# Exit versus Voice

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We study the relative effectiveness of exit (divestment and boycott) and voice (engagement) strategies in a world where companies generate externalities and some agents care about the social impact of their decisions. We show that if the majority of investors are even slightly socially responsible, voice achieves the socially optimal outcome. In contrast, exit does not unless everybody is significantly socially responsible. If the majority of investors are purely selfish, exit is a more effective strategy, but neither strategy generally achieves the first best. We also show that exit can sometimes reduce social welfare.

## I. Introduction

In recent years, companies have come under increasing stakeholder pressure to pursue environmental and social goals. In 2019, US$20.6 billion

We thank Anat Admati, Philippe Aghion, Lucian Bebchuk, Tim Besley, Patrick Bolton, John Campbell, Mathias Dewatripont, Alex Edmans, Tore Ellingsen, Jeffrey Gordon, Daniel Green, Elhanan Helpman, Bengt Holmstrom, Harrison Hong, Robert Hughes, Louis Kaplow, Divya Kirti, Augustin Landier, Christian Leuz, Eric Maskin, Joe Ostroy, Ellen

Electronically published October 28, 2022

*Journal of Political Economy*, volume 130, number 12, December 2022.

https://doi.org/10.1086/720516

flowed to funds that explicitly exclude "nonsustainable" companies, more than 10 times the level a decade earlier (CB Insights 2020). A 2020 survey suggests that 38% of Americans are boycotting at least one company, up from 26% only the year before.[1] In the 2021 proxy season, 20% of environmental and social shareholder proposals received majority support, compared with only 3% in 2016.[2]

At the same time, a growing academic literature has argued that the usual presumption that firms should maximize profit or market value is not valid in a world where, as result of political failures at either the national or international level, externalities are not well controlled.[3] In particular, Hart and Zingales (2017) show that, to the extent that a firm has a comparative advantage relative to individuals in producing a public good (or avoiding a public bad), a firm's shareholders may wish it to pursue some social goals at the expense of profit. Consumers and workers may also be willing to pay a price for a firm to act in a socially responsible way.

In this paper, we analyze theoretically whether pressure by stakeholders—consumers, workers, and shareholders—is likely to achieve a socially desirable outcome.[4] For concreteness, we focus on the case of environmental harm caused by pollution. Using Hirschman's (1970) terminology, we can describe stakeholders' choices as exit versus voice. Investors or consumers can exercise their exit option by divesting from polluting companies or boycotting their products; alternatively, investors can use

Quigley, Ben Roth, Martin Schmalz, Klaus Schmidt, Dirk Schoenmaker, Ilya Segal, Holger Spamann, Yossi Spiegel, Kathy Spier, Laura Starks, David Thesmar, Stefano Zamagni, Joseph Zechner, Xingtan Zhang; seminar participants at Harvard, the Massachusetts Institute of Technology, the National Bureau of Economic Research, University of Chicago, Indiana University, University of Colorado Boulder, the City University of New York, Boston University, Cambridge Judge Business School, École des hautes études commerciales de Paris (HEC), University of Zurich, and Vienna University of Economics and Business; the ESSO (Economics of Social Sector Organisations), FOM (Finance, Organizations and Markets), ECGI (European Corporate Governance Institute), Stony Brook International Game Theory, Games 2020.1, and 2021 ALEA (American Law and Economics Association) conferences; and the editor and two anonymous referees for their very useful comments. Eleonora Broccardo gratefully acknowledges financial support from the Department of Economics and Management at the University of Trento. Oliver Hart gratefully acknowledges financial support from the Harvard-Radcliffe Institute. Luigi Zingales gratefully acknowledges financial support from the Stigler Center at the University of Chicago. This paper was edited by Emir Kamenica.

[1] https://www.comparecards.com/blog/38-percent-boycotting-companies-political-pandemic-reasons/.

[2] https://www.ey.com/en_us/board-matters/esg-developments-in-the-2021-proxy-season.

[3] See, e.g., Elhauge (2005), Graff Zivin and Small (2005), Baron (2007), Henderson and Malani (2009), Benabou and Tirole (2010), Stout (2012), Magill, Quinzii, and Rochet (2015), Hart and Zingales (2017), Mayer (2018), Morgan and Tumlinson (2019), Schoenmaker and Schramade (2019), and Edmans (2020).

[4] Our approach should not be confused with what Bebchuk and Tallarita (2022) call "stakeholderism." Stakeholderism refers to a situation where, in making business decisions, corporate leaders take into account the well-being of stakeholders (rather than just shareholders). In contrast, we are interested in analyzing how various stakeholders (including shareholders) can persuade companies to act in a more socially responsible manner.

their voice by voting or engaging with management.[5] (We focus on consumer boycotts but argue that worker boycotts are conceptually similar.)

We consider a situation where the harm from a polluting firm is spread globally over many individuals in such a way that no single person is significantly affected. Under standard assumptions that agents are purely selfish, we are faced with a severe free rider problem: no one will act to reduce the harm. To explain social action, we assume—consistent with empirical evidence—that some investors and consumers are socially responsible in the sense that, when they make a decision, they put a positive weight $\lambda$ on the well-being of others affected by the decision. Thus, the decision to boycott, divest, or engage is not based on purely deontological considerations but on the consequences that these actions have (hence, we call such agents consequentialists).[6]

In our model, each firm can choose to be clean or dirty. A dirty firm produces environmental damage equal to $h$.[7] A firm can avoid this damage by incurring a fixed cost $\delta$ and becoming clean. Given our simple setup, it is socially desirable for a firm to become clean if and only if $h > \delta$.

We start by computing a competitive free entry equilibrium of this economy in the absence of any environmental concerns. We then study how the equilibrium changes when environmental concerns become an issue, depending on the strategy adopted by socially responsible stakeholders.

We first consider the voice strategy. Shareholders are in a unique position to exercise voice because they have voting rights. As a starting point, we abstract from any existing corporate governance rules and assume shareholders are presented with a binding vote on whether the firm they invest in should be clean or dirty. We assume that each shareholder votes their preferred outcome. A shareholder trades off their personal capital loss resulting from the choice of the clean technology against the net social benefit from that technology, weighted by the shareholder's social parameter $\lambda$. If shareholders are well diversified, the personal capital loss is negligible. The net social benefit equals the reduced pollution minus the cost of generating that reduction. Thus, as long as $\lambda$ is positive, the second effect dominates,

[5] We focus on voice by investors because shareholders have voting rights. Other stakeholders may exercise voice in other ways, e.g., workers or customers can complain. We do not consider other forms of voice in this paper, but see Gans, Goldfarb, and Lederman (2021).

[6] Our approach differs from the universal ownership literature (see Quigley 2019; Gordon 2021). That literature argues that the externalities produced by one firm affect the profitability of other firms, so that even a purely selfish well-diversified investor will internalize some of these externalities in their decisions. While not denying this, we are interested in externalities that affect noninvestors as well as investors. To analyze these, we ignore interdependency among firms and focus on social responsibility as a driver of decisions.

[7] In this paper, we assume $h$ to be known by everybody. If we maintained the standard common knowledge assumption but introduced uncertainty, we would add an interesting risk-management problem, analyzed by Andersson, Bolton, and Samama (2016).

and socially responsible shareholders vote in line with a benevolent planner's goal.

This result continues to hold if shareholders vote simultaneously on whether *all* the firms they own should be clean or dirty.[8] Now the personal capital loss is no longer negligible—it is scaled up by the number of firms each shareholder owns—but the social benefit from multiple clean technologies is also scaled up. Thus, the trade-off does not change, as long as the marginal utility an agent receives from wealth and from social benefits is constant.

The conclusion is that, if the majority of agents are even slightly socially responsible, shareholder voice achieves the benevolent planner's solution. When the majority of agents have a $\lambda$ equal to zero, however, a voice strategy has no impact in reducing pollution.

In practice, putting proposals up for a proxy vote is expensive, and it will not be in the interest of atomistic investors to incur the cost of doing so. We argue that mutual funds can use engagement as a marketing strategy and that socially responsible agents will be willing to invest in a green fund that is committed to promoting an environmental agenda.

We then move to analyze two different exit strategies: divestment and boycotts. Both these strategies work by lowering the market value of a dirty firm, inducing some value-maximizing managers to switch to the clean technology.[9] However, as shown by Heinkel, Kraus, and Zechner (2001) for divestment, this effect is attenuated, given that selfish agents partially offset the effects of divestment/boycotting via their increased investment/purchases in companies shunned by socially responsible agents.[10] The magnitude of the response depends on the slope of the demand curve for shares or goods, which is driven by agents' risk tolerance, in the case of shares, and by the marginal utility of consumption, in the case of goods.[11]

When we consider the incentive to participate in an exit strategy, we find that only those agents with a social responsibility parameter $\lambda$ above a cutoff will choose to exit (this cutoff depends on what others are doing). It

[8] A simultaneous vote might represent the case where an investor holds shares via a mutual fund and conveys their strategy for voting on all proposals to the mutual fund.

[9] For divestment to have any effect, the demand for shares must be downward sloping (for empirical evidence that this is the case, see Shleifer 1986). Indeed, Lindset and Nguyen (2020) show that when a large socially responsible investor announces divestment from a targeted set of companies, the stock prices of the targeted companies drop, albeit only by a little.

[10] As an example of this, the *Financial Times* reports that hedge funds are scooping up shares of oil companies dumped by socially responsible divestors (https://www.ft.com/content/ed11c971-be02-47dc-875b-90762b35080e).

[11] In practice, the effect of divestment may vary by asset class. According to a review of the literature, there appears to be little to no effect on prices of publicly traded stocks due to divestment or exclusion other than in the very short term, whereas exit in other asset classes can affect valuations and the cost of capital (Quigley, Bugden, and Odgers 2020, app. IV).

turns out that, if the most socially responsible investors (consumers) are not willing to pay for most of the cost of cleanup by themselves, the *only* equilibrium is where nobody divests (boycotts), and no firms become clean. When the most socially responsible shareholders are willing to pay most of the cleanup cost, there is a possibility of a nonzero divestment (boycotting) equilibrium, but unless everybody is significantly socially responsible, no divestment (boycotting) equilibrium can achieve the social optimum if $h > \delta$.

Interestingly, the possibility of a nonzero divestment (boycotting) equilibrium exists even when switching to a clean technology is socially inefficient ($h < \delta$), because there is no simple relationship between the individual incentive to participate and the social incentive to create clean firms. Thus, exit can reduce social welfare.

We carry out our analysis under the assumption that exit decisions are common knowledge and that agents can commit to them. As we explain in section VII, in the absence of this assumption, both exit strategies become even less effective.

There is a vast literature on socially responsible investment (SRI). Benabou and Tirole (2010), Kitzmueller and Shimshack (2012), and Christensen, Hail, and Leuz (2019) provide very useful overviews. On the divestment side, the first formal model is by Heinkel, Kraus, and Zechner (2001). Our model of divestment is similar to theirs but with the difference that they take as given that socially responsible investors refuse to hold shares of dirty companies, whereas we suppose that socially responsible investors make the divestment decision based on the impact this decision has. Also our model incorporates boycotts and voice as well as divestment. Pástor, Stambaugh, and Taylor (2021) extend the Heinkel, Kraus, and Zechner (2001) model to derive an ESG (environmental, social, and governance) factor in an equilibrium asset-pricing model when investors have a taste for ESG (for another paper along similar lines, see Pedersen, Fitzgibbons, and Pomorski 2021). They do endogenize the divestment decision but under the assumption that investors are purely selfish.[12] Graff Zivin and Small (2005) and Morgan and Tumlinson (2019) suppose that investors value public goods and pay more for the shares of firms that bundle private and public goods; see also Bonnefon et al. (2019) and Aghion et al. (2020). However, each investor is selfish in that he values his consumption of the public good and not the utility from the public good accruing to others. Baron (2007), Chowdhry, Davies, and Waters (2019), and Gollier and Pouget (2022) consider the impact of divestment but for the case of large as opposed to atomistic investors. Landier and Lovo (2020) study the social welfare effect of selected investment by an ESG fund that has

[12] Admati and Pfleiderer (2009) consider a model where the threat by a large, privately informed shareholder to divest can put pressure on management to adopt a value-maximizing strategy, under the assumption that investors are purely selfish.

some market power, while Green and Roth (2020) and Oehmke and Opp (2022) analyze optimal investment choices for large socially responsible investors who fund wealth-constrained entrepreneurs, exploring the complementarities between the actions of social investors and those of selfish investors.

There is also a smaller literature on consumer boycotting (for a survey, see Kitzmueller and Shimshack 2012). Boycotts can be seen as a way to redistribute surplus (see Baron 2001) or as a way to induce companies to provide a public good (see Bagnoli and Watts 2003; Besley and Ghatak 2007). In Bagnoli and Watts (2003) and Besley and Ghatak (2007), each consumer is selfish in that he values his consumption of the public good and not the utility from the public good accruing to others.

There is also a vast literature on corporate social responsibility. This literature argues that companies can or should have a purpose beyond profit or value maximization, including to act in a socially responsible manner (e.g., Stout 2012; Magill, Quinzii, and Rochet 2015; Mayer 2018; Schoenmaker and Schramade 2019; Edmans 2020). In contrast, we assume that some individuals are socially responsible and derive the consequences for corporate behavior, depending on the tools these socially responsible individuals have at their disposal.

The rest of the paper proceeds as follows. Section II describes our assumption on socially responsible investors and consumers. Section III presents the framework. Section IV analyzes the voice strategy, section V the divestment strategy, and section VI the boycott one. Section VII includes discussion and qualifications. Section VIII concludes.

## II. Socially Responsible Investors and Consumers

Responsible investing dates back at least as far as 1758, when the Philadelphia Yearly Meeting of the Society of Friends required its members to cease and desist from slaveholding (Brown 1988). Consumer boycotting can be traced back even further to the Jain religion, whose diet forbids the consumption of not only products obtained from dead animals but also roots and tubers because they involve the uprooting (and thus eventual killing) of a plant (Laidlaw 1995). The rejection of slavery by the Quakers—as was that of roots and tubers and products obtained from dead animals by the Jains—was on deontological grounds and thus did not lend itself to any economic calculus.[13] This original perspective survives in much of the contemporary socially responsible investment literature. From Heinkel, Kraus,

[13] In the *Wealth of Nations*, Adam Smith expressed skepticism that the Quakers would have voted to free their slaves if they had many slaves. But, according to Pack and Dimand (1996), “The Quakers of Philadelphia did make a substantial financial sacrifice when they freed their slaves” (268).

and Zechner (2001) to Hong and Kacperczyk (2009), the early literature assumes that some investors simply do not want to own certain kinds of stocks. Such an approach is appropriate for "sinful" products, such as tobacco, alcohol, or prostitution, but applies less well to social concerns with less of a moral nature. Most investors are not morally against companies that emit $CO_2$, they would just like these companies to emit less of it. When Trinity Church tried to block the sale of automatic weapons' magazines at Walmart (discussed in Hart and Zingales 2017), it was not morally against Walmart, it simply wanted Walmart not to facilitate mass shootings, and so on.

Some of the literature on socially responsible investment and consumption departs from the purely deontological view. For example, Bagnoli and Watts (2003), Graff Zivin and Small (2005), Besley and Ghatak (2007), and Morgan and Tumlinson (2019) endogenize investor and consumer choice by assuming that an individual will value a share or good based on a combination of its private characteristics and the increased harm resulting from production. However, these authors assume that individuals consider only the personal disutility of the increased harm, ignoring the impact on others. As a result, in a large economy, there will be an extreme free rider problem, leading to a large deviation between private and social optimality. Sugden (1982) convincingly argues that such a model is inconsistent with the evidence on charitable contributions. One way to mitigate the free rider problem is to introduce a "warm glow" effect, along the lines of Andreoni (1989).[14] In a sense, this is what Pástor, Stambaugh, and Taylor (2021) do in assuming an individual taste for green investment. However, in Pástor, Stambaugh, and Taylor's approach, investors ignore their impact on others. For a recent paper in which moral individuals take into account their impact on others and act as consequentialists, see Schmidt and Herweg (2021).

In our model, socially responsible individuals are altruistic in the sense that they put some weight on the utility of others. This assumption is uncontroversial for foundations that have an explicit social goal, such as the Rockefeller Brothers Fund. Yet there is growing evidence in support of this assumption for individual agents as well: see Andreoni and Miller (2002), Charness and Rabin (2002), Riedl and Smeets (2017), Brodback, Guenster, and Mezger (2019), and Bauer, Ruof, and Smeets (2021).[15] We adopt Hart and Zingales's (2017) formulation: we assume that, in making

[14] Another way is to introduce reciprocal behavior along the lines of Sugden (1984).

[15] Andreoni and Miller (2002) and Charness and Rabin (2002) find support for such preferences in lab experiments. A preference for socially responsible investment has also been found in field experiments in situations where this preference yields lower expected returns (Riedl and Smeets 2017; Bauer, Ruof, and Smeets 2021). This preference is positively correlated with the degree of altruism (Brodback et al. 2019). Such a preference is also consistent with the lower return of impact funds (Barber, Morse, and Yasuda 2021).

a decision, an individual puts weight $\lambda \in [0, 1]$ on the welfare of others affected by the decision, where $\lambda$ reflects their degree of social responsibility.[16] Consider, for example, the decision of a doctor to get vaccinated against COVID-19 at the beginning of the vaccination campaign, when nobody else was vaccinated. This decision has a private benefit (a reduction in the chance of becoming infected and possibly dying) but also a social one: a reduction in the probability of infecting other people, who might also die as a result. If we assume that the expected private benefit equals 20 and that, on average, one unvaccinated person infects five others, the expected benefit from vaccination for a socially responsible individual equals $20 + \lambda\,(100)$. If the cost of vaccination is below 20, everybody will get vaccinated, regardless of their degree of social responsibility. But if the cost of vaccination equals 30, only the more socially responsible people ($\lambda > 0.1$) will decide to get vaccinated.

As did Hart and Zingales (2017), we assume that the socially responsible component enters at the time a decision is made but not after the decision is made.[17] Assuming otherwise would lead to the paradoxical result that a pandemic raises people's utility. To appreciate this point, go back to the vaccine example and suppose that the cost of vaccination equals 30 and $\lambda = 0.5$. An individual with such a high $\lambda$ will get vaccinated, since $-10 + 0.5(100) = 40 > 0$. Yet it is unreasonable to think that 40 is their final utility, because they would then be better off as a result of the pandemic. By contrast, if we assume (as we do here) that the social responsibility component of utility plays a role only in the decision-making process but does not enter final utility, then the final utility of the individual is $-10$, and thus the pandemic reduces their utility.[18]

One interesting question regards how broad is the group of people whose welfare enters a socially responsible individual's calculations: Does it include people in one's neighborhood, the whole town, the whole country, or the whole world? The answer depends on the socially responsible perspective of an individual and what they consider to be their relevant community. In this paper, we assume that the community includes everyone

[16] We suppose that the effect is linear, i.e., the impact on others is multiplied by $\lambda$. For some experimental evidence that the effect may be nonlinear, see Heeb et al. (forthcoming). For formulations similar to ours, see Besley and Ghatak (2018), Frydlinger and Hart (2019), and Acquatella (2020). In contrast to Hart and Zingales (2017), we do not assume that an agent acts altruistically only when they feel responsible for a situation that has arisen, and we drop the (ad hoc) assumption that the impact on others is weighted by an investor's shareholding.

[17] Frydlinger and Hart (2019) and Acquatella (2020) make a similar assumption.

[18] Our approach has a connection to Becker and Murphy (1993), where advertising changes the marginal utility of a decision. Here moral considerations change the marginal utility of a decision. The only place in the analysis where including the socially responsible component in the final utility might change the results is in the calculation of the benevolent planner's solution in sec. III.D.

affected by the pollution. In the case of greenhouse gas emissions, this means more or less everyone. We return to this issue in section VII.I.

## III. The Economy

### A. *The Case Where Pollution Is Not a Problem*

Consider a three-date economy, as shown in figure 1. There are three distinct groups: entrepreneurs, investors, and consumers. At date 0, entrepreneurs can set up firms at a fixed cost $F$; they have zero initial wealth and care only about date 0 money. Entrepreneurs finance the fixed cost by selling shares to investors. They put managers on an incentive scheme so that they will maximize market value in future periods (we return to this below). Investors care only about date 2 return. Production decisions are made at date 1, and production and consumption take place at date 2. Investors and consumers are socially responsible, but this does not affect the equilibrium in this subsection since at date 0, pollution is not yet an issue (and is not expected to be an issue).

Each firm has a capacity constraint equal to one. There is an additional marginal cost of production $C$, incurred at date 2. The expected value of $C$ is zero, but $C$ is uncertain. We suppose

$$C = \varepsilon, \tag{1}$$

where $\varepsilon$ is an aggregate shock, realized at date 2, which is normally distributed with mean zero and variance $\sigma^2$.[19] There is symmetric information throughout. We assume that the shock is an aggregate one so that the limited risk-bearing capacity of investors plays a role.

We will study a competitive free-entry equilibrium. In the basic economy, we normalize the number of investors and the number of consumers each to be one (there is an unlimited number of entrepreneurs). Of course, a one-investor, one-consumer economy is not competitive. Therefore, in order to make the economy competitive, we will replicate it and take limits, as described below.

The investor has an exponential utility function

$$U = -e^{-\gamma\omega}, \tag{2}$$

where $\omega$ is their final wealth. The investor holds the shares until date 2, when output is sold and profit is realized. However, at date 1, there is an opportunity for portfolio rebalancing.

The product market consists of a homogenous good. The consumer's utility function is

[19] An alternative interpretation of a negative cost is that there is a positive shock to revenue.

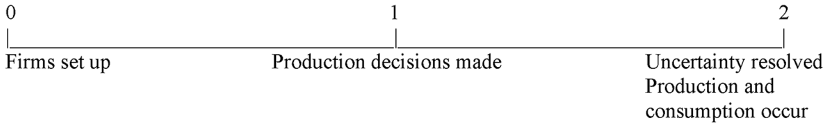


Fig. 1.—Time line.

$$U = \rho q - \frac{1}{2}\tau q^2 - pq, \tag{3}$$

where the third term is the cost of buying $q$ units of the good at price $p$. The maximization of this utility leads to the following demand curve,

$$p = \rho - \tau q, \qquad q = \frac{\rho - p}{\tau}. \tag{4}$$

Output is sold in a competitive market at date 2. At date 1, each firm decides to produce up to its capacity constraint of one since price exceeds the expected value of $C$, which is zero. Thus, total supply equals $N$, where $N$ is the number of firms set up at date 0, and equilibrium in the date 2 goods market is given by

$$N = \frac{\rho - p}{\tau}. \tag{5}$$

Each firm's date 2 profit is

$$\tilde{\Pi} = p - \varepsilon = \rho - \tau N - \varepsilon, \tag{6}$$

and expected profit is

$$\Pi = \rho - \tau N. \tag{7}$$

Consider the investor's date 0 portfolio decision. Assume that the investor can borrow and lend at a zero rate of interest. In a free-entry equilibrium, the market value of each firm at date 0 must be $F$, since otherwise firms would enter or exit. The total return for the investor at date 2 is therefore $x\tilde{\Pi} - xF$, where $x$ is their investment level (the number of firms they buy), and we normalize the investor's initial wealth to be zero. This return has a certainty equivalent equal to

$$\mathrm{CE} = x(\Pi - F) - \frac{1}{2}\gamma x^2\sigma^2. \tag{8}$$

The investor's demand for shares at date 0 will be given by the $x$ that maximizes this certainty equivalent. Thus,

$$x = \frac{\Pi - F}{\gamma\sigma^2}. \tag{9}$$

Equation (9) provides the total demand for firms' shares. The total supply equals $N$. Hence, for the stock market to clear at date 0, we must have

$$\frac{\Pi - F}{\gamma\sigma^2} = N. \tag{10}$$

Using (7), we obtain

$$N = \frac{\rho - F}{\gamma\sigma^2 + \tau}. \tag{11}$$

This is the equilibrium number of firms that will set up at date 0.[20] From now on, we assume $\rho > F$, so $N > 0$. For future reference, it is useful to derive the formula for the certainty equivalent at the optimal investment level $x$. This is obtained by substituting (9) into (8):

$$\mathrm{CE} = \frac{1}{2}\frac{(\Pi - F)^2}{\gamma\sigma^2} = \frac{1}{2}\frac{(\rho - \tau N - F)^2}{\gamma\sigma^2}. \tag{12}$$

### *B. Replica Economy*

The economy as it stands is not competitive. To make it so, we replicate the investor and consumer sectors $r$ times and take limits as $r \to \infty$. In the replica economy, there are $r$ investors with the above investor preferences and $r$ consumers with the above consumer preferences. It is easy to see that the equilibrium number of firms will be $Nr$, where $N$ is given by (11). For large $r$, each investor, consumer, and firm is small relative to the aggregate economy and so has little influence on market prices. In other words, for large $r$, the economy is approximately perfectly competitive, and in the limit $r = \infty$, it is perfectly competitive.[21]

In the equilibrium of the basic economy, the single investor holds 100% of each of the $N$ firms. In the replica economy, we assume that each of the $r$ investors holds $1/r$ of each of the $Nr$ firms; that is, each investor is fully diversified.[22]

In what follows, we will have the replica or limit economy in mind, even though we will not always be explicit about it. When we study the

[20] We ignore the fact that the solution to (11) may not be an integer. This will become unimportant in the limit economy described below.

[21] For details, see, e.g., Mas-Colell, Whinston, and Green (1995).

[22] This assumption makes sense if the shock hitting each firm's marginal cost at date 2 has an idiosyncratic component as well as the aggregate one.

effects of individual divestment, boycott, and engagement decisions, the replica economy will be particularly important.

### C. *Pollution Becomes a Problem at Date 1*

Suppose that at date 1, pollution becomes a problem (to emphasize, this eventuality is unanticipated at date 0).[23] Operating with the existing technology (which we will now label dirty), each firm produces harm $h > 0$ to the environment at date 2. We assume that the total harm from a single firm stays the same as the economy is replicated (replication simply makes the economy more competitive). We also suppose that each firm's harm is spread globally in such a way that the direct effect on any investor or consumer can be ignored.[24] Finally, we assume that $h$ is common knowledge.

A firm can avoid polluting by incurring an additional fixed cost $\delta$ at date 1; this fixed cost comes out of date 2 profits. We call the firms that decide to pay this cost "clean." Thus, the cost of a clean firm is

$$C^{\mathrm{C}} = \delta + \varepsilon, \tag{13}$$

while the cost of a dirty firm is as before

$$C^{\mathrm{D}} = \varepsilon. \tag{14}$$

We assume that

$$\delta < F, \tag{15}$$

which ensures that a firm prefers to install the clean technology rather than closing down.

If all investors and consumers are purely selfish, the existence of pollution will not change any production or investment decision significantly. The reason is that, since the direct pollution impact of any production and investment decision is negligible, nobody internalizes the pollution externalities (as described by Pástor, Stambaugh, and Taylor 2021). As we will see shortly, this is not the case when people are socially responsible. In this case, the outcome depends on the strategy adopted by socially

[23] We consider a rational expectations equilibrium in sec. VII.

[24] As an example, suppose that the harm is the result of the plastic packaging of a firm's output ending up in landfills. Imagine that the basic economy ($r = 1$) is an island that contains, in addition to one investor and one consumer, $s$ agents (who do not invest or consume) and that the harm is spread equally across all participants, so that each suffers a fraction $1/(2 + s)$ of the total. For large $s$, the direct harm experienced by any investor or consumer can be ignored. Now suppose that in the replica economy, there are $r$ such islands that trade with one another, so that each firm's plastic packaging ends up equally on all islands. Then the harm is spread globally, and the total damage from each polluting firm is independent of $r$.

responsible investors and consumers. Before analyzing this, however, we need to consider what a benevolent planner would do so that we have an appropriate benchmark.

### *D. Benevolent Planner's Response to Environmental Damage*

As a benchmark, we derive a benevolent planner's solution in a world where all investors and consumers are purely selfish.[25] The number of firms $N$ that entrepreneurs have set up at date 0 is given at date 1. However, a benevolent planner can dictate what technology—clean or dirty—each firm should adopt at date 1; that is, they can choose the proportion of clean firms $\phi = n_c/N$. Assume that this is the only instrument at the planner's disposal. That is, the planner chooses $\phi$ and then lets the date 1 stock market and the date 2 product market clear. The question is at what level will they set $\phi$.

We suppose that the planner's objective is to maximize the sum of investor and consumer surplus, net of the harm imposed by pollution. In appendix A, we show that the solution is very simple. If $h > \delta$, that is, if the cost of avoiding pollution is less than the cost of pollution itself, the planner will want all firms to use the clean technology ($\phi = 1$), while if $h < \delta$, that is, if the cost of avoiding pollution is greater than the cost of polluting, the planner will want all firms to remain dirty ($\phi = 0$).

## IV. Voice

We now analyze what happens when there is no planner (or government) and social action is left to individual investors or consumers. As in section II, we assume that, in making a decision, an individual puts weight $\lambda \in [0, 1]$ on the welfare of those affected by the decision, where $\lambda$ reflects their degree of social responsibility. For simplicity, we suppose that the distribution of $\lambda$ in the population is the same for investors and consumers. The distribution has finite support $\{\lambda_1,..\lambda_m\}$, where $\lambda_{\min} \equiv \lambda_1 < \ldots < \lambda_m \equiv \lambda_{\max}$, with associated strictly positive probabilities $\pi_1, \ldots,$ $\pi_m$.[26] (Here $\lambda_{\min}$ could be zero.)

We will study equilibrium in the limit economy where $r = \infty$, but in order to analyze individual decisions, we will take limits as $r \to \infty$. We

[25] The solution is the same under the assumption that investors and consumers are socially responsible, but the socially responsible component does not enter their final utility. See the discussion in sec. II.

[26] To avoid the replica economy being stochastic, the reader can imagine that each $\lambda$ type is represented in the replica economy exactly according to its frequency. For example, suppose that $m = 2$, $\pi_1 = 0.1$, and $\pi_2 = 0.9$. Then when $r = 10$, there will be one consumer of type 1 and nine of type 2. One can then consider replicas where $r = 20, 30, 40$, etc.

start with voice strategies. We focus on the unique ability shareholders have to exercise voice using their voting rights. To build intuition and provide another useful benchmark, we consider first the case where investors are not diversified at all. Specifically, suppose that each investor holds 100% of $N$ firms in the replica economy (rather than $1/r$ of $Nr$ firms). Suppose that, as a 100% owner, the investor can use their voice to determine what these firms do at date 1. Will the investor want their firms to be clean or dirty?

To answer this question, we consider the investor's return under the two strategies: investor's date 2 return if all firms they own are dirty $= N(\rho - \tau N - \varepsilon) - NF$, and investor's date 2 return if all firms they own are clean $= N(\rho - \tau N - \delta - \varepsilon) - NF$.

It follows that the investor loses $N\delta$ if they make their firms clean. They put 100% weight on this personal loss. Their decision has no effect on other investors or consumers (clean firms still supply one unit at date 2, and so the goods price does not change). But the environmental gain is $Nh$, which the investor weights by their social responsibility parameter $\lambda$. So the investor will choose clean if and only if

$$\lambda N h > N\delta \Leftrightarrow \lambda h > \delta. \tag{16}$$

We turn now to the more interesting case where investors are fully diversified. For the moment, we abstract from any existing corporate governance rules and assume shareholders are presented with a binding vote on whether a firm they invest in should be clean or dirty (we consider institutional frictions later). As in Hart and Zingales (2017), we assume that shareholders will vote as if they were pivotal since this is the only case where their vote matters; in other words, they vote the outcome they would like to occur. We assume that all investors continue to buy dirty as well as clean firms. To put it another way, they do not both engage and divest. For the moment, we also ignore consumer boycotts.

Suppose that a fraction $\nu$ of the firms have chosen to become clean at date 1 in the replica economy; that is, there are $\nu Nr$ clean firms and $(1-\nu)Nr$ dirty firms. Given $\nu\, Nr$ clean firms, the date 1 stock market equilibrium is as follows. The gross return of a clean firm is $\delta$ less than that of a dirty firm. Thus, in order to ensure that investors stay invested in both kinds of firms, and have the same overall demand for shares as before, we must have $V_c = F - \delta$ and $V_d = F$ (see also app. A). Applying (12), we see that the certainty equivalent (CE) of each fully diversified investor is

$$\mathrm{CE} = \frac{1}{2}\frac{(\Pi - F)^2}{\gamma\sigma^2} - \nu N\delta, \tag{17}$$

where the second term reflects the capital loss caused by a fraction $\nu$ of the $Nr$ firms the investor owns becoming clean (they own $1/r$ of each one).

Assume now that a vote takes place on whether one of the remaining dirty firms should become clean. If this firm becomes clean, this will cause the investor's CE to change by $(\partial \mathrm{CE}/\partial \nu)\Delta\nu$. But in the replica economy $\Delta\nu = (\nu Nr + 1/Nr) - \nu = 1/Nr$, and so the change in CE $= -\delta/r$.

The point is that one firm's becoming clean causes a total capital loss of $\delta$, but this is spread evenly over all the shareholders of the firm, each absorbing a fraction $1/r$. Note the difference from the case where investors are not diversified. There the capital loss an investor experiences from one of the firms they own becoming clean is $\delta$ rather than $\delta/r$.

The remaining effect of bringing about an extra clean firm consists of two elements: the impact on the environment and the impact on the wealth of other investors (the effect on consumers is zero, since the supply of output remains at $N$). The impact on the environment is

$$h\frac{\partial(\nu Nr)}{\partial \nu}\Delta\nu = h. \tag{18}$$

The (negative) capital gain experienced by the other investors, who own a fraction $1 - (1/r)$ of the firm, is

$$-\left(1 - \frac{1}{r}\right)\delta. \tag{19}$$

The investor will vote clean if the sum of the terms in (18) and (19), weighted by $\lambda$, exceeds their personal capital loss, that is,

$$-\frac{1}{r}\delta + \lambda\left[h - \left(1 - \frac{1}{r}\right)\delta\right] > 0. \tag{20}$$

As $r \to \infty$, (20) becomes

$$h - \delta > 0, \tag{21}$$

as long as $\lambda > 0$. This is the same criterion used by the planner. Hence, as long as the majority of investors are at least slightly socially responsible, voting will deliver the social optimum.

PROPOSITION 1.

*a*) Suppose that the majority of investors have $\lambda > 0$. Then majority rule will deliver a socially optimal outcome.

*b*) Suppose that the majority of investors have $\lambda = 0$. Then majority rule delivers a socially optimal outcome only if $h < \delta$.

Proposition 1 is highly dependent on the way social benefits enter investors' utility. We have assumed that socially responsible investors put a positive weight on the net social benefit. If, instead, socially responsible investors were to weigh positively only the reduction in pollution ($h$) but not its cost ($\delta$), then diversified shareholders would vote in favor of an environmental policy that is too aggressive from the perspective of a benevolent social planner. This is the allegation that is often raised against activist investors who buy a few shares just to put some issue on the ballot (so-called gadfly proposals).

A natural question to ask is whether proposition 1, part *a* depends on investors voting on one firm at a time. What would happen if investors voted on all firms at the same time? A fully diversified investor will now experience a capital loss of $N\delta$ if every firm becomes clean (they own $1/r$ of $Nr$ firms). The effect on the wealth of other investors is $-(1-[1/r])Nr\delta$, while the effect on the environment is $Nrh$. It follows that an investor will vote for all firms to become clean if

$$-N\delta + \lambda\left[Nrh - \left(1 - \frac{1}{r}\right)Nr\delta\right] > 0. \tag{22}$$

Dividing by $Nr$ and taking limits as $r \to \infty$ yields (21). In other words, although the capital loss effect on an individual investor is scaled up, so is the impact of the investor's action on the rest of the economy.

This result is dependent on investors' marginal utility from wealth and from social benefits being constant. If investors have diminishing marginal utility of wealth, they may vote against all the firms in their portfolio becoming clean, even if this is socially optimal. As a result, when an institutional investor picks a voting policy, it is likely to choose one that is less proenvironmental than the benevolent planner solution. Note that the bias here is the opposite of the one encountered in the so-called gadfly proposals.

To see how voting might work in practice, it is useful to consider a real-world example. In 1984, DuPont faced a choice between polluting the Ohio River with a toxic substance known as perfluorooctanoic acid (PFOA) and investing in incineration. Shapira and Zingales (2017) use court case documents to calculate the present value of the cost of incineration, US\$19 million, and the present value of the social cost of pollution, US\$350 million (both are in 1984 dollars). Clearly, it was socially desirable to incinerate. DuPont decided not to do so. We can easily understand this decision using the logic of this section. At the time, the Bronfman family had an approximately 20% stake in DuPont. By the logic of (20), polluting was preferable for the Bronfman family if

$$-0.2(19) + \lambda[350-(1-0.2)(19)] < 0, \tag{23}$$

where the first term represents the capital loss to the family if incineration occurs, and the second term represents the reduction in damage minus the capital loss experienced by other shareholders, weighted by the family's social responsibility parameter $\lambda$.[27] Thus, if the Bronfmans are not willing to give up US\$3.8 million for a social gain of US\$335 million, that is, $\lambda < 0.01$, the optimal decision for the Bronfman family is to pollute.[28]

For a diversified shareholder, the calculation would be quite different. Using today's numbers, an investor who has a diversified portfolio worth US\$500,000 owns a fraction of the US stock market equal approximately to $10^{-8}$.[29] As a result, they would vote for incineration if

$$-10^{-8}(19) + \lambda[350-(1-10^{-8})(19)] > 0, \tag{24}$$

or $\lambda > 5.7(10^{-8})$. In other words, as long as the majority of investors are willing to give up US\$0.19 of their wealth for a social gain of US\$331 million, the outcome will be incineration.

In the standard approach to corporate governance, based on the idea that firms should maximize market value, large shareholders are often thought to be beneficial because they reduce the agency costs caused by the separation of ownership and control (Shleifer and Vishny 1997). In contrast, once externalities are considered, large shareholders may be detrimental because they put too much weight on profit relative to the social good.

It is useful to relate our voice result to the literature on public goods. The private provision of public goods is challenging because of the free rider problem. One solution to this is taxation: Everyone has to pay for the public good, whether they want to or not. Corporate voting works in a similar way. If a majority votes clean, all shareholders bear the cost $\delta$, whether or not they voted for clean. In a nutshell, this is why voice can achieve the social optimum.[30]

## V. Divestment

We now put voice aside and consider an alternative strategy for investors: exit via divestment. The way this works is as follows. In our model, firms

[27] In this calculation we ignore the possible liability cost from pollution.

[28] We should stress that this is a hypothetical calculation; we have no evidence that the Bronfman family was ever involved in this decision.

[29] This is based on a stock market capitalization of US\$48 trillion.

[30] A natural question to ask is whether Coasian bargaining, rather than voice, could achieve a socially optimal outcome. Suppose $h > \delta$ and consider a situation where, consistent with Charness and Rabin (2002), there are some agents with $\lambda$ slightly above .25 (in a large economy, there will be many of them). Then a coalition of four of them could get together and approach a dirty firm with the following offer: We will pay you $\delta$; in return, you agree to become clean. The cost $\delta$ is split equally among the four. Each agent should be prepared to do this since $\lambda h - \delta/4 > 0$, and the firm should agree since it is no worse off. The main difficulty with this solution is that it is not clear who should be in the coalition. That is, each agent would like other agents with $\lambda$ above one-fourth to form the coalition and pay the $\delta/4$. There is a classic free-rider problem, and thus the coalition may not form.

do not raise capital at date 1. However, if some investors divest, this reduces the value of dirty firms and may cause some value-maximizing managers to choose the clean technology.

Assume that a fraction $\mu$ of investors announce at date 1 that they will hold shares only in clean firms; we will see below that only investors with a $\lambda$ above a particular cutoff will choose to divest. We suppose that investors' announcements are visible and that investors can commit to their divestment decisions (we return to the visibility and commitment issue in sec. VII). Firms observe these announcements and then decide whether to stay dirty or become clean. We want to characterize a (Nash) equilibrium. To this end, we derive the product market and capital market equilibrium under the assumption that a fraction $\mu$ of investors divest.[31] Then we check that a fraction $\mu$ of investors do indeed want to divest. In this section, we assume that there is no consumer boycott.

As noted, we suppose that at date 1, firms are run by value-maximizing managers. One can imagine that (before there were any environmental concerns) initial entrepreneurs designed an incentive scheme to encourage managers to maximize market value at date 1 in order to obtain the highest valuation at date 0 (there could be some unmodeled agency problems). Note that initial entrepreneurs are not well diversified and so they want to maximize the value of their own company, not the joint value of all companies, as the common ownership literature suggests (see Azar, Schmalz, and Tecu 2018).[32]

Value maximization implies that in an equilibrium where both clean and dirty firms operate, they must have the same value $V$, otherwise there would be switching.[33] Let $n_c$ be the number of clean firms and $n_d = N - n_c$ the number of dirty firms. Note that the mix of clean and dirty firms has no effect on the date 2 product market equilibrium since each firm will supply at its capacity constraint of one whether it is clean or dirty.

For divestors, the analogy of (9) is

$$x = \frac{\Pi - \delta - V}{\gamma\sigma^2}, \tag{25}$$

[31] We assume that subsequent to divestment decisions, investors and firms are price takers in the market for shares. This is a good approximation since, as noted earlier, the economy is approximately competitive for large $r$.

[32] In this paper, we do not discuss how incentive contracts can affect the ESG decisions of managers; on this, see Davies and Van Wesep (2018).

[33] An interesting question is whether a purely selfish investor could take advantage of the fact that clean and dirty firms have the same price but different expected profitability by short selling one and using the proceeds to invest in the other. The feasibility of this strategy depends on whether socially responsible investors are willing to lend shares to short sellers and whether they are willing to accept borrowed shares as bona fide clean shares. In our model, where socially responsible investors care about their impact, the answer to both questions is negative. A socially responsible investor, who accepts a lower return for a greater cause, would be foolish to lend his shares to a speculator who undoes his strategy without fully compensating him. The same is true for an investor buying lent shares.

since clean firms yield expected profits $\Pi - \delta$, rather than $\Pi$, and cost V. Since divestors represent a mass $\mu$ of investors, their demand for clean firms is

$$\mu x = \mu\left(\frac{\Pi - \delta - V}{\gamma\sigma^2}\right). \tag{26}$$

The rest of the market will not invest in clean firms since they are less profitable but equally expensive. Hence, (26) represents the total demand for clean firms, and we must have

$$\mu\left(\frac{\Pi - \delta - V}{\gamma\sigma^2}\right) = n_c. \tag{27}$$

Similarly, the demand for dirty firms will be given by

$$(1 - \mu)\left(\frac{\Pi - V}{\gamma\sigma^2}\right), \tag{28}$$

which must be equal to $n_d$:

$$(1 - \mu)\left(\frac{\Pi - V}{\gamma\sigma^2}\right) = n_d. \tag{29}$$

Adding (27) and (29) yields

$$\Pi - V - \mu\delta = N\gamma\sigma^2. \tag{30}$$

We know from (10) that $N\gamma\sigma^2 = \Pi - F$,[34] and therefore

$$V = F - \mu\delta. \tag{31}$$

Substituting back into (27), we obtain

$$\begin{aligned} n_c &= \mu\left(\frac{\Pi - F - \delta(1 - \mu)}{\gamma\sigma^2}\right), \\ &= \mu N - \frac{\mu\delta(1 - \mu)}{\gamma\sigma^2}. \end{aligned} \tag{32}$$

A similar formula can be found in Heinkel, Kraus, and Zechner (2001). We know from (32) that divestment will be effective when either the mass of divestors is close to one or the cost of the clean technology is small (the impact of $\gamma\sigma^2$ is more complicated since $N$ depends on this; see [11]).

It is helpful to provide some intuition. To understand (31), note that divestment leads to a fall in the demand for dirty firms' shares, causing $V$

[34] Note that $V = F - \mu\delta > 0$ given (15). In other words, a value-maximizing firm prefers to adopt the clean technology rather than closing down.

to fall. If $V$ fell by $\delta$, clean firms would have the same net return as dirty firms previously, while dirty firms would have a higher net return. As a result, the total demand for shares would exceed the supply. Hence $V$ must fall by less than $\delta$, indeed by $\mu\delta$, according to (31), which also throws light on (32). If $V$ fell by $\delta$, the demand for clean firms' shares would be in proportion to the number of divestors since divestors would invest as much as before. However, since $V$ falls less, the demand for clean shares is lower, and the number of clean firms is less than proportional to the number of divestors. Indeed $n_c$ is quadratic in $\mu$.

From (32), we can infer that the marginal impact of divestment $\partial n_c/\partial\mu$ is increasing in $\mu$. If $N < \delta/\gamma\sigma^2$, we have a corner solution: the number of clean firms $n_c = 0$ in a neighborhood of $\mu = 0$, and for low $\mu$, the marginal impact of $\mu$ on $n_c$ is zero. In this case, it is an equilibrium for no investor to divest: starting at $\mu = 0$, nondivestors will absorb any divested stock with minimal price impact, and as a result, no firms will become clean.[35]

Conversely, $n_c > 0$ if $N > [\delta(1-\mu)]/\gamma\sigma^2$. From now on, we assume that we are at an interior solution for any $\mu > 0$, that is,

$$N > \frac{\delta}{\gamma\sigma^2}. \tag{33}$$

We next determine whether an investor wants to divest when (33) holds. As a first step, we compare the certainty equivalent of a divestor with the certainty equivalent of a nondivestor.[36] We then bring in the environmental impact of divestment.

Since nondivestors invest only in high-return dirty firms, their payoff is given by

$$x\tilde{\Pi} + (x_0 - x)V - x_0 F, \tag{34}$$

where $x_0$ is their date 0 investment.

The certainty equivalent of (34) is

$$x(\Pi - V) + x_0(V - F) - \frac{1}{2}\gamma x^2\sigma^2, \tag{35}$$

and the $x$ that maximizes (35) is

$$x = \frac{\Pi - V}{\gamma\sigma^2}. \tag{36}$$

[35] Note that a similar effect occurs if a fraction of investors announce that they will divest from a single firm. Nondivestors will purchase the divestors' shares in the targeted firm, and divestors will purchase an equal number of shares in other (dirty) firms. In other words, there will be a simple exchange, and there will be no effect on prices. Thus, in this case too, divestment has zero impact.

[36] In what follows, we suppose that idiosyncratic shocks are realized at date 1 (see n. 22), so that there is no diversification cost from investing only in clean firms/dirty firms.

Substituting (36) and (9) (with $x = x_0$) into (35) and using (31), we obtain the following expression for the CE of a nondivestor:

$$\mathrm{CE}_{\mathrm{nd}} = \frac{1}{2\gamma\sigma^2}(\Pi - F + \mu\delta)^2 - \mu\delta\frac{\Pi - F}{\gamma\sigma^2}. \tag{37}$$

Carrying out the same exercise for a divestor yields[37]

$$\mathrm{CE}_{\mathrm{d}} = \frac{1}{2\gamma\sigma^2}(\Pi - F - \delta + \mu\delta)^2 - \frac{\mu\delta}{\gamma\sigma^2}(\Pi - F). \tag{38}$$

Thus, by divesting, an investor loses

$$\mathrm{CE}_{\mathrm{nd}} - \mathrm{CE}_{\mathrm{d}} = \frac{\delta}{2\gamma\sigma^2}(2\Pi - 2F - \delta(1 - 2\mu)). \tag{39}$$

An investor will compare the loss in (39) with the effect their divestment has on the environment and on other people's utilities (where the latter is weighted by their $\lambda$). We compute this effect for the replica economy and then take limits as $r \to \infty$. In the replica economy, there are $r$ investors, $\mu r$ of whom divest; $r$ consumers; and $Nr$ firms set up in the free entry equilibrium, of which $n_c r$ choose to become clean at date 1, where $n_c$ is given by (32). The effect of one investor's divestment decision is composed of three elements: the impact on other investors, the impact on consumers, and the impact on the environment. Investors are optimizing, and so by the envelope theorem, a small change in the market value of firms caused by one investor divesting will have a second-order effect on other investors.[38] Consumers will be unaffected because total supply equals $N$, independent of the mix of clean and dirty firms. Thus, we are left with the effect on the environment.

Since $\mu r$ investors are divesting, if one investor stops divesting, $\mu$ changes from $\mu$ to $\mu - (1/r)$; that is, $\Delta\mu = -(1/r)$. The number of clean firms changes from $n_c r$ to $(n_c + [\partial n_c/\partial\mu]\Delta\mu)r$, plus some second-order terms. That is, as $r \to \infty$, the change in the number of clean firms is

$$\frac{\partial n_c}{\partial\mu}\left(-\frac{1}{r}\right)r = -\frac{\partial n_c}{\partial\mu} = -N + \frac{\delta(1 - 2\mu)}{\gamma\sigma^2}, \tag{40}$$

where we use (32). So the damage created by the investor's decision not to divest is $\{N - [\delta(1 - 2\mu)/\gamma\sigma^2]\}h$, which the investor weights by their socially responsible parameter $\lambda$. They then compare this to the expression in (39). We may conclude that an investor will be willing to stay divested if

$$\frac{\delta}{2\gamma\sigma^2}(2\Pi - 2F - \delta(1 - 2\mu)) \leq \lambda h\left[N - \frac{\delta(1 - 2\mu)}{\gamma\sigma^2}\right], \tag{41}$$

[37] Note that (33) implies $n_c > 0$, which in turn, given (27), implies $\Pi - F - \delta + \mu\delta > 0$.
[38] See, e.g., Mas-Colell, Whinston, and Green (1995, 657–59).

which can be rewritten, using (10), as

$$(\lambda h - \delta)\left(N - \frac{\delta}{\gamma\sigma^2}\right) + \frac{\mu\delta}{\gamma\sigma^2}(2\lambda h - \delta) \geq \frac{\delta^2}{2\gamma\sigma^2}. \quad (42)$$

Note that the left-hand side is increasing in $\lambda$, while the right-hand side is constant, from which we conclude that there is a cutoff: only investors with $\lambda$ above a critical value will divest. Also, if $2\lambda h < \delta$, the left-hand side is negative and so cannot exceed or equal the right-hand side, while if $2\lambda h > \delta$, the left-hand side is increasing in $\mu$. It follows that as $\mu$ increases, the set of investors whose $\lambda$ satisfies (42) becomes larger. In other words, the cutoff is decreasing in $\mu$ (divestment decisions are strategic complements).

We can use (42) to characterize a divestment equilibrium for the limit economy. For each $\mu$, let $\lambda(\mu)$ be the unique value of $\lambda$ such that the left-hand side of (42) equals the right-hand side. (Here $\lambda(\mu)$ could exceed 1.) Define the functions $G$ and $\hat{G}$, for all $\lambda'$, as follows: $G(\lambda') = \text{Probability}(\lambda > \lambda')$ and $\hat{G}(\lambda') = \text{Probability}(\lambda \geq \lambda')$.

Definition 1. A divestment equilibrium for the limit economy ($r = \infty$) is a $0 \leq \mu \leq 1$, where $\mu$ represents the fraction of investors who divest, such that either

i) $G(\lambda(\mu)) = \mu$ or
ii) $G(\lambda(\mu)) < \mu$ and $\hat{G}(\lambda(\mu)) \geq \mu$.

To understand this definition, note that in the first statement, given $\mu$, the mass of investors who strictly want to divest equals $\mu$, and so in the equilibrium, only those investors divest; while in the second statement, the mass of investors who strictly want to divest is less than $\mu$, but the mass of investors who either strictly want to divest or are indifferent is at least $\mu$, and so a fraction of the indifferent investors can be chosen such that the total mass of divestors equals $\mu$.

Proposition 2. A divestment equilibrium exists.

*Proof.* We use a fixed point argument. For each $\lambda \geq 0$, define the correspondence $H(\lambda) = \{1\}$ if $\lambda < \lambda_{\min}$, $H(\lambda) = \{\Sigma_{j=i+1}^{m}\pi_j\}$ if $\lambda_i < \lambda < \lambda_{i+1}$ ($i = 1, \ldots, m-1$), $H(\lambda) = [\Sigma_{j=i+1}^{m}\pi_j, \Sigma_{j=i}^{m}\pi_j]$ if $\lambda = \lambda_i$ ($i = 1, \ldots, m$), and $H(\lambda) = \{0\}$ if $\lambda > \lambda_{\max}$. Now consider the correspondence $\xi$ from [0,1] into itself, where $\xi(\mu) = H(\lambda(\mu))$. It is easy to see that $\xi$ is upper hemicontinuous and convex valued, and so by Kakutani's fixed point theorem, there exists $\mu^*$ such that $\mu^* \in \xi(\mu^*)$. It is easy to check that $\mu^*$ is a divestment equilibrium. QED

Proposition 3.

1) Suppose that $\lambda_{\max} h < \delta$. Then $\mu = 0$ is an equilibrium.
2) Suppose that $\lambda_{\max} h < (3/4)\delta$. Then $\mu = 0$ is the unique equilibrium.

3) Suppose that $h > \delta$ and $\lambda_{\min} h < (3/4)\delta$. Then $\mu = 1$ is not an equilibrium; that is, no divestment equilibrium is socially optimal.

*Proof.* Note first that, if $\lambda_{\max} h < \delta$, the left-hand side is less than the right-hand side at $\mu = 0$, for all $\lambda < \lambda_{\max}$. Hence, $\mu = 0$ is an equilibrium in this case. Second, an investor with $\lambda h < (3/4)\delta$ will never divest. To see this, note that if $\lambda h < (1/2)\delta$, the left-hand side of (42) is negative. On the other hand, if $(3/4)\delta > \lambda h > (1/2)\delta$, the left-hand side is increasing in $\mu$, but even at $\mu = 1$, the second term of the left-hand side is less than the right-hand side (the first term is negative since $\lambda h < \delta$). Hence, if $\lambda_{\max} h < (3/4)\delta$, $\mu = 0$ is the unique equilibrium.

Finally, suppose $h > \delta$ and $\lambda_{\min} h < (3/4)\delta$. The social optimum requires $n_c = N$, which, from (32), can happen only if $\mu = 1$. But that means that (42) must hold when $\lambda = \lambda_{\min}$. However, the first term of the left-hand side is negative (since $\lambda_{\min} h < (3/4)\delta < \delta$), while the second term is less than the right-hand side if $\lambda_{\min} h < (3/4)\delta$. Hence (42) cannot hold, and thus it is not an equilibrium for everybody to divest. QED

It is worth comparing proposition 3 with the result for the case of undiversified investors considered in section IV. We showed there that if $\lambda_{\max} h < \delta$, undiversified investors will use their voice to keep firms dirty. Proposition 3, part 1 tells us the same is true when diversified investors divest: there is an equilibrium with no clean firms. One obvious implication of proposition 3 is that there can be too little divestment when $h > \delta$. When $h > \delta$, the social optimum is $n_c = N$ (see sec. III.D), and so we want everyone to divest (if $\mu = 1$, $n_c = N$). Yet if $\lambda_{\max} h < (3/4)\delta$, $\mu = 0$ is the only equilibrium: there is no divestment at all, and $n_c = 0$.

To see the implications of this proposition, let us return to the DuPont case described in section IV, where $h =$ US\$350 million and $\delta =$ US\$19 million. Assume that all firms face a trade-off like DuPont's; that is, $h =$ US\$350 million and $\delta =$ US\$19 million for all firms. Then, by proposition 3, part 2, if

$$\lambda_{\max} < \frac{3}{4} \times \frac{19}{350} = 0.04,$$

the unique equilibrium is one where no one divests and no firm becomes clean. Also, by proposition 3, part 3, even if $\lambda_{\max} > 0.04$, as long as $\lambda_{\min} < 0.04$—that is, as long as some investors are not willing to give up US\$0.19 for a social gain of US\$4.7—in every equilibrium some firms remain dirty. In contrast, we saw in section IV that voice would lead to a clean outcome for all firms as long as the majority of shareholders are willing to give up US\$0.19 for a social gain of US\$331 million.

To obtain further insight when the assumptions of proposition 3 do not hold, it is useful to consider the case of two types. Suppose that

$m = 2$, $\lambda_{min} = 0$, $\lambda_{max} > 0$, and $1 > \pi_2 > 0$, that is, only one type is socially responsible. We know from proposition 3, part 2, that if $\lambda_{max} h < (3/4)\delta$, the unique equilibrium is $\mu = 0$. So suppose $\lambda_{max} h > (3/4)\delta$. We distinguish between two cases.

CASE 1. $\lambda_{max} h > \delta$.

In figure 2, we graph the left-hand side of (42), with $\lambda = \lambda_{max}$, against the right-hand side. Figures 2*A*–2*C* illustrate the possibilities. In figure 2*A*, the left-hand side exceeds the right-hand side for all $\mu$, and so all socially responsible investors divest: $\mu = \pi_2$ is the unique equilibrium. In figure 2*B*, the left-hand side is less than the right-hand side for small $\mu$ but greater than the right-hand side for $\mu = \pi_2$, and there are three equilibria: $\mu = 0$, $\mu = \hat{\mu}$, and $\mu = \pi_2$. In figure 2*C*, the left-hand side is less than the right-hand side at $\mu = \pi_2$, and $\mu = 0$ is the unique equilibrium.

Comparing with our two benchmarks, we see that this is a case where the benevolent planner would choose all firms to be clean ($\lambda_{max} h > \delta \Rightarrow h > \delta$, and so $n_c = N$); undiversified socially responsible investors would use their voice to make the firms they own clean ($\lambda_{max} h > \delta$, and so $n_c = \pi_2 N$); but divestment may lead to no firms becoming clean ($\mu = 0$, $n_c = 0$).

CASE 2. $(3/4)\delta < \lambda_{max} h < \delta$.

Now the left-hand side of (42) is less than the right-hand side when $\mu = 0$ and may be less than or greater than the right-hand side when $\mu = \pi_2$. The situation is similar as in figures 2*B* and 2*C*. There is always an equilibrium with $\mu = 0$, but there may be equilbria with $\mu > 0$ too.

Case 2 can hold even if $h < \delta$. Hence, it is possible to have a situation where a benevolent planner would choose no clean firms ($n_c = 0$); undiversified investors would use their voice to ensure no clean firms ($n_c = 0$); but divestment would lead some firms to become clean ($n_c > 0$). This is a case where exit reduces social welfare.

The case of multiple equilibria, illustrated in figure 2*B*, can throw some light on when activist campaigns can have a multiplier effect. When $\lambda_{max} h < (3/4)\delta$, convincing a large investor (such as the Norwegian sovereign wealth fund) to divest will have a limited impact because it will not induce other socially responsible investors to divest. By contrast, when $\lambda_{max} h > (3/4)\delta$, convincing a large investor to divest could lead all socially responsible investors to divest. The multiplier effect is more likely to occur when the efficiency cost of pollution ($h/\delta$) is high and the degree of social responsibility ($\lambda_{max}$) is high.

The next proposition summarizes the comparison of voice and exit.

PROPOSITION 4.

i) If the majority of investors have a strictly positive $\lambda$, voice reaches the social optimum, whereas divestment may not. Furthermore, if

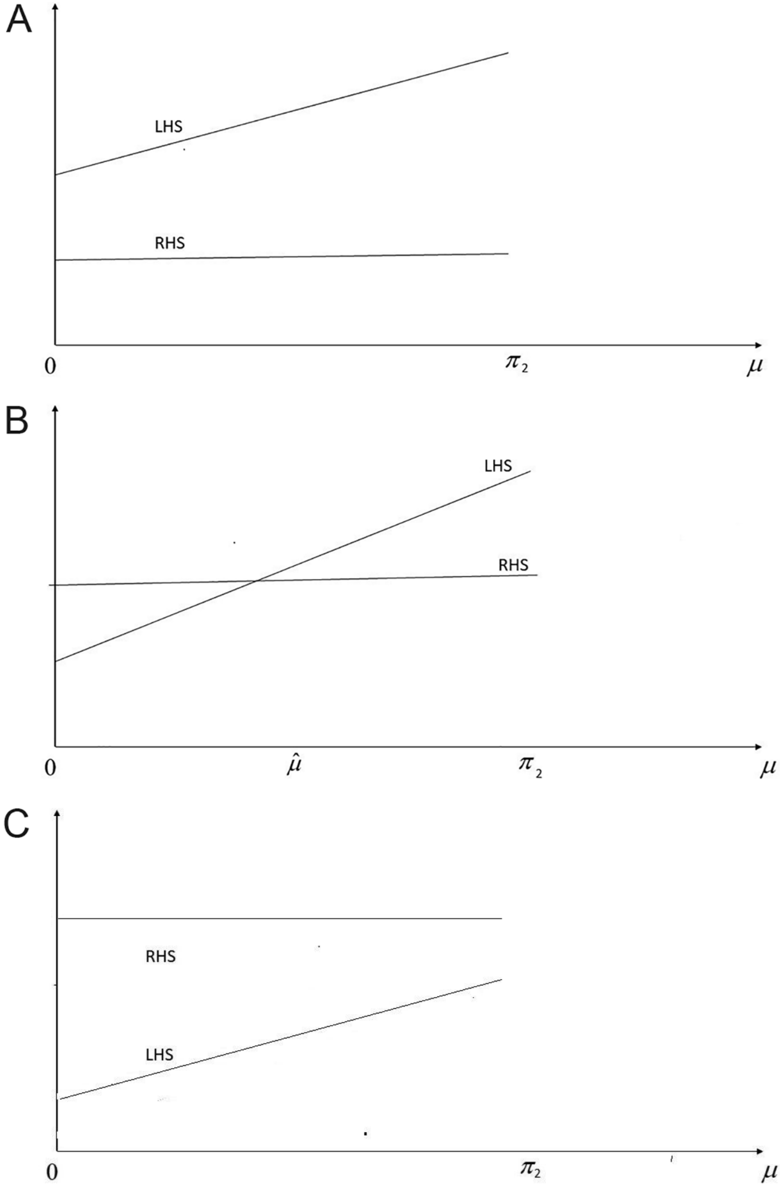


Fig. 2.—Possible cases. LHS = left-hand side; RHS = right-hand side.

$h > \delta$ and $\lambda_{\min} h < (3/4)\delta$, no divestment equilibrium is socially optimal.

ii) If the majority of investors have $\lambda = 0$ and $h > \delta$, divestment weakly dominates voice but never reaches the social optimum.

iii) If $h < \delta$, voice reaches the social optimum, whereas divestment may not.

To understand this proposition, we saw in section IV that if the majority of investors have a strictly positive $\lambda$, voice reaches the social optimum. In contrast, if $h > \delta$, divesting never reaches the social optimum as long as some investors have $\lambda h < (3/4)\delta$. When $h < \delta$, divestment may achieve the social optimum, since $\mu = 0$ can be an equilibrium (and this implies $n_c = 0$). However, as we showed above, there can in some cases be an equilibrium with $\mu$ positive.[39]

As we noted earlier, voice is sensitive to the social preferences of investors. If investors care only about environmental harm and not about the cost to other investors, then voice can be too aggressive. In contrast, our analysis of exit does not change if socially responsible investors care only about environmental harm. The reason is that, as we saw earlier, a divestment decision by one investor affects only the environment and has no impact on other investors and consumers.

## VI. Boycotts

In this section, we ignore the possibility of divesting and focus on a different form of exit, starting with a consumer boycott.

### A. *Consumer Boycott*

For a consumer boycott to be possible, we need to assume that consumers know the technology behind the good they buy: they can tell whether the good is produced by a clean firm or a dirty firm. We suppose that boycotting decisions are common knowledge and that consumers can commit to them (but see sec. VII). As in previous sections, we suppose that a boycott is not anticipated at date 0 when firms are set up but only becomes a factor at date 1. Thus, $N$ is predetermined at date 1 and is given by (11).

[39] We have assumed that firms can adjust continuously to the choices of investors, in the sense that $n_c r$ is a continuous variable. If $n_c r$ has to be an integer, this can affect the incentives to divest. Suppose we are at $\mu = 0$ with $N > \delta/\gamma\sigma^2$. According to (32), if one investor divests, the number of clean firms becomes positive. But maybe $n_c r$ equals 0.1. In our model, this counts as a positive impact, possibly enough to motivate a socially responsible investor to divest. In reality, since a fraction of a firm is not feasible, the question is whether the new equilibrium would involve zero or one clean firm. That is, an individual divestment decision may have no impact or a disproportionate impact. (Another interpretation is that $n_c r = 0.1$ is achieved by one firm at date 1 transforming itself into two firms: a dirty firm that produces 0.9 of its output and a clean firm that produces 0.1 and incurs cost $0.1\delta$ [constant returns to scale] and that investors can invest in either firm.) We leave the details of the integer case to future work.

Boycotting works by reducing the demand for, and hence price of, dirty goods. Clean goods sell for a higher price, and in the case where both dirty and clean firms operate, this higher price offsets the increased cost $\delta$ of producing clean goods to the point where the profits and hence market values of clean and dirty firms are the same.

As for the case of divestment, we start by assuming that a fraction $\theta$ of consumers will boycott the dirty product and then derive the equilibrium value of $\theta$. Arguments similar to the divestment case (see app. B for details) yield that the equilibrium number of clean firms is given by

$$n_c = \theta \mathrm{N} - \frac{\delta\theta(1-\theta)}{\tau}. \tag{43}$$

Note that the impact of boycotting is similar to that of divesting (compare [43] and [32]). Boycotting will be effective when either the mass of boycotters is close to one or the cost of the clean technology is small. As with divestors, boycotters impact the equilibrium level of clean firms less than proportionally. Also $\tau$ plays the role that $\gamma\sigma^2$ played in the divestment case.

As in the previous section, we focus on an interior solution by assuming $N > \delta/\tau$. Comparing the utility loss from boycotting with the environmental impact achieved yields the following condition, which parallels (42):

$$(\lambda h - \delta)\left(N - \frac{\delta}{\tau}\right) + \frac{\theta\delta}{\tau}(2\lambda h - \delta) \geq \frac{\delta^2}{2\tau}. \tag{44}$$

A consumer will boycott if (44) is satisfied. Note that (44) is the same as (42) but with $\tau$ replacing $\gamma\sigma^2$. As a result, there is a one-to-one mapping between the results in the boycott and divestment cases. For convenience, we restate the key result in proposition 5.

PROPOSITION 5.

1) Suppose that $\lambda_{\max} h < \delta$. Then $\theta = 0$ is an equilibrium.
2) Suppose that $\lambda_{\max} h < (3/4)\delta$. Then $\theta = 0$ is the unique equilibrium.
3) Suppose that $h > \delta$ and $\lambda_{\min} h < (3/4)\delta$. Then $\theta = 1$ is not an equilibrium; that is, no divestment equilibrium is socially optimal.

### *B. Consumer Boycott vs. Divestment*

Imagine an activist who is interested in starting a campaign to convince a certain number of socially responsible people who think $h$ is zero that $h$ is in fact positive. Where will their effort be more productive, if they convince shareholders or consumers? As noted, in comparing (42) and (44), given the fraction of the group exiting, the only difference is that $\gamma\sigma^2$ appears in the first expression and $\tau$ in the second. Now $\gamma\sigma^2$ represents the slope of the demand curve for shares and $\tau$ the slope of the demand curve for the product. To the extent we think of the demand for goods to be inelastic and the demand for shares to be elastic, $\tau > \gamma\sigma^2$. Remember, however, that $N$ depends on both $\gamma\sigma^2$ and $\tau$ (see [11]). Thus, in what follows, we will vary $\gamma\sigma^2$ and $\tau$ but keep the sum constant. If we keep $\gamma\sigma^2 + \tau$ constant, the number of firms $N$ will remain constant.

Suppose $\gamma\sigma^2$ is very small. Then (33) is violated, and we are at a corner solution for low $\mu$. In this case, $n_c > 0$ is a necessary condition for a divestment campaign to have any effect; that is,

$$\mu > 1 - \frac{N\gamma\sigma^2}{\delta}. \tag{45}$$

Note that the right-hand side of this equation converges to one as $\gamma\sigma^2$ converges to zero. In other words, for small $\gamma\sigma^2$, a divestment campaign has to persuade a huge fraction of investors to divest for it to be effective. Thus, if $\gamma\sigma^2$ is small, given the choice, an activist will prefer to try to convince consumers rather than investors.

The case where $\gamma\sigma^2$ is not so low for there to be a corner solution is more complex. Consider (41). The right-hand side represents the impact of divestment and the left-hand side the cost. The right-hand side is decreasing in $\gamma\sigma^2$ as long as $\mu > 1/2$. In other words, a reduction in $\gamma\sigma^2$ might increase the incentive to divest. There are two elements here. First, divestment decisions are strategic complements (which explains why a high $\mu$ might be important). Second, while a low $\gamma\sigma^2$ means that when one person divests, others easily buy their shares, it is also the case that the person divesting has a large demand for the shares of clean firms. The left-hand side may also increase or decrease in $\gamma\sigma^2$ (recall that $\Pi = \rho - \tau N$ and that we are keeping $\gamma\sigma^2 + \tau$ constant). Because of these various effects, signing the impact of $\gamma\sigma^2$ relative to $\tau$ is difficult in the interior case, as is comparing the effectiveness of divestment and boycott campaigns.

### *C. Labor Boycott*

Our simple model does not have any labor costs, let alone the possibility of workers boycotting a firm. Yet in a competitive labor market, the effect of a labor boycott would be very similar to that of the consumer boycott we analyzed in section VI.A. Purely selfish workers work for any firm, while socially responsible workers boycott dirty firms. The resulting equilibrium would be similar to that in section VI.A, with workers in dirty firms being paid more than workers in clean firms and the equilibrium number of clean firms depending on the slope of the labor supply curve. Indeed, Nyborg and Zhang (2013) provide evidence that workers in socially responsible firms are paid less. To the extent that the supply of workers (especially for certain types of highly qualified workers) is less elastic than is the demand for products, a labor boycott is more likely to be successful in curbing pollution than a consumer boycott.

The situation is different if a firm has some market power. Consider, for instance, a case where there is a monopsonist and many workers. The monopsonist has the choice to stay dirty and be able to hire only from a smaller pool of workers or pay the cost $\delta$ and be able to hire all workers. As we discuss in Broccardo, Hart, and Zingales (2020), when the market is not competitive, if the pool of boycotters is large enough, not only will boycotters be able to turn the firm clean, but they will also be able to do so without bearing any cost.

## VII. Discussion

### A. *Direct Engagement by Atomistic Investors*

Depending on whether individuals own stock directly or through intermediaries, to succeed, the engagement strategy has to overcome various challenges. Let us start first with the case where the majority of stock ownership is direct. One question is why individual shareholders vote at all and are not rationally apathetic, given that the probability their vote will be pivotal is negligible. In fact, in our world of socially responsible investors, it is not so difficult to explain why people vote, since they care about the impact of their actions on others. Furthermore, empirical evidence (Brav, Cain, and Zytnick 2021) shows that individual investors do vote, consistent with the existence of consumption benefits from voting.

A more challenging question is why any shareholder would pay for the cost of putting a proposal on the ballot. Here an intermediary can play a role by using engagement as a marketing strategy (O'Leary and Valdmanis 2020). To see how this works, consider the case where the majority of investors have a strictly positive $\lambda$. Then, a green fund can be structured as a not for profit, charging a fee $\psi$ for each dollar invested to pay for the cost of putting on the corporate ballot propositions to switch to clean. An investor moving US$1 into the green fund will cause such a proposition to be put on the ballot in $\psi/c$ additional companies, where $c$ is the cost of putting a proposition on the ballot. Then, an individual will move their investment into a green fund if and only if

$$-\frac{\delta}{r}\frac{\psi}{c} + \lambda\frac{\psi}{c}\left[h - \left(1 - \frac{1}{r}\right)\delta)\right] > \psi, \tag{46}$$

where the left-hand side is the net benefit of investing a dollar in the green fund and having $\psi/c$ companies switch to clean, and the right-hand side is the extra fee they have to pay. As $r \to \infty$, (46) can be rewritten as

$$\lambda > \frac{c}{h - \delta}. \tag{47}$$

Thus, only investors with λ above this cutoff will invest in the green fund and only if the majority of investors are socially responsible. To return to the DuPont example, if the cost of putting a proposition on the corporate proxy is equal to 1 million in 1984 dollars, then the cutoff is 1/331 or 0.003. If the majority of investors are not socially responsible, then even investors with λ above the cutoff will refuse to invest in the green fund, because activism will not have any benefit.[40]

### B. *Engagement through Intermediaries*

Let us now consider the case where the majority of stocks are held by mutual and pension funds, as is true today. In this case, an intermediary's incentive to vote is considerable given that its vote could be decisive. In addition, since 2003, the US Securities and Exchange Commission has required asset management firms "to adopt policies and procedures reasonably designed to ensure that the adviser votes proxies in the best interests of clients."[41] This regulation has been interpreted as a requirement to exercise the right to vote.[42]

A bigger problem concerns the transmission of preferences from investors to institutions. There are three ways in which this transmission can be achieved. First, intermediaries can learn in advance of a vote about their investors' preferences. Until recently, this would have been prohibitively costly, but now it is feasible. Indeed, Fintech asset management firm Betterment has started asking investors in the partner ETF Engine No. 1 what proxy fights they want the ETF to engage in.[43] Similarly, British startup Tumelo offers brokerage firms a service to collect the votes of their clients. Second, intermediaries can delegate their voting decisions to their own investors, as BlackRock has started to do.[44] Third, institutional investors can choose and advertise their voting behavior, "ideology" in the language of Bolton et al. (2020; for evidence that ESG funds do this, see Curtis, Fisch, and Robertson 2021). This is what Engine No. 1 has done with the ETF: VOTE (https://etf.engine1.com/). With this knowledge,

[40] For an alternative explanation, based on stockholder politics specialists, see Tallarita (2022).

[41] https://www.sec.gov/rules/final/ia-2106.htm.

[42] https://www.dlapiper.com/en/us/insights/publications/2019/09/sec-issues-guidance-on-investment-advisers-proxy-voting-responsibilities/.

[43] https://www.nytimes.com/2021/10/15/business/shareholder-democracy-stocks.html.

[44] https://www.blackrock.com/corporate/about-us/investment-stewardship/proxy-voting-choice.

socially responsible investors can vote with their feet by picking the intermediary with the "right ideology."

Ironically, investors voting with their feet is a form of exit to induce voice. The reason it is more likely to be effective than traditional divestment is that it works through quantities not prices. The mutual fund investor who withdraws their money from one (open-end) mutual fund and transfers it to another (open-end) mutual fund is shrinking the assets of the former and expanding the assets of the latter. In contrast, the stock investor who sells a dirty stock and buys a clean one does not affect the asset base of either but only relative asset prices.

### C. *Visibility and Commitment*

So far, we have assumed that individuals can commit to their strategy (be it divestment or boycotting) and that this strategy is common knowledge. In practice, it is difficult for individuals to communicate and commit to their strategy. Here technology and institutions might make a difference.

In our model, firms are assumed to be aware that some investors (consumers) plan to divest (boycott). But how do they know this? One way is for investors or consumers to make announcements. In a preinternet world, the authors of this paper could have announced that they would divest, but it would have been hard for anyone to know about it. In contrast, large institutions and companies could easily publicize their divestment and boycott decisions. Today, thanks to social media, this difference has become smaller, facilitating the announcement of divestments and boycotts.

Even today, it is difficult to verify whether someone has carried through their announced strategy, given the variability of demand (see Ashenfelter, Ciccarella, and Shatz 2007). Verification is important because there is a commitment issue. At date 1, some investors could announce that they will divest. This announcement might, if believed, be sufficient to push some companies to switch to clean. But, after having achieved their goal, the divestors will be tempted to sell the clean companies and buy the more profitable dirty ones, which trade at the same price. If this behavior is anticipated, divestment will become ineffective.

The same problem arises in the case of boycotts. Some consumers may announce that they will buy only clean products, causing some companies to install a clean technology. But once this is done, what ensures that consumers do not renege on their promise and buy cheaper dirty products?

These commitment problems can exist even in the presence of intermediaries. Suppose that investors invest through a mutual fund, for example, Fidelity. Fidelity might have a fund that plans to invest only in clean companies and another fund that plans to invest only in dirty companies. A socially responsible investor might put all their money in the Fidelity green fund. Seeing how much wealth has been invested in the green fund, some companies may elect to become clean. But once companies have made this decision, what is to stop investors from switching their money from the green fund to the dirty fund?[45]

The commitment problem is stark in our setting because we study a one-shot game: firms make their production decisions at date 1, then investors and consumers make their investment and consumption decisions, and then the world ends. Reality is more complex, and commitment may be easier to establish in a repeated setting.

Visibility can also help with commitment. Even today, if the authors of this paper announce that they will divest from oil companies, it would be hard for anyone to check.[46] In contrast, the Norwegian sovereign wealth fund's divestment decisions can easily be verified since they regularly disclose all their holdings. In a similar fashion, on June 26, 2020, Unilever announced that it would not advertise on Facebook or Twitter for the rest of the year, citing hate speech and divisive content on the platforms.[47] Unilever's action can easily be verified, and so Unilever is likely to stick to this commitment.

### *D. Rational Expectation Equilibrium*

We have assumed that the harm at date 1 is unanticipated at date 0. Relaxing this assumption does not change the analysis very much. If all investors and consumers are purely selfish, it does not change it at all since the date 1 market value of firms will be independent of $h$, and so the incentives of entrepreneurs to set up firms at date 0 will be unaffected. On the other hand, if divestment or boycotting by socially responsible investors or consumers is anticipated to occur at date 1, then this reduces the date 1 and date 0 market value of firms, and so the equilibrium number of firms will be lower. The same is true if it is anticipated that successful engagement will cause firms to choose the clean technology since this reduces future profitability. Given this, founders of firms at date 0 may try to make engagement more difficult at date 1 through provisions in the corporate charter, for example, by putting in supermajority provisions or a dual-class voting structure.

[45] One way in which a mutual fund can help increase the level of commitment is by offering only clean products, increasing the cost for investors to switch.

[46] However, someone who makes a personal decision to divest or boycott may incur a personal cost if they deviate from this decision, which can help to sustain commitment. See, e.g., Ederer and Stremitzer (2017). Note that commitment is not an issue in the literature that assumes that people divest or boycott for moral reasons.

[47] See https://www.wsj.com/articles/unilever-to-halt-u-s-ads-on-facebook-and-twitter-for-rest-of-2020-11593187230.

### *E. Social Entrepreneurs*

Suppose that some entrepreneurs are socially responsible but many (an infinite number) are not. In the free entry equilibrium, the market value of a firm that does not encourage social responsibility will be $F$, and the market value of a firm that does encourage social responsibility will be below $F$. Since we have assumed that entrepreneurs have zero wealth, they will not be able to finance the latter. In effect, competition drives out good behavior (on this, see Shleifer 2004; Aghion et al. 2020; Dewatripont and Tirole 2020). The situation is different at date 1. At this point, the entry cost $F$ is sunk, and so firms earn rents. Therefore, firms have the ability to choose clean without being driven out of the market.

### *F. Takeovers*

A natural question to ask is whether takeovers affect engagement. As Hart and Zingales (2017) show (see also Elhauge 2005), takeovers can undermine social action to turn companies clean, creating an "amoral drift." Here we briefly sketch the argument.

Suppose that engagement leads a company to choose clean (provisionally). This means that its market value will be $V_c = F - \delta$. A (purely selfish) bidder could make an unconditional tender offer for the company at a price $V_c < p < V_d = F$, at the same time announcing that, if more than 50% of the shares are tendered, they plan to freeze out nontendering shareholders at a price $V_c < p' < p$.[48] Even a socially responsible investor will tender. The reason is that given that they have a very small shareholding, the chance that their tender decision will be pivotal is negligible. Furthermore, by not tendering, they receive $p'$ if the bid succeeds as opposed to $p$; while if the bid fails, they own shares worth $V_c$ rather than receiving $p$ (they could always buy back their shares). Thus, tendering is a dominant strategy. Since everyone tenders, the bid succeeds and the bidder makes a profit of $V_d - p$. This is true even if a majority of the investors are socially responsible and would have voted against the bid if given the chance. For further details, see Hart and Zingales (2017).

There is an asymmetry here. It is unlikely that a socially responsible bidder will buy a dirty company and turn it clean. The reason is that the bidder will have to pay at least $V_d$ to persuade shareholders to tender (at a lower price, it would be profitable for someone, e.g., management, to make a counteroffer), which means he loses $V_d - V_c$ on the transaction. There is an environmental gain of $h$, but this is weighted by $\lambda$. Thus, only if $V_d - V_c = \delta < \lambda h$ will he proceed. In contrast, dispersed shareholders will

[48] Such a bid overcomes the free-rider problem analyzed in Grossman and Hart (1980).

vote for the company to become clean if $h > \delta$ and the majority have a positive $\lambda$.

One important qualification to the above is that, as a result of a number of legal decisions in recent years and the existence of poison pills, it has become hard to take over a US company if the majority is against the bid. These developments serve to mitigate the amoral drift and make it less likely that takeovers will interfere with socially responsible engagement.

### *G. Multidimensionality of Societal Concerns*

Our model greatly simplifies the issue of socially responsible choices by focusing on a well-defined clean/dirty technology choice, where the costs and benefits are common knowledge. Reality is more complex for two major reasons. First, societal concerns are multidimensional, making it difficult to assess performance. Consider, for example, the issue of board diversity. While investors might agree that diversity is a positive value, some investors might measure diversity along a gender dimension, others along a race dimension, and yet others along an ideological or intellectual dimension. To this point, Berg, Kölbel, and Rigobon (2019) show that environmental, social, and governance (ESG) measures differ greatly: 38% because of a difference in scope and 56% because of a difference in the way that a common objective is measured.

Second, companies are likely to have better information about the terms of the trade-off than investors, especially when societal concerns are multidimensional. In the absence of any conflict of interest, the managers could provide investors with the information needed to choose according to their preferences. Yet it is unlikely that managerial preferences are perfectly aligned with those of shareholders, given that managers are not well diversified with respect to their labor income.

If we drop our simplifying assumptions, exit and voice strategies may become less powerful. It is not obvious which strategy will be affected more.

### *H. Awareness and Social Pressure Campaigns*

The biggest limitation of our analysis is that we take social preferences as given. As a result, we miss an important benefit of exit campaigns: their effect on social preferences and (more generally) political change. For an analysis of the social and political effects of divestment, see Quigley, Bugden, and Odgers (2020).

When it comes to informing and changing people's preferences, the exit strategy is superior to the voice one. A successful information campaign keeps the relevant piece of news in the media for an extended period of time. A corporate vote is not so newsworthy to begin with. The media feel compelled to cover it at most twice, when the vote is announced and when the votes are counted. By contrast, an exit campaign is newsworthy every time a famous person/institution joins the exiters. Thus, exit is more effective at communicating news.

Exit is also more effective at pressuring people into behaving socially, even if their $\lambda$ is equal to zero. It is not only peer pressure that operates but also the pressure to join a growing and potentially successful movement (Thaler and Sunstein 2008). Both these forces help a highly motivated minority to achieve successes it would never be able to achieve through a voice strategy. Consistent with this idea, corporate boycotts succeed mostly by affecting a target's reputation in the media, not the demand for their product (King 2011).

For these reasons, a highly motivated minority might find exit a more successful strategy than voice. Yet there is no guarantee that the ability of an exit strategy to succeed is linked to the social desirability of its goal. Thus, extending the model to incorporate information and social pressure is unlikely to change the fundamental result that voice is more aligned to social incentives than exit.

### *I. Community of Reference*

We have assumed that socially responsible agents weigh the impact of their decisions on everyone on the entire planet. In practice, people are more likely to internalize the impact they have on their community than on the world at large. This local bias in social responsibility might explain some of the observed trends in corporate governance. Until the 1970s, companies were owned very locally. Even during the 1990s, Huberman (2001) documents a bias in favor of owning local companies. A locally concentrated ownership favors an internalization of the externalities produced by firms, especially if production and distribution are also locally concentrated. From the 1980s, we have witnessed two important trends: the globalization of firms and the indexation of individual portfolios. The combination of these two trends has led firms to become more asocial, that is, to ignore most of the externalities they produce. We can interpret the rise of the ESG movement as a reaction to this increasing asociality of firms.

### *J. Empirical Evidence*

There is plenty of evidence suggesting that divestment fails to affect the value of targeted firms. The classic study is by Teoh, Welch, and Wazzan (1999), who show that divestment from South Africa during the apartheid regime had no impact on equity prices of South African companies. More recently, Berk and van Binsbergen (2021) find no detectable change in value when firms are either included or excluded from the leading socially conscious US index (FTSE USA 4Good).

The evidence on boycotts is more mixed. In his classic study of boycotts, Friedman (1985) finds that 24 of the 90 boycotts examined were (at least partially) successful in attaining the objective desired by the group who launched the boycott. Yet Friedman does not analyze whether these boycotts worked by lowering demand or by creating negative publicity (or both). Neither do Davidson, Worrell, and El-Jelly (1995), who show that, unlike for divestment, consumer boycotts decrease stock prices. The first paper to find a significant effect of a boycott on sales is by Chavis and Leslie (2009), who find 26% lower sales of French wine after the boycott triggered by France's opposition to the war in Iraq (but for evidence to the contrary, see Ashenfelter, Ciccarella, and Shatz 2007).

Thus, the evidence on exit is very consistent with the predictions of our model, but what about the effect of voice? Dimson, Karakaş, and Li (2015), Naaraayanan, Sachdeva, and Sharmak (2021), and Barko, Cremers, and Renneboog (2022) show the effectiveness of behind-the-scenes engagement by socially responsible funds. While these successes are consistent with our model, they are not exactly the strategy described in our paper, which is limited to voting at the shareholder meeting. Until a few years ago, the success of shareholder propositions in the ESG space was minimal: in 2016, only 3% received a majority of votes (Smith 2021). In the past few years, however, the tide has changed. In 2020, 12% of environmental and social shareholder proposals achieved more than 50% of the votes. For meetings through June 30, 2021, that proportion rose to 20% (Smith 2021). This is hardly surprising, since a growing number of institutions and mutual funds have started to announce a more active stand on the ESG front.

Getting a shareholder proposition approved is not enough to insure impact. Yet by using plant-level data, Naaraayanan, Sachdeva, and Sharmak (2021) find that firms targeted by environmental activist investors with shareholder propositions reduce their toxic releases, greenhouse gas emissions, and cancer-causing pollution through preventative efforts.

Last but not least, the implications of our model are consistent with Krueger, Sautner, and Starks's (2020) survey of institutional investors, which finds that such investors consider engagement, rather than divestment, to be the better approach for addressing an externality such as climate risk.

## VIII. Conclusions

This paper is an attempt to analyze the welfare implications of two traditional strategies aimed at impacting corporate outcomes in the presence of externalities: exit and voice. To make the problem tractable, we have made a number of simplifying assumptions: identical firms with zero marginal cost up to a capacity constraint, a linear demand curve, constant absolute risk aversion, normal distribution, and so forth. We have also studied the three principal socially responsible strategies—divestment, boycotting and engagement—separately, without considering how they might interact with one another. Subject to these limitations, we find that when the majority of investors are even slightly socially responsible, voice achieves the socially desirable outcome. In contrast, exit may not for three reasons. First, unless there is a set of highly socially responsible investors (consumers) willing to pay for most of the cost of cleanup by themselves, the only equilibrium is one with zero exit and zero clean firms. Second, even when there are some very socially responsible investors (consumers), the impact on the environment is limited unless everybody is significantly socially responsible. Finally, individual incentives to join an exit strategy are not necessarily aligned with social incentives, and so exit can lead to a less desirable outcome than the one achieved when all individuals are purely selfish.

One question raised by our paper is why social engagement is relatively rare in spite of all its desirable properties. In some cases, engagement is infeasible because somebody owns a majority of the votes, such as Mark Zuckerberg with Facebook, or the company is privately held, such as Koch Industries. We think that an important additional factor resides in the current US proxy system, which tends to limit shareholders' ability to influence corporate policy. The restrictions reflect a fear that individual shareholders are activists in the sense that they put a lot of weight on a single issue (e.g., their utility is $-Nh$). If instead individuals are socially responsible (in the way we define), this fear is unfounded. Individual shareholders have the incentive to vote on issues in a socially optimal way, and their engagement can lead to more efficient outcomes. Another important limitation is represented by the interpretation of the fiduciary duty of asset managers. To the extent that the duty to vote in the interest of the beneficiaries is narrowly interpreted as the duty to vote in their financial interest, socially responsible investors have their wings clipped by the law.

Another question is what comparative advantage firms have vis-à-vis the government in addressing externalities (e.g., Egorov and Harstad 2017; Besley and Persson 2020). After all, our voice option is not very different from single-issue referenda, common in Switzerland and California (see Matsusaka 2020). The corporate solution has three advantages. First, a referendum-imposed regulation has—by necessity—to be general, creating potentially large deadweight costs. A firm-by firm solution is more flexible and cost-effective. Second, in the investment world, there are monetary incentives for mutual funds to cater to investors' preferences, which are not present in the political world. Mutual funds can pay for the cost of setting up a proxy in a way that political parties cannot. Third, in the United States, companies can spend massively to influence the outcomes of referenda (as Uber and Lyft did recently in California), and their spending is constitutionally protected. By contrast, shareholders can choose to limit such spending. Thus, shareholder voice has the chance of being less prone to capture than political voice. Last but not least, regulations and referenda—while useful domestically—cannot cross borders as corporations' operations do (for a further discussion of this, see Arnold and Bustos 2005). Firms can avoid undesirable legislation by forum shopping. In contrast, investors' pressure is not limited by jurisdiction, allowing for the efficient enforcement of environmental standards across varying regulatory regimes.

## Appendix A

### The Benevolent Planner's Solution

Each firm produces one unit whether it is clean or dirty. As a result, the product market equilibrium and consumer surplus are independent of $\phi$. To derive investor utility, we need to compute the investors' return at date 1 after the planner sets the proportion of clean firms at $\phi$ and investors freely reoptimize their investment choices.

Let the equilibrium prices of the two types of firms be $V_c$ and $V_d$. The gross return of a clean firm is $\delta$ less than that of a dirty firm. Thus, in order to ensure that (purely selfish) investors stay invested in both kinds of firms at date 1, we must have

$$V_c = V_d - \delta. \tag{A1}$$

The return of an investor at date 2 is

$$x(\tilde{\Pi} - V_d) + x_0[\phi V_c + (1-\phi)V_d] - x_0 F, \tag{A2}$$

where $x$ is their date 1 portfolio holding. The first term reflects the fact that the net return on their investment is $\tilde{\Pi} - V_d = \tilde{\Pi} - \delta - V_c$. In the second and third terms, $x_0$ is the portfolio holding chosen at date 0 (given by [9]). The second term reflects the fact that a fraction $\phi$ of the firms the investor owns have become clean, and the third term is the original cost of the date 0 investment.

The certainty equivalent of this return is

$$\mathrm{CE} = x(\Pi - V_d) + x_0[\phi V_c + (1-\phi)V_d] - x_0 F - \frac{1}{2}\gamma x^2\sigma^2, \tag{A3}$$

and so the investor's date 1 choice of $x$ will satisfy

$$x = \frac{\Pi - V_d}{\gamma\sigma^2}. \tag{A4}$$

The condition for date 1 stock market equilibrium is $x = N$, which combined with (10) yields

$$V_d = F. \tag{A5}$$

Thus,

$$\begin{aligned}\mathrm{CE} &= \frac{(\Pi - F)^2}{2\gamma\sigma^2} - \phi\delta x_0 \\ &= \frac{(\Pi - F)^2}{2\gamma\sigma^2} - \phi\delta\frac{(\Pi - F)}{\gamma\sigma^2}.\end{aligned} \tag{A6}$$

By choosing $\phi N$ clean firms, the planner will cause the total amount of pollution to be $(1 - \phi)Nh$. The planner will maximize investor surplus net of harm; that is,

$$\left[\frac{(\Pi - F)^2}{2\gamma\sigma^2} - \phi\delta\frac{(\Pi - F)}{\gamma\sigma^2} - (1 - \phi)Nh\right] \tag{A7}$$

with respect to $\phi$. Recall that $\Pi = \tau - \rho N$, which is independent of $\phi$. We obtain a bang-bang solution (either $\phi = 0$ or $\phi = 1$) depending on whether

$$\delta\frac{(\Pi - F)}{\gamma\sigma^2} > \text{ or } < Nh. \tag{A8}$$

Using (10), this boils down to

$$\delta > \text{ or } < h. \tag{A9}$$

## Appendix B

### The Consumer Boycott

We suppose that a boycott is not anticipated at date 0 when firms are set up but only becomes a factor at date 1. Thus, $N$ is predetermined at date 1 and is given by (11).

Consider the replica economy where there are $r$ consumers. We start by assuming that a fraction $\theta$ of consumers will boycott the dirty product and then derive the equilibrium value of $\theta$. Boycotters buy only clean items at a price $p_c$. The other consumers are either indifferent about what they buy (if $p_c = p_d$) or buy only dirty items (if $p_d < p_c$). We will see that $p_d < p_c$. Thus, a fraction $\theta$ of the demand will be for clean products and a fraction $(1 - \theta)$ for dirty products.

Consider an equilibrium with $n_c$ clean firms and $n_d$ dirty firms, where $n_d = N - n_c$. The equilibrium in the output market requires that

$$\theta\left(\frac{\rho - p_c}{\tau}\right) = n_c, \quad (1 - \theta)\left(\frac{\rho - p_d}{\tau}\right) = n_d, \tag{B1}$$

where $p_c$ and $p_d$ are the prices of clean and dirty goods, respectively.

Solving these equations yields

$$\begin{aligned}p_c &= \frac{\theta\rho - \tau n_c}{\theta}, \\ p_d &= \frac{(1 - \theta)\rho - \tau n_d}{1 - \theta}.\end{aligned} \tag{B2}$$

In an interior equilibrium, the expected date 1 profit of clean and dirty firms must be the same, since otherwise the lower profit firms would have a lower market value (since investors must be induced to hold the shares), and a dirty firm would have the incentive to become clean, or vice versa. Hence,

$$\Pi_c = p_c - \delta = \Pi_d = p_d. \tag{B3}$$

Substituting the value of $p_c$ and $p$, we have

$$\frac{\theta\rho - \tau n_c}{\theta} - \delta = \frac{(1-\theta)\rho - \tau n_d}{1-\theta}, \tag{B4}$$

and using $n_d = N - n_c$, we can rewrite this as

$$\begin{aligned} n_c &= \theta N - \frac{\delta\theta(1-\theta)}{\tau}, \\ n_d &= (1-\theta)N + \frac{\delta\theta(1-\theta)}{\tau}. \end{aligned} \tag{B5}$$

If $N < \delta/\tau$, we have a corner solution: the number of clean firms $n_c = 0$ in a neighborhood of $\theta = 0$, and for low $\theta$, the marginal impact of $\theta$ on $n_c$ is zero. Under these conditions, it is an equilibrium for no consumer to divest: starting at $\theta = 0$, nonboycotting consumers will absorb any goods boycotters shun with minimal price impact, and as a result, no firms will become clean.

For small $\theta$, we have an interior solution with a positive number of clean firms ($n_c > 0$) if and only if $N > \delta/\tau$. From now on, we assume

$$N > \frac{\delta}{\tau}. \tag{B6}$$

Suppose that one of the consumers stops boycotting. When they were boycotting dirty products, they were maximizing their utility $\rho q - (1/2)\tau q^2 - p_c q$, yielding $q = (\rho - p_c)/\tau$. This purchase generates a utility of $(\rho - p_c)([\rho - p_c]/\tau) - (1/2)\tau([\rho - p_c]/\tau)^2 = (1/2\tau)(\rho - p_c)^2$. When they stop boycotting, they maximize $\rho q - (1/2)\tau q^2 - p_d q$, and so their utility becomes $(1/2\tau)(\rho - p_d)^2$. Thus, the change is

$$\frac{1}{2\tau}\left[(\rho - p_d)^2 - (\rho - p_c)^2\right] = \frac{1}{2\tau}[(2\rho - p_d - p_c)(p_c - p_d)]. \tag{B7}$$

At the same time, the consumer bears a cost of not boycotting due to their internalizing a fraction of social welfare. As in the divestment case, the effect of their stopping their boycott on other consumers' and investors' utility can be ignored by the envelope theorem. But there is a negative effect on the environment equal to $h(\partial n_c/\partial\theta)$, which will have weight $\lambda$ in their utility function. Thus, a boycott is sustainable if and only if

$$\frac{1}{2\tau}(2\rho - p_d - p_c)(p_c - p_d) \le \lambda h \frac{\partial n_c}{\partial \theta}. \tag{B8}$$

We can rewrite this as

$$\frac{1}{2\tau}\left(2\rho - \left[\rho - \frac{\tau n_c}{\theta} + \rho - \frac{\tau n_d}{1-\theta}\right]\right)\left(\frac{\tau n_d}{1-\theta} - \frac{\tau n_c}{\theta}\right) \le \lambda h\left[N - \frac{\delta}{\tau}(1-2\theta)\right], \quad \text{(B9)}$$

where we use (B2). After some manipulation and the use of (B5), this can be simplified to

$$(\tau \mathrm{N} - \delta)(\delta - \lambda h) \le 2\theta\delta\left(\lambda h - \frac{\delta}{2}\right) - \frac{\delta^2}{2}. \quad \text{(B10)}$$

For each $\theta$, let $\lambda'(\theta)$ be the unique value of $\lambda$ such that the left-hand side of (B10) equals the right-hand side. The following definition and proposition parallel the material in the divestment section, and we state them without discussion or proof.

Definition B1. A boycott equilibrium for the limit economy ($r = \infty$) is a $0 \le \theta \le 1$, where $\theta$ represents the fraction of investors who divest, such that either

1) $G(\lambda'(\theta)) = \theta$ or
2) $G(\lambda'(\theta)) < \theta$ and $\hat{G}(\lambda'(\theta)) \ge \theta$.

Proposition B1. A boycott equilibrium exists.

Proposition 5 in the text parallels proposition 3 for the divestment case.

## References

Acquatella, Angie. 2020. “Optimal Reimbursement Contracts for Physician Administered Treatments.” Manuscript, Harvard Univ., Cambridge, MA.
Admati, Anat, and Paul Pfleiderer. 2009. “The ‘Wall Street Walk’ and Shareholder Activism: Exit as a form of Voice.” *Rev. Financial Studies* 22 (7): 2645–85.
Aghion, Philippe, Roland Bénabou, Ralf Martin, and Alexandra Roulet. 2020. “Environmental Preferences and Technological Choices: Is Market Competition Clean or Dirty?” Discussion Paper no. 1684, Centre for Economic Performance, London.
Andersson, Mats, Patrick Bolton, and Frédéric Samama. 2016. “Hedging Climate Risk.” *Financial Analysts J.* 72 (3): 13–32.
Andreoni, James. 1989. “Giving with Impure Altruism: Applications to Charity and Ricardian Equivalence.” *J.P.E.* 97 (6): 1447–58.
Andreoni, James, and John Miller. 2002. “Giving according to GARP: An Experimental Test of the Consistency of Preferences for Altruism.” *Econometrica* 70 (2): 737–53.
Arnold, Denis, and Bustos Keith. 2005. “Business, Ethics, and Global Climate Change.” *Bus. and Professional Ethics J.* 24 (1/2): 103–30.
Ashenfelter, Orley C., Stephen Ciccarella, and Howard J. Shatz. 2007. “French Wine and the US Boycott of 2003: Does Politics Really Affect Commerce?” Working Paper no. 13258, NBER, Cambridge, MA.
Azar, José, Martin C. Schmalz, and Isabel Tecu. 2018. “Anticompetitive Effects of Common Ownership.” *J. Finance* 73(4): 1513–65.
Bagnoli, Mark, and Watts Susan G. 2003. “Selling to Socially Responsible Consumers: Competition and the Private Provision of Public Goods.” *J. Econ. and Management Strategy* 12 (3): 419–45.

Barber, Brad, Adair Morse, and Ayako Yasuda. 2021. "Impact Investing." *J. Financial Econ.* 139 (1): 162–85.
Barko, Tamas, Martijn Cremers, and Luc Renneboog. 2022. "Shareholder Engagement on Environmental, Social, and Governance Performance." *J. Bus. Ethics* 180 (2): 777–812.
Baron, David P. 2001. "Private Politics, Corporate Social Responsibility, and Integrated Strategy." *J. Econ. and Management Strategy* 10 (1): 7–45.
———. 2007. "Corporate Social Responsibility and Social Entrepreneurship." *J. Econ. and Management Strategy* 16 (3): 683–717.
Bauer, Rob, Tobias Ruof, and Paul Smeets. 2021. "Get Real! Individuals Prefer More Sustainable Investments." *Rev. Financial Studies* 34 (8): 3976–4043.
Bebchuk, Lucian A., and Roberto Tallarita. 2022. "The Illusory Promise of Stakeholder Governance." *Cornell Law Rev.* 106:91–177.
Becker, Gary S., and Kevin M. Murphy. 1993. "A Simple Theory of Advertising as a Good or Bad." *Q.J.E.* 108 (4): 941–64.
Bénabou, Roland, and Jean Tirole. 2010. "Individual and Corporate Social Responsibility." *Economica* 77 (305): 1–19.
Berg, Florian, Julian Kölbel, and Roberto Rigobon. 2019. "Aggregate Confusion: The Divergence of ESG Ratings." Working paper, MIT, Cambridge, MA.
Berk, Jonathan B., and Jules H. van Binsbergen. 2021. "The Impact of Impact Investing." Res. Paper no. 22-008, Stanford Univ. Graduate School of Bus. Res., Stanford, CA.
Besley, Timothy, and Maitreesh Ghatak. 2007. "Retailing Public Goods: The Economics of Corporate Social Responsibility." *J. Public Econ.* 91 (9): 1645–63.
———. 2018. "Prosocial Motivation and Incentive." *Ann. Rev. Econ.* 10:411–38.
Besley, Timothy, and Torsten Persson. 2020. "Escaping the Climate Trap? Values, Technologies, and Politics." Manuscript, London School Econ.
Bolton, Patrick, Li Tao, Ravina Enrichetta, and Rosenthal Howard. 2020. "Investor Ideology." *J. Financial Econ.* 137 (2): 320–52.
Bonnefon, Jean-François, Landier Augustin, Sastry Parinitha, and Thesmar David. 2019. "Do Investors Care About Corporate Externalities? Experimental Evidence." Research Paper no. 1350, HEC Paris.
Brav, Alon, Matthew Cain, and Jonathon Zytnick. 2021. "Retail Shareholder Participation in the Proxy Process: Monitoring, Engagement, and Voting." *J. Financial Econ.* 44 (2): 492–522.
Broccardo, Eleonora, Oliver D. Hart, and Luigi Zingales. 2020. "Exit vs. Voice." Working Paper no. 27710, NBER, Cambridge, MA.
Brodback, Daniel, Nadja Guenster, and David Mezger. 2019. "Altruism and Egoism in Investment Decisions." *Rev. Financial Econ.* 37 (1): 118–48.
Brown, Ira V. 1988. "Pennsylvania's Antislavery Pioneers, 1688–1776." *Pennsylvania Hist.* 55 (2): 59–77.
CB Insights. 2020. "State of Fintech: Investment & Sector Trends to Watch," https://www.cbinsights.com/research/report/fintech-trends-q4-2019/.
Charness, Gary, and Matthew Rabin. 2002. "Understanding Social Preferences with Simple Tests." *Q.J.E.* 117 (3): 817–69.
Chavis, Larry, and Phillip Leslie. 2009. "Consumer Boycotts: The Impact of the Iraq War on French Wine Sales in the US." *Quantitative Marketing and Econ.* 7 (1): 37–67.
Chowdhry, Bhagwan, Shaun William Davies, and Brian Waters. 2019. "Investing for Impact." *Rev. Financial Studies* 32 (3): 864–904.
Christensen, Hans B., Luzi Hail, and Christian Leuz. 2019. "Adoption of CSR and Sustainability Reporting Standards: Economic Analysis and Review." Working Paper no. 26169, NBER, Cambridge, MA.

Curtis, Quinn, Jill E. Fisch, and Adriana Z. Robertson. 2021. "Do ESG Mutual Funds Deliver on Their Promises?" Working paper, Faculty Scholarship at Penn Carey Law 2298.

Davidson, Wallace N., Dan L. Worrell, and Abuzar El-Jelly. 1995. "Influencing Managers to Change Unpopular Corporate Behavior through Boycotts and Divestitures." *Bus. and Strategy* 34 (2): 171–96.

Davies, Shaun William, and Edward Dickersin Van Wesep. 2018. "The Unintended Consequences of Divestment." *J. Financial Econ.* 128 (3): 558–75.

Dewatripont, Mathias, and Jean Tirole. 2020. "The Morality of Markets and the Nature of Competition." Working paper, Toulouse School Econ.

Dimson, Elroy, Oğuzhan Karakaş, and Xi Li. 2015. "Active Ownership." *Rev. Financial Studies* 28 (12): 3225–68.

Ederer, Florian, and Alezander Stremitzer. 2017. "Promises and Expectations." *Games and Econ. Behavior* 106 (C): 161–78.

Edmans, Alex. 2020. *Grow the Pie: How Great Companies Deliver Both Purpose and Profit.* Cambridge: Cambridge Univ. Press.

Egorov, Georgy, and Bård Harstad. 2017. "Private Politics and Public Regulation." *Rev. Econ. Studies* 84 (4): 1652–82

Elhauge, Einer. 2005. "Sacrificing Corporate Profits in the Public Interest." *New York Univ. Law Rev.* 80 (3): 733–869.

Friedman, Monroe. 1985. "Consumer Boycotts in the United States, 1970–1980: Contemporary Events in Historical Perspective." *J. Consumer Affairs* 19 (1): 96–117.

Frydlinger, David, and Oliver D. Hart. 2019. "Overcoming Contractual Incompleteness: The Role of Guiding Principles." Working Paper no. 26245, NBER, Cambridge, MA.

Gans, Joshua S., Avi Goldfarb, and Mara Lederman. 2021. "Exit, Tweets, and Loyalty." *American Econ. J. Microeconomics* 13 (2): 68–112.

Gollier, Christian, and Sébastien Pouget. 2022. "Investment Strategies and Corporate Behaviour with Socially Responsible Investors: A Theory of Active Ownership." *Economica* 89 (356): 997–1023.

Gordon, Jeffrey N. 2021. "Systematic Stewardship." Working Paper no. 640, Center for Law and Economics, Columbia Univ., New York.

Graff Zivin, Joshua, and Arthur Small. 2005. "A Modigliani-Miller Theory of Altruistic Corporate Social Responsibility." *Topics in Econ. Analysis and Policy* 5 (1): 1–19.

Green, Daniel, and Benjamin N. Roth. 2020. "The Allocation of Socially Responsible Capital." Working paper, Harvard Bus. School.

Grossman, Sanford, and Oliver Hart. 1980. "Takeover Bids, the Free-Rider Problem, and the Theory of the Corporation." *Bell J. Econ.* 11 (1): 42–64.

Hart, Oliver, and Luigi Zingales. 2017. "Companies Should Maximize Shareholder Welfare Not Market Value." *J. Law Finance and Accounting* 2 (2): 247–75.

Heeb, Florian, Julian F. Kölbel, Falko Paetzold, and Stefan Zeisberger. Forthcoming. "Do Investors Care about Impact?" *Rev. Financial Studies.*

Heinkel, Robert, Alan Kraus, and Josef Zechner. 2001. "The Effect of Green Investment on Corporate Behavior." *J. Financial and Quantitative Analysis* 36 (4): 431–49.

Henderson, M. Todd, and Anup Malani. 2009. "Corporate Philanthropy and the Market for Altruism." *Columbia Law Rev.* 109: 571–627.

Hirschman, Albert O. 1970. *Exit, Voice, and Loyalty: Responses to Decline in Firms, Organizations, and States.* Cambridge: Harvard Univ. Press.

Hong, Harrison, and Marcin Kacperczyk. 2009. "The Price of Sin: The Effects of Social Norms on Markets." *J. Financial Econ.* 93:15–36.

Huberman, G. 2001. “Familiarity Breeds Investment.” *Rev. Financial Studies* 14 (3): 659–80.

King, Brayden G. 2011. “The Tactical Disruptiveness of Social Movements Sources of Market and Mediated Disruption in Corporate Boycotts.” *Social Problems* 58 (4): 491–517.

Kitzmueller, Markus, and Jay Shimshack. 2012. “Economic Perspectives on Corporate Social Responsibility.” *J. Econ. Literature* 50 (1): 51–84.

Krueger, Philipp, Zacharias Sautner, and Laura T. Starks. 2020. “The Importance of Climate Risks for Institutional Investors.” *Rev. Financial Studies* 33 (3): 1067–111.

Laidlaw, James. 1995. *Riches and Renunciation. Religion, Economy, and Society among the Jains.* Oxford: Clarendon.

Landier, Augustin, and Stefano Lovo. 2020. “ESG Investing: How to Optimize Impact?” Research Paper no. FIN-2020-1363, HEC Paris.

Lindset, Snorre, and Quynh Trang Nguyen. 2020. “Can an Influential and Responsible Investor indeed be Influential through Responsible Investments? Evidence from a $1 Trillion Fund.” https://ssrn.com/abstract=3640447 or https://doi.org/10.2139/ssrn.3640447.

Magill, Michael, Martine Quinzii, and Jean-Charles Rochet. 2015. “A Theory of the Stakeholder Corporation.” *Econometrica* 83 (5): 1685–725.

Mas-Colell, Andreu, Michael D. Whinston, and Jerry R. Green. 1995. *Microeconomic Theory.* Oxford: Oxford Univ. Press.

Matsusaka, John. 2020. *Let the People Rule: How Direct Democracy Can Meet the Populist Challenge.* Princeton, NJ: Princeton Univ. Press.

Mayer, Colin. 2018. *Prosperity: Better Business Makes the Greater Good.* Oxford: Oxford Univ. Press.

Morgan, John, and Justin Tumlinson. 2019. “Corporate Provision of Public Goods.” *Management Science* 65 (10): 4489–504.

Naaraayanan, S. Lakshmi, Kunal Sachdeva, and Varun Sharmak. 2021. “The Real Effects of Environmental Activist Investing.” Finance Working Paper no. 743/2021, European Corporate Governance Institute.

Nyborg, Karine, and Tao Zhang. 2013. “Is Corporate Social Responsibility Associated with Lower Wages?” *Environmental and Res. Econ.* 55 (1): 107–17.

Oehmke, Martin, and Marcus M. Opp. 2022. “A Theory of Socially Responsible Investment.” Research Paper no. 20–2, Swedish House of Finance, Stockholm.

O’Leary Michael, and Warren Valdmanis. 2020. *Accountable: The Rise of Citizen Capitalism.* New York: Harper Bus.

Pack, Spencer J., and Robert W. Dimand. 1996. “Slavery, Adam Smith’s Economic Vision and the Invisible Hand.” *Hist. Econ. Ideas* 4 (1/2): 253–69.

Pástor, Ľuboš, Robert F. Stambaugh, and Lucian A. Taylor. 2021. “Sustainable Investing in Equilibrium.” *J. Financial Econ.* 142 (2): 550–71.

Pedersen, Lasse Heje, Shaun Fitzgibbons, and Lukasz Pomorski. 2021. “Responsible Investing: The ESG-Efficient Frontier.” *J. Financial Econ.* 142 (2): 572–97.

Quigley, Ellen. 2019. “Universal Ownership in the Anthropocene.” Working paper.

Quigley, Ellen C., Emily Bugden, and Anthony Odgers. 2020. “Fossil Fuel Divestment: Advantages and Disadvantages for the University of Cambridge.” Cambridge Univ., Cambridge. https://www.cam.ac.uk/system/files/sm6_divestment_report.pdf.

Riedl, Arno, and Paul Smeets. 2017. “Why Do Investors Hold Socially Responsible Mutual Funds?” *J. Finance* 72 (6): 2505–50.

Schmidt, Klaus, and Fabian Herweg. 2021. "Prices versus Quantities with Morally Concerned Consumers." Rationality and Competition Discussion Paper no. 272, CRC TRR (Collaborative Research Centre/Transregio) 190 Rationality and Competition, Berlin.

Schoenmaker, Dirk, and Willem Schramade. 2019. *Principles of Sustainable Finance*. Oxford: Oxford Univ. Press.

Shapira, Roy, and Luigi Zingales. 2017. "Is Pollution Value-Maximizing? The DuPont Case." Working Paper no. 23866, NBER, Cambridge, MA.

Shleifer, Andrei. 1986. "Do Demand Curves for Stocks Slope Down?" *J. Finance* 41 (3): 579–90.

———. 2004. "Does Competition Destroy Ethical Behavior?" *A.E.R.* 94 (2): 414–18.

Shleifer, Andrei, and Robert W. Vishny. 1997. "A Survey of Corporate Governance." *J. Finance* 52 (2): 737–83.

Smith, Jamie. 2021. "What Boards Should Know about ESG Developments in the 2021 Proxy Season." https://www.ey.com/en_us/board-matters/esg-developments-in-the-2021-proxy-season.

Stout, Lynn. 2012. *The Shareholder Value Myth*. San Francisco, CA: Berrett-Koehler.

Sugden, Robert. 1982. "On the Economics of Philanthropy." *Economic J.* 92 (366): 341–50.

———. 1984. "Reciprocity: The Supply of Public Goods through Voluntary Contributions." *Economic J.* 94 (376): 772–87.

Tallarita, Roberto. 2022. "Stockholder Politics." *Hastings Law J.* 73 (6): 1697–760.

Teoh, Siew Hong, Ivo Welch, and C. Paul Wazzan. 1999. "The Effect of Socially Activist Investment Policies on the Financial Markets: Evidence from the South African Boycott." *J. Bus.* 72 (1): 35–89.

Thaler, Richard H., and Cass R. Sunstein. 2008. *Nudge: Improving Decisions About Health, Wealth, and Happiness*. New Haven, CT: Penguin.