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Do Shareholders Vote Strategically? Voting Behavior, Proposal Screening, and Majority Rules*

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Abstract. We analyze how shareholders screen management proposals at annual general meetings. First, we use a simple model of strategic voting to develop a theoretical benchmark of effective information aggregation through voting. Then, we derive testable implications and provide structural estimates of the model parameters. The main conclusions are that shareholders vote strategically and that proposal screening increases value. Shareholders largely neutralize the lock-in effect of supermajority rules, thereby preventing the incorrect rejection of proposals.

JEL Classification: D72, G34

1. Introduction

In this paper we investigate the hypothesis that shareholders vote strategically and increase company value when they screen management proposals put forward at annual general meetings. In principle, shareholders' involvement in some key company decisions may help to overcome the agency problem between managers and shareholders. However, this involvement creates a collective action problem because company decisions require information and expertise, and in a widely-held firm a large number of shareholders have to make uncoordinated choices about

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how to cast their votes. Shareholders' individual expertise and information needs to be aggregated in a way so that they *collectively* make correct decisions.[1]

We use a simple voting model to establish a theoretical benchmark for how well information aggregation works. The model shows that correct collective decision-making requires that shareholders vote strategically, i.e., they do not simply cast their votes in favor of proposals about which they have positive information and against all other proposals. Such a simple voting rule, referred to in the literature as sincere voting, does not take into account other shareholders' information and leads to a significant loss of value. We then perform structural estimation of the model based on a large sample of shareholder votes in the United States and analyze how shareholders' voting behavior conforms to the theoretical benchmark. We find that it is remarkably consistent with the prescriptions of the model: the results suggest that shareholders vote strategically and understand the hazards of collective decision-making. Their screening is particularly valuable when managers ability to objectively evaluate the proposal is compromised because of the agency conflict between managers and shareholders.

In the model we use, the proposal increases the value of the firm in one state of the world, but decreases it in the other state.[2] Nobody knows the true state of nature, but each shareholder receives some private information in addition to the publicly available information. Shareholders have homogeneous preferences and are only interested in a higher value of their shares. If shareholders could communicate and coordinate their behavior through a central mechanism, they would pool their information and make a decision based on a simple cutoff rule: the proposal is accepted if the amount of positive information exceeds the cutoff, otherwise the proposal is rejected. This central mechanism is referred to as the coordinator. However, such a central mechanism does not exist and shareholders must vote on the proposal without learning each others' information.

Strategic voting effectively amounts to shareholders trying to identify the voting behavior that would be prescribed by the coordinator as closely as they can. To see what is involved in this, consider a simple example of a company with five shareholders with equal stakes. Voting is by simple majority, so a proposal is accepted if at least three of them vote in favor. They consider a proposal, say, on a merger with another company and each of them receives some private information about the attractiveness of this merger. A good signal exactly cancels a bad signal,

[1] This collective action problem of correct information aggregation is different from and exacerbates those mentioned by Berle and Means (1932) and Pound (1988), who stress the difficulty of shareholders to become informed and to recover the costs from voting.

[2] The model is a version of the political voting model developed by Austen-Smith and Banks (1996) and Feddersen and Pesendorfer (1998). Subsequent papers include Feddersen and Pesendorfer (1996), Dekel and Piccione (2000), and Persico (2004). Voting models with heterogeneous preferences include Feddersen and Pesendorfer (1997) and Maug and Yilmaz (2002).

and accepting the proposal is optimal whenever the number of good signals exceeds the number of bad signals. With a simple majority rule it is rational for each shareholder to vote in favor of the proposal if her own signal is good and against it otherwise: she casts the decisive vote exactly when two of the other four shareholders have observed a good signal and two have observed a bad signal. Then she knows that the merger is value enhancing if and only if her own signal is good, so she votes in favor whenever this is the case.

Now consider the same company with a corporate charter that imposes a supermajority requirement, so that at least four of the five shareholders have to vote in favor to pass the merger proposal. Sincere voting ("vote in favor whenever your own signal is good") is now inadequate. Each shareholder's vote is decisive now if one of the other shareholders votes against the proposal and three vote in favor. But if three votes in favor indicate three favorable signals, then voting in favor is better for each shareholder even if her own signal is bad because there are still more good than bad signals. As a consequence, rational shareholders will change their voting strategy, so that two shareholders completely ignore their information and always back the proposal, independently of their information; we label them " passive" voters. The other three continue to vote sincerely; we call them "active" voters. Now each active voter is decisive if one of the other active voters has observed a bad signal and voted against, and the third active voter has observed a good signal and voted in favor. Then it is again correct to vote sincerely, as one good signal cancels one bad signal. The two passive voters would also not want to change their strategy. Hence, shareholders have to think about the information *other* shareholders have in those situations where they cast the decisive vote. This is what we call strategic voting.

This simple example illustrates that if shareholders vote sincerely, then proposal screening by shareholders destroys value. In our case with a supermajority requirement, all proposals where only three shareholders have observed good signals increase value, yet they would all be rejected if shareholders voted sincerely. Hence, strategic voting is economically important. If shareholders do not vote strategically, it might be beneficial to exclude them from decision-making altogether and leave decisions to expert managers, agency problems notwithstanding. The simple example also illustrates two testable hypotheses. First, if shareholders do vote strategically, then they adjust their behavior in response to higher majority rules by voting for proposals more often. Second, the pass rate is influenced by supermajority requirements if shareholders vote sincerely, but not so much if they vote strategically.

We examine the relation between the majority rule and the voting outcome, identify the structural parameters of the voting model, check if these parameters satisfy the theoretical constraints, and test the hypotheses formulated above. Our database consists of 13,405 management proposals from 8,486 shareholder meetings in the

United States for the period from 1994 to 2003. We find evidence consistent with the model and conclude that shareholders vote strategically, that proposal screening increases value, and that strategic voting is important when a management proposal is subject to a supermajority rule. These insights are important because shareholders and their consultants, managers, and regulators invest substantial resources into the voting process. Also, we find that concerns about ineffective supermajority requirements expressed in the finance literature may be overstated: while simple majority rules are generally optimal based on our structural estimations, the strategic voting behavior of shareholders counteracts the conservatism of supermajority rules.[3]

The literature on shareholder voting on management proposals focuses predominantly on the agency conflict between shareholders and management. In their discussion of shareholder voting, Brickley, Lease, and Smith (1994) contrast two hypotheses. The "management-interest hypothesis" follows the tradition of Berle and Means (1932) and contends that the voting process is captured by management. By contrast, the "shareholder-interest hypothesis," associated with Easterbrook and Fischel (1983) holds that voting is an effective mechanism of corporate control. The results of our analysis concur with the shareholder-interest hypothesis.

Previous empirical work on voting outside of financial economics has been devoted mostly to the turnout question (why people vote or not vote), and only a few experimental studies investigate how people vote. Guarnaschelli, McKelvey, and Palfrey (2000) and Battaglini, Morton, and Palfrey (2005) show that the theory of strategic voting is consistent with the behavior of agents in the laboratory. To the best of our knowledge, our paper is the first to investigate strategic voting and information aggregation in field data. Matvos and Ostrovsky (2006) also discuss strategic voting by mutual funds. They develop a model where shareholders (mutual funds) impose direct externalities on each other. Their notion of strategic voting is therefore different from ours. Brickley, Lease, and Smith (1988) and (1994) report some empirical results related to ours. At the time of their two studies, the theory of strategic voting was not developed and they offer a different interpretation, which we discuss at the end of the paper.

The rest of the paper is organized as follows: Section 2 develops the basic model with an emphasis on the empirical implications. The testable restrictions are derived in Section 3, the data are described in Section 4, and the results of the structural estimation are reported in Section 5. Section 6 discusses alternative interpretations of the results, and Section 7 concludes.

[3] See, e.g., DeAngelo and Rice (1983), Jarrell and Poulsen (1987), Gompers, Ishii, and Metrick (2003), and Bebchuk, Cohen, and Ferrell (2005) for expressions of this concern.

2. The Theory of Strategic Voting

2.1 ASSUMPTIONS

A proposal can be either accepted or rejected. The payoff v to the firm from accepting the proposal depends on the state of nature. Acceptance of the proposal increases the value of the firm by $v = 1$ with probability p and decreases it by $v = -1$ with probability $1 - p$. There are N shareholders with one vote each. Shareholders must vote either for or against the proposal. All votes are cast simultaneously and the voting rule requires that a votes are in favor of the proposal. The voting rule a is exogenous. Each shareholder i privately observes a signal $\sigma_i \in \{0, 1\}$, which indicates the state of the world correctly with a probability strictly less than 1:

$$\Pr(\sigma = 1|v = 1) = \Pr(\sigma = 0|v = -1) = 1 - \varepsilon, \quad 0 < \varepsilon < \tfrac{1}{2}. \tag{1}$$

The signal is incorrect with probability ε and therefore correct with probability $1 - \varepsilon$. The private signals are statistically independent conditional on the state of nature. The probability of receiving a good signal is:

$$\pi = p(1 - \varepsilon) + (1 - p)\varepsilon. \tag{2}$$

The prior p represents common information available to all shareholders. It includes proxy material, vote recommendations, and the stock price. We assume that markets are incomplete so that shareholders cannot take bets on the stock with and without the proposal. The signal σ represents information that is specific to individual shareholders, and it includes genuinely private information as well as differences in analyzing publicly available information. If these interpretations are correlated across shareholders and therefore have a common component, then this common component would also be reflected in the prior p. The ex-ante expected payoff from accepting the proposal is $E(v) = 2p - 1$. Therefore, if no private information is available, the proposal should be accepted whenever $p > 1/2$.

The assumptions are standard in political voting models. We assume symmetry of voters (one shareholder/one vote). This is an approximation as shareholders have votes proportional to the number of shares they own, an aspect we ignore to preserve analytic tractability. The one shareholder/one vote assumption may be a reasonable approximation in widely-held firms. We also assume that payoffs and error probabilities are symmetric across states.[4] For analytic tractability, we do not allow for abstentions or non-participation, which would also require a model

[4] This assumption simply preserves identifiability. If we allowed asymmetry across states, we would introduce additional parameters we could not identify, so the symmetry assumption does not restrict the empirical analysis.

with more parameters.[5] Assumptions that are specific to shareholder voting are discussed in Section 6 after we have presented our empirical results.

2.2 VOTING WITH A COORDINATOR

We start by counterfactually assuming that there is a coordinator who collects N signals from all shareholders to arrive at an optimal decision. Shareholders are assumed to have homogeneous preferences and the coordinator maximizes the expected wealth of all shareholders given all the information they have collectively. The solution with a coordinator shows how well shareholders can do if they could overcome the collective action problem completely. The information consists of g good signals and $N-g$ bad signals.

First, we derive the objective function. Invariably, the coordinator will commit two types of errors. With probability e_I, she will reject a value-increasing proposal (type I-error), and with probability e_{II}, she will accept a value-reducing proposal (type II-error). Given that all signals have the same precision, we can restrict ourselves to decisions by a simple cutoff rule: if $g \geq a$ signals are good, the proposal is accepted, otherwise it is rejected. The coordinator chooses a cutoff rule a that minimizes the expected loss:

$$\begin{aligned} L &= p \sum_{g<a} \Pr(g \mid v = +1) + (1-p) \sum_{g \geq a} \Pr(g \mid v = -1) \\ &= p e_I + (1-p) e_{II}. \end{aligned} \tag{3}$$

Note that L can also be interpreted as the probability of error.

Next, we derive the optimal cutoff rule. Let $\beta(g, N)$ be the probability of being in the good state after observing g good signals and $N-g$ bad signals. In Appendix A, we derive the functional form of $\beta(g, N)$ by applying Bayes' Rule. Intuitively, $\beta(g, N)$ increases with g and decreases with N. Then, we can rewrite L as:[6]

$$L = \sum_{g<a} \beta(g, N) \Pr(g) + \sum_{g \geq a} (1 - \beta(g, N)) \Pr(g). \tag{4}$$

The coordinator accepts the proposal whenever $\beta(g, N) \geq 1 - \beta(g, N)$, hence, whenever $\beta(g, N) \geq 1/2$. We ignore that g is an integer and define the optimal cutoff rule a^* from $\beta(a^*, N) = 1/2$. From this condition, we derive the following expression for the optimal cutoff rule in Appendix A:

$$\frac{a^*}{N} = \frac{1}{2} - \frac{1}{2N \ln\left(\frac{1-\varepsilon}{\varepsilon}\right)} \ln\left(\frac{p}{1-p}\right), \tag{5}$$

[5] See Feddersen and Pesendorfer (1996) for a model that explicitly allows for abstentions.

[6] We use the fact that $p \Pr(g \mid v = +1) = \Pr(g, v = +1) = \beta(g, N) \Pr(g)$.

which is subject to $a^* \in [0, N]$.[7] Anticipating the discussion of voting rules, we shall refer to a^*/N as the optimal majority rule. From (5) we can observe two interesting properties. First, a^*/N decreases with the prior p. Submajority ($a^*/N < 1/2$) is optimal for $p > 1/2$ and supermajority ($a^*/N > 1/2$) for $p < 1/2$: The better the prior on the proposal, the less favorable posterior information is required to make the proposal acceptable to shareholders. Second, the simple majority rule ($a^*/N = 1/2$) is optimal in two distinct cases: (1) when $p = 1/2$ (then the second term in Equation (5) is zero), which is a knife-edge result, and (2) when the amount of information is large, which occurs whenever the signals are precise ($\varepsilon \to 0$) or the number of shareholders is large ($N \to \infty$). In (5), the second term represents the prior and is therefore a function of p. The first term represents the posterior information and equals $1/2$ because of symmetry, so that one good signal always cancels out one bad signal.[8] As N becomes large or as ε becomes small, the prior becomes less important and a^*/N converges to the $1/2$.

The set of possible solutions to (3) includes two extreme cases. First, when there is no information ($\varepsilon = 1/2$), the coordinator bases her decision on the prior alone and $L = \min(p, 1-p) \leq 1/2$. Second, when there is perfect information ($\varepsilon = 0$), all decisions are correct and $L = 0$. In the intermediate case with imperfect information, we must have $0 \leq L \leq 1/2$.

2.3 SHAREHOLDER VOTING

We now consider the more realistic case where no coordinator exists and information is revealed and aggregated through voting. Decisions are based on the statutory rule a. Statutory rules are chosen before the vote and apply to broad classes of proposals, so they cannot be assumed to be tailored to individual proposals. Therefore, we may have that $a \neq a^*$.[9]

The model has two classes of equilibria: equilibria that are symmetric in mixed strategies (Feddersen and Pesendorfer, 1998) and equilibria that are asymmetric in pure strategies, so shareholders with the same information may choose different

[7] If $a^* < 0$, then $\beta(0, N) > 1/2$ (the proposal is always good), and if $a^* > N$, then $\beta(N, N) < 1/2$ (the proposal is always bad). In both cases, the decision depends only on the prior p and the signals of shareholders cannot make a difference to the optimal decision.

[8] It can be shown that the fact that the first term equals 1/2 does not depend on the assumption of symmetric payoffs. The argument for this claim and other material regarding this paper is contained in an additional document with supplemental material, which is available from the journal's website at http://www2.wu-wien.ac.at/rof/supmat.html or from the authors upon request.

[9] This veil-of-ignorance argument is common in the discussion of majority rules in the political science literature, e.g., Aghion and Bolton (2003) and Holden (2004). See also Grossman and Hart (1988) for a related argument in financial economics.

strategies (see Maug, 1999, and Persico, 2004). While the theoretical distinction between pure and mixed strategy equilibria is important, the two classes of equilibria generate similar empirical predictions. We focus on pure strategy equilibria, which are linear and can be estimated with ordinary least squares, but we also produce numerical results on mixed strategy equilibria to demonstrate that pure and mixed strategy equilibria are similar.[10]

In the pure strategy equilibria, some shareholders vote in favor if they observe a good signal and against if they observe a bad signal. Following Austen-Smith and Banks (1996), we refer to this behavior as sincere voting. The remaining shareholders ignore their information and vote passively for or against the proposal independently of their information. The number of sincerely voting shareholders is denoted with k. We prove the following theorem in Appendix B:

Proposition 1 ***(Pure Strategy Equilibria).*** *For any set of parameters such that* $\beta(0, N) \leq 1/2 \leq \beta(N, N)$, *a number k of the N shareholders vote sincerely*:

$$k = \max\{N - 2|a^* - a|, 0\}, \tag{6}$$

where a^* is defined from condition (5). The remaining $N-k$ shareholders vote passively in favor if $a \geq a^*$ and against if $a < a^*$. The number of passive voters is strictly positive if $a \neq a^*$.

The number of shareholders voting sincerely is a linear, decreasing function of the absolute difference between the statutory rule and the optimal rule, $|a^* - a|$: if the statutory rule a exceeds the optimal rule a^*, then some shareholders passively vote in favor. In the opposite case, some shareholders passively vote against. To develop some intuition for (6), recall that in our symmetric setup, one good signal always cancels one bad signal. Hence, for each passive shareholder who votes 'yes,' there has to be another passive shareholder who votes 'no,' so that the posterior after observing all sincere votes remains the same, i.e., $\beta = 1/2$, which it is with the optimal majority rule. For example, if the actual majority rule is too high ($a > a^*$), then there must be $a^* - a$ shareholders who passively vote in favor to achieve the majority requirement a. Then another $a^* - a$ shareholders have to vote against to cancel these yes-votes, and only the remaining k shareholders vote sincerely.

The number of shareholders voting sincerely can be zero from (6), in which case the equilibrium is non-responsive. All shareholders vote sincerely only if the statutory rule coincides with the optimal rule.

[10] The results on mixed strategy equilibria are available in a document with supplemental material, see Footnote 8 above.

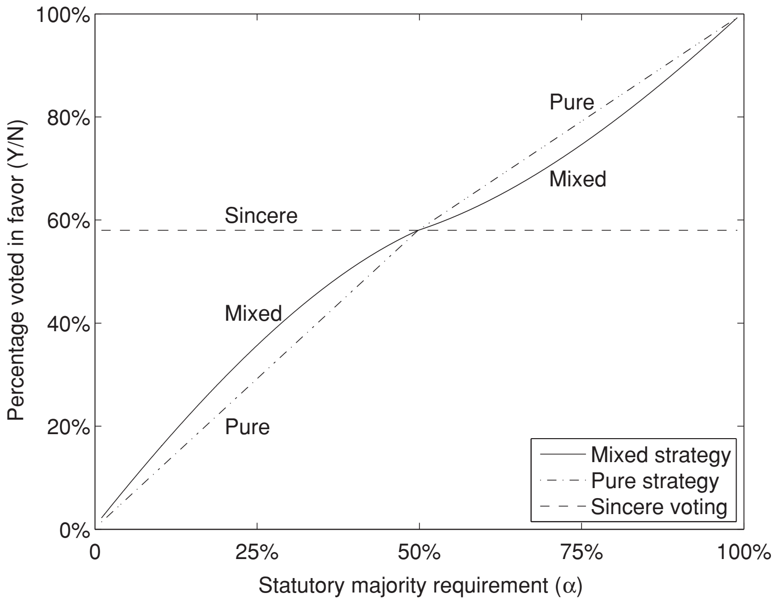

Figure 1. Expected Proportion in Favor and Statutory Rule
The non-linear function (solid) represents the expected proportion in favor for mixed strategy equilibria, the piecewise linear function (dash-dotted) represents pure strategy equilibria, and the horizontal line (dashed) represents sincere voting. Parameters: $p = 0.6$, $\varepsilon = 0.1$, and $N = 50$.

2.4 COMPARATIVE STATICS

First, the expected proportion in favor increases with the statutory rule. When $a > a^*$, shareholders vote in favor more often. All passively voting shareholders *and* all other shareholders with a good signal vote in favor. When $a < a^*$, the behavior is reversed. The relation between the proportion in favor and the statutory rule is illustrated numerically in Figure 1. Define $\alpha = a/N$, $\alpha^* = a^*/N$, and $\kappa = k/N$ and let $E(y/N)$ denote the expected proportion in favor of a proposal. From Proposition 1, the expected proportion of votes in favor equals:

$$E(y/N) = \begin{cases} \pi\kappa = \pi - 2\pi\alpha^* + 2\pi\alpha, & \text{if } \alpha < \alpha^*, \\ \pi\kappa + 1 - \kappa = \pi - 2(1-\pi)\alpha^* + 2(1-\pi)\alpha, & \text{if } \alpha \geq \alpha^*. \end{cases} \tag{7}$$

In Figure 1, the pure strategy equilibria are represented by the piecewise linear (dash-dotted) function with a kink at $\alpha = \alpha^*$, the mixed strategy equilibria by the non-linear (solid) function with an inflection point at $\alpha = \alpha^*$, and sincere voting by all shareholders by the horizontal (dashed) line. The figure emphasizes the difference between strategic and sincere voting. Strategic voting implies that

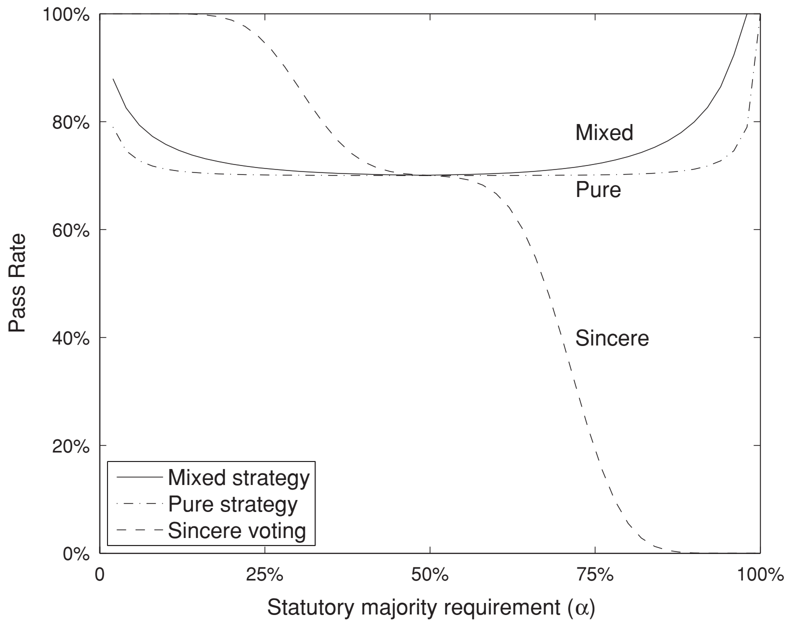

Figure 2. Pass Rate and Statutory Rule
The figure shows the probability that a proposal passes for mixed strategy equilibria (solid), pure strategy equilibria (dash-dotted), and sincere voting (dashed). Parameters: $p = 0.7$, $\varepsilon = 0.3$, and $N = 50$.

$E(y/N)$ increases with α, whereas there is no relation if all shareholders vote sincerely.

Second, the pass rate for a proposal is almost independent of the statutory rule. In the bad state, the probability of incorrectly passing the proposal equals e_{II}. Similarly, the probability of passing the proposal in the good state is 1 minus the probability of incorrectly rejecting it, hence $1 - e_I$ (see Equation (3)). Thus, the expected pass rate equals:

$$Pass = p(1 - e_I) + (1 - p)e_{II}. \tag{8}$$

For all strategic voting equilibria, the pass rate converges relatively fast to the prior probability as N gets large or ε gets small, except near the extreme submajority and supermajority rules:[11]

$$\lim_{N\to\infty} Pass = \lim_{\varepsilon\to 0} Pass = p. \tag{9}$$

When shareholders vote strategically, they effectively mimic the coordinator so that, on average, a proposal passes with probability p.

[11] From arguments which parallel Proposition 2 of Feddersen and Pesendorfer (1998), the error probabilities converge to zero: $\lim_{N\to\infty} e_I = \lim_{N\to\infty} e_{II} = 0$. Then, (9) follows immediately.

Figure 2 plots the pass rate as a function of the statutory rule α for pure strategy equilibria (dash-dotted), mixed strategy equilibria (solid), and sincere voting (dashed). For both mixed and pure strategy equilibria, the pass rate is close to the prior p except near the extreme submajority and supermajority. Sincere voting by all shareholders, on the other hand, distorts the voting outcome unless the statutory rule is close to the optimal rule: such behavior leads to accepting too many proposals under a submajority rule and rejecting too many proposals under a supermajority rule. Strategic voting mitigates these biases and eliminates them completely if the amount of information is large (9).

2.5 EFFICIENCY PROPERTIES OF VOTING RULES

In Figure 3, we evaluate the loss function (3) numerically for mixed and for pure strategy equilibria, sincere voting, the coordinator, and the two special cases with no private information and perfect information, respectively. The figure emphasizes the following properties:

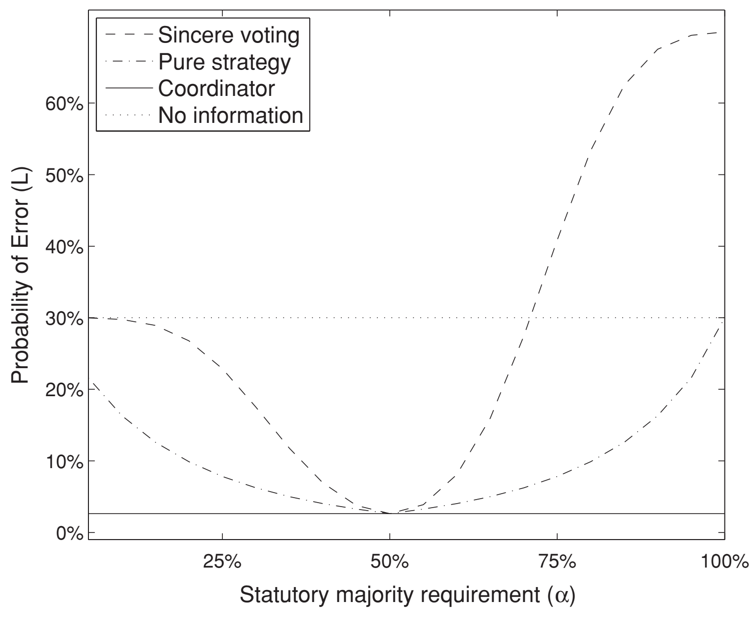

Figure 3. Probability of Error and Statutory Rule
The figure shows the loss function (3) for sincere voting (dashed) and for pure strategy equilibria (dash-dotted). The horizontal line (dotted) is the loss with no private information. Parameters: $p = 0.7$, $\varepsilon = 0.3$, and $N = 20$.

- Sincere voting results in larger errors than strategic voting except when the statutory rule equals the optimal rule. In other words, sincere voting is an equilibrium if and only if $\alpha = \alpha^*$ (Austen-Smith and Banks, 1996).
- Strategic voting is always better than decision-making without private information, because each shareholder uses the available information in the same way as the coordinator would, so more information is used without introducing a bias. When the statutory rule approaches unanimity, the probability of error is almost as high with strategic voting as with no private information. The inefficiency of the unanimity rule is the main insight of Feddersen and Pesendorfer (1998).
- Sincere voting can result in larger errors than decision-making without private information because it introduces a bias. For the parameters in Figure 3, sincere voting destroys value when the statutory rule exceeds approximately $\alpha = 2/3$. The reason is that, by the law of large numbers, sincere voting inevitably leads shareholders to always reject the proposal when always accepting it is a better decision rule (for $p > 1/2$).

3. Testing Methodology

Assume the following relation between the observed and the expected proportion in favor:

$$y/N = E(y/N) + \xi, \tag{10}$$

where $E(\xi) = Cov(\pi, \xi) = Cov(\alpha^*, \xi) = 0$ and $Var(\xi) = \sigma^2$. We shall estimate (10) in a cross-section of proposals. Small amounts of noise arise within the theory from the realizations of shareholders' private information. Larger amounts of noise arise from omitted variables, which are always present in field data. Key identifying assumptions are that the model parameters, π and α^*, are uncorrelated with the statutory majority rule, i.e., $Cov(\pi, \alpha) = Cov(\alpha^*, \alpha) = 0$. In Section 6 below, we discuss the possibility that π and α are correlated. Identification of the model also requires exogenous variation in the majority requirement. The assumptions imply a simple regression model from $E\,(y/N) = \gamma_0 + \gamma_1\alpha$ such that

$$y/N = \gamma_0 + \gamma_1\alpha + \beta' X + \xi, \tag{11}$$

where X is a vector of control variables. Combining (7) and (11) and equating corresponding coefficients, we obtain:

$$\begin{aligned} &\gamma_0 = \pi - 2\pi\alpha^*, && \gamma_1 = 2\pi, && \text{if } \alpha < \alpha^*, \\ &\gamma_0 = \pi - 2(1-\pi)\alpha^*, && \gamma_1 = 2(1-\pi), && \text{if } \alpha \geq \alpha^*. \end{aligned} \tag{12}$$

Equations (11) and (12) define a piecewise linear regression with a kink at α^*. For the parameter values in Figure 1, the top expressions of (12) defines the steeper line to the left, where $\alpha < \alpha^*$, and the bottom expressions defines the flatter line to the right, where $\alpha \geq \alpha^*$. Each line in (12) represents a system of two linear equations in two unknowns with unique solutions given by:

$$\begin{array}{lll} \pi = \frac{\gamma_1}{2}, & \alpha^* = \frac{1}{2} - \frac{\gamma_0}{\gamma_1}, & \text{if } \alpha < \alpha^*, \\ \pi = 1 - \frac{\gamma_1}{2}, & \alpha^* = \frac{1-\gamma_0}{\gamma_1} - \frac{1}{2}, & \text{if } \alpha \geq \alpha^*. \end{array} \tag{13}$$

Our strategy is to estimate γ_0 and γ_1 from (11), compute estimates of π and α^* from (13), and perform the following tests based on these estimates:

Test 1. Strategic voting implies that $\gamma_1 > 0$, whereas sincere voting implies $\gamma_1 = 0$. This represents a direct test on the regression parameters.

Test 2. Consider two groups of proposals such that the priors are different, so $p_H > p_L$ and consequently $\pi_H > \pi_L$. Then (5) implies that $\alpha_H^* < \alpha_L^*$. Let the respective slope parameters from regression (11) be γ_{1H} and γ_{1L}. Strategic voting implies that the slope parameters are different:

$$\begin{array}{ll} \gamma_{1H} > \gamma_{1L}, & \text{if } \alpha < \alpha_H^*, \\ \gamma_{1H} < \gamma_{1L}, & \text{if } \alpha > \alpha_L^*. \end{array} \tag{14}$$

This conclusion follows directly from (12).[12] To develop an intuition for this test, consider the second case where $\alpha > \alpha_L^* > \alpha_H^*$ (the second inequality follows from (5)). In this case, the line described by (11) is higher because the number of shareholders passively voting 'yes' is higher (higher intercept), whereas the number of shareholders voting sincerely is correspondingly smaller, which gives rise a smaller slope. Geometrically, the kink in Figure 1 moves up with p, so that the slope to the left of the kink increases in p, whereas it decreases to the right.

Test 3. Strategic voting implies that the pass rate converges to p and becomes independent of α as N increases. Let ν be a noise term. Using probit analysis, we shall estimate the model:

$$Pass = \theta_0 + \theta_1\alpha + \nu, \tag{15}$$

and test whether $\theta_1 = 0$. While this test requires the additional assumption that N is large, this seems defensible in the context of shareholder voting in a widely-held firm. For example, on average across listed stocks, about 200 investment managers are required under SEC rule 13(f) to report their ownership.

[12] The inequality can go both ways in the interval $[\alpha_H^*, \alpha_L^*]$. If $\pi_L > 0.5$, then $1 - \pi_H < 1 - \pi_L < \pi_L$, so $\gamma_{1L} > \gamma_{1H}$. For $\pi_H < 0.5$, the opposite case obtains.

Tests 1 to 3 do not depend on the assumption that error probabilities and payoffs are symmetric across states, but the next two tests do.[13] They are therefore not a test of the theory, but a test of the specific parametrization chosen here.

Test C (cross-coefficient restrictions). The model parameters are confined to the unit interval, $\pi, \alpha^* \in [0, 1]$, and (12) constrains the regression parameters to $\gamma_0 \in [-1, 1]$ and $\gamma_1 \in [0, 2]$. A wide range of values for the regression parameters is consistent with the theory, but once we fix the value for one regression parameter, the permissible range for the other parameter is considerably tighter because (12) imposes the following cross-coefficient restrictions:

$$\begin{aligned} &\gamma_0 - \tfrac{\gamma_1}{2} \leq 0 \leq \gamma_0 + \tfrac{\gamma_1}{2}, && \text{if } \alpha < \alpha^*, \\ &\gamma_0 + \tfrac{\gamma_1}{2} \leq 1 \leq \gamma_0 + \tfrac{3\gamma_1}{2}, && \text{if } \alpha \geq \alpha^*. \end{aligned} \tag{16}$$

Test M (majority rule). We are interested in testing whether the simple majority is optimal, $\alpha^* = 1/2$. From (13), the implied restrictions on the regression parameters equal:

$$\begin{aligned} &\gamma_0 = 0, && \text{if } \alpha < \alpha^* = \tfrac{1}{2}. \\ &\gamma_0 + \gamma_1 = 1, && \text{if } \alpha \geq \alpha^* = \tfrac{1}{2}. \end{aligned} \tag{17}$$

This test is also an implication of symmetry and requires that $p = 1/2$, alternatively that N is large or ε small (see the discussion following Equation (5) above).

4. Institutional Background and Data

4.1 LEGAL BACKGROUND

Several regulatory bodies influence shareholder voting in the United States. First, exchange regulations require that there is an annual general meeting and that shareholders approve equity-based compensation plans and significant stock-for-stock mergers and acquisitions. Second, state laws require that shareholders vote on fundamental corporate changes such as mergers and charter amendments. Firms may choose any quorum and majority rules. Third, some investors are required to vote. Under the Employee Retirement Income Security Act (ERISA) pension funds must vote according to two letters issued in 1988 (Avon Letter) and 1990 (ISSI letter), and an amendment of the Investment Advisers Act (1940) as of 2003 requires that investment advisers vote. Fourth, a provision of the tax code is based on shareholder voting: A corporation may not deduct for federal income tax purposes annual

[13] The proofs for this statement are available in a document with supplemental material, see Footnote 8 above.

compensation in excess of $1 million paid to its officers and directors, unless the compensation is approved by shareholders.

Shareholders can vote in person at the meeting or by mailing back the proxy card or by internet. When shares are registered in street name and the proposal is classified as routine, shareholders can instruct the broker to vote the shares, resulting in a broker vote. Routine proposals include, among others, compensation and recapitalization proposals with low levels of shareholder dilution. All other proposals are non-routine, e.g., restructuring proposals and corporate governance proposals.

Votes can be cast either for or against a proposal, but shareholders can also formally abstain. The proxy statement specifies one of three vote count methods. Let *For*, *Against*, and *Abstain* denote the number of votes cast according to each label, and let *Nonvoted* denote the number of shares that are not voted.

Type I. A proposal passes if there is quorum and

$$\frac{\mathit{For}}{\mathit{For} + \mathit{Against}} > \alpha. \tag{18}$$

Abstentions and non-voted shares do not count.

Type II. A proposal passes if there is quorum and

$$\frac{\mathit{For}}{\mathit{For} + \mathit{Against} + \mathit{Abstain}} > \alpha. \tag{19}$$

Abstentions effectively count as votes against the proposal, but non-voted shares do not count.

Type III. A proposal passes if there is quorum and

$$\frac{\mathit{For}}{\mathit{For} + \mathit{Against} + \mathit{Abstain} + \mathit{Nonvoted}} > \alpha. \tag{20}$$

Abstentions and non-voted shares effectively count as votes against the proposal.

4.2 DATA

The Investor Responsibility Research Center (IRRC) collects voting results from 10-K/10-Q filings for significant management proposals of large U.S. corporations. We use their data for 1994–2003. Each record states the company name, the meeting date, a verbal description of the proposal, the voting results, and the statutory rule. For Type I proposals, they report the percent voted for and against, for Type II and Type III proposals, they also collect the abstentions.

Brickley, Lease, and Smith (1994) and Bethel and Gillan (2002) show that routine proposals receive more votes in their favor than non-routine proposals. We manually

Table I Statutory Rules

The table shows the number of statutory majority rules for 13,405 management proposals.

	50%	55%	60%	67%	70%	75%	80%
Observations	12,895	1	6	417	2	39	45

collect the routine classification variable from the NYSE Weekly Bulletin and the Amex Weekly Bulletin, respectively. Nasdaq does not classify proposals as routine or non-routine, but allows brokers to vote according to the NYSE and Amex regulations. We shall estimate the missing values (see below).

Morgan and Poulsen (2001) and Bethel and Gillan (2002) show that proposals with positive vote recommendations are associated with a five percentage points higher support than proposals with negative vote recommendations. We collect Institutional Shareholder Services (ISS) vote recommendations from Investext.

Brickley, Lease, and Smith (1988), Morgan and Poulsen (2001), and Bethel and Gillan (2002) show that the proportion in favor of management proposals increases with insider ownership. We hand collect insider ownership from electronic proxy statements (Edgar). Electronic proxy statements are sometimes missing, especially at the start of the sample period. When data are missing, we replace the missing value with the observation closest in time (before or after). We define insider voting power as the proportion of the voting rights held by officers and directors and affiliated blocks.

Brickley, Lease, and Smith (1988), Morgan and Poulsen (2001), and Burch, Morgan, and Wolf (2004) show that the number of votes cast in favor of a management proposal increases with firm size. Following the literature, we measure size as the log of market capitalization in million dollars, deflated with the S&P500 index to correct for changes in stock price levels.

The IRRC data set contains 14,548 management proposals with complete voting results data. We exclude management proposals where insider ownership is missing or insiders control more than the proportion α of the voting rights. The final sample consists of 13,405 management proposals put forward at 8,486 shareholder meetings by 2,589 firms. An ISS vote recommendation is available for 7,173 management proposals, which is about half of the final sample.

4.3 DESCRIPTIVE STATISTICS

The distribution of statutory rules can be seen in Table 1. Most proposals are decided by simple majority and only a few by supermajority. Henceforth, we refer to the former as simple-majority proposals and to the latter as supermajority proposals.

Table II Voting Results

The table summarizes the voting results for 13,405 management proposals. Type I: proportion of shares voted for and against. Type II: proportion of shares voted including abstentions. Type III: proportion of shares outstanding.

	All proposals	Type I	Type II	Type III
Proportion voted for	0.828	0.867	0.849	0.742
Proportion voted against	0.120	0.133	0.138	0.069
Proportion abstain	n/a	n/a	0.013	0.007
Proportion non-voted	n/a	n/a	n/a	0.182
Pass rate	0.985	0.995	0.991	0.960
Failed proposals	205	20	58	127
Supermajority	510	19	22	469
Observations	13,405	3,668	6,526	3,211

The voting results are examined in Table 2. The table reports the average proportion voted for and against, abstentions, and non-voted. The table also reports the pass rate, the number of failed proposals, the number of proposals subject to a supermajority rule, and the total number of proposals. Several observations can be made.

Voting outcomes are predictable. The average proportion in favor of a management proposal is 82.8% and the pass rate is 98.5%. Hence, there is almost no uncertainty about voting outcomes and the economic value of proposal screening is not of first-order importance for the average proposal. There are many reasons for this. Managers are hired as experts on running the firm, so one would expect that the average management proposal is good (high p). Also, proposal screening may take place before the meeting, so that mainly high-p proposals are subject to a shareholder vote. In any case, these behaviors do *not* bias our analysis, they only shift the distribution towards high$-p$ proposals.

Turnout is high. Turnout can be inferred from the average proportion of non-voted shares in the fourth row. It is 81.8%. Regulations that require investment managers to vote may contribute to the high shareholder turnout.

Non-voted shares matter. The proportion in favor and the pass rate are similar for proposals of Type I and Type II, because abstentions are generally negligible, but the proportion in favor and the pass rate are significantly smaller for Type III proposals. The 205 failed proposals are examined in further detail in Table 3. The top row shows the number of proposals that fail because more votes are cast against the proposal than in favor of it. The second row shows that one supermajority proposal fails because a sufficient number of votes are cast against to veto the passage of the proposal. Together these 103 proposals fail for reasons accounted for by the strategic voting model. The other 102 proposals in the table fail for reasons outside the theory, which does not model abstentions and voter participation. The

Table III Failed Proposals

The table reports the number of proposals that fail for one of four reasons: The number of votes against exceeds the number of votes in favor, the number of votes in favor exceeds the number of votes against, but the number of votes against is sufficient to veto the proposal, (a) counting no votes only, (b) counting no votes and abstentions as votes against, and (c) counting no votes, abstentions, and non-participation as votes against. Here y/N, n/N, ab/N, and nv/N denote the proportion of votes in favor, against, abstentions, and not voted. Type I: proportion of shares voted for and against. Type II: proportion of shares voted including abstentions. Type III: proportion of shares outstanding.

	All proposals	Type I	Type II	Type III	
				Simple majority	Super majority
Blocking majority $y/N < n/N$	102	20	53	28	1
Blocking minority $y/N \geq n/N$					
(a) with no votes $n/N > 1 - \alpha$	1	0	0	0	1
(b) with abstentions $(n + ab)/N > 1 - \alpha$	7	n/a	5	0	2
(c) with non-participation $(n + ab + nv)/N > 1 - \alpha$	95	n/a	n/a	48	47
Sum failed proposals	205	20	58	127	

seven proposals in the third row fail because abstentions count as votes against the proposal, and the 95 proposals in the fourth row fail because non-voted shares count against the proposal. Hence, shareholder turnout is an important determinant of the passage of Type III proposals.

Summary statistics for subcategories of management proposals are reported in Table 4. The proposals have been sorted into four main categories: compensation (Panel A), recapitalization (Panel B), restructuring (Panel C), and charter amendments (Panel D). Corporate governance proposals to restore shareholder rights (Panel D1) and corporate governance proposals to remove shareholder rights (Panel D2) are separated from other charter amendments. Three facts are apparent from the table. First, compensation proposals dominate (9,604 or 71.6% of all proposals), probably as a result of exchange regulations and tax incentives (see above). Second, supermajority rules are used for all proposal categories, but are most common for corporate governance proposals to restore shareholder rights (Panel D1), because charter rules that entrench management are often supported by supermajority rules. Third, voting outcomes are predictable except for corporate governance proposals (Panels D1 and D2). Strategic voting may make the biggest difference here.

Table 5 shows the impact of broker votes on voting outcomes. The sample is restricted to management proposals by NYSE and Amex firms with known routine classification. It is also restricted to the three main proposal categories with a mix

Table IV Voting Results for Major Proposal Categories

The table summarizes the voting results for 13,405 management proposals. The average proportion voted for, the pass rate, the number of supermajority proposals, and the number of observations. Type I: proportion of shares voted for and against. Type II: proportion of shares voted including abstentions. Type III: proportion of shares outstanding. The table omits 24 proposals, which do not belong to any of the main categories.

	All proposals	Type I	Type II	Type III
A. *Compensation*[a]				
Proportion voted for	0.845	0.860	0.843	0.733
Pass rate	0.992	0.994	0.991	0.994
Supermajority	11	5	3	3
Observations	9,604	3,201	6,045	358
B. *Recapitalization*[b]				
Proportion voted for	0.782	0.883	0.892	0.754
Pass rate	0.980	1.000	0.995	0.976
Supermajority	137	3	8	126
Observations	1,879	202	197	1,480
C. *Restructuring*[c]				
Proportion voted for	0.812	0.964	0.973	0.737
Pass rate	0.997	1.000	1.000	0.995
Supermajority	125	4	1	120
Observations	865	139	142	584
D. *Charter amendments*[d]				
Proportion voted for	0.834	0.963	0.952	0.786
Pass rate	0.991	1.000	1.000	0.987
Supermajority	123	5	6	112
Observations	667	87	102	478
D1. *Restore rights*[e]				
Proportion voted for	0.750	0.958	0.920	0.725
Pass rate	0.851	1.000	1.000	0.832
Supermajority	91	1	3	87
Observations	175	9	11	155
D2. *Remove rights*[f]				
Proportion voted for	0.587	0.768	0.663	0.555
Pass rate	0.694	1.000	0.737	0.649
Supermajority	23	1	1	21
Observations	193	20	19	154

[a] Approve stock option plan, stock award plan, cash bonus plan, employee stock purchase plan, director deferred compensation plan, and director loan plan.
[b] Authorize management to issue stock, preferred stock, debt, and stock split.
[c] Approve merger, acquisition, spinoff, divestiture, restructure to holding company, leveraged buyout, and liquidation.
[d] Approve technical charter amendments, approve board size, change company name, and change state of incorporation.
[e] Declassify the board, remove supermajority lock-in provision, opt out of anti-takeover state law, recapitalize into single-class firm, restore shareholders' advance notice and special meeting rights, adopt cumulative voting, and set director tenure limit.
[f] Classify the board, approve supermajority lock-in provision, poison pill, provision to remove directors for cause only, director liability provision, recapitalize into dual-class firm, remove shareholders' advance notice, special meeting, and preemptive rights, opt into anti-takeover state law, remove cumulative voting, remove director tenure limit, and remove shareholder approval of golden parachute.

Table V Routine Versus Non-Routine Proposals

The table shows the voting results for 8,075 management proposals relating to compensation, recapitalization, and charter amendments (excluding corporate governance proposals) by NYSE and Amex firms with known routine classification. Broker votes are included in the vote counts for routine proposals. Type I: proportion of shares voted for and against. Type II: proportion of shares voted including abstentions. Type III: proportion of shares outstanding.

	Type I		Type II		Type III	
	Routine	Non-Rout.	Routine	Non-Rout.	Routine	Non-Rout.
Proportion voted for	0.898	0.833	0.887	0.811	0.786	0.688
Pass rate	1.000	0.997	1.000	0.992	0.996	0.952
Failed proposals	0	2	1	11	5	20
Observations	1,619	783	2,790	1,337	1,132	414

of routine and non-routine proposals: compensation proposals (Panel A in Table 4 above), recapitalization proposals (Panel B), and charter amendments other than corporate governance proposals (Panel D). We can see in Table 5 that routine proposals receive more votes in their favor than non-routine proposals. On average, broker votes raise the proportion in favor by 6.5% for Type I proposals, 7.6% for Type II proposals, and 9.8% for Type III proposals. If we subtract these averages from the observed proportion in favor of the 5,541 routine proposals in Table 5, we find that the outcome of 85 routine proposals swings from pass to fail. Hence, we concur with Bethel and Gillan (2002) that broker votes may swing the outcome from fail to pass for a significant number of management proposals.

5. Results

5.1 PROPORTION IN FAVOR AND STATUTORY RULE

In this section, we report the results of estimating the regression model (11). The vector of control variables includes insider voting power, firm size, and dummy variables for Type III and routine proposals. Since we want to make inference from the regression intercept, we subtract the sample mean from each control variable. The routine dummy variable is missing for proposals at Nasdaq firms and must be estimated. We classify restructuring proposals and governance proposals as non-routine according to the NYSE and Amex rules. Furthermore, we classify Type III proposals depending on observed turnout: the proposal is routine if turnout exceeds 85% and it is non-routine if turnout is less than 75%. Missing values on the remaining Type III proposals, and Type I and Type II proposals by Nasdaq firms, are replaced by the conditional sample mean for each of the proposal subcategories in Table 4.

The model in Section 2 assumes that shares are voted for or against a proposal and is silent about abstentions and non-voted shares. Therefore, in testing the model, we shall transform the data and define the proportion in favor as:

$$y/N = \frac{For}{For + Against}. \tag{21}$$

The transformation makes no difference for Type I proposals, it makes only a small difference for Type II proposals, but it makes a bigger difference for Type III proposals.

Table 6 reports the coefficients of ordinary least squares (12) and model parameters (13) assuming that $\alpha \geq \alpha^*$. Imputed model parameters for $\alpha < \alpha^*$ are rejected (Test C) and not reported. Robust standard errors are reported below the coefficients. We cannot use panel estimation methods because there is a single observation for 60% of all shareholder meetings and 15% of all firms in our sample. We checked the robustness of our results by using only one observation per meeting or firm, respectively, to be sure our results are not driven by within-meeting or within-firm correlations. The coefficient estimates do not change significantly, but they become less precise as we lose some observations.[14] We also notice that the 510 supermajority proposals are well spread out among 429 shareholder meetings. Since management proposals typically pass, they do not reappear on the agenda next year. We discuss the regression results with respect to the tests in Section 3.

Test 1. The proportion in favor increases significantly with the statutory majority rule. The positive slope coefficient is consistent with strategic voting and inconsistent with all shareholders voting sincerely. The slope coefficient in the regression with all proposals implies that a proposal at $\alpha = 2/3$ obtains 3.7% more votes in favor than a simple-majority proposal.[15] When the supermajority rule is $\alpha = 4/5$, the additional support is 6.6%. These additional votes swing 77 of 510 supermajority proposals from fail to pass. The effect on the pass rate is similar to that of the vote count method and broker votes, so the estimated economic effect of strategic voting is comparable in magnitude to other effects that have been documented on shareholder voting before.

Test 2. Test 2 distinguishes three regions, but only one region is empirically relevant. When $p > 1/2$ and N is large, we have that for all observations $\alpha \geq 1/2$, so

[14] We do not report these results. The estimates are based on regressions, where we first sort the data so that supermajority proposals are selected and simple-majority proposals deleted and then sort the data again so that proposals with ISS vote recommendation are selected and proposals without ISS vote recommendation are deleted. The standard errors increase by approximately 50%-100% if we include only one proposal per firm, and by approximately 25%-50%, if we include only one proposal per shareholder meeting. These increases are not large enough to alter any inference.

[15] We estimate the impact of a supermajority proposal relative to the simple majority requirement from the estimate $\hat{\gamma}_1$ as $\hat{\gamma}_1\,(\alpha - 1/2)$.

Table VI Proportion in Favor and Statutory Rule

Panel A summarizes the results of ordinary least squares regressions of the proportion in favor on the statutory rule, a dummy variable for routine proposals, a dummy variable for Type III proposals, insider voting power, and size. The sample mean has been subtracted from each of the control variables. Robust standard errors are reported below the estimated parameters. Panel B shows imputed model parameters assuming $\alpha \geq \alpha^*$. The standard error of α^* has been computed with the delta method. Panel C. Test 2 is a test of the difference between the slope coefficients when ISS recommends against versus for. Test C is derived from the quantitative parameter restrictions. Test M is test of the optimality of the simple majority rule.

	All proposals	ISS for	ISS against
A. *Regressions*			
Constant	0.763	0.885	0.580
	(0.012)	(0.008)	(0.053)
Majority (α)	0.221	0.075	0.282
	(0.023)	(0.015)	(0.104)
Routine	0.035	0.004	0.049
	(0.002)	(0.002)	(0.007)
Type III	0.049	0.034	0.041
	(0.002)	(0.002)	(0.007)
Insider	0.065	0.102	0.223
	(0.009)	(0.008)	(0.021)
Size	0.009	0.007	0.003
	(0.001)	(0.001)	(0.002)
R^2	0.067	0.093	0.092
Supermajority	510	434	60
Observations	13,405	5,377	1,796
B. *Parameters*			
π	0.890	0.962	0.859
	(0.011)	(0.008)	(0.052)
α^*	0.573	1.030	0.989
	(0.057)	(0.209)	(0.364)
C. *Tests*			
Test 2: $\gamma_{1L} \geq \gamma_{1H}$			0.207
			(0.106)
Test C: $\gamma_0 + \frac{1}{2}\gamma_1 \leq 1$	0.873	0.922	0.721
	(0.001)	(0.001)	(0.003)
Test C: $\gamma_0 + \frac{3}{2}\gamma_1 \geq 1$	1.094	0.998	1.003
	(0.022)	(0.015)	(0.104)
Test M: $\gamma_0 + \gamma_1 = 1$	0.984	0.960	0.862
	(0.011)	(0.008)	(0.052)

Test 2 amounts to testing whether $\gamma_{1H} < \gamma_{1L}$. We proxy for p (respectively, π) based on ISS vote recommendations and treat them as publicly available information and therefore as a proxy for p. Consequently, a positive vote recommendation means that public information is favorable and that π is higher than if the vote recommendation is negative. The difference between the imputed model parameter, $\pi = 0.962$ when ISS recommends for, and $\pi = 0.859$ when ISS recommends against, is consistent with this interpretation. The statistically significant difference between the slope coefficients for the two subsamples is therefore consistent with strategic voting.

Tests C. The tests of restrictions on the regression parameters cannot reject the null that the cross-coefficient restrictions imposed by the model are satisfied. We note that this test follows from the assumption of symmetric signal errors, so this assumption cannot be rejected.

Test M. The sum of coefficients is close to one, which means that the simple majority rule is optimal. The parameter estimate is $\alpha^* = 0.573$ in the full sample and not statistically different from 1/2.

Control variables. Type III proposals attract more votes in their favor than Type I and Type II proposals. This finding provides additional evidence in favor of the strategic voting theory. For Type III proposals the effective majority requirement is higher because in order to meet the hurdle specified in (20) a higher proportion of the votes cast has to be voted in favor. Consistent with previous empirical work cited above, we find that the proportion in favor increases with the routine dummy, insider ownership, and firm size.

Table 7 examines the robustness of the regression results across subsets of the data. We can see that the slope coefficient γ_1 is significantly positive in all subsets with the exception of restructuring proposals, where the average support in favor is close to one. The slope coefficients are significantly positive also in the subsamples with only a few observations at supermajority, because each regression approximates a restricted regression, which forces the regression line through the conditional sample mean at simple majority.

5.2 PASS RATE AND STATUTORY RULE

We estimate a probit model with the dependent variable equal to one if the proposal passes and zero if it fails. In addition to the independent variables used above, we add a dummy variable which equals one when ISS recommends for and zero when ISS recommends against. The ISS vote recommendation enters the probit regression additively because, under the joint hypothesis that shareholders vote strategically (Test 3) and the ISS vote recommendation being a proxy for p, a shift in the prior p affects only the intercept and not the sensitivity to the majority rule, which is zero. Missing values on the ISS vote recommendation are replaced by the unconditional sample mean.

The estimation results are reported in Panel A of Table 8. Column (1) shows results for ordinary probit and column (2) for weighted probit. The weights are $w_\alpha = \sqrt{n_\alpha \times p \times (1-p)}$, where n_α is the number of observations at α and p is the average pass rate for the sample. The weighting procedure assumes that the

Table VII Robustness

Panel A summarizes the results of ordinary least squares regressions of the proportion in favor on the statutory rule, a dummy variable for routine proposals, a dummy variable for Type III proposals, insider voting power, and size measured as the log of market capitalization deflated by 1,000 times the S&P500 index. The sample mean has been subtracted from each of the control variables. Robust standard errors are reported below the estimated parameters. Type I: proportion of shares voted for and against. Type II: proportion of shares voted including abstentions. Type III: proportion of shares outstanding. See Table 4 for definitions of proposal categories. Panel B shows imputed model parameters assuming $\alpha \geq \alpha^*$. The standard error of α^* has been computed with the delta method. Panel C. Test C is derived from the quantitative parameter restrictions. Test M is test of the optimality of the simple majority rule.

	Routine	Non-routine	Type I	Type II	Type III	Compensation	Recapitalization	Restructuring	Charter amendments
A. *Regressions*									
Constant	0.811	0.766	0.649	0.585	0.824	0.745	0.826	0.985	0.807
	(0.012)	(0.018)	(0.045)	(0.040)	(0.013)	(0.038)	(0.020)	(0.012)	(0.020)
Majority (α)	0.178	0.188	0.434	0.546	0.171	0.233	0.134	-0.027	0.241
	(0.024)	(0.034)	(0.091)	(0.079)	(0.024)	(0.075)	(0.037)	(0.024)	(0.039)
Routine	n/a	n/a	0.041	0.056	0.003	0.067	0.012	n/a	0.107
			(0.005)	(0.004)	(0.004)	(0.003)	(0.007)		(0.008)
Type III	0.015	0.063	n/a	n/a	n/a	0.036	0.003	0.002	-0.008
	(0.003)	(0.004)				(0.005)	(0.006)	(0.004)	(0.009)
Insider	0.074	0.035	0.056	0.101	0.015	0.088	0.027	0.038	0.024
	(0.011)	(0.016)	(0.017)	(0.013)	(0.016)	(0.011)	(0.019)	(0.017)	(0.029)
Size	0.005	0.009	0.009	0.011	0.005	0.010	0.005	0.003	0.011
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
R^2	0.024	0.084	0.038	0.051	0.017	0.069	0.011	0.008	0.176
Supermajority	186	302	19	22	469	11	137	125	237
Observations	5,994	3,940	3,668	6,526	3,211	9,604	1,879	865	1,035
B. *Parameters*									
π	0.911	0.906	0.783	0.727	0.914	0.883	0.933	1.013	0.879
	(0.012)	(0.017)	(0.045)	(0.040)	(0.012)	(0.038)	(0.019)	(0.012)	(0.020)
α^*	0.559	0.749	0.309	0.260	0.525	0.591	0.797	-1.042	0.299
	(0.073)	(0.135)	(0.064)	(0.037)	(0.068)	(0.190)	(0.219)	(0.931)	(0.048)
C. *Tests*									
Test C: $\gamma_0 + \frac{1}{2}\gamma_1 \leq 1$	0.900	0.859	0.866	0.858	0.910	0.862	0.893	0.972	0.928
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.004)	(0.003)	(0.005)
Test C: $\gamma_0 + \frac{3}{2}\gamma_1 \geq 1$	1.078	1.047	1.300	1.404	1.081	1.096	1.027	0.945	1.169
	(0.023)	(0.034)	(0.091)	(0.079)	(0.023)	(0.075)	(0.037)	(0.023)	(0.038)
Test M: $\gamma_0 + \gamma_1 = 1$	0.989	0.953	1.083	1.131	0.996	0.979	0.960	0.959	1.048
	(0.012)	(0.017)	(0.045)	(0.039)	(0.011)	(0.037)	(0.019)	(0.012)	(0.019)

Table VIII Pass Rate and Statutory Rule

The table shows the results of regressing the pass/fail dummy variable on the statutory rule, a dummy variable for ISS vote recommendations, a dummy variable for Type III proposals, a dummy variable for routine proposals, insider voting power, and size. Missing values for the ISS dummy, the routine dummy, and insider voting power are replaced by sample means. Panel A reports estimated coefficients and standard errors (below). Panel B reports the elasticity at mean α and the implied change in the pass rate when the statutory rule increases from 1/2 to 2/3. Weighted probit: the weight is the square root of the number of observations at each level of the statutory rule times the sample average pass probability times the failure probability. The weighted failure count is less than the actual count when the weight is low. Sample restriction: weighted probit model without the 45 observations at $\alpha = 4/5$ supermajority. Regression: ordinary least squares estimation using the full sample. The standard errors are heteroscedasticity robust.

	Probit			
	Ordinary (1)	Weighted (2)	Sample $\alpha < 4/5$ (3)	Regression (4)
A. *Coefficients*				
Constant	4.11	3.56	3.13	1.204
	(0.26)	(0.65)	(0.77)	(0.042)
Majority (α)	−4.48	−3.35	−2.50	−0.502
	(0.49)	(1.30)	(1.54)	(0.083)
ISS For	1.09	1.06	1.06	0.048
	(0.08)	(0.07)	(0.09)	(0.005)
Type III	−0.58	−0.60	−0.60	−0.199
	(0.08)	(0.07)	(0.07)	(0.003)
Routine	0.74	0.68	0.67	0.234
	(0.08)	(0.09)	(0.09)	(0.002)
Insider	1.71	2.01	2.00	0.051
	(0.34)	(0.40)	(0.40)	(0.009)
Size	0.18	0.19	0.19	0.005
	(0.02)	(0.02)	(0.02)	(0.001)
Fail	205	165	163	205
Obs	13,405	13,405	13,360	13,405
B. *Significance*				
Elasticity at mean α	−0.0262	−0.0184	−0.0137	−0.2586
$Pass_{2/3} - Pass_{1/2}$	−0.0086	−0.0060	−0.0045	−0.0849

pass rate is estimated less accurately in the tail of the distribution of α where there are fewer observations. In column (3), we report the results of the weighted probit regression without 45 observations with a supermajority requirement of $\alpha = 4/5$. The elimination of these observations is motivated by the discussion of Table 3 above. It shows that approximately half of the rejected proposals fail because non-voted shares count as votes against Type III proposals, and these are concentrated in the tail of the distribution of the statutory rule α. In particular, among the 45 management proposals subject to a $4/5-$supermajority requirement, 26 proposals pass and 19 fail. Moreover, of those that fail as many as 17 would have failed even if *all* participating shareholders would have voted in favor of the proposal. No amount of strategic voting behavior by participating shareholders could have reversed these failures, which are therefore excluded. Finally, for comparison with Brickley, Lease, and Smith (1988) we also report least squares results in column (4).

We can see in Table 8 that the pass rate decreases with the statutory rule. Statistical significance decreases across the three probit models and the coefficient from specification (3) is insignificantly different from zero. This pattern suggests that the negative effect is largely driven by the 45 observations that are excluded in specification (3). Hence, the negative relation between the pass rate and the statutory rule is predominantly a consequence of non-participation. We can also see in Table 8 that the pass rate depends on the explanatory variables in the same way as the proportion in favor in Table 6 and Table 7: the pass rate decreases with the Type III dummy, and it increases with the routine dummy, insider ownership, and firm size.

Panel B of Table 8 reports the elasticity at the means of the independent variables. The magnitude of the probit elasticities is small. The implied pass rate decreases by less than one percent as we move from a simple majority to a two-thirds supermajority requirement. We conclude that the observed negative relation between the pass rate and the statutory rule is predominantly a consequence of non-participation and that the evidence is more in line with the predictions of the strategic voting model than with sincere voting.

6. Relation to the Shareholder Voting Literature

The empirical analysis in our paper has been centered around the correlation between the proportion in favor and the statutory rule. This empirical observation is not a new discovery and other explanations along the management-interest hypothesis in the tradition of Berle and Means (1932) have been offered.

Agenda control. We ignore the process whereby managers select proposals and potentially also time the date when a proposal is put on the agenda. Brickley, Lease, and Smith (1988) and (1994) propose the hypothesis that management screen proposals more carefully when they are subject to a supermajority rule. Therefore, on average, supermajority proposals that appear on the agenda are associated with a higher π than simple-majority proposals. The agenda-control hypothesis offers an explanation for only one of our empirical findings, namely Test 1. By contrast, the strategic voting theory can also explain Test 2, 3, C, and M.

Proxy-solicitation costs. Management spend corporate resources on soliciting proxies from shareholders.[16] The costs cover the printing and mailing of proxy material as well as managerial time and effort. Management may contact large

[16] E.g., Pound (1988), Young, Millar, and Glezen (1993).

shareholders directly and explain why their support for a certain proposal is important. One possibility is that management increase their efforts when a proposal is subject to a supermajority rule. Our data provide a natural experiment to test the higher-effort hypothesis. There are 198 shareholder meetings with simultaneous simple-majority and supermajority proposals. Direct contact with the large shareholders should raise the support for all proposals put forward at the same meeting and not just supermajority proposals. Then, the proportion in favor should not differ between the simple-majority proposals and the supermajority proposals in the matched sample. We randomly select one simple-majority proposal and one supermajority proposal from each of the 198 meetings with at least one proposal of each type. In 138 of the 198 matched proposals or 70% of the time, the supermajority proposal obtains more votes in its favor than the simple-majority proposal. The higher proportion of votes in favor of supermajority proposals is robust in a regression with control variables (not tabulated). We conclude that explanations based on proxy solicitation costs are unlikely to account for our results.

Heterogenous preferences. The voting model assumes that all shareholders have the same monetary payoffs from accepting or rejecting the proposal. However, the recent literature on shareholder voting suggests that shareholders perceive payoffs differently. For example, mutual funds may have business ties with the firms in which they own shares, and public pension funds may have managers with political and social goals.[17] In both cases, their payoffs are different from those of other shareholders. The model can accommodate heterogeneous preferences by assuming that there are two or more classes of shareholders with different payoffs. It can be shown that the qualitative features of the model do not change: the expected voting outcome $E\,(y/N)$ is still positively correlated with the majority requirement, so Test 1 is still valid. However, the functional relationship in Equation (7) becomes more complex and has several points where the slope changes. These points depend on the distribution of votes between management-friendly and independent shareholders. Since we cannot identify the voting rights exercised by shareholders who are friendly to management, we do not attempt to estimate this model.

Pre-play communication. We assume that shareholders cannot communicate all their private information prior to voting. Suppose instead that shareholders can communicate freely and costlessly before the vote in such a way that all information becomes public.[18] In our model this would correspond to the case

[17] See, e.g., Brickley, Lease, and Smith (1988), Woidtke (2002), Davis and Kim (2007).

[18] This is formally equivalent to the introduction of straw polls into the model, see Coughlan (2000) for an analysis of pre-play communication for a similar model. Whether private information can be effectively communicated before the formal vote in a jury setting is the subject of a lively debate. In juries the number of voters is small and extensive deliberations take place before the final vote. See also Feddersen and Pesendorfer (1998), Persico (2004), and Austen-Smith and Feddersen (2006).

where all information is public and therefore incorporated into the prior p, whereas private signals have no information content ($\varepsilon = 0.5$). In this case voting does not aggregate any additional information and $E(y/N)$ becomes unrelated to the majority requirement α. Test 1 rejects this alternative hypothesis, which implies that the slope coefficient γ_1 equals zero.

7. Conclusions

We find that in shareholder voting (1) higher statutory rules are associated with a higher vote cast in favor of the proposal, as predicted by strategic voting theory; (2) controlling for the effect of non-participation, the pass rate is independent of the statutory rule; and (3) imputed model parameters are consistent with the quantitative restrictions of the strategic voting model. We conclude that shareholders vote strategically and that proposal screening increases value. Within the context of our sample, strategic voting makes every voting rule asymptotically efficient irrespective of model parameters. Therefore, supermajority rules are almost as good as simple majority rules which is not the case with sincere voting.

We can rule out that shareholders vote sincerely. This is important because sincere voting can destroy shareholder value. We also argue against the alternative hypotheses that majority rules and voting outcomes are related (1) because managers control the meeting agenda (agenda-control hypothesis), (2) because management invest more in proxy solicitation when majority requirements are higher (higher-effort hypothesis), or (3) because shareholders can effectively communicate their private information prior to voting (pre-play-communication hypothesis). Deemphasizing the first two alternatives is important, because they suggest that management manipulate the shareholder meeting. Instead, we concur with Easterbrook and Fischel (1983) and other advocates of the shareholder-interest hypothesis.

The economic effect of strategic voting can be assessed in terms of the number of supermajority proposals that are swung from fail to pass with the support from strategic votes. The estimated effect is similar in magnitude to that resulting from counting broker votes in favor of routine proposals and the effect from counting non-voted shares as votes against the proposal.

The main limitation of our model is its simplicity. We have imposed a binary signal structure with symmetric payoffs and errors, and we have assumed symmetric voters with homogeneous preferences and who each have one vote. The symmetry assumptions narrow down the number of model parameters to be identified in the data. As a result, we cannot account for different shareholder structures, degrees of ownership concentration, and non-participation. Furthermore, we cannot explain why supermajority rules exist. Supermajority rules make decision-making more conservative, but strategic voting largely neutralizes the desired conservatism. A more realistic model of shareholder voting would account for ownership structure and non-participation and combine heterogeneous preferences with an informational role for voting. Finally, we do not study biases arising from sources other than supermajority rules. For example, if insider shares are committed in favor of management proposals, outside shareholders may compensate for this bias by reducing their support. We leave these issues to future research.

Appendix A: General Results

Derivation of $\boldsymbol{\beta}(\boldsymbol{g}, \boldsymbol{N})$. Denote by $\Pr(g, N|v)$ the probability that g out of N signals are positive conditional on the state of the world v. Then:

$$\begin{aligned}\beta(g, N) &= \frac{\Pr(g, N\,|v = 1)}{\Pr(g, N\,|v = 1) + \Pr(g, N\,|v = -1)}\\ &= \frac{\binom{N}{a} p\,(1-\varepsilon)^g\,\varepsilon^{N-g}}{\binom{N}{a} p\,(1-\varepsilon)^g\,\varepsilon^{N-g} + \binom{N}{N-a}(1-p)\,\varepsilon^g\,(1-\varepsilon)^{N-g}}.\end{aligned} \tag{22}$$

Observe that $\binom{N}{a} = \binom{N}{N-a}$ and simplify to obtain:

$$\beta(g, N) = \frac{p}{p + (1-p)\left(\frac{\varepsilon}{1-\epsilon}\right)^{2g-N}}. \tag{23}$$

Derivation of (5). Recall that a^* is defined from $\beta(a^*, N) \geq 1/2 \geq \beta(a^* - 1, N)$. We simplify by using $\beta(a^*, N) = 1/2$ and rewrite:

$$\frac{p}{1-p} = \left(\frac{1-\varepsilon}{\varepsilon}\right)^{N-2a^*}. \tag{24}$$

Taking logs on both sides and rewriting gives the desired result.

Appendix B: Proof of Proposition 1

We demonstrate the result in four steps. We first analyze the parameter ranges where some shareholders passively vote against. The second step analyzes the parameter ranges where some shareholders passively vote for. Then, we show that these two cases and the case of sincere voting by all shareholders cover all possible cases. These three steps complete the description of equilibrium. Step 4 derives Equation (6).

Step 1: $\boldsymbol{N - k > 1}$ shareholders always vote against. We show that for any proposal and for any majority rule, where the parameters satisfy:

$$\beta(a, N) \leq \tfrac{1}{2} \leq \beta(a, a) \tag{25}$$

there always exists an equilibrium, where k shareholders vote sincerely, $k \geq a$, and the remaining $N - k > 1$ shareholders always vote against.

Consider the k^{th} voter who votes sincerely. She is marginal if $a - 1$ voters who vote sincerely observe good signals and the remaining k–a observe bad signals. Then, sincere voting is a best response if and only if

$$\beta\,(a - 1, k) \leq \tfrac{1}{2} \leq \beta\,(a, k)\,. \tag{26}$$

Now consider one of the other N–k passive voters. This voter is pivotal whenever $a - 1$ voters who vote sincerely observe good signals and the remaining $k + 1 - a$ observe bad signals. Then, voting against even after observing a good signal is a best response if $\beta\,(a, k + 1) \leq 1/2$. This together with condition (26) implies that the proposed equilibrium exists whenever

$$\beta\,(a, k + 1) \leq \tfrac{1}{2} \leq \beta\,(a, k) \tag{27}$$

since $\beta\,(a, k + 1) > \beta\,(a - 1, k)$ from (23). Condition (27) implies that the proposed equilibrium exist for k satisfying the above parameters. Since $\beta\,(a, k)$ increases in a and decreases in k, condition (27) can only be satisfied for some $a < a^*$ if $k < N$, where k is increasing in a. Moreover, any k such that $a \leq k \leq N - 1$ defines an interval, where the proposed equilibrium exists. Since β is decreasing in k, the lowest value β can take is for $k = N - 1$, otherwise the number of shareholders voting against would be zero. Then, beliefs are $\beta\,(a, N - 1)$. Conversely, the highest value beliefs can take is for the lowest value of k, a, then: $\beta = \beta\,(a, a)$. Hence, letting k run from a to $N - 1$ partitions the interval (25) into N–a subintervals, and that value of k for which condition (27) is satisfied defines one of these subintervals uniquely.

Step 2: $N - k > 1$ shareholders always vote for. Next, we show that for any proposal and any majority rule, where the parameters satisfy:

$$\beta\,(0, N - a + 1) \leq \tfrac{1}{2} \leq \beta\,(a - 1, N) \tag{28}$$

there always exists an equilibrium, where k shareholders vote sincerely, where $N - a + 1 \leq k \leq N - 1$.

It is evident that $N - k \leq a - 1$ otherwise the proposal would always be accepted, independently of the information available to all shareholders. Hence, $N - a + 1 \leq k \leq N - 1$. Consider again one of the k sincere voters. This shareholder is pivotal if and only if the other $k - 1$ voters have received exactly $a - 1 - (N - k)$ good signals and N–a bad signals. Hence, the beliefs of the shareholder support her conjectured equilibrium voting strategy if and only if

$$\beta\,(a - (N - k) - 1, k) \leq \tfrac{1}{2} \leq \beta\,(a - (N - k)\,, k)\,. \tag{29}$$

Now consider one of the passive for-voters. She follows her equilibrium strategy only if she rejects the proposal even if she receives adverse information. Whenever she is pivotal, and has observed bad information, she knows $k+1$ signals. Of these, $N-a+1$ are bad and $a-(N-k)$ are good. Hence, her passive voting strategy is optimal if and only if:

$$\beta\left(a-(N-k), k+1\right) \geq \tfrac{1}{2}. \tag{30}$$

Since $\beta(a-(N-k), k) > \beta(a-(N-k), k+1) > \beta(a-(N-k)-1, k)$, conditions (29) and (30) together imply:

$$\beta\left(a-(N-k), k+1\right) \geq \tfrac{1}{2} \geq \beta\left(a-(N-k)-1, k\right). \tag{31}$$

Moreover, for any k such that $N-a+1 \leq k \leq N-1$ the proposed equilibrium exists. Since $\beta\left(a-(N-k), k\right)$ is increasing in a and k, condition (31) can only be satisfied for some $a > a^*$ if $k < N$, where k is decreasing in a. Also, the lowest value β can take is for $k = N-a+1$. Then, beliefs at the lower bound of (31) are $\beta\left(0, N-a+1\right)$. Conversely, for the upper limit of the interval (31), the highest value β can take is the highest of k and $N-1$. Then, $\beta = \beta\left(a-1, N\right)$. Hence, letting k run from $N-a+1$ to $N-1$ partitions the interval (28) into $a-1$ subintervals, and that value of k for which condition (31) is satisfied defines one of these subintervals uniquely. Hence, these conditions define a unique value for k, where the proposed equilibrium exists.

Step 3: Uniqueness. The interval $\beta(a-1, N) \leq 1/2 \leq \beta(a, N)$ together with (25) and (28) cover the interval:

$$\beta\left(0, N-a+1\right) \leq \tfrac{1}{2} \leq \beta\left(a, a\right). \tag{32}$$

We can see that for $a = 1$ the lower bound of (32) is $\beta\left(0, N\right)$, and for $a = N$ the upper bound is $\beta\left(N, N\right)$, hence for any $a \in [1, N]$ there exists an equilibrium with at least one sincere voter.

Finally, we have to show that the equilibria characterized so far are unique, showing that there are no equilibria with k voters who vote sincerely, where l shareholders always vote for and the remaining $N-k-l$ shareholders always vote against. We prove this by contradiction. Every shareholder is pivotal whenever there are $a-1$ for-votes. Shareholders passively voting for are pivotal if sincerely voting shareholders have observed $a-1-(l-1)$ good signals. Hence, a shareholder voting for who has observed a bad signal only votes for if:

$$\beta\left(a-l, k+1\right) \geq \tfrac{1}{2}. \tag{33}$$

Conversely, a shareholder voting against is pivotal if the sincere voters have observed $a-1-l$ good signals, and votes against even though she has observed a favorable signal only if:

$$\beta\left(a-l, k+1\right) \leq \tfrac{1}{2}. \tag{34}$$

Conditions (33) and (34) are consistent only if $\beta(a - l, k + 1) = 1/2$, which is generically not true.

Step 4: Derivation of (6). We proceed as in the derivation of (5) and require that $\beta(a, k) = 1/2$. Then, after solving and taking logs we obtain:

$$a = \frac{k}{2} - \frac{1}{2\ln\frac{1-\varepsilon}{\varepsilon}} \ln\frac{p}{1-p}. \tag{35}$$

Using $a^* = \alpha^* N$ yields:

$$\left|a^* - a\right| = \frac{N-k}{2}.$$

Defining $\kappa = k/N$ gives (6) immediately.

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