Electoral Labor Politics and Firm-Level Investor Protection*

Stylianos Papageorgiou
Department of Accounting and Finance
University of Cyprus
P.O. Box 20537, 1678 Nicosia, Cyprus
papageorgiou.stylianos@ucy.ac.cy

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Abstract

Electoral politics sets worker rents, and boards choose investor protection that secures outside investors' cash-flow claims and compresses managerial rents. With managers and workers under moral hazard, extreme rent splits tighten the other side's incentive constraint. Output is maximized at a benchmark worker rent that balances these incentives. Without investor protection, skewed political power yields two-sided distortions around this benchmark, upward favoring workers and downward favoring managers. Endogenous investor protection makes distortions one-sided: pro-manager distortions disappear, while pro-worker distortions occur over a larger region. Investor protection has opposing production effects via political discipline and incentive tightening. Managerial ownership affects these channels.

Keywords: worker rent, cash-flow claims, double-sided moral hazard, probabilistic voting

JEL Classification: D72, D82, G34, J53

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1 Introduction

Worker rent extraction is shaped by labor institutions that are politically contested (Botero et al., 2004). At the same time, investor protection shapes how securely outside owners can claim cash flows, and thereby shifts rent away from managers. A canonical framework linking labor policy and shareholder rights is set by Pagano and Volpin (2005a), who study their joint political determination. In this paper the interlink between labor politics and investor claims remains, but the institutional locus is distinct: electoral politics determines worker rent extraction, while corporate boards choose investor protection.

Firm-level investor protection is empirically shown to have first-order economic consequences (Bebchuk et al., 2009); this paper predicts political consequences along with real effects: endogenous investor protection tightens managers' incentive constraint, but also neutralizes their distributive gains from lower worker rents. This rules out outcomes in which worker rents fall below a production-maximizing benchmark; when politics departs from the benchmark, distortions are one-sided and favor workers. This asymmetry is attenuated by managerial ownership, which restores managers' incentives to electorally induce lower worker rents.

These results hold in an economy that consists of managers and workers, who can produce by forming employment agreements inside firms that are owned by outside capital. Both workers and managers can privately benefit from shirking. An agreement is formed only when a manager matches with a worker, and both exert high effort. Agreement formation is constrained by the short side, i.e., by the side that features the fewer members for whom high effort is incentive compatible.

Electoral politics determines how much rent a worker can extract when production succeeds. Investor protection determines how securely outside investors can claim cash flows, and thus how much residual rent is left for managers. Electoral competition selects

worker rent through vote-share maximization under probabilistic voting, while boards choose investor protection to maximize outside owners' expected payoff given the political environment. Thus, electoral politics and investor protection are not pure distributional choices; they also select which side is short, and thus determine agreement formation overall.

Extreme policies thus become self-defeating. Tilting rents toward one side tightens the other side's incentive constraint, shrinks the set of viable matches, and reduces aggregate production. This creates an anchor worker rent that maximizes agreement formation by balancing the incentive-compatible pools of managers and workers. Electoral competition selects this anchor over a wide parameter region. Deviations arise only under sufficiently skewed political power, and those deviations can be two-sided in the absence of investor protection: strong workers push their rent above the anchor, while strong managers push the worker rent below, with the resulting inefficiency taking the form of wasted matching capacity on the long side.

Allowing firms to choose investor protection reshapes this logic because governance loads onto the political margin asymmetrically. When policy moves in a manager-favoring direction, workers are in the short side, thereby pinning down agreement formation. As a result, boards can strengthen investor protection (which compresses managerial rents) without compromising production. The corporate response therefore absorbs the distributive gains managers would otherwise obtain from pushing worker rents down, removing their political motive to pursue such platforms.

By contrast, boards cannot absorb workers' political gains, so worker-favoring deviations remain when political power is skewed enough in favor of workers. In fact, boards, though constrained by the trade-off between a higher investor claim and tightened managerial incentives, still compromise managers' political gains via investor protection. This lowers the political-power threshold for a worker-favoring platform, and the parameter

region over which worker rents exceed the efficient anchor expands.

Aggregate production need not move in the same direction as the distortion asymmetry. Endogenous investor protection can raise output when it prevents manager-favoring platforms that would otherwise depress feasible production, but it can also reduce output because securing investor claims tightens managerial incentive constraints. Thus, production gains from firm-level investor protection obtain only in a strict subset of the region that generates manager-favoring distortions without protection. Within this subset, managerial power is sufficiently strong that the political-discipline gains dominate the incentive-tightening losses; outside that subset, investor protection weakly lowers aggregate production.

Managerial ownership attenuates the asymmetric way through which firm-level investor protection loads into electoral labor politics. The reason is that managerial ownership preserves managers' net political gains from lowering worker rents: when managers own shares, strengthening investor protection is no longer a pure transfer away from managers. As a result, manager-favoring deviations re-emerge and expand with managerial ownership, converging to the benchmark without investor protection as managers approach full ownership.

Related Literature. This paper relates directly to the literature that links labor institutions and corporate governance within a political economy framework. Pagano and Volpin (2005a) study how electoral competition shapes both labor protection and shareholder rights. Perotti and von Thadden (2006) similarly place corporate control and labor rents in a political economy equilibrium. Our paper preserves the central interdependence between labor institutions and corporate governance, and shifts the institutional locus: electoral politics determines worker rent extraction, while investor protection is a firm-level governance choice made by boards for given politics. This dual layer interacts with double-sided moral hazard in a non-trivial way: it makes political deviations around a

constrained-efficient benchmark asymmetric.

The interplay between labor and governance arrangements in shaping corporate outcomes has been empirically established. Gorton and Schmid (2004) and Faleye et al. (2006) document the effects of labor voice within governance structures, and Atanassov and Kim (2009) show that labor power interacts with the governance environment in shaping restructuring choices. On the theory side, Pagano and Volpin (2005b) model workers as an active constituency in corporate control, implying that labor's position inside the firm can affect governance outcomes rather than only cash-flow division. Our paper provides a tractable theory in which labor rent extraction and investor protection jointly determine incentive compatibility and agreement formation, and studies how electoral determination of labor rents interacts with the firm's endogenous investor protection.

Thus, this paper also relates to the literature on the interlink between politics and corporate governance. Rajan and Zingales (2003) emphasize how incumbent interests shape financial development, while Bebchuk and Neeman (2010), Biais and Perotti (2002), and Ševčík (2012) study how political incentives and majority voting can generate endogenous investor protection, ownership, and control arrangements. More recently, Döttling et al. (2025) explicitly highlight the feedback from corporate choices to political incentives in equilibrium. We show that the political determination of worker rents depends on boards' endogenous choice of investor protection, and that managerial ownership shapes this feedback by weakening the extent to which investor protection shifts rents away from managers.

Finally, this paper speaks to theories linking investor protection to real activity. Shleifer and Wolfenzon (2002) formalize how stronger protection supports larger scales. Castro et al. (2004) study the supply and demand effects of investor protection in a growth setting. La Porta et al. (2002) document that stronger investor protection is associated with higher corporate valuation. Alongside the incentive-tightening channel, we unravel

a new political-discipline channel: firm-level investor protection can neutralize managers' electoral motives to pursue lower worker rents.

The paper proceeds as follows. Section 2 describes the model. The equilibrium without investor protection is characterized in Section 3, and investor protection is endogenized in Section 4. Section 5 considers the role of managerial ownership, and Section 6 discusses modeling assumptions and empirical implications. Section 7 concludes. All proofs are in the Appendix.

2 Model

Consider a continuum of citizens of mass one. A citizen either belongs to the managerial class or to the working class. Let μ and $1-\mu$ denote the mass of managers and workers, respectively, where $\mu \in (0,1)$ is a given parameter. Everyone is risk-neutral, and delayed payoffs are not discounted.

Each manager runs a firm that is owned by outside capital. A firm is active if and only if its manager signs an employment agreement with a worker. It is without loss of generality to assume that every manager can employ at most one worker and every worker can be employed by at most one manager. Both managers and workers are plagued by moral hazard in that they can decide whether to exert low or high effort after their employment agreement has been signed.[1]

An agreement is successful and generates one output unit if and only if both signatories exert high effort. This one output unit belongs *de jure* to the owners. But political and corporate structures *de facto* allow workers and managers to extract rents. Specifically, established labor institutions (ranging from minimum wage, to paid leave requirements, to union rights) allow the worker to extract a rent $\eta \in [0,1]$. Moreover, established

[1]This is the underlying friction in our paper, which builds on the framework of moral hazard with multiple agents, as pioneered by Holmstrom (1982).

corporate governance (captured by the degree of investor protection within the firm) allows owners to secure a claim $\gamma \in [0, 1-\eta]$. We interpret γ as the secured cash-flow allocated to equity holders; in the baseline, equity holders are entirely outside investors. Overall, conditional on success, the unit output is split as η to the worker, $1-\eta-\gamma$ to the manager, and γ to outside capital.

Private benefits accrue to a signatory that exerts low effort when the other signatory exerts high effort. No private benefits occur if both signatories exert low effort. Let b_m and b_w denote the private benefit a manager and a worker would obtain, respectively, by exerting low effort when their counterparty exerts high effort. It is common knowledge that each manager's b_m and each worker's b_w are drawn independently from a uniform distribution on $[0, 1]$. The realizations of b_m and b_w are drawn right after rent sharing rules, i.e., η and γ, become known.[2]

Signing no agreement implies a payoff equal to zero. Signing an agreement entails an arbitrarily small cost $\varepsilon > 0$ for each signatory. Throughout the paper we consider the limit as $\varepsilon \to 0$, and hence omit ε from the payoff expressions; its only role is to rule out "sign-to-let-you-shirk" outcomes.

The mechanics of signing an employment agreement run as follows: Random matching between managers and workers takes place repeatedly. Upon matching, counterparties observe each other's type (as characterized by the realizations of b_m and b_w). In equilibrium, a manager and a worker sign an agreement if and only if high effort is ensured on both sides.[3] Otherwise, matched workers and managers separate (because an agreement would imply a negative payoff for at least one signatory) and re-enter the matching pool. We assume that any manager for whom high effort is ex post optimal is eventually

[2]Postponing the realizations of b_m and b_w after η and γ become known simplifies the analysis of the political game that is described later. The results remain the same, though the analysis becomes more tedious, in a setup where the realizations of b_m and b_w occur at the beginning of time.

[3]This parallels Tirole (2006, Chapter 3), where a project is undertaken only if high effort is ensured in a one-sided moral hazard setting.

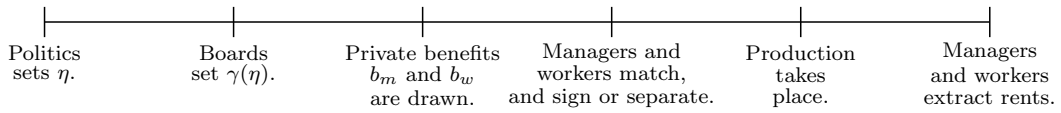


Figure 1: Timeline

matched provided there remains an unmatched worker for whom high effort is also ex post optimal, and vice versa.

Figure 1 shows the sequence of events. First, the variable η is set (and becomes publicly known) as the result of a political process that will be detailed later in this section. Second, boards, acting on behalf of owners, set owner claim $\gamma(\eta)$ in their firms. Then the realizations of b_m and b_w are drawn, and managers and workers pursue an employment agreement as described above: they match, observe each other's type, and either sign, or separate and re-enter the matching pool. Once an employment agreement is signed, the firm becomes active and output is realized depending on the signatories' effort choices. Finally, the realized output is allocated according to the established η and $\gamma(\eta)$, which we treat as enforceable institutions. To keep notation light, we write γ instead of $\gamma(\eta)$ when no confusion arises.

We say that a manager or a worker is incentive compatible if exerting high effort is ex post optimal, conditional on the other signatory exerting high effort. Specifically, a manager is incentive compatible if and only if

$$b_m \leq 1 - \eta - \gamma. \tag{1}$$

Accordingly, a worker is incentive compatible if and only if

$$b_w \leq \eta. \tag{2}$$

By (1) and (2), and since b_m and b_w are drawn from standard uniform distributions, the

mass of incentive compatible managers reads

$$\iota_m = (1 - \eta - \gamma)\mu, \tag{3}$$

and the mass of incentive compatible workers reads

$$\iota_w = \eta(1 - \mu). \tag{4}$$

Let p_m denote the probability with which a manager will sign an employment agreement. This probability is the product of (i) the probability that this manager is incentive compatible (which is equal to $\frac{\iota_m}{\mu}$), and (ii) the probability that an incentive compatible manager eventually matches with an incentive compatible worker (which is equal to 1 if $\iota_m \leq \iota_w$, whereas it is equal to $\frac{\iota_w}{\iota_m}$ if $\iota_m > \iota_w$). That is,

$$p_m(\eta, \gamma) = \begin{cases} \frac{\iota_m}{\mu} & \text{if } \iota_m \leq \iota_w \\ \\ \frac{\iota_w}{\mu} & \text{if } \iota_m > \iota_w. \end{cases} \tag{5}$$

Accordingly, let p_w denote the probability with which a worker will sign an employment agreement. This probability is the product of (i) the probability that this worker is incentive compatible (which is equal to $\frac{\iota_w}{1-\mu}$), and (ii) the probability that an incentive compatible worker eventually matches with an incentive compatible manager (which is equal to 1 if $\iota_m > \iota_w$, whereas it is equal to $\frac{\iota_m}{\iota_w}$ if $\iota_m \leq \iota_w$). That is,

$$p_w(\eta, \gamma) = \begin{cases} \frac{\iota_m}{1-\mu} & \text{if } \iota_m \leq \iota_w \\ \\ \frac{\iota_w}{1-\mu} & \text{if } \iota_m > \iota_w. \end{cases} \tag{6}$$

Since matching is repeated and any incentive-compatible agent on the short side is

eventually matched, the mass of successful agreements (and thus aggregate production) is pinned down by the short side of the market (the smaller of the two incentive-compatible pools), i.e., $\min\{\iota_m, \iota_w\}$, where ι_m and ι_w are given by (3) and (4), respectively. Throughout the paper we use aggregate production

$$Y(\eta, \gamma(\eta)) = \min\{(1 - \eta - \gamma(\eta)) \cdot \mu, \eta \cdot (1 - \mu)\} \tag{7}$$

as the natural production-efficiency benchmark. Thus, we refer to a policy

$$\eta^E \in \arg\max_{\eta \in [0,1]} Y(\eta, \gamma(\eta)) \tag{8}$$

as a constrained-efficient policy.

We proceed to describe the political process that determines the variable η, and thus the rent a matched worker extracts. In particular, an electoral competition takes place at the beginning of time. The electorate is composed of all citizens, i.e., workers and managers.[4] There are two candidates (A and B), each citizen has exactly one vote, and refraining from voting is not an option (see Davis et al. (1970), and Hinich et al. (1973), among many others).

The two candidates compete by simultaneously announcing the platform that they will implement in case they win the election. In doing so, they choose labor institutions, thus determining η. Let $\eta_k \in [0, 1]$ denote the choice of candidate $k \in \{A, B\}$. Let v_k denote the vote share of candidate $k \in \{A, B\}$. The candidate with the largest vote share implements the platform he announced before the election.[5]

Candidates choose their platform anticipating that citizens will vote for the one that

[4]The role of ownership in the political process remains mute in the baseline analysis as a result of granting no citizen-status to outside capital. The electoral implications of ownership are captured in Section 5 where managers hold firm shares.

[5]We assume no time inconsistency. This is standard in static voting models where candidates are ex post indifferent between honoring or reneging on their ex ante announcements.

maximizes their utility. In turn, candidates and citizens anticipate that boards will choose γ to maximize owners' expected utility. Note that the decision on γ is taken at the firm level. But because all firms face the same environment and the owners' problem is identical across firms, i.e.,

$$\max_{\gamma \in [0,1-\eta]} \gamma \cdot p_m(\eta, \gamma), \tag{9}$$

a symmetric equilibrium occurs where all boards choose the same owner claim γ.

Citizens' utility accounts for a policy-driven economic payoff and a random political bias in the tradition of probabilistic voting (Lindbeck and Weibull, 1987). In particular, the utility of a manager, denoted by u_m reads

$$u_m = \begin{cases} y_m(\eta_A, \gamma(\eta_A)) & \text{if } A \text{ wins} \\ y_m(\eta_B, \gamma(\eta_B)) + \beta_m & \text{if } B \text{ wins,} \end{cases} \tag{10}$$

where

$$y_m(\eta, \gamma(\eta)) = p_m(\eta, \gamma(\eta)) \cdot (1 - \eta - \gamma(\eta)) \tag{11}$$

is managers' expected payoff, and $\beta_m \in \mathcal{U}(-1/(2\chi_m), 1/(2\chi_m))$ represents managers' political bias in favor or against candidate B. Accordingly, the utility of a worker, denoted by u_w, reads

$$u_w = \begin{cases} y_w(\eta_A, \gamma(\eta_A)) & \text{if } A \text{ wins} \\ y_w(\eta_B, \gamma(\eta_B)) + \beta_w & \text{if } B \text{ wins,} \end{cases} \tag{12}$$

where

$$y_w(\eta, \gamma(\eta)) = p_w(\eta, \gamma(\eta)) \cdot \eta \tag{13}$$

is the worker's expected payoff, and $\beta_w \in \mathcal{U}(-1/(2\chi_w), 1/(2\chi_w))$ represents workers' political bias in favor or against candidate B.

Each manager's β_m and each worker's β_w are drawn independently, and these dis-

tributions are publicly known. As is typical in probabilistic voting, the distribution parameters χ_w and χ_m turn out to be measures of the political power of workers and managers, respectively. Throughout the paper, we will interpret the variable

$$X \equiv \frac{\chi_w}{\chi_m} \in (0, +\infty) \tag{14}$$

as the relative political power of workers vis-à-vis managers: the working class is politically more powerful than the managerial class if $X > 1$, and vice versa if $X < 1$.

We assume that candidates are non-ideological, and aim at maximizing their vote shares.[6] Moreover, we make the otherwise inconsequential assumption that candidates choose the smaller policy value in case of indifference. Finally, as is standard in probabilistic voting, we assume that χ_w and χ_m are small enough so that vote shares do not take corner values.

3 Equilibrium without Investor Protection

In this section we assume that owners cannot secure any claim. Namely, we fix $\gamma = 0$, and we proceed to characterize the political equilibrium over η. This means that the payoff expressions (11) and (13) are specified as

$$y_m(\eta, 0) = \frac{Y(\eta, 0)}{\mu}(1 - \eta) \tag{15}$$

and

$$y_w(\eta, 0) = \frac{Y(\eta, 0)}{1 - \mu}\eta, \tag{16}$$

[6]It is straightforward to allow candidates to maximize their probability of winning via an additional random variable representing a generic bias. We opt for the simpler voting setup in order to focus on the interaction between electoral labor politics and firm-level investor protection.

respectively, where

$$Y(\eta, 0) = \min\{(1-\eta)\mu, \eta(1-\mu)\} \tag{17}$$

is the aggregate production for fixed $\gamma = 0$. From (17) we obtain that the constrained-efficient policy, denoted by $\eta^E_{\gamma=0}$ in the absence of investor protection, is characterized by $(1-\eta^E_{\gamma=0})\mu = \eta^E_{\gamma=0}(1-\mu)$. Therefore,

$$\eta^E_{\gamma=0} = \mu. \tag{18}$$

Let $\mathcal{G}_{\gamma=0}$ denote the game where the two vote-share-maximizing candidates simultaneously choose η_A and η_B, being aware that the utility of every manager is determined by (10) and (15), and the utility of every worker is determined by (12) and (16). An equilibrium of the game $\mathcal{G}_{\gamma=0}$ is a pure-strategy Nash equilibrium. We focus on symmetric equilibria, which are characterized by a common policy $\eta^*_{\gamma=0}$. It will be useful to define the following thresholds:

$$\overline{X}_{\gamma=0}(\mu) \equiv \frac{2(1-\mu)}{1-2\mu} \qquad \forall \mu \in (0, 0.5) \tag{19}$$

$$\underline{X}_{\gamma=0}(\mu) \equiv \frac{2\mu - 1}{2\mu} \qquad \forall \mu \in (0.5, 1)\,. \tag{20}$$

Proposition 1. *In the equilibrium of game $\mathcal{G}_{\gamma=0}$, candidates set policy as follows: If $\mu < 0.5$, then*

$$\eta^*_{\gamma=0} = \begin{cases} \eta^E_{\gamma=0} & \text{for } X \leq \overline{X}_{\gamma=0} \\ \frac{X-2}{2(X-1)} & \text{for } \overline{X}_{\gamma=0} < X. \end{cases} \tag{21}$$

If $\mu > 0.5$, then

$$\eta^*_{\gamma=0} = \begin{cases} \frac{1}{2(1-X)} & \text{for } X \leq \underline{X}_{\gamma=0} \\ \eta^E_{\gamma=0} & \text{for } \underline{X}_{\gamma=0} < X. \end{cases} \tag{22}$$

If $\mu = 0.5$*, then* $\eta^*_{\gamma=0} = \eta^E_{\gamma=0}$ *for all* $X \in (0, +\infty)$.

Proposition 1 shows that double-sided moral hazard rules out corner policies. The reason is that a higher share on rents for a class (conditional on production) comes at the cost of a lower probability of production. This creates a natural anchor at $\eta^E_{\gamma=0} = \mu$. At this level, the two incentive-compatible pools have equal mass. This means that matching capacity is not wasted on either side. Namely, every incentive-compatible agent can be paired with an incentive-compatible counterparty. Any deviation from $\eta^E_{\gamma=0}$ creates an imbalance between a long-side where incentive-compatible agents are abundant and a short-side where incentive-compatible agents are scarce. As a result, some incentive-compatible agents in the long-side fail to produce. This production loss feeds back into expected payoffs and hence into voting incentives.

The political equilibrium inherits this discipline. When relative political power is not too skewed, candidates choose the anchor $\eta^E_{\gamma=0} = \mu$. In these cases, the incentives to keep agreement formation high outweigh the effects from the distributive antagonism. This induces the anchor policy that maximizes agreement formation given the incentive constraints. Only when political power is sufficiently skewed do candidates deviate from $\eta^E_{\gamma=0} = \mu$ toward a class-biased policy. The thresholds $\overline{X}_{\gamma=0}$ and $\underline{X}_{\gamma=0}$ describe exactly how large the political skewness must be, as a function of class size μ, for distributive motives to dominate the agreement formation discipline.

The direction and form of the deviation depend on which class is larger. When $\mu < 1/2$ (workers are the majority), equilibrium policy remains at $\eta^E_{\gamma=0} = \mu$ unless workers' relative political power X is high enough; when this condition is met, policy increases above μ. Symmetrically, when $\mu > 1/2$ (managers are the majority), policy remains at $\eta^E_{\gamma=0} = \mu$ unless workers are sufficiently weak in political power; when they are, policy falls below μ. In both cases, the deviation is bounded: as political power becomes extreme, policy converges to an interior limit, because pushing the split further would

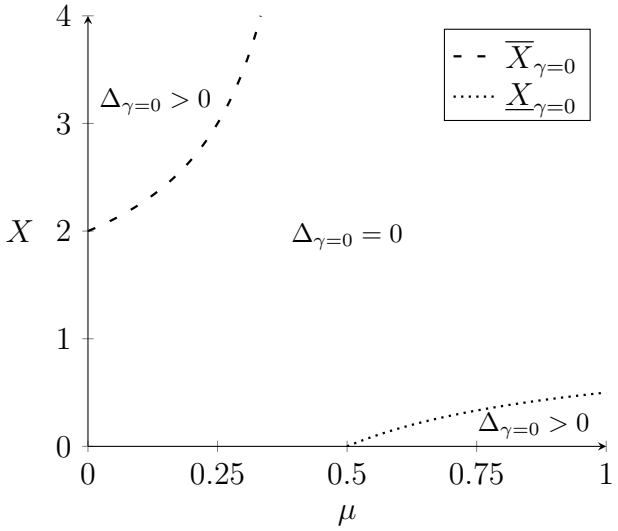


Figure 2: Production implications of the political equilibrium in the economy without investor protection.

tighten the disadvantaged side's incentive constraint so much that agreement formation collapses, undoing the gains from a more favorable rent sharing. Thus, under double-sided moral hazard, politics ceases to be merely a distributive mechanism; it also matters for preserving the incentive-compatible mass on the other side so that production can occur.

To quantify the real effect of political distortions in this environment, we measure inefficiency in terms of foregone production relative to the constrained-efficient benchmark. Specifically, define the production loss

$$\Delta_{\gamma=0}(\mu, X) \equiv Y(\eta^E_{\gamma=0}, 0) - Y(\eta^*_{\gamma=0}, 0). \tag{23}$$

By construction, $\Delta_{\gamma=0}(\mu, X) \geq 0$, and $\Delta_{\gamma=0}(\mu, X) = 0$ if and only if equilibrium policy coincides with the efficiency anchor, $\eta^*_{\gamma=0} = \eta^E_{\gamma=0} = \mu$.

Figure 2 summarizes the implications of Proposition 1 for production efficiency. When μ is close to $1/2$, the anchor is robust: moving η away from μ immediately creates a severe matching imbalance, so distributive motives must be very strong to justify departing from

$\eta^E_{\gamma=0}$. When class sizes are more uneven, the political-power skew required for a departure becomes less extreme. Thus there are two distortion regions that expand toward the upper-left and bottom-right corners.

Specifically, when workers are the majority ($\mu < 1/2$) and their political power is sufficiently high (large X), equilibrium policy shifts above μ, the mass of incentive-compatible managers falls short of the workers' counter-mass, and a production loss materializes as a result of wasted incentive-compatibility capacity on the workers' side. When managers are the majority ($\mu > 1/2$) and workers are sufficiently weak in political power (small X), equilibrium policy shifts below μ, the mass of incentive-compatible workers falls short of the managers' counter-mass, and a production loss materializes as a result of wasted incentive-compatibility capacity on the managers' side. Outside these two regions, political competition selects the anchor policy and the production loss is zero.

4 Equilibrium with Endogenous Investor Protection

We proceed to characterize the equilibrium in the economy that is described in Section 2. Solving backward, we begin by characterizing the optimal response of boards. Fix a policy η. According to (9), a representative board chooses $\gamma \in [0, 1-\eta]$ to maximize $\gamma \cdot p_m(\eta, \gamma)$. Because of (5), the board's objective is linear in γ when $\iota_m > \iota_w$, and strictly concave in γ when $\iota_m \leq \iota_w$. This yields the following best response:

$$\gamma^*(\eta) = \begin{cases} \frac{\mu-\eta}{\mu} & \text{for } \eta \leq \frac{\mu}{2-\mu} \\ \frac{1-\eta}{2} & \text{for } \eta > \frac{\mu}{2-\mu}. \end{cases} \tag{24}$$

The intuition is as follows. For low enough γ, and fixed η, managers remain abundant relative to workers (i.e., $\iota_m > \iota_w$), so agreement formation is pinned down by the worker pool and $p_m = \iota_w/\mu$ is independent of γ. In that region, raising γ increases owners' payoff

without reducing the probability of production, so the board raises γ up to the boundary at which managers cease to be abundant, i.e., where the two incentive-compatible pools are equal, $\iota_m = \iota_w$.

Once γ is such that managers are on the short side (i.e., $\iota_m < \iota_w$), agreement formation is pinned down by the manager pool and $p_m = \iota_m/\mu = 1 - \eta - \gamma$. Further increases in γ then tighten managers' incentive constraint and reduce agreement formation, so owners face a tradeoff between a higher conditional share and a lower probability of production. This leads the board to choose the interior maximizer $\gamma = (1-\eta)/2$ whenever it lies in the region $\iota_m \leq \iota_w$. The cutoff $\eta = \mu/(2-\mu)$ is exactly the value at which this interior maximizer meets the boundary $\iota_m = \iota_w$ (equivalently, where $(1-\eta)/2 = (\mu-\eta)/\mu$).

Let $\mathcal{G}$ denote the game in which the two vote-share-maximizing candidates simultaneously choose platforms η_A and η_B, anticipating that voting is determined by utilities (10) and (12). The candidate who wins implements his announced platform η_k with $k \in \{A, B\}$, and each firm's board sets the owner claim according to the best response $\gamma^*(\eta_k)$ as characterized in (24). An equilibrium of game $\mathcal{G}$ is a subgame perfect Nash equilibrium. We focus on symmetric equilibria, which are characterized by a common policy η^* and a common owner-protection choice $\gamma^* = \gamma^*(\eta^*)$. We define

$$\overline{X}_{\gamma^*}(\mu) \equiv \frac{2(1-\mu)}{2-3\mu} \qquad \forall \mu \in \left(0, \frac{2}{3}\right). \tag{25}$$

Proposition 2. *The constrained-efficient policy under endogenous owner protection reads* $\eta^E = \frac{\mu}{2-\mu}$. *Moreover, in the equilibrium of game* $\mathcal{G}$, *candidates set policy and boards set investor protection as follows: If* $\mu < 2/3$, *then*

$$\eta^* = \begin{cases} \eta^E & \text{for } X \leq \overline{X}_{\gamma^*} \\ \frac{X-1}{2X-1} & \text{for } \overline{X}_{\gamma^*} < X, \end{cases} \tag{26}$$

and

$$\gamma^*(\eta^*) = \begin{cases} \frac{1-\mu}{2-\mu} & \text{for } X \leq \overline{X}_{\gamma^*} \\ \frac{X}{2(2X-1)} & \text{for } \overline{X}_{\gamma^*} < X. \end{cases} \tag{27}$$

If $\mu \geq 2/3$, *then* $\eta^* = \eta^E$ *and* $\gamma^*(\eta^*) = \frac{1-\mu}{2-\mu}$.

When η is low enough so that, under the board's choice, managers remain abundant relative to workers, boards have scope to protect owners without being concerned with reducing production. In fact, boards raise $\gamma^*(\eta)$ up to the boundary at which $\iota_m(\eta, \gamma^*(\eta)) = \iota_w(\eta, \gamma^*(\eta))$. This gives rise to a core political consequence of endogenous investor protection:[7] managers' expected payoff is increasing in η as long as boards' response keeps the economy on this equal-mass boundary. That is, managers no longer benefit from tilting the political outcome below the anchor policy η^E, because boards absorb the distributive margin through stronger investor protection.

The constrained-efficient anchor $\eta^E = \frac{\mu}{2-\mu}$ is the point at which boards switch from "equalizing scarcity" to the interior solution $\gamma^*(\eta) = \frac{1-\eta}{2}$. When workers' political power is sufficiently high, i.e., when (μ, X) are in the upper-left region of the space $(0,1) \times (0, +\infty)$, candidates implement a worker-favoring policy above η^E. Otherwise, the anchor is already high enough that the political incentive to move further up is dominated by the agreement-formation loss (and the induced investor-protection response), so η^* remains pinned at η^E.

We define the production loss under endogenous investor protection as follows:

$$\Delta_{\gamma^*}(\mu, X) \equiv Y(\eta^E, \gamma^*(\eta^E)) - Y(\eta^*, \gamma^*(\eta^*)). \tag{28}$$

[7]This implication does not rely on parametric assumptions, such as the uniform distribution of b_m and b_w or the piecewise linear specification of agreement formation. The critical modelling choice is that aggregate matches are pinned down by the short side of the matching technology. See Section 6 for an elaborate discussion.

Moreover, for the sake of comparison between games $\mathcal{G}_{\gamma=0}$ and $\mathcal{G}$, we define

$$\overline{\mathcal{D}}_{\gamma=0} \equiv \left\{(\mu, X) : \eta^*_{\gamma=0} > \eta^E_{\gamma=0}\right\} \tag{29}$$

$$\underline{\mathcal{D}}_{\gamma=0} \equiv \left\{(\mu, X) : \eta^*_{\gamma=0} < \eta^E_{\gamma=0}\right\} \tag{30}$$

$$\overline{\mathcal{D}}_{\gamma^*} \equiv \left\{(\mu, X) : \eta^* > \eta^E\right\} \tag{31}$$

$$\underline{\mathcal{D}}_{\gamma^*} \equiv \left\{(\mu, X) : \eta^* < \eta^E\right\}. \tag{32}$$

Proposition 3. *Endogenous investor protection eliminates the parameter region in which equilibrium policy lies below the constrained-efficient anchor and expands the region in which equilibrium policy lies above the constrained-efficient anchor. Formally,* $\varnothing \neq \overline{\mathcal{D}}_{\gamma=0} \subsetneq \overline{\mathcal{D}}_{\gamma^*}$ *and* $\underline{\mathcal{D}}_{\gamma^*} = \varnothing \neq \underline{\mathcal{D}}_{\gamma=0}$.

Endogenous investor protection changes the nature of electoral conflict over rent sharing. Without investor protection, electoral competition can distort policy in either direction relative to the constrained-efficient anchor: sufficiently strong workers push η above the anchor, while sufficiently strong managers push η below it. With endogenous investor protection, this symmetry breaks. Owner protection removes the political payoff to pushing η below the anchor, so the only remaining distortion is worker-favoring and it occurs on a larger set of parameters. Proposition 3 formalizes this asymmetry: the manager-favoring set disappears, i.e., $\underline{\mathcal{D}}_{\gamma^*} = \varnothing$, while the worker-favoring set strictly expands, $\varnothing \neq \overline{\mathcal{D}}_{\gamma=0} \subsetneq \overline{\mathcal{D}}_{\gamma^*}$.

Figure 3 provides a visual summary by overlaying the distortion thresholds with and without investor protection. The dotted curve $\underline{X}_{\gamma=0}$ is the boundary below which, without investor protection and for $\mu > 1/2$, electoral competition selects $\eta^*_{\gamma=0} < \eta^E_{\gamma=0}$ and production falls below the benchmark because workers are on the short side. Under endogenous investor protection, this region disappears. On the worker-favoring side, the dashed curve $\overline{X}_{\gamma=0}$ gives the threshold above which workers push η above the anchor

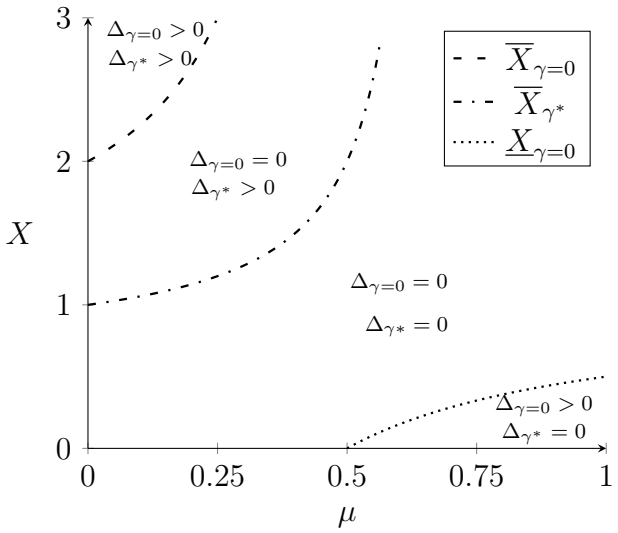


Figure 3: Comparison of distortion regions with and without endogenous investor protection.

without investor protection, while the dash-dotted curve $\overline{X}_{\gamma^*}$ gives the analogous threshold under endogenous investor protection (for $\mu < 2/3$). The downward shift from $\overline{X}_{\gamma=0}$ to $\overline{X}_{\gamma^*}$ is the result of the strict expansion $\overline{\mathcal{D}}_{\gamma=0} \subsetneq \overline{\mathcal{D}}_{\gamma^*}$: once investor protection is endogenous, a smaller political-power advantage is sufficient for workers to implement a policy above the anchor.

The asymmetry that emerges with endogenous investor protection is driven by how the firm-level response loads onto the political margin. When policy tilts downward (low η), boards can raise investor protection while the worker side remains the short side, so the owners' instrument absorbs the distributive shift and eliminates managers' incentive to demand even lower η; this is why $\underline{\mathcal{D}}_{\gamma^*}$ is empty. When policy tilts upward (high η), the economy is already constrained by the manager side and boards face the interior trade-off, so investor protection cannot neutralize workers' distributive gains without further contracting agreement formation; worker-favoring deviations therefore remain feasible and require a weaker political-power advantage than in the economy without investor protection.

A separate question is whether this governance response can raise aggregate produc-

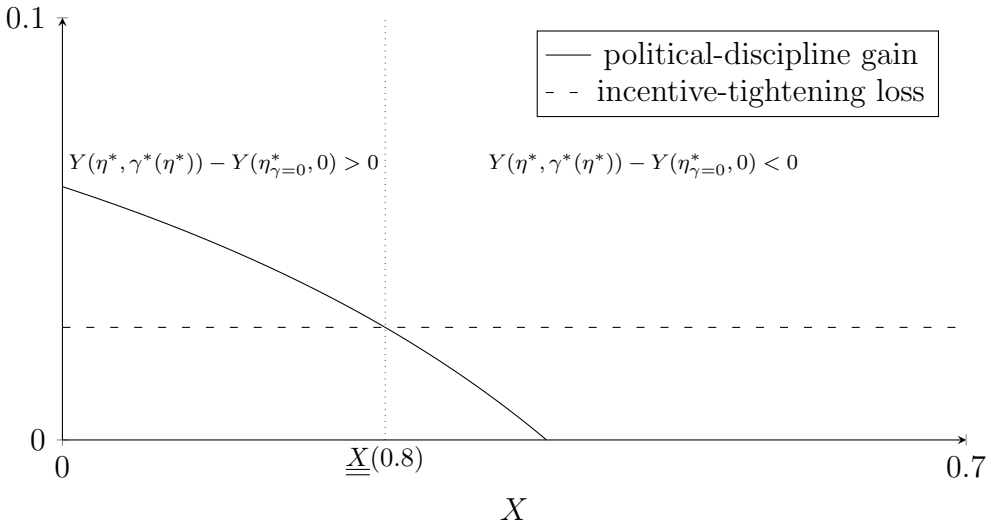


Figure 4: Production gains and losses from endogenous investor protection in an economy with fixed $\mu = 0.8$.

tion in absolute terms. We thus compare equilibrium output in the economy without investor protection, $Y(\eta^*_{\gamma=0}, 0)$, to equilibrium output under endogenous investor protection, $Y(\eta^*, \gamma^*(\eta^*))$, and study the sign of their difference across (μ, X).

Proposition 4. *Consider the threshold* $\underline{\underline{X}}(\mu) \equiv \frac{3\mu-2}{2\mu}$ *that is defined on the domain* $\mu \in [2/3, 1)$*, which satisfies* $\underline{\underline{X}}(\mu) < \underline{X}_{\gamma=0}(\mu)$ *for* $\mu \in [2/3, 1)$*. It holds that* $Y(\eta^*, \gamma^*(\eta^*)) - Y(\eta^*_{\gamma=0}, 0) > 0$ *if and only if* $\mu > 2/3$ *and* $X < \underline{\underline{X}}(\mu)$*. Otherwise,* $Y(\eta^*, \gamma^*(\eta^*)) - Y(\eta^*_{\gamma=0}, 0) \leq 0$*.*

Endogenous investor protection can raise aggregate production in absolute terms. The production-gain region is a strict subset of the parameter set that generates manager-favoring distortions under no protection. Specifically, gains arise only when $\mu > 2/3$ and X is sufficiently low (specifically, $X < \underline{\underline{X}}(\mu)$). For all remaining parameter values, equilibrium output under endogenous owner protection is weakly lower than under no protection.

To understand the mechanism, we write the difference of aggregate production with

and without investor protection as follows:

$$Y(\eta^*, \gamma^*(\eta^*)) - Y(\eta^*_{\gamma=0}, 0) \equiv \underbrace{\left[Y(\eta^E_{\gamma=0}, 0) - Y(\eta^*_{\gamma=0}, 0)\right]}_{\text{political-discipline gain}} - \underbrace{\left[Y(\eta^E_{\gamma=0}, 0) - Y(\eta^*, \gamma^*(\eta^*))\right]}_{\text{incentive-tightening loss}}. \tag{33}$$

Intuition follows from this decomposition of $Y(\eta^*, \gamma^*(\eta^*)) - Y(\eta^*_{\gamma=0}, 0)$, which is numerically illustrated in Figure 4. First, endogenous investor protection yields a production gain via political discipline on managers: it prevents managers from electorally inducing a worker rent that is too low, thereby reducing the wasted matching capacity that arises without protection. Second, secured claims for owners tighten managers' incentive constraint, contracting agreement formation. When managers are sufficiently powerful politically, the discipline gain exceeds the incentive-tightening loss. Otherwise, the loss dominates and endogenous investor protection reduces agreement formation, and thus aggregate production.

5 Managerial Ownership

Let σ, with $\sigma \in (0, 1)$, denote managers' equity share in their firm, with outside capital holding $1-\sigma$.[8] Investor protection secures a total cash-flow claim $\gamma \in [0, 1-\eta]$ for equity holders. With managerial ownership σ, outside investors receive $(1-\sigma)\gamma$ and managers receive $\sigma\gamma$ as shareholders, in addition to their residual cash-flow $1-\eta-\gamma$. This means that the incentive compatibility constraint for managers reads

$$b_m \leq 1 - \eta - \gamma \cdot (1 - \sigma), \tag{34}$$

[8]It would be both realistic and straightforward to consider a setup in which workers have also a claim in firms' ownership, e.g. via pension funds. Such a modeling choice has only quantitative consequences, and we thus omit it to focus on the most salient mechanism that arises via managers' ownership.

and thus the mass of incentive compatible managers becomes

$$\iota_m = (1 - \eta - \gamma \cdot (1 - \sigma)) \cdot \mu. \tag{35}$$

An immediate consequence is that the best response of boards, which still solve (9) yet with $p_m = \min\{(1 - \eta - \gamma \cdot (1 - \sigma)) \cdot \mu, \eta \cdot (1 - \mu)\}/\mu$, now reads

$$\gamma^*_\sigma(\eta) = \begin{cases} \min\left\{1 - \eta, \frac{\mu - \eta}{\mu(1-\sigma)}\right\} & \text{for } \eta \leq \frac{\mu}{2-\mu} \\ \min\left\{1 - \eta, \frac{1-\eta}{2(1-\sigma)}\right\} & \text{for } \eta > \frac{\mu}{2-\mu}. \end{cases} \tag{36}$$

It then holds that the constrained-efficient policy, which maximizes

$$Y_\sigma(\eta, \gamma^*_\sigma(\eta)) \equiv \min\{(1 - \eta - \gamma^*_\sigma(\eta) \cdot (1 - \sigma)) \cdot \mu, \eta \cdot (1 - \mu)\}, \tag{37}$$

now reads

$$\eta^E_\sigma = \underset{\eta \in [0,1]}{\arg\max}\ Y_\sigma(\eta, \gamma^*_\sigma(\eta)) = \begin{cases} \frac{\mu}{2-\mu} & \text{for } \sigma \leq 0.5 \\ \frac{\mu\sigma}{1-\mu+\mu\sigma} & \text{for } \sigma > 0.5. \end{cases} \tag{38}$$

The payoff of a worker is given by substituting for (4), (6), (35) and (36) into (13). The payoff of a manager is given by substituting for (4), (5), (35) and (36) into

$$y_m(\eta, \gamma(\eta)) = p_m(\eta, \gamma(\eta)) \cdot (1 - \eta - \gamma(\eta) + \sigma\gamma(\eta)). \tag{39}$$

Let η^*_σ denote the policy that characterizes a symmetric subgame perfect Nash equilibrium in which the two vote-share-maximizing candidates simultaneously choose platforms, anticipating that voting is determined by utilities (10) and (12), where payoffs are given by (39) and (13) for managers and workers, respectively, and each firm's board sets

investor protection according to the best response (36). We also define

$$\overline{\mathcal{D}}_\sigma \equiv \left\{(\mu, X) : \eta^*_\sigma > \eta^E_\sigma\right\} \tag{40}$$

$$\underline{\mathcal{D}}_\sigma \equiv \left\{(\mu, X) : \eta^*_\sigma < \eta^E_\sigma\right\}. \tag{41}$$

Proposition 5. *Fix $\sigma \in (0,1)$. There is a non-empty parameter region that admits an equilibrium policy above η^E_σ, and is weakly shrinking in σ. There also is a non-empty parameter region that admits an equilibrium policy below η^E_σ, and is strictly expanding in σ. Formally, $\overline{\mathcal{D}}_\sigma \neq \varnothing$, $\underline{\mathcal{D}}_\sigma \neq \varnothing$, $\overline{\mathcal{D}}_{\sigma'} \supseteq \overline{\mathcal{D}}_{\sigma''}$ and $\underline{\mathcal{D}}_{\sigma'} \subsetneq \underline{\mathcal{D}}_{\sigma''}$, for any $0 < \sigma' < \sigma'' < 1$.*

Proposition 5 shows that managerial ownership attenuates the baseline asymmetry by reintroducing manager-favoring political distortions around the constrained-efficiency anchor. For low σ, a manager-favoring distortion region $\underline{\mathcal{D}}_\sigma$ exists but is confined to a small corner (high μ and low X). As σ rises, $\underline{\mathcal{D}}_\sigma$ expands monotonically, making equilibrium policy increasingly likely to fall below η^E_σ; the no-protection benchmark is approached as $\sigma \to 1$. At the same time, the worker-favoring distortion region $\overline{\mathcal{D}}_\sigma$ remains non-empty for all $\sigma \in (0,1)$: it coincides with the baseline endogenous-protection case for $\sigma \leq 0.5$, and shrinks for $\sigma > 0.5$.

Manager-favoring deviations re-emerge because ownership weakens the board's ability to neutralize the political gains from lowering η. When $\sigma = 0$, and for parameter values where the worker side remains short after the board's response, a lower η can be offset by a higher γ without reducing agreement formation; this absorbs the distributive effect of a manager-favoring shift and leaves managers with no net benefit from pushing η down. When $\sigma > 0$, managers internalize a fraction σ of any secured claim, so increases in γ are no longer a pure transfer away from them. Boards therefore choose higher protection for a given η, and, as σ rises, the feasibility bound $\gamma \leq 1 - \eta$ binds on a larger region. In that region, boards cannot further raise γ to offset a fall in η, while managers retain

net political gains from lower worker rents. Hence $\underline{\mathcal{D}}_\sigma$ expands monotonically with σ, approaching the no-protection benchmark as σ approaches one.

6 Discussion

This section discusses the role of modeling assumptions in deriving the main results, and elaborates on empirical implications.

Two modeling ingredients are central for the asymmetric way firm-level investor protection interacts with labor politics. In particular, the combination of (i) two-sided incentive constraints (workers and managers can both shirk), and (ii) agreement formation pinned down by the short side of the incentive-compatible pools, delivers an interior benchmark for rent sharing that maximizes matches. Firm-level investor protection then loads onto the political margin by changing the manager-side residual claim and thus the manager pool that remains incentive compatible for a given η. This is what allows investor protection to absorb manager-favoring political shifts when managers are pure agents, and what makes the political distortions one-sided in the baseline. With managerial ownership, this absorption is weakened because investor protection is no longer a pure transfer away from managers, restoring managers' net political gains from lowering η and reintroducing a manager-favoring distortion region.

Several parametric assumptions merely simplify the exposition. The uniform distributions for b_m and b_w deliver closed-form expressions for incentive-compatible masses and transparent region characterizations; alternative continuous distributions preserve the logic under standard regularity conditions as long as the incentive-compatible sets vary smoothly with residual claims. The timing assumption that b_m and b_w are realized after the announcement of η and γ simplifies the political analysis; moving type realizations earlier changes the information structure but not the key force that extreme platforms

contract the short side. Probabilistic voting is used as a convenient reduced form to obtain a disciplined mapping from expected payoffs into platforms and a one-dimensional measure of relative political power X. Finally, preventing outside capital from voting in the baseline abstracts from a direct electoral role for outside investors to isolate the role of investor protection; Section 5 captures the most salient ownership-related electoral effect through managerial stakes.

A measurement map follows directly from the model. The key political object is worker rent extraction, η, which can be proxied by policy-driven labor-regulation measures and discrete labor-institution shifts (e.g., reforms affecting union power, dismissal protections, minimum-wage rules, or paid-leave mandates) as in cross-country labor-institution indices and related reform episodes (Botero et al., 2004). The corporate object is investor protection, γ, which can be proxied by firm-level governance and investor-protection measures that capture the security of outside cash-flow claims (Gompers et al., 2003; Bebchuk et al., 2009). Real outcomes corresponding to agreement formation and feasibility include employment/hiring (or separation) margins, investment/output, and market-based valuations (Besley and Burgess, 2004; Gompers et al., 2003). The ownership object is managerial ownership, σ, which can be measured using standard executive ownership data.

The central prediction is an asymmetric pass-through from electoral politics into real outcomes once investor protection responds endogenously. When politics shifts in a manager-favoring direction, boards can tighten investor protection in a way that limits the pass-through into match feasibility and firm value; when politics shifts in a worker-favoring direction, investor protection cannot offset higher worker rents without further tightening managerial incentives and contracting the viable manager pool, so the real effects are larger. This points to designs that exploit plausibly exogenous political shifts or discrete labor-institution reforms to generate variation in η, and then test whether

(i) worker-favoring shifts are associated with larger contractions in real activity and firm value than manager-favoring shifts of comparable magnitude, and (ii) this asymmetry is attenuated in firms with higher managerial ownership.

The model also speaks to welfare implications of democracy. Classic political-economy models emphasize that majority voting can generate redistribution financed by distortionary taxation (Meltzer and Richard, 1981; Alesina and Rodrik, 1994) and that political incentives can sustain inefficient policy choices (Acemoglu and Robinson, 2001). A contrasting view stresses that electoral competition can deliver efficient outcomes under plausible conditions (Wittman, 1989). In our setting, two-sided incentive constraints pin down a sharp interior benchmark for rent sharing that maximizes match feasibility. Electoral competition selects this benchmark over a wide region; when it does not, democratic "failure" takes a tractable form (namely, foregone matches relative to the benchmark) because platforms that push rent sharing too far in either direction tighten the opposite side's incentive constraint and contract the short side that determines output.

7 Conclusion

Double-sided moral hazard disciplines electoral conflict over rent sharing by creating a constrained-efficient anchor at which incentive-compatible managers and workers are equal in mass. Without investor protection, electoral competition can distort policy on either side of this anchor: politically strong workers push toward higher worker rents, while politically weak workers allow manager-favoring policies below the anchor.

Endogenous investor protection breaks this symmetry. When policy tilts downward, firm-level investor protection absorbs the distributive margin and removes managers' incentive to politically seek further reductions in worker rents, thus eliminating the manager-favoring distortion region; when policy tilts upward, investor protection can-

not neutralize higher worker rents without further tightening managerial incentives and contracting match feasibility, so worker-favoring distortions remain and expand.

The political discipline of managers via endogenous investor protection boosts production because it alleviates manager-favoring political distortions; but investor protection also harms production by tightening managers' incentive constraints. With managerial ownership, the manager-favoring region re-emerges and converges back to the no-protection benchmark as it approaches the limit of full managerial ownership.

Appendix

Proof of Proposition 1

We first characterize the behavior of the vote share of politicians for values of η_A and η_B so that $0 < \eta_A < \eta_B < \eta^E_{\gamma=0}$, where $\eta^E_{\gamma=0} = \mu$ according to (18). In these cases we know from (3) and (4) that $\iota_w < \iota_m$, which also means that $p_m = \frac{\iota_w}{\mu}$ and $p_w = \frac{\iota_w}{1-\mu}$ according to (5) and (6). Substituting for (3)–(6) into (10), (12), (15) and (16), we obtain that a manager votes for candidate A if and only if $\frac{1-\mu}{\mu}\eta_A(1-\eta_A) > \frac{1-\mu}{\mu}\eta_B(1-\eta_B) + \beta_m$, whereas a worker votes for candidate A if and only if $\eta_A^2 > \eta_B^2 + \beta_w$. This means that a manager votes for candidate A with probability $0.5 + \chi_m \frac{1-\mu}{\mu}\left(\eta_A(1-\eta_A) - \eta_B(1-\eta_B)\right)$, whereas a worker votes for candidate A with probability $0.5 + \chi_w\left(\eta_A^2 - \eta_B^2\right)$. Thus, we obtain that the vote share of candidate A for given η_A and η_B so that $0 < \eta_A < \eta_B < \mu$ reads

$$v_A = 0.5 + \chi_w(1-\mu)\left(\eta_A^2 - \eta_B^2\right) + \chi_m(1-\mu)\left(\eta_A(1-\eta_A) - \eta_B(1-\eta_B)\right). \tag{42}$$

We further obtain that

$$\frac{\partial v_A}{\partial \eta_A} = (1-\mu)\left(\chi_m - \eta_A 2(\chi_m - \chi_w)\right) \tag{43}$$

$$\frac{\partial^2 v_A}{\partial \eta_A^2} = -2(1-\mu)\left(\chi_m - \chi_w\right) \tag{44}$$

for given η_A and η_B so that $0 < \eta_A < \eta_B < \mu$.

We then characterize the behavior of the vote share of politicians for values of η_A and η_B so that $\mu < \eta_A < \eta_B < 1$. In these cases we know from (3) and (4) that $\iota_w > \iota_m$, which also means that $p_m = \frac{\iota_m}{\mu}$ and $p_w = \frac{\iota_m}{1-\mu}$ according to (5) and (6). Substituting for (3)–(6) into (10), (12), (15) and (16), we obtain that a manager votes for candidate A if and only if $(1-\eta_A)^2 > (1-\eta_B)^2 + \beta_m$, whereas a worker votes for candidate A if and only if $\frac{\mu}{1-\mu}\eta_A(1-\eta_A) > \frac{\mu}{1-\mu}\eta_B(1-\eta_B) + \beta_w$. This means that a manager votes for candidate A with probability $0.5 + \chi_m\left((1-\eta_A)^2 - (1-\eta_B)^2\right)$, whereas a worker votes for candidate A with probability $0.5 + \chi_w \frac{\mu}{1-\mu}\left(\eta_A(1-\eta_A) - \eta_B(1-\eta_B)\right)$. Thus, we obtain that the vote share of candidate A for given η_A and η_B so that $\mu < \eta_A < \eta_B < 1$ reads

$$v_A = 0.5 + \chi_w \mu\left(\eta_A(1-\eta_A) - \eta_B(1-\eta_B)\right) + \chi_m \mu\left((1-\eta_A)^2 - (1-\eta_B)^2\right). \tag{45}$$

We further obtain that

$$\frac{\partial v_A}{\partial \eta_A} = \mu\left((\chi_w - 2\chi_m) - \eta_A 2(\chi_w - \chi_m)\right) \tag{46}$$

$$\frac{\partial^2 v_A}{\partial \eta_A^2} = -2\mu\left(\chi_w - \chi_m\right) \tag{47}$$

for given η_A and η_B so that $\mu < \eta_A < \eta_B < 1$.

Consider now cases where $\chi_m < \chi_w$. We know from (43) and (44) that v_A is strictly convex and strictly increasing for every $0 < \eta_A < \eta_B < \mu$. We also know from (46) and (47) that v_A is strictly concave for every $\mu < \eta_A < \eta_B < 1$ with a peak at $\eta = \frac{\chi_w - 2\chi_m}{2(\chi_w - \chi_m)}$

whenever this value exceeds μ (and otherwise at $\eta = \mu$). Therefore, and since both candidates face a symmetric problem, we obtain that $\eta^*_{\gamma=0} = \max\left\{\mu, \frac{\chi_w - 2\chi_m}{2(\chi_w - \chi_m)}\right\}$.

Consider finally cases where $\chi_m > \chi_w$. We know from (46) and (47) that v_A is strictly convex for every $\mu < \eta_A < \eta_B < 1$. Therefore, candidates (who face a symmetrical problem) maximize their vote share either at $\eta = \mu$ or at $\eta = 1$ as long as $\mu \leq \eta_A \leq \eta_B \leq 1$. Say that $\eta_A = \mu$ and $\eta_B = 1$. Then (45) implies that if candidate B chooses $\eta_B = 1$, a deviation by A to $\eta_A = \mu$ yields $v_A = 0.5 + \mu(1-\mu)(\chi_w\mu + \chi_m(1-\mu)) > 0.5$. Hence, $\eta = 1$ cannot be optimal (it loses to $\eta = \mu$), so candidates never choose $\eta = 1$ in this region. Hence, and because we know from (43) and (44) that v_a is strictly concave with a peak at $\eta_A = \min\left\{\mu, \frac{\chi_m}{2(\chi_m - \chi_w)}\right\}$ for every $0 < \eta_A < \eta_B < \mu$, we obtain that $\eta^*_{\gamma=0} = \min\left\{\mu, \frac{\chi_m}{2(\chi_m - \chi_w)}\right\}$ for $\chi_m > \chi_w$. □

Proof of Proposition 2

We solve backward. We thus begin by solving the problem of a firm's board. Fix $\eta \in [0,1]$ and consider the board's objective $\gamma \cdot p_m(\eta, \gamma)$ over $\gamma \in [0, 1-\eta]$. We consider first cases where $\gamma < \frac{\mu - \eta}{\mu}$. In these cases, $\iota_m > \iota_w$ and, by (5), $p_m = \frac{\iota_w}{\mu} = \frac{\eta(1-\mu)}{\mu}$. Hence owners' expected payoff equals $\gamma\frac{\eta(1-\mu)}{\mu}$, which is strictly increasing in γ. Therefore, the board raises γ throughout this region. We consider then cases where $\gamma \geq \frac{\mu - \eta}{\mu}$. In these cases, $\iota_m \leq \iota_w$ and, by (5), $p_m = \frac{\iota_m}{\mu} = 1 - \eta - \gamma$. Hence owners' expected payoff equals $\gamma(1-\eta-\gamma)$, which is strictly concave with unconstrained maximizer $\gamma = \frac{1-\eta}{2}$. Accounting for the lower bound $\gamma \geq \frac{\mu - \eta}{\mu}$, we obtain $\gamma^*(\eta) = \max\left\{\frac{\mu - \eta}{\mu}, \frac{1-\eta}{2}\right\}$. This establishes (24).

We next characterize the constrained-efficient policy. Under $\gamma^*(\eta)$, aggregate production is $Y(\eta, \gamma^*(\eta)) = \min\{\iota_m(\eta, \gamma^*(\eta)), \iota_w(\eta, \gamma^*(\eta))\}$. If $\eta \leq \frac{\mu}{2-\mu}$, then $\gamma^*(\eta) = \frac{\mu - \eta}{\mu}$ and $\iota_m = \iota_w = \eta(1-\mu)$, so $Y(\eta, \gamma^*(\eta)) = \eta(1-\mu)$, which is increasing in η. If $\eta > \frac{\mu}{2-\mu}$, then $\gamma^*(\eta) = \frac{1-\eta}{2}$ and $\iota_m = \mu\frac{1-\eta}{2} < \iota_w = \eta(1-\mu)$, so $Y(\eta, \gamma^*(\eta)) = \mu\frac{1-\eta}{2}$, which is decreasing in η. Therefore, $Y(\eta, \gamma^*(\eta))$ is maximized at the cutoff, so $\eta^E = \frac{\mu}{2-\mu}$.

We now turn to the political game. We characterize the vote share of candidate A as a function of (η_A, η_B). We first characterize the behavior of the vote share for values of η_A and η_B such that $0 < \eta_A < \eta_B < \frac{\mu}{2-\mu}$. In these cases, by (3), (4) and (24), we have $\iota_w = \iota_m = \eta(1-\mu)$, and thus $p_m = \eta\frac{1-\mu}{\mu}$ and $p_w = \eta$ by (5) and (6). Substituting into (10)–(13), a manager votes for A if and only if $\left(\frac{1-\mu}{\mu}\right)^2 \eta_A^2 > \left(\frac{1-\mu}{\mu}\right)^2 \eta_B^2 + \beta_m$, and a worker votes for A if and only if $\eta_A^2 > \eta_B^2 + \beta_w$. Hence a manager votes for A with probability $0.5 + \chi_m \left(\frac{1-\mu}{\mu}\right)^2 (\eta_A^2 - \eta_B^2)$, and a worker votes for A with probability $0.5 + \chi_w(\eta_A^2 - \eta_B^2)$. Thus, for $0 < \eta_A < \eta_B < \frac{\mu}{2-\mu}$,

$$v_A = 0.5 + \chi_m \mu \left(\frac{1-\mu}{\mu}\right)^2 (\eta_A^2 - \eta_B^2) + \chi_w(1-\mu)(\eta_A^2 - \eta_B^2), \tag{48}$$

which is strictly increasing in η_A.

We then characterize the vote share for values of η_A and η_B such that $\frac{\mu}{2-\mu} < \eta_A < \eta_B < 1$. In these cases, by (3), (4) and (24), we have $\iota_w = \eta(1-\mu) > \iota_m = \mu\frac{1-\eta}{2}$, and thus $p_m = \frac{1-\eta}{2}$ and $p_w = \frac{\mu(1-\eta)}{2(1-\mu)}$. Substituting into (10)–(13), a manager votes for A if and only if $\left(\frac{1-\eta_A}{2}\right)^2 > \left(\frac{1-\eta_B}{2}\right)^2 + \beta_m$, and a worker votes for A if and only if $\frac{\mu}{2(1-\mu)}\eta_A(1-\eta_A) > \frac{\mu}{2(1-\mu)}\eta_B(1-\eta_B) + \beta_w$. Therefore, for $\frac{\mu}{2-\mu} < \eta_A < \eta_B < 1$,

$$v_A = 0.5 + \chi_m \frac{\mu}{4}\big((1-\eta_A)^2 - (1-\eta_B)^2\big) + \chi_w \frac{\mu}{2}\big(\eta_A(1-\eta_A) - \eta_B(1-\eta_B)\big). \tag{49}$$

Moreover,

$$\frac{\partial v_A}{\partial \eta_A} = \frac{\mu}{2}\Big(\chi_w - \chi_m - \eta_A(2\chi_w - \chi_m)\Big), \tag{50}$$

$$\frac{\partial^2 v_A}{\partial \eta_A^2} = -\frac{\mu}{2}(2\chi_w - \chi_m). \tag{51}$$

Consider first cases where $2\chi_w > \chi_m$. Then (48) implies v_A is strictly increasing in η_A on $(0, \frac{\mu}{2-\mu})$, and (51) implies v_A is strictly concave in η_A on $(\frac{\mu}{2-\mu}, 1)$ with unique

peak at $\eta_A = \frac{\chi_w - \chi_m}{2\chi_w - \chi_m}$. Therefore, candidate A's best response (given η_B) is to choose $\eta_A = \max\left\{\frac{\mu}{2-\mu}, \frac{\chi_w - \chi_m}{2\chi_w - \chi_m}\right\}$, and by symmetry the same holds for candidate B. Hence the symmetric equilibrium policy is $\eta^* = \max\left\{\frac{\mu}{2-\mu}, \frac{\chi_w - \chi_m}{2\chi_w - \chi_m}\right\}$.

Consider finally cases where $\chi_m \geq 2\chi_w$. Then (51) implies v_A is weakly convex on $(\frac{\mu}{2-\mu}, 1)$, so the maximum over $[\frac{\mu}{2-\mu}, 1]$ is attained at an endpoint. Evaluating (49) at $(\eta_A, \eta_B) = (\frac{\mu}{2-\mu}, 1)$ yields

$$v_A = \frac{1}{2} + \chi_m \frac{\mu(1-\mu)^2}{(2-\mu)^2} + \chi_w \frac{\mu^2(1-\mu)}{(2-\mu)^2} > \frac{1}{2},$$

so choosing $\eta = \frac{\mu}{2-\mu}$ strictly dominates choosing $\eta = 1$ against $\eta_B = 1$. Since (48) is strictly increasing in η_A on $(0, \frac{\mu}{2-\mu})$, it follows that the (unique) symmetric equilibrium is $\eta^* = \frac{\mu}{2-\mu} = \eta^E$ for all $2\chi_w \leq \chi_m$. □

Proof of Proposition 3

We know from Proposition 1 that $\eta^*_{\gamma=0} > \eta^E_{\gamma=0}$ if and only if $\mu < 1/2$ and $X > \overline{X}_{\gamma=0}(\mu)$, whereas $\eta^*_{\gamma=0} < \eta^E_{\gamma=0}$ if and only if $\mu > 1/2$ and $X < \underline{X}_{\gamma=0}(\mu)$. We also know from Proposition 2 that $\eta^* > \eta^E$ if and only if $\mu < 2/3$ and $X > \overline{X}_{\gamma^*}(\mu)$, whereas $\eta^* \geq \eta^E$ for all (μ, X).

We first prove $\varnothing \neq \overline{\mathcal{D}}_{\gamma=0} \subsetneq \overline{\mathcal{D}}_{\gamma^*}$. For $\mu \in (0, 1/2)$, $\overline{X}_{\gamma=0}(\mu) = \frac{2(1-\mu)}{1-2\mu}$ and $\overline{X}_{\gamma^*}(\mu) = \frac{2(1-\mu)}{2-3\mu}$, and hence $\overline{X}_{\gamma^*}(\mu) < \overline{X}_{\gamma=0}(\mu)$. Therefore, whenever $(\mu, X) \in \overline{\mathcal{D}}_{\gamma=0}$, we have $X > \overline{X}_{\gamma=0}(\mu)$, and thus also $X > \overline{X}_{\gamma^*}(\mu)$, implying $(\mu, X) \in \overline{\mathcal{D}}_{\gamma^*}$. This establishes $\overline{\mathcal{D}}_{\gamma=0} \subseteq \overline{\mathcal{D}}_{\gamma^*}$. Strictness follows because for any fixed $\mu \in (0, 1/2)$ one can choose X such that $\overline{X}_{\gamma^*}(\mu) < X < \overline{X}_{\gamma=0}(\mu)$, in which case $(\mu, X) \in \overline{\mathcal{D}}_{\gamma^*}$ but $(\mu, X) \notin \overline{\mathcal{D}}_{\gamma=0}$. Finally, $\overline{\mathcal{D}}_{\gamma=0} \neq \varnothing$ because for any $\mu \in (0, 1/2)$ and any $X > \overline{X}_{\gamma=0}(\mu)$ we have $\eta^*_{\gamma=0} > \eta^E_{\gamma=0}$.

We next prove $\underline{\mathcal{D}}_{\gamma^*} = \varnothing \neq \underline{\mathcal{D}}_{\gamma=0}$. Under endogenous owner protection, Proposition 2 implies $\eta^* = \eta^E$ when $X \leq \overline{X}_{\gamma^*}(\mu)$ and $\eta^* > \eta^E$ when $X > \overline{X}_{\gamma^*}(\mu)$ (for $\mu < 2/3$), and

$\eta^* = \eta^E$ for all X when $\mu \geq 2/3$. Hence $\eta^* \geq \eta^E$ for all (μ, X), so $\underline{\mathcal{D}}_{\gamma^*} = \varnothing$. In contrast, in the economy without owner protection, for any $\mu \in (1/2, 1)$ and any $X < \underline{X}_{\gamma=0}(\mu) = \frac{2\mu-1}{2\mu}$ we have $\eta^*_{\gamma=0} < \eta^E_{\gamma=0}$ (Proposition 1), and thus $\underline{\mathcal{D}}_{\gamma=0} \neq \varnothing$. □

Proof of Proposition 4

From (7) and Proposition 1, we obtain that $Y(\eta^*_{\gamma=0}, 0) = \mu(1-\mu)$ when $\eta^*_{\gamma=0} = \mu$, $Y(\eta^*_{\gamma=0}, 0) = \mu X/(2(X-1))$ when $\mu < 1/2$ and $X > \overline{X}_{\gamma=0}(\mu)$, and $Y(\eta^*_{\gamma=0}, 0) = (1-\mu)/(2(1-X))$ when $\mu > 1/2$ and $X < \underline{X}_{\gamma=0}(\mu)$. From (7) and Proposition 2, we obtain that $Y(\eta^*, \gamma^*(\eta^*)) = \mu(1-\mu)/(2-\mu)$ whenever either $\mu \geq 2/3$ or $\mu < 2/3$ and $X \leq \overline{X}_{\gamma^*}(\mu)$, and $Y(\eta^*, \gamma^*(\eta^*)) = \mu X/(2(2X-1))$ whenever $\mu < 2/3$ and $X > \overline{X}_{\gamma^*}(\mu)$.

We first show that $Y(\eta^*, \gamma^*(\eta^*)) - Y(\eta^*_{\gamma=0}, 0) \leq 0$ outside the manager-favoring distortion region of the no-protection economy. If $\eta^*_{\gamma=0} = \mu$, then $Y(\eta^*_{\gamma=0}, 0) = \mu(1-\mu)$ while $Y(\eta^*, \gamma^*(\eta^*)) \leq \mu(1-\mu)/(2-\mu) < \mu(1-\mu)$, so $Y(\eta^*, \gamma^*(\eta^*)) - Y(\eta^*_{\gamma=0}, 0) < 0$. If $\mu < 1/2$ and $X > \overline{X}_{\gamma=0}(\mu)$, then $Y(\eta^*_{\gamma=0}, 0) = \mu X/(2(X-1))$ and $Y(\eta^*, \gamma^*(\eta^*)) = \mu X/(2(2X-1))$, so $Y(\eta^*, \gamma^*(\eta^*)) - Y(\eta^*_{\gamma=0}, 0) < 0$ since $2X - 1 > X - 1$ for $X > 1$.

We therefore focus on the manager-favoring distortion region without owner protection, i.e., $\mu > 1/2$ and $X < \underline{X}_{\gamma=0}(\mu)$, where $Y(\eta^*_{\gamma=0}, 0) = (1-\mu)/(2(1-X))$ and $X < 1$. In this region, Proposition 2 implies $\eta^* = \eta^E$ and thus $Y(\eta^*, \gamma^*(\eta^*)) = \mu(1-\mu)/(2-\mu)$. Hence,

$$Y(\eta^*, \gamma^*(\eta^*)) - Y(\eta^*_{\gamma=0}, 0) > 0 \iff \frac{\mu(1-\mu)}{2-\mu} > \frac{1-\mu}{2(1-X)} \iff X < \frac{3\mu-2}{2\mu}. \tag{52}$$

If $\mu \leq 2/3$, then $(3\mu-2)/(2\mu) \leq 0$, so $Y(\eta^*, \gamma^*(\eta^*)) - Y(\eta^*_{\gamma=0}, 0) \leq 0$ for all $X > 0$. If $\mu > 2/3$, then $(3\mu-2)/(2\mu) > 0$, and $Y(\eta^*, \gamma^*(\eta^*)) - Y(\eta^*_{\gamma=0}, 0) > 0$ holds if and only if $X < (3\mu-2)/(2\mu)$. □

Proof of Proposition 5

We split the proof in two parts. We characterize the equilibrium for $\sigma \leq 0.5$ in the first part, and then for $\sigma > 0.5$ in the second part.

Part A: $\sigma \leq 0.5$

We characterize the behavior of the vote share for values of η_A and η_B such that $0 < \eta_A < \eta_B < \frac{\mu\sigma}{1-\mu(1-\sigma)}$. In these cases, by (4), (35) and (36), we have $\iota_w = \eta(1-\mu) < \iota_m = (1-\eta)\sigma\mu$, and thus $p_m = \eta\frac{1-\mu}{\mu}$ and $p_w = \eta$ by (5) and (6). Substituting into (10), (12), (13) and (39), we obtain that a manager votes for A if and only if $\frac{1-\mu}{\mu}\sigma\eta_A(1-\eta_A) > \frac{1-\mu}{\mu}\sigma\eta_B(1-\eta_B) + \beta_m$, and a worker votes for A if and only if $\eta_A^2 > \eta_B^2 + \beta_w$. Hence a manager votes for A with probability $0.5 + \chi_m\frac{1-\mu}{\mu}\sigma(\eta_A(1-\eta_A) - \eta_B(1-\eta_B))$, and a worker votes for A with probability $0.5 + \chi_w(\eta_A^2 - \eta_B^2)$. Thus, for $0 < \eta_A < \eta_B < \frac{\mu\sigma}{1-\mu(1-\sigma)}$,

$$\begin{aligned} v_A = 0.5 &+ \chi_m(1-\mu)\sigma(\eta_A(1-\eta_A) - \eta_B(1-\eta_B)) \\ &+ \chi_w(1-\mu)(\eta_A^2 - \eta_B^2). \end{aligned} \tag{53}$$

Moreover,

$$\frac{\partial v_A}{\partial \eta_A} = (1-\mu)\left(\sigma\chi_m - \eta_A 2(\sigma\chi_m - \chi_w)\right), \tag{54}$$

$$\frac{\partial^2 v_A}{\partial \eta_A^2} = -(1-\mu)2(\sigma\chi_m - \chi_w). \tag{55}$$

The vote share of candidate A for $\frac{\mu\sigma}{1-\mu(1-\sigma)} < \eta_A < \eta_B < \frac{\mu}{2-\mu}$ is given by (48), and for $\frac{\mu}{2-\mu} < \eta_A < \eta_B$ is given by (49). Accounting for the behavior of (48) and (49), as described in the proof of Proposition 2, and taking (53)–(55), we know that the only candidate solution that deviates from the solution of Proposition 2 is $\eta_\sigma^* = \frac{\sigma\chi_m}{2(\sigma\chi_m - \chi_w)}$ for $X < \sigma$. This is an equilibrium if and only if $v_A > 0.5$ when $\eta_A = \frac{\sigma\chi_m}{2(\sigma\chi_m - \chi_w)}$ and $\eta_B = \frac{\mu}{2-\mu}$.

Namely, if and only if

$$v_A = 0.5 + (1-\mu)\frac{\sigma^2\chi_m^2}{4(\sigma\chi_m - \chi_w)} - \mu\chi_m\frac{(1-\mu)^2}{(2-\mu)^2} - (1-\mu)\chi_w\frac{\mu^2}{(2-\mu)^2}. \tag{56}$$

Therefore, for $X < \min\{\sigma,\ \underline{X}_\sigma\}$, where

$$\underline{X}_\sigma(\mu) \equiv \frac{\mu(1+\sigma) - 1 - \sqrt{(1-\mu)(1-2\sigma)(1+2\sigma-\mu)}}{2\mu}, \tag{57}$$

candidates choose $\eta_\sigma^* < \eta_\sigma^E$. Since $X > 0$, a necessary condition for a non-empty downward-deviation region is $\underline{X}_\sigma(\mu) > 0$ in (57). If $\mu \le \frac{2}{3}$ and $\sigma \le \frac{1}{2}$, then $\mu(1+\sigma) \le \frac{2}{3}\cdot\frac{3}{2} = 1$, and thus $\mu(1+\sigma)-1 \le 0$. Because the square-root term in (57) is non-negative, it follows that $\underline{X}_\sigma(\mu) \le 0$. Hence the condition $X < \min\{\sigma, \underline{X}_\sigma(\mu)\}$ cannot hold for any $X > 0$, and therefore $\underline{\mathcal{D}}_\sigma = \varnothing$ for all $\sigma \le \frac{1}{2}$ when $\mu \le \frac{2}{3}$.

Consider now $\mu > \frac{2}{3}$. Then $\underline{X}_0(\mu) = \frac{\mu-1}{\mu} < 0$, while $\underline{X}_{1/2}(\mu) = \frac{3\mu-2}{4\mu} > 0$. By continuity of $\underline{X}_\sigma(\mu)$ in σ on $[0, \frac{1}{2}]$, there exists $\bar{\sigma}(\mu) \in (0, \frac{1}{2})$ such that $\underline{X}_{\bar{\sigma}(\mu)}(\mu) = 0$. Solving $\underline{X}_\sigma(\mu) = 0$ yields the unique solution

$$\bar{\sigma}(\mu) = \frac{4\mu(1-\mu)}{(2-\mu)^2}. \tag{58}$$

Therefore, for $\mu > \frac{2}{3}$, the downward-deviation region is empty for $\sigma \le \bar{\sigma}(\mu)$ and becomes non-empty for $\sigma > \bar{\sigma}(\mu)$, in which case candidates choose $\eta_\sigma^* < \eta^E$ if and only if $X < \min\{\sigma, \underline{X}_\sigma(\mu)\}$. Since $\bar{\sigma}(\mu) = \frac{4\mu(1-\mu)}{(2-\mu)^2} \to 0$ as $\mu \to 1$, there exists $\mu \in (\frac{2}{3}, 1)$ such that $\sigma > \bar{\sigma}(\mu)$. For this μ, we have $\underline{X}_\sigma(\mu) > 0$, and thus there is $X \in (0, \min\{\sigma, \underline{X}_\sigma(\mu)\})$. Then $X < \min\{\sigma, \underline{X}_\sigma(\mu)\}$, which implies $\eta_\sigma^* < \eta_\sigma^E$, i.e., $(\mu, X) \in \underline{\mathcal{D}}_\sigma$. Therefore, $\underline{\mathcal{D}}_\sigma \neq \varnothing$ for all $\sigma \in (0, \frac{1}{2}]$.

Following the same reasoning as in the proof of Proposition 2, we obtain that for $\sigma \le 0.5$, candidates choose $\eta_\sigma^* > \eta^E$ for every $X > \overline{X}_\sigma(\mu)$ and $\mu < 2/3$, where $\overline{X}_\sigma(\mu) =$

$\overline{X}_{\gamma^*}(\mu)$ as defined by (25).

Part B: $\sigma > 0.5$

For $\sigma > 1/2$, the board's best response satisfies $\gamma^*_\sigma(\eta) = 1-\eta$ for all $\eta \in [0,1]$. Accordingly, the constrained-efficient policy reads

$$\eta^E_\sigma = \frac{\mu\sigma}{1-\mu+\mu\sigma}. \tag{59}$$

Define the threshold

$$\tilde{\mu}(\sigma) \equiv \frac{1}{1+\sigma}, \tag{60}$$

and the political-power thresholds

$$\overline{X}_\sigma(\mu) \equiv \frac{2\sigma(1-\mu)}{1-\mu(1+\sigma)} \qquad \forall \mu \in (0, \tilde{\mu}(\sigma)), \tag{61}$$

$$\underline{X}_\sigma(\mu) \equiv \frac{\mu(1+\sigma)-1}{2\mu} \qquad \forall \mu \in (\tilde{\mu}(\sigma), 1). \tag{62}$$

Then, in the equilibrium, candidates set policy as follows: If $\mu < \tilde{\mu}(\sigma)$, then

$$\eta^*_\sigma = \begin{cases} \eta^E_\sigma & \text{for } X \leq \overline{X}_\sigma(\mu) \\ \frac{X-2\sigma}{2(X-\sigma)} & \text{for } \overline{X}_\sigma(\mu) < X. \end{cases} \tag{63}$$

If $\mu > \tilde{\mu}(\sigma)$, then

$$\eta^*_\sigma = \begin{cases} \frac{\sigma}{2(\sigma-X)} & \text{for } X \leq \underline{X}_\sigma(\mu) \\ \eta^E_\sigma & \text{for } \underline{X}_\sigma(\mu) < X. \end{cases} \tag{64}$$

If $\mu = \tilde{\mu}(\sigma)$, then $\eta^*_\sigma = \eta^E_\sigma = \frac{1}{2}$ for all $X \in (0, +\infty)$.

The argument is completed by following the reasoning of the proof of Proposition 3, and accounting especially for the behavior of $\overline{X}_\sigma$ and $\underline{X}_\sigma$ with respect to σ. □

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