Ownership and Competition*

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Abstract

We model the tradeoffs of an investor who builds positions and exerts governance in competing firms. The investor's governance in a given firm *reflects* and *affects* her stakes in its product market rivals: she anticipates how a certain exposure to competing firms would influence her governance and incorporates that information when choosing her portfolio. This two-way interaction creates an incentive for the investor to hold undiversified portfolios, tilted toward the firms where she exerts more governance, and can be such that poor governance persists even in more competitive sectors, and shocks to competition in product markets carry over to ownership markets, and vice versa.

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1 Introduction

Large shareholders play an important role in corporate governance since, in virtue of their stakes, they have significant incentives to monitor and (where possible) improve firm performance. In recent years, however, their governance role has come under scrutiny: due to a broader rise in diversified investment strategies, most large institutional investors have become increasingly invested in groups of competing firms (Backus, Conlon, and Sinkinson 2021). This has stimulated a large literature studying whether large investors influence competition and other important corporate decisions (e.g., He and Huang 2017; Azar, Schmalz, and Tecu 2018; Dennis, Gerardi, and Schenone 2022; Lewellen and Lewellen 2022; Antón, Ederer, Giné, and Schmalz 2023) and may have contributed to the sharp rise in market power and concentration in the last four decades (Covarrubias, Gutiérrez, and Philippon 2020; De Loecker, Eeckhout, and Unger 2020).[1]

To make progress on this question, we model the tradeoffs faced by an investor who builds positions and exerts governance in competing firms. The existing literature has studied how holding large stakes in competing firms may impact governance and competition (e.g., Rubinstein and Yaari 1983; Rotemberg 1984; López and Vives 2019; Azar and Vives 2021; Ederer and Pellegrino 2022), but how this feeds back into an investor's incentives to acquire such stakes in the first place is less understood. We are particularly interested in understanding how these tradeoffs shape the equilibrium interactions of ownership, governance, and competition, and how to think about competition policy in a world where investors influence the objectives of competing firms.

We extend the traditional models of ownership and governance decisions (e.g., Admati, Pfleiderer, and Zechner 1994; DeMarzo and Urošević 2006) to a setting with competing firms. A large investor (L) acquires positions in competing firms and exerts governance to influence how they are managed. We consider two different types of governance actions. First, a more traditional one, where L reduces managerial slack and improves firm efficiency (e.g., by cutting production costs). Second, one where L tries to soften competition among firms (e.g., by pushing them to set higher

[1] As of today, the US Federal Trade Commission (FTC), the US Department of Justice (DOJ), the OECD, and the European Commission have conducted hearings about the potential anti-competitive effects of horizontal shareholding (Azar and Schmalz 2017).

prices or stay out of certain markets).[2] The second type of governance is socially *undesirable*, since it leads to higher markups on products, reducing product market surplus and welfare.

Engaging in either type of governance entails private costs (e.g., the time spent gathering information on how to reduce production costs and monitoring management, or the legal and reputational risk of influencing competition), and small shareholders *free-ride* on these efforts. Finally, the large investor cannot credibly commit to a particular level or type of governance, so her governance and portfolio decisions must be incentive-compatible with each other in equilibrium.

The central insight of the model is that investors' governance in a given firm *reflects* and *affects* their stakes in the firm's product market rivals: investors anticipate how a certain exposure to competing firms would influence their governance, and incorporate that information when choosing their portfolios. This two-way interaction between the ownership and governance of competing firms generates a number of interesting effects. Perhaps most notably, it creates an incentive for investors to hold undiversified portfolios, tilted toward the firms where they exert more governance, and can be such that poor governance persists even in more competitive sectors, and shocks to competition in product markets carry over to ownership markets, and vice versa.

The first step in understanding our results is to describe the types of portfolio and governance actions that are incentive-compatible and can arise in equilibrium. Abstracting from the governance cost and consistent with traditional investment theory, a balanced, diversified portfolio gives L the highest risk-adjusted returns. However, such a portfolio also aligns the investor's payoff with the industry profits, creating an incentive for L to do governance in many firms. This may mean cutting slack and reducing costs in multiple firms, but possibly also pushing them to compete less aggressively. Either way, engaging in many firms implies large governance costs for the investor.

An alternative to the strategy described above is to build a portfolio that induces governance in fewer firms, to save on the governance costs. For example, suppose L knows how to implement changes that would reduce firms' production costs. This type of governance generates *negative*

[2] Shekita (2022) provides a collection of examples of the second type of governance. Specific instances include large institutional investors, like SoftBank and BlackRock, pushing for consolidation among commonly-owned firms in the food delivery, pharmaceutical, and banking industries. In a survey of institutional investors, McCahery, Sautner, and Starks (2016) found that 63% of respondents had engaged in discussions with top management over the previous five years, which is a possible channel for either type of governance. BlackRock's Investment Stewardship Annual Report reports that in 2020, the company "had over 3,000 in-depth conversations with corporate leadership." Similar figures apply to the other two "Big Three," Vanguard and State Street.

spillovers across firms: a firm with lower costs may try to gain more market share or push its rivals to set lower prices. If L's portfolio is sufficiently *tilted* toward a given firm, say j, she cares little about not hurting the other firms, so is willing to cut j's costs. By contrast, she cares a lot about helping j maintain its competitive edge, so she prefers to keep its competitors' costs high.

The ability to control her exposure to the governance spillovers, and use it to reach a better balance between portfolio returns and governance costs, may then push L to hold an undiversified portfolio, tilted toward the firms where she exerts more governance. This suggests that, when selecting portfolios of competing firms, large investors may use under-diversification as a commitment to exert less governance and/or escape the temptation to influence competition.[3]

Our model is sufficiently general to capture several important features of the economic environment, including the *ex-ante* degree of product market competition, the concentration of assets under management, and the relative availability of different governance actions. The second step of our analysis is to explore how the investor's preferred strategy interacts with these features.

We begin by showing that rising markups in product markets and ownership concentration in asset markets may reinforce each other in a feedback loop. Through this loop, exogenous shocks to competition in one market carry over to the other, amplifying their effects in the process.

To build intuition, suppose the number N of firms in an industry declines, due to some *exogenous* reason pushing the least productive ones out of the market (similar to the "winner takes most" dynamics in Autor, Dorn, Katz, Patterson, and Van Reenen 2020). All else equal, the reduction in N implies a more concentrated industry, featuring less competition and higher markups. This has two contrasting effects on L's governance-returns tradeoff. On the one hand, softening competition becomes less tempting, since firms compete less to begin with. On the other hand, it also becomes cheaper, as there are now fewer firms to coordinate. If the latter effect dominates, L is more likely to build a large, diversified portfolio and influence competition when N decreases. Her *endogenous* response to the increase in markups then leads to an increase in ownership concentration (in the hands of L), and a further weakening of competition in the product market.

[3] A large literature in finance investigates why observed portfolios often display surprisingly low levels of diversification, seemingly inconsistent with traditional investment theory (Merton 1987; Mitton and Vorkink 2007; Barberis and Huang 2008; Van Nieuwerburgh and Veldkamp 2009, 2010). We are not aware of any theories that link under-diversification to the governance of competing firms.

A similar mechanism applies to an exogenous increase in ownership concentration. In the last two decades, the increase in horizontal shareholding has been accompanied by an increased concentration of assets under management in a small group of institutional investors (Backus, Conlon, and Sinkinson 2021; Kacperczyk, Nosal, and Sundaresan 2023).[4] We use our model to explore the product market implications of this concentration. We capture the increase in concentration as a decrease in the mass m of small shareholders in the ownership market.

The investor responds to a decrease in m by holding overall larger stakes. The typical governance response is more nuanced. In equilibrium, L does not do governance if m is sufficiently large, and pushes to reduce firms' production costs for intermediate values of m. When m becomes sufficiently low, however, L tends to switch governance type and pressure firms to compete less aggressively. The reason has to do with portfolio returns: when m is small, the investor has significant market power in the equity market, which means that deviations from a balanced portfolio (that are necessary for L to engage in traditional governance) are more costly in terms of foregone trading profits. So, the investor's response to an exogenous decrease in m may lead to a weakening of competition in product markets and further ownership concentration in equity markets.

The mechanisms described above require that L is able or willing to influence competition. Perhaps not surprisingly, institutional investors typically say they are not.[5] In the next step of the analysis, we take their word at face value and focus on the more traditional type of governance, which is fixing inefficient firms. In the literature, competition is typically seen as a *substitute* for this type of governance: in competitive industries, firms already have strong incentives to maximize profits or else they will go out of business, so there is little inefficiency to fix (Hart 1983; Shleifer and Vishny 1997; Allen and Gale 2000). Consistent with this idea, there is evidence that governance matters less for firm value in more competitive industries (Giroud and Mueller 2010, 2011).

Our model offers a different, less "efficiency-based" interpretation of these findings. Rather than

[4]In 2019, the institutional ownership of an average stock in the US equaled around 60%. This ownership structure is heavily skewed, with the ten largest investors holding, on average, 35% of total shares outstanding, and it varies greatly across individual assets. It is worth emphasizing that, contrary to the popular intuition, the large increase in horizontal shareholding from 1980 to today predates and is not primarily associated with the rise of BlackRock and Vanguard: in the time series, this trend is driven by a broader rise in diversified investment strategies, of which these firms are only the most recent incarnation (Backus, Conlon, and Sinkinson 2021).

[5]For an example, see the following excerpt from Warren Buffett's interview with Becky Quick (CNBC, February 2017):
Quick: *You know, Warren, it does occur to me, though, if you're building up such a significant stake in all the major players, is that anything that's, like, monopolistic behavior?* ***Buffett:*** *I've never met the CEOs of any of the four airlines . . . But– no– have no communication with them.*

substitute it, competition may *deter* this type of governance in our model: the negative spillovers are larger in more competitive industries, so this governance type requires larger deviations from a higher-return, more balanced portfolio. The deviations make this strategy relatively less attractive, so that the investor is more likely to hold a balanced portfolio and *not* engage in governance in more competitive industries, even if firms are ex-ante less efficient. These results may explain why bad management practices and poor governance often persist even in competitive sectors (Bloom and Van Reenen 2007; Foster, Haltiwanger, and Syverson 2008), and contribute to a long-standing literature on the effects of competition on firms' productivity (Nickell 1996; Syverson 2004).

Another typical pushback to the idea that large, diversified investors may try to soften competition is that this would create opportunities for other investors (e.g., hedge funds) to push some of the firms to take advantage of the reduced competition, and so fail to benefit the diversified investors. We emphasize that this argument does not consider the free-riding problem, which is such that the hedge fund may not benefit either: if share prices are accurate on average, they correctly reflect profits, so that the hedge fund would not be able to profit from pushing competition.

Because of the free-riding, we show that an investor who builds positions and exerts governance in competing firms never takes governance actions that *reduce* overall industry profits in our model. This means that, although L may choose not to intervene to soften competition, it would also never actively promote it, even when doing so has no direct costs. Since we cannot expect investors to *promote* competition, competition policy takes center stage in the last part of our analysis. An interesting aspect is that by impacting the governance actions that are incentive-compatible with certain portfolios, competition policy *indirectly* affects the investor's portfolio decisions, creating spillovers to equity markets. We evaluate different policy measures in light of these spillovers.

The alleged anticompetitive effects of horizontal shareholding have caught the attention of policymakers and antitrust scholars. The common proposals for a policy response span from outright prohibition of such investments to limiting their ability to influence management (Elhauge 2015, 2017; Posner, Scott Morgan, and Weyl 2016; Posner 2021). These have received staunch opposition from institutional investors, who claim that such measures would cause significant disruptions to equity markets.[6] In our model, these policies safeguard competition. However, they may also distort investors' portfolios and crowd out some socially desirable governance.

We argue that a more traditional antitrust approach may be as effective at promoting competition, but also create positive spillovers to investors. In our model, larger penalties on firms for anti-competitive conduct and stricter enforcement of antitrust rules *indirectly* increase L's cost of influencing competition. This makes the investor shy away from influencing competition even when she holds a balanced portfolio, which increases her portfolio returns while reducing the governance costs. In some cases, it may push her toward the socially desirable governance type. Overall, our results suggest that if policymakers are worried about the effects of horizontal shareholding on competition, strengthening the traditional competition authorities (e.g., the DOJ's Antitrust Division and the FTC's Bureau of Competition in the US, which have seen a significant decrease in enforcement actions and funding in the last few decades (Morton 2020; Gilbert 2023; Babina, Barkai, Jeffers, Karger, and Volkova 2023)) may be a sensible and less controversial first step.

Contributions. We make three main contributions to the literature. First, we extend the models of ownership and governance decisions (Admati, Pfleiderer, and Zechner 1994; Burkart, Gromb, and Panunzi 1997; Maug 1998; DeMarzo and Urošević 2006; Levit, Malenko, and Maug 2019) to a setting with competing firms. The model provides an account of how the ownership and governance of competing firms are jointly determined in equilibrium, contributing to a large literature on the interaction between governance and competition (Hart 1983; Shleifer and Vishny 1997; Mayer 1997; Allen and Gale 2000; Raith 2003; Giroud and Mueller 2010, 2011). From a more normative angle, the model speaks to the tools and objectives of competition policy in a world where financial markets both shape, and are affected by, the intensity of competition in product markets. Through the normative angle, our results also contribute to the literature on the regulation of market power (e.g., Motta 2004; Tirole 2015; Gutiérrez and Philippon 2018, 2019; Chassang and Ortner 2023).

Second, we contribute to a large and growing theoretical literature studying how large, diver-

[6] See, e.g., 'Investment Giants Raise Voices in Debate Over Their Impact on Competition,' *Wall Street Journal*, 2019, and BlackRock's letter to the FTC in response to its hearing on Competition and Consumer Protection in the 21st Century (https://www.blackrock.com/corporate/literature/publication/ftc-hearing-8-competition-consumer-protection-21st-century-011419.pdf.

sified investors shape the objectives of competing firms. Much of economic theory is based on the assumption that firms maximize profits: by and large, investors would discipline firms that do not at least *mimic* profit-maximizing behavior (Friedman 1953; Grossman and Hart 1980; Shleifer and Vishny 1997). A number of more recent papers have challenged this assumption, asking to what extent it is likely to hold in a world where investors own shares of competing firms. Our contribution here is to bring theory closer to practice: the existing papers either take investors' portfolios as given (López and Vives 2019; Azar and Vives 2021; Ederer and Pellegrino 2022; Antón, Ederer, Giné, and Schmalz 2023) or do not explicitly model how investors influence firms and/or how stock prices reflect governance (Rubinstein and Yaari 1983; Rotemberg 1984; O'Brien and Salop 1999; Moreno and Petrakis 2022; Denicolò and Panunzi 2023).[7] By contrast, we add the governance of competing firms to a canonical rational expectations model of financial markets.

Finally, we provide a framework for studying the ownership choices of large investors in the presence of governance spillovers. While we focus on competition, the model is sufficiently general to capture other types of spillovers, so it may be used for other applications. There is a growing body of evidence that institutional investors influence and redirect innovation among the firms in their portfolios (Aghion, Van Reenen, and Zingales 2013; Antón, Ederer, Giné, and Schmalz 2021; Li, Liu, and Taylor 2023; Kini, Lee, and Shen 2023). Similar effects have been documented for other corporate policies, like mergers and acquisitions, and supply-chain relationships (Matvos and Ostrovsky 2008; Lindsey 2008; He and Huang 2017; Freeman 2021). Our model can be used to study how the anticipation of these spillovers affects investors' portfolio choices.

2 The model

The model consists of two dates, $t \in \{1, 2\}$, and a collection of publicly traded firms $j \in \mathcal{J} \equiv \{1, \ldots, N\}$. At time $t = 1$, a large strategic investor ($i = L$) and a mass $m > 0$ of small atomistic investors ($i = S$) trade claims to the firms' profits in a financial market. At time $t = 2$, the large investor can engage in governance to influence the distribution of firm profits, which are then paid

[7] Rotemberg (1984) considers a model of trading similar to ours but abstracts away from governance, assuming that firms maximize shareholders' payoff. Other papers consider governance but simplify the trading model, assuming Nash-bargaining among investors (Rubinstein and Yaari 1983; Moreno and Petrakis 2022; Denicolò and Panunzi 2023).

out to shareholders at the end of the period. All agents in the model are rational and risk-averse; for simplicity, we assume that there is no discounting.

2.1 Governance and firm values

We consider $N \geq 2$ ex-ante identical firms. Firm j generates profits v_j, which are distributed to its shareholders at $t = 2$. L can influence the expected level of firm profits through her governance choices $g_j \in \{0, 1\}$. If L exerts governance in firm j (i.e., if $g_j = 1$), she incurs a private cost $\kappa \geq 0$.[8]

We let $v_j = \pi_j + \varepsilon_j$, where π_j denotes expected firm profits. The random variable $\varepsilon_j \sim \mathcal{N}(0, \sigma)$ represents a shock to the firm's liquidation value. This shock is independent and identically distributed across firms and is realized after all the actions in the model are taken. We denote the collection of realized and expected profits by $\mathbf{v} \equiv (v_1, \ldots, v_N)$ and $\boldsymbol{\pi} \equiv (\pi_1, \ldots, \pi_N)$, respectively.

Expected firm profits π_j depend on the large investor's governance efforts $\mathbf{g} \equiv (g_1, \ldots, g_N)$.[9] More specifically, given $\boldsymbol{\iota} \equiv (1, \ldots, 1)$, we assume that

$$\pi_j = \pi(g_j, \boldsymbol{\iota}'\mathbf{g}). \tag{1}$$

Firm j's expected profits depend both on L's governance in that firm, through g_j, as well as her governance in the other firms, through $\boldsymbol{\iota}'\mathbf{g} = \sum_j g_j$. To keep things simple, we assume that π_j only depends on the number of firms where L exerts governance, which we denote by $n \equiv \boldsymbol{\iota}'\mathbf{g}$.

Governance has a direct positive effect on firm value, that is $\pi(1, n) \geq \pi(0, n)$ and $\pi(1, n) \geq \pi(0, n-1)$, for any $n \geq 1$.[10] The indirect effect operates through the aggregate governance n and is the key novel element of our model, as it captures the governance spillovers. We consider both positive and negative spillovers, that is, $\pi(g_j, n)$ increasing and decreasing with n, respectively. The interpretation we have in mind for the positive spillovers is L's efforts to limit competition

[8]For simplicity, we assume that the cost of doing governance does not depend on the investor's stake (similar to the *allocation-neutral* specification in Admati, Pfleiderer, and Zechner (1994)). Our qualitative results go through if κ is a decreasing function of y_j.

[9]Consistent with the existing literature, we focus on the large investor's governance efforts and assume that $i = S$ is too small to have a meaningful impact on firm profits.

[10]When L goes from doing governance in $n-1$ to n firms, the profit of the n-th firm increases from $\pi(0, n-1)$ to $\pi(1, n)$, so the second inequality is also necessary for the direct effect of governance to be positive. In practice, some governance actions may be associated with a negative direct effect. For example, L may pressure only some firms to compete less aggressively, to benefit the other firms. In that case, one can interpret the firms for which $g_j = 1$ as those *not* being pressured, and all our results would go through. A similar logic applies to the practice of "tunneling", that is, reallocating profits or resources from one firm to another (Johnson, La Porta, Lopez-de Silanes, and Shleifer 2000; Bertrand, Mehta, and Mullainathan 2002).

(e.g., by facilitating price agreements or controlling aggregate supply), which benefit all firms. The negative spillover case captures the more traditional type of governance: efforts to improve firm j's productivity (e.g., by reducing production costs and/or improving product quality). Improving firm j strengthens its product market position, which negatively affects its competitors.

The sum of the direct and indirect effects of governance determines its aggregate effects on expected industry profits, which we denote by $\Pi(n) \equiv \boldsymbol{\iota}'\boldsymbol{\pi}$. Let $\mathbf{y}_L \equiv (y_{1L}, \ldots, y_{NL})$ describe the large investor's portfolio; at the beginning of $t = 2$, L chooses $\mathbf{g}$ to maximize her portfolio payoff:[11]

$$\max_{\mathbf{g}} \mathbf{y}_L'\boldsymbol{\pi} - \kappa\boldsymbol{\iota}'\mathbf{g}. \tag{2}$$

We establish the main properties of the equilibrium for a generic function π_j, without having to specify the details of how firms compete and governance works. To illustrate the equilibrium characterization and to derive some of the comparative statics results, we put more structure on π_j by considering two traditional models of competition, which we describe in Section 2.4.

2.2 Ownership market

At time $t = 1$, investors trade claims to the firms' terminal values. All investors have CARA preferences; the risk-aversion coefficient is $\gamma_S > 0$ for the small investors (S), and $\gamma_L \geq 0$ for the large investor (L).[12] When choosing her optimal portfolio $\mathbf{y}_L$, the large investor anticipates the effect of her trades on the stock price. Small investors, however, take the price as given when they trade. They submit price schedules depending on the price vector $\mathbf{p} \equiv (p_1, \ldots, p_N)$ and $\mathbf{y}_L$. For simplicity, we consider a fixed unit supply of shares for each firm.

The optimal demand vector for each small investor is given by $\mathbf{y}_s \equiv (y_{1S}, \ldots, y_{NS})$ with

$$\mathbf{y}_S = \frac{1}{\gamma_S \sigma^2} (\boldsymbol{\pi} - \mathbf{p}). \tag{3}$$

Market clearing requires $\mathbf{y}_L + m\mathbf{y}_S = \boldsymbol{\iota}$. We can, therefore, write the equilibrium stock price vector

[11] Note that, at the beginning of $t = 2$, L has already acquired a position of y_{jL} in firm j and expects a payoff equal to $y_{jL}\pi_j$ for each j. Strictly speaking, L's utility also includes an additional term capturing the risk of her position. However, this term does not depend on $\mathbf{g}$ and, as a result, it does not affect the governance choice.

[12] An alternative formulation of the model, which yields the exact same results and expressions, is to assume that investors are risk-neutral but incur a trading cost $\frac{1}{2}\gamma_i\sigma^2 y^2$ from acquiring an amount y of shares. In addition, this alternative formulation accommodates examples where the equilibria at the product market or governance stage are in mixed-strategy.

as a function of the large investor's demand:

$$\mathbf{p} = \boldsymbol{\pi} - \frac{\gamma_S \sigma^2}{m}(\boldsymbol{\iota} - \mathbf{y}_L). \tag{4}$$

The equilibrium stock price for firm j reflects the expected firm profits net of a risk premium, which is proportional to a small investor's stake $\mathbf{y}_S = \frac{1}{m}(1 - \mathbf{y}_L)$ in the firm and it increases with their risk aversion γ_S and the volatility of the firm's profits σ.

The large investor has price impact and chooses $\mathbf{y}_L$ to maximize her expected utility:

$$\max_{\mathbf{y}_L} \mathbf{y}_L' (\boldsymbol{\pi} - \mathbf{p}) - \frac{\gamma_L \sigma^2}{2} \mathbf{y}_L' \mathbf{y}_L - \kappa n \tag{5}$$

where $n = \boldsymbol{\iota}'\mathbf{g}$ is evaluated at the optimal governance choice given $\mathbf{y}_L$, that is, at the value of $\mathbf{g}$ that solves Program (2).

The investor chooses her portfolio at time $t = 1$, anticipating the governance choice that each portfolio will induce at time $t = 2$. Since the equilibrium stock prices reflect firm profits, $\boldsymbol{\pi}$ cancels out from the investor's objective in Program (5). Therefore, the governance choice only affects L's time $t = 1$ payoffs through the governance cost κn.

2.3 Sequence of events and equilibrium definition

The timing of the model is summarized in what follows.

t = 1: Investors trade and form their portfolios $\{y_{ij}\}$ for $i \in \{L, S\}$ and $j \in \mathcal{J}$.

t = 2: L chooses governance effort g_j; profits realize and are distributed to shareholders.

We use *subgame perfect equilibrium* as the solution concept and restrict our attention to pure-strategy equilibria. An equilibrium is a collection $\{\{y_{ij}\}, \mathbf{g}\}$ for $i \in \{L, S\}$ and $j \in \mathcal{J}$, that jointly solves Programs (2) and (5) and satisfies sequential rationality.

2.4 Applied examples

Before analyzing the model, we describe how our general framework maps into two simple models of competition and governance. The examples we develop here will also be useful to illustrate the equilibrium characterization, and for some of our comparative statics and welfare results.

In both examples, firms compete to sell a homogeneous good to consumers, and L chooses between two possible governance actions: she can reduce production costs in an arbitrary number of firms, who will then compete with each other (*cut costs*), or pressure all firms to cooperate and charge higher markups (*facilitate collusion*). The objective is to obtain equilibrium expressions for how firms' profits change with the investor's governance actions, that is for $\pi(1, n)$ and $\pi(0, n)$.

For simplicity, we assume that the firms' production costs are linear. $c > 0$ denotes the firms' marginal cost of production when L does not exert governance to cut costs; if she does, the cost becomes $c' \in [0, c)$. Example 1 describes the first model, where firms compete à la *Bertrand*.

Example 1 (Bertrand competition) *Firms simultaneously set product prices ρ_j, and consumers buy from those charging the lowest price. Let $\rho^m(x) = \arg\max_\rho D(\rho)(\rho - x)$, where $D(\rho)$ is the product-market demand, which is decreasing and concave in ρ and satisfies $D(c) > 0$. In equilibrium:*

1. *firm j's expected profits π_j are strictly positive only if the large investor (L) either **(i)** facilitates collusion ($n = N$), in which case all firms set the monopoly price $\rho(c)^m$ and make expected profits $\frac{1}{N}D(\rho^m)(\rho^m - c)$, or **(ii)** cuts costs only in firm j ($n = 1$), in which case $\pi_j = D(\rho')(\rho' - c')$, where $\rho' = \min\{\rho(c')^m, c\}$ and $\pi_{-j} = 0$ for all other firms.*

2. *Depending on the parameters and her portfolio, L chooses one of the following governance actions: staying passive ($n = 0$), cutting costs in one firm only ($n = 1$), and facilitating collusion ($n = N$).*

In the Bertrand model, when firms do not cooperate, they all price at the marginal cost and make zero profits if at least two firms have the same production cost: If one of these were to charge a positive markup, it would be profitable for the other to charge a slightly lower price and capture the entire demand. If only *one* firm has a lower cost, however, it can charge slightly below the others' cost and still make a positive profit. Finally, if the investor convinces firms to cooperate, they maximize industry profits: they all set the monopoly price and split the resulting profits.

$\pi(1, n)$ goes from strictly positive to zero when n goes from 1 to $n' \in (1, N-1)$, since cutting costs in more than one firm dissipates its competitive advantage. So governance generates a negative spillover in this range for n. When n goes from $n \in (1, N-1)$ to N, however, the spillovers are positive, since $\pi(1, n)$ goes from zero to strictly positive for all firms. Of course, L only exerts governance that increases at least some firms' values in equilibrium. If she exerts governance, she thus chooses between $n = 1$ and $n = N$; otherwise, she stays passive and chooses $n = 0$.

In Example 2, firms choose their supply, and the product price adjusts to clear the market (competition à la *Cournot*). Here, firms may make strictly positive profits even when they do not cooperate, but their profits decrease with the number of firms N in the industry. When firms collude, each one produces a fraction $\frac{1}{N}$ of the quantity that maximizes industry profits. Equilibrium governance is richer in this example, with L potentially cutting costs in multiple firms.

Example 2 (Cournot-quantity game) *Firms simultaneously choose quantities q_j, and the market clearing price ρ equates aggregate supply $\sum_j q_j$ and aggregate demand $A - b\rho$, with $A > bc$. In equilibrium:*

1. *firms' expected profits satisfy $\pi(1, n) > \pi(0, n) \geq 0$ for any $n \in \{1, \ldots, N-1\}$, and $\pi(1, N) > 0$;*
2. *Depending on the parameters and her portfolio, L chooses $n \in \{0, \ldots, N\}$, where $n = N$ either represents cutting cost in all firms or facilitating collusion, depending on which action leads to higher industry payoffs.*

3 Equilibrium analysis

We work our way backward and start with deriving L's governance choices for a given portfolio. We then determine her portfolio choice given the correctly anticipated governance efforts.

3.1 Preliminaries

The following Lemma describes L's governance choice for a given portfolio $\mathbf{y}_L$.

Lemma 1 *For a given portfolio $\mathbf{y}_L$, a sequentially rational governance choice $\mathbf{g}^*$ always exists and is unique.*

Lemma 1 implies that, for each given portfolio, there is only one governance choice that is *both* incentive-compatible and sequentially rational at the same time. The reason is as follows. Suppose that, given a portfolio $\mathbf{y}_L$, two different governance choices, $\mathbf{g}'$ and $\mathbf{g}''$, maximize the large investor's utility at the governance stage. This means that both $\mathbf{g}'$ and $\mathbf{g}''$ are incentive-compatible given $\mathbf{y}_L$. The least *active* strategy (i.e., the one with lower $\boldsymbol{\iota}'\mathbf{g}$), say $\mathbf{g}'$, ensures L a higher utility at time $t = 1$: the effect of $\mathbf{g}$ on firm profits is correctly priced-in in equilibrium, so L strictly prefers the strategy with the lower governance costs at that stage. It follows that it would not be rational for L to pick a portfolio $\mathbf{y}_L$ at time $t = 1$, and then break the tie against $\mathbf{g}'$ at the governance stage.

The result in Lemma 1 simplifies the analysis of L's portfolio choice, as it implies that there is always only one $\mathbf{g}$ that is selected in equilibrium for each portfolio $\mathbf{y}_L$. Lemma 2 below puts more structure on the equilibrium governance choice, and on how this relates to the investor's portfolio.

Lemma 2 *Let* $\overline{n} = \arg\max_n\{\frac{\gamma_S}{m\gamma_L+2\gamma_S}\boldsymbol{\iota}'\boldsymbol{\pi} - n\kappa\}$*; in equilibrium, the large investor:*

1. *never exerts governance in more than* $\overline{n}$ *firms (i.e.,* $n^* \leq \overline{n}$*);*
2. *chooses* $n^* = \overline{n}$ *iff she holds the "unconstrained optimal" portfolio* $\mathbf{y}_L = \frac{\gamma_S}{m\gamma_L+2\gamma_S}\boldsymbol{\iota}$*.*

To build intuition, first consider the case where the large investor's governance choice is exogenous, meaning that it does not depend on her portfolio choice. In that case, the investor holds a balanced portfolio, with positions $\frac{\gamma_S}{m\gamma_L+2\gamma_S}$ in each firm, to maximize her risk-return trade-off. We refer to this portfolio as the "unconstrained optimal" portfolio, since it represents the solution to the investor's portfolio choice problem (Program 5) for a fixed value of n, that is, without the incentive-compatibility constraint implied by the optimal governance choice (Program 2).

Now consider the governance choice again. If the investor sticks to the unconstrained optimal portfolio, she ends up choosing $\overline{n} = \arg\max_n\{\frac{\gamma_S}{m\gamma_L+2\gamma_S}\boldsymbol{\iota}'\boldsymbol{\pi} - n\kappa\}$, as this is the incentive-compatible governance choice at the unconstrained optimal $\mathbf{y}_L$. Of course, L may now want to hold a different portfolio, to induce a different governance choice. However, she cannot get a higher payoff by choosing a $\mathbf{y}_L$ that induces governance in more than $\overline{n}$ firms: such a portfolio would have lower risk-adjusted returns and larger governance costs. So L always chooses $n \leq \overline{n}$ in equilibrium, and she chooses $n = \overline{n}$ only when she holds the unconstrained optimal portfolio.

3.2 Benchmark without competition

To understand how competition among firms affects large investors' portfolio and governance decisions, it is useful to first briefly study a benchmark *without* competition. In this scenario, expected firm profits π_j are only a function of g_j and do not depend on governance choices in other firms, that is, $\pi_j(g_j, \boldsymbol{\iota}'\mathbf{g}) = \pi_j^{nc}(g_j)$. The investor's problem then collapses into a firm-by-firm problem. The next Proposition characterizes the equilibrium in this benchmark.

Proposition 1 (No competition benchmark) *A financial market equilibrium always exists; the large investor (L) chooses the same positions and governance actions in all firms:*

1. *If the governance cost κ is sufficiently large ($\kappa \geq \frac{\pi^{nc}(1)}{m+2}$), L does not exert governance ($n^* = 0$) and holds positions $\mathbf{y}_L = \frac{\gamma_S}{m\gamma_L + 2\gamma_S}\boldsymbol{\iota}$;*
2. *If $\underline{\kappa}^{nc} \leq \kappa < \frac{\pi^{nc}(1)}{m+2}$, L chooses $n^* = 0$ and $\mathbf{y}_L = \frac{\kappa}{\pi^{nc}(1)}\boldsymbol{\iota}$;*
3. *If $\kappa < \underline{\kappa}^{nc}$, L exerts governance in all firms ($n^* = N$) and holds positions $\mathbf{y}_L = \frac{\gamma_S}{m\gamma_L + 2\gamma_S}\boldsymbol{\iota}$.*

L remains passive if the governance cost κ exceeds the threshold $\underline{\kappa}^{nc}$, in which case she holds one of two portfolios. If κ is very high, she holds the unconstrained optimal portfolio (that is, $\frac{\gamma_S}{m\gamma_L + 2\gamma_S}$ in each firm). If κ is in an intermediate range, she still chooses to remain passive but must hold back on her positions to satisfy the incentive-compatibility constraint: if $y_{jL} > \frac{\kappa}{\pi^{nc}(1)}$, L's stake in the firm is too large to not exercise governance at $t = 2$. So the investor chooses to invest less at $t = 1$, sacrificing some returns from trading, to save on the governance costs at $t = 2$. Finally, if the governance cost is lower than $\underline{\kappa}^{nc}$, the large investor becomes active and holds again $\frac{\gamma_S}{m\gamma_L + 2\gamma_S}$ in all firms, since the governance cost is too small for L to distort her portfolio.

L's governance in a firm j only depends on her stake in that firm, since g_j has no indirect effects on the other firms. This means that the investor's choice of how much to invest and engage in firm j does not interact with how much L holds or engages in the other firms, and vice-versa. Since the firms are ex-ante identical, L then chooses the same positions and takes the same governance action in all firms. As we show below, this is not the case in the model with competition.

3.3 Equilibrium characterization

Having described how the large investors' governance choices depend on firm ownership, we can now solve for the investors' optimal portfolio choices.

Proposition 2 (Equilibrium) *A financial market equilibrium always exists; the large investor (L) may choose different positions and governance actions across firms:*

1. *If it is incentive-compatible to not exert governance at the unconstrained optimal portfolio (i.e., $\overline{n} = 0$), L chooses $n^* = 0$ and holds that portfolio ($\mathbf{y}_L = \frac{\gamma_S}{m\gamma_L + 2\gamma_S}\boldsymbol{\iota}$);*
2. *Otherwise, L exerts governance in a subset of firms $n^* \in \{0, \ldots, N\}$ and holds larger positions in those firms: $y_{jL} = \overline{y}$ and $g_j = 1$ in $j \leq n^*$, and $y_{jL} = \underline{y}$ and $g_j = 0$ in $j > n^*$, with $\overline{y} \geq \underline{y}$.*

The positions $(\overline{y}, \underline{y})$ solve Program (5) subject to $n^* = \arg\max_n \{n\overline{y}\pi(1, n) + (N - n)\underline{y}\pi(0, n) - \kappa n\}$.

Proposition 2 characterizes the equilibrium. Without governance, the investor would hold $\frac{\gamma_S}{m\gamma_L + 2\gamma_S}$ in each firm, to maximize her risk-return trade-off. L chooses this portfolio whenever it is incentive-compatible with *not* exerting governance, which is the case when the governance cost κ is very high. Otherwise, the investor faces a tradeoff: she either exerts governance in all firms and pays the cost κN, or *deviates* from the optimal unconstrained portfolio and opts for one that induces less governance at time $t = 2$, giving up some portfolio returns to save on governance costs.

It is useful to think of how the investor chooses her optimal portfolio as a two-step process. First, for any value of n, L derives the best portfolio for which it is incentive-compatible to exert governance in exactly n firms. The governance choice problem at time $t = 2$ (Program 2) defines a set of portfolios for which $\boldsymbol{\iota}'\mathbf{g}^* = n$, and L chooses the best portfolio within that set. The investor's expected utility at $t = 1$ is concave in her positions,[13] so she would like to hold similar stakes in all firms. However, this may not be consistent with incentive-compatibility. So L settles for the second-best: holding only two different types of positions, $\overline{y}$ and $\underline{y}$, the larger in the firms where

[13]For the large investor, this concavity comes from two different channels. First, her risk aversion makes it increasingly more costly to hold larger stakes in each firm j, as doing so increases L's exposure to the firm's idiosyncratic risk. Second, since L has market power, S is the marginal investor, which implies that $\pi_j - p_j$ increases with the small investors' aggregate holding in firm j, as compensation for their risk exposure. So, on the one hand, L wants to increase y_{jL}, to get a larger fraction of the return. On the other, increasing y_{jL} reduces the small investors' holding and, thus, $\pi_j - p_j$.

she exerts governance. In the second step, the investor compares all portfolios resulting from the first step and chooses the one that gives the highest risk-adjusted return net of the governance cost.

The two-step procedure described above is similar to Grossman and Hart's approach to the principal-agent problem (Grossman and Hart 1983), where the principal first finds the optimal way to induce any possible action by the agent, and then chooses the one that maximizes her payoff net of the agent's pay. Once the optimal incentive-compatible portfolios are determined, comparing them is a more straightforward step. So here we focus on illustrating the first step, and return to the second when we describe our comparative statics results (Section 3.4). The optimal portfolio that induces governance in n firms solves the convex programming problem below.

Proposition 3 (Optimal incentive-compatible portfolios) *The optimal portfolio that is incentive-compatible with exerting governance in firms $j \leq n$ solves the following problem:*

$$\max_{\underline{y},\overline{y}} \sigma^2 \left[n \left(\frac{\gamma_s}{m} \overline{y}(1-\overline{y}) - \frac{\gamma_l}{2} \overline{y}^2 \right) + (N-n) \left(\frac{\gamma_s}{m} \underline{y}(1-\underline{y}) - \frac{\gamma_l}{2} \underline{y}^2 \right) \right] \tag{6}$$

$$s.t.\ n\overline{y}\pi(1,n) + (N-n)\underline{y}\pi(0,n) - n\kappa \geq \begin{cases} (n\overline{y} + (\tilde{n}-n)\underline{y})\pi(1,\tilde{n}) + (N-\tilde{n})\underline{y}\pi(0,\tilde{n}) - \tilde{n}\kappa & \text{if } \tilde{n} \geq n \\ \tilde{n}\overline{y}\pi(1,\tilde{n}) + ((n-\tilde{n})\overline{y} + (N-n)\underline{y})\pi(0,\tilde{n}) - \tilde{n}\kappa & \text{if } \tilde{n} < n \end{cases}$$

$$\forall \tilde{n} \in \{0, 1, \ldots, N\}, \quad \text{and} \quad \overline{y} \geq \underline{y}.$$

Provided that the set of $(\overline{y}, \underline{y})$ that satisfies the incentive-compatibility constraint above is non-empty, a solution to Program (6) always exists and is unique.

Provided that L would want to do governance in n firms for at least some portfolio, a solution to Program (6) always exists and is unique. Since the constrained set is compact and the objective is continuous, this follows directly from the Weierstrass Theorem. To understand why the optimal portfolio may be tilted (that is, feature $\overline{y} > \underline{y}$), it is useful to zoom in on some of the incentive-compatibility (IC) constraints. For example, consider the IC that ensures that L prefers exerting governance in n firms over $\tilde{n} > n$. Rearranging this constraint, we obtain:

$$\overline{y} n \underbrace{[\pi(1,\tilde{n}) - \pi(1,n)]}_{\text{Indirect effect on } j \leq n} + \underline{y} \left\{ (\tilde{n} - n) \underbrace{[\pi(1,\tilde{n}) - \pi(0,n)]}_{\text{Direct effect on } j \in (n,\tilde{n}]} + (N - \tilde{n}) \underbrace{[\pi(0,\tilde{n}) - \pi(0,n)]}_{\text{Indirect effect on } j > \tilde{n}} \right\} - \kappa(\tilde{n} - n) \leq 0. \tag{7}$$

Increasing aggregate governance from n to $\tilde{n}$ has four different effects. First, an indirect effect on the firms where L was already doing governance ($j \leq n$), and those where she continues to stay passive ($j > \tilde{n}$). These correspond to the first and third terms in Inequality (7), respectively. There is also a direct effect on the firms $j \in (n, \tilde{n}]$, since L exerts governance in these firms at $\tilde{n}$, but not at n. Finally, the governance cost increases from κn to $\kappa \tilde{n}$. The direct effect and the cost increase correspond to the second and last terms in Inequality (7), respectively.

If the indirect effects are zero, the IC above simplifies to $\underline{y}\,[\pi(1) - \pi(0)] - \kappa \leq 0$, which implies $\underline{y} \leq \frac{\kappa}{\pi(1)-\pi(0)}$, since π_j no longer depends on aggregate governance. In this case, we are back to the benchmark without competition, where whether L chooses to do governance also in firms $j > n$ only depends on her stake in those firms. If the indirect effects are different from zero, both $\underline{y}$ and $\overline{y}$ affect the IC constraint, in potentially different directions. For example, consider an industry with only 2 firms, and set $\tilde{n} = 2$ and $n = 1$; the IC constraint becomes:

$$\overline{y} \underbrace{[\pi(1,2) - \pi(1,1)]}_{\text{Indirect effect on } j=1} + \underline{y} \underbrace{[\pi(1,2) - \pi(0,1)]}_{\text{Direct effect on } j=2} - \kappa \leq 0. \tag{8}$$

The direct effect on firm 2 is always positive, that is $\pi(1,2) > \pi(0,1)$. If the governance spillovers are negative, the indirect effect on firm 1 is instead negative, that is, $\pi(1,1) > \pi(1,2)$. This is the case, for example, in the Bertrand model (Example 1) if being the only firm with lower costs is better than splitting the monopoly profits with another firm, and in the Cournot model (Example 2) when L prefers cutting firms' production costs to pushing them to cooperate.

In this case, $\underline{y}$ and $\overline{y}$ have opposite effects on the IC constraint. Similar to the benchmark without competition, increasing $\underline{y}$ makes the constraint harder to satisfy, since L becomes more exposed to firm 2 and has thus more incentives to do governance in it. Increasing $\overline{y}$, however, reduces these incentives and, thus, relaxes the IC constraint: the larger the investor's stake in firm 1, the more she internalizes the negative spillovers of doing governance also in firm 2. This second effect creates an incentive for L to tilt her portfolio towards firm 1, so that she can hold overall larger positions in both firms (that is, $\overline{y} > \underline{y} > \frac{\kappa}{\pi(1,2)-\pi(0,1)}$) while still doing governance in only one.

More generally, the fact that $\underline{y}$ and $\overline{y}$ have different effects on the IC constraint means that tilting her portfolio may allow L to reach higher returns overall, by either saving on governance costs or being able to hold larger stakes. The implicit cost of this strategy is lower diversification, since the investor is then relatively more exposed to the risk of the firms where she exerts governance.

So far, our discussion of incentive compatibility has focused on the case where L is tempted to do governance in more than n firms, that is, when the relevant IC constraint in Program (6) is one with $\tilde{n} > n$. Lemma 3 shows that this is always the case in equilibrium.

Lemma 3 *If it is incentive-compatible to exert some governance at the unconstrained optimal portfolio ($\overline{n} > 0$), the large investor (L) selects the best portfolio among $\mathbf{y}_L = \frac{\gamma_S}{m\gamma_L+2\gamma_S}\boldsymbol{\iota}$ (and $n^* = \overline{n}$) and the portfolios that solve Program (6) for $n < \overline{n}$. In equilibrium, if $n < \overline{n}$, the portfolio L holds must satisfy:*

$$\begin{aligned} n\overline{y}\pi(1,n) + (N-n)\underline{y}\pi(0,n) - n\kappa &= \max_{\tilde{n}>n}\left\{(n\overline{y} + (\tilde{n}-n)\underline{y})\pi(1,\tilde{n}) + (N-\tilde{n})\underline{y}\pi(0,\tilde{n}) - \tilde{n}\kappa\right\} \quad (9)\\ &> \max_{\tilde{n}<n}\left\{\tilde{n}\overline{y}\pi(1,\tilde{n}) + ((n-\tilde{n})\overline{y} + (N-n)\underline{y})\pi(0,\tilde{n}) - \tilde{n}\kappa\right\}. \end{aligned}$$

For the sake of contradiction, suppose that, in equilibrium, L is indifferent between doing governance in n or $\tilde{n} < n$ firms (that is, the IC constraint in Program (6) is binding for some $\tilde{n} < n$). Following the same logic as for Lemma 1, even though L may be indifferent between n and $\tilde{n}$ at the governance stage ($t = 2$), she strictly prefers $\tilde{n}$ at the portfolio-choice stage ($t = 1$), since at that stage she always prefers less governance. So, choosing the same portfolio and doing less governance (i.e., $\tilde{n} < n$) would be incentive-compatible, and strictly preferred by L. That, however, violates the initial equilibrium conjecture, since L must choose an optimal portfolio in equilibrium.

The discussion above implies that, if an IC constraint is binding in equilibrium, it must be for some $\tilde{n}$ greater than n. Moreover, the equilibrium portfolio cannot feature $n < \overline{n}$ and have none of the IC constraints binding: in that case, L's portfolio-choice problem would be equivalent to an unconstrained one; however, absent any IC constraints, L would choose $\mathbf{y}_L = \frac{\gamma_S}{m\gamma_L+2\gamma_S}\boldsymbol{\iota}$, which is then incentive-compatible with $n^* = \overline{n}$. The results in Lemma 3 have an interesting economic implication: in equilibrium, the need to tilt her portfolio always originates from L's incentive to do less governance. So, the implicit benefit of under-diversification is always lower governance costs.

Equilibrium illustration. We conclude this section with an illustration of the equilibrium in one of the applied examples we described in Section 2.4. Figure 1 describes the large investor's equilibrium choices in the context of a Bertrand setting with $N = 2$ firms (see Example 1). The left panel plots L's portfolio and the corresponding governance choice as a function of the governance cost κ. For small values of κ, L holds the unconstrained-optimal portfolio and exerts governance in both firms. As κ increases, L optimally tilts her portfolio toward one firm and exerts governance only in this firm. By doing so, she sacrifices portfolio returns but does not have to pay the governance cost in both firms. As κ increases further, exerting governance becomes too costly, and L is better off holding a lower, balanced position in both firms, which makes it incentive-compatible to stay passive. Since exerting governance becomes less attractive as κ increases, the distortion in L's passive portfolio decreases and y_{jL} converges to the unconstrained optimal portfolio as $\kappa \to \infty$.

The right panel displays L's expected utility at the optimal portfolios that are incentive-compatible with exerting governance in $n \in \{0, 1, 2\}$ firms. For a given κ, L chooses the portfolio that yields the highest utility, so her expected utility in equilibrium is the upper envelope of U_L. An increase in the governance cost reduces U_L if L exerts governance in at least one firm. Since the reduction scales with n, L optimally transitions from $n = 2$ to $n = 1$ for $\kappa \approx 0.04$. An increase in κ decreases the distortion in y_{jL} that is needed for L to stay passive ($n = 0$). Therefore, U_L always *increases* with κ at this portfolio. For $\kappa \approx 0.14$, then it becomes optimal for L to remain passive.

3.4 Comparative statics

We now analyze the effect of varying some of the key parameters of the model. We first look at their effect on the equilibrium portfolio and governance decisions, and then explore their implications for welfare and product market surplus in Section 4.

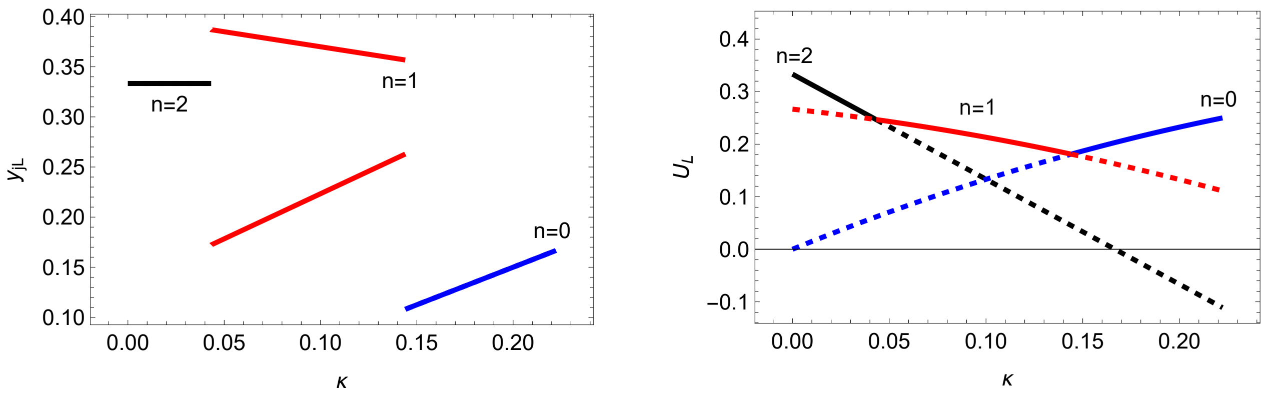

Figure 1: The left (right) panel plots the large investor's position (expected utility) as a function of the governance cost in the setting with Betrand competition (Example 1). Parameters: $N = 2, \pi(1,1) = \frac{4}{3}, \pi(1,2) = 1, m = 1, \gamma_S = \gamma_L = 1$.

Proposition 4 (Facilitating collusion) *Consider the setting with Bertrand competition (Example 1); the set of parameters for which the large investor facilitates collusion:*

1. *decreases with the governance cost κ and with the mass of small shareholders m, and it increases with the riskiness of firm profits σ^2 and investors' risk-aversion γ.*
2. *decreases with the number of firms N in the industry.*

Proposition 4 calls for several comments. First, it describes how equilibrium governance changes with its cost κ. L does not do governance if κ is sufficiently large, and pushes to reduce firms' production costs for intermediate values of κ. When κ becomes sufficiently low, however, L switches governance type and pressures firms to compete less aggressively. The reason has to do with the returns to scale: improving firms is more effective when only a few firms are improved (so as to preserve their competitive advantage) while softening competition is more effective when more firms are on board. So L prefers this second type of governance only when engaging in many firms is relatively cheap, which is the case when the per-firm governance cost κ is sufficiently small.

A similar response applies to a decrease in the mass of small shareholders m, which captures an increase in the relative size of the large investor. The investor responds to a decrease in m by holding overall larger stakes. The governance response is more nuanced. L does not do governance if m is sufficiently large, reduces production costs for intermediate values of m, and pressures firms to compete less aggressively when m becomes sufficiently low. The reason here has to do with portfolio returns: when m is small, the investor has significant market power in the asset market, which means that deviations from a balanced portfolio (that are necessary for L to engage in traditional governance) are more costly in terms of foregone trading profits.

Since an increase in γ or σ^2 also increases L's market power (when γ or σ^2 are small, the small investors trade more aggressively, which erodes L's trading profits), the same logic above applies to the comparative statics results for these parameters. Next, we study the effects of changes in the number N of firms in the industry. When N decreases, influencing competition becomes cheaper, as there are now fewer firms to coordinate. This makes the strategy of building large stakes in all firms and softening competition relatively more attractive. So the investor is more likely to facilitate collusion in smaller industries. Finally, Proposition 4 considers the setting with Bertrand competition, where characterizing closed form solutions and deriving analytical results is easier. Our main qualitative results, however, also apply to the Cournot setting in Example 2.

There is a lively debate in the literature about the extent to which large investors can influence competition in practice. The idea that they engage in monitoring and try to reduce managerial slack is instead less controversial. Proposition 5 explores how investing in competing firms affects this more traditional type of governance in our model.

Proposition 5 (Only cost-cutting) *Consider only governance actions with negative spillovers (e.g., cost-cutting); compared to the benchmark without competition, the large investor may exert more or less governance in the equilibrium of the model with competing firms.*

On the one hand, competition *deters* the more traditional type of governance in our model: the negative spillovers are larger in more competitive industries, so that L may need to deviate from a higher-return, more balanced portfolio if it wants to do any governance at all. On the other hand, it makes it incentive-compatible for L to build relatively large positions in all firms while doing governance *only* in a subset, since the investor at least partly internalizes the negative spillovers. This second effect helps L save on governance costs. If the first effect dominates, governance and competition are substitutes: L exerts less governance in more competitive industries.

4 Welfare analysis

This section explores the welfare implications of our results. The first step is to study how the equilibrium choices differ from those that a benevolent social planner would take, which helps us understand the types of inefficiencies that arise in equilibrium. In the second step, we use the model to evaluate a number of policies aimed at alleviating such inefficiencies.

4.1 Planner's solution

We consider a setting in which a social planner chooses $\{\mathbf{y}_L, \mathbf{g}\}$ to maximize social welfare. The social planner's problem differs from the equilibrium in two ways. First, the social planner internalizes the degree of risk-sharing between large and small investors, while each individual investor solely cares about their own risk exposure. Second, in addition to the impact of governance on firm profits, the social planner also internalizes its impact on consumers. We define product market surplus PMS as the sum of industry profits Π and consumer surplus CS. We assume that PMS depends solely on n, i.e., the number of firms in which the large investor engages in governance. Next, we distinguish between governance actions based on their impact on PMS.

Definition 1 *A governance vector* $\mathbf{g}$ *with* $\boldsymbol{\iota}'\mathbf{g} = n$ *is socially desirable if it increases product market surplus, that is, if* $PMS(n) \geq PMS(0)$, *and socially undesirable otherwise.*

The social planner chooses the large investor's portfolio $\mathbf{y}_L$ and governance efforts $\mathbf{g}$ to maximize social welfare:

$$\max_{\mathbf{y}_L, \mathbf{g}} SW = PMS(n) - \kappa n - \frac{\gamma \sigma^2}{2} \left(\mathbf{y}_L' \mathbf{y}_L + m \mathbf{y}_S' \mathbf{y}_S \right), \tag{10}$$

where the small investors' portfolio holdings follow from market clearing: $\mathbf{y}_S = \frac{1}{m}(\boldsymbol{\iota} - \mathbf{y}_L)$. Social welfare consists of three components: product market surplus, L's governance cost, and the degree of risk sharing between L and the mass m of small investors S. Proposition 6 formally characterizes the solution to the social planner's problem.

Proposition 6 (Planner's solution) *The social planner sets* $\mathbf{y}_L^{SP} = \frac{1}{m+1}\boldsymbol{\iota}$. *The socially optimal governance vector is given by* $\mathbf{g}^{SP} = \arg\max_{\mathbf{g}} PMS(n) - \kappa n$ *where* $n = \boldsymbol{\iota}'\mathbf{g}$.

A crucial difference between Program (10) and the equilibrium is that the social planner chooses $\mathbf{y}_L$ and $\mathbf{g}$ simultaneously. In other words, $\mathbf{g}^{SP}$ does not need to be incentive-compatible but is, instead, chosen to trade off the positive effect on product market surplus with the large investor's cost of governance. As a consequence, the choice of $\mathbf{y}_L$ and $\mathbf{g}$ can be separated and the planner sets $\mathbf{y}_L^{SP} = \frac{1}{m+1}\boldsymbol{\iota}$ to efficiently share risk between L and S.

4.2 Market failures

In a next step, we compare the planner's solution to the main equilibrium in Section 3.3.

Proposition 7 (Sources of inefficiency) *In equilibrium, the large investor L never chooses* $(\mathbf{y}_L, \mathbf{g})$ *that solves the planner's problem. Moreover:*

1. *Fixing* $\mathbf{g}$*, L always trades too little;*
2. *Fixing* $\mathbf{y}_L$*, L always exerts too little socially desirable governance and too much socially undesirable governance (Definition 1).*
3. *Suppose industry profits* $\Pi(n)$ *are concave in* n*. In equilibrium, L never exerts governance that reduces industry profits, that is, such that* $\Pi(n^*) < \Pi(0)$ *(e.g., promoting competition).*

Proposition 7 identifies two types of inefficiencies. The first type relates to the large investor's portfolio choice and the second type relates to her governance choice. The first type arises because the large investor strategically considers her price impact when choosing $\mathbf{y}_L$. For a fixed governance choice $\mathbf{g}$, the large investor, therefore, always trades too little and exposes small investors to too much risk, relative to the planner's solution. The second type arises because the large investor and the social planner differ in terms of the perceived benefit from governance. While the large investor benefits from the positive impact of n on the expected profits of firms in her portfolio, the social planner cares about product market surplus more generally.

Moreover, we show that under mild conditions on industry profits, the large investor never engages in governance actions that reduce overall industry profits. This result suggests that L does not take governance actions to promote competition.

4.3 Policy intervention

The previous analysis has highlighted inefficiencies associated with the large investor's portfolio and governance choices. Next, we evaluate a number of policies aimed at alleviating such inefficiencies. The following Definition introduces three commonly-discussed policy interventions.

Definition 2 (Types of regulations) *We consider the following types of policy interventions:*

1. ***Limiting engagement:*** *this regulation increases the governance cost κ.*

2. ***Limiting horizontal shareholding:*** *this regulation limits the investors' ability to build large stakes in all firms, that is, given positions $y_{1L} \geq y_{2L} \geq \ldots \geq y_{NL}$, if $y_{1L} > \overline{y}^r$, then $y_{jL} \leq \underline{y}^r$ for all $j > 1$.*

3. ***Traditional competition policy:*** *this regulation decreases a firm's profit (e.g., by imposing fines) if its product price is above the competitive equilibrium level.*

The first type of policy intervention makes it more costly for the large investor to engage in governance in a specific firm and, therefore, discourages L from becoming active. The second type takes a more *indirect* approach and prohibits the large investor from building large positions in competing firms. The third type represents traditional anti-trust policies that are targeted at firms, instead of investors. The following Proposition evaluates these policy interventions and discusses their impact on L's equilibrium governance choices and utility, in the context of the setting featuring Bertrand competition (Example 1).

Proposition 8 (Analysis of regulation) *Consider the setting with Bertrand competition (Example 1); the following results hold in equilibrium:*

1. *Limiting engagement always decreases socially-undesirable governance, but may also decrease socially-desirable governance and the large investor L's utility.*

2. *Limiting horizontal shareholding may increase or decrease both socially-undesirable and socially-desirable governance, and always reduces L's utility.*

3. *Traditional competition policy always increases socially-desirable governance, decreases socially-undesirable governance, and increases L's utility.*

Proposition 8 shows that limiting investor engagement always discourages the large investor from socially-undesirable governance actions. However, it might also crowd-out socially-desirable actions (e.g., cost cutting) and, ultimately, reduce product market welfare. The net effect on L's expected utility is unclear. On the one hand, increasing κ can make it incentive-compatible to stay passive and may save governance costs. On the other hand, there is also a negative direct effect, which lowers L's expected utility if she remains active after the policy is passed.

Limiting horizontal shareholdings always makes the large investor worse off by shrinking the set of feasible portfolios. Moreover, it may also increase socially-undesirable or decrease socially-desirable governance. The scenario arises if the limit is set such that L can only take a large position in one firm if she also holds back significantly in all other firms. In this case, the cost-cutting portfolio becomes less attractive and L might switch to a balanced portfolio, which is incentive-compatible with socially-undesirable governance.

Traditional competition policy indirectly increases L's cost of influencing competition and discourages socially-undesirable governance. As a result, the large investor prefers either to remain passive or to engage in socially-desirable governance. The large investor is always better off with such an intervention because it allows her to save on costly governance efforts without substantially distorting her portfolio.

5 Conclusions

We model the tradeoffs faced by an investor who builds positions and exerts governance in competing firms. The investor's governance in a given firm *reflects* and *affects* her stakes in its product market rivals: the investor anticipates how a certain exposure to competing firms would influence her governance and incorporates that information when choosing her portfolio. This link in the ownership and governance of competing firms can be such that rising markups and ownership concentration reinforce each other, leading to a progressive decrease in competition over time, and bad management practices and poor governance persist even in more competitive sectors.

References

Admati, A. R., P. Pfleiderer, and J. Zechner (1994). Large shareholder activism, risk sharing, and financial market equilibrium. *Journal of Political Economy 102*(6), 1097–1130.

Aghion, P., J. Van Reenen, and L. Zingales (2013). Innovation and institutional ownership. *American economic review 103*(1), 277–304.

Allen, F. and D. Gale (2000). Corporate governance and competition. *Corporate governance: Theoretical and empirical perspectives 23*(4), 23–94.

Antón, M., F. Ederer, M. Giné, and M. Schmalz (2023). Common ownership, competition, and top management incentives. *Journal of Political Economy 131*(5), 1294–1355.

Antón, M., F. Ederer, M. Giné, and M. C. Schmalz (2021). Innovation: the bright side of common ownership? *Available at SSRN 3099578*.

Autor, D., D. Dorn, L. F. Katz, C. Patterson, and J. Van Reenen (2020). The fall of the labor share and the rise of superstar firms. *Quarterly Journal of Economics 135*(2), 645–709.

Azar, J. and M. C. Schmalz (2017). Common ownership of competitors raises antitrust concerns. *Journal of European Competition Law & Practice 8*(5), 329–332.

Azar, J., M. C. Schmalz, and I. Tecu (2018). Anticompetitive effects of common ownership. *Journal of Finance 73*(4), 1513–1565.

Azar, J. and X. Vives (2021). General equilibrium oligopoly and ownership structure. *Econometrica 89*(3), 999–1048.

Babina, T., S. Barkai, J. Jeffers, E. Karger, and E. Volkova (2023). Antitrust enforcement increases economic activity. Technical report, National Bureau of Economic Research.

Backus, M., C. Conlon, and M. Sinkinson (2021). Common ownership in america: 1980–2017. *American Economic Journal: Microeconomics 13*(3), 273–308.

Barberis, N. and M. Huang (2008). Stocks as lotteries: The implications of probability weighting for security prices. *American Economic Review 98*(5), 2066–2100.

Bertrand, M., P. Mehta, and S. Mullainathan (2002). Ferreting out tunneling: An application to indian business groups. *Quarterly Journal of Economics 117*(1), 121–148.

Bloom, N. and J. Van Reenen (2007). Measuring and explaining management practices across firms and countries. *Quarterly Journal of Economics 122*(4), 1351–1408.

Burkart, M., D. Gromb, and F. Panunzi (1997). Large shareholders, monitoring, and the value of the firm. *Quarterly Journal of Economics 112*(3), 693–728.

Chassang, S. and J. Ortner (2023). Regulating collusion. *Annual Review of Economics 15*, 177–204.

Covarrubias, M., G. Gutiérrez, and T. Philippon (2020). From good to bad concentration? us industries over the past 30 years. *NBER Macroeconomics Annual 34*(1), 1–46.

De Loecker, J., J. Eeckhout, and G. Unger (2020). The rise of market power and the macroeconomic implications. *Quarterly Journal of Economics 135*(2), 561–644.

DeMarzo, P. M. and B. Urošević (2006). Ownership dynamics and asset pricing with a large shareholder. *Journal of Political Economy 114*(4), 774–815.

Denicolò, V. and F. Panunzi (2023). Common ownership, competition, and corporate governance. *European Corporate Governance Institute–Finance Working Paper* (927).

Dennis, P., K. Gerardi, and C. Schenone (2022). Common ownership does not have anticompetitive effects in the airline industry. *Journal of Finance 77*(5), 2765–2798.

Ederer, F. and B. Pellegrino (2022). A tale of two networks: Common ownership and product market rivalry. Technical report, National Bureau of Economic Research.

Elhauge, E. (2015). Horizontal shareholding. *Harv. L. Rev. 129*, 1267.

Elhauge, E. (2017). Tackling horizontal shareholding: an update and extension to the sherman act and eu competition law. In *V Background Paper for 128th meeting of the OECD Competition Committee*.

Foster, L., J. Haltiwanger, and C. Syverson (2008). Reallocation, firm turnover, and efficiency: Selection on productivity or profitability? *American Economic Review 98*(1), 394–425.

Freeman, K. (2021). Overlapping ownership along the supply chain. *Kelley School of Business Research Paper* (16-84).

Friedman, M. (1953). *Essays in positive economics*. University of Chicago Press.

Gilbert, R. J. (2023). Antitrust reform: An economic perspective. *Annual Review of Economics 15*.

Giroud, X. and H. M. Mueller (2010). Does corporate governance matter in competitive industries? *Journal of Financial Economics 95*(3), 312–331.

Giroud, X. and H. M. Mueller (2011). Corporate governance, product market competition, and equity prices. *Journal of Finance 66*(2), 563–600.

Grossman, S. J. and O. D. Hart (1980). Takeover bids, the free-rider problem, and the theory of the corporation. *Bell Journal of Economics*, 42–64.

Grossman, S. J. and O. D. Hart (1983). An analysis of the principal-agent problem. *Econometrica 51*(1).

Gutiérrez, G. and T. Philippon (2018). *How EU markets became more competitive than US markets: A study of institutional drift*. Number w24700. National Bureau of Economic Research New York,.

Gutiérrez, G. and T. Philippon (2019). The failure of free entry. Technical report, National Bureau of Economic Research.

Hart, O. D. (1983). The market mechanism as an incentive scheme. *Bell Journal of Economics*, 366–382.

He, J. J. and J. Huang (2017). Product market competition in a world of cross-ownership: Evidence from institutional blockholdings. *Review of Financial Studies 30*(8), 2674–2718.

Johnson, S., R. La Porta, F. Lopez-de Silanes, and A. Shleifer (2000). Tunneling. *American Economic Review 90*(2), 22–27.

Kacperczyk, M. T., J. Nosal, and S. Sundaresan (2023). Market power and price informativeness. *Available at SSRN 3137803*.

Kini, O., S. Lee, and M. Shen (2023). Common institutional ownership and product market threats. *Management Science*.

Levit, D., N. Malenko, and E. G. Maug (2019). Trading and shareholder democracy. *Journal of Finance, Forthcoming* (631).

Lewellen, J. and K. Lewellen (2022). Institutional investors and corporate governance: The incentive to be engaged. *Journal of Finance 77*(1), 213–264.

Li, X., T. Liu, and L. A. Taylor (2023). Common ownership and innovation efficiency. *Journal of Financial Economics 147*(3), 475–497.

Lindsey, L. (2008). Blurring firm boundaries: The role of venture capital in strategic alliances. *Journal of Finance 63*(3), 1137–1168.

López, Á. L. and X. Vives (2019). Overlapping ownership, r&d spillovers, and antitrust policy. *Journal of Political Economy 127*(5), 2394–2437.

Matvos, G. and M. Ostrovsky (2008). Cross-ownership, returns, and voting in mergers. *Journal of Financial Economics 89*(3), 391–403.

Maug, E. (1998). Large shareholders as monitors: Is there a trade-off between liquidity and control? *Journal of Finance 53*(1), 65–98.

Mayer, C. (1997). Corporate governance, competition, and performance. *Journal of Law and Society 24*(1), 152–176.

McCahery, J. A., Z. Sautner, and L. T. Starks (2016). Behind the scenes: The corporate governance preferences of institutional investors. *Journal of Finance 71*(6), 2905–2932.

Merton, R. (1987). A simple model of capital market equilibrium with incomplete information. *Journal of Finance 42*(3), 483–510.

Mitton, T. and K. Vorkink (2007). Equilibrium underdiversification and the preference for skewness. *Review of Financial Studies 20*(4), 1255–1288.

Moreno, D. and E. Petrakis (2022). The impact on market outcomes of the portfolio selection of large equity investors. *Economics Letters 212*, 110296.

Morton, F. M. S. (2020). Reforming us antitrust enforcement and competition policy.

Motta, M. (2004). *Competition policy: theory and practice*. Cambridge University Press.

Nickell, S. J. (1996). Competition and corporate performance. *Journal of Political Economy 104*(4), 724–746.

O'Brien, D. P. and S. C. Salop (1999). Competitive effects of partial ownership: Financial interest and corporate control. *Antitrust LJ 67*, 559.

Posner, E. A. (2021). Policy implications of the common ownership debate. *The Antitrust Bulletin 66*(1), 140–149.

Posner, E. A., F. M. Scott Morgan, and E. G. Weyl (2016). A proposal to limit the anticompetitive power of institutional investors. *Antitrust LJ 81*, 669.

Raith, M. (2003). Competition, risk, and managerial incentives. *American Economic Review 93*(4), 1425–1436.

Rotemberg, J. (1984). Financial transaction costs and industrial performance. *Working Paper, MIT*.

Rubinstein, A. and M. E. Yaari (1983). The competitive stock market as cartel maker: Some examples. Technical report, Suntory and Toyota International Centres for Economics and Related Disciplines.

Shekita, N. (2022). Interventions by common owners. *Journal of Competition Law & Economics 18*(1), 99–134.

Shleifer, A. and R. W. Vishny (1997). A survey of corporate governance. *Journal of Finance 52*(2), 737–783.

Syverson, C. (2004). Market structure and productivity: A concrete example. *Journal of Political Economy 112*(6), 1181–1222.

Tirole, J. (2015). Market failures and public policy. *American Economic Review 105*(6), 1665–1682.

Van Nieuwerburgh, S. and L. Veldkamp (2009). Information immobility and the home bias puzzle. *Journal of Finance 64*(3), 1187–1215.

Van Nieuwerburgh, S. and L. Veldkamp (2010). Information acquisition and under-diversification. *Review of Economic Studies 77*(2), 779–805.

A Proofs

A.1 Proof of Lemma 1.

For a given ownership vector $\mathbf{y}_L = (y_{1L}, \ldots, y_{NL}\}$ with $y_{1L} \geq \ldots \geq y_{NL}$, the large investor's objective function in Program 2 is a real-valued function for all $\mathbf{g} \in \{\{0,1\}, \ldots, \{0,1\}\}$. As a result, there always exists a maximum. If $\pi(1,n) \geq \pi(0,n)$, then L optimally becomes active in firms $j \in \{1, \ldots, n^*\}$. Vice versa, if $\pi(1,n) \leq \pi(0,n)$, then L becomes active in firms $j \in \{N - n^* + 1, \ldots, N\}$.

A.2 Proof of Lemma 2.

Note that $\frac{\gamma_S}{m\gamma_L + 2\gamma_S}\boldsymbol{\iota}$ maximizes L's expected utility for a fixed governance choice n. Suppose there is a portfolio vector $\mathbf{y}$ that is incentive-compatible with $n > \overline{n}$. In this case, L would be strictly better off choosing $\mathbf{y} = \frac{\gamma_S}{m\gamma_L + 2\gamma_S}\boldsymbol{\iota}$ and $n^* = \overline{n}$. Moreover, if L holds the unconstrained optimal portfolio $\mathbf{y} = \frac{\gamma_S}{m\gamma_L + 2\gamma_S}\boldsymbol{\iota}$, she will choose $n^* = \overline{n}$ because $\overline{n} = \arg\max_n\{\frac{\gamma_S}{m\gamma_L + 2\gamma_S}\boldsymbol{\iota}'\boldsymbol{\pi} - n\kappa\}$. Similarly, if she chooses $n^* = \overline{n}$, she will hold the unconstrained optimal portfolio because this portfolio maximizes L's expected utility for a given n.

A.3 Proof of Proposition 1.

Without competition, the large investor's problem collapses into a firm-by-firm problem.

1. If $g_j = 0$ is incentive-compatible at $y_{jL} = \frac{\gamma_S}{m\gamma_L + 2\gamma_S}$, i.e., if $\frac{\gamma_S}{m\gamma_L + 2\gamma_S}\pi^{nc}(1) - \kappa \geq 0$, then L chooses $y^*_{jL} = \frac{\gamma_S}{m\gamma_L + 2\gamma_S}$ and $g^*_j = 0$ because $\frac{\gamma_S}{m\gamma_L + 2\gamma_S}$ maximizes the risk-return tradeoff and $g_j = 0$ minimizes the governance cost.

2. Otherwise, L chooses between the best portfolio incentive-compatible with $g_j = 1$ and that incentive-compatible with $g_j = 0$. The first portfolio is equal to $y_{jL} = \frac{\gamma_S}{m\gamma_L + 2\gamma_S}$ and leads to an objective function (per-firm) equal to $\gamma\sigma^2\left[\frac{1}{m}y_{jL}(1 - y_{jL}) - \frac{1}{2}y^2_{jL}\right] - \kappa$. The second portfolio maximizes $\gamma\sigma^2\left[\frac{1}{m}y_{jL}(1 - y_{jL}) - \frac{1}{2}y^2_{jL}\right]$ subject to the incentive-compatibility constraint $y_{jL}\pi^{nc}(1) \leq \kappa$. The concavity of the objective function implies that the optimal portfolio is equal to $\frac{\kappa}{\pi^{nc}(1)}$.

It follows that L chooses $y^*_{jL} = \frac{\gamma_S}{m\gamma_L + 2\gamma_S}$ and $g^*_j = 1$ if and only if:

$$\gamma\sigma^2\left[\frac{1}{m}\frac{\gamma_S}{m\gamma_L+2\gamma_S}\left(1-\frac{\gamma_S}{m\gamma_L+2\gamma_S}\right)-\frac{1}{2}\frac{1}{(m+2)^2}\right]-\kappa > \gamma\sigma^2\left[\frac{1}{m}\frac{\kappa}{\pi^{nc}(1)}\left(1-\frac{\kappa}{\pi^{nc}(1)}\right)-\frac{1}{2}\left(\frac{\kappa}{\pi^{nc}(1)}\right)^2\right] \tag{A.1}$$

First, note that the left-hand side decreases in κ, while the right-hand side increases in κ. Second, note that at $\kappa = 0$, the condition above holds, while at $\kappa = \frac{\pi^{nc}(1)}{m+2}$ it does not. Hence, it follows that the condition holds, i.e., L chooses $y^*_{jL} = \frac{\gamma_S}{m\gamma_L+2\gamma_S}$ and $g^*_j = 1$, if and only if κ is smaller than $\frac{\pi^{nc}(1)}{m+2} > \underline{\kappa}^{nc} > 0$, which satisfies:

$$\left[\frac{1}{m}\frac{\gamma_S}{m\gamma_L+2\gamma_S}\left(1-\frac{\gamma_S}{m\gamma_L+2\gamma_S}\right)-\frac{1}{2}\frac{1}{(m+2)^2}\right]-\frac{\underline{\kappa}^{nc}}{\gamma\sigma^2} = \left[\frac{1}{m}\frac{\underline{\kappa}^{nc}}{\pi^{nc}(1)}\left(1-\frac{\underline{\kappa}^{nc}}{\pi^{nc}(1)}\right)-\frac{1}{2}\left(\frac{\underline{\kappa}^{nc}}{\pi^{nc}(1)}\right)^2\right] \tag{A.2}$$

A.4 Proof of Proposition 2.

The large investor's objective function is upper semi-continuous defined on a compact set. Hence, it always reaches a maximum, which corresponds to the optimal portfolio choice $\mathbf{y}_L$. The optimal holdings for S follow from market clearing and the equilibrium stock price follows from Eq. (4).

Note that without L's incentive-compatibility constraint, Program 5 is maximized at $\mathbf{y}_L = \frac{\gamma_S}{m\gamma_L+2\gamma_S}\boldsymbol{\iota}$ and $n = 0$. Hence, if $n = 0$ is incentive compatible with this portfolio choice, then the constrained choice is equal to the unconstrained choice.

Without loss of generality, consider $\mathbf{y}'_L$ with $y_{1L} \geq \ldots \geq y_{NL}$ and $n' > 0$. Suppose there exists $y_{j'L}$ and $y_{j''L}$ with $j', j'' < n'$ such that $y_{j'L} \neq y_{j''L}$, then there always exists a $\mathbf{y}''_L \neq \mathbf{y}'_L$ that is strictly preferred. The incentive-compatibility constraint implies that L chooses n at $\mathbf{y}_L$:

$$\pi(1,n')\sum_{j=1}^{n'} y_{jL} + \pi(0,n')\sum_{j=n'+1}^{N} y_{jL} - \kappa n' \geq \pi(1,n)\sum_{j=1}^{n} y_{jL} + \pi(0,n)\sum_{j=n+1}^{N} y_{jL} - \kappa n \tag{A.3}$$

for all $n \neq n'$.

Next, consider $n \geq n'$ so that L is active in more firms under n. It follows that the constraint is unaffected if we change $y_{j'L}, y_{j''L}$ as long as $y_{j'L} + y_{j''L}$ stays constant. Hence, L is better of setting both values to $\frac{1}{2}\left(y_{j'L} + y_{j''L}\right)$ since her objective is concave.

For $n < n'$, it is possible that changing $y_{j'L}, y_{j''L}$ (while keeping $y_{j'L} + y_{j''L}$ constant) affects the right-hand side of the constraint above so that the incentive-compatibility constraint is violated for some $n < n'$. As before, setting both values to $\frac{1}{2}\left(y_{j'L} + y_{j''L}\right)$ improves the risk-return tradeoff and reduces governance costs. Hence, it makes L better off. The proof for $j', j'' > n'$ follows the same steps.

A.5 Proof of Proposition 3.

The re-formulation of L's optimization problem follows directly from the results in Grossman and Hart (1983) and our findings in Proposition 2.

A.6 Proof of Lemma 3.

We have shown before that L will never be active in more than $\overline{n}$ firms. If L chooses to be active in less than $\overline{n}$ firms, the relevant incentive-compatibility constraints are those associated with $\tilde{n} > n$. As argued in the main text, if L was indifferent between n and $\tilde{n} < n$ at the governance stage, she strictly prefers $\tilde{n}$ at the portfolio stage.

A.7 Proof of Proposition 4.

We have shown that L facilitates collusion if $\pi(1, N) > \frac{1}{N}\pi(1, 1)$ and κ being sufficiently small. Below, we will use these results to show how the parameter space for $n^* = N$ changes with model parameters.

1. Since L only facilitates collusion if $\pi(1, N) > \frac{1}{N}\pi(1, 1)$ and κ being sufficiently small, an increase in κ reduces the parameter space in which L chooses $n^* = N$.

2. An increase in γ and σ^2 increases the upper bar for κ. As a result, an increase in these two parameters increases the parameter space in which L chooses $n^* = N$.

3. An increase in m decreases the upper bar for κ. As a result, an increase in this parameter decreases the parameter space in which L chooses $n^* = N$.

4. An increase in N decreases the upper bar for κ which makes $n^* = N$ less likely.

A.8 Proof of Proposition 5.

Consider the following setting with negative spillovers and $N = 2$: $\pi(0,0) = \pi(0)^{nc}$, $\pi(1,1) = \pi(1)^{nc}$, and $\pi(1,2) = 0$. Without competition, L cuts cost in both firms if and only if $\kappa < \underline{\kappa}^{nc}$ (see Proposition 1). With competition, L chooses $y_{jL} = \frac{\gamma_S}{m\gamma_L + 2\gamma_S}$ and $n = 0$ if $\kappa > \frac{\gamma_S}{m\gamma_L+2\gamma_S}\pi(1,1)$. Otherwise, she chooses the best of the two following strategies: (i) $y_{jL} = \frac{\kappa}{\pi(1,1)}$ and $n = 0$, and (ii) $y_{jL} = \frac{\gamma_S}{m\gamma_L+2\gamma_S}$ and $n = 1$. Comparing U_L for these two strategies implies that L prefers (ii) if and only if $\kappa < \frac{\pi(1,1)\left(2\gamma\sigma^2+m\pi(1,1)\right)-\sqrt{m\pi(1,1)^3\left(4\gamma\sigma^2+m\pi(1,1)\right)}}{2\gamma(m+2)\sigma^2} \equiv \tilde{\kappa}$.

We can then show that $\underline{\kappa}^{nc} < \tilde{\kappa}$ so that for $\kappa \in (\underline{\kappa}^{nc}, \tilde{\kappa})$, L is active in one firm with competition but passive without competition. If $\kappa \in (0, \underline{\kappa}^{nc}$, however, L is active in one firm with competition and in two firms without competition.

A.9 Proof of Proposition 6.

We start with the planner's choice for $\mathbf{y}_L$. The social planner chooses $\mathbf{y}_L$ to solve:

$$\min_{\mathbf{y}_L} \mathbf{y}_L'\mathbf{y}_L + \frac{1}{m}(\boldsymbol{\iota} - \mathbf{y}_L)'(\boldsymbol{\iota} - \mathbf{y}_L) \tag{A.4}$$

where we have used the market clearing condition. It follows that the social planner sets $\mathbf{y}_L = \frac{1}{m+1}\boldsymbol{\iota}$.

Since the governance action does not affect $\frac{\gamma}{2}\left[\mathbf{y}_L'\mathbf{y}_L + \frac{1}{m}(\boldsymbol{\iota} - \mathbf{y}_L)'(\boldsymbol{\iota} - \mathbf{y}_L)\right]$, it follows that the social planner sets $n = \boldsymbol{\iota}'\mathbf{g}$ to solve:

$$\max_{\mathbf{g}} PMS(n) - \kappa n. \tag{A.5}$$

A.10 Proof of Proposition 7.

If L's governance efforts $\mathbf{g}$ are fixed, she sets $\mathbf{y}_L$ to maximize $\frac{1}{m}\mathbf{y}_L'(\boldsymbol{\iota} - \mathbf{y}_L) - \frac{1}{2}\mathbf{y}_L'\mathbf{y}_L$, which leads to $\mathbf{y}_L = \frac{\gamma_S}{m\gamma_L+2\gamma_S}\boldsymbol{\iota}$. We have shown in the Proof of Proposition 6 that the social planner sets $\mathbf{y}_L = \frac{1}{m+1}\boldsymbol{\iota}$.

For a fixed portfolio $\mathbf{y}_L$, L sets $\mathbf{g}$ to maximize $\mathbf{y}_L\boldsymbol{\pi} - \kappa n$, while the social planner maximizes $PMS(n) - \kappa n$. It directly follows that the social planner would never choose n that reduces PMS, while L might be willing to do that if this action increases $\mathbf{y}_L\boldsymbol{\pi}$. Vice versa, L does not internalize the full benefits of socially-desirable governance but bears the full cost. Hence, she always underinvests in governance in this case.

We assume that industry profits $\Pi(n) = \sum_{j=1}^{N} \pi_j = n\pi(1,n) + (N-n)\pi(0,n)$ are concave and maximized at $\hat{n} \in \{1, \ldots, N\}$. Next, we consider the portfolio vector $\vec{y}' = \frac{\gamma_S}{m\gamma_L + 2\gamma_S}\boldsymbol{\iota}$. We will then proceed in two steps. First, we will show that with portfolio $\vec{y}'$, L would never become active in more than $\hat{n}$ firms. Second, we will show that $\vec{y}'$ is always preferred to any $\vec{y}''$ that induces $n'' > \hat{n}$.

L prefers becoming active in $\hat{n}$ firms over becoming active in $n'' > \hat{n}$ firms if:

$$\frac{\gamma_S}{m\gamma_L + 2\gamma_S}\left[\hat{n}\pi(1,\hat{n}) + (N-\hat{n})\pi(0,\hat{n})\right] - \hat{n}\kappa > \frac{\gamma_S}{m\gamma_L + 2\gamma_S}\left[\hat{n}\pi(1,n'') + (N-\hat{n})\pi(0,n'')\right] - n''\kappa. \tag{A.6}$$

This condition always holds because industry profits are maximized at $\hat{n}$ and $n'' > \hat{n}$.

Next, we show that $\vec{y}'$ is preferred to any $\vec{y}$, which is incentive-compatible with $n'' > \hat{n}$. Hence, our goal is to show that:

$$U_L(\vec{y}', n') > U_L(\vec{y}, n'') \tag{A.7}$$

with $n^{'} \leq \hat{n}$ reflecting L's incentive-compatible choice at $\vec{y}'$. We also know that $U_L(\vec{y}', n') \geq U_L(\vec{y}', \hat{n})$. Note that:

$$U_L(\vec{y}', \hat{n}) = \gamma\sigma^2 N\left[\frac{1}{m}\frac{\gamma_S}{m\gamma_L + 2\gamma_S}\left(1 - \frac{\gamma_S}{m\gamma_L + 2\gamma_S}\right) - \frac{1}{2}\frac{1}{(m+2)^2}\right] - \hat{n}\kappa. \tag{A.8}$$

For any $\vec{y}''$ with elements $\overline{y}''$ and $\underline{y}''$, which is incentive-compatible with $n'' > \hat{n}$ we have that:

$$U_L(\vec{y}, n'') = \gamma\sigma^2\left[n''\frac{1}{m}\overline{y}''(1-\overline{y}'') - \hat{n}\frac{1}{2}\overline{y}''\overline{y}'' + (N-\hat{n})\frac{1}{m}\underline{y}''(1-\underline{y}'') - \frac{1}{2}\underline{y}''\underline{y}''\right] - n''\kappa. \tag{A.9}$$

It follows that $U_L(\vec{y}', \hat{n}) > U_L(\vec{y}, n'')$ because (i) $n'' > \hat{n}$ and (ii) $y = \frac{\gamma_S}{m\gamma_L + 2\gamma_S}$ maximizes the risk-return trade-off for all j.

A.11 Proof of Proposition 8.

Limiting engagement. We have shown in the Proof of Corollary **??** that L is only willing to facilitate collusion if κ is sufficiently small. Hence, it immediately follows that an increase in the governance cost κ always (weakly) decreases socially-undesirable governance. If $\pi(1,N) < \frac{1}{N}\pi(1,1)$, then L is willing to cut cost if κ is sufficiently small. In this case, increasing κ (weakly) decreases socially-desirable governance. However, if $\frac{1}{N}\pi(1,1) < \pi(1,N) < \frac{1}{N}\pi(1,1)$, then L cuts cost for intermediate values of κ. In this case, an increase in κ can (weakly) increase socially-desirable governance. To see that an increase in κ has an ambiguous effect on L's expected utility, we can consider the case $\pi(1,N) > \pi(1,1)$ so that L facilitates collusion if κ is sufficiently small and stays passive otherwise. If κ increases in such that L continues to facilitate collusion, then L is worse off. If, however, the increase in κ is such that κ exceeds $\frac{\gamma_S}{m\gamma_L+2\gamma_S}\pi(1,N)$, then L can stay passive and hold $\frac{\gamma_S}{m\gamma_L+2\gamma_S}$, which makes her better off.

Limiting horizontal shareholding. First, note that any additional constraint on L's portfolio choice makes the large investor worse off by a revealed-preference-type argument. First, we focus on the ambiguous effect on socially-desirable governance ($n = 1$). If $\pi(1,N) < \frac{1}{N}\pi(1,1)$, L cuts cost with a position of $\frac{\gamma_S}{m\gamma_L+2\gamma_S}$ in each firm if κ is sufficiently small. In this case, a limit of $\overline{y}^r = \underline{y}^r = \frac{\kappa}{\pi(1,1)}$ might incentivize L to stay passive. If $\frac{1}{N}\pi(1,1) < \pi(1,N) < \pi(1,1)$ and $\kappa < \frac{N\pi(1,N)-\pi(1,1)}{(N-1)(m+2)}$, L facilitates collusion with a position of $\frac{\gamma_S}{m\gamma_L+2\gamma_S}$ and cuts cost with $\overline{y} > \frac{\gamma_S}{m\gamma_L+2\gamma_S} > \underline{y}$. Now, suppose that $\overline{y}^r = \underline{y}^r = \underline{y}$ and that, without regulation, L facilitates collusion. With regulation, L can no longer hold $\frac{\gamma_S}{m\gamma_L+2\gamma_S}$ in each firm but is forced to hold $y_{1L} = \frac{\gamma_S}{m\gamma_L+2\gamma_S}$ and $y_{jL} = \underline{y}$ for $j \geq 2$. In this case, L might switch from $n = N$ to $n = 1$ (which is unaffected by the policy).

If $\pi(1,N) > \pi(1,1)$, L facilitates collusion and holds $\frac{\gamma_S}{m\gamma_L+2\gamma_S}$ in each firm if κ is sufficiently small; otherwise, she remains passive and holds $\frac{\kappa}{\pi(1,N)}$ in each firm. Suppose $\overline{y}^r = \underline{y}^r = \frac{\kappa}{\pi(1,N)}$, then L might prefer to stay passive. However, if $\frac{1}{N}\pi(1,1) < \pi(1,N) < \frac{1}{N}\pi(1,1)$, then L might switch from $n = 1$ to $n = N$. In particular, suppose that $\overline{y}^r = \frac{\gamma_S}{m\gamma_L+2\gamma_S} < \overline{y}$ and $\underline{y}^r = 0$. In this case, regulation does not affect the optimal portfolio if L facilitates collusion. If L cuts cost without regulation, then she must reduce y_{jL} to zero for all $j \geq 2$, which might be too costly and can lead to a switch to $n = N$ and $y_{jL} = \frac{\gamma_S}{m\gamma_L+2\gamma_S}$ for all j.

Traditional competition policy. In this example, firms set prices above the competitive equilibrium level if L facilitates collusion and $n = N$. Hence, this type of regulation leads to reductions in $\pi(1,N)$. Following the results in the Proof of Corollary **??**, we distinguish between three scenarios.

1. If $\pi(1, N) > \pi(1, 1)$, L chooses $n = 0$ if κ is sufficiently high and $n = N$ otherwise. A decrease in $\pi(1, N)$ makes $n = 0$ ($n = N$) more (less) attractive and L better off.

2. If $\pi(1, N) < \frac{1}{N}\pi(1, 1)$, L chooses $n = 0$ if κ is sufficiently high and $n = 1$ otherwise. A decrease in $\pi(1, N)$ has no influence on n and U_L.

3. If $\frac{1}{N}\pi(1, 1) < \pi(1, N) <$, L chooses $n = 0$ if κ is sufficiently high, $n = N$ if κ is sufficiently low, and $n = 1$ otherwise. A decrease in $\pi(1, N)$ makes $n = 1$ ($n = N$) more (less) attractive and L better off.