

Trading and Shareholder Democracy

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Trading and Shareholder Democracy

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Abstract

We study shareholder voting in a model in which trading aspects the composition of the shareholder base. Trading and voting are complementary, which gives rise to self-fulfilling expectations about proposal acceptance and multiple equilibria. Prices and shareholder welfare can move in opposite directions, so the former may be an invalid proxy for the latter. Increasing liquidity can reduce welfare, because it allows extreme shareholders to gain more weight in voting. Delegating decision-making to the board can improve shareholder value. However, the optimal board is biased, does not represent current shareholders, and may not garner support from the majority of shareholders.

Keywords: Corporate Governance, Voting, Shareholder Rights, Trading, Delegation

JEL Classifications: D74, D83, G34, K22

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Trading and Shareholder Democracy*

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January 21, 2021

Abstract

We study shareholder voting in a model in which trading affects the composition of the shareholder base. Trading and voting are complementary, which gives rise to self-fulfilling expectations about proposal acceptance and multiple equilibria. Prices and shareholder welfare can move in opposite directions, so the former may be an invalid proxy for the latter. Increasing liquidity can reduce welfare, because it allows extreme shareholders to gain more weight in voting. Delegating decision-making to the board can improve shareholder value. However, the optimal board is biased, does not represent current shareholders, and may not garner support from the majority of shareholders.

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“Shareholders express views by buying and selling shares; (...) The more shareholders govern, the more poorly the firms do in the marketplace. Shareholders’ interests are protected not by voting, but by the market for stock (...).” (Easterbrook and Fischel (1983), pp. 396-397)

1 Introduction

In many advanced economies, regulatory reforms and charter amendments have empowered shareholders and enhanced their voting rights in an effort to constrain managerial discretion.¹ As a result, shareholders not only elect directors, but frequently vote on executive compensation, corporate transactions, changes to the corporate charter, and social or environmental policies. This shift of power from boards to shareholder meetings takes for granted that shareholder voting increases shareholder welfare and firm valuations by aligning the preferences of those who make decisions with those for whom decisions are made – a form of “corporate democracy.”² However, unlike the political setting, a key feature of the corporate setting is the existence of the market for shares, which allows investors to choose their ownership stakes based on their preferences and the stock price. Thus, who gets to vote on the firm’s policies is fundamentally linked to voters’ views on how the firm should be run. While the literature has looked at many important questions in the context of shareholder voting, it has so far not examined the effectiveness of voting when the shareholder base forms endogenously through trading.³ The main goal of this paper is to examine the link between trading and voting and its implications for shareholder welfare, and to highlight how the effectiveness of shareholder voting vis-a-vis board decision-making is affected by the firm’s trading environment.

Specifically, we study the relationship between trading and voting in a context in which shareholders differ in their attitudes toward proposals. We provide several key insights. First, trading aligns the shareholder base with the expected outcome, even if the expected outcome

¹Cremers and Sepe (2016) make the same observation and review the large legal literature on the subject (see also Hayden and Bodie, 2008). The finance literature has assembled a wealth of empirical evidence on this shift, including the discussion on the effectiveness of say-on-pay votes, surveyed by Ferri and Göx (2018), reforms to disclose mutual fund votes in the United States (e.g., Davis and Kim, 2007; Cvijanovic, Dasgupta, and Zachariadis, 2016), and the introduction of mandatory voting on some takeover proposals in the UK (Becht, Polo, and Rossi, 2016).

²E.g., the speech by SEC Commissioner Aguilar (<https://www.sec.gov/news/speech/2009/spch102909laa.htm>).

³Karpoff (2001) surveys the earlier and Yermack (2010) the later literature on shareholder voting.

is not optimal. There can even be multiple equilibria, so that similar firms can end up having very different ownership structures and taking very different strategic directions – a source of non-fundamental indeterminacy. Second, changes in the governance environment of the firm can affect shareholder welfare and prices in opposite directions, which suggests that price reactions to voting outcomes may not be a valid empirical proxy for their welfare effects. Third, while higher market liquidity increases the ability of shareholders to gain from trade, it may nevertheless reduce welfare by allowing the shareholder base to become more extreme, so that the views of more extreme shareholders prevail over those with more moderate attitudes. Finally, shareholder welfare can be increased if, instead of voting, decisions are delegated to a board of directors, but only if the board is biased and does not represent the average shareholder. However, short-term trading considerations may prevent the optimal board from getting the support of the majority of shareholders. In addition, we analyze several actively-debated governance issues, such as the role of index investors and the growing importance of environmental and social proposals.

We consider a model in which a continuum of shareholders first trade their shares in a competitive market and then vote on a proposal. Each shareholder’s valuation of the proposal depends on an uncertain common value that all shareholders share, but also on a private value that reflects shareholders’ different attitudes toward the proposal. After shareholders trade, but before they vote, they observe a signal on the proposal’s common value; the signal is public and there is no asymmetric information. Because of private values, some shareholders are biased toward the proposal and vote to accept it even if the common value is expected to be low; we call them *activist* shareholders, because they want to change the status quo. By contrast, other shareholders are biased against the proposal and have a higher bar for accepting it; we call them *conservative*, since they are biased in favor of the status quo. These different attitudes between shareholders may reflect private benefits from their ties with the company or ownership of other firms, different social or political views (“investor ideology”), time horizons, risk aversion, and tax considerations.⁴ Some commentators even argue that shareholder voting

⁴Van Wesep (2014), Cvijanovic, Groen-Xu, and Zachariadis (2020), and Matsusaka and Shu (2021) provide theoretical analyses of voting with heterogeneous shareholder preferences. Empirically, Cvijanovic, Dasgupta, and Zachariadis (2016) and He, Huang, and Zhao (2019) analyze the heterogeneity between mutual funds arising from conflicts of interest or common ownership, and Matvos and Ostrovsky (2010) show that funds differ systematically in their support for management. Some shareholders have interests that set them apart from other shareholders, e.g., unions (Agrawal, 2012), family shareholders and founders (Mullins and Schoar, 2016;

should be seen as a system to aggregate heterogeneous preferences (Hayden and Bodie, 2008).

We start by analyzing the setting in which shareholders can trade but cannot vote, e.g., if the decision on the proposal is taken by the board of directors. Because of heterogeneous preferences, shareholders differ in their valuation of the firm, which creates gains from trade. The equilibrium is unique and can be of two types: if the probability of proposal adoption is above a certain threshold, then activist shareholders value the firm more than conservative shareholders and buy shares from them, whereas in the opposite case, conservatives buy and activists sell. Thus, trading allows matching between shareholders and firms: Shareholders who do not agree with the firm's decisions sell to those who expect their preferred alternative to be chosen, and thereby benefit from the higher price the buyers are willing to pay.

By contrast, if the decision on the proposal is made by a shareholder vote, then multiple equilibria can arise. An *activist* equilibrium, in which the proposal is accepted with a relatively high probability, can co-exist with a *conservative* equilibrium, in which the proposal is likely to be rejected. Multiplicity arises because of a feedback loop between trading and voting: Shareholders' trading decisions depend on expected voting outcomes, and voting outcomes depend on how trading changes the shareholder base. Specifically, if shareholders expect a high (low) likelihood of proposal adoption, the more conservative shareholders sell to (buy from) the more activist shareholders. As a result, the shareholder base after trading is more activist (conservative) and proposals are approved more (less) often, confirming the ex-ante expectations. The evidence is consistent with the existence of such a feedback loop (e.g., Cox, Mondino, and Thomas, 2020; Li, Maug, and Schwartz-Ziv, 2021; see Section 8 for more details). Multiplicity of equilibria is especially likely when liquidity or the heterogeneity of the initial shareholder base are high. The resulting fundamental indeterminacy highlights potential empirical challenges in analyzing shareholder voting, since firms with the same fundamental characteristics can have different ownership structures and adopt different policies.

Next, we explore prices and shareholder welfare, and highlight that they are different and may even move in opposite directions. We first note that the decision on the proposal depends

Villalonga and Amit, 2006), CEOs, and governments. Bolton et al. (2019) and Bubb and Catan (2019) develop different classifications of shareholders' attitudes to corporate governance. Bushee (1998) and Gaspar, Massa, and Matos (2005) analyze the implications of differences in time horizons between investors. Desai and Jin (2011) study differences in shareholder tax characteristics. Hayden and Bodie (2008) provide a comprehensive overview of different sources of shareholder heterogeneity.

on the identity of the marginal voter, who is indifferent between accepting and rejecting the proposal if it just passes. For example, under simple majority, the marginal voter is the median voter among those shareholders who hold shares after trading. However, the share price depends on how proposal adoption affects the valuation of the marginal trader, who is just indifferent between buying and selling shares. Hence, if the gap between the marginal voter and the marginal trader widens, the share price decreases. Finally, we show that shareholder welfare, which we define as the average valuation of the initial shareholders, depends on how the decision on the proposal affects the valuation of the average shareholder who holds shares after trading. Hence, if the gap between the marginal voter and the average post-trade shareholder widens, ex ante shareholder welfare declines.

Price and shareholder welfare react differently to policy changes, and may even move in opposite directions, because they are determined by, respectively, the valuation of the marginal trader and the valuation of the average shareholder. In particular, consider the case in which the marginal voter is more extreme than the marginal trader, but less extreme than the average post-trade shareholder. Then a policy change, such as an increase in the majority requirement, either shifts the marginal voter towards the marginal trader but farther away from the average post-trade shareholder, or the opposite. Hence, prices increase (decrease) exactly when shareholder welfare decreases (increases). This result challenges the notion that there is a close connection between shareholder welfare and prices. It casts doubt on the common interpretation of event studies, which are prevalent in empirical work on shareholder voting.

Our analysis also uncovers a novel effect of financial markets on shareholder welfare. If shareholders do not vote, e.g., if decisions over the proposal are made by the board, greater opportunities to trade and higher liquidity always increase welfare: Shareholder heterogeneity creates gains from trade, and more liquid markets allow more gains from trade to be realized. However, when decisions are made by a shareholder vote, trading may be detrimental to shareholder welfare. Intuitively, greater opportunities to trade lead to larger shifts in the shareholder base and make the marginal voter more extreme, which may widen the gap between the marginal voter and the average shareholder and thereby reduce welfare. By highlighting this effect, our paper contributes to the literature on real effects of financial markets (see [Bond, Edmans, and Goldstein \(2012\)](#) for a survey).

Finally, we examine the optimal allocation of power between boards and shareholder meet-

ings by comparing welfare in the two settings described above – when shareholders trade and vote; and when shareholders trade but decisions are made by the board. The board, like each of the shareholders, is characterized by its attitude toward the proposal.

We define the optimal board as that which maximizes the initial shareholder welfare. We first show that the optimal board is biased and does not reflect the preferences of the initial shareholder base; instead, it maximizes the average valuation of the post-trade shareholder base. Intuitively, the optimal board caters to the preferences of the shareholders with the highest willingness to pay, rather than to the average pre-trade shareholder. Indeed, if the board's preferences are aligned with those of more extreme shareholders, this also benefits shareholders with more moderate views, who can now sell their shares to those with more extreme views for a higher price. Essentially, the design of an optimal board accounts for gains from trade between shareholders with different views. Importantly, this biased optimal board, as well as a “good enough” board that is sufficiently similar to the optimal board, increases shareholder welfare relative to decision-making via shareholder voting. In other words, the argument that whenever the board is biased, decisions should be delegated to shareholders, is not necessarily correct if shareholders can trade. In fact, delegation to an unbiased board can decrease shareholder welfare, whereas delegation to a biased board can increase it. Similarly, the objective of the optimal board should not be to maximize the share price, since the price reflects only the preferences of the marginal trader and not those of the average shareholder.

Even if it is optimal to delegate decision-making to the board, it is not guaranteed that the majority of shareholders will want to do so. To show this, we extend the model by adding a stage before trading in which shareholders vote on whether to delegate the decision on the proposal to the board. We show that shareholders may choose not to delegate decision-making to a board, not even an optimal board, because with voting before trading, a new externality arises: Shareholders who expect to buy shares after the vote on delegation consider not only the implications of delegation for the long-term value of the firm, but also for the short-term price at which they can buy shares from those shareholders who sell. As a result, short-term trading considerations may push these shareholders to vote against delegation to an optimal board in order to benefit from a lower price.

Overall, we strike a cautious note on the general movement to “shareholder democracy” since voting may lead to suboptimal outcomes when shareholders can trade. As we show,

trading allows shareholders with more extreme preferences to build large positions and use their voting power to implement their preferred policies, which can hurt more moderate shareholders and decrease shareholder welfare. Delegating decisions to the board may dominate decision-making via shareholder voting even if the board is biased and pursues interests different from those of the average shareholder. However, shareholders might make incorrect decisions when voting to delegate authority to the board since they always give some weight to short-term trading considerations. As such, we resonate the critical stance of [Easterbrook and Fischel \(1983\)](#) in the opening vignette.

2 Discussion of the literature

Our paper is related to the theoretical literature on shareholder voting (e.g., [Maug and Rydqvist, 2009](#); [Levit and Malenko, 2011](#); [Van Wesep, 2014](#); [Bar-Isaac and Shapiro, 2019](#); [Malenko and Malenko, 2019](#); and [Cvijanovic, Groen-Xu, and Zachariadis, 2020](#)). These papers all assume an exogenous shareholder base and discuss strategic interactions between shareholders based on heterogeneous information (building on the strategic voting literature, e.g., [Austen-Smith and Banks \(1996\)](#) and [Feddersen and Pesendorfer \(1996\)](#)), heterogeneous preferences, or both. [Bernhardt, Liu, and Marquez \(2018\)](#) show that the combined acquirer-target return could be a poor proxy for the welfare consequences of mergers when shareholders have heterogeneous valuations, which is related to our result that prices and welfare could move in opposite directions. Differently from this paper and other papers in this strand of the literature, our analysis endogenizes the shareholder base by studying how the voting equilibrium changes if shareholders can trade in anticipation of voting outcomes. [Musto and Yilmaz \(2003\)](#) analyze how adding a financial market changes political voting outcomes. However, in their model voters trade financial claims but not the votes, which is different from the corporate context. Overall, our paper contributes to this literature by overcoming an important theoretical challenge when analyzing shareholder voting: Shareholders' valuations and their trading decisions depend on expected voting outcomes, but voting outcomes depend in turn on the composition of the shareholder base, which is endogenous and changes through trading.

We are aware of three strands of literature that integrate the analysis of shareholder voting with trading. The first is the literature on general equilibrium economies with incomplete

markets, which recognizes that shareholders with different preferences will be unanimous and production decisions can be separated from consumption decisions (Fisher separation) only if markets are complete and perfectly competitive.⁵ With incomplete or imperfectly competitive markets, shareholders will generally disagree about the optimal production plans of the firm, since they are not only interested in profit maximization but also in the effect of firms' decisions on product prices (e.g., [Kelsey and Milne, 1996](#)). Then conflicts of interest arise, governance mechanisms become necessary, and the objective of the firm becomes undefined. The models in this literature introduce mechanisms such as voting, blockholders, or boards of directors to close this gap.⁶ Compared to this earlier literature, we analyze a less general model, which allows us to characterize equilibria beyond existence, analyze the way in which voting and trading interact, derive implications for shareholder welfare, and characterize delegation decisions and their properties. [Meirowitz and Pi \(2020\)](#) also study the interaction between trading and voting, but examine how shareholders' ability to trade *after* voting affects information aggregation, whereas we focus on the endogeneity of the shareholder base and the feedback loop between trading and voting.

The second literature analyzes the issues that arise when financial markets allow traders to exercise voting rights without exposure to the firm's cash flows. [Blair, Golbe, and Gerard \(1989\)](#), [Neeman and Orosel \(2006\)](#), and [Kalay and Pant \(2009\)](#) show that vote-buying can enhance the efficiency of contests for corporate control, while [Speit and Voss \(2020\)](#) show that it can enable a hostile activist to destroy value. [Brav and Mathews \(2011\)](#) conclude that the implications of empty voting for efficiency are ambiguous and depend on transaction costs and shareholders' ability to evaluate proposals. [Esö, Hansen, and White \(2014\)](#) argue that empty voting may improve information aggregation. Our paper is complementary to this literature, since we abstract from derivatives markets and vote-trading and assume one-share-one-vote throughout.⁷ The political science literature on vote-trading reflects a closely related idea.⁸

⁵See [Gevers \(1974\)](#), [Drèze \(1985\)](#), [DeMarzo \(1993\)](#), and [Kelsey and Milne \(1996\)](#) on incomplete markets and [Demichelis and Ritzberger \(2011\)](#) on imperfect competition. [Hirshleifer \(1966\)](#) shows that Fisher separation obtains in an inter-temporal production economy with complete markets in a state-preference framework.

⁶See [Gevers \(1974\)](#), [Drèze \(1985\)](#), and [DeMarzo \(1993\)](#) on majority voting. [Drèze \(1985\)](#) and [DeMarzo \(1993\)](#) conceptualize the board of directors as a group of controlling blockholders.

⁷[Burkart and Lee \(2008\)](#) provide a survey of the theoretical literature on the one-share-one-vote structure.

⁸The endogeneity of the voter base in our model also connects our paper to the literature on voter participation and voluntary voting (e.g., [Palfrey and Rosenthal, 1985](#); [Krishna and Morgan, 2011, 2012](#)) and to the literature on sorting based on voters' preferences for public goods (e.g., [Tiebout, 1956](#)).

This literature investigates vote-trading as a mechanism to address a limitation of standard voting rules, which do not reflect the intensity of preferences (e.g., see [Casella, Llorente-Saguer, and Palfrey \(2012\)](#), [Lalley and Weyl \(2018\)](#), and references therein). However, in this literature, agents trade votes but not their exposure to the voting outcome, whereas in our model cash flows are tied to voting rights and always traded in the same proportion. This feature of most publicly traded stocks is critical for our main results.

The third literature analyzes blockholders who form large blocks endogenously through trading and affect governance through voice or exit (see [Edmans \(2014\)](#) and [Edmans and Holderness \(2017\)](#) for surveys). However, this literature does not focus on the complementarities and collective action problems that arise in our model, as the majority of this literature focuses on models with a single blockholder. Relative to existing governance models of multiple blockholders, our paper analyzes the feedback loop between voting and trading and how this affects the choice between delegation to a board and shareholder voting.^{9,10}

Our model also has some similarities to models of takeovers (see [Betton, Eckbo, and Thorburn \(2008\)](#) for a survey): it features a stage in which shares change hands, followed by a stage in which a decision is made by the party in control. Differently from models of takeovers, trade in our model happens in a centralized market and decisions are made collectively through voting. Both distinctions are crucial for our main results.

Finally, our paper contributes to the literature on the allocation of control between shareholders and management (e.g., [Burkart, Gromb, and Panunzi \(1997\)](#), [Harris and Raviv \(2010\)](#), and [Chakraborty and Yilmaz \(2017\)](#)) by showing how the optimal balance of power depends on the firm's trading environment.

3 Model

Consider a firm with a continuum of measure one of risk-neutral shareholders. Each shareholder is endowed with $e > 0$ shares. Shareholders choose between two alternative policies by voting

⁹See [Zwiebel, 1995](#); [Noe, 2002](#); [Edmans and Manso, 2011](#); [Dhillon and Rossetto \(2015\)](#); and [Brav, Dasgupta, and Mathews, 2019](#).

¹⁰[Garlappi, Giammarino, and Lazrak \(2017; 2019\)](#) analyze group decision-making about investment projects and show how trade among group members may overcome inefficiencies from differences in beliefs. These papers focus on the dynamics of group decision-making and do not feature the mechanisms and results that arise in our model.

on a proposal, such that one policy is implemented if the proposal is rejected ($d = 0$), and another policy is implemented if it is accepted ($d = 1$). For example, by voting on a proposal to remove a takeover defense, shareholders might induce the firm to cut R&D and effectively change its investment strategy from a longer-term to a shorter-term policy.¹¹

Preferences. Shareholders' preferences over the two policies depend on a common value component and on shareholders' private values. The common value is determined by an unknown state $\theta \in \{-1, 1\}$: if $\theta = -1$ ($\theta = 1$), rejecting the proposal and implementing the first policy is value-increasing (decreasing); and, vice versa, if $\theta = 1$ ($\theta = -1$), accepting the proposal and implementing the second policy is value-increasing (decreasing). Thus, for the common value it is critical that the policy matches the state, i.e., that the proposal is accepted if and only if $\theta = 1$. Similar setups are employed in the strategic voting literature, e.g., [Austen-Smith and Banks \(1996\)](#) and [Feddersen and Pesendorfer \(1996\)](#). For example, in the case of a proposal that would lead to cutting R&D, $\theta = 1$ ($\theta = -1$) corresponds to shorter-term (longer-term) projects having a higher NPV, so that approving (rejecting) the proposal is value-increasing if and only if $\theta = 1$ ($\theta = -1$).

In addition to the common value component, shareholders have private values over the two policies, which reflect the heterogeneity in their preferences. For brevity and ease of exposition, we refer to these private values as biases and denote them by b . A shareholder with bias $b > 0$ ($b < 0$) receives additional (dis)utility if the proposal is accepted and the second policy is adopted, and experiences an additional loss (gain) if the proposal is rejected and the first policy is adopted. Heterogeneity in preferences can stem from time horizons, private benefits, social or political views, common ownership, risk aversion, or tax considerations. As noted in the Introduction, the evidence for preference heterogeneity is pervasive. In the R&D example, suppose that b captures variation in investors' time horizons, and a larger b reflects a shorter horizon, i.e., more impatience. Then, shareholders with a larger b get more utility from a shorter-term strategy and more disutility from a longer-term strategy relative to those with a smaller b .

¹¹By making the firm more susceptible to hostile takeovers and shareholder activism, removal of antitakeover defenses may induce managerial short-termism, such as cutting R&D and other long-term investment. See, e.g., [Stein \(1988\)](#) for a model deriving this prediction and [Atanassov \(2013\)](#) for empirical evidence.

Overall, we assume that the value of a share from the perspective of shareholder b is

$$v(d, \theta, b) = v_0 + (\theta + b)(d - \phi) = v_0 + \begin{cases} \phi(-\theta - b) & \text{if } d = 0, \\ (1 - \phi)(\theta + b) & \text{if } d = 1, \end{cases} \quad (1)$$

where $v_0 \geq 0$ captures the part of valuation that is not affected by the decision between the two policies and is sufficiently large to ensure that shareholder value is always non-negative.¹² Parameter $\phi \in [0, 1]$ is the weight of the first policy (proposal rejection), and $1 - \phi$ is the weight of the second policy (proposal acceptance). In the symmetric case, $\phi = \frac{1}{2}$, and from the perspective of shareholder b , the gain from making the right decision equals the loss from making the wrong decision. This captures situations in which the two policies are in conflict with each other — for example, a choice between a short-term vs. long-term investment project (for a proposal that would cut R&D), a choice between a shareholder-friendly vs. management-friendly governance structure (for a proposal to destagger the board), or a choice between a more vs. less socially responsible corporate strategy (for social and environmental proposals).

In other cases, in which the two policies are not as related, shareholders may only disagree in their assessment of just one of them, so that ϕ is close to 0 or 1. For example, $\phi = 0$ captures a proposal to invest in a new project that is completely independent of the firm's assets in place, when the valuation of assets in place is common knowledge and the same for all shareholders. Most of our results hold for any ϕ , and we discuss the specific results for which this parameter plays a more important role below.

Because of private values, shareholders apply different hurdle rates for accepting the proposal. Specifically, for any ϕ , a shareholder with bias b would like the proposal to be accepted if and only if his expectation of $\theta + b$ is positive. To facilitate the exposition, we will refer to the first policy, which is implemented upon the rejection of the proposal, as the status quo, and to high (low) b shareholders as “activist” (“conservative”), because a high b is associated with a bias against (toward) the status quo.

Suppose that the cross section of shareholders' biases b is given by a differentiable cdf G , which is publicly known and has full support with positive density g on $[-\bar{b}, \bar{b}]$. The cdf G describes the composition of the initial shareholder base regarding the preferences for the

¹²We assume (1) for simplicity. In all likelihood, $v(d, \theta, b)$ can be generalized to $v_0 + u(\theta, b)(d - \phi)$, where $u(\theta, b)$ is strictly increasing in θ and b .

proposal. The economic environment of the firm is in constant flux from changes in regulation, technology, and consumer tastes, which warrant adaptations and new decisions. As such, the model captures a snapshot of the firm at the point in time when a new proposal is put on the agenda following some unexpected shock. For simplicity, we assume that all initial shareholders hold the same stake e in the firm; in Section 7.3 we show that our results remain unchanged if we consider a more general setting in which a shareholder with bias b holds $e(b)$ shares for some function $e(\cdot)$.

Timeline. The game has two stages: first, trading and then, voting. This timing allows us to focus on the endogeneity of the voter base, which is crucial for our analysis. At the outset, all shareholders are uninformed about the value of θ ; they all have the same prior on its distribution, which we specify below. Then trading takes place. Short sales are not allowed. In the baseline model, shareholders can either sell any number of shares up to their entire endowment e , or buy any number of shares up to a fixed finite quantity $x > 0$, or not trade. The quantity x captures trading frictions (e.g., illiquidity, transaction costs, wealth constraints), which limit shareholders' ability to build large positions in the firm: without trading frictions, the firm would be owned by a single type of shareholder (see Section 4.2).¹³ In Section 7.3 we show that our main results remain unchanged if a shareholder with bias b can buy up to $x(b)$ shares for some function $x(\cdot)$. This extension captures cases in which the heterogeneity across shareholders also interacts with their ability or incentives to trade, e.g., due to differences in risk-aversion, time horizon, and taxes.

In equilibrium the market must clear, and we denote the market clearing share price by p . We assume that shareholders do not trade if they are indifferent between trading at the market price p and not trading at all. This tie-breaking rule could be rationalized by adding arbitrarily small transaction costs.¹⁴

After the market clears, but before voting takes place, all shareholders observe a public signal about the state θ . This public information may stem from disclosures by management,

¹³For simplicity, we consider one round of trade, but allowing for multiple rounds of trade prior to the vote would not change the properties of the equilibrium as long as we keep the same restriction on the aggregate number of shares that can be bought, x . In Section 7.4, we analyze a second round of trade *after* the vote.

¹⁴The purpose of this tie-breaking rule is to exclude equilibria that exist only in knife-edge cases. However, as the proof of Proposition 3 shows, other tie-breaking rules also eliminate these knife-edge equilibria — for example, rules under which indifferent shareholders always sell or always buy shares.

analysts, or proxy advisors. Let $q = \mathbb{E}[\theta|\text{public signal}]$ be the shareholders' posterior expectation of the state following the signal. For simplicity and ease of exposition, we assume that the public signal is q itself, and that q is distributed according to a differentiable cdf F with mean zero and full support with positive density f on $[-\Delta, \Delta]$, where $\Delta \in (0, 1)$. Thus, the ex-ante expectation of θ is zero. The symmetry of the support of q around zero is not necessary for any of the main results. To simplify the exposition, it is useful to introduce

$$H(q) \equiv 1 - F(q). \quad (2)$$

At the second stage, after observing the public signal q , each shareholder votes the shares he owns after the trading stage, based on his preferences and the realization of q . Shareholders vote either in favor or against the proposal. Each share has one vote. If a proportion of more than $\tau \in (0, 1)$ of all shares are cast in favor of the proposal, the proposal is accepted. Otherwise, the proposal is rejected. Parameter τ captures not only the statutory majority requirement, but also the power of the CEO, the independence of the board, and shareholder rights: The combination of all of these factors determines how much effective power shareholder votes have to change corporate policies, especially for non-binding proposals.¹⁵

The timeline of the model aligns well with observed practices. In the model, trading determines the voter base, which puts the record date, i.e., the date that determines who is eligible to vote, after the trading stage. This sequence of events applies to all votes on important issues such as M&As, proxy fights, special meetings, and high-profile shareholder proposals, which are known well ahead of the record date. If the record date were prior to the trading stage, then shareholders who sell their shares during trading could still vote, and we do not analyze such “empty voting.” We also assume that shareholders observe the signal q after the record date. Examples of such signals include proxy advisors' recommendations, which are released about one month after the record date on average (see Fig. 1 in [Li, Maug, and Schwartz-Ziv, 2021](#)) as well as managements' responses to these recommendations. (See

¹⁵[Levit and Malenko \(2011\)](#) show that voting on non-binding proposals is effectively binding with an endogenously determined voting threshold that depends on the firm's governance characteristics. For binding proposals, there is heterogeneity across firms with respect to the statutory majority requirement used in shareholder voting. While a large fraction of firms use a simple majority rule, many firms still have supermajority voting for issues such as mergers or bylaw and charter amendments, and supermajority requirements are often a subject of debate (see [Papadopoulos, 2019](#), and [Maug and Rydqvist, 2009](#)).

Section 7.4 for the analysis of a second round of trade after information is revealed.)

We analyze subgame perfect Nash equilibria in undominated strategies of the induced voting game. The restriction to undominated strategies is common in voting games, which typically impose the equivalent restriction that agents vote as-if-pivotal.¹⁶ This restriction implies that shareholder b votes his shares in favor of the proposal if and only if

$$b + q > 0. \tag{3}$$

For simplicity, we assume that $\bar{b} < \Delta$, which implies that even the most extreme shareholders condition their vote on the signal.

Extensions. Our baseline model makes some simplifying assumptions for tractability and ease of exposition. In Section 7 we relax some of these assumptions to discuss the following extensions: (1) the presence of index investors, who do not trade and only vote; (2) investors' social concerns, such that proposals have an impact on investors' welfare irrespective of their ownership in the firm, e.g., for proposals with a social or environmental impact; (3) a second round of trade after the vote; (4) shareholders' endowment e and their ability to trade x can vary with their bias b . In addition, in Section A.7 of the Online Appendix, we introduce partial sales of endowments by assuming that shareholders cannot sell more than $y < e$ shares. Our main results continue to hold in all these extensions. Finally, [Levit, Malenko, and Maug \(2021\)](#) study blockholders and the voting premium by analyzing a similar specification but without an upper limit on purchases of shares, in which a shareholder's utility from buying $s \geq -e$ shares is a quadratic function of the shares s traded.

4 Analysis

We solve the model by backward induction. Before analyzing the full model with trading and voting, we first analyze two benchmark cases to build the intuition, one in which shareholders vote but do not trade (Section 4.1) and one in which they trade but do not vote (Section 4.2).

We start by showing that, regardless of trading, proposal approval at the voting stage takes the form of a simple cutoff rule:

¹⁶E.g., [Baron and Ferejohn \(1989\)](#) and [Austen-Smith and Banks \(1996\)](#). This restriction helps rule out trivial equilibria, in which shareholders are indifferent between voting for and against since they are never pivotal.

Lemma 1. *If the proposal is decided by a shareholder vote, then in any equilibrium, there exists q^* such that the proposal is approved by shareholders if and only if $q > q^*$.*

Intuitively, this result follows because all shareholders, regardless of their biases, value the proposal more if it is more likely to increase value, i.e., if $\theta = 1$ is more likely.

4.1 Voting without trading

To begin, we develop the benchmark case in which shareholders vote but do not trade. Lemma 1 also applies in this case. The shareholder base at the voting stage is characterized by the pre-trade distribution G , and the proposal is approved if and only if a fraction of at least τ of the initial shareholders vote in favor. Since shareholders with a larger bias value the proposal more, it is approved if and only if the $(1 - \tau)$ -th shareholder, who has a bias of $G^{-1}(1 - \tau)$, votes for the proposal. Hence, the cutoff q^* is given by the expression in Proposition 1:

Proposition 1 (voting without trading). *If the proposal is decided by a shareholder vote but shareholders do not trade, there always exists a unique equilibrium. In this equilibrium, the proposal is approved by shareholders if and only if $q > q_{NoTrade}$, where*

$$q_{NoTrade} \equiv -G^{-1}(1 - \tau). \quad (4)$$

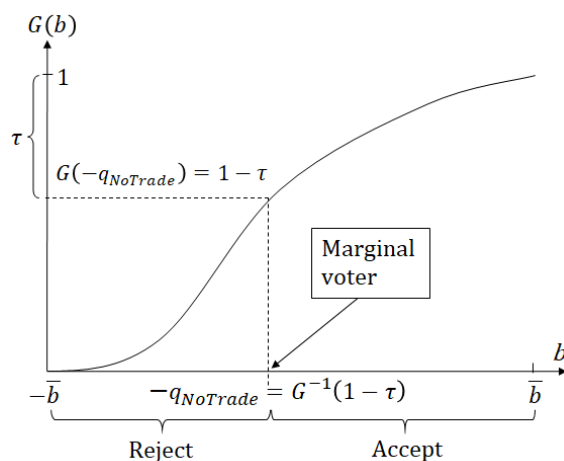


Figure 1 - Equilibrium characterization of the No-trade benchmark

Figure 1 illustrates the equilibrium of Proposition 1 and plots the cdf G against the private values (biases) b . The shareholder with bias $b = -q_{NoTrade}$ is the *marginal voter*. The identity of this shareholder is crucial for the decision on the proposal because his vote always coincides with the voting outcome. If $q = q_{NoTrade}$, there are $G(-q_{NoTrade}) = 1 - \tau$ shareholders for whom $b + q < 0$, who vote against (“Reject” region of the figure), and τ shareholders who vote in favor (“Accept” region). Thus, the marginal voter is the shareholder who is indifferent between accepting and rejecting the proposal if exactly τ shareholders vote to accept it.

4.2 Trading without voting

In the next step, we consider the second, complementary benchmark case, in which we have trading without voting. In this case, trading occurs as in the general model but then, after the public signal q is revealed, the decision on the proposal is exogenous. For concreteness, and to prepare for our later discussion of delegation in Section 6, we assume that the decision is made by the board of directors. We abstract from collective decision-making within the board and treat it as one single agent who acts like a shareholder with bias $b_m \in [-\bar{b}, \bar{b}]$ and valuation $v(d, \theta, b_m)$, so that it approves the proposal if and only if $b_m + q > 0$. Motivated by Lemma 1, we cast the following discussion in terms of a general exogenous decision rule q^* ; for the decision rule of the board we have $q^* = -b_m$.

Denote by $v(b, q^*)$ the valuation of a shareholder with bias b prior to the realization of q , as a function of the cutoff q^* . Then

$$v(b, q^*) = \mathbb{E}[v(\mathbf{1}_{q > q^*}, \theta, b)], \quad (5)$$

where the indicator function $\mathbf{1}_{q > q^*}$ obtains a value of one if $q > q^*$ and zero otherwise, and $v(d, \theta, b)$ is defined by (1). Notice that $v(b, q^*)$ can be rewritten as

$$v(b, q^*) = v_0 + b(H(q^*) - \phi) + H(q^*) \mathbb{E}[\theta | q > q^*], \quad (6)$$

and that it increases in b if and only if the probability of proposal approval, $H(q^*) = \Pr[q > q^*]$, is greater than ϕ . In words, activist shareholders with a large bias toward the proposal value the firm more than conservative shareholders with a small bias if and only if the proposal

is sufficiently likely to be approved. At the trading stage, the shareholder optimally buys x shares if his valuation exceeds the market price, $v(b, q^*) > p$, sells his endowment of e shares if $v(b, q^*) < p$, and does not trade otherwise. These observations lead to the following result.

Proposition 2 (trading without voting). *There always exists a unique equilibrium of the game in which the proposal is decided by a board with decision rule q^* .*

- (i) *If $H(q^*) > \phi$, the equilibrium is “**activist**.” a shareholder with bias b buys x shares if $b > b_a$ and sells his entire endowment e if $b < b_a$, where*

$$b_a \equiv G^{-1}(\delta) \tag{7}$$

and

$$\delta \equiv \frac{x}{x + e}. \tag{8}$$

The share price is given by $p = v(b_a, q^)$.*

- (ii) *If $H(q^*) < \phi$, the equilibrium is “**conservative**.” a shareholder with bias b buys x shares if $b < b_c$ and sells his entire endowment e if $b > b_c$, where*

$$b_c \equiv G^{-1}(1 - \delta). \tag{9}$$

The share price is given by $p = v(b_c, q^)$.*

- (iii) *If $H(q^*) = \phi$, no shareholder trades, and the price is $p = v_0 + \phi \mathbb{E}[\theta | q > q^*]$.*

In equilibrium, the firm is always owned by investors who value it most, which gives rise to two different types of equilibria. In part (i) of Proposition 2, the proposal is approved with a relatively high probability, $H(q^*) > \phi$, so activist shareholders value the firm more than conservatives. Hence, the equilibrium is “activist” in the sense that activist shareholders buy shares from conservatives, and the post-trade shareholder base has a high preference b for the proposal. In part (ii), the proposal is approved with a relatively low probability. Hence, the equilibrium is “conservative” in the sense that conservative shareholders buy from activists, creating a post-trade shareholder base that has a low preference b for the proposal. Overall, trading allows matching between firms and shareholders: Shareholders who like the

firm's policies end up holding the firm, while other shareholders sell, so that the post-trade shareholder base becomes more homogeneous.

Parameter ϕ determines how high the likelihood of proposal approval must be for activists or for conservatives to have the highest valuation. For example, if $\phi \approx \frac{1}{2}$, such as for a proposal that would change the investment strategy from long-term to short-term, then short-term (long-term) shareholders have the highest valuation if and only if the likelihood of proposal approval is high (low) enough. In contrast, if $\phi \approx 0$, such as in a vote for a new project when assets in place are valued equally by all shareholders, then shareholders who favor the project (i.e., activists) have the highest valuation for any positive probability that the project is adopted.

In the activist (conservative) equilibrium, the market-clearing condition determines the "marginal trader" with bias b_a (b_c). For example, in the activist equilibrium, the $1 - G(b_a)$ more activist shareholders with $b > b_a$ buy x shares each; the $G(b_a)$ more conservative shareholders with $b < b_a$ sell e shares each; and the marginal trader b_a is indifferent between buying and selling given the market price. Hence, market clearing requires $x(1 - G(b_a)) = eG(b_a)$, or $G(b_a) = \delta$ from (8), which gives the marginal trader b_a as in (7). Since $\delta = \frac{x}{x+e}$ measures the relative strength with which shareholders can buy shares, we think of it as capturing shareholders' opportunities to trade. We will refer to δ as market liquidity, since it captures market depth, which is the most important aspect of liquidity in our model.

The equilibrium share price $p = v(b_a, q^*)$ is determined by the identity of the marginal trader and equals his valuation of the firm, which depends on the decision rule q^* . Any investor with $b \neq b_a$ values the firm differently from the marginal trader, so his valuation is either higher or lower than the market price, creating gains from trade. This equilibrium is illustrated in the left panel of Figure 2. The conservative equilibrium is derived similarly and is displayed in the right panel. In what follows, we ignore the knife-edge case (iii), in which $H(q^*) = \phi$ and no shareholder trades.¹⁷

The identity of the marginal trader depends on liquidity, as summarized in the next result.

Corollary 1. *The marginal trader becomes more extreme when liquidity is higher, i.e., b_a increases in δ and b_c decreases in δ . In addition, $b_c < b_a$ if and only if $\delta > 0.5$.*

Corollary 1 follows directly from expressions (7) and (9). To see the intuition, notice that

¹⁷In Section 4.3 we show that when trade is allowed, this knife-edge equilibrium does not exist.

when liquidity δ is high, shareholders with the strongest preference for the likely outcome, i.e., those with a large bias in the activist equilibrium and those with a small bias in the conservative equilibrium, have the highest willingness to pay and buy the maximum number of shares. We sometimes refer to these shareholders as “extremists.” Other shareholders with more moderate views (i.e., $b \in (b_c, b_a)$), take advantage of this opportunity and sell their shares to shareholders with extreme views. In the limit, when there are no trading frictions ($\delta \rightarrow 1$), the firm is held by a single type of shareholder (\bar{b} or $-\bar{b}$). In contrast, when liquidity is low, only shareholders with the most extreme view *against* the likely outcome find it beneficial to sell their shares at a low price, while moderate shareholders (i.e., $b \in (b_a, b_c)$) always buy shares. This explains why the marginal trader in an activist equilibrium is more activist than in the conservative equilibrium if and only if liquidity is sufficiently high ($\delta > 0.5$).

Overall, if liquidity is high, the post-trade ownership structure is dominated by extremists, who can translate their strong views on the proposal into large positions in the firm. In contrast, when liquidity is low, the post-trade shareholder base is relatively moderate and closer to the initial shareholder base. Below we show that this feature has significant implications for prices and welfare when the decision on the proposal is made by a shareholder vote.

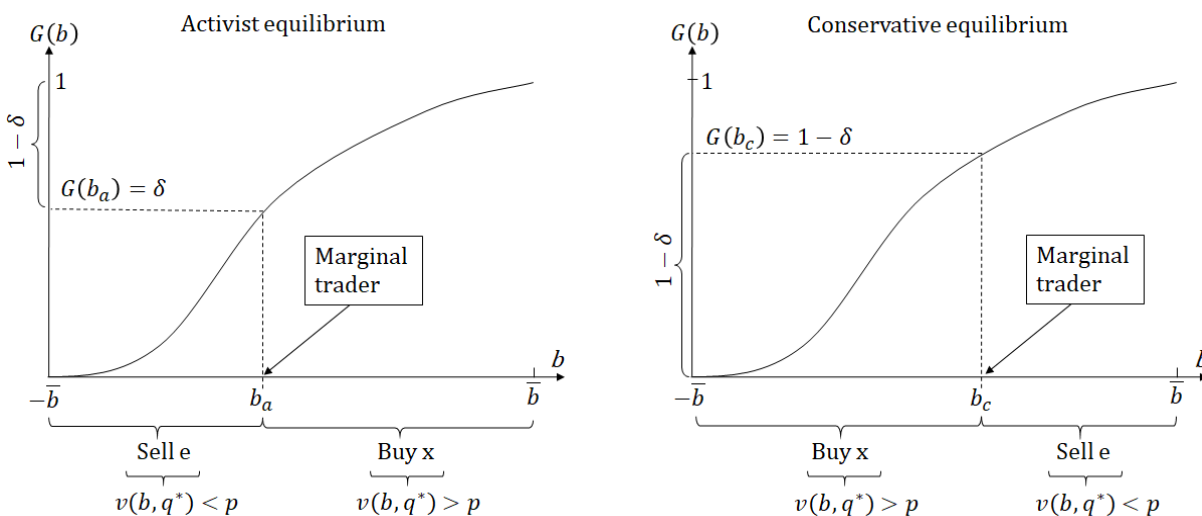


Figure 2 - Equilibrium characterization of the No-vote benchmark

4.3 Equilibrium with trading and voting

We now analyze the general model, in which shareholders trade their shares, and those who own the shares after the trading stage vote those shares at the voting stage. In Section 4.3.1, we characterize the equilibria and discuss their properties. Then, in Section 4.3.2, we discuss the complementarity between trading and voting and derive the circumstances under which multiple equilibria exist.

4.3.1 Existence and characterization of equilibria

According to Lemma 1, the decision rule on the proposal takes the form of an endogenous cutoff q^* , and the proposal is approved if and only if $q > q^*$, i.e., with probability $H(q^*)$. The value of the firm for shareholder b as a function of q^* is again given by (6). As in the no-vote benchmark, $v(b, q^*)$ is increasing in b if and only if $H(q^*) > \phi$. At the trading stage, a shareholder with bias b buys x shares if $v(b, q^*) > p$, sells his endowment of e shares if $v(b, q^*) < p$, and does not trade otherwise. However, differently from the no-vote benchmark, the decision rule is now tightly linked to the trading outcome. In particular, the trading stage determines the composition of the shareholder base at the voting stage, which, in turn, determines the cutoff q^* and the probability that the proposal is approved. Therefore, there is a feedback loop between trading and voting: Shareholders' trading decisions depend on expected voting outcomes, and voting outcomes depend on how trading changes the shareholder base.

The next result fully characterizes the equilibria of the game.

Proposition 3 (trading and voting). *An equilibrium of the game with trading and voting always exists.*

(i) An **activist** equilibrium exists if and only if $H(q_a) > \phi$, where

$$q_a \equiv -G^{-1}(1 - \tau(1 - \delta)). \quad (10)$$

In this equilibrium, a shareholder with bias b buys x shares if $b > b_a$ and sells his entire endowment e if $b < b_a$, where $b_a \equiv G^{-1}(\delta)$. The proposal is accepted if and only if $q > q_a$, and the share price is given by $p_a = v(b_a, q_a)$.

(ii) A **conservative** equilibrium exists if and only if $H(q_c) < \phi$, where

$$q_c \equiv -G^{-1}((1 - \delta)(1 - \tau)). \quad (11)$$

In this equilibrium, a shareholder with bias b buys x shares if $b < b_c$ and sells his entire endowment e if $b > b_c$, where $b_c = G^{-1}(1 - \delta)$. The proposal is accepted if and only if $q > q_c$, and the share price is given by $p_c = v(b_c, q_c)$.

(iii) Other equilibria do not exist.

Note that $q_c > q_a$: the cutoff for accepting the proposal is higher in the conservative equilibrium than in the activist equilibrium. Accordingly, the probability of accepting the proposal is higher in the activist equilibrium, i.e., $H(q_a) > H(q_c)$. Figure 3 illustrates both equilibria and combines the respective elements from Figures 1 and 2.

The logic behind both equilibria is the same as in the no-vote benchmark in Proposition 2. In the activist equilibrium displayed in the left panel of Figure 3, the cutoff q_a is relatively low ($-q_a$, the bias of the marginal voter, is high) and the proposal is likely to be approved. Hence, the term $H(q_a) - \phi$ in (6) is positive, so conservative shareholders who are biased against the proposal, $b < b_a$, sell their endowment to shareholders who are biased toward the proposal, $b > b_a$. The marginal trader b_a is determined by the exact same market clearing condition described in Proposition 2. Hence, $1 - G(b_a) = 1 - \delta$ shareholders own the firm after trading, and of these, at least $\tau(1 - \delta)$ need to approve the proposal to satisfy the majority requirement, so that $1 - G(-q_a)$ shareholders vote in favor, with q_a defined by (10). Importantly, and differently from the no-vote benchmark, the cutoff q_a is now *endogenously* low: the fact that the post-trade shareholder base consists of shareholders who are biased toward the proposal, $b > b_a$, implies that the post-trade shareholders will optimally vote in favor of the proposal unless their expectation q is sufficiently low to offset their bias. Hence, the expectations about the high likelihood of proposal approval become self-fulfilling. The conservative equilibrium displayed in the right panel of Figure 3 is constructed similarly.

Figure 3 also illustrates that the marginal voter is always more extreme than the marginal trader, i.e., in the activist (conservative) equilibrium, the marginal voter is more activist (conservative) than the marginal trader: $-q_a > b_a$ ($-q_c < b_c$). These relationships follow from Proposition 3 and play an important role in the analysis of welfare and prices in Section 5.

Similar to Lemma 1, the marginal trader becomes more extreme as liquidity increases. In addition, (10) and (11) imply that the marginal voter also becomes more extreme: $-q_a$ ($-q_c$) increases (decreases) in δ . The extreme to which the marginal trader and the marginal voter converge as liquidity increases depends on the type of equilibrium:

Corollary 2. *The marginal voter becomes more extreme as liquidity increases. In the activist (conservative) equilibrium, $-q_a$ increases in δ , and both $-q_a$ and b_a converge to \bar{b} as $\delta \rightarrow 1$ ($-q_c$ decreases in δ , and both $-q_c$ and b_c converge to $-\bar{b}$ as $\delta \rightarrow 1$).*

Intuitively, when liquidity is high, the post-trade shareholder base is dominated by extremists, and their more extreme preferences push the firm’s decision-making to the extreme. Therefore, our analysis uncovers a new effect of liquidity on governance through voice.

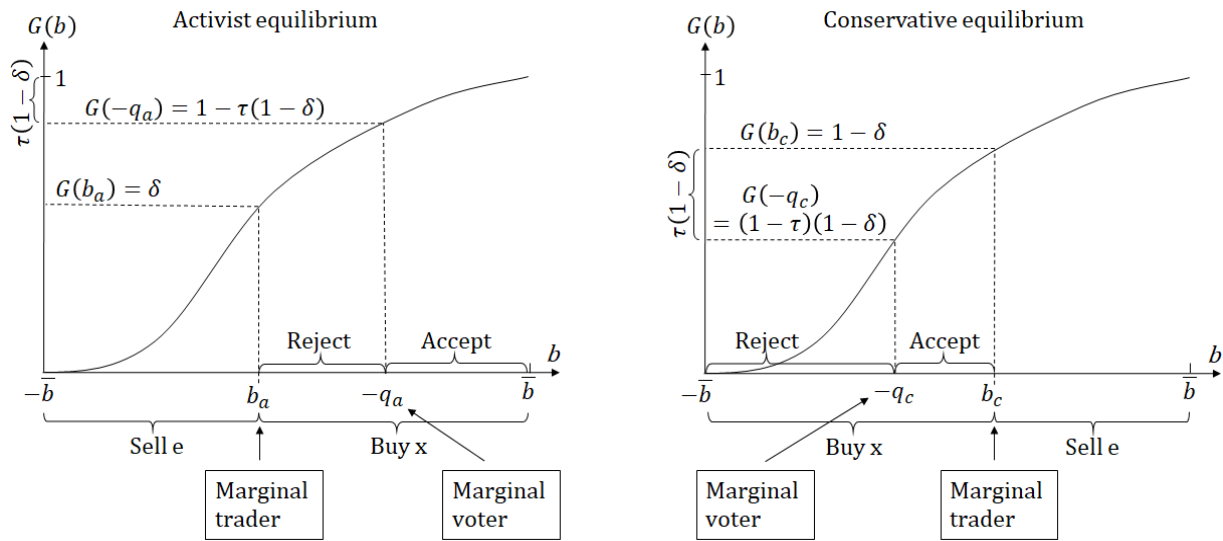


Figure 3 - Equilibrium characterization of the model with trading and voting

4.3.2 Multiple equilibria

As the above discussion shows, the introduction of voting creates self-fulfilling expectations: Shareholders with a preference for the expected outcome buy shares, which in turn makes their preferred outcome more likely. The presence of self-fulfilling expectations suggests that the two equilibria—conservative and activist—can coexist. Indeed, according to Proposition 3, both

equilibria exist whenever

$$H(q_c) < \phi < H(q_a). \tag{12}$$

Classic examples of multiple equilibrium models in financial economics include [Diamond and Dybvig \(1983\)](#) on bank runs, [Calvo \(1988\)](#) on debt repudiation, and [Obstfeld \(1996\)](#) on currency crises. Unlike these models, in which different equilibria (e.g., with vs. without a bank run) have different properties and policy implications, the activist and conservative equilibria in our model are mirror images of each other and have similar policy implications.

The multiplicity of equilibria can be interpreted as an additional source of volatility: If agents change expectations for exogenous reasons and, accordingly, coordinate on a different equilibrium, then prices and voting outcomes may change without any change in the fundamentals of the firm. We thus treat multiple equilibria as a source of non-fundamental indeterminacy: The same proposal voted on at two firms with similar characteristics and fundamentals could have very different voting outcomes and valuation effects. This indeterminacy underscores potential empirical challenges in analyzing shareholder voting and could explain the mixed evidence about the effect of voting on proposals on shareholder value.¹⁸ The next result highlights the factors that contribute to the multiplicity of equilibria.

Proposition 4. *The conservative and the activist equilibria coexist if the market is liquid (sufficiently high δ); if the voting requirement is in an intermediate interval, $\tau \in (\underline{\tau}, \bar{\tau})$; if the expected voting outcome is critical for whether activist or conservative shareholders value the firm more, $\phi \in (H(q_c), H(q_a))$; and only if the heterogeneity of the initial shareholder base is not too small.*

Intuitively, the multiplicity of equilibria arises from the possibility that expectations become self-fulfilling. If liquidity δ is large, then the firm experiences large shifts in the shareholder base, and the direction of these shifts depends on the expected proposal outcome, so the interval in (12) in which the two equilibria coexist expands. Multiple equilibria are also less likely if the governance structure requires either very large or very small majorities to approve a decision: then, an activist (conservative) equilibrium is unlikely to exist because approval (rejection) of

¹⁸[Karpoff \(2001\)](#) surveys the earlier literature, and [Yermack \(2010\)](#) and [Ferri and Göx \(2018\)](#) review some of the later studies. [Cumat, Gine, and Guadalupe \(2012\)](#) also summarize that “(...) the range of results in the existing literature varies widely, from negative effects of increased shareholder rights (...) to very large and positive effects on firm performance (...)” (pp. 1943-44).

the proposal requires almost all shareholders to vote in its favor (against). Since most firms have simple majority voting rules, the non-fundamental indeterminacy we point out seems important. Multiple equilibria are also less likely for extreme values of ϕ . As discussed above, intermediate values of ϕ correspond to cases when shareholders choose between policies that are in conflict, such as long-term and short-term investment policies. Then the likelihood of proposal approval becomes critical for whether activists or conservatives value the firm more. Finally, the heterogeneity among shareholders (in the sense of a mean-preserving spread) cannot be too small; otherwise, there are not enough shareholders with extreme views who can give rise to both types of equilibria.

This non-fundamental indeterminacy raises the question of how shareholders coordinate on a particular equilibrium. There are multiple potential sources in the economic environment that may influence expectation formation about the voting outcome and hence equilibrium selection. For example, some shareholders may be more visible or have better access to the media, putting them into a position to influence the expectations of other shareholders. Proxy advisory firms may perform a similar function and may have an influence on voting outcomes by coordinating shareholders' expectations.

Finally, while the multiplicity of equilibria can be important to interpret empirical evidence about the effects of shareholder voting, it is not important for any of the subsequent results: those results are exactly the same in the region with a unique equilibrium.

5 Shareholder welfare and prices

In this section we analyze the price and welfare effects of trading and voting. In Section 5.1, we show that shareholder welfare and prices can move in opposite directions in response to changes in parameters, and in Section 5.2, we show that in the presence of voting, the ability to trade can be detrimental to shareholder welfare.

5.1 Opposing effects on shareholder welfare and prices

The literature in financial economics often draws a parallel between shareholder welfare and prices and uses stock returns to approximate the effects on shareholder welfare. This parallel

is natural if shareholders have homogeneous preferences but may no longer be valid if they are heterogeneous. Hence, we compare the price and shareholder welfare at the same point in time and show that they can move in opposite directions in response to exogenous changes to the firm’s governance structure.¹⁹

Recall from Proposition 3 that the share price is given by the valuation of the marginal trader at the trading stage, $p_a = v(b_a, q_a)$ and $p_c = v(b_c, q_c)$. To capture shareholder welfare at the same point in time, we define it as the average welfare of all pre-trade (initial) shareholders, which, as shown in Lemma 2 below, also equals the average welfare of the post-trade shareholders. Specifically, in the activist equilibrium, the expected value of initial shareholders is

$$W_a = ep_a \Pr[b < b_a] + \mathbb{E}[(e + x)v(b, q_a) - xp_a | b > b_a] \Pr[b > b_a]. \quad (13)$$

Similarly, in the conservative equilibrium, the expected value of initial shareholders is

$$W_c = ep_c \Pr[b > b_c] + \mathbb{E}[(e + x)v(b, q_c) - xp_c | b < b_c] \Pr[b < b_c]. \quad (14)$$

In both expressions, the first term captures the value of shareholders who sell their endowment e , whereas the second term is the expected value of shareholders who buy shares: it equals the value of their post-trade stake in the firm minus the price paid for the additional shares acquired through trading. The welfare functions (13) and (14) can be motivated in one of two ways. First, they can be regarded as utilitarian social welfare functions, in which all shareholders of the firm have equal weights. Second, we could assess each shareholder’s valuation from a prior position in which they do not yet know their preferences b , but know the cdf G . Then W_a and W_c would represent the valuation and the objective of each individual shareholder.²⁰ In Section A.5 of the Online Appendix, we discuss why our results hold for arbitrary weights of shareholders in the welfare function, and why they hold if we define welfare as the valuation of the median, rather than average, initial shareholder.

¹⁹Our analysis in this section is related to the ideas in Rice (2006), which is not available in the public domain.

²⁰Rawls (1971) (chapter 1) and Hayek (1976) (chapter 8) both endorsed analyzing welfare from the perspective of such an initial position, in which each individual (here shareholder) acts from behind a “veil of ignorance.”

To simplify notation, we define

$$\beta_a \equiv \mathbb{E}[b|b > b_a] \text{ and } \beta_c \equiv \mathbb{E}[b|b < b_c], \quad (15)$$

which denotes the average bias of the post-trade shareholder base for, respectively, the activist and the conservative equilibrium. The average bias of the post-trade shareholder base plays a critical role in the following welfare analysis. Indeed, while the share price is determined by the valuation of the *marginal* trader, the next result shows that shareholder welfare is determined by the valuation of the *average* post-trade shareholder.

Lemma 2. *In any equilibrium, the expected welfare of the pre-trade shareholder base is equal to the valuation of the average post-trade shareholder. In particular,*

$$W_a = e \cdot v(\beta_a, q_a) \text{ and } W_c = e \cdot v(\beta_c, q_c). \quad (16)$$

Intuitively, market clearing implies that all the gains of the shareholders who sell shares are offset by the losses of the shareholders who buy shares. Since selling shareholders sell their entire endowment, their valuations are fully captured by the transfers from buying shareholders. Thus, the welfare of the pre-trade shareholder base equals the welfare of the shareholder base post-trade, i.e., $\mathbb{E}[v(b, q_a) | b > b_a]$ in the activist equilibrium and $\mathbb{E}[v(b, q_c) | b < b_c]$ in the conservative equilibrium. The linearity of $v(b, q^*)$ in b in turn implies that the welfare of the shareholder base post-trade is equal to the valuation of the average post-trade shareholder.

Importantly, both the price and shareholder welfare depend on the identity of the marginal voter, since it determines the firm's decision rule regarding the proposal. Before deriving the main result of this section, we analyze the conditions under which shareholder welfare and the share price are maximized. For this purpose, we consider the following thought experiment: Holding everything else equal, when does $v(b, q^*)$ obtain its maximum as a function of the marginal voter's bias $-q^*$? Expression (6) implies

$$\frac{\partial v(b, q^*)}{\partial q^*} > 0 \Leftrightarrow -q^* > b. \quad (17)$$

Therefore, the valuation $v(b, q^*)$ of a shareholder with bias b is maximized if $-q^* = b$, i.e., if the choice of the shareholder coincides with that of the marginal voter.

Since in the activist equilibrium $p_a = v(b_a, q_a)$ and $W_a = e \cdot v(\beta_a, q_a)$, and in the conservative equilibrium $p_c = v(b_c, q_c)$ and $W_c = e \cdot v(\beta_c, q_c)$, this insight gives the following result, which plays a central role in the analysis below.

Lemma 3.

- (i) *The share price obtains its maximum when the bias of the marginal voter equals the bias of the marginal trader (b_a in the activist equilibrium and b_c in the conservative equilibrium).*
- (ii) *Shareholder welfare obtains its maximum when the bias of the marginal voter equals the bias of the average post-trade shareholder (β_a in the activist equilibrium and β_c in the conservative equilibrium).*

By implication, the share price increases (decreases) if the marginal voter moves toward (away from) the position of the marginal trader.²¹ Similarly, shareholder welfare increases (decreases) if the marginal voter moves toward (away from) the position of the average post-trade shareholder. The next result uses these insights to derive our main implication about the opposing price and welfare effects.

Proposition 5. *Suppose the marginal voter is less extreme than the average post-trade shareholder (i.e., $-q_a < \beta_a$ in the activist equilibrium and $-q_c > \beta_c$ in the conservative equilibrium), and consider a small exogenous change in parameters that affects the position of the marginal voter without affecting the marginal trader or the average post-trade shareholder. Then, if such a change in parameters increases (decreases) the share price, it also necessarily decreases (increases) shareholder welfare.*

A change to the majority requirement τ is an example of a parameter change in our setting that affects the marginal voter without affecting the marginal trader or the average post-trade shareholder. Indeed, based on (10) and (11), an increase in τ makes the marginal voter more conservative (i.e., $-q_a$ and $-q_c$ decrease) because it requires more conservative shareholders to vote for the proposal in order for it to be approved. At the same time, τ has no effect on the marginal trader (b_a and b_c), and hence, on the average post-trade shareholder (β_a and β_c). The next corollary follows directly from Proposition 5.

²¹In an empirical study of proxy contests, Listokin (2009) also observes the difference between the valuations of marginal traders, who set prices, and marginal voters, who determine voting outcomes, and concludes that marginal voters value management control more than marginal traders in his sample.

Corollary 3. *Suppose the marginal voter is less extreme than the average post-trade shareholder. Then, a small change in the majority requirement τ that increases (decreases) the share price, necessarily decreases (increases) shareholder welfare.*

The intuition for Proposition 5 and Corollary 3 is explained with the help of Figure 4, which focuses on the activist equilibrium.

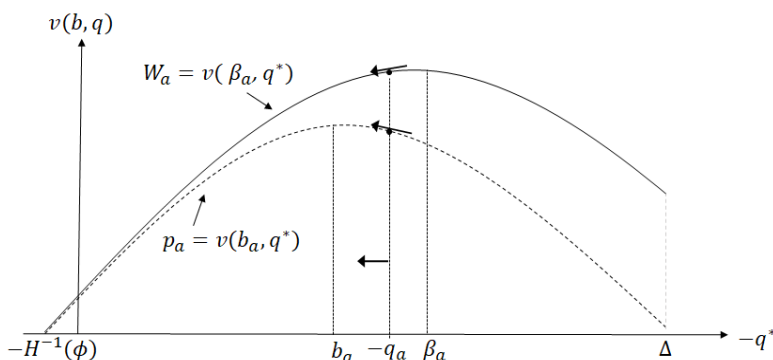


Figure 4 - Opposing effects on shareholder welfare and prices in the activist equilibrium

Recall that, for any given decision rule q^* , the share price equals the valuation of the marginal trader, $p_a = v(b_a, q^*)$, and shareholder welfare is the valuation of the average post-trade shareholder, $W_a = v(\beta_a, q^*)$. Both functions are displayed in Figure 4. Shareholder welfare is maximized if the decision rule equals that of the average post-trade shareholder $-\beta_a$, whereas prices are maximized if the decision rule equals that of the marginal trader $-b_a$. The marginal trader is the most conservative among all post-trade shareholders and benefits from an increase in τ since a stricter majority requirement makes the marginal voter more conservative and moves him closer to the marginal trader. This effect increases the stock price. However, if the marginal voter is more conservative than the average shareholder, then any increase in τ moves the marginal voter even further away from the average shareholder, which decreases welfare. Hence, if the marginal voter is located between the marginal trader and the average post-trade shareholder, then any change of the marginal voter either moves him closer to the marginal trader but farther from the average shareholder (the scenario described in Figure 4), or the opposite, so prices and shareholder welfare move in opposite directions.

The opposing price and welfare effects are not unique to changes in the majority require-

ment: for example, in Sections 7.1 and 7.2, we show that prices and shareholder welfare could react in opposite directions to changes in index investor ownership and the social concerns of shareholders, respectively. Moreover, in Section 7.4, we analyze an extension with an additional round of trade post-voting, and show that the logic above also implies that price and welfare reactions to voting outcomes can have opposite signs.

Overall, Proposition 5 highlights a potential limitation to prices as a measure of shareholder welfare in the context of shareholder voting. By using prices as a proxy for shareholder welfare, the researcher may sometimes not only obtain a biased estimate of the real effect of the proposal, but even get the wrong sign of the effect. In Section 8, we discuss the conditions under which the discrepancy between prices and shareholder welfare is less likely to exist.

5.2 Liquidity and shareholder welfare

In this section, we show that greater opportunities to trade and higher liquidity can be detrimental to shareholder welfare. To see this, recall that shareholder welfare equals the valuation of the average post-trade shareholder and depends on the identity of the marginal voter; e.g., $W_a = v(\beta_a, q_a)$ in the activist equilibrium. Higher liquidity creates two opposing effects. The first, and positive effect is that it enables shareholders with different preferences to exchange more shares and realize larger gains from trade, so that post-trade ownership is concentrated among the more extreme shareholders, who value the firm the most (β_a increases). We can isolate this effect by focusing on the case when decisions are made by a board with an exogenous decision rule q^* , as in the no-vote benchmark in Section 4.2:

Lemma 4. *When the proposal is decided by a board with decision rule q^* , shareholder welfare always increases with liquidity δ .*

However, when decisions are made by a shareholder vote, liquidity has a second effect. Concentrating post-trade ownership among the more extreme shareholders makes the marginal voter $-q_a$ more extreme, which is detrimental to welfare if the average shareholder is more moderate than him (i.e., if $\beta_a < -q_a$, then $v(\beta_a, q_a)$ decreases as $-q_a$ increases).

Whether the combined effect of these two forces is positive or negative depends on whether the wedge between the average shareholder and the marginal voter narrows or widens as they

become more extreme. The next result shows that there are conditions under which this wedge widens and liquidity is detrimental to shareholder welfare:

Proposition 6. *Suppose the proposal is decided by a shareholder vote and the marginal voter in the no-trade benchmark is more extreme than the average shareholder. If $|H(q_{NoTrade}) - \phi|$ is sufficiently small, there exists $\underline{\delta} > 0$ such that shareholder welfare decreases with δ for $\delta < \underline{\delta}$.*

The wedge between the average post-trade shareholder and the marginal voter widens if the marginal voter is already more extreme than the average shareholder, and becomes more extreme at a faster rate as liquidity increases. The term $|H(q_{NoTrade}) - \phi|$ measures the sensitivity of a shareholder's valuation to his bias, and if this sensitivity is small, the average shareholder's valuation does not increase much with δ . The reason δ cannot be too large is that then, both the marginal voter and the average shareholder converge to the most extreme shareholder, so the wedge between them shrinks to zero and welfare increases with δ .

Proposition 6 reveals a new force through which financial markets have real effects. In our setting, financial markets do not aggregate or transmit investors' information to decision-makers. Instead, they allow extreme shareholders to accumulate large positions and then use their votes to implement their preferred decisions. This effect can be detrimental to ex-ante shareholder value, both to shareholders who buy shares and to those who sell. Intuitively, if more trade makes the marginal voter too extreme, then even shareholders who buy shares are worse off if their bias is moderate. Since the willingness to pay of these shareholders decreases, the price at which other shareholders can sell their shares decreases as well. Thus, both shareholders who sell and the moderate shareholders who buy may be worse off if δ is higher. Only the most extreme shareholders are always better off if δ increases. In the proof of Proposition 6, we show that a similar logic may lead the share price to decrease with liquidity.

6 Delegation

The analysis in Section 5.2 shows that shareholder voting generates an externality if shareholders can trade before they vote, with potentially negative implications for aggregate shareholder welfare. In Section 6.1, we ask whether shareholders would be better off if decisions were instead delegated to the board of directors. Thus, we return to the question we raised in

the Introduction, i.e., whether shareholder democracy dominates board primacy for corporate decision-making. In doing so, we abstract from other duties inherent to the role of the board, such as information gathering and advising the management. In Section 6.2, we ask whether the majority of shareholders would support the delegation of authority to the board.

6.1 Optimal board

Reconsider the game from Section 4.2 in which the decision is made unilaterally by a board of directors with bias b_m and decision rule $q^* = -b_m$, which reflects the incentives and preferences of board members. As shown in Proposition 2, the equilibrium is unique and either activist, if the board is biased toward the proposal, or conservative, if it is biased against the proposal. We refer to such boards as “activist” or “conservative,” respectively.

We are interested in the effect of b_m on shareholder welfare, which we define as the average expected valuation of the initial shareholders, as in Section 5. We call a board b_m^* optimal if it maximizes this welfare function. Intuitively, the initial shareholder base in our model captures the firm’s ownership structure before the proposal is put on the agenda. This can be interpreted as the welfare of the shareholders several months before the annual meeting, or as the welfare of the shareholders at the time of the IPO.²² We ask whether the optimal board caters to the average initial shareholder $\mathbb{E}[b]$. As we show next, the answer is no: the board should be biased and cater to the more extreme shareholders.

To see this, note that Lemma 2 holds in this context as well, so the welfare of the initial shareholders equals the welfare of the post-trade shareholders and is given by

$$W_m(b_m) = e \cdot \begin{cases} v(\beta_a, -b_m) & \text{if the board is activist, } H(-b_m) > \phi \\ v(\beta_c, -b_m) & \text{if the board is conservative, } H(-b_m) < \phi. \end{cases} \quad (18)$$

The next result characterizes the bias of the optimal board and compares welfare under delegation to welfare under shareholder voting. For this purpose, we define $\Delta W(b_m)$ as the difference between shareholder welfare under delegation to a board with bias b_m and under the voting

²²Under the IPO interpretation, b_m^* would maximize the initial owner’s proceeds from selling all his shares if the buying shareholders do not yet know their biases at the time of the IPO and act from behind a “veil of ignorance” (see footnote 20 above and Section A.6 of the Online Appendix).

equilibrium with the highest shareholder welfare, i.e., $\Delta W(b_m) \equiv W_m(b_m) - \max\{W_a, W_c\}$.

Proposition 7.

- (i) *If $v(\beta_a, -\beta_a) > v(\beta_c, -\beta_c)$, then the optimal board is activist and $b_m^* = \beta_a$; otherwise, the optimal board is conservative and $b_m^* = \beta_c$.*
- (ii) *The optimal board is always biased. If it is activist (conservative), then $b_m^* > \mathbb{E}[b]$ ($b_m^* < \mathbb{E}[b]$).*
- (iii) *Delegation to the optimal board is always beneficial ($\Delta W(b_m^*) \geq 0$) and is strictly beneficial ($\Delta W(b_m^*) > 0$) unless the voting equilibrium happens to be optimal already (i.e., unless the average post-trade shareholder coincides with the marginal voter). Moreover, there exists $\delta^* \in (0, 1)$ such that if $\delta \in (\delta^*, 1)$, then delegation is beneficial if the board is optimally biased, but detrimental if it is unbiased ($\Delta W(\mathbb{E}[b]) < 0$).*

The first important implication of Proposition 7 is that it is optimal to have a biased board. According to part (ii), the optimal board is always either more conservative or more activist relative to the initial shareholder base, i.e., $b_m^* \neq \mathbb{E}[b]$, even though it maximizes the welfare of the initial shareholders. Intuitively, the aggregate welfare of the initial shareholders equals the aggregate welfare of post-trade shareholders, which, in turn, is maximized by a biased board: From Lemma 3, the bias of the optimal board equals the average bias of *post-trade* shareholders (β_a or β_c). By catering to the preferences of these more extreme shareholders with a higher willingness to pay, such a board also benefits shareholders with more moderate views who sell their shares, since they can now sell for a higher price. Note also that since prices are determined by the valuation of the marginal trader and $\beta_a \neq b_a$ ($\beta_c \neq b_c$), the objective of the optimal board should not be to maximize the share price. Overall, the board maximizes the welfare of the initial shareholders if it is aligned with those shareholders whose willingness to pay is higher than average.

In part (iii), we compare decision-making via shareholder voting, which results in decision rule q_a or q_c , to decision-making by the board. First, note that shareholders cannot be worse off with an optimally chosen board than with a shareholder vote, i.e., $\Delta W(b_m^*) \geq 0$. Moreover, shareholders are strictly better off with delegation to an optimal board, except for the knife-edge case in which the voting equilibrium already yields the highest welfare. In all other cases,

the benefits from delegation are strictly positive. Then, given the continuity of the expected welfare function at b_m^* , the board does not have to be optimally biased to increase welfare relative to decision-making via voting; it just has to be good enough in the sense of being close to b_m^* . This analysis abstracts from other costs or benefits of delegation that are outside of our model. For example, delegation could be costly due to self-dealing and diversion of resources by directors, or beneficial due to directors' informational advantage over shareholders.

Our prior analysis also implies that the optimal board is tightly linked to the firm's trading environment: as liquidity δ increases, the post-trade shareholder base becomes more extreme, so the optimal board becomes more biased. The optimal board is unbiased only if there is no trading between shareholders, i.e., $b_m^* \rightarrow \mathbb{E}[b]$ as $\delta \rightarrow 0$. By contrast, if the stock is sufficiently liquid, part (iii) demonstrates that delegation to an unbiased board decreases shareholder welfare ($\Delta W(\mathbb{E}[b]) < 0$), i.e., the board has to be biased to be preferred to voting.

Overall, the key conclusion of Proposition 7 is that delegating authority to a *biased* board can be optimal and dominate shareholder voting. In other words, the common argument that if the board is biased, decisions should be delegated to shareholders, is not always correct if shareholder trading is taken into account.

6.2 Voting to delegate to a board

Due to shareholder heterogeneity, even the optimal board, which maximizes the aggregate shareholder welfare, may nevertheless harm some of them. Those shareholders may prefer to retain their voting rights. This raises the question whether the majority of the initial shareholders would give up their right to vote and leave the choice to the board that improves aggregate welfare. In other words, can we expect shareholders to reach a consensus on delegation?

To answer this question, we analyze the following extension. Suppose that at the outset of the game, before the trading stage, shareholders choose between two alternatives: (i) all shareholders retain their voting rights, as in the baseline model; and (ii) shareholders delegate decision-making authority to a board with an exogenously given bias b_m , which then decides on the proposal. Decision-making is delegated to the board if and only if a fraction of at least τ of the shareholders support delegation.

In Proposition 8 in the Appendix we show that the optimal board, as characterized by

Proposition 7, cannot always garner support from at least τ of the initial shareholders. The main reason behind this coordination failure are short-term trading considerations that distort shareholder votes on board delegation. To understand the intuition, consider the activist equilibrium and suppose that the marginal voter is more activist than the average post-trade shareholder (i.e., $\beta_a < -q_a$), that is, there are welfare gains from delegating decision rights to a board that is more conservative than the marginal voter. However, notice that in general, shareholders who expect to buy shares ($b > b_a$) would like to reduce the share price p_a . Since the share price is given by the valuation of the marginal trader b_a , shareholders with bias $b > b_a$ have incentives to support boards that the marginal trader dislikes. This consideration amplifies their incentives to support activist boards. Essentially, buying shareholders support boards that are more activist than they are, since they internalize the negative effect that such boards will have on the value of the marginal trader, and thereby, on the price at which they buy. For that reason, even when there are more than τ of the initial shareholders that are more conservative than the marginal voter, they cannot agree to delegate their voting rights to even a marginally more conservative board, and in particular, to the optimal board.

Overall, we show that when voting occurs prior to trading, short-term trading considerations may push shareholders to make suboptimal delegation decisions in order to gain from trading.

7 Extensions and robustness

In this section we discuss several extensions of the model. The complete analysis of these extensions is in the Online Appendix, and we only summarize the key conclusions here.

7.1 Index investors

An important trend in recent decades has been the growth of passively managed index funds: for example, the Big-3 index fund families alone collectively cast about 25% of the votes at S&P 500 firms (Bebchuk and Hirst, 2019). Accordingly, there is an active academic and policy debate about their role for corporate governance.²³ Since index funds do not actively trade but actively vote, our paper provides a natural setting to study their role for shareholder voting.

²³See, e.g., “Vanguard, Trian and the problem with ‘passive’ index funds”, *Forbes*, Feb 15, 2017; Appel, Gormley, and Keim (2016), Heath et al. (2020).

In Section A.1 of the Online Appendix, we extend the model to two groups of investors: fraction μ are indexers, which do not trade but vote, and fraction $1 - \mu$ are actively trading investors, as in the baseline model. The distribution of biases across both investor groups is the same and given by cdf G . Because the marginal trader is determined by the relative demand and supply of non-index shares, his identity is unaffected by the fraction of index investors. In contrast, since index investors participate in the vote, their presence affects the identity of the marginal voter: As index ownership μ increases, the marginal voter becomes less extreme, i.e., less activist (conservative) in the activist (conservative) equilibrium. Intuitively, while the trading of non-index investors aligns the shareholder base with the expected outcome and makes the marginal voter more extreme, the presence of index investors who do not trade has a moderating effect and makes the marginal voter less extreme. This implies, in particular, that if μ is sufficiently large, the equilibrium is unique, i.e., the presence of index investors mitigates non-fundamental uncertainty.

We show that index ownership has a non-monotonic effect on the share price. Intuitively, in our baseline model, the marginal voter is always more extreme than the marginal trader — e.g., more activist in the activist equilibrium. Since the presence of index investors makes the marginal voter more conservative, it aligns decisions with the marginal trader's preferences and thereby increases the price. However, if index ownership is sufficiently large, the marginal voter becomes even more conservative than the marginal trader, and from that point on, an increase in index ownership widens the gap between them, which decreases the price.

In addition, we reinforce our conclusion about the opposing price and welfare effects. In particular, we show that an increase in index ownership can have a positive effect on the share price but a negative effect on shareholder welfare. Intuitively, if the marginal voter is between the marginal trader and the average post-trade non-index shareholder, an increase in index ownership makes the marginal voter more moderate and thus moves him closer to the marginal trader but farther from the average shareholder.

7.2 Social concerns

Environmental and social (E&S) issues are becoming increasingly important for shareholders and gaining prominence in voting: about 30% of shareholder proposals in recent years are

related to E&S issues (Bolton et al., 2019; Bubb and Catan, 2019). If a proposal has environmental or social implications, shareholders may care about it even beyond its impact on the value of their shares. In Section A.2 of the Online Appendix, we analyze a variation of the model that accounts for such preferences: we assume that the preferences of a shareholder with bias b who trades $t \in [-e, x]$ shares and owns $e + t$ shares after trading, are given by

$$(e + t) [v_0 + (\theta + b) (d - \phi)] + \gamma bd. \quad (19)$$

Parameter $\gamma \geq 0$ captures the weight shareholders assign to the proposal beyond their ownership in the firm, and thus measures shareholders' social concerns. The case $\gamma = 0$ is the baseline model.

As in the existing literature (e.g., Hart and Zingales (2017)), our focus is on the implications of voting and trading on shareholder welfare, which here includes their concerns for the welfare of other stakeholders. The presence of shareholders' social concerns affects the welfare functions W_a and W_c , which now represent the valuation of investors with attitudes $\beta_a + (\gamma/e) \mathbb{E}[b]$ and $\beta_c + (\gamma/e) \mathbb{E}[b]$, respectively. Intuitively, because investors are now affected by the proposal even if they sell their shares, the welfare function must put some weight on $\mathbb{E}[b]$, the average bias of the pre-trade shareholder base. However, and for the same reasons as in the baseline model, we show that our main results extend to this setting (e.g., opposing price and welfare effects, a biased optimal board, and shareholders' collective failure to delegate authority to the optimal board). Interestingly, new insights also emerge from this extension.

First, social concerns amplify shareholders' attitudes to the proposal: A shareholder votes in favor if and only if $q > -b(1 + (\gamma/e)(1 - \delta))$. Hence, conservative shareholders ($b < 0$) become even more conservative in that they apply an even higher hurdle toward accepting the proposal, whereas activist shareholders ($b > 0$) become even more activist. We show that this amplification makes multiple equilibria more likely, since larger social concerns reinforce the self-fulfilling property of voting outcomes. In addition, the amplification effect implies that the share price can be negatively affected by social concerns: Since investors buy and sell shares in order to maximize their trading profits rather than to affect the voting outcome, social concerns make the marginal voter's preferences even more extreme, but they do not change the identity of the marginal trader. As a result, social concerns widen the gap between the marginal trader

and the marginal voter, and thereby decrease the price.

7.3 Heterogeneous endowments and trading frictions

We also extend the baseline model by allowing shareholders to differ with respect to their endowments and their ability to buy shares (see Section A.3 of the Online Appendix for the complete analysis). Specifically, we assume that a shareholder with bias b has an endowment $e(b) > 0$ and can buy up to $x(b) > 0$ shares. We do not restrict the correlations between $x(b)$, $e(b)$, and b in any way. For example, endowments and trading opportunities could be higher for activist shareholders, for conservative shareholders, or for extremist (high- $|b|$) shareholders. We denote the total endowment by $\mathbf{e} \equiv \int_{-\bar{b}}^{\bar{b}} e(b) dG(g)$.

The trading equilibrium is very similar to the baseline case, i.e., there is an activist and a conservative equilibrium. Consider the activist equilibrium. The marginal trader b_a , who is indifferent between buying and selling, is determined by market clearing, i.e., by the unique solution of $\int_{b_a}^b x(b) dG(b) = \int_{-b}^{b_a} e(b) dG(b)$. All shareholders with a bias higher (lower) than that of the marginal trader buy (sell), so post-trading, a shareholder with bias $b > b_a$ holds $x(b) + e(b)$ shares. Thus, we define a new density function and cdf for the distribution of post-trade shareholders as

$$g_a(b) \equiv g(b) \frac{x(b) + e(b)}{\mathbf{e}}, \quad G_a(b) \equiv \int_{b_a}^b g_a(b) db, \quad (20)$$

which allows us to apply the arguments of the baseline model to this extension. In particular, the marginal voter is given by $-q_a = G_a^{-1}(1 - \tau)$ and is more extreme than the marginal trader, i.e., $-q_a > b_a$. The welfare functions have the same characteristics and reflect the welfare of the post-trade shareholders (as in Lemma 2), so our results on the opposing effects on welfare and prices (Proposition 5) and the optimal board (Propositions 7 and 8) continue to hold.

7.4 Second round of trading

The baseline model features one round of trading, which takes place *prior* to the vote and before the public signal is revealed. In a further extension, we introduce a second round of trading *after* the vote. The purpose of this extension is twofold. First, it allows us to analyze

the price and welfare reactions to the voting outcome. Second, it shows the robustness of our insights to a dynamic trading environment and in particular, to allowing shareholders to trade after learning the public signal.²⁴ For simplicity, in this discussion, we focus on the case $\phi = 0$, when the equilibrium is activist. The complete analysis of this case and the discussion of cases with $\phi \neq 0$ are in Section A.4 of the Online Appendix.

The pre-vote trading stage is similar to that in the baseline model: conservative shareholders with $b < b_a$ sell to activist shareholders, so the shareholder base at the voting stage consists of shareholders with $b > b_a$, where b_a is given by (7). However, additional trading now takes place after the vote: If the proposal is accepted, the more moderate shareholders among those with $b > b_a$ sell to the more activist shareholders. The anticipation of this post-vote trading implies that the pre-vote share price is the expected post-vote price, i.e., the expected valuation of the post-vote marginal trader. Therefore, the price reaction to proposal approval is positive if and only if proposal approval benefits the post-vote marginal trader.

We next show that the average price and welfare reactions to proposal approval can have opposite signs. The intuition is similar to the intuition for opposing price and welfare effects in Section 5.1. If the marginal voter is more activist (i.e., more extreme) than the post-vote marginal trader, then on average, this marginal trader's valuation and hence the share price react negatively to proposal approval. In contrast, shareholder welfare can on average react positively to proposal approval if the marginal voter is less activist (i.e., less extreme) than the *average* shareholder after the post-vote trading stage. Overall, this extension further supports our conclusion in Section 5.1 that price reactions may be an imperfect proxy for welfare effects of shareholder votes.

8 Implications for empirical research

In this section, we discuss the implications of our analysis for empirical research. One implication of our model is that we should expect large turnover in the shareholder base before shareholder votes, especially for votes on important issues. [Cox, Mondino, and Thomas \(2020\)](#) support this prediction. They find that targets in M&A deals experience substantial ownership

²⁴In Section A.4 of the Online Appendix, we also discuss an alternative game, in which the second round of trading occurs between the public signal and the vote, and show that the trading patterns are similar to those characterized by the extension in this section.

changes after the deal is announced, and the extent of these ownership changes is positively associated with the likelihood that the deal later garners shareholder approval. The authors conclude that investors who buy shares prior to the vote would like the deal to go through and thus push for its completion by voting in favor, which is consistent with our model. Similarly, [Li, Maug, and Schwartz-Ziv \(2021\)](#), document a large increase in trading volume before and after shareholder votes. Their finding that shareholders whose vote was opposed to the voting outcome are more likely to reduce their holdings after the vote and that this makes the shareholder base more homogeneous, is also consistent with our predictions from Section 7.4, which analyzes an extension to a post-vote round of trading.

Our observation that shareholder welfare and share prices may move in opposite directions indicates an important limitation to conventional inferences from event studies of shareholder votes (see Section 5.1). Hence, we ask under which conditions this discrepancy between prices and welfare is less likely and, accordingly, when the common interpretation of event studies of voting would be more appropriate. This discrepancy is likely to be smaller if the average post-trade shareholder is closer to the marginal trader, i.e., if the post-trade shareholder base is less heterogeneous. This, in turn, is more likely when the firm's shares are sufficiently liquid: If there are few barriers to trade, the post-trade ownership is more concentrated and homogeneous. Shareholder heterogeneity is also less likely for issues that involve a clear conflict between shareholders and management, rather than issues that typically cause disagreements among shareholders, such as E&S policies (e.g., [Bolton et al., 2019](#)).

Building on the analysis in Section 7.4, we can predict whether prices and welfare are likely to react in the same direction to the approval of a proposal based on the vote tally. Intuitively, overwhelming shareholder support of the proposal implies that both the marginal trader and the average shareholder likely voted in its favor, and hence benefited from its approval. In contrast, approval of the proposal for which the vote was close implies a significant level of shareholder disagreement, so the marginal and average shareholder are more likely to be affected by this outcome differently. Hence, event study returns are less reliable as indicators of shareholder welfare when voting results are close. This conclusion and our results in Section 7.4 on opposing price and welfare reactions to voting outcomes hold even if the abnormal reaction is measured in a short interval around the voting outcome, that is, if the pre-vote round of trade takes place after the record date, i.e., after the allocation of votes is determined

(see Section A.4 of the Online Appendix for details).

Finally, the multiplicity of equilibria highlighted in Section 4.3.2 implies that similar proposals in similar firms could have very different levels of shareholder support and valuation effects. Since this non-fundamental indeterminacy presents potential challenges in studying shareholder voting, it is worth discussing when it is more or less likely. As follows from the analysis in Sections 4.3.2, 7.1, and 7.2, non-fundamental indeterminacy is less likely in firms that have a large proportion of long-term, non-transient shareholders (e.g., firms with high index fund ownership, or with high insider ownership) and is more likely in firms with liquid shares, which can experience large swings in the shareholder base. Across proposals, non-fundamental indeterminacy is relatively more likely for proposals on environmental and social issues, both because they may affect investors' utility beyond their direct impact on their valuations, and because they can create substantial heterogeneity in investors' preferences.

9 Conclusion

In this paper we study the effectiveness of shareholder voting in a context in which the shareholder base forms endogenously through trading. Specifically, we analyze the relationship between trading and voting in a setting in which shareholders have identical information but heterogeneous preferences. They trade with each other, and those who end up owning the shares vote on a proposal. An important conclusion of our analysis is that when shareholders can trade, shareholder voting may not lead to optimal outcomes. First, shareholders with extreme views can accumulate large positions and use their voting power to implement their preferred policies, which can be detrimental to moderate shareholders and to aggregate shareholder welfare. Second, delegating authority to the board of directors can improve shareholder welfare relative to voting, but short-term trading considerations can prevent shareholders from making the optimal delegation decision. Moreover, the welfare of current shareholders is not maximized with a board that best represents their preferences. Rather, it is maximized by a board that represents the interests of shareholders who own the firm after trading, and thus the optimal board needs to be biased. Hence, observing that the board pursues interests different from those of the average shareholder is not sufficient for making a case for “shareholder democracy” – such a divergence can indeed be optimal. The parallelism to political democ-

racy breaks down in one important respect: Shareholders can trade, and trading aligns the shareholder base with the expected outcomes.²⁵

The model in this paper relies on heterogeneous preferences. However, it could be easily modified to accommodate homogeneous preferences if we assume that shareholders have differences of opinions. For example, in such a model, all shareholders may have the same bias but different interpretations of the public signal about the value of the proposal.²⁶ The characterization of the equilibrium would remain similar, but the welfare analysis would require some adjustments, since models with differences of opinions lack objectively correct probability distributions. Exploring such an extension is left for future research.

²⁵Easterbrook and Fischel (1983) already pointed out this important difference when they argued that the ability to sell shares serves the same purpose as voting in a polity, which is designed to “elicit the views of the governed and to limit powerful states.” (p. 396). The issue is still debated vigorously in the law literature, see Bebchuk (2005) and Bainbridge (2006).

²⁶Some papers have explored differences of opinions in relation to corporate governance theoretically (Boot, Gopalan, and Thakor, 2006; Kakhbod et al., 2020) and empirically (Li, Maug, and Schwartz-Ziv, 2021).

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Appendix - Proofs

This appendix contains the proofs of the main results. The Online Appendix can be accessed at https://www.nadyamalenko.com/Levit,Malenko,Maug_OnlineAppendix.pdf.

Proof of Lemma 1. Given the realization of q , a shareholder indexed by b votes his shares for the proposal if and only if $q > -b$. Denote the fraction of post-trade shares voted to approve the proposal by $\Lambda(q)$. Note that $\Lambda(q)$ is weakly increasing (everyone who votes “for” given a smaller q will also vote “for” given a larger q , and there might be a non-negative mass of new shareholders who start voting “for”). If for the highest possible $q = \Delta$, we have $\Lambda(\Delta) \leq \tau$, then q^* in the statement of the lemma is equal to Δ (because the proposal is never approved). Similarly, if for the lowest possible $q = -\Delta$, we have $\Lambda(-\Delta) > \tau$, then q^* in the statement of the lemma is equal to $-\Delta$ (because the proposal is always approved). Finally, if $\Lambda(-\Delta) \leq \tau < \Lambda(\Delta)$, there exists $q^* \in [-\Delta, \Delta)$ such that the fraction of votes voted in favor of the proposal is greater than τ if and only if $q > q^*$. Hence, the proposal is approved if and only if $q > q^*$. ■

Proof of Proposition 2. We consider three cases. First, suppose $H(q^*) > \phi$. In this case, $v(b, q^*)$ increases in b , and a shareholder with bias b buys x shares if

$$v(b, q^*) > p \Leftrightarrow b > b_a \equiv \frac{p - v_0 - H(q^*) \mathbb{E}[\theta | q > q^*]}{H(q^*) - \phi},$$

and sells e shares if $v(b, q^*) < p$. Therefore, the total demand for shares is $D(p) = x \Pr[b > b_a]$ and the total supply of shares is $S(p) = e \Pr[b < b_a]$. The market clears if and only if $D(p) = S(p) \Leftrightarrow$

$$\Pr[b < b_a] = \frac{x}{x + e} = \delta \Leftrightarrow b_a = G^{-1}(\delta).$$

Since $\delta \in (0, 1)$, we have $b_a \in (-\bar{b}, \bar{b})$. The price that clears the market is the valuation of the marginal trader b_a , and therefore, $p = v(b_a, q^*)$, as required.

Second, suppose $H(q^*) < \phi$. In this case, $v(b, q^*)$ decreases in b , and a shareholder with bias b buys x shares if

$$v(b, q^*) > p \Leftrightarrow b < b_c \equiv \frac{p - v_0 - H(q^*) \mathbb{E}[\theta | q > q^*]}{H(q^*) - \phi},$$

and sells e shares if $v(b, q^*) < p$. Therefore, the total demand for shares is $D(p) = x \Pr[b < b_c]$ and the total supply of shares is $S(p) = e \Pr[b > b_c]$. The market clears if and only if $D(p) = S(p) \Leftrightarrow$

$$\Pr[b < b_c] = \frac{e}{x + e} = 1 - \delta \Leftrightarrow b_c = G^{-1}(1 - \delta).$$

Since $\delta \in (0, 1)$, we have $b_c \in (-\bar{b}, \bar{b})$. The price that clears the market is the valuation of the marginal trader b_c , and therefore, $p = v(b_c, q^*)$, as required.

Finally, suppose $H(q^*) = \phi$. In this case, the expected value of each shareholder is

$$v(b, q^*) = v_0 + H(q^*) \mathbb{E}[\theta | q > q^*] = v_0 + \phi \mathbb{E}[\theta | q > q^*].$$

The market can clear only if $p = v_0 + \phi \mathbb{E}[\theta | q > q^*]$, since otherwise, either all shareholders would want to buy shares or all shareholders would want to sell their shares. Notice that shareholder value does not depend on b , and that market clearing implies that all shareholders are indifferent between buying and selling shares. Based on the tie-breaking rule we adopt, shareholders will not trade. ■

Proof of Proposition 3. According to Lemma 1, any equilibrium is characterized by some cutoff q^* at the voting stage. We consider three cases.

First, suppose that $H(q^*) > \phi$ (activist equilibrium). The arguments in the proof of Proposition 2 can again be repeated word for word. In particular, the marginal trader is b_a as given by (7), and after the trading stage, the shareholder base consists entirely of shareholders with $b > b_a$. Consider a realization of q . If $q > -b_a$, the proposal is accepted ($b > b_a > -q$ for all shareholders of the firm). If $q < -b_a$, then shareholders who vote in favor are those with $b \in (-q, \bar{b}]$ out of $b \in (b_a, \bar{b}]$, which gives a fraction of $\Pr[-q < b | b_a < b]$ affirmative votes. Hence, the proposal is accepted if and only if either (1) $q > -b_a$ or (2) $q < -b_a$ and $\Pr[-q < b | b_a < b] > \tau$, where the condition in (1) is equivalent to $q > -G^{-1}(\delta)$, and the conditions in (2) are together equivalent to

$$\begin{aligned} \Pr[-q < b | b_a < b, q < -b_a] > \tau &\Leftrightarrow 1 - G(-q) > \tau(1 - G(b_a)) = \tau(1 - \delta) \\ &\Leftrightarrow q > -G^{-1}(1 - \tau(1 - \delta)). \end{aligned}$$

Hence, the proposal is accepted if and only if $q > q_a = \min\{-G^{-1}(\delta), -G^{-1}(1 - \tau(1 - \delta))\}$, and since $\delta < 1 - \tau(1 - \delta)$, the cutoff in this “activist” equilibrium is q_a as given by (10). Similarly to the proof of Proposition 2, the share price is $p_a = v(b_a, q_a)$.

Second, suppose that $H(q^*) < \phi$ (conservative equilibrium). The arguments in the proof of Proposition 2 can again be repeated here. In particular, the marginal trader is b_c as given by (9), and after the trading stage, the shareholder base consists entirely of shareholders with $b < b_c$. Consider a realization of q . Recall that shareholder b votes for the proposal if and only if $q > -b$. Hence, if $q < -b_c$, all shareholders of the firm vote against ($b < b_c < -q$), so the proposal is rejected. If $q > -b_c$, then shareholders who vote in favor are those with $b \in (-q, b_c)$ out of $b \in [-\bar{b}, b_c)$, which gives a fraction of $\Pr[-q < b < b_c | b < b_c]$ affirmative votes. Hence, the proposal is accepted if and only if $-q < b_c$ and $\tau < \Pr[-q < b < b_c | b < b_c]$, which are together equivalent to

$$\begin{aligned} \tau < \frac{\Pr[b < b_c] - \Pr[b < -q]}{\Pr[b < b_c]} &\Leftrightarrow \Pr[b < -q] < (1 - \tau) \Pr[b < b_c] \\ &\Leftrightarrow G(-q) < (1 - \tau)(1 - \delta) \Leftrightarrow q > -G^{-1}((1 - \tau)(1 - \delta)). \end{aligned}$$

Hence, the cutoff in this “conservative” equilibrium is q_c , given by (11). Similarly to the proof of Proposition 2, the share price is $p_c = v(b_c, q_c)$.

Third, suppose $H(q^*) = \phi$. In this case, the value of each shareholder is

$$v(b, q^*) = v_0 + H(q^*) \mathbb{E}[\theta | q > q^*] = v_0 + \phi \mathbb{E}[\theta | q > q^*].$$

Therefore, the market can clear only if $p = v_0 + \phi \mathbb{E}[\theta | q > q^*]$. Notice that shareholder value does not depend on b , and that market clearing implies that all shareholders are indifferent between buying and selling shares. Based on the tie-breaking rule we adopt, shareholders will not trade. Therefore, the post-trade shareholder base is identical to the pre-trade shareholder base. Next, note that $H(q^*) = \phi$ implies that the proposal is accepted if and only if $q > F^{-1}(1 - \phi)$. Since a shareholder votes for the proposal if and only if $q > -b$, it must be that the fraction of initial shareholders with $F^{-1}(1 - \phi) > -b$ is exactly τ , which is equivalent to $1 - G(-F^{-1}(1 - \phi)) = \tau$, or $G^{-1}(1 - \tau) = -F^{-1}(1 - \phi)$. This is a knife-edge case that we ignore, since it does not hold generically.

Finally, notice that $q_a < q_c$, and therefore, either $H(q_c) < \phi$, or $H(q_a) > \phi$, or both. Therefore, an equilibrium always exists (but may be non-unique if $H(q_c) < \phi < H(q_a)$). This completes the proof.

As a side note, notice also that many other tie-breaking rules, those in which all shareholders follow the same strategy upon indifference (e.g., buy $r \in [-e, x]$ shares), would also eliminate this type of equilibrium. Indeed, if all shareholders buy or sell a certain (the same across shareholders) amount of shares upon indifference, the market is unlikely to clear. For the market to clear, shareholders with different biases would need to behave differently when they are indifferent between buying and selling shares, that is, the tie-breaking rule has to differ across shareholders in a particular way. Since such a tie-breaking rule is somewhat arbitrary, we ruled it out as an unlikely outcome. ■

Proof of Proposition 4. Note that condition (12) can be written as

$$(1 - \delta)(1 - \tau) < G(-F^{-1}(1 - \phi)) < 1 - \tau(1 - \delta). \quad (21)$$

To see the point about δ , note that (21) is equivalent to

$$\delta > \max \left\{ 1 - \frac{G(-F^{-1}(1 - \phi))}{1 - \tau}, 1 - \frac{1 - G(-F^{-1}(1 - \phi))}{\tau} \right\}.$$

To see the point about τ , note that (21) is equivalent to

$$1 - \frac{G(-F^{-1}(1 - \phi))}{1 - \delta} < \tau < \frac{1 - G(-F^{-1}(1 - \phi))}{1 - \delta}.$$

To see the point about ϕ , note that (21) is equivalent to

$$1 - F(-G^{-1}((1 - \delta)(1 - \tau))) < \phi < 1 - F(-G^{-1}(1 - \tau(1 - \delta))).$$

Finally, let us parameterize the cdf G with σ , where higher values of σ indicate a ranking in terms of the mean-preserving spread, such that as $\sigma \rightarrow 0$, the distribution converges to

a mass point at $\mathbb{E}[b]$. Then, as $\sigma \rightarrow 0$, the marginal voter converges to $\mathbb{E}[b]$. This implies $\lim_{\sigma \rightarrow 0} q^* = -\mathbb{E}[b]$ in any equilibrium, and thus, the voting equilibrium must be unique: it is an activist equilibrium if and only if $H(-\mathbb{E}[b]) < \phi$. Therefore, (12) can be satisfied only if σ is sufficiently large, i.e., the shareholder base is sufficiently heterogeneous. ■

Proof of Lemma 2. Recall that in the activist equilibrium, market clearing implies $\Pr[b < b_a]e = \Pr[b > b_a]x$, where $\Pr[b > b_a] = 1 - \delta = \frac{e}{x+\epsilon}$. Therefore,

$$\begin{aligned} W_a &= \Pr[b < b_a]ep_a + \Pr[b > b_a]\mathbb{E}[(e+x)v(b, q_a) - xp_a | b > b_a] \\ &= \Pr[b > b_a]xp_a + \Pr[b > b_a]\mathbb{E}[(e+x)v(b, q_a) - xp_a | b > b_a] \\ &= \Pr[b > b_a]\mathbb{E}[(e+x)v(b, q_a) | b > b_a] = (1-\delta)(e+x)\mathbb{E}[v(b, q_a) | b > b_a] \\ &= e\mathbb{E}[v(b, q_a) | b > b_a] = ev(\mathbb{E}[b | b > b_a], q_a) = ev(\beta_a, q_a), \end{aligned}$$

where the second to last equality follows from the linearity of $v(b, q_a)$ in b . The proof for the conservative equilibrium is similar and for brevity, is presented in Section B.3 of the Online Appendix. ■

Proof of Proposition 5. First, consider the activist equilibrium. Recall that in this equilibrium $W_a = e \cdot v(\beta_a, q_a)$ and $p_a = v(b_a, q_a)$. Then, a change in parameters that affects the marginal voter (q_a) without changing the marginal trader only affects W_a and p_a through its effect on q_a . Also recall that based on (17), $v(\beta_a, q^*)$ is a hump-shaped function in q^* with a maximum at $q^* = -\beta_a$, and $v(b_a, q^*)$ is a hump-shaped function in q^* with a maximum at $q^* = -b_a$. Since $-b_a < q_a - \beta_a$ by assumption of the proposition, any small enough change in parameters that leaves this order unchanged ($-b_a < q_a - \beta_a$) either increases the distance to $-\beta_a$ but decreases the distance to $-b_a$, or vice versa. Hence, this change of parameters necessarily moves prices and welfare in opposite directions. The proof for the conservative equilibrium is similar and for brevity, is presented in Section B.3 of the Online Appendix. ■

Proof of Lemma 4. We prove a more general result, that both price and shareholder welfare increase with δ . Indeed, based on Proposition 2, the share price is

$$p_{NoVote}(q^*) = v_0 + H(q^*)\mathbb{E}[q|q > q^*] + \begin{cases} b_c(H(q^*) - \phi) & \text{if } H(q^*) < \phi \\ b_a(H(q^*) - \phi) & \text{if } H(q^*) > \phi, \end{cases}$$

and the expected shareholder welfare is

$$W_{NoVote}(q^*) = e \cdot \left[v_0 + H(q^*)\mathbb{E}[q|q > q^*] + \begin{cases} \beta_c(H(q^*) - \phi) & \text{if } H(q^*) < \phi \\ \beta_a(H(q^*) - \phi) & \text{if } H(q^*) > \phi. \end{cases} \right]$$

Recall that $b_c = G^{-1}(1-\delta)$, $\beta_c = \mathbb{E}[b|b < b_c]$, $b_a = G^{-1}(\delta)$, and $\beta_a = \mathbb{E}[b|b > b_a]$. Thus, $p_{NoVote}(q^*)$ and $W_{NoVote}(q^*)$ depend on δ only through their effect on b_c and b_a . Since, by Corollary 1, b_c and β_c are decreasing in δ , and b_a and β_a are increasing in δ , both $p_{NoVote}(q^*)$ and $W_{NoVote}(q^*)$ increase in δ . ■

Proof of Proposition 6. To prove the proposition, we prove a more general result, which characterizes the conditions under which shareholder welfare and the share price increase or

decrease in δ :

General result for Proposition 6: *There exist $\underline{\delta}$ and $\bar{\delta}$, $0 < \underline{\delta} < \bar{\delta} < 1$, such that:*

(i) *The share price increases in δ if $\delta > \bar{\delta}$, and decreases in δ if $\delta < \underline{\delta}$ and $|H(q_{NoTrade}) - \phi|$ is sufficiently small.*

(ii) *Shareholder welfare increases in δ if $\delta > \bar{\delta}$, and decreases in δ if $\delta < \underline{\delta}$, $|H(q_{NoTrade}) - \phi|$ is sufficiently small, and the marginal voter in the no-trade benchmark is more extreme than the average shareholder.*

Proof of the general result:

First, consider the activist equilibrium, which exists if and only if $H(q_a) - \phi > 0$. Recall that $p_a = v(b_a, q_a)$ and $W_a = e \cdot v(\beta_a, q_a)$, where $b_a = G^{-1}(\delta)$, $\beta_a = \mathbb{E}[b|b > b_a] = \frac{1}{G(1-b_a)} \int_{b_a}^{\bar{b}} b dG(b)$, and $q_a = -G^{-1}(1 - \tau(1 - \delta))$. Using (6),

$$\frac{\partial p_a}{\partial \delta} = \frac{\partial b_a}{\partial \delta} (H(q_a) - \phi) - (b_a + q_a) \frac{\partial q_a}{\partial \delta} f(q_a) \quad (22)$$

and

$$\frac{1}{e} \frac{\partial W_a}{\partial \delta} = \frac{\partial \beta_a}{\partial \delta} (H(q_a) - \phi) - (\beta_a + q_a) \frac{\partial q_a}{\partial \delta} f(q_a). \quad (23)$$

Using (10) and (7), we get $\frac{\partial q_a}{\partial \delta} = -\frac{\tau}{g(-q_a)} < 0$, $\frac{\partial b_a}{\partial \delta} = \frac{1}{g(b_a)} > 0$, and

$$\begin{aligned} \frac{\partial \beta_a}{\partial \delta} &= \frac{-\frac{\partial b_a}{\partial \delta} b_a g(b_a) [1 - G(b_a)] + \left[\int_{b_a}^{\bar{b}} b g(b) db \right] g(b_a) \frac{\partial b_a}{\partial \delta}}{[1 - G(b_a)]^2} \\ &= \frac{\partial b_a}{\partial \delta} \frac{g(b_a)}{1 - G(b_a)} (\beta_a - b_a) = \frac{\beta_a - b_a}{1 - G(b_a)} > 0. \end{aligned}$$

Plugging into (22) and (23), we get

$$\begin{aligned} \frac{\partial p_a}{\partial \delta} &= \frac{H(q_a) - \phi}{g(b_a)} + \tau (b_a + q_a) \frac{f(q_a)}{g(-q_a)}, \\ \frac{1}{e} \frac{\partial W_a}{\partial \delta} &= \frac{H(q_a) - \phi}{1 - G(b_a)} (\beta_a - b_a) + \tau (\beta_a + q_a) \frac{f(q_a)}{g(-q_a)}. \end{aligned}$$

Notice that as $\delta \rightarrow 1$, b_a , β_a , and $-q_a$ all converge to \bar{b} , and $H(q_a) - \phi \rightarrow H(-\bar{b}) - \phi$. Suppose the activist equilibrium exists in the limit (which is the case if $H(-\bar{b}) > \phi$). Since g is positive on $[-\bar{b}, \bar{b}]$, $\lim_{\delta \rightarrow 1} \frac{\partial p_a}{\partial \delta} = \frac{H(-\bar{b}) - \phi}{g(\bar{b})} > 0$.

In addition, $\lim_{\delta \rightarrow 1} \frac{1}{e} \frac{\partial W_a}{\partial \delta} = (H(-\bar{b}) - \phi) \lim_{\delta \rightarrow 1} \frac{\beta_a - b_a}{1 - G(b_a)}$. Using l'Hopital's rule,

$$\lim_{\delta \rightarrow 1} \frac{\beta_a - b_a}{1 - G(b_a)} = \lim_{\delta \rightarrow 1} \frac{\frac{\partial \beta_a}{\partial \delta} - \frac{\partial b_a}{\partial \delta}}{-g(b_a) \frac{\partial b_a}{\partial \delta}} = \frac{1}{g(\bar{b})} - \lim_{\delta \rightarrow 1} \frac{\beta_a - b_a}{1 - G(b_a)}$$

which implies $\lim_{\delta \rightarrow 1} \frac{\beta_a - b_a}{1 - G(b_a)} = \frac{1}{2} \frac{1}{g(\bar{b})} > 0$. Therefore, $\lim_{\delta \rightarrow 1} \frac{\partial W_a}{\partial \delta} > 0$.

Also notice that as $\delta \rightarrow 0$, we have $b_a \rightarrow -\bar{b}$, $\beta_a \rightarrow \mathbb{E}[b]$, and $q_a \rightarrow q_{NoTrade} = -G^{-1}(1 - \tau) < \bar{b}$. Suppose the activist equilibrium exists in this limit (which is the case if $H(q_{NoTrade}) > \phi$). Then

$$\lim_{\delta \rightarrow 0} \frac{\partial p_a}{\partial \delta} = \frac{H(q_{NoTrade}) - \phi}{g(-\bar{b})} + \tau(-\bar{b} + q_{NoTrade}) \frac{f(q_{NoTrade})}{g(-q_{NoTrade})},$$

where the second term is strictly negative because $-\bar{b} + q_{NoTrade} < 0$ and the density f is positive. Hence, $\lim_{\delta \rightarrow 0} \frac{\partial p_a}{\partial \delta} < 0$ if $|H(q_{NoTrade}) - \phi|$ is sufficiently small. Also notice that

$$\lim_{\delta \rightarrow 0} \frac{1}{e} \frac{\partial W_a}{\partial \delta} = (H(q_{NoTrade}) - \phi)(\mathbb{E}[b] + \bar{b}) + \tau(\mathbb{E}[b] + q_{NoTrade}) \frac{f(q_{NoTrade})}{g(-q_{NoTrade})}. \quad (24)$$

Thus, if $\mathbb{E}[b] + q_{NoTrade} < 0$ (i.e., the marginal voter in the no-trade benchmark is more extreme (activist) than the average shareholder) and $|H(q_{NoTrade}) - \phi|$ is small enough, then $\lim_{\delta \rightarrow 0} \frac{\partial W_a}{\partial \delta} < 0$.

The analysis for the conservative equilibrium is similar and for brevity, is presented in Section B.3 of the Online Appendix. It shows that (1) $\lim_{\delta \rightarrow 1} \frac{\partial W_c}{\partial \delta} > 0$ and (2) that if $\mathbb{E}[b] + q_{NoTrade} > 0$ (i.e., the marginal voter is more extreme (conservative) than the average post-trade shareholder) and $|H(q_{NoTrade}) - \phi|$ is small enough, then $\lim_{\delta \rightarrow 0} \frac{\partial W_c}{\partial \delta} < 0$.

Given the strictly positive (negative) limits of $\frac{\partial p}{\partial \delta}$ and $\frac{\partial W}{\partial \delta}$ as $\delta \rightarrow 1$ ($\delta \rightarrow 0$) for any equilibrium as long as it exists, it follows that under the conditions of the proposition, there exist $\underline{\delta}$ and $\bar{\delta}$, $0 < \underline{\delta} < \bar{\delta} < 1$, such that both the share price and welfare in any equilibrium that exists increase (decrease) in δ for $\delta > \bar{\delta}$ ($\delta < \underline{\delta}$), as required. ■

Proof of Proposition 7. We start by making a remark about the case $q^* = H^{-1}(\phi)$. If $q^* = H^{-1}(\phi)$, then all shareholders are indifferent between buying and selling, and the tie-breaking rule we adopt implies that in equilibrium, no shareholder trades. While this tie-breaking rule implies that the trading strategies of shareholders in the delegation equilibrium are not continuous in q^* as $q^* \rightarrow H^{-1}(\phi)$, the expected welfare of shareholders in any equilibrium continuously converges to welfare in the equilibrium with $q^* = H^{-1}(\phi)$. Indeed, shareholder welfare in the equilibrium in which $q^* = H^{-1}(\phi)$ and shareholders thus do not trade is

$$e \cdot \mathbb{E}[v(b, H^{-1}(\phi))] = e \cdot v(\mathbb{E}[b], H^{-1}(\phi)) = e \cdot (v_0 + \phi \mathbb{E}[\theta | q > H^{-1}(\phi)]). \quad (25)$$

Using (16) and (6), it is easy to see that the limit of shareholder welfare in both the conservative equilibrium ($e \cdot \lim_{q^* \searrow H^{-1}(\phi)} v(\beta_c, q^*)$) and in the activist equilibrium ($e \cdot \lim_{q^* \nearrow H^{-1}(\phi)} v(\beta_a, q^*)$) is the same and equals (25), as required. We now proceed to the proof of the proposition.

Proof of (i). We first show that $b_m^* = \beta_a$ if $v(\beta_a, -\beta_a) > v(\beta_c, -\beta_c)$, and $b_m^* = \beta_c$ otherwise. The choice of the optimal board is equivalent to choosing the cutoff q^* that maximizes expected shareholder welfare. Recall from Section 5 and (17) that $v(b, q^*)$ is a hump-shaped function in q^* with a maximum at $q^* = -b$. Thus, within the range of q^* that generates a conservative equilibrium or the equilibrium where shareholders are indifferent and do not trade ($H(q^*) \leq \phi \Leftrightarrow q^* \geq H^{-1}(\phi)$), (16) implies that the optimal cutoff q^* is the point closest to $-\beta_c$ in this range, i.e., $\max\{-\beta_c, H^{-1}(\phi)\}$. Similarly, within the range of q^* that generates

an activist equilibrium or the equilibrium where shareholders are indifferent and do not trade ($H(q^*) \geq \phi \Leftrightarrow q^* \leq H^{-1}(\phi)$), the optimal cutoff q^* is the point closest to $-\beta_a$ in this range, i.e., $\min\{-\beta_a, H^{-1}(\phi)\}$. Since $\beta_c < \beta_a$, there are three cases to consider:

Case 1: If $H^{-1}(\phi) \leq -\beta_a$, then any $q^* < H^{-1}(\phi)$ generates an activist equilibrium, and it is welfare inferior to the equilibrium with $q^* = H^{-1}(\phi)$. At the same time, setting $q^* = -\beta_c$ would generate a conservative equilibrium that is superior to an equilibrium with $q^* = H^{-1}(\phi)$ because $-\beta_c > -\beta_a \geq H^{-1}(\phi)$. Therefore, in this case $b_m^* = \beta_c$.

Case 2: If $-\beta_c \leq H^{-1}(\phi)$, then any $q^* > H^{-1}(\phi)$ generates a conservative equilibrium, and it is welfare inferior to an equilibrium with $q^* = H^{-1}(\phi)$. At the same time, setting $q^* = -\beta_a$ would generate an activist equilibrium that is superior to an equilibrium with $q^* = H^{-1}(\phi)$ because $-\beta_a < -\beta_c \leq H^{-1}(\phi)$. Therefore, in this case $b_m^* = \beta_a$.

Case 3: If $-\beta_a < H^{-1}(\phi) < -\beta_c$, then the optimal cutoff among those that generate a conservative equilibrium is $-\beta_c$, and the optimal cutoff among those that generate an activist equilibrium is $-\beta_a$, and both generate higher welfare than $q^* = H^{-1}(\phi)$. Then, $b_m^* = \beta_a$ if $v(\beta_a, -\beta_a) > v(\beta_c, -\beta_c)$, and $b_m^* = \beta_c$ otherwise. Notice that

$$v(\beta_a, -\beta_a) > v(\beta_c, -\beta_c) \Leftrightarrow H^{-1}(\phi) > H^{-1}(\Phi) \Leftrightarrow \phi < \Phi, \quad (26)$$

where

$$\begin{aligned} \Phi &\equiv H(-\beta_c) + \mathbb{E}[\beta_a + q \mid -\beta_a < q < -\beta_c] \frac{H(-\beta_a) - H(-\beta_c)}{\beta_a - \beta_c} \\ &= H(-\beta_a) + \mathbb{E}[\beta_c + q \mid -\beta_a < q < -\beta_c] \frac{H(-\beta_a) - H(-\beta_c)}{\beta_a - \beta_c}. \end{aligned} \quad (27)$$

Thus, $b_m^* = \beta_a$ if $\phi < \Phi \Leftrightarrow H^{-1}(\phi) > H^{-1}(\Phi)$ and $b_m^* = \beta_c$ if $\phi > \Phi \Leftrightarrow H^{-1}(\phi) < H^{-1}(\Phi)$. Also notice that $H(-\beta_a) > \Phi > H(-\beta_c)$, which implies $-\beta_a < H^{-1}(\Phi) < -\beta_c$.

Taken together, the three cases above imply that $b_m^* = \beta_c$ if either $H^{-1}(\phi) \leq -\beta_a$ or $-\beta_a < H^{-1}(\phi)$ and $H^{-1}(\phi) < H^{-1}(\Phi)$. Since $-\beta_a < H^{-1}(\Phi)$, these two conditions together imply that $b_m^* = \beta_c$ if $H^{-1}(\phi) < H^{-1}(\Phi) \Leftrightarrow \phi > \Phi$. And, the three cases above imply that $b_m^* = \beta_a$ if either $-\beta_c \leq H^{-1}(\phi)$ or $H^{-1}(\phi) < -\beta_c$ and $H^{-1}(\Phi) < H^{-1}(\phi)$. Since $H^{-1}(\Phi) < -\beta_c$, these two conditions together imply that $b_m^* = \beta_a$ if $H^{-1}(\phi) > H^{-1}(\Phi) \Leftrightarrow \phi < \Phi$. If $\phi = \Phi$, both β_a and β_c give the highest possible shareholder welfare. We conclude that $b_m^* = \beta_a$ if $\phi < \Phi \Leftrightarrow v(\beta_a, -\beta_a) > v(\beta_c, -\beta_c)$, and $b_m^* = \beta_c$ otherwise.

Proof of (ii). The statement of part (ii) automatically follows from the fact that $\beta_a = \mathbb{E}[b \mid b > b_a] > \mathbb{E}[b]$ and $\beta_c = \mathbb{E}[b \mid b < b_c] < \mathbb{E}[b]$.

Proof of (iii). Consider $\Delta W(b_m)$ as a function of δ , and denote it $\Delta W(b_m, \delta)$. Notice that the delegation equilibrium can replicate any conservative (activist) voting equilibrium if we set $b_m = -q_c$ ($b_m = -q_a$). Therefore, delegation to the optimal board always weakly dominates the voting equilibrium ($\Delta W(b_m, \delta) \geq 0$) and strictly dominates it ($\Delta W(b_m, \delta) > 0$) except the knife-edge cases when the voting equilibrium is already efficient, i.e., the average post-trade shareholder coincides with the marginal voter.

Recall that as a function of δ , $\lim_{\delta \rightarrow 1} \beta_a(\delta) = \lim_{\delta \rightarrow 1} (-q_a(\delta)) = \bar{b}$ and $\lim_{\delta \rightarrow 1} \beta_c(\delta) = \lim_{\delta \rightarrow 1} (-q_c(\delta)) = -\bar{b}$. Moreover, since $\mathbb{E}[b]$ does not change with δ , if the selected voting equi-

librium is activist, then $\lim_{\delta \rightarrow 1} |\beta_a(\delta) - \mathbb{E}[b]| > 0 = \lim_{\delta \rightarrow 1} |\beta_a(\delta) - (-q_a(\delta))|$, and if the selected voting equilibrium is conservative, then $\lim_{\delta \rightarrow 1} |\beta_c(\delta) - \mathbb{E}[b]| > 0 = \lim_{\delta \rightarrow 1} |\beta_c(\delta) - (-q_c(\delta))|$. Suppose, for simplicity, that the unbiased board induces an activist equilibrium (if it induces a conservative equilibrium, the argument is identical). Then shareholder welfare in this delegation equilibrium is $W_m(b_m) = e \cdot v(\beta_a, -\mathbb{E}[b])$. Next, shareholder welfare in the voting equilibrium with the highest shareholder welfare satisfies $\max\{W_a, W_c\} \geq W_a = e \cdot v(\beta_a, q_a(\delta))$. Since $v(\beta_a, q^*)$ is a hump-shaped function in q^* with a unique maximum at $-\beta_a$, and since $\lim_{\delta \rightarrow 1} |\beta_a(\delta) - (-q_a(\delta))| = 0 < \lim_{\delta \rightarrow 1} |\beta_a(\delta) - \mathbb{E}[b]|$, there exists $\delta^* \in (0, 1)$ such that $v(\beta_a, -q_a(\delta)) > v(\beta_a, -\mathbb{E}[b])$ for any $\delta \in (\delta^*, 1)$. Hence, $\max\{W_a, W_c\} \geq e \cdot v(\beta_a, q_a(\delta)) > e \cdot v(\beta_a, -\mathbb{E}[b]) = W_m(\mathbb{E}[b])$, so $\Delta W(\mathbb{E}[b]) < 0$ for any $\delta \in (\delta^*, 1)$, as required. ■

Proposition 8. *Suppose shareholders expect the activist (conservative) equilibrium in the voting game, and the optimal board induces an activist (conservative) equilibrium as well. Then, there exists $\bar{\tau} \in (0, 1)$ such that if $\tau \in (\bar{\tau}, 1)$, then at least $1 - \tau$ initial shareholders strictly prefer retaining their voting rights over delegation to the optimal board.*

Proof. We present the proof when shareholders expect the voting equilibrium to be activist. Section B.3 in the Online Appendix presents the proof when the voting equilibrium is expected to be conservative, which is very similar.

The expected payoff of shareholder b when the voting equilibrium is expected to be activist is

$$V_a(b, q^*) = \begin{cases} (e + x)v(b, q^*) - xv(b_a, q^*) & \text{if } b > b_a \\ ev(b_a, q^*) & \text{if } b \leq b_a. \end{cases} \quad (28)$$

Similarly, if shareholder b expects the delegation (to a board with bias $b_m = -q_m$) equilibrium to be activist, his expected payoff is $V_a(b, q_m)$. Recall that the delegation equilibrium is activist if and only if $H(q_m) > \phi \Leftrightarrow -q_m > -H^{-1}(\phi)$.

Consider as an alternative an activist board with bias $b_m = -q_m > -H^{-1}(\phi)$. Shareholder b prefers delegation to such a board over the activist voting equilibrium if and only if $V_a(b, q_a) < V_a(b, q_m)$. We consider several cases:

Case 1: If $b \leq b_a$, then

$$\begin{aligned} V_a(b, q_a) < V_a(b, q_m) &\Leftrightarrow v(b_a, q_a) < v(b_a, q_m) \Leftrightarrow \\ b_a(H(q_a) - H(q_m)) &< H(q_m)\mathbb{E}[\theta|q > q_m] - H(q_a)\mathbb{E}[\theta|q > q_a]. \end{aligned}$$

(1a) If in addition $q_a > q_m$, then $H(q_a) - H(q_m) < 0$, so

$$V_a(b, q_a) < V_a(b, q_m) \Leftrightarrow b_a > \mathbb{E}[-q| -q_a < -q < -q_m],$$

which never holds given that $-q_a > b_a$. Thus, shareholders $b \leq b_a$ never support delegation to a board who is more extreme than the marginal voter, i.e., $q_m < q_a \Leftrightarrow b_m > -q_a$.

(1b) If instead $q_a < q_m$, then $H(q_a) - H(q_m) < 0$, so

$$V_a(b, q_a) < V_a(b, q_m) \Leftrightarrow b_a < \mathbb{E}[-q| -q_m < -q < -q_a].$$

Since $b_a < -q_a$, this always holds if $b_a \leq -q_m$ and might even hold if $b_a > -q_m$. Thus, shareholders with $b \leq b_a$ support delegation to a board whenever $-q_m \in [b_a, -q_a)$, and might even do so if $-q_m < b_a$.

Case 2: If $b > b_a$, then (8) and (28) imply

$$\begin{aligned} V_a(b, q_a) < V_a(b, q_m) &\Leftrightarrow v(b, q_a) - \delta v(b_a, q_a) < v(b, q_m) - \delta v(b_a, q_m) \Leftrightarrow \\ &v(b, q_a) - v(b, q_m) < \delta [v(b_a, q_a) - v(b_a, q_m)] \Leftrightarrow \\ &b(H(q_a) - H(q_m)) + H(q_a) \mathbb{E}[\theta|q > q_a] - H(q_m) \mathbb{E}[\theta|q > q_m] \\ &< \delta [b_a(H(q_a) - H(q_m)) + H(q_a) \mathbb{E}[\theta|q > q_a] - H(q_m) \mathbb{E}[\theta|q > q_m]]. \end{aligned}$$

(2a) If in addition $q_a > q_m$, then $H(q_a) < H(q_m)$, so

$$V_a(b, q_a) < V_a(b, q_m) \Leftrightarrow b > \delta b_a + (1 - \delta) \mathbb{E}[-q | -q_a < -q < -q_m],$$

and notice that since $-q_a > b_a$, then $\delta b_a + (1 - \delta) \mathbb{E}[-q | -q_a < -q < -q_m] > b_a$.

(2b) If instead $q_a < q_m$, then $H(q_a) > H(q_m)$, so

$$V_a(b, q_a) < V_a(b, q_m) \Leftrightarrow b < \delta b_a + (1 - \delta) \mathbb{E}[-q | -q_m < -q < -q_a].$$

The overall support for delegation to the board is the combined support of shareholders with $b \leq b_a$ and $b > b_a$. Then:

(i) First, consider a board with $-q_m > -q_a \Leftrightarrow q_m < q_a$. Then only shareholders with $b > \delta b_a + (1 - \delta) \mathbb{E}[-q | -q_a < -q < -q_m] > b_a$ support delegation to the board. It follows that if $1 - G(b_a) < \tau \Leftrightarrow 1 - \delta < \tau$, then this type of board does not obtain τ -support.

(ii) Second, consider a board with $-q_m < -q_a \Leftrightarrow q_m > q_a$. Such a board obtains support from $b \leq b_a$ if $b_a < \mathbb{E}[-q | -q_m < -q < -q_a]$ and from $b > b_a$ that satisfy $b < \delta b_a + (1 - \delta) \mathbb{E}[-q | -q_m < -q < -q_a]$. There are two cases:

1. If $b_a > \mathbb{E}[-q | -q_m < -q < -q_a]$, then $\delta b_a + (1 - \delta) \mathbb{E}[-q | -q_m < -q < -q_a] < b_a$. Thus, in this case, there is no support for delegation from either shareholders with $b \leq b_a$ or from those with $b > b_a$.

2. If $b_a < \mathbb{E}[-q | -q_m < -q < -q_a]$, then $\delta b_a + (1 - \delta) \mathbb{E}[-q | -q_m < -q < -q_a] > b_a$. Thus, both shareholders with $b \leq b_a$ and with $b \in (b_a, \delta b_a + (1 - \delta) \mathbb{E}[-q | -q_m < -q < -q_a])$ support delegation. So overall, delegation receives support from shareholders with $b < \delta b_a + (1 - \delta) \mathbb{E}[-q | -q_m < -q < -q_a]$. Notice that $\mathbb{E}[-q | -q_m < -q < -q_a] < -q_a$, and hence the fraction of initial shareholders supporting delegation is

$$G(\delta b_a + (1 - \delta) \mathbb{E}[-q | -q_m < -q < -q_a]) < G(\delta b_a - (1 - \delta) q_a).$$

Note that $\lim_{\tau \rightarrow 1} q_a = -b_a$. Thus, $\lim_{\tau \rightarrow 1} G(\delta b_a - (1 - \delta) q_a) = G(b_a) < 1$.

Combining (i) and (ii), we conclude that as $\tau \rightarrow 1$, no activist board gains τ -support from shareholders if they expect the activist voting equilibrium. ■

The Online Appendix can be accessed at
https://www.nadyamalenko.com/Levit,Malenko,Maug_OnlineAppendix.pdf.

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