c is ambiguous, because this may decrease a_S^W via (5) and hence decrease V_S^M.
17. The observability of all other actions, and the solution concept, remain unchanged from Section 2.2.

However, there is also a new constraint on the existence of a soft equilibrium: providing favors must be credible for managers. This constraint drives a wedge between managers' preferences between the soft and tough regimes and the conditions for the soft equilibrium to exist. Consequently, the tough management externality can now undermine the soft equilibrium even when it would be Pareto dominant.

- *New comparative statics:* Because the tough management externality can now undermine the soft equilibrium even when it would be Pareto dominant, parameter changes that at first glance should improve efficiency—including reductions in k or c, increases in q, or reductions in a minimum wage—can make all agents worse off by destroying the soft equilibrium. (In contrast, in the simplified model of Section 2, the soft equilibrium can Pareto dominate the tough equilibrium and the same parameter changes can destroy the soft equilibrium, but by Proposition 1.4 these two things cannot happen at the same time.)

- *Tough-but-fair management*: There is now a third management regime, where the manager chooses high monitoring but also does favors for workers who are not caught shirking. This regime can capture management practices that combine intensive monitoring with "fair" treatment of workers, which is reminiscent of early twentieth-century management models such as "Taylorism" (associated with Frederick Winslow Taylor) or "Fordism" (associated with Henry Ford).

To simplify the analysis, we henceforth assume that

$$y - \frac{c}{p} \leq 0, \tag{10}$$

so a manager who chooses low monitoring but does not do favors cannot make positive profits.

A worker's expected payoff in a soft equilibrium is now $w + d - c$ if he works and $(1-p)(w+d)$ if he shirks, so the lowest wage that induces effort is thus

$$w = \frac{c}{p} - d,$$

and employment rents and surplus are given by

$$\Pi_S^W = w + d - c = \frac{1-p}{p}c, \qquad \Pi_S^M = y - \frac{c}{p} + d - e, \qquad \text{and} \qquad \bar{\Pi}_S = y - c + d - e.$$[18]

18. The equation $w = c/p - d$ relies on our restriction to public equilibrium strategies, where (in particular) managers do not condition the decision to do a favor on the current-period wage (which is sunk at the time of the favor decision). Without this restriction, higher wages could be sustained by the belief that a manager who cuts wages will not provide a favor.

In contrast, the equations for Π_T^W and Π_T^M remain unchanged, as managers do not do favors in a tough equilibrium.

Next, a soft equilibrium exists if and only if it is unprofitable for a soft manager to deviate by choosing high monitoring or by reneging on an expected favor. Recall that a soft manager's equilibrium payoff starting in an employment period is $\left(\Pi_S^M + \delta V^M\left(a^W, a^M\right)\right)/(1+\delta)$. If a soft manager deviates to high monitoring, it is without loss to specify that the current worker does not trust the manager to do a favor, so the manager's future profit is $\Pi_T^M/(1+\delta)$. Hence, this deviation is unprofitable if and only if

$$\Pi_T^M \leq \Pi_S^M + \delta V_S^M \qquad \Longleftrightarrow \qquad \rho - k - d + e \leq \delta V_S^M. \tag{11}$$

In contrast, if a soft manager chooses low monitoring but deviates by reneging on a favor, her payoff is

$$\frac{1-\delta^2}{1+\delta}\left(\Pi_S^M + e\right) + \frac{\delta^2}{1+\delta}\Pi_T^M.$$

So this deviation is unprofitable if and only if

$$\left(1-\delta^2\right)\left(\Pi_S^M + e\right) + \delta^2\Pi_T^M \leq \Pi_S^M + \delta V_S^M \qquad \Longleftrightarrow \qquad \delta^2\left(\rho - k - d\right) + e \leq \delta V_S^M. \tag{12}$$

In total, we see that both (11) and (12) hold—so a soft equilibrium exist—if and only if

$$e + \max\left\{\rho - k - d, \delta^2\left(\rho - k - d\right)\right\} \leq \delta V_S^M. \tag{13}$$

This inequality has a simple interpretation. If $\rho - k - d \geq 0$, then a soft manager who plans to start forgoing favors will also choose high monitoring starting in the current period. In this case, the binding incentive constraint is $e + \rho - k - d \leq \delta V^M$. If instead $\rho - k - d < 0$, then a soft manager who plans to start forgoing favors will choose low monitoring in the current period, but will choose high monitoring in the next employment period. In this case, the binding incentive constraint is $e + \delta^2\left(\rho - k - d\right) \leq \delta V^M$. While these two constraints differ, they are both easier to satisfy when e or ρ is smaller, or when k, d, δ, or V^M is greater.

We next turn to the tough-but-fair regime, where the worker's expected payoff is $w + d - c$ if he works and $(1-q)(w+d)$ if he shirks. The lowest wage that induces effort is thus

$$w = \frac{c}{q} - d,$$

and employment rents and surplus are given by

$$\Pi_{TF}^W = w + d - c = \frac{1-q}{q}c, \qquad \Pi_{TF}^M = y - \frac{c}{q} - k + d - e, \qquad \text{and} \qquad \bar{\Pi}_{TF} = y - c - k + d - e.$$

A tough-but-fair manager cannot gain by deviating to low monitoring, because this causes the current worker to lose trust that the manager will do a favor, and low monitoring without favors is assumed to be unprofitable. Hence, a tough-but-fair equilibrium exists if and only if the manager cannot gain by reneging on an expected favor. If the manager reneges on a favor, her continuation payoff is

$$\frac{1-\delta^2}{1+\delta}\left(\Pi_{TF}^M + e\right) + \frac{\delta^2}{1+\delta}\Pi_T^M.$$

So this deviation is unprofitable—and thus a tough-but-fair equilibrium exists—if and only if

$$\begin{aligned}\left(1-\delta^2\right)\left(\Pi_{TF}^M + e\right) + \delta^2\Pi_T^M &\leq \Pi_{TF}^M + \delta V_{TF}^M \quad \Longleftrightarrow \\ e - \delta^2 d &\leq \delta V_{TF}^M. \end{aligned} \tag{14}$$

The following proposition—which generalizes Propositions 1 and 2 to the model with workplace favor exchange—summarizes the above discussion.

Proposition 3

1. *A tough equilibrium always exists. A soft equilibrium exists if and only if the manager incentive constraint* (13) *holds, where* $V_S^M = V^M(a_S^W, a_S^M)$*, with* (a_S^W, a_S^M) *given by the largest solution to* (5) *and* (6) *when* $\Pi^W = \Pi_S^W$ *and* $\Pi^M = \Pi_S^M$*. A tough-but-fair equilibrium exists if and only if* (14) *holds, where* $V_{TF}^M = V^M(a_{TF}^W, a_{TF}^M)$*, with* $\left(a_{TF}^W, a_{TF}^M\right)$ *given by the largest solution to* (5) *and* (6) *when* $\Pi^W = \Pi_{TF}^W$ *and* $\Pi^M = \Pi_{TF}^M$*.*

2. *The existence of a soft equilibrium is favored by an increase in* δ*,* α*,* k*, or* d*, by a decrease in* q *or* e*, or by a simultaneous increase in* p *and* c *that keeps worker rents* $\frac{1-p}{p}c$ *constant. Moreover, in a soft equilibrium all agents' utilities are increasing in* α*,* k*, and* d*, and are decreasing in* q *and* e*. The conditions for the existence of a soft equilibrium do not depend on* y*.*

   The existence of a tough-but-fair equilibrium is favored by an increase in δ*,* α*,* c*, or* d*, or by a decrease in* q *or* e*. Moreover, in a tough-but-fair equilibrium all agents' utilities are increasing in* α *and* d*, and are decreasing in* q *and* e*. The conditions for the existence of a tough-but-fair equilibrium do not depend on* y*,* k*, or* p*.*

We now turn to the main results of this section, which show that parameter changes that undermine the existence of a soft equilibrium, or that reduce workers' employment rents within a given management regime, can reduce welfare for managers as well as workers by undermining favor exchange or by reducing workers' community effort. Notably, this logic applies even when the direct effect of the parameter change is to increase total employment rents.

We first consider improvements in the intensive monitoring technology (an increase in q or a decrease in k) and the imposition of a minimum wage (a lower bound on w). From the perspective of an employment relation viewed in isolation, better intensive monitoring can only increase managers' profits, and the imposition of a minimum wage can only reduce total welfare (by possibly raising the wage above the manager's willingness to pay). However, both of these standard results can be overturned once we account for the interplay between employment and community.

Proposition 4

1. *Making intensive monitoring more precise or less costly to adopt (increasing q or decreasing k) can reduce welfare for both workers and managers by destroying the soft equilibrium.*

2. *Imposing a minimum wage (a lower bound on w) can increase welfare for both workers and managers by supporting a soft equilibrium where it did not previously exist.*

The intuition for the first result is that increasing q or decreasing k can destroy the soft equilibrium by making intensive monitoring more attractive (as in Proposition 2), which can reduce everyone's welfare (as in Proposition 1.3). The intuition for the second result is that a manager who is constrained in her ability to cut wages following a deviation to intensive monitoring gains less from this deviation. As noted above, these results rely on workplace favor exchange.

We next turn to the effects of labor-saving technological or organizational changes such as automation, outsourcing, or offshoring. We model these phenomena in a reduced-form manner as a reduction in workers' effort costs c together with a (positive or negative) change in the value of this effort for managers, y. The logic of this approach is that automation, outsourcing, and offshoring all lower local labor requirements for production by shrinking the set of tasks assigned to local workers—either because some of these tasks are now performed by machines (automation) or by workers employed in firms outside the community (outsourcing) or in other countries (offshoring). At the same time, the value managers place on motivating high effort by local workers can either increase (if the remaining locally-sourced tasks are sufficiently complementary with the automated, outsourced, or offshored tasks) or decrease (if these complementarities are absent).

Within each management regime, a reduction in c shifts employment rents from workers to managers. This in turn reduces the maximum incentive compatible community effort level for workers, while increasing it for managers. If $a^M > a^W$ (which is possible in a soft or tough-but-fair equilibrium), then total community benefits are reduced following this shift, because there are decreasing returns to community effort ($b(\cdot)$ is concave).[19] Because worker employment rents are also decreasing in c, automation leaves workers worse off overall, while the overall effect on manager welfare is ambiguous. This is the case we focus on in the next proposition.

19. The proof of this result requires a novel inductive argument, which is provided in the Appendix.

Proposition 5 *Suppose that automation, outsourcing, or offshoring decreases c, while possibly also increasing or decreasing y. In a soft or tough-but-fair equilibrium, if* $\Pi^M - \Pi_T^M \geq \frac{1-\beta}{\beta}\Pi^W$ *(which implies that* $a^M > a^W$*) then community benefits and worker welfare both decrease. Moreover, for some parameters, a decrease in c (holding y fixed) also reduces welfare for both workers and managers by destroying the soft equilibrium.*

Proposition 5 can help explain the negative effects that automation, outsourcing, and offshoring can have on local communities by eliminating high-wage jobs. In line with this interpretation, automation appears to have played a role in the Hormel case mentioned in the Introduction. Specifically, Hormel CEO Richard Knowlton arranged a new $100M manufacturing facility shortly before the strike and was viewed as "an architect of the new business, demanding more from automation and technology than from labor," (Hage and Klauda, 1989, p. 52). Knowlton's approach followed the contemporary practices of other companies in the meat-packing industry, but Hormel was much more intertwined with its local community than were its peers in major metropolitan areas. Hormel's automation efforts therefore faced greater community resistance and ultimately had greater consequences for local community life.

It is also interesting to consider the implications of automation, outsourcing, and offshoring when $a^M < a^W$. In this case, the implications for community benefits are ambiguous, because reducing c increases managers' employment rents by less than it reduces workers' employment rents. The effect of automation on worker welfare also become ambiguous once we consider shifts between employment regimes. In particular, automation can stabilize the soft equilibrium because, by reducing worker rents, it reduces managers' incentives to deviate to intensive monitoring to shift these rents to themselves. Due to this mechanism, automation can sometimes *improve* community relations.

Overall, our results show that when employment relationships are socially embedded, a full evaluation of any technological or organizational change must account for the impact of the distribution of employment rents between workers and managers on community interactions. In particular, apparently efficiency-enhancing innovations—such as improved monitoring or reduced restrictions on employment contracts—can undermine community cooperation and ultimately reduce all parties' welfare. In the next two sections, we will see that improved alternatives to community interactions and increases in overall productivity sometimes have similar adverse effects.

4 Opting Out of Community Interactions

We now partially endogenize community structure by letting individuals opt out of community interactions. This "opting out" can capture a range of ways in which an individual can separate herself from the local community, including residential segregation or turning to market-provided alternatives to traditionally community-based services, such as private schooling.

Formally, we now assume that at the beginning of each community interaction period, each agent can opt out of the interaction. If an agent opts out, she no longer exerts community effort or receives community benefits, and instead receives an exogenous outside option of γ^W (for a worker) or γ^M (for a manager). Agents who opt out of community interactions continue to participate in employment relations.

The presence of outside alternatives to community interactions can affect equilibrium behavior in one of two ways. First, some agents may opt out of the community. Second, even if all agents continue to participate in the community along the equilibrium path, the presence of outside options tightens the incentive constraints that determine community effort, as well as managers' incentive constraints in a soft or tough-but-fair equilibrium. Let us start with the latter case, where the incentive constraints for community effort, (5) and (6), are replaced by:[20]

$$\begin{aligned} a^W &= \max\left\{\delta\frac{1-\beta}{\beta}\Pi^W + \min\left\{B\left(a^W,a^M\right)-\gamma^W, \delta^2\left(B\left(a^W,a^M\right)-\gamma^W\right)\right\},0\right\}, && (15)\\ a^M &= \max\left\{\delta\left(\Pi^M-\Pi^M_T\right) + \min\left\{B\left(a^W,a^M\right)-\gamma^M, \delta^2\left(B\left(a^W,a^M\right)-\gamma^M\right)\right\},0\right\}. && (16)\end{aligned}$$

For all agents to prefer to participate in the community, the largest solution $\left(a^W,a^M\right)$ to (15)–(16) must satisfy

$$\begin{aligned} a^W &\le \delta\frac{1-\beta}{\beta}\Pi^W + B\left(a^W,a^M\right)-\gamma^W \qquad \text{and} && (17)\\ a^M &\le \delta\left(\Pi^M-\Pi^M_T\right) + B\left(a^W,a^M\right)-\gamma^M. && (18)\end{aligned}$$

Note that (17)–(18) always hold when a^W and a^M are both strictly positive, but may be violated when $a^W=0$ or $a^M=0$. In addition, the incentive compatibility constraints for managers to provide favors, (7) and (14), are replaced by

$$\begin{aligned} e+\max\left\{\rho-k-d,\delta^2\left(\rho-k-d\right)\right\} &\le \delta\left(V^M\left(a^W,a^M\right)-\gamma^M\right) \qquad \text{and} && (19)\\ e-\delta^2 d &\le \delta\left(V^M\left(a^W,a^M\right)-\gamma^M\right). && (20)\end{aligned}$$

Equations (15)–(20) characterize equilibria where all agents participate in the community. In the alternative case where (17) or (18) is violated, at least one type of agent opts out of community interactions. Observe that if only one group (say, managers) opts out in equilibrium, then community effort for the other group (workers) is again given by (15), but now with $a^M=0$. Additionally, if managers opt out in equilibrium, then the $V^M\left(a^W,a^M\right)-\gamma^M$ term in (19) and (20) drops out, so the necessary and sufficient conditions for the existence of a soft or

20. To see this, note that a worker prefers to participate in the community rather than opting out iff $a^M \le \delta\frac{1-\beta}{\beta}\Pi^W + B\left(a^W,a^M\right)-\gamma^W$, and he prefers to exert effort in the community iff $a^M \le \delta\frac{1-\beta}{\beta}\Pi^W + \delta^2\left(B\left(a^W,a^M\right)-\gamma^W\right)$, and the highest value of a^M that satisfies both inequalities is given by (15).

tough-but-fair equilibrium simplify to

$$e \leq \delta^2 (k + d - \rho) \qquad \text{and} \qquad e \leq \delta^2 d.$$

The next proposition summarizes the effects of outside options on community-employment relations. For the second part of this proposition, we say that outside options become *polarized* in favor of managers if γ^W decreases by Δ while γ^M increases by $\frac{\beta}{1-\beta}\Delta$, for some $\Delta > 0$, so that managers' outside options improve while the sum of all agents' outside options remains fixed.

Proposition 6

1. *For each type of equilibrium (soft, tough-but-fair, and tough), increasing either group's outside option reduces all agents' welfare, so long as neither group takes their outside option in equilibrium. If one group takes their outside option, the other group is left worse off.*

2. *Increasing either group's outside option shrinks the parameter range for which a soft or tough-but-fair equilibrium exists.*

3. *In a soft or tough-but-fair equilibrium, a polarization of the groups' outside options in favor of managers decreases total welfare whenever $a^W > a^M > 0$ and $B\left(a^W, a^M\right) > \gamma^W$.*

Proposition 6.1 is a version of the standard result that improving outside options can reduce trust in relationships.[21] This comparative static can represent societal trends such as improvements in communication technologies that make it easier for the rich to segregate themselves in small enclaves, or improvements in transportation that give the rich access to a wider range of market goods and services. An implication of Proposition 6.1 is that total welfare is non-monotone in the outside options. For example, starting in a soft equilibrium, increasing γ^M reduces social welfare as described in the proposition, so long as managers remain in the community in equilibrium. When γ^M crosses a threshold, managers start opting out, and total welfare decreases discontinuously. However, further increases in γ^M raise total welfare, as this benefits managers and has no effect on workers.

Proposition 6.2 shows that improving outside options shifts the equilibrium employment regime from soft or tough-but-fair to tough (in addition to reducing payoffs within each type of equilibrium). The intuition is that improving outside options reduces community benefits, which in turn makes it more difficult to dissuade managers from adopting the tough regime. This finding and intuition are consistent with the evidence in Daniele Amore, Bennedsen, and Larsen (2022), discussed in the Introduction: Danish firms with locally-residing CEOs and with CEOs

21. Earlier results along these lines were noted by Arnott and Stiglitz (1991), Baker, Gibbons, and Murphy (1994), Kranton (1996), and Ghosh and Ray (1996), among others. The logic is also similar to that of Proposition 2.

whose children attend the same school as those of employees, have higher employee satisfaction. The Anchor Hocking case from the Introduction is also consistent with this result: Alexander (2017) reports that many Lancaster residents believed that the venture capitalist Newell, who later took over the company, instructed managers not to live in Lancaster,[22] because they would not adopt painful cost-cutting measures if they were heavily involved in the community.[23]

Finally, Proposition 6.3 establishes that polarizing outside options in favor of managers reduces total welfare, when managers exert less community effort than workers. This form of polarization can capture societal changes that push rich and poor individuals to segregate in distinct neighborhoods, where the rich neighborhoods are more desirable. The logic of this result is that, when $B\left(a^W, a^M\right) > \gamma^W$, the direct effect of polarizing outside options in favor of managers is to increase workers' community effort while decreasing managers' community effort by at least as much. Since there are diminishing returns to community effort, when $a^W > a^M$ the net effect of this change is to reduce community benefits.[24]

5 Productivity and Firm Size

We finally endogenize firm size. This extension lets us analyze how changes in productivity affect firm size, the equilibrium management regime, and the distribution of rents. In addition, it also allows a more realistic income distribution, as now each manager can hire many workers.

We assume that at the beginning of each period, each manager chooses a number ℓ of workers to match with. Assume that $\ell \in \{0, \ldots, L\}$, where $\frac{1-\beta}{\beta}L < 1$, so that each manager can achieve her desired firm size and there are always some unemployed workers. For simplicity, we also assume throughout this section that γ^M is sufficiently high that all managers opt out of community interactions in equilibrium.[25]

The model is otherwise unchanged. A manager's utility in an employment relation is now

$$\begin{aligned}\Pi^M &= \theta g\left(\#\text{workers who work}\right) - \left(\#\text{workers not caught shirking}\right) w \\ &\quad - e\left(\#\text{favors done}\right) - \mathbf{1}\left\{\text{high monitoring}\right\} k\left(\ell\right),\end{aligned}$$

where $\theta > 0$ designates the (Hicks-neutral) productivity of the manager's firm, and g is a

22. There is no evidence that Newell actually did this, but the residents' concern reflects the logic of our result.

23. We also note that a similar comparative static would arise if we separately parameterized workers' and managers' preference weights on community benefits in our baseline model and considered a reduction in managers' weight. This can be interpreted as a shift from local owner-management to external management (e.g., by venture capital) and tends to undermine the soft equilibrium (similar to the α comparative static in Proposition 2).

24. This reasoning is symmetric to that of Proposition 5.2, but the comparative static is reversed because Proposition 5.2 concerns a shift in equilibrium continuation payoffs, while Proposition 6.3 concerns a shift in payoffs following a deviation.

25. This simplifying assumption eliminates potentially offsetting effects coming through the impact of productivity on managers' values of community interactions. It also makes the observability of a manager's choice of labor ℓ immaterial. Without it, the analysis would differ depending on whether or not ℓ is observable.

concave production function satisfying $\lim_{\ell \to \infty} g(\ell) = \infty$ and $\lim_{\ell \to \infty} g'(\ell) = 0$. In addition, $e(\ell)$ and $k(\ell)$ now represent, respectively, the cost of carrying out favors for ℓ workers and the cost of intensive monitoring when the manager employs ℓ workers.[26]

We say that there are *economies of scale in favor exchange* if $e(\ell)$ is concave (so the cost of providing favors to ℓ workers increases sublinearly in ℓ), and there are *economies of scale in monitoring* if $k(\ell)$ is concave (so the cost of intensively monitoring ℓ workers increases sublinearly in ℓ). Conversely, there are *diseconomies of scale in favor exchange* if $e(\ell)$ is convex, and there are *diseconomies of scale in monitoring* if $k(\ell)$ is convex.

Proposition 7 *If there are economies of scale in favor exchange and diseconomies of scale in monitoring, then higher productivity favors the existence of a soft equilibrium. Conversely, if there are diseconomies of scale in favor exchange and economies of scale in monitoring, then lower productivity favors the existence of a soft equilibrium.*

A notable implication is that when there are diseconomies of scale in favor exchange and/or economies of scale in monitoring, higher productivity can *reduce* labor demand, in the sense that the wage at a given level of employment declines, because managers increase monitoring.

The welfare implications of Proposition 7 are similar to those in the baseline model:

Proposition 8 *Fix parameters where a soft equilibrium exists.*

1. *If there are economies of scale in favor exchange and diseconomies of scale in monitoring, increasing productivity increases both workers' and managers' welfare in the soft equilibrium.*

2. *If there are diseconomies of scale in favor exchange and economies of scale in monitoring, increasing productivity can reduce both workers' and managers' welfare by destroying the soft equilibrium.*

To see the intuition, consider the case with diseconomies of scale in favor exchange and economies of scale in monitoring. When productivity increases, the manager hires more workers, which makes favor exchange more costly and makes intensive monitoring less costly. This undermines the soft equilibrium. Moreover, as in the baseline model, adopting tough employment imposes a negative externality by reducing community effort. Thus, increasing productivity can ultimately make all agents worse off.

We view diseconomies of scale in favor exchange and economies of scale in monitoring as realistic assumptions. The former assumption captures the idea that it is more difficult to maintain trust and reciprocity in larger organizations. The latter assumption is especially

26. We assume that in each period the manager must use the same monitoring intensity for all workers.

natural when intensive monitoring involves large fixed costs, such as installing surveillance technologies in the workplace or adopting a new human resource management regime.[27]

While we have emphasized the result that higher productivity can make everyone worse off by undermining community effort, employment-community interactions also present a new channel by which higher productivity can improve welfare. Even in a tough equilibrium, higher productivity raises labor demand $\ell(\theta)$, which increases workers' probability of employment, and thus increases their employment rent $\frac{1-\beta}{\beta}\frac{1-q}{q}c\ell(\theta)$. These higher employment rents then encourage more community effort for workers (and also, indirectly, for managers), which makes everyone better off. This channel from productivity to community effort (via higher likelihood of employment and greater worker rents) is also reminiscent of narratives proposed by Wilson (1996), Putnam (2000), and Murray (2012), among others.

6 Conclusion

This paper builds a framework that views employment as socially embedded—or as a "social institution"—as in Malinowski (1922), Polanyi (1944), Thompson (1971), and Solow (1990), in our case closely intertwined with community relations. Differently from previous approaches within economics, we develop this point in a multi-activity contact framework (Bernheim and Whinston 1990). We use our model to elucidate how the community influences employment and firms, and how workplace behavior, employment, and wages shape the nature of community interactions. Inspired by evidence from case studies and the literature emphasizing the importance of work for community behavior (Wilson 1996, Murray 2012), we argue that cooperation in the community depends in part on how much "rent" (payoffs above alternative options) workers receive from employment, as well as the profits that managers and business owners make. We emphasize that not only is workers' ability to obtain high-rent jobs linked to their standing in the community (as in the literature on community-based job recommendations following Granovetter 1985), but community cooperation can also encourage managers to adopt more worker-friendly practices, due to the threat of being excluded from the community if they adopt harsher policies.

These linkages imply that different types of community-employment equilibria are possible. In a "soft equilibrium,"employment relations involve high wages, low worker monitoring, and favor exchange between workers and managers. In a "tough equilibrium, "wages are lower, monitoring is higher, and there is no favor exchange. We find that the soft equilibrium can Pareto dominate the tough equilibrium, even when the tough equilibrium yields higher profits for managers, because the soft equilibrium can support higher levels of community cooperation

27. Suggestive empirical evidence in favor of this assumption comes from Guiso, Sapienza, and Zingales (2015), who find that firm performance is higher when workers view top managers as trustworthy, and that this trust is harder to sustain in public firms. This is consistent with the idea that managers earn higher profits by monetizing favors in a soft equilibrium, but that trust is harder to sustain in larger, more productive firms.

by providing greater employment rents for workers. This observation drives our main comparative static results: a range of technological and social opportunities that would, all else equal, make either some or all agents better off, can destabilize the soft management regime and shift the economy to a Pareto inferior tough equilibrium. Improved monitoring technologies; new opportunities for automation, outsourcing, and offshoring; declines in minimum wages; the availability of new residential neighborhoods for well-off citizens; and even more efficient production technologies can all unravel the soft equilibrium. In each case, the logic is that these technological or social developments raise managers' profits in isolation, but additionally encourage them to increase monitoring, renege on workplace favor exchange, or reduce their community involvement. More generally, we stress that, because employment relations are embedded in communities, major technological or demand shifts can have important indirect effects on wages, employment, productivity, and the income distribution via their impact on community relations; and, conversely, social trends that transform community relations also influence labor market and organizational dynamics.

We see several exciting areas for further empirical and theoretical research along these lines. First, our theoretical framework is amendable to various extensions, including introducing additional linkages between employment and community interactions (e.g., making workers' workplace behavior observable to the community); modelling residential choice and community interactions in multiple neighborhoods (which would endogenize managers' payoffs when they withdraw from mixed communities); modelling technological changes such as automation in greater detail; studying the effects of labor and capital taxation on worker and manager incentives; explicitly modelling communication (e.g., job recommendations) within communities; introducing unionization and worker bargaining power (rather than assuming managers have all the bargaining power in workplaces, as in the current model); and introducing additional dimensions of heterogeneity, such as ethnic diversity or social network structure within communities. These and other directions can contribute to a deeper understanding of the interplay of employment and community interactions and their implications for contemporary socioeconomic trends.

Second, a major simplification implicit in our framework is that we have have focused exclusively on the "good side" of communities: their role as a venue for cooperation, local public good provision, and information sharing. In reality, community norms can also support discrimination against and exclusion of certain groups, as well as excessive informal taxation and incentives for conformity, in the extreme leading to what Acemoglu and Robinson (2019) refer to as the "cage of norms." An important next step is to incorporate such adverse aspects of community relations and investigate when more favorable employment outcomes support positive community norms and when they instead abet negative or discriminatory norms.

Third, our work also points towards new empirical explorations. More work is needed to investigate whether there is a causal relationship between the disappearance of attractive employment opportunities for workers and the retrenchment of civic life in local communities, and whether this causal effect works through the mechanisms highlighted by our framework. The evidence presented in, among others, Wilson (1996), Black, McKinnish, and Sanders (2005), and Autor, Dorn, and Hanson (2019) suggests that this is plausible, but the exact causal mechanisms have yet to be studied empirically. For instance, it is possible that variables found to be correlated with social mobility, education, health, and other socioeconomic outcomes in these literatures may be proxying for labor market rents or how binding the outside options of different demographic groups are. Our results therefore push for empirical models where the causal effects of these variables are carefully controlled for. They also suggest new empirical tests, for example exploring whether exogenous declines in wages in an area—holding constant other aspects of the labor market such as the employment rate—reduce community effort and worsen social outcomes. Relatedly, more can be done to explore whether our distinction between soft and tough management provides a useful lens for interpreting different types of management-worker relations across companies; whether the predicted synergy between soft management and more cooperative community relations exists and can be quantified; and whether recent economic and social trends in the United States and other countries can be partially explained by shifts from a soft socioeconomic equilibrium to a tough one.

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Appendix: Omitted Proofs

Proof of Lemma 1

For the first claim, substituting for $B\left(a^W, a^M\right)$, we can rewrite (5) and (6) as

$$\begin{aligned} a^W &= \delta\frac{1-\beta}{\beta}\Pi^W + \delta^2\left(\beta\alpha b\left(a^W\right) + (1-\beta)\,\alpha b\left(a^M\right)\right), \\ a^M &= \max\left\{\delta\left(\Pi^M - \Pi_T^M\right) + \delta^2\left(\beta\alpha b\left(a^W\right) + (1-\beta)\,\alpha b\left(a^M\right)\right), 0\right\}. \end{aligned}$$

Thus, $\left(a^W, a^M\right)$ is a fixed point of the function $F : \mathbb{R}_+^2 \to \mathbb{R}_+^2$ given by

$$F\left(\tilde{a}^W, \tilde{a}^M\right) = \left(\begin{array}{c} \delta\frac{1-\beta}{\beta}\Pi^W + \delta^2\left(\beta\alpha b\left(\tilde{a}^W\right) + (1-\beta)\,\alpha b\left(\tilde{a}^M\right)\right), \\ \max\left\{\delta\left(\Pi^M - \Pi_T^M\right) + \delta^2\left(\beta\alpha b\left(\tilde{a}^W\right) + (1-\beta)\,\alpha b\left(\tilde{a}^M\right)\right), 0\right\} \end{array}\right).$$

This function is increasing in $\left(\tilde{a}^W, \tilde{a}^M\right)$, as b is increasing. Moreover, by the Inada condition $\lim_{a\to\infty} b'(a) = 0$, there exists $\bar{a} > 0$ such that if $\left(\tilde{a}^W, \tilde{a}^M\right)$ satisfies $\max\left\{\tilde{a}^W, \tilde{a}^M\right\} > \bar{a}$, then $\max\left\{F_1\left(\tilde{a}^W, \tilde{a}^M\right), F_2\left(\tilde{a}^W, \tilde{a}^M\right)\right\} < \max\left\{\tilde{a}^W, \tilde{a}^M\right\}$. Hence, any fixed point of F must lie in $[0, \bar{a}]^2$, and by Tarski's fixed point theorem the set of fixed points of F on $[0, \bar{a}]^2$ forms a complete lattice. Hence, the largest fixed point of F satisfies the conditions of the lemma.

For the second and third claims, note that the function F is continuous and increasing in $\left(\tilde{a}^W, \tilde{a}^M\right)$ and $\left(\Pi^W, \Pi^M - \Pi_T^M, \delta\right)$. Hence, its largest fixed point is increasing in $\left(\Pi^W, \Pi^M - \Pi_T^M, \delta\right)$, by Theorem 1 of Milgrom and Roberts (1994). Moreover, the first component of F is strictly increasing in $\tilde{a}^W$, $\tilde{a}^M$, Π^W, and δ; and when $\tilde{a}^W > 0$ the second component of F is strictly increasing in $\tilde{a}^W$, $\tilde{a}^M$, $\Pi^M - \Pi_T^M$, and δ. This implies that the first component of the largest fixed point cannot remain constant when Π^W or δ increases, or when $a^M > 0$ and $\Pi^M - \Pi_T^M$ increases; and that the second component of the largest fixed point cannot remain constant at a strictly positive value when Π^W, $\Pi^M - \Pi_T^M$, or δ increases.

For the fourth claim, note that $\left(a^W, a^M\right) \to 0$ as $\delta \to 0$. By the Inada condition $\lim_{a\to 0} b'(a) = \infty$,

$$\begin{aligned} \frac{d}{da^W}\left(B\left(a^W, a^M\right) - a^W\right) &= \beta\alpha b'\left(a^W\right) - 1, \\ \frac{d}{da^M}\left(B\left(a^W, a^M\right) - a^W\right) &= \beta\alpha b'\left(a^M\right), \\ \frac{d}{da^W}\left(B\left(a^W, a^M\right) - a^W\right) &= (1-\beta)\,\alpha b'\left(a^M\right), \qquad \text{and} \\ \frac{d}{da^M}\left(B\left(a^W, a^M\right) - a^M\right) &= (1-\beta)\,\alpha b'\left(a^M\right) - 1 \end{aligned}$$

are all strictly positive for sufficiently small a^W and a^M. Hence, for sufficiently small δ, $V^W\left(a^W, a^M\right)$ and $V^M\left(a^W, a^M\right)$ are both strictly increasing in a^W and a^M. The claim follows since all incentive compatible pairs $\left(\tilde{a}^W, \tilde{a}^M\right)$ satisfy $\tilde{a}^W \leq a^W$ and $\tilde{a}^M \leq a^M$, where $\left(a^W, a^M\right)$ is the pair defined in part 1.

As observed in the text, the fifth claim follows because $a^W > \delta^2 B\left(a^W, a^M\right) \geq a^M$.

Proof of Proposition 1

Parts 1, 2, and 4 are proved in the text. For part 3, note that if $k = \rho$ (contrary to inequality (1)), then (i) the soft equilibrium exists (by (7), which holds strictly as $V_S^M > 0$), (ii) manager profits are equal in the soft and tough equilibria, (iii) worker employment rents are strictly higher in the soft equilibrium, and (iii) community effort levels and payoffs are strictly higher in the soft equilibrium (by (i), (ii), Lemma 1.2–4, and $\delta < \bar{\delta}$), and hence both worker and manager welfare is strictly higher in the soft equilibrium. Next, manager profits and both worker and manager community effort levels are continuous in k, in both the soft and tough equilibrum (as follows from continuity of the function F defined in the proof of Lemma 1). Hence, there exists $k^* < \rho$ such that the soft equilibrium Pareto dominates the tough equilibrium whenever $k \in (k^*, \rho)$.

Proof of Proposition 2

Proposition 2 follows as the special case where $d = e = 0$ of the corresponding result in Proposition 3.

Proof of Proposition 3

The first part of the proposition is proved in the text.

For the second part, consider a soft equilibrium. Substituting for Π_S^W, Π_S^M, and Π_T^M, we see that a^W and a^M are given by the greatest fixed point of

$$F\left(\tilde{a}^W, \tilde{a}^M\right) = \left(\begin{array}{c} \delta \frac{1-\beta}{\beta} \frac{1-p}{p} c + \alpha \delta^2 B\left(\tilde{a}^W, \tilde{a}^M\right), \\ \max\left\{ \delta\left(d - e + k - \frac{q-p}{pq} c\right) + \alpha\delta^2 B\left(\tilde{a}^W, \tilde{a}^M\right), 0 \right\} \end{array} \right).$$

Note that each component of F is increasing in $\tilde{a}^W$, $\tilde{a}^M$, δ, α, k, and d, and decreasing in q and e. (The only non-obvious part of this observation is that the second component is increasing in δ, but this holds because the derivative of $\delta\left(d - e + k - \frac{q-p}{pq}c\right) + \alpha\delta^2 B\left(\tilde{a}^W, \tilde{a}^M\right)$ with respect to δ is $d - e + k - \frac{q-p}{pq}c + 2\alpha\delta B\left(\tilde{a}^W, \tilde{a}^M\right)$, which is positive whenever $\delta\left(d - e + k - \frac{q-p}{pq}c\right) + \alpha\delta^2 B\left(\tilde{a}^W, \tilde{a}^M\right)$ is.) Hence, by Theorem 1 of Milgrom and Roberts (1994), a^W and a^M are both increasing in δ, α, k, and d, and decreasing in q and e. Next, since $V^M\left(a^W, a^M\right)$ is increasing in a^W and a^M (as $\delta < \bar{\delta}$), it is increasing in δ, α, k, and d, and decreasing in q and e. Thus, since (7) is easier to satisfy when V^M, δ, k, or d increases, or q or e decreases, we see that (taking into account both the effect on V^M and the direct effect on (7) for a fixed V^M) (7) is easier to satisfy when δ, α, k, or d increases, or q or e decreases. In addition, the validity of (7) does not depend on y. Since a soft equilibrium exists if and only if (7) holds, this establishes the comparative statics for these parameters. In addition, the result for a simultaneous increase in p and c that keeps $\frac{1-p}{p}c$ constant follows because such a change decreases $\frac{q-p}{pq}c = \frac{q-p}{q(1-p)}\frac{1-p}{p}c$, and thus has the same effect on the existence of a soft equilibrium as a decrease in q. Moreover, an increase in α, k, or d, or a decrease in q or e, all weakly increase Π_S^W and Π_S^M as well as V_S^W and V_S^M, and hence increase all agents' welfare in a soft equilibrium.

Now consider a tough-but-fair equilibrium. Substituting for Π_{TF}^W, Π_{TF}^M, and Π_T^M, we see that a^W and a^M are given by the greatest fixed point of

$$F\left(\tilde{a}^W, \tilde{a}^M\right) = \begin{pmatrix} \delta\frac{1-\beta}{\beta}\frac{1-q}{q}c + \alpha\delta^2 B\left(\tilde{a}^W, \tilde{a}^M\right), \\ \delta\left(d-e\right) + \alpha\delta^2 B\left(\tilde{a}^W, \tilde{a}^M\right) \end{pmatrix}.$$

Each component of F is increasing in $\tilde{a}^W$, $\tilde{a}^M$, δ, α, c, and d, and decreasing in q and e. Therefore, a^W and a^M (and hence V^M) are increasing in δ, α, c, and d, and decreasing in q and e. Thus, since (14) is easier to satisfy when V^M, δ, or d increases, or e decreases, we see that (14) is easier to satisfy when δ, α, c, or d increases, or q or e decreases. In addition, the validity of (14) does not depend on y, k, or p. Since a soft equilibrium exists if and only if (14) holds, this establishes the existence comparative statics. Moreover, an increase in α or d, or a decrease in q or e, all weakly increase Π_S^W and Π_S^M as well as V_S^W and V_S^M, and hence raise all agents' welfare in a soft equilibrium.

Proof of Proposition 4

Since Proposition 4 asserts a possibility result, it suffices to construct explicit examples.

For Proposition 4.1, suppose that $\beta = .5$, $y = 1$, $c = .22$, $p = .83$, $q = .9$, $k = .02$, $d = .12$, $e = .09$, $\alpha = 1$, $b\left(a\right) = \sqrt{a}$, and $\delta = .4$. Then $\rho \approx .02062$, $\Pi_S^W \approx .04506$, $\Pi_S^M \approx .7649$, $\Pi_T^W = \Pi_{TF}^W \approx .02444$, $\Pi_T^M \approx .7356$, and $\Pi_{TF}^M \approx .7656$. Next, $\left(a_S^W, a_S^M\right)$ is the greatest solution to

$$a_S^W = (.4)\,\Pi_S^W + (.4)^2\left(.5\sqrt{a_S^W} + .5\sqrt{a_S^M}\right) \text{ and } a_S^M = (.4)\left(\Pi_S^M - \Pi_T^M\right) + (.4)^2\left(.5\sqrt{a_S^W} + .5\sqrt{a_S^M}\right),$$

which is given by $\left(a_S^W \approx .05414, a_S^M \approx .04787\right)$. Moreover, $\left(a_T^W, a_T^M\right)$ is the greatest solution to

$$a_T^W = (.4)\,\Pi_T^W + (.4)^2\left(.5\sqrt{a_T^W} + .5\sqrt{a_T^M}\right) \text{ and } a_T^M = (.4)\,(0) + (.4)^2\left(.5\sqrt{a_T^W} + .5\sqrt{a_T^M}\right),$$

which is given by $\left(a_T^W \approx .03945, a_T^M \approx .02967\right)$. Finally, $\left(a_{TF}^W, a_{TF}^M\right)$ is the greatest solution to

$$a_{TF}^W = (.4)\,\Pi_{TF}^W + (.4)^2\left(.5\sqrt{a_{TF}^W} + .5\sqrt{a_{TF}^M}\right) \text{ and } a_{TF}^M = (.4)\left(\Pi_{TF}^M - \Pi_T^M\right) + (.4)^2\left(.5\sqrt{a_{TF}^W} + .5\sqrt{a_{TF}^M}\right),$$

which is given by $\left(a_{TF}^W \approx .04361, a_{TF}^M \approx .04584\right)$. We thus have

$$\begin{aligned}
V_S^W &= .5\sqrt{a_S^W} + .5\sqrt{a_S^M} - a_S^W \approx .1716,\ V_S^M = .5\sqrt{a_S^W} + .5\sqrt{a_S^M} - a_S^M \approx .1779, \\
V_T^W &= .5\sqrt{a_T^W} + .5\sqrt{a_T^M} - a_T^W \approx .1460,\ V_T^M = .5\sqrt{a_T^W} + .5\sqrt{a_T^M} - a_T^M \approx .1558, \\
V_{TF}^W &= .5\sqrt{a_{TF}^W} + .5\sqrt{a_{TF}^M} - a_{TF}^W \approx .1679,\ V_{TF}^M = .5\sqrt{a_{TF}^W} + .5\sqrt{a_{TF}^M} - a_{TF}^M \approx .1656.
\end{aligned}$$

Hence, the soft equilibrium exists, since

$$\begin{aligned}
e + \max\left\{\rho - k - d, \delta^2(\rho - k - d)\right\} &\approx .09 + \max\left\{.02062 - .02 - .12, .4^2(.02062 - .02 - .12)\right\} \\
&\approx .07090 < .07116 \approx (.4)\, V_S^M.
\end{aligned}$$

However, the tough-but-fair equilibrium does not exist, since

$$e - \delta^2 d = .09 - .4^2(.12) = .0708 > .06625 \approx \delta V_{TF}^M;$$

and managers' soft and tough equilibrium payoffs are

$$\frac{1}{1+.4}\Pi_S^M + \frac{.4}{1+.4}V_S^M \approx .5972 \text{ and } \frac{1}{1+.4}\Pi_T^M + \frac{.4}{1+.4}V_T^M \approx .5699.$$

Now suppose that q increases to $\hat{q} = .99$. Then Π_T^W decreases to $\approx .002222$ and Π_T^M increases to $\approx .7578$ (while Π_S^W and Π_S^M remains constant), so $\left(a_S^W, a_S^M\right)$ is now given by $\left(a_S^W \approx .05138, a_S^M = .03620\right)$, and $\left(a_T^W, a_T^M\right)$ is now given by $\left(a_T^W \approx .02692, a_T^M = .02604\right)$. We thus have

$$\begin{aligned}
V_S^W &= .5\sqrt{a_S^W} + .5\sqrt{a_S^M} - a_S^W \approx .1571,\ V_S^M = .5\sqrt{a_S^W} + .5\sqrt{a_S^M} - a_S^M \approx .1723, \\
V_T^W &= .5\sqrt{a_T^W} + .5\sqrt{a_T^M} - a_T^W \approx .1358,\ V_T^M = .5\sqrt{a_T^W} + .5\sqrt{a_T^M} - a_T^M \approx .1367.
\end{aligned}$$

Hence, the soft equilibrium does not exist, since in this case $e + \delta^2(\rho - k - d) \approx .07445 > .06892 \approx \delta V_S^M$, and managers' tough equilibrium payoff is $\frac{1}{1+.4}\Pi_T^M + \frac{.4}{1+.4}V_T^M \approx .5858$. Therefore, managers are better-off in the soft equilibrium with intensive monitoring precision q than in the the tough equilibrium with monitoring cost $\hat{q}$. Moreover, the same is clearly true for workers, as both their employment and community payoffs are higher in the soft equilibrium.

Now consider the original value for q (i.e., $q = .9$), but suppose that k decreases to $\hat{k} = .01$. Then Π_T^M increases to $\approx .7456$ (while Π_S^W, Π_S^M, and Π_T^W remains constant), so $\left(a_S^W, a_S^M\right)$ is now given by $\left(a_S^W \approx .05297, a_S^M = .04270\right)$; while $\left(a_T^W, a_T^M\right)$ are unchanged from their original values of $\left(a_T^W \approx .03945, a_T^M \approx .02967\right)$. We thus have

$$V_S^W = .5\sqrt{a_S^W} + .5\sqrt{a_S^M} - a_S^W \approx .1654 \text{ and } V_S^M = .5\sqrt{a_S^W} + .5\sqrt{a_S^M} - a_S^M \approx .1757.$$

Hence, the soft equilibrium does not exist, because $e + \delta^2 \left(\rho - \hat{k} - d\right) \approx .07250 > .07028 \approx \delta V_S^M$, and managers' tough equilibrium payoff is $\frac{1}{1+.4}\Pi_T^M + \frac{.4}{1+.4}V_T^M \approx .5770$. Thus, managers are better-off in the soft equilibrium with monitoring cost k than in the the tough equilibrium with monitoring cost $\hat{k}$, and the same is clearly true for workers. This completes the proof of Proposition 4.1.

Next, for Proposition 4.2, suppose that $\beta = .607$, $y = 1$, $c = .285$, $p = .252$, $q = .802$, $k = .42$, $d = .409$, $e = .248$, $\alpha = 13.199$, $b(a) = a^{.679}$, and $\delta = .119$. Then $\rho \approx .7756$, $\Pi_S^W \approx .8460$, $\Pi_S^M \approx .03005$, $\Pi_T^W = \Pi_{TF}^W \approx .07036$, $\Pi_T^M \approx .2246$, and $\Pi_{TF}^M \approx .3856$. Next, $\left(a_S^W, a_S^M\right)$ is given by $\left(a_S^W \approx 0.087, a_S^M \approx 0\right)$; $\left(a_T^W, a_T^M\right)$ is given by $\left(a_T^W \approx 0.0152, a_T^M \approx 0.0098\right)$; and $\left(a_{TF}^W, a_{TF}^M\right)$ is given by $\left(a_{TF}^W \approx 0.0213, a_{TF}^M \approx 0.0350\right)$. We thus have

$$V_S^W \approx 1.437,\ V_S^M \approx 1.523,\ V_T^W \approx 0.676,\ V_T^M \approx 0.682,\ V_{TF}^W \approx 1.098, \text{ and } V_{TF}^M \approx 1.084.$$

Hence, the soft equilibrium does not exist, as $e + \delta^2 (\rho - k - d) \approx 0.2472 > 0.1813 \approx \delta V_S^M$. Moreover, the tough-but-fair equilibrium also does not exist, since $e - \delta^2 d = 0.2422 > 0.1290 \approx \delta V_{TF}^M$. Managers' tough equilibrium payoff is $\frac{1}{1+\delta}\Pi_T^M + \frac{\delta}{1+\delta}V_T^M \approx 0.2732$.

Now consider introducing a minimum wage of $\underline{w} = .72195$ (which equals the soft equilibrium wage, $c/p - d$). Then Π_T^W increases to .4370 and Π_T^M decreases to -.1420 (while Π_S^W and Π_S^M remain constant), so now, $\left(a_S^W, a_S^M\right)$ is given by $\left(a_S^W \approx 0.0989, a_S^M \approx 0.0541\right)$, and $V_S^W \approx 2.2831$ and $V_S^M \approx 2.3278$. Hence, the soft equilibrium now exists, as $e + \delta^2 (\rho - k - d) \approx 0.247 < 0.2770 \approx \delta V_S^M$. Moreover, managers' payoff in the soft equilibrium is $\frac{1}{1+\delta}\Pi_S^M + \frac{\delta}{1+\delta}V_S^M \approx 0.2743$. Consequently, managers are better-off in the soft equilibrium with minimum wage $\underline{w}$ than in the the tough equilibrium without a minimum wage, and the same is clearly true for workers. This completes the proof of Proposition 4.2.

Proof of Proposition 5

Fix a soft or tough-but-fair equilibrium. Recall that

$$a^W = \delta \frac{1-\beta}{\beta} \Pi^W + \delta^2 B\left(a^W, a^M\right).$$

Hence, total worker welfare can be written as

$$\begin{aligned} & \frac{1}{1+\delta}\Pi^W + \frac{\delta}{1+\delta}\left(B\left(a^W, a^M\right) - a^W\right) \\ = \ & \frac{1}{1+\delta}\Pi^W + \frac{\delta}{1+\delta}\left(B\left(a^W, a^M\right) - \delta\frac{1-\beta}{\beta}\Pi^W - \delta^2 B\left(a^W, a^M\right)\right) \\ = \ & \frac{1}{1+\delta}\left(1 - \delta^2\frac{1-\beta}{\beta}\right)\Pi^W + \frac{\delta}{1+\delta}\left(1-\delta^2\right) B\left(a^W, a^M\right). \end{aligned}$$

Since $\beta > 1/2$, we have expressed worker welfare as an increasing function of Π^W and $B\left(a^W, a^M\right)$. Thus, since Π^W is increasing in c and independent of y, it suffices to show that $B\left(a^W, a^M\right)$ is increasing in c and independent of y.

To see this, let

$$F\left(a^W, a^M\right) = \begin{pmatrix} \delta \frac{1-\beta}{\beta}\Pi^W + \delta^2 B\left(a^W, a^M\right), \\ \delta\left(\Pi^M - \Pi_T^M\right) + \delta^2 B\left(a^W, a^M\right) \end{pmatrix}.$$

Note that the maximum incentive compatible community effort levels are given by the greatest fixed point of F, because $\Pi^W \geq 0$ and $\Pi^M - \Pi_T^M \geq \frac{1-\beta}{\beta}\Pi^W$ imply that $\Pi^M - \Pi_T^M \geq 0$. In a tough-but-fair equilibrium, we have

$$F\left(a^W, a^M\right) = \begin{pmatrix} \delta \frac{1-\beta}{\beta}\frac{1-q}{q}c + \delta^2 B\left(a^W, a^M\right), \\ \delta\left(d - e\right) + \delta^2 B\left(a^W, a^M\right) \end{pmatrix}.$$

Since F is monotone in a^W, a^M, and c, Theorem 1 of Milgrom and Roberts (1994) implies that the greatest fixed point of F is increasing in c, which completes the proof for a tough-but-fair equilibrium.

The argument for a soft equilibrium is more complicated. In a soft equilibrium, we have

$$F\left(a^W, a^M\right) = \begin{pmatrix} \delta \frac{1-\beta}{\beta}\frac{1-p}{p}c + \delta^2 B\left(a^W, a^M\right), \\ \delta\left(-\frac{q-p}{pq}c + k + d - e\right) + \delta^2 B\left(a^W, a^M\right) \end{pmatrix}.$$

Note that $\frac{q-p}{pq} < \frac{1-p}{p}$. Thus, an increase in c that increases $\frac{q-p}{pq}c$ by Δ increases $\frac{1-p}{p}c$ by more than Δ. It thus suffices to show that, when $-\left(\tau + \Delta\right) \geq \frac{1-\beta}{\beta}\left(\frac{1-p}{p}c + \Delta\right)$, we have $B\left(\bar{a}^W, \bar{a}^M\right) \leq B\left(\hat{a}^W, \hat{a}^M\right)$, where $\left(\bar{a}^W, \bar{a}^M\right)$ and $\left(\hat{a}^W, \hat{a}^M\right)$ are, respectively, the greatest fixed points of

$$\begin{aligned} F\left(a^W, a^M\right) &= \begin{pmatrix} \delta \frac{1-\beta}{\beta}\frac{1-p}{p}c + \delta^2 B\left(a^W, a^M\right), \\ -\delta\tau + \delta^2 B\left(a^W, a^M\right) \end{pmatrix} \qquad \text{and} \\ \hat{F}\left(a^W, a^M\right) &= \begin{pmatrix} \delta \frac{1-\beta}{\beta}\left(\frac{1-p}{p}c + \Delta\right) + \delta^2 B\left(a^W, a^M\right), \\ -\delta\left(\tau + \Delta\right) + \delta^2 B\left(a^W, a^M\right) \end{pmatrix}. \end{aligned}$$

To see this, note that since F and $\hat{F}$ are monotone and continuous, there exists $\bar{a} > 0$ such that $\left(\bar{a}^W, \bar{a}^M\right) = \lim_{n\to\infty} F^n\left(\bar{a}, \bar{a}\right)$ and $\left(\hat{a}^W, \hat{a}^M\right) = \lim_{n\to\infty} \hat{F}^n\left(\bar{a}, \bar{a}\right)$, where $F^n\left(\cdot, \cdot\right)$ and $\hat{F}^n\left(\cdot, \cdot\right)$ denote the n-fold iterations of $F\left(\cdot, \cdot\right)$ and $\hat{F}\left(\cdot, \cdot\right)$, respectively. (This follows by defining $\bar{a} > 0$ as in the proof of Lemma 1.1 and applying the argument of Theorem 5 of Milgrom and Roberts, 1990.) For each $n \geq 1$, let $\left(a_n^W, a_n^M\right) = F^n\left(\bar{a}, \bar{a}\right)$ and let $\left(\hat{a}_n^W, \hat{a}_n^M\right) = \hat{F}^n\left(\bar{a}, \bar{a}\right)$. We will prove that, for each $n \geq 1$,

$$\begin{aligned} B\left(a_n^W, a_n^M\right) &\leq B\left(\hat{a}_n^W, \hat{a}_n^M\right) \qquad \text{and} &\text{(A1)}\\ B\left(a_{n-1}^W, a_{n-1}^M\right) - \beta a_n^W - (1-\beta)\, a_n^M &\leq B\left(\hat{a}_{n-1}^W, \hat{a}_{n-1}^M\right) - \beta \hat{a}_n^W - (1-\beta)\,\hat{a}_n^M. &\text{(A2)}\end{aligned}$$

Given these relations and the fact that (A1) is preserved in the limit, we can conclude that $B\left(\bar{a}^W, \bar{a}^M\right) \leq B\left(\hat{a}^W, \hat{a}^M\right)$, completing the proof.

It thus remains to establish (A1) and (A2). We argue by induction on n. For $n = 1$, let $B_0 = b\left(\bar{a}\right)$. We have

$$\begin{aligned} a_1^W &= \delta\frac{1-\beta}{\beta}\frac{1-p}{p}c + \delta^2 B_0, \qquad a_1^M = -\delta\tau + \delta^2 B_0,\\ \hat{a}_1^W &= \delta\frac{1-\beta}{\beta}\left(\frac{1-p}{p}c + \Delta\right) + \delta^2 B_0, \qquad \text{and} \qquad \hat{a}_1^M = -\delta\left(\tau+\Delta\right) + \delta^2 B_0.\end{aligned}$$

Note that

$$\begin{aligned} & B\left(\hat{a}_1^W, \hat{a}_1^M\right) - B\left(a_1^W, a_1^M\right)\\ =\ & \beta\alpha b\left(\hat{a}_1^W\right) + (1-\beta)\,\alpha b\left(\hat{a}_1^M\right) - \left(\beta\alpha b\left(a_1^W\right) + (1-\beta)\,\alpha b\left(a_1^M\right)\right)\\ =\ & \int_{s=0}^{\Delta}\frac{\partial}{\partial s}\left(\beta\alpha b\left(\delta\frac{1-\beta}{\beta}\left(\frac{1-p}{p}c+s\right)+\delta^2 B_0\right) + (1-\beta)\,\alpha b\left(-\delta\left(\tau+s\right)+\delta^2 B_0\right)\right)ds\\ =\ & \delta\left(1-\beta\right)\int_{s=0}^{\Delta}\left(\alpha b'\left(\delta\frac{1-\beta}{\beta}\left(\frac{1-p}{p}c+s\right)+\delta^2 B_0\right) - \alpha b'\left(-\delta\left(\tau+s\right)+\delta^2 B_0\right)\right)ds\\ \geq\ & 0,\end{aligned}$$

where the inequality follows because b is concave and $\frac{1-\beta}{\beta}\left(\frac{1-p}{p}c+s\right) \leq -\left(\tau+s\right)$ for all $s \in [0,\Delta]$, by the hypothesis that $\frac{1-\beta}{\beta}\left(\frac{1-p}{p}c+\Delta\right) \leq -\left(\tau+\Delta\right)$. Hence, (A1) holds for $n = 1$. Moreover, (A2) holds for $n = 1$, as

$$\begin{aligned} B\left(a_0^W, a_0^M\right) - \beta a_1^W - (1-\beta)\,a_1^M &= B_0 - \beta a_1^W - (1-\beta)\,a_1^M\\ &= B_0 - \beta\left(\hat{a}_1^W - \delta\frac{1-\beta}{\beta}\Delta\right) - (1-\beta)\left(\hat{a}_1^M + \delta\Delta\right)\\ &= B\left(\hat{a}_0^W, \hat{a}_0^M\right) - \beta\hat{a}_1^W - (1-\beta)\,\hat{a}_1^M.\end{aligned}$$

Now suppose that (A1) and (A2) hold for some $n \geq 1$. Let

$$B_n = \beta\alpha b\left(a_n^W\right) + (1-\beta)\,\alpha b\left(a_n^M\right) \qquad \text{and} \qquad \hat{B}_n = \beta\alpha b\left(\hat{a}_n^W\right) + (1-\beta)\,\alpha b\left(\hat{a}_n^M\right).$$

By hypothesis, $B_n \le \hat{B}_n$. We have

$$
\begin{aligned}
a_{n+1}^W &= \delta\frac{1-\beta}{\beta}\frac{1-p}{p}c + \delta^2 B_n, \qquad a_{n+1}^M = -\delta\tau + \delta^2 B_n, \\
\hat{a}_{n+1}^W &= \delta\frac{1-\beta}{\beta}\left(\frac{1-p}{p}c + \Delta\right) + \delta^2 \hat{B}_n, \qquad \text{and} \qquad a_{n+1}^M = -\delta\left(\tau + \Delta\right) + \delta^2 \hat{B}_n.
\end{aligned}
$$

Note that

$$
\begin{aligned}
B_{n+1} &= \beta\alpha b\left(a_{n+1}^W\right) + \left(1-\beta\right)\alpha b\left(a_{n+1}^M\right) \\
&\le \beta\alpha b\left(\delta\frac{1-\beta}{\beta}\frac{1-p}{p}c + \delta^2\hat{B}_n\right) + \left(1-\beta\right)\alpha b\left(-\delta\tau + \delta^2\hat{B}_n\right) \\
&\le \beta\alpha b\left(\hat{a}_{n+1}^W\right) + \left(1-\beta\right)\alpha b\left(\hat{a}_{n+1}^M\right) = \hat{B}_{n+1},
\end{aligned}
$$

where the first inequality holds because b is increasing and $B_n \le \hat{B}_n$, and the second inequality holds by the same argument as in the $n=1$ case, with $\hat{B}_n$ in place of B_0. Hence, (A1) holds for $n+1$. Moreover, (A2) holds for $n+1$, as we have $\beta a_{n+1}^W + \left(1-\beta\right) a_{n+1}^M = \delta\left(1-\beta\right)\left(\frac{1-p}{p}c - \tau\right) + \delta^2 B_n$, and therefore

$$
\begin{aligned}
B\left(a_n^W, a_n^M\right) - \beta a_{n+1}^W - \left(1-\beta\right) a_{n+1}^M &= B_n\left(1-\delta^2\right) - \delta\left(1-\beta\right)\left(\frac{1-p}{p}c - \tau\right) \\
&\le \hat{B}_n\left(1-\delta^2\right) - \delta\left(1-\beta\right)\left(\frac{1-p}{p}c - \tau\right) \\
&= B\left(\hat{a}_n^W, \hat{a}_n^M\right) - \beta\hat{a}_{n+1}^W - \left(1-\beta\right)\hat{a}_{n+1}^M.
\end{aligned}
$$

This completes the proof for a soft equilibrium.

To see that decreasing c can make both workers and managers worse off by destorying the soft equilibrium, suppose that $\beta = .62$, $p = .78$, $q = .94$, $k = .09$, $\alpha = 7.3$, $b(a) = a^{.83}$, $d = .36$, $e = .33$ and $\delta = .29$. First suppose that $c = .6$, so $\rho \approx .1309$. Then $\Pi_S^W = .169$, $\Pi_{TF}^W = \Pi_T^W \approx .038$, $\Pi_S^M \approx .261$, $\Pi_{TF}^M \approx .302$ and $\Pi_T^M \approx .272$. Next, $\left(a_S^W, a_S^M\right)$ is the greatest solution to

$$
a_S^W = \delta\Pi_S^W + \delta^2\alpha\left(\beta b(a_S^W) + (1-\beta)b(a_S^M)\right) \text{ and } a_S^M = \delta(\Pi_S^M - \Pi_T^M) + \delta^2\alpha\left(\beta b(a_S^W) + (1-\beta)b(a_S^M)\right),
$$

which is given by $(a_S^W \approx 0.1243, a_S^M \approx .0736)$; $\left(a_T^W, a_T^M\right)$ is the greatest solution to

$$
a_T^W = \delta\Pi_T^W + \delta^2\alpha\left(\beta b(a_T^W) + (1-\beta)b(a_T^M)\right) \text{ and } a_T^M = \delta(0) + \delta^2\alpha\left(\beta b(a_T^W) + (1-\beta)b(a_T^M)\right),
$$

which is given by $(a_T^W \approx .0810, a_T^M \approx .0742)$; and $\left(a_{TF}^W, a_{TF}^M\right)$ is the greatest solution to

$$
a_{TF}^W = \delta\Pi_{TF}^W + \delta^2\alpha\left(\beta b(a_{TF}^W) + (1-\beta)b(a_{TF}^M)\right) \text{ and } a_{TF}^M = \delta(\Pi_{TF}^M - \Pi_T^M) + \delta^2\alpha\left(\beta b(a_{TF}^W) + (1-\beta)b(a_{TF}^M)\right),
$$

which is given by $(a_{TF}^W \approx .0674, a_{TF}^M \approx .0519)$. We thus have

$$V_S^W = \alpha\left(\beta b(a_S^W) + (1-\beta)b(a_S^M)\right) - a_S^W \approx 0.9956 \text{ and } V_S^M = \alpha\left(\beta b(a_S^W) + (1-\beta)b(a_S^M)\right) - a_S^M \approx 1.120,$$

$$V_T^W = \alpha\left(\beta b(a_T^W) + (1-\beta)b(a_T^M)\right) - a_T^W \approx 0.8016 \text{ and } V_T^M = \alpha\left(\beta b(a_T^W) + (1-\beta)b(a_T^M)\right) - a_S^T \approx 0.8084,$$

$$V_{TF}^W = \alpha\left(\beta b(a_{TF}^W) + (1-\beta)b(a_{TF}^M)\right) - a_{TF}^W \approx 0.6534 \text{ and } V_T^M = \alpha\left(\beta b(a_{TF}^W) + (1-\beta)b(a_{TF}^M)\right) - a_{TF}^T \approx 0.,$$

Hence, the soft equilibrium exists, as

$$\begin{aligned} e + \max\{\rho - k - d, \delta^2(\rho - k - d)\} &\approx .33 + \max\{.1309 - .09 - .36, .4^2(.1309 - .09 - .36)\} \\ &\approx .3032 < .3034 \approx \delta V_S^M. \end{aligned}$$

However, the tough-but-fair equilibrium does not exist since

$$e - \delta^2 d = .33 - (.29)^2(.36) = .2997 > .1940 \approx \delta V_{TF}^M,$$

and managers' soft and tough equilibrium payoffs are

$$\frac{1}{1+.29}\Pi_S^M + \frac{.4}{1+.29}V_S^M \approx .4374 \text{ and } \frac{1}{1+.29}\Pi_T^M + \frac{.29}{1+.29}V_T^M \approx .3924.$$

Now suppose that c decreases to $\hat{c} = .55$, so $\hat{\rho} = .120$. Recalling that a decrease in c cannot create a tough-but-fair equilibrium, the new profit levels in a soft and tough equilibria are $\hat{\Pi}_S^W \approx .155$, $\hat{\Pi}_T^W \approx .035$, $\hat{\Pi}_S^M \approx .32487$, and $\hat{\Pi}_T^M \approx .32489$; while the new levels of effort $\left(\hat{a}_S^W, \hat{a}_S^M\right)$ are given by $\left(\hat{a}_S^W \approx .1210, \hat{a}_S^M \approx .0761\right)$, and the new levels of effort $\left(\hat{a}_T^W, \hat{a}_T^M\right)$ are given by $\left(\hat{a}_T^W \approx .0792, \hat{a}_T^M \approx .0729\right)$. We thus have:

$$\hat{V}_S^W \approx .9902,\ \hat{V}_S^M \approx 1.035,\ \hat{V}_T^W \approx .7881,\ \hat{V}_T^M \approx .7943$$

Hence the soft equilibrium no longer exists because $e + \delta^2(\hat{\rho} - k - d) = .303 > .300 \approx \delta\hat{V}_S^M$. Finally, a manager's payoff in the tough equilibrium is now

$$\frac{1}{1+.29}\hat{\Pi}_T^M + \frac{.29}{1+.29}\hat{V}_T^M \approx .4304,$$

which is below her payoff in the previous soft equilibrium.

Proof of Proposition 6

For the first claim, note that $\left(a^W, a^M\right)$ is now given as the greatest fixed point of the function

$$F\left(a^W, a^M\right) = \begin{pmatrix} \max\left\{\delta\frac{1-\beta}{\beta}\Pi^W + \min\left\{B\left(a^W, a^M\right) - \gamma^W, \delta^2\left(B\left(a^W, a^M\right) - \gamma^W\right)\right\}, 0\right\}, \\ \max\left\{\delta\left(\Pi^M - \Pi_T^M\right) + \min\left\{B\left(a^W, a^M\right) - \gamma^M, \delta^2\left(B\left(a^W, a^M\right) - \gamma^M\right)\right\}, 0\right\} \end{pmatrix}.$$

Since F is increasing in $\left(a^W, a^M\right)$ and decreasing in $\left(\gamma^W, \gamma^M\right)$, its greatest fixed point is decreasing in γ^W and γ^M by Theorem 1 of Milgrom and Roberts (1994). Hence, since $\delta < \bar{\bar{\delta}}$ (so V^W and V^M are increasing in a^W and a^M), V^W and V^M are both decreasing in γ^W and γ^M, and hence so are workers' and managers' overall payoffs. It is also clear that if either group takes their outside option, this both directly reduces the other group's community payoff, and also further reduces this payoff by reducing the other group's maximum incentive compatible community effort level.

For the second claim, increasing either γ^W or γ^M shrinks the parameter range over which a soft or tough-but-fair equilibrium exists, because increasing either γ^W or γ^M makes both (19) and (20) harder to satisfy, both by decreasing V^M and also (for γ^M) by making (19) and (20) harder to satisfy for any fixed value of V^M.

The proof of the third claim is similar to the proof of Proposition 5.2. In particular, defining

$$F\left(a^W, a^M\right) = \left(\begin{array}{c} \delta\frac{1-\beta}{\beta}\Pi^W + \delta^2 B\left(a^W, a^M\right), \\ \delta\left(\Pi^M - \Pi_T^M\right) + \min\left\{B\left(a^W, a^M\right) - \gamma^M, \delta^2\left(B\left(a^W, a^M\right) - \gamma^M\right)\right\} \end{array}\right), \quad \text{and}$$

$$\hat{F}\left(a^W, a^M\right) = \left(\begin{array}{c} \delta\frac{1-\beta}{\beta}\Pi^W + \delta^2\left(B\left(a^W, a^M\right) - \gamma^W + \Delta\right), \\ \delta\left(\Pi^M - \Pi_T^M\right) + \min\left\{B\left(a^W, a^M\right) - \gamma^M - \frac{\beta}{1-\beta}\Delta, \delta^2\left(B\left(a^W, a^M\right) - \gamma^M - \frac{\beta}{1-\beta}\Delta\right)\right\} \end{array}\right),$$

(which are the equations defining the maximum incentive compatible community effort levels when $a^M > 0$ and $B\left(a^W, a^M\right) > \gamma$), the same argument as in the proof of Proposition 5.2 shows that, whenever $a^W > a^M$, $B\left(a^W, a^M\right)$ is larger at the greatest fixed point of F than at the greatest fixed point of $\hat{F}$.

Proof of Proposition 7

Suppose first that $e'' \leq 0$ and $k'' \geq 0$. Since managers do not participate in community interactions, the soft equilibrium exists at parameter θ if and only if there exists $\ell > 0$ such that

$$e(\ell) \leq \frac{\delta^2}{1-\delta^2}\left(\Pi_S^M(\theta, \ell) - \Pi_T^M(\theta)\right), \tag{A3}$$

where

$$\Pi_T^M(\theta) = \max_\ell \Pi_T^M(\theta, \ell) = \max_\ell \theta g(\ell) - \frac{c}{q}\ell - k(\ell) \tag{A4}$$

and

$$\Pi_S^M(\theta, \ell) = \theta g(\ell) - \left(\frac{c}{p} - d\right)\ell - e(\ell). \tag{A5}$$

Equivalently, the soft equilibrium exists at parameter θ if and only if

$$\hat{\Pi}_S^M(\theta) \geq \Pi_T^M(\theta), \tag{A6}$$

where

$$\begin{aligned}
\hat{\Pi}_S^M(\theta) &= \max_{\ell} \hat{\Pi}_S^M(\theta, \ell) \\
&= \max_{\ell} \theta g(\ell) - \left(\frac{c}{p} - d\right)\ell - e(\ell) - \frac{1-\delta^2}{\delta^2} e(\ell) \\
&= \max_{\ell} \theta g(\ell) - \left(\frac{c}{p} - d\right)\ell - \frac{e(\ell)}{\delta^2}.
\end{aligned}$$

Let $\ell_T(\theta) = \text{argmax}_\ell \Pi_T^M(\theta, \ell)$ and $\ell_S(\theta) = \text{argmax}_\ell \hat{\Pi}_S^M(\theta, \ell)$.

Lemma A2 *If $\ell_S(\theta) \leq \ell_T(\theta)$ and $\ell_S(\theta') \geq \ell_T(\theta')$ then $\theta \leq \theta'$.*

Proof. To ease notation, let $\ell = \ell_S(\theta)$ and $\ell' = \ell_S(\theta')$. Since $g'' < 0$ and $k'' \geq 0$, $\Pi_T^M\left(\tilde{\theta}, \ell\right)$ is concave in ℓ. Hence, we have

$$\frac{d}{d\ell}\Pi_T^M(\theta', \ell') \leq 0 = \frac{d}{d\ell}\hat{\Pi}_S^M(\theta', \ell') = \frac{d}{d\ell}\hat{\Pi}_S^M(\theta, \ell) \leq \frac{d}{d\ell}\Pi_T^M(\theta, \ell),$$

where the first inequality follows by concavity of Π_T^M in ℓ and $\ell' \geq \ell_T(\theta')$; the equalities are the first-order conditions for ℓ' and ℓ; and the second inequality follows by concavity of Π_T^M in ℓ and $\ell \leq \ell_T(\theta)$. Hence,

$$\begin{aligned}
\theta' g'(\ell') - \frac{c}{q} - k'(\ell') &\leq \theta' g'(\ell') - \frac{c}{p} + d - \frac{e'(\ell')}{\delta^2}, \\
\theta g'(\ell) - \frac{c}{q} - k'(\ell) &\geq \theta g'(\ell) - \frac{c}{p} + d - \frac{e'(\ell)}{\delta^2}.
\end{aligned}$$

Combining these inequalities, we have

$$k'(\ell) - k'(\ell') \leq \frac{e'(\ell) - e'(\ell')}{\delta^2}.$$

Since k' is increasing and e' is decreasing, we have $\ell \leq \ell'$. Finally, since $\ell_S(\theta)$ is an strictly increasing function (by Topkis's theorem), we have $\theta \leq \theta'$. ■

Now, note that

$$\hat{\Pi}_S^M(0) = \Pi_T^M(0)$$

and

$$\frac{\partial \hat{\Pi}_S^M\left(\tilde{\theta}, \ell_S\left(\tilde{\theta}\right)\right)}{\partial \tilde{\theta}} = \ell_S\left(\tilde{\theta}\right) \qquad \text{and} \qquad \frac{\partial \Pi_T^M\left(\tilde{\theta}, \ell_T\left(\tilde{\theta}\right)\right)}{\partial \tilde{\theta}} = \ell_T\left(\tilde{\theta}\right).$$

By the integral envelope theorem (Milgrom and Segal 2002) ,

$$\hat{\Pi}_S^M(\theta) - \Pi_T^M(\theta) = \int_0^\theta \left(\ell_S\left(\tilde{\theta}\right) - \ell_T\left(\tilde{\theta}\right)\right) d\tilde{\theta}.$$

By Lemma A2, there exists θ^* such that

$$\ell_S\left(\tilde{\theta}\right) - \ell_T\left(\tilde{\theta}\right) \geq 0 \qquad \Longleftrightarrow \qquad \tilde{\theta} \geq \theta^*.$$

Hence, there exists $\hat{\theta}$ such that (A6) holds—and hence a soft equilibrium exists—if and only if $\theta \geq \hat{\theta}$.

Similarly, if $e'' \geq 0$ and $k'' \leq 0$, then there is a threshold $\hat{\theta}$ such that the soft equilibrium exists if and only if $\theta \leq \hat{\theta}$. The argument is symmetric. (In the proof of the lemma, now we use that $\Pi_S^M\left(\tilde{\theta}, \ell\right)$ is concave.)

Proof of Proposition 8

For the first part, from Proposition 7, a soft equilibrium continues to exist as productivity increases. Moreover, an increase in productivity increases managers' employment rents $\Pi_S^M(\theta)$, as well as managers' labor demand $\ell_S(\theta)$. Note that worker utility in employment periods is given by $\frac{1-\beta}{\beta}\frac{1-p}{p}c\ell_S(\theta)$. Hence, worker employment utility—and hence worker community effort and worker utility in community interactions—is increasing in $\ell_S(\theta)$, and hence also in θ. Thus, an increase in productivity raises managers' utility in employment relations (and leaves fixed managers' utility of γ^M from opting out of community interactions), as well as workers' utility in both employment and community interactions.

For the second part, we give an explicit example. Suppose that $\beta = .99$, $L = 50$, $c = .35$, $p = .55$, $q = .72$, $g(\ell) = \ell^{.84}$, $k(\ell) = .38\ell^{.34}$, $d = .14$, $e(\ell) = .01\ell^{1.19}$, $\delta = .58$, and $\theta = .95$. Since we are assuming that managers opt out of community interactions, it suffices to focus on managers' and workers' employment rents: in particular, the function $b(a)$ is immaterial. In what follows, for all maximization problems over ℓ, recall that $\ell \in \{0, 1, \ldots, L\}$. Recall that manager profit is

$$\Pi_T^M = \max_{\ell} \theta g(\ell) - \frac{c}{q}\ell - k(\ell),$$

tough labor demand is

$$\ell_T = \operatorname*{argmax}_{\ell} \theta g(l) - \frac{c}{q}\ell - k(\ell),$$

tough worker rent is

$$\Pi_T^W = \frac{1-\beta}{\beta}\frac{1-q}{q}c\ell_T(\theta),$$

soft manager profit is

$$\begin{aligned} \Pi_S^M &= \max_{\ell} \theta g(\ell) - \left(\frac{c}{p} - d\right)\ell - e(\ell) \\ \text{subject to} \qquad e(\ell) &\leq \delta^2\left(\theta g(\ell) - \left(\frac{c}{p} - d\right)\ell - \Pi_T^M\right) \end{aligned}$$

(where, if the constraint is violated for all $\ell \in \{0, 1, \ldots, L\}$, then a soft equilibrium does not exist), soft labor demand is

$$\begin{aligned} \ell_S &= \operatorname*{argmax}_{\ell} \theta g(l) - \left(\frac{c}{p} - d\right) \ell - e(\ell) \\ \text{subject to} \qquad e(\ell) &\leq \frac{\delta^2}{1-\delta^2} \left(\Pi_S^M - \Pi_T^M\right), \end{aligned}$$

and soft worker rent at productivity θ is

$$\Pi_S^W = \frac{1-\beta}{\beta} \frac{1-p}{p} c \ell_S(\theta).$$

With the parameters specified above, a soft equilibrium exists, and we have

$$\begin{aligned} \ell_T &= 17, \qquad \Pi_T^M = 1.004, \qquad \Pi_T^W = .02337, \\ \ell_S &= 15, \qquad \Pi_S^M = 1.543, \qquad \Pi_S^W = .04339. \end{aligned}$$

Now suppose that θ increases to .99. Then a soft equilibrium no longer exists (i.e., the above constraint is violated for all ℓ), and we have $\ell_T = 23$, $\Pi_T^M = 1.503$, and $\Pi_S^W = .03162$. Therefore, both managers and workers are better-off in the soft equilibrium with productivity .95 than in the the tough equilibrium with productivity .99.