Voting Choice*

Andrey Malenko†   **Nadya Malenko**‡

February 2025

Abstract

Traditionally, fund managers cast votes on behalf of fund investors. Recently, there is a shift towards "pass-through voting," with fund managers offering their investors a choice: delegate their votes to the fund or vote themselves. We develop a theory of delegation of voting rights to study the implications of such voting choice. If investors have heterogeneous preferences, voting choice may decrease investor welfare because investors retain voting rights excessively, prioritizing their preferences over information. If investors have heterogeneous information, voting choice generally improves investor welfare. However, it may decrease fund managers' information collection effort, resulting in less informed voting outcomes.

Keywords: voting, delegation, voting choice, pass-through voting, ESG, index funds, aggregation of information, heterogeneous preferences, externalities

*We are grateful to Tim Baldenius, Sugato Bhattacharyya, Alon Brav, Georgy Chabakauri, Ken Deng, Hulya Eraslan, Erik Gordon, Hans Peter Grüner, William Johnson, Ali Lazrak, Michelle Lowry, Uday Rajan, Magdalena Rola-Janicka, Jan Schneemeier, Tobias Tröger, Zhe Wang, Lucy White, Kostas Zachariadis, Jeff Zwiebel, Jonathon Zytnick, participants of the BI Conference on Corporate Governance, UBC Summer Finance Conference, NYU-LawFin/SAFE-ESCP Conference, Research Symposium on Finance and Economics, Aarhus Workshop on Strategic Interaction in Corporate Finance, Vienna Festival of Finance Theory, OxFIT, AFA, ASU Sonoran Winter Finance Conference, MFA, SFS Cavalcade, Four Corners conference, EFA, and seminar participants at multiple universities for helpful comments.

†Boston College, CEPR, ECGI, and FTG. Email: malenkoa@bc.edu.

‡Boston College, CEPR, ECGI, FTG, and NBER. Email: malenko@bc.edu.

1 Introduction

The tremendous growth of institutional investors, particularly large passive funds, has drawn attention to their increasingly important role in corporate governance. Major investment advisors such as BlackRock, Vanguard, and State Street have become among the largest shareholders in many publicly traded firms (Lewellen and Lewellen, 2022). In this role, they cast votes on behalf of millions of investors and have substantial voting power, making them pivotal in important corporate votes (Bebchuk and Hirst, 2019; Brav et al., 2023). At the same time, shareholder disagreements over voting issues are becoming increasingly prevalent given the growing role of environmental and social (E&S) concerns (Fisch and Schwartz, 2023).

These trends have generated an intense debate about whether asset managers are in the best position to vote their investors' shares.[1] Do funds' votes represent their investors' preferences? Are their votes sufficiently informed? This debate has become especially heated in the context of E&S issues and has led to several important developments to democratize corporate governance. In October 2021, BlackRock announced the "Voting Choice" program, which gives its investors a choice: delegate their votes to BlackRock, as had been the default before, or exercise their voting rights themselves (so-called "pass-through voting"). As of December 2023, investors constituting about 25% of BlackRock's eligible assets opted to cast their own votes. Vanguard, State Street, and other asset managers have followed suit.[2] While BlackRock initially offered this choice only to institutional clients, in February 2024 it expanded the program to retail investors through its largest ETF, increasing eligible Voting Choice assets to $2.6 trillion, or half of BlackRock's index equity assets under management. Regulators have been considering a more drastic change: The INvestor Democracy is EXpected (INDEX) Act, introduced in the Senate in May 2022, aims to require passively managed funds to collect voting instructions from all of their individual investors and vote according to them.[3]

Motivated by this ongoing debate and important institutional changes, our paper develops

[1]See "BlackRock Walks a Political Tightrope on Climate Issues," *The Wall Street Journal*, Oct. 9, 2022. According to *Reuters* (May 22, 2023), large asset managers' "influential votes have drawn much criticism, both from activists urging them to push portfolio companies harder on issues such as climate change or workforce diversity and, this year, from right-wing U.S. politicians who say the firms focus too much on ESG matters." See Lund (2018), Bebchuk and Hirst (2019), Griffin (2020), and Fisch and Schwartz (2023) for the legal debate about the role of asset managers in voting.

[2]For BlackRock, see here; for Vanguard, see here; and for State Street, see here. In June 2023, the first UK asset manager CIRCA5000 introduced voting choice for its clients.

[3]Specifically, the Act proposes that the fund "cannot vote without instructions from fund investors, except for routine matters" if it holds more than 1% of a firm's shares. An identical bill was introduced in the House of Representatives in July 2022.

a theory of delegation of voting rights. Our model is general and can capture various sources of disagreements between investors, such as different social and political ideologies, tax status, investment horizon, or the composition of their investment portfolios. We use the model to explore the following questions. When is delegating voting to the fund manager beneficial for a fund's investor, and when will the investor prefer to cast his own vote? Do investors benefit from having the choice between delegating and voting themselves? Does such "voting choice" dominate other alternatives, such as the fund voting all its investors' shares or all investors voting themselves?

In our model, the fund manager owns the firm on behalf of the fund's investors. There is a proposal up for a vote, whose value depends on the unknown state. The fund manager gets a signal about the state and casts the votes that are delegated to her. Under complete delegation (which corresponds to the system that has been in place until recently), all investors delegate their voting rights to the fund manager, so she votes all the shares and effectively controls the voting outcome. Under mandatory pass-through voting (which corresponds to the system proposed by the INDEX Act), all investors cast their own votes. Finally, under voting choice, all investors independently decide whether to delegate their votes to the fund manager or to vote themselves.[4] Investors may prefer to retain their votes for two reasons: to vote according to their own preferences (rather than the preferences of the fund manager) or to use their private information about the proposal (rather than to rely on the fund manager's information).

Our analysis demonstrates that whether voting choice increases investor welfare crucially depends on whether investors retain their votes because of their preferences or their private information. To show this, we consider two scenarios: in the first, fund investors have heterogeneous preferences but no private information, whereas in the second, investors have aligned preferences but receive conditionally independent private signals about the proposal.

In the setting with heterogeneous preferences, the value of the proposal to each investor depends on an uncertain common value and an investor-specific private value. Such private values may arise from investors' different stance on E&S issues (Hart and Zingales, 2017; Bolton et al., 2020), differences in their portfolio holdings (Matvos and Ostrovsky, 2008), or the varying tax implications that the proposal holds for different investors (Desai and Jin, 2011). The fund manager gets a private signal about the common value and votes to maximize the expected

[4] More specifically, under the "Voting Choice" program, the fund's investors have a choice between delegating their vote to the fund manager, casting their own vote, and voting according to a custom policy offered by a proxy advisor that best aligns with their preferences (Hu, Malenko, and Zytnick, 2024). In our paper, for simplicity, we analyze the last two options together and treat both of them as the investor casting his own vote (since for both options, the investor's vote closely represents the investor's preferences).

welfare of her investors, knowing that their private values are drawn from some distribution centered around zero. Each fund investor faces the following trade-off when deciding whether to delegate his vote. On the one hand, delegation is valuable because the fund manager is more informed about the state, but on the other hand, the fund manager's preferences generally differ from those of the investor. In equilibrium, each investor delegates his vote only if his preferences are sufficiently aligned with those of the fund manager.

If the fund manager has one investor only, having a choice always benefits the investor, and his welfare is maximized under the voting choice system. Intuitively, the investor chooses to retain his voting rights and not delegate only when it is in his interest to do so. With multiple investors, however, the question of whether voting choice improves investor welfare is more nuanced because of a collective action problem: when an investor decides whether to retain his voting rights or delegate voting to the fund manager, he trades off the costs and benefits of delegation for himself, but ignores the externalities imposed by his choice on other investors.

In particular, an investor's decision to delegate his vote affects other investors in two ways. First, the decision is made based on the fund manager's information, whereas the investor's vote would be uninformed.[5] This force, which we refer to as the "information effect," imposes a positive externality on other investors. Because investors only internalize the benefits of a more informed decision on the value of their own shares, but not on the value of other investors' shares, the information effect leads to excessive retention of voting rights and too little delegation. Second, the decision is made according to the fund manager's preferences rather than the delegating investor's preferences. This "preference effect" benefits investors aligned with the fund manager's vote and hurts investors misaligned with the fund manager's vote. We show that even though investors' preferences are on average unbiased, the preference effect on aggregate hurts other investors. Intuitively, this is because the investor's delegation decision only matters when the vote is split, and since the fund manager votes a block of shares, a split vote implies that more investors oppose the fund manager's vote than support it. Because the investor does not internalize this overall negative externality of his delegation decision, the preference effect leads to excessive delegation of voting rights.

Which of the two effects dominates and whether voting choice is ultimately beneficial depends on the distribution of investors' preferences, and the heterogeneity of preferences in

[5] This echoes the concern about pass-through voting expressed by Fisch and Schwartz (2023), who write: "Even if fund investors could be nudged to vote, there are reasons to question whether their votes would be informed. ... Pass-through voting ... fails to account for the significant loss of sophistication, expertise, and efficiency that institutional intermediaries provide."

particular. However, the impact of preference heterogeneity varies greatly based on the exact form of heterogeneity. Suppose first that the preferences of moderate investors become stronger. We show that in this case, the information effect can dominate: if many investors have strong preferences, they all prioritize their preferences over information and retain their votes, leading to insufficient delegation. Interestingly, this implies that as preference heterogeneity increases in this way, voting choice does not necessarily become more beneficial and may become dominated by complete delegation. There are two opposite effects. On the one hand, stronger heterogeneity makes preference aggregation more important, which favors voting choice over complete delegation. On the other hand, because more investors prioritize their preferences over information, there is more underutilization of the fund manager's information, and requiring delegation of votes to the fund can help correct this inefficiency.

In contrast, suppose that preference heterogeneity increases because the tails of the distribution become heavier: moderate investors remain moderate, whereas the preferences of extreme investors become more extreme. We show that in this case, the preference effect eventually dominates, i.e., there is excessive delegation under voting choice. Intuitively, moderate investors continue to delegate their votes, so the fund's information is not underutilized. Instead, the key concern is insufficient aggregation of investors' preferences due to the negative externality that delegating investors impose on those with extreme preferences. As a result, voting choice is preferred to complete delegation. Moreover, because even voting choice features excessive delegation, mandatory pass-through voting dominates both voting choice and complete delegation if the tails of the distribution are heavy enough. Together, these results highlight that greater heterogeneity in investors' preferences does not necessarily make voting choice more attractive, and the type of preference heterogeneity matters a lot.

In practice, the fund manager's preferences may be misaligned with those of the average investor (Zytnick, 2022; Li, Naaraayanan, and Sachdeva, 2023; Herrmann et al., 2024). For example, the fund manager may be reluctant to vote against management to avoid jeopardizing business ties with the company (Davis and Kim, 2007; Cvijanovic, Dasgupta, and Zachariadis, 2016) or may be excessively biased towards E&S issues (as some critics of large asset managers have alleged). We show that when the fund manager is biased, voting choice has another, indirect, effect: it changes the fund manager's voting behavior. When all votes are delegated to the fund manager, she is more likely to vote in line with her information (rather than in line with her private value from the proposal) compared to the system with voting choice. This is because the fund manager cares not only about her private value, but also about the welfare of her investors. Under complete delegation, the fund manager's concern about investors' welfare constrains her opportunistic behavior and encourages her to vote in line with her information. In contrast, under voting choice, only investors whose preferences are relatively aligned with those of the fund manager choose to delegate their votes. As a result, the fund manager's concern about her investors' welfare now pushes her even further in the direction of her own bias. We refer to this as the "incentive effect" of delegation. Each individual investor, however, does not internalize the incentive effect, which may also lead to insufficient delegation under voting choice.

Overall, when investors have heterogeneous preferences, voting choice generally results in either excessive or insufficient delegation and can be dominated by complete delegation or mandatory pass-through voting. The conclusions are very different when investors have aligned preferences but heterogeneous information, so that the key goal of voting is to aggregate the dispersed information held by investors and the fund manager. We show that in this case, the equilibrium with voting choice achieves the efficient level of delegation – one that maximizes expected investor welfare. Intuitively, if investors' information is less precise, they are more likely to delegate their votes to the fund manager, whereas if their information is more precise, they optimally delegate less. As a result, the voting outcome puts a larger weight on more precise signals and a smaller weight on less precise signals, leading to effective aggregation of information. Essentially, since investors have the same preferences and incur no costs of delegating or casting their votes, their interests are fully aligned, leading to no inefficiencies in equilibrium (McLennan, 1998). Since the equilibrium achieves the efficient level of delegation, voting choice dominates both complete delegation and mandatory pass-through voting.

While in our baseline model, the fund manager and investors are endowed with information, investors often actively decide whether to become informed about voting issues (e.g., Iliev, Kalodimos, and Lowry, 2021). We extend the model to analyze endogenous information acquisition and show that the fewer votes the fund manager casts on behalf of fund investors, the lower are her incentives to become informed. A negative feedback loop emerges: when fewer votes are delegated, the fund manager acquires less precise information, which, in turn, leads fund investors to delegate even fewer votes to her. As a result, even if investors have aligned preferences, voting choice can lead to coordination failure and decrease investor welfare relative to complete delegation: the equilibrium with no delegation and no information acquisition by the fund manager is self-fulfilling, even if it is collectively in the interest of all investors to delegate voting and information acquisition to the fund.

Our results suggest caution in the move to democratizing proxy voting and have several policy implications. The case of uninformed investors with heterogeneous preferences can capture the scenario in which the fund's clients are small institutional investors or retail investors voting on E&S proposals. Greater heterogeneity of investors' preferences does not necessarily make voting choice more desirable, as it may lead to excessive retention of voting rights and underutilization of the fund manager's information. What matters is why preferences become more heterogeneous: do most investors become more concerned about E&S issues, or do only extreme investors become more extreme.[6] In contrast, the case of privately informed investors with aligned preferences can describe the scenario in which the fund's clients are relatively large institutional investors focused on profit maximization. Voting choice in this case can achieve the optimal level of delegation and dominate both the status quo system and the system proposed by the INDEX Act, but it is important to ensure investor coordination on the efficient equilibrium. Despite this, voting choice has not been actively discussed or universally offered to funds' clients until recently, even though it could have been an efficient solution for governance proposals, which have been common on voting ballots for years. Finally, the scenario in which the fund's clients are institutional investors with different ideologies, e.g., as in voting on E&S proposals, is likely to combine both cases, and whether voting choice improves investor welfare depends on their relative importance. In particular, voting choice can make investors worse off if they are not very informed about the financial benefits of the proposals and the heterogeneity in their preferences is not too large.

Our theory is not limited to delegation to asset managers and can apply in other settings, such as delegation to the board of directors. Typically, shareholders entrust authority to the board, which is often presumed to possess more in-depth knowledge of the firm's fundamentals compared to shareholders. However, there are instances where the law mandates a form of mandatory pass-through voting. For instance, in many jurisdictions, a shareholder vote is required to approve substantial share issuances, and shareholders of the target are required to vote on whether to accept an acquisition offer. Notably, an intermediate solution akin to the voting choice system has not yet been implemented in this setting. The tradeoffs discussed in this paper remain relevant when examining the delegation of voting rights to the board. At the same time, the board setting has some unique characteristics, as the board itself is a collective

[6] Another concern about offering voting choice to retail investors is that these investors may not participate in the vote (Fisch and Schwartz, 2023). We highlight that even if vote participation is costless (e.g., if investors' votes are executed via proxy advisors' thematic policies; see Section 3.2), voting choice can be inefficient because investors make privately optimal delegation decisions, disregarding their effect on other investors.

decision-making body and shareholders have the authority to vote on board members.

Related literature. The literature on shareholder voting examines how efficiently voting aggregates shareholders' heterogeneous information and preferences.[7] The contribution of our paper is to study the delegation of voting rights. Bar-Isaac and Shapiro (2020) analyze strategic voting with a blockholder and small shareholders. Our result that voting choice is beneficial in the homogeneous preference setting is related to their result that the blockholder may optimally abstain on part of his votes: in both cases, this helps improve information aggregation by avoiding over-reliance on one signal. Malenko and Malenko (2019) study shareholders' choice between acquiring their own signals and buying information from a proxy advisor, and show that over-reliance on one noisy signal (proxy advisor's recommendation) may occur. Their paper features homogeneous preferences and a proxy advisor that maximizes profits from information sale, whereas our focus is on the trade-off between aggregating preferences and making an informed decision, and the fund manager cares about the welfare of her investors.[8] Campbell et al. (2022) and Dhillon et al. (2023) study liquid democracy, a system where voters can delegate their votes to other voters. Eso, Hansen, and White (2014) analyze vote trading and show that uninformed voters may sell their votes at a zero price, essentially delegating them to voters who buy. Our paper differs in two aspects: first, we study delegation to an intermediary, rather than to other voters; second, these papers focus on information aggregation, while we focus on the trade-off between the aggregation of preferences and aggregation of information.[9] This leads to different results: in these papers, liquid democracy improves efficiency if the best equilibrium is played (Campbell et al., 2022; Dhillon et al., 2023) and trading of votes at zero price improves efficiency (Eso et al., 2014), but this is not the case for voting choice in our model, where welfare can be reduced by voting choice.

[7]For example, Maug (1999), Bond and Eraslan (2010), Levit and Malenko (2011), Meirowitz and Pi (2022), and Bouton et al. (2023) focus on the aggregation of heterogeneous information, whereas Van Wesep (2014), Cvijanovic, Groen-Xu, and Zachariadis (2020), Levit, Malenko, and Maug (2022, 2023), Matsusaka and Shu (2021), and Meirowitz, Pi, and Ringgenberg (2023) focus on the aggregation of heterogeneous preferences. See Brav, Malenko, and Malenko (2023) for a survey of the literature.

[8]Levit and Tsoy (2022), Ma and Xiong (2021), Malenko, Malenko, and Spatt (2022), and Matsusaka and Shu (2021) endogenize the quality of proxy advisors' recommendations, and Buechel, Mechtenberg, and Wagner (2023) highlight that their recommendations can trigger more independent research by shareholders.

[9]In Campbell et al. (2022), all voters have common interests. In Dhillon et al. (2023), voters are either independent (have common interests) or partisan, but partisans have extreme preferences and vote the same way in any system, so only independent voters' strategies are relevant for the analysis. Eso et al. (2014) focus on weak partisans, who prefer the vote to be cast according to the state, while we account for the welfare of investors with strong preferences, who prefer the vote to align with their preferences and not the state.

Our paper is also related to the literature on delegation, started by Holmstrom (1984).[10] The trade-off faced by the principal in this literature is similar to that faced by fund investors in our setting with heterogeneous preferences: the benefit of delegation is that the agent (fund manager) is more informed, whereas the cost is that the agent's preferences are misaligned with those of the principal. Geelen, Hajda, and Starmans (2023) analyze this trade-off in the context of diverging pro-social preferences between the agent and the principal and show that a more pro-social agent does not always benefit the organization's sustainability. The key difference of our paper from this literature is that we consider multiple principals (fund investors), who decide about delegating authority to one agent, without internalizing the effect of their delegation decisions on each other. Thus, our paper is an example of "common agency" (Bernheim and Whinston, 1986), but in a delegation context. The literature has also studied delegation with externalities (e.g., Alonso, Dessein, and Matouschek, 2008 and 2015; Rantakari, 2008) but has analyzed very different problems: in these papers, one principal decides on delegation to multiple agents, and agents do not interact through voting.

Finally, the paper contributes to the growing literature on socially responsible investing, which studies how investors' social preferences affect their decisions on investment and voice.[11] Our paper analyzes voice (voting). Differently from this literature, which typically models a socially responsible fund as a single agent, our focus is on the collective action nature of decisions within a fund: the fund manager owns shares on behalf of multiple investors, who may have different pro-social preferences and thus prefer different policies. Carlson, Fisher, and Lazrak (2023) also study the collective decision-making process within an institution considering fossil-fuel divestment, but analyze the political implications of divestment and do not examine the delegation of voting rights. The focus on delegation and the trade-off between information and preferences relates our paper to the empirical literature studying whether fund managers' votes on E&S proposals are informative (e.g., Lowry, Wang, and Wei, 2023) and represent the views and preferences of fund investors (e.g., Li, Naaraayanan, and Sachdeva, 2023; Michaely, Ordonez-Calafi, and Rubio, 2023; Zytnick, 2022; Herrmann et al., 2024).

[10] See, e.g., Aghion and Tirole (1997), Dessein (2002), Harris and Raviv (2008), Baldenius, Melumad, and Meng (2014), and Chakraborty and Yilmaz (2017). See Gibbons, Matouschek, and Roberts (2013) for a survey.

[11] See Heinkel, Kraus, and Zechner (2001); Chowdhry, Davies, and Waters (2019); Oehmke and Opp (2022); Broccardo, Hart, and Zingales (2022); Gupta, Kopytov, and Starmans (2022); Edmans, Levit, and Schneemeier (2022); and Piccolo, Schneemeier, and Bisceglia (2023), among others.

2 Model

Consider a firm that is fully owned by a fund. The fund has N clients (fund investors) with equal ownership, where N is odd. We normalize the number of shares in the firm to N, so that each fund investor owns exactly one share in the firm via the fund manager.

There is a proposal up for a vote, which is approved if at least $\frac{N+1}{2}$ votes are cast in favor. Investors' preferences regarding the proposal consist of a common value component and a private value component. The common value component is $u(d, \theta)$, where $d \in \{0, 1\}$ is the decision to accept ($d = 1$) or reject ($d = 0$) and $\theta \in \{0, 1\}$ is the state of the world. Function $u(d, \theta)$ is given by

$$\begin{aligned} u(1, \theta) &= \begin{cases} 1 & \text{if } \theta = 1, \\ -1 & \text{if } \theta = 0, \end{cases} \\ u(0, \theta) &= 0. \end{aligned}$$

In other words, approving the proposal increases (decreases) common value if $\theta = 1$ ($\theta = 0$), while rejecting the proposal and maintaining the status quo leaves value unchanged. The ex-ante probability that the proposal increases common value is $\Pr(\theta = 1) = \frac{1}{2}$. For example, the vote could capture a proxy fight, with shareholders deciding whether to elect the activist's director nominees. If the incumbent management wins and its nominees stay in place ($d = 0$), firm value remains unchanged, whereas if the activist wins ($d = 1$), common value increases only if the activist's proposed strategy is better than the management's ($\theta = 1$).

Investor i's utility from the proposal depends on common value $u(d, \theta)$ and the investor's private value, captured by the preference parameter x_i, as follows:

$$v(x_i, d, \theta) = u(d, \theta) + dx_i. \tag{1}$$

In the proxy fight example, if the activist promotes environmentally friendly policies (as Engine No. 1 in Exxon in 2021),[12] investors may have different concerns about the environment and hence value the activist's strategy differently. Other sources of shareholder heterogeneity that can capture x_i include differences in investment horizon, tax status, and differences in portfolio holdings. Such heterogeneity and its effect on voting outcomes has been widely documented (e.g., Bolton et al., 2020; Bubb and Catan, 2022; Li, Maug, and Schwartz-Ziv, 2022).

[12] See "Exxon's Board Defeat Signals the Rise of Social-Good Activists," *New York Times*, June 9, 2021.

Each investor's private value is an independent and identically distributed draw from distribution $F(\cdot)$ with density $f(\cdot)$, which has mean zero. The assumption of zero mean is a normalization: what matters for the analysis is the distance between the mean and the private value of the fund manager. For simplicity, we assume that F is symmetric around zero.

In the baseline model, we assume that the fund manager maximizes the (utilitarian) welfare of her investors, i.e., $u(d, \theta) + d\left(\frac{1}{N}\sum_{i=1}^{N} x_i\right)$. However, the fund manager does not know the realizations of her investors' private values for the proposal, only their distribution. Hence, effectively, $x = 0$ for the fund manager, i.e., her preferences capture the expected preferences of fund investors. For example, the fund manager may want to retain her current investors and hence wants to make decisions that increase their welfare. In Section 3, we consider a biased fund manager, who also puts some weight on her own private value from the proposal.

The information structure is as follows. The fund manager observes a private signal $s \in \{0, 1\}$ about state θ with precision $p \in [\frac{1}{2}, 1]$:

$$\Pr(s = 1|\theta = 1) = \Pr(s = 0|\theta = 0) = p, \tag{2}$$

and each fund investor observes a private signal $\sigma_i \in \{0, 1\}$ with precision $\pi \in [\frac{1}{2}, 1]$:

$$\Pr(\sigma_i = 1|\theta = 1) = \Pr(\sigma_i = 0|\theta = 0) = \pi. \tag{3}$$

All signals are independent conditional on the state.

We assume that investors do not abstain from voting (see Section 3.2 for a discussion). We also assume that the fund manager cannot split votes, i.e., she votes all shares in the same direction, which corresponds to the observed voting practices of asset managers.

In our analysis, we will be interested in comparing the following three voting systems:

Complete delegation to the fund. The fund manager votes on behalf of all N investors. This corresponds to the proxy voting system that has been the status quo until recently.

Mandatory pass-through voting. There is no delegation, and all investors are required to vote themselves. This best corresponds to the system proposed under the INDEX Act.

Voting choice. Given the realization of his private value x_i, each investor i decides whether to delegate his vote to the fund manager or to vote himself. These delegation decisions are made simultaneously and non-cooperatively. Then, the non-delegating investors and the fund manager cast their votes based on the signals they observe. For simplicity, we assume that the fund manager casts her vote not knowing the exact number of investors that delegated. This assumption is not needed in the baseline model with an unbiased fund manager[13] but will be convenient in an extension to a biased fund manager.

As we conclude in the paper, the comparison between these voting systems crucially depends on whether investors have heterogeneous information or heterogeneous preferences. To show this distinction most clearly, we separately consider the following two settings:

1. *Heterogeneous preferences.* In this setting, the private signals of investors are fully uninformative, i.e., $\pi = \frac{1}{2}$.

2. *Heterogeneous information.* In this setting, investors get informative private signals about the state, i.e., $\pi > \frac{1}{2}$, and all investors have the same preferences, i.e., x_i in (1) equals zero with certainty. Many existing models of strategic voting belong to this class (e.g., Austen-Smith and Banks, 1996; Feddersen and Pesendorfer, 1998).

A possible interpretation of these two settings is the following. The setting with heterogeneous preferences can capture the scenario in which the fund's clients are retail investors or small institutions. Such investors are unlikely to have significant private information about proposals given their small size and the fact that the fund owns multiple firms. The setting with heterogeneous information can capture the scenario in which the fund's clients are large institutional investors focused on profit maximization (for example, BlackRock manages money on behalf of many institutional clients). In reality, investors can have both heterogeneous preferences and private information at the same time. We conjecture that such a model has effects present in the models that feature heterogeneous preferences and heterogeneous information separately, and which effect dominates depends on their relative strength.

Note that if the fund has one investor only, voting choice always weakly benefits the investor: the investor optimally decides whether to delegate or not, so having the option to decide cannot make him worse off. With multiple investors, however, the delegation decision that is privately optimal from an individual investor's perspective may not be optimal from the aggregate investor welfare perspective because of externalities it imposes on other investors. As a result, the question of whether voting choice improves investor welfare becomes non-trivial.

[13] Formally, the equilibrium characterized below will also be an equilibrium in a game in which the fund manager observes the number of shareholders that delegated before voting.

2.1 Equilibrium concept and selection

The equilibrium concept is a symmetric Bayes-Nash equilibrium:[14]

Voting stage. At the voting stage, we focus on equilibria that are symmetric around zero. In the model with heterogeneous preferences, this restriction means that investor i with preference $x_i = x$ follows the opposite voting strategy from investor j with preference $x_j = -x$. In the model with heterogeneous information, this restriction means that investor i with signal $\sigma_i = \sigma$ follows the opposite voting strategy from investor j with signal $\sigma_j = 1 - \sigma$. We make the symmetry assumption because it helps eliminate "uninformative" equilibria, in which no fund investor delegates his vote and all investors vote "for" (or all vote "against"), so that the decision aggregates neither preferences nor information.[15]

Delegation stage under "voting choice." In the model with heterogeneous preferences, we look for equilibria in which investor i with preference $x_i = x$ follows the same delegation strategy as investor j with preference $x_j = -x$. In addition, we look for equilibria with a non-zero probability of retention of voting rights, which can be justified by a "trembling hand" refinement. Without this refinement, there is always an equilibrium in which all investors delegate.[16] In the model with heterogeneous information, we look for equilibria in which all investors play the same delegation strategy, i.e., each investor i delegates his vote to the fund manager with the same probability $q_d \in [0, 1]$.

3 Heterogeneous preferences

Suppose investors have heterogeneous preferences but no private information about the state. We first characterize the equilibrium under the three regimes described above.

Equilibrium under complete delegation to the fund. The fund manager maximizes $u(d, \theta) + d\left(\frac{1}{N}\sum_{i=1}^{N} x_i\right)$. For example, if her investors strongly favor the proposal ($\frac{1}{N}\sum_{i=1}^{N} x_i >$

[14] We only focus on symmetric equilibria in the setting with an unbiased fund manager. In the extension to a biased fund manager in Section 3.1, the equilibrium is asymmetric.

[15] Without the symmetry assumption, these "uninformative" equilibria would always exist. This is because, in such equilibria, an investor's vote is never pivotal for the outcome, so voting "for" (or "against") regardless of one's preferences and information, as well as not delegating the vote, is an equilibrium strategy.

[16] Indeed, if investor i expects all other investors to delegate with certainty, he expects his vote to never be pivotal, which means that his delegation decision is irrelevant for his utility. Thus, he finds it optimal to delegate, no matter how high or low x_i is. A "trembling hand" refinement eliminates this equilibrium, because it makes investor i's vote pivotal with positive, even if negligible, probability. Then, an investor with very high $|x_i|$ will prefer to retain his voting right, as formally follows from the analysis below.

1), she would like the proposal to be accepted even if $\theta = 0$. However, the fund manager does not know the realizations of her investors' private values for this proposal and only knows that their private values are on average unbiased ($\mathbb{E}[x_i] = 0$). Hence, she votes for the proposal if and only if she gets a positive signal about its common value. The expected common value of each investor is then given by

$$\Pr(\theta = 1)\Pr(s = 1|\theta = 1) - \Pr(\theta = 0)\Pr(s = 1|\theta = 0) = p - \frac{1}{2}, \tag{4}$$

and the expected welfare of all investors is $N\left(p - \frac{1}{2}\right)$.

Equilibrium under mandatory pass-through voting. Since all investors are uninformed about common value, each investor simply votes in the direction of his private value: in favor (against) the proposal if $x_i > 0$ ($x_i < 0$).

Equilibrium with voting choice. Consider investor i with private value x_i deciding whether to vote himself or delegate his vote to the fund. If the investor does not delegate, he votes in favor if and only if $x_i > 0$, i.e., entirely in line with his private value.[17] The investor's expected payoff in the pivotal state is then x_i. If the investor delegates, the fund manager votes on his behalf. The fund manager casts all the votes delegated to her according to her signal s.[18] Hence, the investor's expected payoff from delegation in the pivotal state is

$$\Pr(s = 1)\left(\mathbb{E}\left[u(1, \theta)|s = 1\right] + x_i\right) = \frac{1}{2}(2p - 1 + x_i).$$

Comparing the two, the investor delegates his vote if and only if

$$\frac{1}{2}(2p - 1 + x_i) \geq x_i \Leftrightarrow 2p - 1 \geq x_i.$$

[17] Even though the investor rationally conditions his vote on the event of being pivotal (i.e., the votes of the fund manager and the non-delegating investors being split), this event does not convey any information about θ because the fund manager's voting strategy, the investors' delegation strategies, and the distribution of investors' preferences are all symmetric around zero.

[18] This is because, given the symmetry of the delegation strategies and the symmetry of the distribution around zero, the fact that the fund manager's vote is pivotal for the decision does not convey information about whether investors' private values are more likely to be positive or negative. Thus, the fund manager's conditional (on the pivotal event) expectation of investors' private values is zero.

The case $x_i \leq 0$ is analogous by symmetry. Hence, investor i delegates his vote if and only if

$$|x_i| \leq 2p - 1. \tag{5}$$

This strategy reflects the standard trade-off between information and bias in the delegation literature (e.g., Dessein, 2002): the benefit of delegating the vote is that the fund manager is more informed, but if the investor's private value is sufficiently extreme, he prefers not to delegate since his preferences differ substantially from those of the fund manager.

Investors' welfare. Notice that the equilibrium under all three systems takes the following form: investors delegate voting to the fund manager if and only if $|x_i| \leq \hat{x}$ for some cutoff $\hat{x}$. The case of complete delegation corresponds to $\hat{x} = \infty$, mandatory pass-through voting corresponds to $\hat{x} = 0$, and voting choice corresponds to $\hat{x} = 2p - 1$. To compare these systems, it is useful to characterize the expected (utilitarian) welfare of fund investors, $U(\hat{x})$, as a function of any given cutoff $\hat{x} \in [0, \infty]$.

Lemma 1. *Suppose that each investor delegates voting to the fund manager if and only if $|x_i| \leq \hat{x}$ for some cutoff $\hat{x}$. Then the expected investor welfare, $U(\hat{x})$, satisfies*

$$\frac{U(\hat{x})}{N} = \left(2 \sum_{k=\frac{N+1}{2}}^{N} P(F(\hat{x}), N, k) - 1\right)(p - \frac{1}{2}) + P(F(\hat{x}), N-1, \frac{N-1}{2}) \int_{\hat{x}}^{\infty} x f(x)\, dx, \tag{6}$$

where $P(z, N, k) = \frac{N!}{k!(N-k)!} z^k (1-z)^{N-k}$. The first component of (6) increases in $\hat{x}$, whereas the second component decreases in $\hat{x}$.

Equation (6) shows that investor welfare is the sum of two components. The first component captures the expected common value of investors, which is determined by the probability of making the decision that maximizes common value (accepting the proposal if and only if $\theta = 1$). This component is the product of two terms. The term $p - \frac{1}{2}$ coincides with (4) and captures the expected common value if the decision is made according to the fund manager's signal. This term is multiplied by the probability that the voting outcome coincides with the fund manager's vote, and this probability depends on $\hat{x}$: the more delegation (the higher $F(\hat{x})$), the higher is this term. For example, under complete delegation ($\hat{x} \to \infty$), this term converges to one and the entire first component of (6) converges to the expression (4), whereas under mandatory pass-through voting, this term equals zero. The second component in (6) captures the expected private value of investors and depends on the extent to which the decision aggregates their preferences. This component is larger if there is less delegation, i.e., $\hat{x}$ is smaller.

Lemma 1 thus illustrates the trade-off between the costs and benefits of delegation. On the one hand, more delegation (higher $\hat{x}$) increases the probability that the decision maximizes investors' common value from the proposal. On the other hand, more delegation increases the chances that the decision does not efficiently aggregate investors' preferences. The optimal $\hat{x}$ that maximizes expected investor welfare trades off these two effects.

The optimal level of delegation

To compare complete delegation, mandatory pass-through voting, and voting choice, it is useful to compare the delegation cutoffs under these systems (∞, 0, and $2p-1$, respectively) to the delegation cutoff that maximizes investor welfare. We therefore analyze the following problem.

Suppose we could optimally choose the cutoff $\hat{x}^* \in [0, \infty]$ (such that any investor would delegate his vote if and only if $|x_i| \leq \hat{x}^*$) to maximize expected investor welfare. If $\hat{x}^* > 2p-1$, the equilibrium with voting choice features *underdelegation*: it would be optimal to delegate more votes than what happens in equilibrium. If $\hat{x}^* < 2p-1$, the equilibrium with voting choice features *overdelegation*: it would be optimal to delegate fewer votes.

How does the optimal $\hat{x}^*$ compare to $2p-1$ (the equilibrium with voting choice)? To understand the intuition, consider the trade-off in increasing the delegation cutoff from $\hat{x}$ to $\hat{x}+\varepsilon$ for a small ε. This change only matters if there is an investor with a private value satisfying $|x| \in (\hat{x}, \hat{x}+\varepsilon)$: otherwise, the increase in the cutoff does not change any investors' delegation decisions and hence any of the votes. Since ε is infinitesimal, we can focus on the case in which only one investor has a private value in this interval. Consider an investor with such a private value and suppose, without loss of generality, that the investor's private value is negative, i.e., $-(\hat{x}+\varepsilon) < x < -\hat{x}$. If the investor did not delegate his vote, he would vote against the proposal (as his expectation of the common value is zero and his private value is negative). The increase in the delegation cutoff induces the investor to delegate his vote, which changes the investor's vote in situations where he would vote differently from the fund manager, i.e., in situations where the fund manager's signal is positive. What are the effects of this change in the investor's vote on overall investor welfare? Importantly, it only matters if the investor's vote is pivotal, i.e., the same number of votes are cast in the direction of the fund manager's vote (for the proposal) and in the opposite direction (against the proposal). Changing the voting outcome from being against to being in line with the fund manager's vote has effect on both common values and private values of other investors:

1. *Information effect* (effect on common values): The decision is now made according to the fund manager's information. This effect increases the common value from the proposal and thereby benefits all N investors.

2. *Preference effect* (effect on private values): The decision is now made according to the preferences of investors who like the proposal (in line with the fund manager's positive vote) and against the preferences of investors who dislike the proposal. The preferences of delegating investors are on average zero: $\mathbb{E}\left[x \mid x \in (-\hat{x}, \hat{x})\right] = 0$, so the expected effect on delegating investors' private values is neutral. However, the non-delegating investors are on average, conditional on a split vote, biased against the proposal, so they are on average hurt. To see why, note that the fund manager casts a block of votes delegated to her, all in favor of the proposal. Hence, conditional on the pivotal event, it must be that out of the non-delegated votes (with $|x| > \hat{x}$), there are more investors who dislike the proposal and vote against it than investors who like the proposal, so that the combined votes against counteract the block of favorable votes cast by the fund manager. Put simply, the investor's delegation decision only matters when the vote is split, and since the fund manager votes a block of shares, a split vote implies that more investors oppose the fund manager's vote than support it. Thus, on average, conditional on a split vote, the effect on the private values of other investors is negative. This intuition is illustrated in Figure 1: the left (right) panel shows a realization of private values that can (cannot) occur if the fund manager votes for the proposal and the vote is split.

If only the information effect were present, the investor's decision to delegate voting to the fund would impose a positive externality on other investors, so voting choice would feature underdelegation relative to the optimal level of delegation. If only the preference effect were present, the externality from delegation would be on average negative, so voting choice would feature overdelegation. The combination of these two effects implies that generally, there can be both underdelegation and overdelegation.

Which of the two effects dominates depends on the distribution of investors' preferences F. As preferences become more heterogeneous, two effects happen simultaneously. First, more investors have strong preferences regarding the proposal and prioritize them over information, so they prefer to cast their own votes rather than delegate them to the fund manager. While this is individually optimal for each investor, this is suboptimal for investors as a whole because the information of the fund manager is underutilized. This effect strengthens the positive

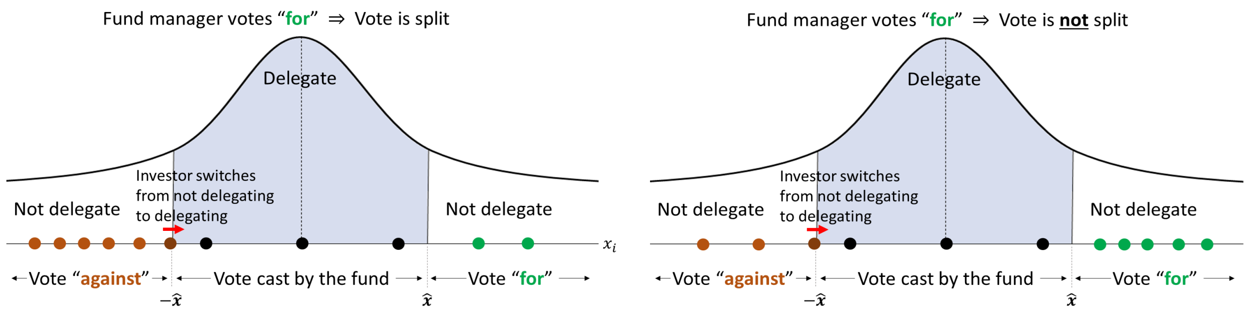

Figure 1. The preference effect. The figure illustrates two possible realizations of investors' private values (on the x-axis). The black dots stand for private values of delegating investors (whose votes are cast by the fund); the brown dots stand for private values of non-delegating investors with $x_i < 0$ (who vote "against"); and the green dots stand for private values of non-delegating investors with $x_i > 0$ (who vote "for"). The left (right) panel illustrates realizations of private values that are consistent (not consistent) with the fund manager voting "for" and the vote being split.

externality and leads to underdelegation. The second effect is that as investors with strong preferences become even more concerned about their private values, the preference externality becomes stronger as well, leading to overdelegation.

To isolate the two effects, it is useful to consider a change in the distribution that keeps investors' private values constant in the middle of the distribution (i.e., moderate investors remain moderate), but varies the preferences of investors in the tails. This limits the information effect (as moderate investors continue to delegate their votes to the fund), resulting in the following comparative statics.

Proposition 1. *Let $\hat{x}^*(F)$ denote the optimal delegation cutoff given distribution F.*

(i) *Consider distribution G, symmetric around zero, such that $G(x) = F(x)$ for $x \in [-\hat{x}^*(F), \hat{x}^*(F)]$ but $G(x|x \geq \hat{x}^*(F))$ dominates $F(x|x \geq \hat{x}^*(F))$ in the sense of first-order stochastic dominance. Then, the optimal delegation cutoff is lower for G: $\hat{x}^*(G) < \hat{x}^*(F)$.*

(ii) *Consider a class of symmetric around zero distributions that coincide with F for $x \in [1-2p, 2p-1]$ but differ in the tails, $\int_{2p-1}^{\infty} xf(x)\,dx$. If the tails are sufficiently heavy ($\int_{2p-1}^{\infty} xf(x)\,dx$ is sufficiently high), there is overdelegation in equilibrium. In contrast, if the tails are sufficiently thin ($\int_{2p-1}^{\infty} xf(x)\,dx$ is sufficiently low), there is underdelegation.*

Intuitively, if the tails are heavy, then the preferences of non-delegating investors are strong, so the negative externality imposed by a delegating investor is large. At the same time, there are many moderate investors who delegate their votes, so the fund manager's information is not strongly underutilized. Hence, the negative externality dominates, so there is overdelegation.

In general, however, as preference heterogeneity increases, either of the two effects can dominate, which has implications for the next set of results.

Comparison between voting choice and other voting systems

We now use our results to compare the welfare of investors under the three voting systems. Recall that if the fund had only one investor, the system with voting choice would dominate both complete delegation and mandatory pass-through voting. In contrast, with multiple investors, the comparison between voting choice and the two other systems is not obvious.

One may think that if investors' preferences become more heterogeneous, the move from complete delegation to voting choice may be warranted, as it allows to aggregate such heterogeneous preferences more efficiently. We show, however, that this logic may not be correct, as it does not take into account the information effect. In particular, the next example shows that an increase in preference heterogeneity can: (1) result in investors being better off under complete delegation, even though investors are better off under voting choice when preferences are less heterogeneous; (2) result in lower expected investor welfare under voting choice than when preferences are less heterogeneous.

Example 1. Consider $N = 5$, $p = 0.75$, and two distributions of investor preferences, F and G, symmetric around zero, with densities

$$f(x) = \begin{cases} 0.3 & x \in [-0.5, 0.5] \\ 1.75 & x \in [-0.7, 0.5] \cup [0.5, 0.7] \end{cases}$$
$$g(x) = \begin{cases} 0.1 & x \in [-0.5, 0.5] \\ 2.25 & x \in [-0.7, 0.5] \cup [0.5, 0.7] \end{cases}$$

Distribution G is a mean-preserving spread of distribution F, so G features higher heterogeneity in investors' preferences. Under voting choice, the equilibrium delegation cutoff is $\hat{x} = 2p - 1 = \frac{1}{2}$, regardless of the distribution. Expected per-share investor welfare under voting choice (expression (6) for $\hat{x} = \frac{1}{2}$) is 0.2564 for distribution F and 0.2475 for distribution G. Thus, an increase in preference heterogeneity decreases investor welfare under voting choice. Moreover, complete delegation of voting to the fund results in expected per-share investor welfare (expression (6) for $\hat{x} = \infty$) of $p - \frac{1}{2} = 0.25$, so investors prefer voting choice over complete delegation under distribution F, but prefer complete delegation over voting choice under distribution G.[19]

Intuitively, greater heterogeneity of investors' preferences has two effects. First, the tails of preferences become more important, as highlighted in Proposition 1. But second, as more investors' preferences become stronger, they choose to delegate less to the fund manager, i.e., $F(2p-1)$ declines. When the information effect dominates the preference effect, so that there is underdelegation in equilibrium, an increase in preference heterogeneity further exacerbates the underdelegation problem and underutilization of the fund manager's information, decreasing investor welfare under voting choice. Requiring all votes to be delegated to the fund manager could then be preferred, so as to alleviate this inefficiency. This is exactly what happens in Example 1: the probability that an investor voluntarily delegates voting to the fund falls from 30% under distribution F to 10% under distribution G. As a result, complete delegation to the fund dominates voting choice under greater heterogeneity of investors' preferences, even though voting choice was preferred under lower heterogeneity.

If, however, the probability of delegation remains high and preferences become more heterogeneous in the tails, then the underutilization of the fund manager's information is not a concern, and the key goal is to ensure the aggregation of investors' preferences. This corresponds to the perturbation of the distribution introduced in Proposition 1, which increases the importance of the tails but keeps the middle of the distribution unchanged. As the next result shows, if tails become sufficiently heavy, voting choice dominates complete delegation. Moreover, at some point, both voting choice and complete delegation become dominated by mandatory pass-through voting.

Proposition 2. *Consider a class of symmetric around zero distributions that coincide with* F *for* $x \in [1-2p, 2p-1]$ *but differ in the tails,* $\int_{2p-1}^{\infty} x f(x)\, dx$.

(i) *If the tails are sufficiently heavy (*$\int_{2p-1}^{\infty} x f(x)\, dx$ *is sufficiently high), voting choice results in higher expected investor welfare than complete delegation. If the tails are sufficiently thin (*$\int_{2p-1}^{\infty} x f(x)\, dx$ *is sufficiently low), complete delegation results in higher expected investor welfare than voting choice.*

[19] Mandatory pass-through voting is, in this example, dominated by both voting choice or complete delegation for both F and G. Specifically, the expected per-share investor welfare under mandatory pass-through voting (expression (6) for $\hat{x} = 0$) is 0.0928 for F and 0.1059 for G.

(*ii*) *If the tails are sufficiently heavy, mandatory pass-through voting results in higher expected investor welfare than either voting choice or complete delegation.*

Intuitively, the advantage of voting choice over complete delegation is that it aggregates the preferences of investors with strong realizations of private values. If the tails of preference distribution are thin, this advantage of voting choice is not very important. Instead, the equilibrium under voting choice features underdelegation and underutilizes the fund manager's information (see Proposition 1). Complete delegation of voting uses the fund manager's information more efficiently, leading to the result that full delegation is better for expected investor welfare than voting choice.

In contrast, if the tails of preference distribution are sufficiently heavy, then aggregation of investors' preferences becomes an important concern, and voting choice results in higher expected investor welfare than complete delegation. Moreover, recall from Proposition 1 that if the tails of the distribution are sufficiently heavy, equilibrium under voting choice features overdelegation: investors do not internalize that by delegating their votes, they impose a negative externality on other investors with extreme preferences. In this case, although voting choice allows some aggregation of investors' preferences (as opposed to no aggregation of preferences under complete delegation), it still features inefficiently little aggregation. Full aggregation of investors' preferences can be achieved by requiring mandatory pass-through voting. While this happens at a cost of not using the fund manager's information, this cost is dominated by its benefits if the tails are important enough.

The comparison of Propositions 1, 2, and Example 1 shows that greater heterogeneity in preferences could have very different effects depending on the source of heterogeneity. A chance in the distribution of preferences in Example 1 corresponds to the situation where some investors with moderate preferences became investors with strong preferences. For example, in the context of E&S proposals, many investors who previously mostly cared about the common value, now become more concerned about E&S issues. In contrast, the perturbation analyzed in Proposition 1 corresponds to the situation where investors with strong E&S preferences become even more extreme, but investors with moderate preferences remain moderate.

3.1 Biased fund manager and the "incentive effect"

We now relax the assumption that the fund manager only cares about the welfare of her investors. Instead, suppose that the fund manager's utility equals the expected per-share utility of her investors plus additional utility w (private value) that she gets if the proposal is accepted. The private value w is a random draw from distribution $H(\cdot)$ with support $[\underline{w}, \bar{w}]$, where $\underline{w} \geq 0$ and $\bar{w} \in [0, \infty]$.[20] When fund investors make their delegation decisions, they know the distribution H (and hence know that the manager favors the proposal) but do not know the realization of w. For example, investors know that the fund manager is on average supportive of ESG proposals, but the exact private value she gets from a certain proposal is proposal- and firm-specific and hence is unknown. The case $\underline{w} = \bar{w} = 0$ corresponds to an unbiased fund manager analyzed up to now. We present the complete analysis of the equilibrium in the appendix and only describe the key effects here.

Recall that by assumption (see Section 2), the fund manager casts her vote without observing the realized number of votes that are delegated to her. Hence, she votes based on the conjectured delegation strategies of investors (in equilibrium, she has rational expectations about them), as well as based on her signal s and her private value w. Suppose the fund manager receives a positive signal. Since she favors the proposal and the expected private value of her investors is zero, she finds it optimal to vote for the proposal, in line with the signal. If she receives a negative signal, she may still find it optimal to vote for the proposal if her private value w is large enough. In equilibrium, there is a cutoff w^* such that the fund manager votes against upon observing a negative signal if and only if $w \leq w^*$.

When fund investors decide whether to delegate their votes, they anticipate that upon receiving a negative signal, the fund manager votes against with probability $\alpha = H(w^*)$. In the appendix, we show that given α, investors' delegation decisions are characterized by two cutoffs, x_l and x_h, $x_l < 0 < x_h$, such that investor i delegates if and only if $x_i \in [x_l, x_h]$, where

$$x_l = -\frac{\alpha(2p-1)}{2-\alpha}, \tag{7}$$

$$x_h = 2p-1. \tag{8}$$

If $\alpha = 1$, i.e., the fund manager always votes in line with the signal (which is the case when she is unbiased, $\underline{w} = \bar{w} = 0$), then investors' delegation strategy is symmetric around zero: $-x_l = x_h = 2p-1$, as in (5). For any $\alpha < 1$, the delegation strategy is asymmetric: $-x_l < x_h$. Intuitively, knowing that the fund manager favors the proposal, an investor with $x_i > 0$ is generally satisfied with the fund manager's votes and only retains his vote if his preference for the proposal is very strong. In contrast, investors with $x_i < 0$ disagree with the fund manager

[20] The case where the manager has a preference against the proposal is analogous by symmetry.

and retain their votes even if their preferences are moderate. In the extreme case when $\alpha = 0$ and the fund manager's vote is uninformative, we have $x_l = 0$: every investor with a negative x_i retains his vote and votes against.[21] The fact that non-delegating investors with $x_i > 0$ have, on average, a stronger intensity of preferences than non-delegating investors with $x_i < 0$ will have important implications for the fund manager's voting strategy.

Before comparing voting choice with complete delegation, we discuss the assumption that the fund manager does not observe the number of votes delegated to her. This assumption was not important in the case of an unbiased manager ($\underline{w} = \bar{w} = 0$): given the symmetry of investors' delegation strategies, the equilibrium characterized in that case would also be an equilibrium if the manager observed the number of delegated votes before casting her vote. In contrast, when the fund manager is biased, delegation strategies are no longer symmetric around zero, and the manager could learn about her investors' private values from the number of delegated votes. Note that even in the equilibrium we consider below, such learning takes place: the fund manager infers some information about her investors' private values even without observing the realized number of delegated votes, but solely from the event of her vote being pivotal (see the discussion after Lemma 2). Knowing the number of delegated votes would then be a second source of learning, and we abstract from this channel for tractability. The model in which the fund manager observes the number of delegated votes has two aspects that make it non-tractable. First, the threshold w^* will depend on the realized number of delegated votes. Second, when deciding whether to delegate, each investor will take into account how his delegation decision will shift w^*. Both issues would make analyzing the equilibrium challenging.

Next, to compare voting choice and complete delegation, we derive fund investors' expected welfare, $U(x_l, x_h, \alpha)$ for any x_l, x_h, and α. The proof of Lemma 1 shows that it is given by

$$\begin{aligned}\frac{U(x_l, x_h, \alpha)}{N} = & \left(\sum_{k=\frac{N+1}{2}}^{N} P\left(F(-x_l), N, k\right) + \sum_{k=\frac{N+1}{2}}^{N} P\left(F(x_h), N, k\right) - 1\right) \alpha \left(p - \frac{1}{2}\right) \\ & + \left(\frac{2-\alpha}{2}\right)\left(-\int_{-\infty}^{x_l} x f(x)\, dx\right) P\left(F(-x_l), N-1, \frac{N-1}{2}\right) \\ & + \frac{\alpha}{2}\left(\int_{x_h}^{\infty} x f(x)\, dx\right) P\left(F(x_h), N-1, \frac{N-1}{2}\right).\end{aligned} \tag{9}$$

This expression reflects the two effects familiar from the discussion of Lemma 1. The first

[21] Since the fund manager always votes in favor in this case, investors with $x_i > 0$ are indifferent between delegating and not (in both cases, their vote is always cast in favor of the proposal), and the vote outcome under the delegation strategy $[x_l, x_h] = [0, 2p-1]$ is the same as when no investor delegates his vote.

term captures investors' expected common value: the term $\alpha\left(p-\frac{1}{2}\right)$ is the expected common value if the decision is made according to the fund manager's vote, and it is multiplied by the probability that the voting outcome coincides with the fund manager's vote. For fixed x_l, x_h, if the fund manager is more biased and votes for the proposal more often (α is lower), investors' common value is lower. The second component of investor welfare, represented by the sum of the second and third terms in (9), captures their expected private values. For any fixed α, more delegation (lower x_l and higher x_h) increases the common value component, but decreases the private value component, exactly as in the unbiased manager case.

Expression (9) also shows that when the fund manager is biased, delegation has a third, indirect, effect on investor welfare through α: the fund manager's voting behavior depends on investors' delegation strategy, and hence investor welfare is affected by it as well. Recall that the fund manager gets $w > 0$ if the proposal is accepted. If this were the only factor that mattered to her, she would always vote in favor, i.e., the cutoff w^* would be infinite and α would be zero. However, the fund manager also cares about the welfare of her investors, which encourages her to vote in line with her signal if w is not too large. We argue that this incentive effect is stronger when all votes are delegated to the fund manager, compared to the case when only investors with $x_i \in (x_l, x_h)$ delegate their votes. In other words, the fund manager votes more informatively and less opportunistically when she casts all investors' votes than when investors have voting choice. We refer to this as the "*incentive effect*" of delegation:

Lemma 2 (incentive effect). *The fund manager is more likely to disregard her information and vote in line with her bias under voting choice than under complete delegation.*

The reason for this result is that under complete delegation, the expected private value of a delegating investor is zero. This, combined with the fund manager's concern for investors' welfare, encourages her to put more weight on her private signal and less on her private value. In contrast, under voting choice, only investors who are relatively aligned with the fund manager choose to delegate their votes. Then, maximizing fund investors' welfare necessitates aligning the fund's vote more closely with the fund manager's own private value.

The more precise intuition is illustrated in Figure 2 and is as follows. The fund manager only cares about the scenario in which her vote is pivotal, i.e., when the votes of non-delegating investors are approximately split. As in the literature on strategic voting (e.g., Austen-Smith and Banks, 1996; Feddersen and Pesendorfer, 1998), the fund manager rationally conditions her vote not only on her private signal s but also on the information that must be true when she is pivotal. In particular, the fact that the vote is close informs the fund manager about her investors' private values, even though she does not observe them directly. This is because in a close vote, the number of non-delegating investors with positive private values ($x_i > 0$) must be close to the number of non-delegating investors with negative private values ($x_i < 0$).[22] While these two groups of investors have approximately the same size, the intensity of their preferences is different: as shown above, investors with a positive x_i only retain their votes if their private values are very large ($x_i > x_h$), whereas investors with a negative x_i retain their votes even if they are moderate ($x_i < x_l$, where $-x_l < x_h$). This, in turn, implies that the average private value of fund investors, conditional on a close vote, is positive. Figure 2 illustrates this logic for the realization when the votes of non-delegating investors are exactly split. As the figure shows, the average private value of delegating investors is positive (since the delegation interval is skewed to the right), and moreover, the average private value of non-delegating investors is positive as well (since the four "green" investors have more intense preferences than the four "brown" investors).[23]

Overall, the fund manager understands that when her vote makes a difference, the average private value of her investors is positive (even though the average unconditional private value is zero). This inference induces the fund manager to vote for the proposal more often compared to complete delegation: under complete delegation, investors' delegation strategies are symmetric around zero, so a split vote is not informative about their private values. In some sense, the optimal delegation response of investors to the fund manager's bias further exacerbates this bias given the fund manager's concern about her investors' welfare. Formally, as the proof of Lemma 2 shows, under complete delegation, the fund manager votes against if $w \le 2p - 1$, whereas under voting choice, she votes against if $w \le w^*$, where $w^* < 2p - 1$.

3.2 Discussion

Abstention. If voting is costly, pass-through voting raises another potential concern: it may involve insufficient participation of investors. In practice, participation has so far not been

[22] Specifically, the difference between the numbers of non-delegating investors with positive and negative private values must be, in absolute value, below the number of delegating investors. The fund manager's vote changes the decision if and only if this condition is satisfied.

[23] If, instead, the fund manager only cares about the welfare of investors who delegate their votes (and disregards the welfare of investors who retain their votes), her estimate of the delegating investors' private values would be positive as well, given that the delegation interval is skewed to the right.

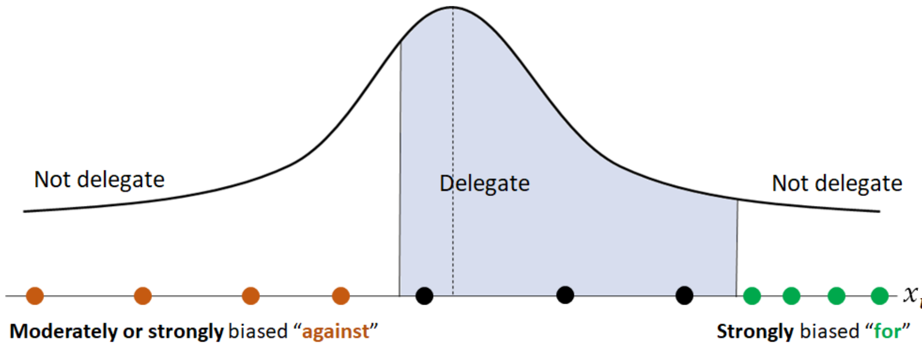

Figure 2. The incentive effect. The figure illustrates a typical realization of investors' private values conditional on the fund manager being pivotal. The black dots stand for private values of delegating investors; the brown dots stand for private values of non-delegating investors with $x_i < 0$, and the green dots stand for private values of non-delegating investors with $x_i > 0$. The sum of investors' realized private values is positive.

an issue for two reasons. First, most fund clients that exercise voting choice are institutional investors, and unlike retail investors, institutional investors rarely abstain.[24] Second, for both retail and institutional fund clients, a practical way to exercise voting choice and cast votes according to their preferences has been to enroll in "thematic" voting policies of proxy advisors. In particular, the two major proxy advisors now offer a menu of policies, such as "climate," "socially responsible investing," "faith-based," and others, which are tailored to different preferences. An investor of the fund has the option to select one of these thematic policies, and the proxy advisor then votes on behalf of the investor in all firms and on all proposals, following the guidelines pre-specified in the corresponding policy.[25]

Communication between the fund manager and investors. An alternative to offering voting choice would be for the fund manager to publicly announce a message and then allow her investors to vote themselves. This essentially resembles a mandatory pass-through voting system, but with the added element of communication from the fund manager. If the fund manager is unbiased, there is an equilibrium in which she truthfully reveals her signal, and investors vote according to this signal if their bias is not strong enough, and vote in line with their bias otherwise. Interestingly, the equilibrium with communication by the fund is

[24]The likely reason why institutions rarely abstain is to avoid being accused of violating fiduciary duties to their clients. For example, based on our calculations using the ISS Voting Analytics database, mutual funds abstain in less than 1% of proposals.

[25]For example, the only options offered by BlackRock to retail investors in its iShares Core S&P 500 ETF (IVV) are to delegate to BlackRock or to pick from a menu of six proxy advisors' policies, three by ISS and three by Glass Lewis. Voting directly is not an option.

equivalent to the equilibrium under voting choice. This is because the set of investors who optimally vote with the signal is the same as the set of investors who optimally delegate their vote under voting choice: these are investors with $|x_i| \leq 2p - 1$. Therefore, all the previously discussed advantages and disadvantages of voting choice, in comparison to complete delegation, also apply to mandatory pass-through voting with communication. In practice, there are significant regulatory limitations that restrict funds' ability to share their information, making voting choice a more viable means of implementing this equilibrium.[26]

If the fund manager is biased, as in section 3.1, communication may no longer be truthful (Crawford and Sobel, 1982), and the two systems will no longer be equivalent. Incentives for strategic communication would also arise in a different system, one where the fund manager polls investors about their preferences x_i: investors might then have incentives to exaggerate their biases when communicating to the fund manager, as in cheap talk models with multiple senders (Austen-Smith, 1993; Battaglini, 2004).

Endogenous information acquisition. We have shown the voting choice may lead to the underutilization of the fund manager's information. Furthermore, it may decrease the fund manager's incentive to acquire information in the first place. In an extension in the appendix, we show that when fewer votes are delegated to the fund manager, her motivation to invest in precise information decreases. As a result, a negative feedback loop can emerge: decreased delegation of votes results in the fund manager acquiring less precise information, which further reduces investors' incentives to delegate votes to her. We analyze this feedback loop in more depth in the setting with heterogeneous information in Section 4.1 and show that it can lead to coordination failure.

Exit. Our model does not allow an investor whose preferences differ from those of the fund manager to withdraw his capital, i.e., exit. Whether exit is attractive depends on the investor's outside option. If the outside option is direct ownership in the shares, it is unlikely to dominate voting choice, as it would lead to the same voting decisions. If the outside option is to invest with another fund manager, who is aligned with the investor's ideology, then the exit decision depends on the switching costs and the fees charged by the two funds. Thus, the analysis of exit requires understanding the industry equilibrium in a setting where funds

[26] In practice, asset managers rarely disclose how they are going to vote or what their views are prior to the vote, partly due to fear that such communication can be considered as "solicitation" or "forming a group" and trigger costly disclosure and filings (e.g., Puchniak and Varottil, 2023).

compete through both fees and ideologies, which is an interesting question outside the scope of this paper. In practice, there is substantial heterogeneity in the preferences of investors within a fund, suggesting that exit is often not optimal. For example, Zytnick (2022) concludes that "individuals do not strongly sort across funds based on ideology" – based on his Figure 3, there is heterogeneity in SRI ideologies among retail investors within a fund. Similarly, institutional clients of BlackRock include both the pension fund of Texas and the pension fund of New York City, with divergent perspectives on BlackRock's position regarding environmental issues.[27]

4 Heterogeneous information

Next, we consider the case in which all investors and the fund manager have the same preferences ($x_i = 0$, $w = 0$), but in addition to the fund manager's private signal s with precision p, fund investors also observe private signals σ_i with precision π. At the first stage, investors decide whether to delegate their votes, and at the second, investors and the fund manager observe their private signals and vote. This timeline is consistent with practice: under voting choice, delegation decisions are made at the beginning of the proxy season and before investors observe specific proposals on firms' agendas and their private signals about these proposals.

When interests are aligned, the primary objective of voting is to aggregate the dispersed information that is held by investors, assigning a greater weight to signals that are more precise. We first note that if $p < \pi$, i.e., the fund manager's signal is less precise than investors' signals, then voting choice is equivalent to mandatory pass-through voting and both dominate complete delegation. This is because no investor would choose to delegate voting to the fund manager, and the system where all investors vote themselves dominates the one where the fund manager casts all the votes for two reasons. First, each individual investor's signal is more informative than that of the fund manager. Second, since investors' signals are conditionally independent, such system features the "wisdom of the crowd" effect, whereby the idiosyncratic errors in individual investors' signals cancel out in the aggregate vote outcome.

Suppose now that $p > \pi$, so that investors have a reason to delegate votes to the fund manager. Consider a symmetric equilibrium in which each investor delegates voting to the fund manager with probability q_d and votes based on his own signal with probability $1 - q_d$. For a given q_d, we can calculate the investor's value from delegating and not delegating, $V_{nd}(q_d)$

[27] See, e.g., the press release by Texas Attorney General Ken Paxton on August 8, 2022 and the press release by New York City Comptroller Brad Lander on September 22, 2022.

and $V_d(q_d)$, assuming that each other investor delegates with probability q_d:

$$\begin{aligned} V_{nd}(q_d) &= \left(\pi - \frac{1}{2}\right)(p\Omega_1(q_d) + (1-p)\Omega_0(q_d)) + v_{np}, \\ V_d(q_d) &= \frac{1}{2}(p\Omega_1(q_d) - (1-p)\Omega_0(q_d)) + v_{np}, \end{aligned}$$

where v_{np} is the component of the investor's value coming from the events when his vote is not pivotal (which is the same upon delegation and non-delegation), and $\Omega_1(q_d)$ and $\Omega_0(q_d)$ are the probabilities that investor i is pivotal when $s = \theta$ (the fund manager's signal is correct) and $s \neq \theta$, respectively:

$$\begin{aligned} \Omega_1(q_d) &= P\left(q_d + (1-q_d)\pi, N-1, \frac{N-1}{2}\right), \\ \Omega_0(q_d) &= P\left((1-q_d)\pi, N-1, \frac{N-1}{2}\right). \end{aligned}$$

In equilibrium, q_d is such that each investor is indifferent between delegating his vote to the fund manager and voting himself, $V_{nd}(q_d) = V_d(q_d)$. Denote the equilibrium value by q_d^*.

The next result shows that unlike the case of heterogeneous preferences (where the equilibrium generally features either under- or over-delegation), the voting choice equilibrium under aligned preferences implements the optimal level of delegation – one that maximizes expected investor welfare:

Proposition 3. *The equilibrium probability of delegation (q_d^*) coincides with the optimal probability of delegation, i.e., one that maximizes expected investor welfare. Voting choice thus dominates both complete delegation and mandatory pass-through voting.*

The intuition for this result is that fund investors have common interests: their preferences are fully aligned, and they also do not incur any private costs when they decide to delegate their votes to the fund or to vote themselves. Hence, this result is related to the general property of common interest games that a strategy profile that maximizes the combined ex-ante utility of the players is a Nash equilibrium (McLennan, 1998). In our context it means that the efficient combination of investors' private signals and the fund manager's signal is sustained in equilibrium. And, since voting choice features the optimal level of delegation, it dominates any other voting system, including complete delegation and mandatory pass-through voting. This result holds for any precision of investors' signals. Even when investors' signals are very imprecise, voting choice features an efficient level of delegation: investors will optimally choose to delegate their voting authority with a low probability, giving greater weight to the fund manager's signal in the voting outcome.

It is useful to compare Proposition 3 with the results of Malenko and Malenko (2019), who consider shareholders' choice between relying on the information from the proxy advisor and relying on their own private information. In their paper, shareholders rely on the proxy advisor either too much or too little, depending on the precision of the proxy advisor's signal. In contrast, in this paper, shareholders' choice between relying on the fund manager's signal vs. their own signals implements the efficient level of delegation. The reason for these different conclusions is the following. In our setting, agents are endowed with information, whereas in Malenko and Malenko (2019), information is costly to acquire: relying on the proxy advisor's recommendations can be thought of as delegating voting to the proxy advisor, but at a cost equal to the advisor's fee. As a result of the information acquisition costs, the game in Malenko and Malenko (2019) is not a common interests game, so inefficiencies arise. We next analyze how introducing costly information acquisition changes our conclusions.

4.1 Endogenous information acquisition

In the baseline model, fund investors and the fund manager are endowed with information. In reality, the quality of private signals is a result of the information collection process, and it may change depending on who casts the vote. Hence, we consider an extension in which information about the common value needs to be acquired at a cost.

The timeline is as follows. At date 1, the fund manager chooses precision $p \in \left[\frac{1}{2}, 1\right]$ of her signal at a per-share cost $c(p)$, and simultaneously each investor chooses whether to delegate his vote to the fund. Let q_d denote the probability with which an investor delegates voting to the fund manager. Each investor who does not delegate chooses precision $\pi \in \left[\frac{1}{2}, 1\right]$ of his private signal σ_i at cost $\gamma(\pi)$ (only investors who choose not to delegate will have incentives to acquire information). We assume that $c(p)$ is a twice differentiable function satisfying $c\left(\frac{1}{2}\right) = 0$, $c'(p) > 0$, $\lim_{p \to \frac{1}{2}} c'(p) = 0$, $\lim_{p \to 1} c'(p) = \infty$, and $c''(p) > 0$. Since $c(p)$ is the per-share cost, the total cost of information acquisition by the fund manager is $Nc(p)$. We assume that investors' cost function $\gamma(\pi)$ satisfies the same properties as $c(p)$. At date 2, all agents observe their private signals, and the votes are cast. The fund manager maximizes fraction $f \in (0, 1]$ of the expected investor welfare minus her information acquisition costs (we can think of f as capturing the fund's management fee).

In this setting, there is a new externality that an investor's delegation decision has: it affects information acquisition by the fund manager. Less frequent delegation reduces the incentives of the fund manager to acquire precise information. Intuitively, if the fund manager expects to vote on behalf of fewer investors, her vote matters less, so she has weaker incentives to become informed. This creates a feedback loop between investors' delegation decisions and the fund manager's information acquisition. If an investor expects other investors to delegate voting to the fund manager with a very high probability, he expects the fund manager to engage in information acquisition (since the fund is expected to control many votes) and the fund's vote to largely determine the vote outcome. Hence, the benefits from unilaterally exercising voting choice and acquiring information are small, both because the fund manager's vote is informed and because the likelihood of the investor being pivotal is low. At the other extreme, if an investor expects all other investors to vote themselves, he rationally concludes that the fund manager will not engage in costly information production, and thus the benefits from delegating votes are low. This feedback loop leads to multiple equilibria, which are characterized by the next result.

Proposition 4. *The set of equilibria under voting choice is as follows.*

1. *There always exists an equilibrium in which all investors delegate voting to the fund manager, $q_d = 1$. In this case, $\pi = \frac{1}{2}$ and $p = c'^{-1}(f)$.*

2. *There always exists an equilibrium in which no investor delegates voting to the fund manager, $q_d = 0$. In this case, $p = \frac{1}{2}$ and π is given by (27) in the appendix.*

3. *There can exist an equilibrium in which some investors delegate voting and some vote themselves: $q_d \in (0, 1)$. In this case, $\pi \in \left(\frac{1}{2}, 1\right)$ and $p \in \left(\frac{1}{2}, 1\right)$. Equilibrium parameters q_d, π, and p satisfy (22), (23), and (26) in the appendix.*

The case in which voting choice is not permitted is equivalent to the equilibrium with $q_d = 1$ in the proposition. Thus, if the same equilibrium is played under voting choice, then voting choice makes no difference. In contrast, if one of the other two types of equilibria are played, then voting choice changes investor welfare. If investors can coordinate on the equilibrium with the highest investor welfare, voting choice is weakly beneficial, echoing the conclusion of the baseline model without information acquisition. However, if one is sceptical about such efficient coordination and is worried about coordination failure, then voting choice can lead to worse outcomes. The next proposition shows this result formally:

Proposition 5. *Let $\tau \in (\underline{\tau}, \bar{\tau})$ be the parameter of the cost function $\gamma(\pi, \tau)$ that satisfies: (i) for a fixed τ, $\gamma(\pi, \tau)$ as a function of π satisfies all properties of the cost function introduced above; (ii) for any $\pi \in \left(\frac{1}{2}, 1\right)$ and $\tau \in (\underline{\tau}, \bar{\tau})$, $\frac{\partial^2}{\partial \pi \partial \tau} \gamma(\pi, \tau) > 0$; (iii) $\lim_{\tau \to \underline{\tau}} \frac{\partial}{\partial \pi} \gamma(\pi, \tau) = 0$ and $\lim_{\tau \to \bar{\tau}} \frac{\partial}{\partial \pi} \gamma(\pi, \tau) = \infty$ for any $\pi \in \left(\frac{1}{2}, 1\right)$. Then:*

1. *if τ is sufficiently low, there is an equilibrium under voting choice that Pareto dominates the equilibrium under complete delegation in the sense of delivering both higher investor welfare and higher expected utility to the fund manager.*

2. *if τ is sufficiently high, there is an equilibrium under voting choice that is Pareto-inferior to the equilibrium under complete delegation in the sense of delivering both lower investor welfare and lower expected utility to the fund manager.*

Intuitively, if τ is low, investors' information acquisition technology is efficient compared to that of the fund manager. In this case, the equilibrium in which all investors collect their own signals and vote based on them (which, as Proposition 4 shows, always exists under voting choice) leads to more informed voting outcomes than if all votes were delegated to the fund and it acquired relatively imprecise information. This is especially so because investors' private signals are conditionally independent, allowing for the "wisdom of the crowd" effect, whereas under complete delegation, the voting outcome entirely depends on the fund's signal. In contrast, if τ is high enough, the fund's information acquisition technology is more efficient than that of investors, so delegation of voting leads to more informed decisions than if investors were acquiring information privately and voting based on it. However, under voting choice, there is a possibility of coordination failure: if none of the votes are delegated to the fund, the fund will not invest in information acquisition, even if it were efficient and relatively cheap to do so. Such an equilibrium exists under voting choice (Proposition 4) and features lower investor welfare than the equilibrium in which voting choice is not offered.

5 Conclusion

The growing concentration of voting power among several large asset managers, combined with increasing disagreements over E&S issues, have generated a heated debate and the move towards "pass-through voting." Attempts to democratize corporate governance have led to several policy proposals, including the INDEX Act, and have encouraged major fund managers to offer "voting choice" to their clients. This paper develops a theory of delegation of voting rights and studies the implications of voting choice and the effectiveness of related policy proposals. Our theory applies both in the context of the ESG debate and more broadly, in any context where shareholders have different preferences and information regarding the proposal.

When investors have heterogeneous preferences, voting choice helps aggregate such preferences more efficiently but can nevertheless lead to inefficient outcomes due to the underutilization of the fund manager's information. Greater diversity in preferences does not necessarily improve the desirability of voting choice as it may lead many investors to prioritize their preferences over information and excessively withdraw their votes from the fund. In contrast, if investors have aligned preferences but possess unique information, voting choice can enhance efficiency and information aggregation in voting outcomes. However, even in this case, voting choice may result in less informed voting outcomes by decreasing the fund manager's incentives to invest in information.

References

[1] Aghion, Philippe, and Jean Tirole, 1997, Formal and real authority in organizations, *Journal of Political Economy* 105, 1–29.

[2] Alonso, Ricardo, Wouter Dessein, and Niko Matouschek, 2008, When does coordination require centralization? *American Economic Review* 98, 145–179.

[3] Alonso, Ricardo, Wouter Dessein, and Niko Matouschek, 2015, Organizing to adapt and compete, *American Economic Journal: Microeconomics* 7, 158–187.

[4] Austen-Smith, David, 1993, Interested experts and policy advice: Multiple referrals under open rule, *Games and Economic Behavior* 5, 3–43.

[5] Austen-Smith, David, and Jeffrey S. Banks, 1996, Information aggregation, rationality, and the Condorcet Jury Theorem, *American Political Science Review* 90, 34–45.

[6] Baldenius, Tim, Nahum Melumad, and Xiaojing Meng, 2014, Board composition and CEO power, *Journal of Financial Economics* 112, 53–68.

[7] Bar-Isaac, Heski, and Joel D. Shapiro, 2020, Blockholder voting, *Journal of Financial Economics* 136, 695–717.

[8] Battaglini, Marco, 2004, Policy advice with imperfectly informed experts, Advances in Theoretical Economics 4, 1–32.

[9] Bebchuk, Lucian A., and Scott Hirst, 2019, Index funds and the future of corporate governance: Theory, evidence, and policy, *Columbia Law Review* 119, 2029–2146.

[10] Bernheim, B. Douglas, and Michael D. Whinston, 1986, Common agency, *Econometrica* 54, 923–942.

[11] Bolton, Patrick, Tao Li, Enrichetta Ravina, and Howard Rosenthal, 2020, Investor ideology, *Journal of Financial Economics* 137, 320–352.

[12] Bond, Philip, and Hulya Eraslan, 2010, Strategic voting over strategic proposals, *Review of Economic Studies* 77, 459–490.

[13] Bouton, Laurent, Aniol Llorente-Saguer, Antonin Macé, and Dimitrios Xefteris, 2021, Voting in shareholders meetings, Working paper.

[14] Brav, Alon, Wei Jiang, Tao Li, and James Pinnington, 2023, Shareholder monitoring through voting: New evidence from proxy contests, *Review of Financial Studies*, forthcoming.

[15] Brav, Alon, Andrey Malenko, and Nadya Malenko, 2023, Shareholder voting: A survey of the literature, Working paper.

[16] Broccardo, Eleonora, Oliver Hart, and Luigi Zingales, 2022, Exit versus voice, *Journal of Political Economy* 130, 3101–3145.

[17] Bubb, Ryan, and Emiliano Catan, 2022, The party structure of mutual funds, *Review of Financial Studies* 35, 2839–2878.

[18] Buechel, Berno, Lydia Mechtenberg, and Alexander F. Wagner, 2023, When do proxy advisors improve corporate decisions? Working paper.

[19] Campbell, Joseph, Alessandra Casella, Lucas de Lara, Victoria Mooers, and Dilip Ravindran, 2022, Liquid democracy. Two experiments on delegation in voting, Working paper.

[20] Carlson, Murray D., Adlai J. Fisher, and Ali Lazrak, 2023, Why divest? The political and informational roles of institutions in asset stranding, Working paper.

[21] Chakraborty, Archishman, and Bilge Yılmaz, 2017, Authority, consensus, and governance, *Review of Financial Studies* 30, 4267–4316.

[22] Chowdhry, Bhagwan, Shaun W. Davies, and Brian Waters, 2019. Investing for impact, *Review of Financial Studies* 32, 864–904.

[23] Crawford, Vincent P., and Joel Sobel, 1982, Strategic information transmission, *Econometrica* 50, 1431–1451.

[24] Cvijanovic, Dragana, Amil Dasgupta, and Konstantinos E. Zachariadis, 2016, Ties that bind: How business connections affect mutual fund activism, *Journal of Finance* 71, 2933–2966.

[25] Cvijanovic, Dragana, Moqi Groen-Xu, and Konstantinos E. Zachariadis, 2020, Free-riders and underdogs: Participation in corporate voting, Working paper.

[26] Davis, Gerald F., and E. Han Kim, 2007, Business ties and proxy voting by mutual funds, *Journal of Financial Economics* 85, 552–570.

[27] Desai, Mihir A., and Li Jin, 2011, Institutional tax clienteles and payout policy, *Journal of Financial Economics* 100, 68–84.

[28] Dessein, Wouter, 2002, Authority and Communication in Organizations, *Review of Economic Studies* 69, 811–838.

[29] Dhillon, Amrita, Grammateia Kotsialou, Dilip Ravindran, and Dimitrios Xefteris, 2023, Information aggregation with delegation of votes, Working paper.

[30] Edmans, Alex, Doron Levit, and Jan Schneemeier, 2022, Socially responsible divestment, Working paper.

[31] Esö, Peter, Stephen Hansen, and Lucy White, 2014, A theory of vote-trading and information aggregation, Working paper.

[32] Feddersen, Timothy, and Wolfgang Pesendorfer, 1998, Convicting the innocent: the inferiority of unanimous jury verdicts under strategic voting, *American Political Science Review* 92, 23–35.

[33] Fisch, Jill E., and Jeff Schwartz, 2023, Corporate democracy and the intermediary voting dilemma, *Texas Law Review*, forthcoming.

[34] Geelen, Thomas, Jakub Hajda, and Jan Starmans, 2023, Sustainable organizations, Working paper.

[35] Gibbons, Robert, Niko Matouschek, and John Roberts, 2013, Decisions in organizations. In *Handbook of Organizational Economics*, edited by R. Gibbons, and J. Roberts, 373–431, Princeton University Press.

[36] Griffin, Caleb, N., 2020, We three kings: Disintermediating voting at the index fund giants, *Maryland Law Review* 79, 954-1008.

[37] Gupta, Deeksha, Alexandr Kopytov, and Jan Starmans, 2022, The pace of change: Socially responsible investing in private markets, Working paper.

[38] Harris, Milton, and Artur Raviv, 2008, A theory of board control and size, *Review of Financial Studies* 21, 1797–1832.

[39] Hart, Oliver, and Luigi Zingales, 2017, Companies should maximize shareholder welfare not market value, Working paper.

[40] He, Yazhou, Bige Kahraman, and Michelle Lowry, 2023, ES risks and shareholder voice, *Review of Financial Studies* 36, 4824–4863.

[41] Heinkel, Robert, Alan Kraus, and Josef Zechner, 2021, The effect of green investment on corporate behavior, *Journal of Financial and Quantitative Analysis* 36, 431–449.

[42] Herrmann, Nathan, John McInnis, Brian Monsen, and Laura T. Starks, 2024. Decentralizing proxy voting power, Working paper.

[43] Holmstrom, Bengt, 1984, On the theory of delegation, in *Bayesian Models in Economic Theory*, edited by M. Boyer and R. Kihlstrom, 115–141, New York: North-Holland.

[44] Hu, Edwin, Nadya Malenko, and Jonathon Zytnick, 2024, Custom proxy voting advice, Working paper.

[45] Iliev, Peter, Jonathan Kalodimos, and Michelle Lowry, 2021, Investors' attention to corporate governance, *Review of Financial Studies* 34, 5581–5628.

[46] Levit, Doron, and Nadya Malenko, 2011, Nonbinding voting for shareholder proposals, *Journal of Finance* 66, 1579–1614.

[47] Levit, Doron, Nadya Malenko, and Ernst Maug, 2022, Trading and shareholder democracy, *Journal of Finance*, forthcoming.

[48] Levit, Doron, Nadya Malenko, and Ernst Maug, 2023, The voting premium, Working paper.

[49] Levit, Doron, and Anton Tsoy, 2022, A theory of one-size-fits-all recommendations, *American Economic Journal: Microeconomics* 14, 318–347.

[50] Lewellen, Jonathan, and Katharina Lewellen, 2022, Institutional investors and corporate governance: The incentive to be engaged, *Journal of Finance* 77, 213–264.

[51] Li, Sophia Zhengzi, Ernst Maug, and Miriam Schwartz-Ziv, 2022, When shareholders disagree: Trading after shareholder meetings, *Review of Financial Studies* 35, 1813–1867.

[52] Li, Tao, S. Lakshmi Naaraayanan, and Kunal Sachdeva, 2023, Conflicting objectives of ESG funds: Evidence from proxy voting, Working paper.

[53] Lowry, M. B., P. Wang, and K. D. Wei, 2023, Are all ESG funds created equal? Only some funds are committed, Working paper.

[54] Lund, Dorothy, 2018, The case against passive shareholder voting, *Journal of Corporation Law* 43, 493–536.

[55] Ma, Shichao and Yan Xiong, 2021, Information bias in the proxy advisory market, *Review of Corporate Finance Studies* 10, 82–135.

[56] Malenko, Andrey, and Nadya Malenko, 2019, Proxy advisory firms: The economics of selling information to voters, *Journal of Finance* 74, 2441–2490.

[57] Malenko, Andrey, Nadya Malenko, and Chester Spatt, 2022, Creating controversy in proxy voting advice, Working paper.

[58] Matsusaka, John G., and Chong Shu, 2021, A theory of proxy advice when investors have social goals. Working paper.

[59] Matvos, Gregor, and Michael Ostrovsky, 2008, Cross-ownership, returns, and voting in mergers, Journal of Financial Economics 89, 391–403.

[60] Maug, Ernst, 1999, How effective is proxy voting? Information aggregation and conflict resolution in corporate voting contests, Working paper.

[61] McLennan, Andrew, 1998, Consequences of the Condorcet jury theorem for beneficial information aggregation by rational agents, *American Political Science Review* 92, 413–418.

[62] Meirowitz, Adam, and Shaoting Pi, 2022, Voting and trading: The shareholder's dilemma, *Journal of Financial Economics* 146, 1073–1096.

[63] Meirowitz, Adam, Shaoting Pi, and Matthew C. Ringgenberg, 2023, Voting for socially responsible corporate policies, Working paper.

[64] Michaely, R., G. Ordonez-Calafi, and S. Rubio, 2023, Mutual funds' strategic voting on environmental and social issues, Working paper.

[65] Oehmke, Martin, and Marcus M. Opp, 2022, A theory of socially responsible investment, Working paper.

[66] Piccolo, Alessio, Jan Schneemeier, and Michele Bisceglia, 2023, Externalities of responsible investments, Working paper.

[67] Puchniak, Dan W., and Umakanth Varottil, 2023, Rethinking acting in concert: Activist ESG stewardship is shareholder democracy, ECGI Law Working Paper No. 731/2023.

[68] Rantakari, Heikki, 2008, Governing adaptation, *Review of Economic Studies* 75, 1257–1285.

[69] Reuters, 2023, State Street to offer proxy voting choices to retail investors (May 22, 2023).

[70] Van Wesep, Edward D., 2014, The idealized electoral college voting mechanism and shareholder power, *Journal of Financial Economics* 113, 90–108.

[71] Zytnick, Jonathon, 2022, Do mutual funds represent individual investors? Working paper.

Appendix

Proof of Lemma 1.

We derive the expected welfare of investors for the more general case, which also applies to the case of a biased fund manager. Suppose each investor delegates his vote to the fund manager if and only if $x_i \in (x_l, x_h)$, and the fund manager votes against the proposal upon receiving a negative signal with probability α. We derive the expected welfare of fund investors, $U(x_l, x_h, \alpha)$ for any possible x_l, x_h, and α. The case of an unbiased fund manager corresponds to $x_l = -x_h$ and $\alpha = 1$. Denote v_{FM} the vote of the fund manager: $v_{FM} = 1$ ($v_{FM} = 0$) corresponds to voting for (against) the proposal.

First, consider the expected welfare of investors conditional on $v_{FM} = 1$. In this case, the fund manager votes for the proposal, and hence a randomly drawn investor with preference parameter x votes for the proposal either if he delegates his vote to the fund manager, i.e., $x_l \leq x \leq x_h$, or if he does not delegate but his private value is $x > x_h$. Hence, a randomly drawn investor votes in favor if and only if if $x \geq x_l$, i.e., with probability $\Pr(x \geq x_l) = 1 - F(x_l)$. The proposal is accepted if at least $\frac{N+1}{2}$ votes are cast in favor, and conditional on k votes in favor, the common value to each of N investors is

$$\begin{aligned} 2\Pr(\theta = 1 | v_{FM} = 1) - 1 &= 2\frac{1 - (1-p)\alpha}{2-\alpha} - 1 \\ &= \frac{2 - 2\alpha + 2p\alpha - 2 + \alpha}{2-\alpha} = \frac{\alpha(2p-1)}{2-\alpha}, \end{aligned}$$

whereas the sum of all investors' private values is $k\mathbb{E}[x|x \geq x_l] + (N-k)\mathbb{E}[x|x < x_l]$, where the first term comes from k investors who vote for (with $x_i \geq x_l$) and the second term comes from $N-k$ investors who vote against (with $x_i < x_l$). If the proposal is rejected, then all investors' common values and private values are zero. Hence, the expected investor welfare in this case is given by

$$U(x_l, x_h, \alpha | v_{FM} = 1) = \sum_{k=\frac{N+1}{2}}^{N} \frac{N!}{k!(N-k)!} (1 - F(x_l))^k F(x_l)^{N-k} \begin{pmatrix} N\frac{\alpha(2p-1)}{2-\alpha} + k\mathbb{E}[x|x \geq x_l] \\ +(N-k)\mathbb{E}[x|x < x_l] \end{pmatrix},$$

where

$$\begin{aligned} \mathbb{E}[x|x \geq x_l] &= \frac{1}{1-F(x_l)} \int_{x_l}^{\infty} xf(x)\,dx, \\ \mathbb{E}[x|x < x_l] &= \frac{1}{F(x_l)} \int_{-\infty}^{x_l} xf(x)\,dx. \end{aligned}$$

Hence,

$$U(x_l, x_h, \alpha | v_{FM} = 1) = \left(\sum_{k=\frac{N+1}{2}}^{N} P(1 - F(x_l), N, k)\right) N \frac{\alpha(2p-1)}{2-\alpha}$$
$$+N \left(\int_{x_l}^{\infty} x f(x)\, dx\right) \left(\sum_{k=\frac{N+1}{2}}^{N} \frac{(N-1)!}{(k-1)!(N-k)!} (1 - F(x_l))^{k-1} F(x_l)^{N-k}\right)$$
$$+N \left(\int_{-\infty}^{x_l} x f(x)\, dx\right) \left(\sum_{k=\frac{N+1}{2}}^{N-1} \frac{(N-1)!}{k!(N-k-1)!} (1 - F(x_l))^{k} F(x_l)^{N-k-1}\right).$$

Note that

$$\int_{x_l}^{\infty} x f(x)\, dx = \int_{x_l}^{-x_l} x f(x)\, dx + \int_{-x_l}^{\infty} x f(x)\, dx = \int_{-x_l}^{\infty} x f(x)\, dx = -\int_{-\infty}^{x_l} x f(x)\, dx,$$

and hence,

$$U(x_l, x_h, \alpha | v_{FM} = 1) = \left(\sum_{k=\frac{N+1}{2}}^{N} P(1 - F(x_l), N, k)\right) N \frac{\alpha(2p-1)}{2-\alpha}$$
$$-N \left(\int_{-\infty}^{x_l} x f(x)\, dx\right) \left(\sum_{k=\frac{N+1}{2}}^{N} \frac{(N-1)!}{(k-1)!(N-k)!} (1 - F(x_l))^{k-1} F(x_l)^{N-k}\right)$$
$$+N \left(\int_{-\infty}^{x_l} x f(x)\, dx\right) \left(\sum_{k=\frac{N+1}{2}}^{N-1} \frac{(N-1)!}{k!(N-k-1)!} (1 - F(x_l))^{k} F(x_l)^{N-k-1}\right).$$

Consider the last two terms:

$$N \left(\int_{-\infty}^{x_l} x f(x)\, dx\right) \begin{pmatrix} \sum_{k=\frac{N+1}{2}}^{N-1} \frac{(N-1)!}{k!(N-k-1)!} (1 - F(x_l))^{k} F(x_l)^{N-k-1} \\ -\sum_{k=\frac{N+1}{2}}^{N} \frac{(N-1)!}{(k-1)!(N-k)!} (1 - F(x_l))^{k-1} F(x_l)^{N-k} \end{pmatrix}$$
$$= N \left(\int_{-\infty}^{x_l} x f(x)\, dx\right) \begin{pmatrix} \sum_{k=\frac{N+1}{2}}^{N-1} \frac{(N-1)!}{k!(N-k-1)!} (1 - F(x_l))^{k} F(x_l)^{N-k-1} \\ -P\left(1 - F(x_l), N-1, \frac{N-1}{2}\right) (1 - F(x_l))^{\frac{N-1}{2}} F(x_l)^{\frac{N-1}{2}} \\ -\sum_{k=\frac{N+1}{2}}^{N-1} \frac{(N-1)!}{k!(N-k-1)!} (1 - F(x_l))^{k} F(x_l)^{N-k-1} \end{pmatrix}$$
$$= -N \left(\int_{-\infty}^{x_l} x f(x)\, dx\right) P\left(1 - F(x_l), N-1, \frac{N-1}{2}\right).$$

Therefore,

$$\frac{U(x_l, x_h, \alpha | v_{FM} = 1)}{N} = \left(\sum_{k=\frac{N+1}{2}}^{N} P(1 - F(x_l), N, k)\right) \frac{\alpha(2p-1)}{2-\alpha}$$
$$-\left(\int_{-\infty}^{x_l} x f(x)\, dx\right) P\left(1 - F(x_l), N-1, \frac{N-1}{2}\right).$$

Second, consider the expected welfare of investors conditional on $v_{FM} = 0$. In this case, the fund manager votes against the proposal, and hence a randomly drawn investor votes against the proposal either if he delegates his vote to the fund manager, i.e., $x_l \leq x \leq x_h$, or if he does not delegate but his private value is $x < x_l$. Hence, a randomly drawn investor votes for the proposal if and only if $x \geq x_h$, i.e., with probability $\Pr(x \geq x_h) = 1 - F(x_h)$. The proposal is accepted if at least $\frac{N+1}{2}$ votes are cast in favor, and conditional on k votes in favor, the common value to each of N investors is

$$\begin{aligned} 2\Pr(\theta = 1 | v_{FM} = 0) - 1 &= 2\Pr(\theta = 1 | s = 0) - 1 \\ &= 2(1-p) - 1 = 1 - 2p, \end{aligned}$$

whereas the sum of all investors' private values is $k\mathbb{E}[x|x \geq x_h] + (N-k)\,\mathbb{E}[x|x < x_h]$, where the first term comes from k investors who vote for (with $x_i \geq x_h$) and the second term comes from $N-k$ investors who vote against (with $x_i < x_h$). If the proposal is rejected, then all investors' common values and private values are zero. Hence, the expected investor welfare in this case is given by

$$U(x_l, x_h, \alpha | v_{FM} = 0) = \sum_{k=\frac{N+1}{2}}^{N} \frac{N!}{k!\,(N-k)!} (1 - F(x_h))^k F(x_h)^{N-k} \left(\begin{array}{c} N(1-2p) + k\mathbb{E}[x|x \geq x_h] \\ + (N-k)\,\mathbb{E}[x|x < x_h] \end{array} \right).$$

Repeating the derivations for $v_{FM} = 1$, we get

$$\begin{aligned} \tfrac{U(x_l,x_h,\alpha|v_{FM}=0)}{N} &= \left(\textstyle\sum_{k=\frac{N+1}{2}}^{N} P(1-F(x_h), N, k)\right)(1-2p) \\ &\quad - \left(\textstyle\int_{-\infty}^{x_h} xf(x)\,dx\right) P\left(1-F(x_h), N-1, \tfrac{N-1}{2}\right) \\ &= \left(\textstyle\sum_{k=\frac{N+1}{2}}^{N} P(1-F(x_h), N, k)\right)(1-2p) + \left(\textstyle\int_{x_h}^{\infty} xf(x)\,dx\right) P\left(1-F(x_h), N-1, \tfrac{N-1}{2}\right). \end{aligned}$$

Finally, we combine these cases together to get the unconditional expected investor welfare:

$$\begin{aligned} \tfrac{U(x_l,x_h,\alpha)}{N} &= \left(\tfrac{2-\alpha}{2}\right) \left(\begin{array}{c} \left(\sum_{k=\frac{N+1}{2}}^{N} P(1-F(x_l), N, k)\right) \frac{\alpha(2p-1)}{2-\alpha} \\ - \left(\int_{-\infty}^{x_l} xf(x)\,dx\right) P\left(1-F(x_l), N-1, \frac{N-1}{2}\right) \end{array} \right) \\ &\quad + \tfrac{\alpha}{2} \left(\begin{array}{c} \left(\sum_{k=\frac{N+1}{2}}^{N} P(1-F(x_h), N, k)\right)(1-2p) \\ + \left(\int_{x_h}^{\infty} xf(x)\,dx\right) P\left(1-F(x_h), N-1, \frac{N-1}{2}\right) \end{array} \right) \end{aligned} \tag{10}$$

Using the expression for $P(y, N, k)$, note that

$$\sum_{k=\frac{N+1}{2}}^{N} P(1-F(\hat{x}), N, k) = \sum_{k=0}^{\frac{N-1}{2}} P(F(\hat{x}), N, k) = 1 - \sum_{k=\frac{N+1}{2}}^{N} P(F(\hat{x}), N, k) \tag{11}$$

and that $P\left(F(\hat{x}), N-1, \frac{N-1}{2}\right) = P\left(1-F(\hat{x}), N-1, \frac{N-1}{2}\right)$. Hence, we can simplify (10) as

$$\begin{aligned} \tfrac{U(x_l,x_h,\alpha)}{N} &= \left(\textstyle\sum_{k=\frac{N+1}{2}}^{N} P(F(-x_l), N, k)\right) \tfrac{\alpha(2p-1)}{2} \\ &\quad - \left(\tfrac{2-\alpha}{2}\right)\left(\textstyle\int_{-\infty}^{x_l} xf(x)\,dx\right) P\left(F(-x_l), N-1, \tfrac{N-1}{2}\right) \\ &\quad - \left(1 - \textstyle\sum_{k=\frac{N+1}{2}}^{N} P(F(x_h), N, k)\right) \tfrac{\alpha(2p-1)}{2} + \tfrac{\alpha}{2}\left(\textstyle\int_{x_h}^{\infty} xf(x)\,dx\right) P\left(F(x_h), N-1, \tfrac{N-1}{2}\right) \end{aligned} \tag{12}$$

or equivalently,

$$\begin{aligned}\frac{U(x_l,x_h,\alpha)}{N} &= \left(\sum_{k=\frac{N+1}{2}}^{N} P\left(F\left(-x_l\right),N,k\right)+\sum_{k=\frac{N+1}{2}}^{N} P\left(F\left(x_h\right),N,k\right)-1\right)\frac{\alpha(2p-1)}{2} \\ &-\left(\frac{2-\alpha}{2}\right)\left(\int_{-\infty}^{x_l} xf\left(x\right)dx\right)P\left(F\left(-x_l\right),N-1,\frac{N-1}{2}\right)+\frac{\alpha}{2}\left(\int_{x_h}^{\infty} xf\left(x\right)dx\right)P\left(F\left(x_h\right),N-1,\frac{N-1}{2}\right).\end{aligned} \tag{13}$$

When $-x_l = x_h = \hat{x}$ and $\alpha = 1$, (13) becomes (6), which completes the proof.

Proof of Proposition 1. Consider the derivative of the investor's expected utility in $\hat{x}$:

$$2\left(\sum_{k=\frac{N+1}{2}}^{N} P'\left(G\left(\hat{x}\right),N,k\right)\right)\left(p-\frac{1}{2}\right)+P'(G\left(\hat{x}\right),N-1,\frac{N-1}{2})\int_{\hat{x}}^{\infty} xg\left(x\right)dx-\hat{x}P(G\left(\hat{x}\right),N-1,\frac{N-1}{2}). \tag{14}$$

When F is substituted with G, this derivative equals zero when evaluated at $\hat{x} = \hat{x}^*\left(F\right)$ by the first-order condition. Evaluating (14) at $\hat{x}^*\left(F\right)$:

$$\begin{aligned}&2\left(\sum_{k=\frac{N+1}{2}}^{N} P'\left(G\left(\hat{x}^*\left(F\right)\right),N,k\right)\right)\left(p-\tfrac{1}{2}\right) \\ &+P'(G\left(\hat{x}^*\left(F\right)\right),N-1,\tfrac{N-1}{2})\int_{\hat{x}^*(F)}^{\infty} xg\left(x\right)dx-\hat{x}^*\left(F\right)P(G\left(\hat{x}^*\left(F\right)\right),N-1,\tfrac{N-1}{2}) \\ &=2\left(\sum_{k=\frac{N+1}{2}}^{N} P'\left(F\left(\hat{x}^*\left(F\right)\right),N,k\right)\right)\left(p-\tfrac{1}{2}\right) \\ &+P'(F\left(\hat{x}^*\left(F\right)\right),N-1,\tfrac{N-1}{2})\int_{\hat{x}^*(F)}^{\infty} xg\left(x\right)dx-\hat{x}^*\left(F\right)P(F\left(\hat{x}^*\left(F\right)\right),N-1,\tfrac{N-1}{2}) \\ &=P'(F\left(\hat{x}^*\left(F\right)\right),N-1,\tfrac{N-1}{2})\int_{\hat{x}^*(F)}^{\infty} x\left(g\left(x\right)-f\left(x\right)\right)dx<0.\end{aligned}$$

The first equality holds because $G\left(\hat{x}^*\left(F\right)\right) = F\left(\hat{x}^*\left(F\right)\right)$. The second equality holds because the derivative is zero at $\hat{x} = \hat{x}^*\left(F\right)$ for distribution F. Finally, the inequality holds because $P'(q,N-1,\frac{N-1}{2}) < 0$ for $q > \frac{1}{2}$ and $\int_{\hat{x}^*(F)}^{\infty} x\left(g\left(x\right)-f\left(x\right)\right)dx > 0$ by first-order stochastic dominance. Therefore, $\hat{x}^*\left(G\right) < \hat{x}^*\left(F\right)$. An analogous argument applies if $G\left(x|x \geq \hat{x}^*\left(F\right)\right)$ is dominated by $F\left(x|x \geq \hat{x}^*\left(F\right)\right)$ in the sense of first-order stochastic dominance.

Proof of Proposition 2. To prove part (i), we subtract the expected investor welfare under complete delegation $(2p-1)$ from (6) for $\hat{x} = 2p-1$ and divide by $P(F\left(2p-1\right),N-1,\frac{N-1}{2})$:

$$\Delta = -D\left(F\left(2p-1\right)\right)\left(2p-1\right)+\left(\int_{2p-1}^{\infty} xf\left(x\right)dx\right), \tag{15}$$

where

$$D\left(q\right) = \frac{\sum_{k=0}^{\frac{N-1}{2}} P\left(q,N,k\right)}{P\left(q,N-1,\frac{N-1}{2}\right)}$$

Voting choice dominates full delegation if and only if $\Delta > 0$. It follows that $\Delta > 0$ if and only if $\int_{2p-1}^{\infty} xf\left(x\right)dx > D\left(F\left(2p-1\right)\right)\left(2p-1\right)$.

We next prove part (ii). By part (i), voting choice results in higher expected investor welfare than complete delegation when $\int_{2p-1}^{\infty} xf\left(x\right)dx$ is sufficiently high, so it is sufficient to prove that mandatory pass-through voting results in higher expected investor welfare than voting choice. The difference in the two expected utilities is given by:

$$
\begin{aligned}
&P(\tfrac{1}{2}, N-1, \tfrac{N-1}{2}) \left(\int_0^\infty x f(x)\, dx\right) - \left(2 \sum_{k=\frac{N+1}{2}}^{N} P\left(F(2p-1), N, k\right) - 1\right) \left(p - \tfrac{1}{2}\right) \\
&\quad - P\left(F(2p-1), N-1, \tfrac{N-1}{2}\right) \left(\int_{2p-1}^\infty x f(x)\, dx\right) \\
&> \left(P(\tfrac{1}{2}, N-1, \tfrac{N-1}{2}) - P\left(F(2p-1), N-1, \tfrac{N-1}{2}\right)\right) \left(\int_{2p-1}^\infty x f(x)\, dx\right) \\
&\quad - \left(2 \sum_{k=\frac{N+1}{2}}^{N} P\left(F(2p-1), N, k\right) - 1\right) \left(p - \tfrac{1}{2}\right),
\end{aligned} \tag{16}
$$

where the first inequality follows from $\int_0^\infty x f(x)\, dx > \int_{2p-1}^\infty x f(x)\, dx$. Since $P(\frac{1}{2}, N-1, \frac{N-1}{2}) > P\left(q, N-1, \frac{N-1}{2}\right)$ for any $q > \frac{1}{2}$ and $F(2p-1) > 0$, the expression in the last two lines of (16) is strictly positive if $\int_{2p-1}^\infty x f(x)\, dx$ is sufficiently high.

Characterizing the equilibrium under voting choice for the case of a biased fund manager.

Suppose that conditional on $s = 0$, the fund manager votes against the proposal with probability α. Denote v_{FM} the fund manager's vote, where $v_{FM} = 1$ ($v_{FM} = 0$) corresponds to a vote in favor (against) the proposal. By Bayes' rule,

$$\Pr(\theta = 0 | v_{FM} = 0) = \Pr(\theta = 0 | s = 0) = p$$

$$
\begin{aligned}
\Pr(\theta = 1 | v_{FM} = 1) &= \frac{\Pr(v_{FM} = 1 | \theta = 1)}{\Pr(v_{FM} = 1 | \theta = 1) + \Pr(v_{FM} = 1 | \theta = 0)} \\
&= \frac{p \Pr(v_{FM} = 1 | s = 1) + (1-p) \Pr(v_{FM} = 1 | s = 0)}{\Pr(v_{FM} = 1 | s = 1) + \Pr(v_{FM} = 1 | s = 0)} \\
&= \frac{p + (1-p)(1-\alpha)}{2 - \alpha} = \frac{1 - (1-p)\alpha}{2 - \alpha} \in \left[\frac{1}{2}, p\right].
\end{aligned}
$$

In particular, if $\alpha = 1$, $\Pr(\theta = 1 | v_{FM} = 1) = p$, and if $\alpha = 0$, $\Pr(\theta = 1 | v_{FM} = 1) = \frac{1}{2}$.

We solve for the equilibrium in three steps.

1. Investors' delegation decisions as a function of the fund manager's strategy α.

Consider investor i with preference parameter x_i, who is deciding whether to delegate his vote to the fund manager or not. The investor's delegation decision only matters when the investor's vote is pivotal, so the investor optimally conditions his decision on the information that is true in the event of him being pivotal (we denote this event by Piv_i). If the investor delegates, he gets

$$\Pr(v_{FM} = 1 | Piv_i) \left(\mathbb{E}\left[u(1, \theta) | v_{FM} = 1, Piv_i\right] + x_i\right).$$

We next calculate $\Pr(v_{FM}=1|Piv_i)$ and $\mathbb{E}[u(1,\theta)|v_{FM}=1,Piv_i]$ given x_l and x_h. Note that

$$\Pr(v_{FM}=1|Piv_i)=\frac{\Pr(Piv_i|v_{FM}=1)\Pr(v_{FM}=1)}{\Pr(Piv_i|v_{FM}=1)\Pr(v_{FM}=1)+\Pr(Piv_i|v_{FM}=0)\Pr(v_{FM}=0)},$$

where

$$\begin{aligned}\Pr(v_{FM}=1) &= \frac{1}{2}+\frac{1}{2}(1-\alpha)=1-\frac{\alpha}{2},\\ \Pr(v_{FM}=0) &= \frac{\alpha}{2},\end{aligned}$$

and

$$\begin{aligned}\Pr(Piv_i|v_{FM}=1) &= C_{N-1}^{\frac{N-1}{2}}\left((1-F(x_l))F(x_l)\right)^{\frac{N-1}{2}},\\ \Pr(Piv_i|v_{FM}=0) &= C_{N-1}^{\frac{N-1}{2}}\left((1-F(x_h))F(x_h)\right)^{\frac{N-1}{2}}.\end{aligned}$$

Hence,

$$\begin{aligned}\Pr(v_{FM}=1|Piv_i) &= \frac{\left((1-F(x_l))F(x_l)\right)^{\frac{N-1}{2}}\left(1-\frac{\alpha}{2}\right)}{\left((1-F(x_l))F(x_l)\right)^{\frac{N-1}{2}}\left(1-\frac{\alpha}{2}\right)+\left((1-F(x_h))F(x_h)\right)^{\frac{N-1}{2}}\frac{\alpha}{2}}\\ &= \frac{1-\frac{\alpha}{2}}{1-\frac{\alpha}{2}+\left(\frac{(1-F(x_h))F(x_h)}{(1-F(x_l))F(x_l)}\right)^{\frac{N-1}{2}}\frac{\alpha}{2}}.\end{aligned}$$

Denoting

$$\left(\frac{(1-F(x_h))F(x_h)}{(1-F(x_l))F(x_l)}\right)^{\frac{N-1}{2}}=K\in[0,\infty],$$

we get

$$\Pr(v_{FM}=1|Piv_i)=\frac{2-\alpha}{2+(K-1)\alpha}.$$

Next,

$$\begin{aligned}\mathbb{E}[u(1,\theta)|v_{FM}=1,Piv_i] &= 2\Pr(\theta=1|v_{FM}=1,Piv_i)-1=2\Pr(\theta=1|v_{FM}=1)-1\\ &= 2\frac{1-(1-p)\alpha}{2-\alpha}-1=\frac{\alpha(2p-1)}{2-\alpha},\end{aligned}$$

where the second equality is due to the fact that only the fund manager has a signal informative about θ, so state-relevant information from Piv_i is subsumed by $v_{FM}=1$. Hence, the payoff of investor i from delegation is:

$$\frac{2-\alpha}{2+(K-1)\alpha}\left(\frac{\alpha(2p-1)}{2-\alpha}+x_i\right).$$

The payoff of investor i from not delegating and voting for the proposal is

$$\begin{aligned}
& \mathbb{E}\left[u\left(1,\theta\right)|Piv_i\right]+x_i \\
= \; & \Pr\left(v_{FM}=1|Piv_i\right)\mathbb{E}\left[u\left(1,\theta\right)|Piv_i,v_{FM}=1\right]+\Pr\left(v_{FM}=0|Piv_i\right)\mathbb{E}\left[u\left(1,\theta\right)|Piv_i,v_{FM}=0\right]+x_i \\
= \; & \Pr\left(v_{FM}=1|Piv_i\right)\mathbb{E}\left[u\left(1,\theta\right)|v_{FM}=1\right]+\Pr\left(v_{FM}=0|Piv_i\right)\mathbb{E}\left[u\left(1,\theta\right)|v_{FM}=0\right]+x_i \\
= \; & \frac{2-\alpha}{2+\left(K-1\right)\alpha}\frac{\alpha\left(2p-1\right)}{2-\alpha}+\frac{K\alpha}{2+\left(K-1\right)\alpha}\mathbb{E}\left[u\left(1,\theta\right)|s=0\right]+x_i \\
= \; & \frac{2-\alpha}{2+\left(K-1\right)\alpha}\frac{\alpha\left(2p-1\right)}{2-\alpha}-\frac{K\alpha}{2+\left(K-1\right)\alpha}\left(2p-1\right)+x_i \\
= \; & \frac{\alpha\left(2p-1\right)}{2+\left(K-1\right)\alpha}-\frac{K\alpha\left(2p-1\right)}{2+\left(K-1\right)\alpha}+x_i=\frac{\left(1-K\right)\alpha\left(2p-1\right)}{2+\left(K-1\right)\alpha}+x_i.
\end{aligned}$$

The investor's payoff from not delegating and voting against is zero.

It follows that an investor's delegation decision is characterized by two cutoffs, x_l and x_h, $x_l<x_h$, such that investor i delegates his vote to the fund manager if and only if $x_i\in[x_l,x_h]$. In particular, for $x_i=x_l$, the investor must be indifferent between delegating and voting against, which gives

$$\frac{2-\alpha}{2+\left(K-1\right)\alpha}\left(\frac{\alpha\left(2p-1\right)}{2-\alpha}+x_l\right)=0, \tag{17}$$

and for $x_i=x_h$, the investor must be indifferent between delegating and voting for, which gives

$$\frac{2-\alpha}{2+\left(K-1\right)\alpha}\left(\frac{\alpha\left(2p-1\right)}{2-\alpha}+x_h\right)=\frac{\left(1-K\right)\alpha\left(2p-1\right)}{2+\left(K-1\right)\alpha}+x_h. \tag{18}$$

From (17), we immediately get

$$x_l=-\frac{\alpha\left(2p-1\right)}{2-\alpha}.$$

From (18), we get

$$\begin{aligned}
\left(1-\frac{2-\alpha}{2+\left(K-1\right)\alpha}\right)x_h &= \frac{2-\alpha}{2+\left(K-1\right)\alpha}\frac{\alpha\left(2p-1\right)}{2-\alpha}-\frac{\left(1-K\right)\alpha\left(2p-1\right)}{2+\left(K-1\right)\alpha} \\
Kx_h &= \left(2p-1\right)-\left(1-K\right)\left(2p-1\right)=K\left(2p-1\right) \\
x_h &= 2p-1.
\end{aligned}$$

Hence, the delegation region is $[x_l,x_h]=\left[-\frac{\alpha(2p-1)}{2-\alpha},2p-1\right]$.

2. Characterizing the voting strategy of the fund manager

Suppose the fund manager gets signal $s=0$ and expects each investor to delegate if $x_i\in[x_l,x_h]$. Recall that the fund manager's utility equals the expected per-share utility of her N clients plus a constant $w>0$ if $d=1$ is implemented. Then, if the fund manager votes in favor, $v_{FM}=1$, her expected utility is:

$$\frac{U\left(x_l, x_h | v_{FM}=1, s=0\right)}{N}+w \Pr\left(d=1 | v_{FM}=1\right).$$

By analogy with the derivation in the proof of Lemma 1,

$$\begin{aligned}\tfrac{U\left(x_l, x_h | v_{FM}=1, s=0\right)}{N} &= \left(\sum_{k=\frac{N+1}{2}}^{N} P\left(F\left(-x_l\right), N, k\right)\right)(1-2p)\\ &-\left(\int_{-\infty}^{x_l} x f(x)\, dx\right) P\left(F\left(-x_l\right), N-1, \tfrac{N-1}{2}\right)\end{aligned}$$

and $\Pr\left(d=1 | v_{FM}=1\right)=\sum_{k=\frac{N+1}{2}}^{N} P\left(F\left(-x_l\right), N, k\right)$. Hence, the fund manager's expected utility from voting in favor is

$$\left(\sum_{k=\frac{N+1}{2}}^{N} P\left(F\left(-x_l\right), N, k\right)\right)(1-2p+w)-\left(\int_{-\infty}^{x_l} x f(x)\, dx\right) P\left(F\left(-x_l\right), N-1, \frac{N-1}{2}\right).$$

If the fund manager chooses $v_{FM}=0$, her expected utility is:

$$\frac{U\left(x_l, x_h | v_{FM}=0, s=0\right)}{N}+w \Pr\left(d=1 | v_{FM}=0\right).$$

By analogy with the derivation in the proof of Lemma 1,

$$\begin{aligned}&\tfrac{U\left(x_l, x_h | v_{FM}=0, s=0\right)}{N} = \tfrac{U\left(x_l, x_h | v_{FM}=0\right)}{N}\\ &=\left(1-\sum_{k=\frac{N+1}{2}}^{N} P\left(F\left(x_h\right), N, k\right)\right)(1-2p)+\left(\int_{x_h}^{\infty} x f(x)\, dx\right) P\left(F\left(x_h\right), N-1, \tfrac{N-1}{2}\right)\end{aligned}$$

and $\Pr\left(d=1 | v_{FM}=0\right)=\sum_{k=\frac{N+1}{2}}^{N} P\left(1-F\left(x_h\right), N, k\right)=1-\sum_{k=\frac{N+1}{2}}^{N} P\left(F\left(x_h\right), N, k\right)$. Hence, the fund manager's expected utility from voting against is

$$\left(1-\sum_{k=\frac{N+1}{2}}^{N} P\left(F\left(x_h\right), N, k\right)\right)(1-2p+w)+\left(\int_{x_h}^{\infty} x f(x)\, dx\right) P\left(F\left(x_h\right), N-1, \frac{N-1}{2}\right).$$

The fund manager finds it optimal to vote against upon $s=0$ if and only if

$$\begin{aligned}&\left(\sum_{k=\frac{N+1}{2}}^{N} P\left(F\left(-x_l\right), N, k\right)\right)(1-2p+w)-\left(\int_{-\infty}^{x_l} x f(x)\, dx\right) P\left(F\left(-x_l\right), N-1, \tfrac{N-1}{2}\right)\\ \leq &\left(1-\sum_{k=\frac{N+1}{2}}^{N} P\left(F\left(x_h\right), N, k\right)\right)(1-2p+w)+\left(\int_{x_h}^{\infty} x f(x)\, dx\right) P\left(F\left(x_h\right), N-1, \tfrac{N-1}{2}\right)\end{aligned}$$

or equivalently,

$$\begin{aligned}&\left(\sum_{k=\frac{N+1}{2}}^{N} P\left(F\left(-x_l\right), N, k\right)+\sum_{k=\frac{N+1}{2}}^{N} P\left(F\left(x_h\right), N, k\right)-1\right)(1-2p+w)\\ \leq &\left(\int_{x_h}^{\infty} x f(x)\, dx\right) P\left(F\left(x_h\right), N-1, \tfrac{N-1}{2}\right)+\left(\int_{-\infty}^{x_l} x f(x)\, dx\right) P\left(F\left(-x_l\right), N-1, \tfrac{N-1}{2}\right).\end{aligned}$$

Hence, the cutoff w^* on informative voting is given by

$$-\left(\int_{-\infty}^{x_l} xf(x)\,dx\right) P\left(F(-x_l), N-1, \tfrac{N-1}{2}\right) - \left(\int_{x_h}^{\infty} xf(x)\,dx\right) P\left(F(x_h), N-1, \tfrac{N-1}{2}\right)$$
$$= (2p-1-w^*)\left(\sum_{k=\frac{N+1}{2}}^{N} P(F(-x_l), N, k) + \sum_{k=\frac{N+1}{2}}^{N} P(F(x_h), N, k) - 1\right), \tag{19}$$

which defines w^* as a function of x_l and x_h: $w^*(x_l, x_h)$.

3. Finding the equilibrium α as the fixed point

Finally, we note that in equilibrium, x_l and x_h are functions of α given above, and $\alpha = \Pr(w \leq w^*) = H(w^*(x_l, x_h))$. Hence, the equilibrium α is found as the solution to the fixed point equation:

$$H^{-1}(\alpha) = w^*\left(\frac{\alpha(2p-1)}{2-\alpha}, 2p-1\right),$$

which completes the characterization of the equilibrium under voting choice.

Proof of Lemma 2.

Consider the cutoff w^* on informative voting defined by (19). Under complete delegation, $x_h = \infty$ and $x_l = -\infty$. Hence, the left-hand side of (19) equals zero, and thus, for the right-hand side to also equal zero, $w^* = 2p-1$. Under voting choice, $-x_l < x_h$, and given the symmetry of F,

$$-\int_{-\infty}^{x_l} xf(x)\,dx = \int_{-x_l}^{\infty} xf(x)\,dx > \int_{x_h}^{\infty} xf(x)\,dx.$$

In addition, since $-x_l > 0$, we have $\frac{1}{2} < F(-x_l) < F(x_h)$. The function $P\left(z, N-1, \frac{N-1}{2}\right)$ is decreasing in z for $z > \frac{1}{2}$ because $z(1-z)' = 1-2z < 0$ for $z > \frac{1}{2}$. Thus, $P\left(F(-x_l), N-1, \frac{N-1}{2}\right) > P\left(F(x_h), N-1, \frac{N-1}{2}\right)$, and hence the left-hand side of (19) is strictly positive. For the right-hand side to also be positive, $w^* < 2p-1$, which implies less informative voting than under complete delegation.

Proof of Proposition 3. The equilibrium probability of an investor being pivotal:

$$p\Omega_1(q_d^*) + (1-p)\Omega_0(q_d^*) = \frac{1}{2\pi - 1}\left(p\Omega_1(q_d^*) - (1-p)\Omega_0(q_d^*)\right).$$

Malenko and Malenko (2019) show that holding the probability of pivotal constant, investor welfare is maximized when $\Omega_1 = \Omega_0$. Simplifying this expression, we get:

$$p(2\pi-2)\Omega_1(q_d^*) + (1-p)(2\pi-1)\Omega_0(q_d^*) + (1-p)\Omega_0(q_d^*) = 0$$
$$(1-p)\pi\Omega_0(q_d^*) = p(1-\pi)\Omega_1(q_d^*) \Leftrightarrow \frac{\Omega_1(q_d^*)}{\Omega_0(q_d^*)} = \frac{(1-p)\pi}{p(1-\pi)}.$$

Next consider the optimal q_d, which maximizes expected investor welfare. Expected investor welfare is given by

$$\sum_{k=\frac{N+1}{2}}^{N}\left(pP\left(p_a,N,k\right)+\left(1-p\right)P\left(p_d,N,k\right)\right)-\frac{1}{2},$$

where

$$\begin{aligned} p_a &= q_d+\left(1-q_d\right)\pi, \\ p_d &= \left(1-q_d\right)\pi. \end{aligned}$$

We can think about maximization over p_a and p_d subject to the constraint:

$$\begin{aligned} 1-\frac{p_d}{\pi} &= \frac{p_a-\pi}{1-\pi}\Leftrightarrow\pi\left(1-\pi\right)-p_d\left(1-\pi\right)=\pi\left(p_a-\pi\right) \\ &\Leftrightarrow \pi-p_d+\pi p_d=\pi p_a\Leftrightarrow\pi p_a+\left(1-\pi\right)p_d=\pi. \end{aligned}$$

Consider the following optimization problem:

$$\max_{p_a,p_d}\sum_{k=\frac{N+1}{2}}^{N}\left(pP\left(p_a,N,k\right)+\left(1-p\right)P\left(p_d,N,k\right)\right)$$

$$\text{s.t. }\ \pi p_a+\left(1-\pi\right)p_d\le\pi$$

The Lagrangian is:

$$\mathcal{L}=\sum_{k=\frac{N+1}{2}}^{N}\left(pP\left(p_a,N,k\right)+\left(1-p\right)P\left(p_d,N,k\right)\right)+\lambda\left(\pi-\pi p_a-\left(1-\pi\right)p_d\right),$$

and the first-order conditions are:

$$\begin{aligned} \textstyle\sum_{k=\frac{N+1}{2}}^{N}P_p\left(p_a,N,k\right)=\lambda\frac{\pi}{p}, \\ \textstyle\sum_{k=\frac{N+1}{2}}^{N}P_p\left(p_d,N,k\right)=\lambda\frac{1-\pi}{1-p}. \end{aligned}$$

Since $p>\pi$, we have $\frac{\pi}{p}<1$ and $\frac{1-\pi}{1-p}>1$. Therefore, $p_a>p_d$. Dividing the two first-order conditions by each other:

$$\frac{\sum_{k=\frac{N+1}{2}}^{N}P_p\left(p_a,N,k\right)}{\sum_{k=\frac{N+1}{2}}^{N}P_p\left(p_d,N,k\right)}=\frac{\pi\left(1-p\right)}{p\left(1-\pi\right)}.$$

Recall that the equilibrium satisfies:

$$\frac{P\left(p_a,N-1,\frac{N-1}{2}\right)}{P\left(p_d,N-1,\frac{N-1}{2}\right)}=\frac{\left(1-p\right)\pi}{p\left(1-\pi\right)}.$$

Recall also that $P(p,N,k) = C_N^k p^k (1-p)^{N-k}$ and $P_p(p,N,k) = P(p,N,k)\frac{k-Np}{p(1-p)}$, so

$$\sum_{k=\frac{N+1}{2}}^{N} P_p(p,N,k) = \sum_{k=\frac{N+1}{2}}^{N} \frac{N!}{k!(N-k)!} p^{k-1}(1-p)^{N-k-1}(k-Np).$$

From Malenko and Malenko (2019):

$$\begin{aligned} L'(x) = \sum_{k=\frac{N+1}{2}}^{N} P_x(x,N,k) = -\sum_{k=0}^{\frac{N-1}{2}} P_x(x,N,k) = -\tfrac{1}{x(1-x)}\left(\sum_{k=0}^{\frac{N-1}{2}} P(x,N,k)(k-Nx)\right) \\ = -\tfrac{1}{x(1-x)}\left(\sum_{k=0}^{\frac{N-1}{2}} kP(x,N,k) - Nx\sum_{k=0}^{\frac{N-1}{2}} P(x,N,k)\right). \end{aligned}$$

Note that $\sum_{k=0}^{\frac{N-1}{2}} P(x,N,k) = I_{1-x}\left(\frac{N+1}{2},\frac{N+1}{2}\right)$, where $I_x(a,b)$ is the regularized incomplete beta function. In addition, according to the proof of Auxiliary Lemma A1,

$$\sum_{k=0}^{\frac{N-1}{2}} kP(x,N,k) = NxI_{1-x}\left(\frac{N+1}{2},\frac{N-1}{2}\right) = Nx\left[I_{1-x}\left(\frac{N+1}{2},\frac{N+1}{2}\right) - \frac{(1-x)^{\frac{N+1}{2}} x^{\frac{N-1}{2}}}{\frac{N-1}{2}B\left(\frac{N+1}{2},\frac{N-1}{2}\right)}\right],$$

where $B(a,b)$ is the beta function. Hence,

$$\begin{aligned} x(1-x)L'(x) &= Nx\frac{(1-x)^{\frac{N+1}{2}} x^{\frac{N-1}{2}}}{\frac{N-1}{2}B\left(\frac{N+1}{2},\frac{N-1}{2}\right)} = \frac{((1-x)x)^{\frac{N+1}{2}} N!}{\left(\frac{N-1}{2}\right)!\left(\frac{N-1}{2}\right)!} = Nx(1-x)P\left(x,N-1,\frac{N-1}{2}\right) \\ L'(x) &= NP\left(x,N-1,\frac{N-1}{2}\right) \end{aligned}$$

Therefore,

$$\frac{\sum_{k=\frac{N+1}{2}}^{N} P_p(p_a,N,k)}{\sum_{k=\frac{N+1}{2}}^{N} P_p(p_d,N,k)} = \frac{P\left(p_a,N-1,\frac{N-1}{2}\right)}{P\left(p_d,N-1,\frac{N-1}{2}\right)}.$$

Hence, the equilibrium under voting choice implements the level of delegation that is optimal for investors as a whole.

Proof of Proposition 4.

We argue that on equilibrium path, if the fund manager engages in costly information acquisition ($\pi > \frac{1}{2}$), then she will always vote according to her signal. To see this, suppose, in contradiction, that the fund manager plays a mixed strategy for some signal realization. By symmetry, she also plays the mixed strategy for the other signal realization. However, this implies that conditional on signal realization and being pivotal, the fund manager is indifferent between the two actions $d \in \{0,1\}$. This implies that information has no value to the fund manager, so she is better off deviating and not acquiring the signal in the first place.

Let q_d denote the probability with which an investor delegates voting to the fund manager. Suppose that fund investors expect that the fund manager acquires a signal with precision p

and votes according to her signal. Consider an investor who expects that each other investor delegates with probability q_d and those who do not delegate acquire signals with precision $\tilde{\pi}$. At the end of this proof, we show that the investor's values from delegating voting to the fund and not delegating and acquiring a signal with precision π are given, respectively, by

$$V_d(\tilde{\pi}, p, q_d) = \frac{1}{2}\left(p\Omega\left(q_d + (1-q_d)\tilde{\pi}\right) - (1-p)\Omega\left((1-q_d)\tilde{\pi}\right)\right), \tag{20}$$

$$V_{nd}(\pi, \tilde{\pi}, p, q_d) = \left(\pi - \frac{1}{2}\right)\left(p\Omega\left(q_d + (1-q_d)\tilde{\pi}\right) + (1-p)\Omega\left((1-q_d)\tilde{\pi}\right)\right) - \gamma(\pi), \tag{21}$$

where $\Omega(p) = P\left(q, N-1, \frac{N-1}{2}\right)$ is the probability that the votes of $N-1$ agents are split equally when each investor votes "for" with probability q and the votes are independent across investors. The intuition for (20)–(21) comes from the fact that an investor's vote makes a difference only if his vote is pivotal for the outcome, which happens if the other $N-1$ votes are split equally. Consider investor i who has not delegated. Since the fund manager's signal and the signals of other investors are conditionally independent of investor i's signal, investor i's gross value from his signal equals the probability that his vote is pivotal times the value of his signal in that event. The latter equals $\pi - \frac{1}{2}$ since acquiring signal with precision π changes the probability of a correct decision in the pivotal event from $\frac{1}{2}$ to π. The former equals $p\Omega\left(q_d + (1-q_d)\tilde{\pi}\right) + (1-p)\Omega\left((1-q_d)\tilde{\pi}\right)$, reflecting the fact that there are two possible events: the fund manager gets a correct signal (with probability p) and the fund manager gets an incorrect signal (with probability $1-p$). In the former case, each investor votes correctly if he delegates voting to the fund manager (with probability q_d) or if he does not delegate voting but gets a correct private signal (with probability $(1-q_d)\tilde{\pi}$). In the latter case, each investor votes correctly only if he does not delegate voting but gets a correct private signal (with probability $(1-q_d)\tilde{\pi}$).

In equilibrium, π must satisfy the first-order optimality condition and the beliefs of investors must be consistent with their actual strategies, $\tilde{\pi} = \pi$, which yields:

$$p\Omega\left(q_d + (1-q_d)\pi\right) + (1-p)\Omega\left((1-q_d)\pi\right) = \gamma'(\pi) \tag{22}$$

In addition, in equilibrium, if $q_d \in (0,1)$, then q_d must be such that each investor is indifferent between delegating and not delegating, i.e., $V_d(\pi, p, q_d) = V_{nd}(\pi, \pi, p, q_d)$:

$$\begin{aligned} &\frac{1}{2}\left(p\Omega\left(q_d + (1-q_d)\pi\right) - (1-p)\Omega\left((1-q_d)\pi\right)\right) \\ = &\left(\pi - \frac{1}{2}\right)\left(p\Omega\left(q_d + (1-q_d)\pi\right) + (1-p)\Omega\left((1-q_d)\pi\right)\right) - \gamma(\pi). \end{aligned} \tag{23}$$

Finally, consider the fund manager's information acquisition problem. Suppose the fund manager expects that each investor delegates voting with probability q_d and that investors who do not delegate acquire signals with precision π. The objective of the fund manager is

$$\max_p fN\left(p - \frac{1}{2}\right)\Pr\left(Piv_{FM}|q_{d,}\pi\right) - Nc(p), \tag{24}$$

where

$$\Pr\left(Piv_{FM}|q_{d,}\pi\right) = \sum_{k=0}^{N} P\left(q_d, N, k\right)\left(\sum_{m=\frac{N+1}{2}-k}^{\frac{N-1}{2}+k} P\left(\pi, N-k, m\right)\right) \tag{25}$$

is the probability that the fund manager's vote is pivotal. Intuitively, when the fund manager is pivotal, acquiring the signal with precision p changes the probability of a correct decision from $\frac{1}{2}$ to p, which increases the value of all shares by $N\left(p-\frac{1}{2}\right)$, and the fund manager captures fraction f of this increase. Taking the first-order condition yields the equilibrium choice of precision p:

$$f\Pr\left(Piv_{FM}|q_{d,}\pi\right) = c'\left(p\right). \tag{26}$$

We next summarize all symmetric equilibria.

(a) Equilibrium with $q_d = 1$. Consider a potential equilibrium in which $q_d = 1$. If $q_d = 1$, then the fund manager is pivotal with certainty. Hence, (24) reduces to $\max_p f\left(p-\frac{1}{2}\right) - c\left(p\right)$, implying $p = c'^{-1}\left(f\right)$. Consider a deviation of investor i to not delegating. Since she expects each other investor to delegate with certainty, she expects to be pivotal with probability zero. Hence, deviation yields a payoff of zero, if she does not acquire information, or negative, if she does. Hence, deviation is not profitable, and thus $q_d = 1$ is indeed an equilibrium, and it always exists.

(b) Equilibrium with $q_d = 0$. Consider a potential equilibrium in which $q_d = 0$. If $q_d = 0$, then $\Pr\left(Piv_{FM}|q_{d,}\pi\right) = 0$, and therefore the solution to (24) is $p = \frac{1}{2}$, i.e., the fund manager does not acquire information. Therefore, deviation to delegation to the fund manager yields an investor a payoff of zero. In contrast, not deviating yields the investor a payoff of

$$\begin{aligned}\left(\pi-\frac{1}{2}\right)\Omega\left(\pi\right)-\gamma\left(\pi\right) &= \max_x\left(x-\frac{1}{2}\right)\Omega\left(\pi\right)-\gamma\left(x\right)\\ &> \left(\frac{1}{2}-\frac{1}{2}\right)\Omega\left(\pi\right)-\gamma\left(\frac{1}{2}\right)=0.\end{aligned}$$

Hence, deviation is unprofitable. Finally, (22) with $q_d = 0$ implies that p is given by

$$\Omega\left(\pi\right) = \gamma'\left(\pi\right). \tag{27}$$

Hence this is indeed an equilibrium, and it always exists.

(c) Equilibrium with $q_d \in (0,1)$. Such as equilibrium exists for a non-empty set of parameters, which can be shown by constructing a numerical example.

We conclude the proof by deriving the values of information (20)–(21) and (24). The first two values are very similar to the derivations in Malenko and Malenko (2019) (see Section C of their Online Appendix). For completeness, we repeat these derivations here. For brevity, we omit the dependence of expectations on $\tilde{\pi}$, p, and q_d in these derivations.

1. Value of not delegating and acquiring a signal with precision p, (21). Investor i's vote makes a difference only if $\sum_{j\neq i} v_j = \frac{N-1}{2}$. Conditional on $\sigma_i = \theta$ and on being pivotal, his utility from the signal is $\frac{1}{2}\mathbb{E}\left[u\left(1,\theta\right)|\sigma_i = 1, PIV_i\right]$. Similarly, conditional on being pivotal and his private signal being $\sigma_i = 0$, the investor's utility from the signal is $-\frac{1}{2}\mathbb{E}\left[u(1,\theta)|\sigma_i = 0, PIV_i\right]$. Overall, the investor's gross (i.e., excluding costs) value of acquiring a signal with precision π is

$$\begin{gathered}\Pr(\sigma_i = 1)\Pr(PIV_i|\sigma_i = 1)\tfrac{1}{2}\mathbb{E}\left[u(1,\theta)|\sigma_i = 1, PIV_i\right] \\ -\Pr(\sigma_i = 0)\Pr(PIV_i|\sigma_i = 0)\tfrac{1}{2}\mathbb{E}\left[u(1,\theta)|\sigma_i = 0, PIV_i\right].\end{gathered}$$

By the symmetry of the model, $\Pr(PIV_i|\sigma_i = 1) = \Pr(PIV_i|\sigma_i = 0)$ and $\mathbb{E}\left[u(1,\theta)|\sigma_i = 1, PIV_i\right] = -\mathbb{E}\left[u(1,\theta)|\sigma_i = 0, PIV_i\right]$, so we get

$$\begin{gathered}\tfrac{1}{2}\Pr(PIV_i|\sigma_i = 1)\mathbb{E}\left[u(1,\theta)|\sigma_i = 1, PIV_i\right] \\ = \tfrac{1}{2}\Pr(PIV_i|\sigma_i = 1)\left(\Pr(\theta = 1|\sigma_i = 1, PIV_i) - \Pr(\theta = 0|\sigma_i = 1, PIV_i)\right) = \left(\pi - \tfrac{1}{2}\right)\Pr(PIV_i),\end{gathered}$$

where

$$\begin{aligned}\Pr(PIV_i) = \Pr(PIV_i|\theta = 1) &= p\Pr(PIV_i|s = 1, \theta = 1) + (1-p)\Pr(PIV_i|s = 0, \theta = 1) \\ &= pP\left(q_d + (1-q_d)\pi, N-1, \tfrac{N-1}{2}\right) + (1-p)P\left((1-q_d)\pi, N-1, \tfrac{N-1}{2}\right).\end{aligned}$$

Adding the cost of information acquisition yields expression (21).

2. Value of delegation (20). For brevity, we omit the dependence of expectations on $\tilde{\pi}$, p, and q_d. As before, investor i's vote makes a difference only if $\sum_{j\neq i} v_j = \frac{N-1}{2}$. Conditional on $s = 1$ and on being pivotal, his payoff from delegation is $\frac{1}{2}\mathbb{E}\left[u(1,\theta)|s = 1, PIV_i\right]$. Similarly, conditional on $s = 0$ and on being pivotal, investor i's utility from delegation is $-\frac{1}{2}\mathbb{E}\left[u(1,\theta)|s = 0, PIV_i\right]$. Overall, the investor's value from delegation is

$$\begin{gathered}\Pr(s = 1)\Pr(PIV_i|s = 1)\tfrac{1}{2}\mathbb{E}\left[u(1,\theta)|s = 1, PIV_i\right] \\ -\Pr(s = 0)\Pr(PIV_i|s = 0)\tfrac{1}{2}\mathbb{E}\left[u(1,\theta)|s = 0, PIV_i\right].\end{gathered}$$

By the symmetry of the model, $\Pr(PIV_i|s = 1) = \Pr(PIV_i|s = 0)$ and $\mathbb{E}\left[u(1,\theta)|s = 1, PIV_i\right] = -\mathbb{E}\left[u(1,\theta)|s = 0, PIV_i\right]$, so we get

$$\begin{gathered}\tfrac{1}{2}\Pr(PIV_i|s = 1)\mathbb{E}\left[u(1,\theta)|s = 1, PIV_i\right] \\ = \tfrac{1}{2}\Pr(PIV_i|s = 1)\left(\Pr(\theta = 1|s = 1, PIV_i) - \Pr(\theta = 0|s = 1, PIV_i)\right) \\ = \tfrac{1}{2}\Pr(PIV_i|s = 1, \theta = 1)\Pr(s = 1|\theta = 1) - \tfrac{1}{2}\Pr(PIV_i|s = 1, \theta = 0)\Pr(s = 1|\theta = 0) \\ = \tfrac{1}{2}\Pr(PIV_i|s = 1, \theta = 1)\pi - \tfrac{1}{2}\Pr(PIV_i|s = 1, \theta = 0)(1-\pi).\end{gathered}$$

Note that $\Pr(PIV_i|s = 1, \theta = 1) = P\left(q_d + (1-q_d)\pi, N-1, \frac{N-1}{2}\right)$ and $\Pr(PIV_i|s = 1, \theta = 0) = P\left((1-q_d)\pi, N-1, \frac{N-1}{2}\right)$, which yields expression (20).

3. Value of information for the fund manager (24). Conditional on $s = 1$ and on being pivotal, the fund manager's utility from signal with precision p is $\frac{1}{2}fN\mathbb{E}\left[u(1,\theta)|s = 1, PIV_{FM}\right]$. Similarly, conditional on being pivotal and the signal being $s = 0$, the fund manager's utility from the signal is $-\frac{1}{2}fN\mathbb{E}\left[u(1,\theta)|s = 0, PIV_{FM}\right]$. Overall, the fund manager's gross (i.e., excluding costs) value of acquiring a signal with precision p is

$$\begin{gathered}\Pr(s = 1)\Pr(PIV_{FM}|s = 1)\tfrac{1}{2}fN\mathbb{E}\left[u(1,\theta)|s = 1, PIV_{FM}\right] \\ -\Pr(s = 0)\Pr(PIV_{FM}|s = 0)\tfrac{1}{2}fN\mathbb{E}\left[u(1,\theta)|s = 0, PIV_{FM}\right].\end{gathered}$$

By the symmetry of the model, $\Pr(PIV_{FM}|s=1) = \Pr(PIV_{FM}|s=0)$ and $\mathbb{E}[u(1,\theta)|s=1, PIV_{FM}] = -\mathbb{E}[u(1,\theta)|s=0, PIV_{FM}]$, so we get

$$\begin{aligned} &\tfrac{1}{2}\Pr(PIV_{FM}|s=1)\,\mathbb{E}[u(1,\theta)|s=1, PIV_{FM}] \\ =\ &\tfrac{1}{2}\Pr(PIV_{FM}|s=1)\left(\Pr(\theta=1|s=1, PIV_{FM}) - \Pr(\theta=0|s=1, PIV_{FM})\right) = \left(p-\tfrac{1}{2}\right)\Pr(PIV_{FM}). \end{aligned}$$

It remains to calculate $\Pr(PIV_{FM})$. Consider an event that k investors out of N delegated to the fund manager. The probability of this event is $P(q_d, N, k)$. In this event, the fund manager is pivotal if the number m of $N-k$ votes that investors cast themselves is between $\frac{N+1}{2} - k$ and $\frac{N-1}{2}+k$. The probability of one of these events occurring is $\sum_{m=\frac{N+1}{2}-k}^{\frac{N-1}{2}+k} P(\pi, N-k, m)$. Combining, we get (24).

Proof of Proposition 5. We prove the proposition by comparing investor welfare and the fund manager's utility in equilibrium with $q_d = 0$ and $q_d = 1$. If $q_d = 1$, investor welfare per-share equals

$$\mathbb{E}[u(1,\theta)d] = \frac{1}{2}\mathbb{E}[s=1|\theta=1] - \frac{1}{2}\mathbb{E}[s=1|\theta=0] = c'^{-1}(f) - \frac{1}{2},$$

and the fund manager's utility is

$$N\max_p\left(f(p-\frac{1}{2}) - c(p)\right).$$

If $q_d = 0$, investor welfare per-share equals

$$\begin{aligned} &\Pr(\theta=1)\textstyle\sum_{k=\frac{N+1}{2}}^{N} P(\pi,N,k) - \Pr(\theta=0)\sum_{k=\frac{N+1}{2}}^{N} P(1-\pi,N,k) - \gamma(\pi,\tau) \\ =\ &\tfrac{1}{2}\textstyle\sum_{k=\frac{N+1}{2}}^{N} P(\pi,N,k) - \tfrac{1}{2}\sum_{k=\frac{N+1}{2}}^{N} P(1-\pi,N,N-k) - \gamma(\pi,\tau) = \sum_{k=\frac{N+1}{2}}^{N} P(\pi,N,k) - \tfrac{1}{2} - \gamma(\pi,\tau), \end{aligned}$$

where $\pi : \Omega(\pi) = \frac{\partial}{\partial\pi}\gamma(\pi,\tau)$, and where we used $\sum_{k=0}^{N} P(1-\pi,N,k) = 1$. The fund manager's utility is

$$Nf\left(\sum_{k=\frac{N+1}{2}}^{N} P(\pi,N,k) - \frac{1}{2}\right).$$

As $\tau \to \underline{\tau}$, $\frac{\partial}{\partial\pi}\gamma(\pi,\tau)$ approaches zero for any $\pi < 1$. Therefore, π approaches one as $\tau \to \underline{\tau}$. Hence, investor welfare approaches $\frac{1}{2} > c'^{-1}(f) - \frac{1}{2}$ and the fund manager's utility approaches $Nf\frac{1}{2} > N\max_p\left(f(p-\frac{1}{2}) - c(p)\right)$, which proves the first part of the proposition. As $\tau \to \bar{\tau}$, $\frac{\partial}{\partial\pi}\gamma(\pi,\tau)$ approaches infinity for any $\pi > \frac{1}{2}$. Therefore, π approaches $\frac{1}{2}$ as $\tau \to \bar{\tau}$. Hence, investor welfare and the fund manager's utility approach zero, which proves the second part of the proposition.

Information acquisition in a setting with heterogeneous preferences

In this section, we show that voting choice may lead the fund manager to underinvest in information. The timeline is as follows. At the initial date, the fund manager chooses precision $p \in \left[\frac{1}{2}, 1\right]$ of her signal facing a convex per-share cost $c(p)$, where $c(p)$ is a twice differentiable function satisfying $c\left(\frac{1}{2}\right) = 0$, $c'(p) > 0$, $\lim_{p \to \frac{1}{2}} c'(p) = 0$, $\lim_{p \to 1} c'(p) = \infty$, and $c''(p) > 0$. Since $c(p)$ is the per-share cost, the total cost of information acquisition by the fund manager is $Nc(p)$. The fund manager maximizes fraction $f \in (0, 1]$ of the expected investor welfare minus her information acquisition costs (we can think of f as capturing the fund's management fee). Simultaneously with the fund manager's choice of p, fund investors observe their preference parameters and decide whether to delegate their votes to the fund manager.

First, consider investors' choice of delegation. Suppose that investors expect the fund manager to obtain a signal with precision $\tilde{p} \in \left[\frac{1}{2}, 1\right]$ (in equilibrium, investors have rational expectations). Then, the game that follows is identical to the one analyzed in the baseline model with $\tilde{p}$ instead of p. In equilibrium, investor i delegates voting to the fund manager if and only if $x_i \in [-\hat{x}(\tilde{p}), \hat{x}(\tilde{p})]$, where $\hat{x}(\tilde{p}) = 2\tilde{p} - 1$, and votes himself otherwise.

Next, consider the fund manager's problem of choosing signal precision p. For a given delegation cutoff $\hat{x}$ and precision p, the expected investor welfare is $U(\hat{x}, p)$ given by (6). The fund manager chooses p to solve

$$\max_p fU(\hat{x}, p) - Nc(p).$$

For a fixed $\hat{x}$, the choice of precision p is given by the first-order condition:

$$2f\left(\sum_{k=\frac{N+1}{2}}^{N} P(F(\hat{x}), N, k) - \frac{1}{2}\right) = c'(p). \tag{28}$$

Less delegation (lower $\hat{x}$) reduces the left-hand side of (28) and thus reduces the fund manager's incentives to invest in information. Intuitively, if the fund manager expects to vote on behalf of fewer shareholders, her vote matters less, so she has weaker incentives to become informed.

In equilibrium, the signal precision expected by investors coincides with the actual choice of precision: $\tilde{p} = p$. Thus, $\hat{x} = 2p - 1$, and p is given by

$$2f\left(\sum_{k=\frac{N+1}{2}}^{N} P(F(2p-1), N, k) - \frac{1}{2}\right) = c'(p). \tag{29}$$