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# FIRM OWNERSHIP AND POLLUTION

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## ABSTRACT

We provide a theoretical micro foundation for how much pollution (negative externalities) a firm will internalize based on the ownership distribution of its shareholders. Small shareholders, compared to large ones, want the firm to spend more on avoiding pollution since they suffer less profit loss for the same environmental benefit. In particular, if a shareholder holds a share of 1/N, where N is the population in society, that shareholder's preferences align with a social planner's. Three theoretical predictions arise. First, small shareholders will systematically vote for a greener corporate profile. Second, firms with a smaller weighted median shareholder will pollute less. Third, countries with concentrated corporate wealth holdings and/or more individualized firm ownership pollute more. This implies that standard models of externalities in environmental economics and macroeconomics containing representative agents are either internally inconsistent or not fully specified.

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# 1 Introduction

Investors have increasingly included environmental, social, and governance factors in their investment decisions (Berk & van Binsbergen, 2025; Kräussl et al., 2024; Oehmke & Opp, 2024). Besides adjusting their portfolios, investors have also become more active through shareholder voting. This form of shareholder activism is a key strategy for shareholders to improve corporate governance and influence the firm to pursue environmental initiatives (Chuah et al., 2024; Dimson et al., 2015; Goranova & Ryan, 2015).

We provide a micro foundation for the extent to which a firm will internalize its pollution externalities, based on its distribution of ownership shares.[1] We first show in Proposition 1 that small shareholders want the firm to abate more pollution. The intuition for this is simple. As private citizens, shareholders experience environmental gains from the firm's abatement (assumed equal for simplicity), yet smaller shareholders bear a smaller share of the abatement cost.[2] We then analyze how these 'wants' of owners aggregate to firm action. Each shareholder votes for or against a green project, where the votes of large shareholders carry proportionately more weight. The preference of the weight-adjusted median shareholder then determines the firm's decision (Proposition 2). If all owners have the same share, firms with many owners have a small weighted median shareholder and will pollute less; those with few owners pollute more. In other words, ownership concentration leads to more emissions.

This conclusion, however, comes with some interesting and important caveats when ownership shares are not equal. If shares are transferred from larger to smaller existing owners (so that ownership inequality is reduced), three effects play out. The first is that the transfer increases the voting weight of initially smaller owners. Since they want the firm to internalize more externalities, this pushes in the direction of less pollution (the distribution-of-power effect). Yet, as a second effect, these recipient owners now have more shares thus prefer more pollution than before (the

[1] This is unlike previous theories where inequality affects the environment due to effects on household consumption choices (Hausman & Stolper, 2021; Heerink et al., 2001) or effects on regulation (Baumgärtner et al., 2017; Boyce, 1994). It is also distinctly different from the recent and quickly growing literature studying how environmental regulation affects inequality (e.g., Hänsel et al., 2022; Kornek et al., 2021; Zhao & Mattauch, 2022) or how environmental degradation affects inequality (Drupp et al., forthcoming).

[2] This is akin to Broccardo et al. (2022). In their setting, shareholder size is homogeneous and the heterogeneity comes from a differential degree of social responsibility.

preference effect of the receiver), pushing in the direction of more pollution. Finally, the giver now has fewer shares thus prefers less pollution than before (the preference effect of the giver). The total impact on the size of the new weighted median voter is ambiguous and—unlike in regular voting models—the preference of a median voter is here endogenous to its size. We provide conditions for when pollution increases and when it decreases following more equalized ownership (Proposition 3). In the special case where the recipient is someone who does not own shares yet, we show that pollution (weakly) decreases (Corollary 4).

Our final result (Proposition 4) shows that countries with more concentrated corporate wealth will have higher pollution levels: inequality degrades the environment. We however show that pollution is high under complete wealth equality if each individual firm is owned by few people or—in the extreme case—a single person. This implies that representative-agent models containing environmental externalities are not internally inconsistent or not fully specified. In particular, a firm owned in equal shares by the entire population (the representative agent) would invest in abatement like a social planner (Corollary 5).

## 2 An owner's abatement preferences

This section outlines a parsimonious model that provides a micro-foundation for the relationship between an investor's holding in a firm and their willingness to invest in pollution abatement.

Consider an economy with $N$ individuals indexed by $n \in \{1, \ldots, N\}$. An individual's ownership share in a firm is given by $\alpha_n \in [0, 1]$, such that

$$\sum_{n=1}^{N} \alpha_n = 1. \tag{1}$$

Note that $\alpha_n$ may be zero representing an individual holding no shares.

The firm can choose to implement a pollution abatement project. If it does, each individual receives the same abatement benefit $b \geq 0$. The cost of implementation $c$ is borne by the firm owners in proportion to their ownership share, i.e., the private cost to individual $n$ equals $\alpha_n c \geq 0$. An abatement project is therefore categorized by a pair of total benefit $Nb \in \mathbb{R}_+$ and total cost

$c \in \mathbb{R}_+$. Hence, it is socially optimal to implement the project if and only if:

$$Nb > c. \tag{2}$$

Since owners bear a differentiated cost, an owner supports an abatement project if and only if its private benefit is weakly greater than its private cost:

$$b/c > \alpha_n. \tag{3}$$

From this, it directly follows:

**Proposition 1.** *A smaller owner wants the firm to pass projects with lower $b/c$.*

**Corollary 1.** *An owner with share $\alpha_n \leq \frac{1}{N}$ wants the firm to pass all projects that a social planner would pass. An owner with share $\alpha_n \geq \frac{1}{N}$ wants the firm to reject all projects that a social planner would reject.*

Proposition 1 states that owners with a lower ownership share will want a firm to implement more green investments and pollute less. The intuition is simple: all firm owners enjoy the same economy-wide benefits from abatement, but the cost of implementation increases in ownership share. Therefore, a small owner has less to lose from implementing a more costly abatement project, and vice versa. As a result, differential ownership within a firm leads to differences in willingness to undertake abatement projects. The corollary implies that an owner with share $1/N$ will want to pass or reject the same projects a social planner would. Hence, owners' preferences align with the social optimum if ownership is spread equally across the population. Very small owners (in the extreme, those that hold no shares) even want the firm to implement socially suboptimal projects as they face minimal cost. Larger owners want to forego certain projects that a social planner would implement.

## 3 A firm's abatement

Proposition 1 and Corollary 1 focus on each owner's desires. Here we analyze a firm's decision rule. An abatement project has two possible outcomes: $(P)ass$ or $(R)eject$. By Proposition 1, each owner's preference order is:

$$P \succ R \ \text{ if } b/c > \alpha_n,$$
$$P \prec R \ \text{ if } b/c \le \alpha_n.$$

We consider simultaneous-move weighted voting, where owners vote between outcomes $(P)ass$ and $(R)eject$. An owner $n$'s vote is represented by an indicator function $\mathbb{I}_n[P]$ which takes value 1 when the owner chooses $P$, and 0 otherwise. The voting weight of an owner is equivalent to its ownership share $\alpha_n$. The project passes if and only if the weighted sum of votes exceeds a simple majority, i.e.,

$$\sum_{n=1}^{N} \alpha_n \cdot \mathbb{I}_n[P] > \frac{1}{2}; \tag{4}$$

and is rejected otherwise.

We focus on Coalition-Proof Nash Equilibrium (CPNE) (Bernheim et al., 1987): an agreement is coalition-proof if and only if there is no profitable joint deviation by any subset of individuals, holding the actions of the rest fixed. We use CPNE as a refinement for two reasons. First, this avoids unreasonable equilibria where a majority of owners act against their interest simply because none of them is individually pivotal. Second, this reflects corporate voting behavior as there have been cases of coalition formation by shareholders to veto business proposals and/or promote specific objectives. A common form of such coalition forming is shareholder activism campaigns. Examples include ClientEarth filing an OECD complaint against BP's advertising campaign (ClientEarth, 2020), the Church of England Pensions Board's shareholder resolutions to disclose the clean-energy supply ratio by Goldman Sachs (The Wall Street Journal, 2023), and impact-driven hedge fund Engine No. 1's successful campaign to replace three of ExxonMobil's twelve board members with candidates with energy-transition experience (Chuah et al., 2024).

Order owners in ascending order of ownership shares and, with some abuse of notation, denote their shares by $\alpha_0 < \alpha_1 < \cdots < \alpha_G$, where $\alpha_0 = 0$ represents non-owners. Each of $g \in \{0, \ldots, G\}$ represents a subset of one or more discrete numbers of owners with the same shares. Let $m_g$ denote the number of agents with share $\alpha_g$. Define $S_p^q \equiv \sum_{g=p}^{q} m_g \cdot \alpha_g$ as the sum of ownership shares from subset $p$ to $q$, $p \leq q$.[3] A weighted median owner has a share $\alpha_\phi$, such that

$$
\begin{aligned}
S_1^{\phi-1} \leq \frac{1}{2} \text{ and } S_1^{\phi} > \frac{1}{2}; \\
S_{\phi+1}^{G} < \frac{1}{2} \text{ and } S_{\phi}^{G} \geq \frac{1}{2}.
\end{aligned} \tag{5}
$$

$S_1^{\phi-1}$ is the combined share of all owners smaller than the weighted median, while $S_{\phi+1}^{G}$ is the combined share of owners above the weighted median. No coalition can achieve a simple majority without the weighted median owners. Note that, technically, there may be more than one weighted median owner and the above definition implies that at least one (but possibly more) of those owners are needed to achieve a winning coalition.

The next proposition (proof in appendix) outlines which projects a firm will implement:

**Proposition 2.** *In all CPNE the firm passes the project if and only if $b/c > \alpha_\phi$ where $\alpha_\phi$ is the share of a weighted median owner.*

Similar to Corollary 1, the firm's decision can coincide with the social planner's:

**Corollary 2.** *A firm will implement all socially-optimal projects and reject all non-socially-optimal projects if and only if $\alpha_\phi = \frac{1}{N}$.*

To conclude, Corollary 3 illustrates a specific scenario in which all owners of a firm possess equal ownership, making each owner a weighted median owner.

**Corollary 3** (Equal Ownership)**.** *Suppose a firm has $K$ owners with equal shares. As $K$ increases, the firm will pass abatement projects with lower $b/c$.*

[3]By convention, if $p > q$ then $S_p^q = 0$.

This corollary, in the spirit of Proposition 1 in Broccardo et al. (2022), says that firms with more equally-sized sharedholders will internalize pollution more. This holds when all owners of the firm are of the same size. We will show next that this conclusion is challenged by non-homogeneous ownership distributions.

To do so, we analyze how *Robin Hood transfers*—an inequality-reducing redistribution of firm ownership—affect the firm's abatement decision. In a Robin Hood transfer, a larger owner $j$ transfers $\epsilon > 0$ shares to a smaller owner $i$, while keeping the ordering between $i$ and $j$ unchanged, i.e. $\alpha_i + \epsilon \leq \alpha_j - \epsilon$.[4] Thus it transforms an initial distribution into another distribution that is more equal, i.e., Lorenz dominant. In this thought experiment, the initial distribution can be thought of as one firm, and the post-transfer distribution can be thought of as another firm.

We can immediately rule out that transfers between owners $i$ and $j$ where $(\alpha_i, \alpha_j) > \alpha_\phi$ or where $(\alpha_i, \alpha_j) < \alpha_\phi$ affect the weighted median. Transfers within these groups (maintaining the ordering between the donor and the recipient) will not change the cumulative ownership of those who possess fewer or more shares than the original weighted median owners. Consequently, in what follows, we focus on cases where Robin Hood transfers occur exclusively between one owner above the weighted median and another below.

Consider such a transfer of shares from an owner with initial share $\alpha_\phi \leq \alpha_j$ to an owner with initial share $\alpha_i \leq \alpha_\phi$. This gives rise to three effects. The first effect is that voting power is transferred from an owner with weaker environmental preferences ($j$) to an owner with stronger environmental preferences ($i$). This distribution-of-power effect goes in the direction of increasing the firm's environmental performance. The second effect is that $i$ now has weaker environmental preferences due to its increased shareholding. We call this a preference effect on the receiver side and it may worsen the firm's environmental performance. Third, $j$ now owns fewer shares and therefore cares more about the environment. We call this a preference effect on the giver side and it may improve the firm's environmental performance.

Which of these effects dominate? In general one might think that, since two of the three effects

[4] Although the ordering between $i$ and $j$ does not change, their ordering with respect to other shareholders may change.

speak in favor of stronger internalization of externalities, more equal shareholding would improve environmental performance. But, under certain conditions, the preference effect on the receiver side can dominate, such that the combined effect of the Robin Hood transfer increases the shareholding of the new weighted median owner and decreases the firm's environmental performance. Proposition 3 summarizes the parametric conditions under which a firm passes abatement projects with a strictly lower or a strictly higher benefit-to-cost ratio $b/c$ after the transfer:

**Proposition 3** (Robin Hood Transfer)**.** *Consider two owners $i$ and $j$ who have shares $\alpha_i \leq \alpha_\phi$ and $\alpha_\phi \leq \alpha_j$ respectively. Suppose owner $j$ makes a Robin Hood transfer of $\epsilon > 0$ shares to owner $i$ such that $\alpha_i + \epsilon \leq \alpha_j - \epsilon$:*

1. *The firm's cutoff $b/c$ for passing a project is strictly lower if and only if:*

$$\begin{cases} \alpha_i + \epsilon \leq \alpha_j - \epsilon < \alpha_\phi \\ S_1^{\phi-1} + \alpha_j > 1/2, \end{cases} \quad or \quad \begin{cases} \alpha_i + \epsilon < \alpha_\phi \leq \alpha_j - \epsilon \\ S_1^{\phi-1} + \epsilon > 1/2; \end{cases}$$

2. *The firm's cutoff $b/c$ for passing a project is strictly higher if and only if:*

$$\begin{cases} \alpha_\phi < \alpha_i + \epsilon \leq \alpha_j - \epsilon \\ S_{\phi+1}^{G} + \alpha_i \geq 1/2. \end{cases}$$

See appendix for proof. Perhaps counterintuitively, the proposition shows that more equality can lead to less abatement. We will illustrate with some examples how the resulting effects can either decrease, increase, or keep pollution constant.

Consider a firm with an initial ownership distribution as detailed in Panel $i$ in Table 1. Owners are sorted in ascending order. The weighted median owner is **bolded**. Starting from the same initial allocation, we implement three different Robin Hood transfers of shares from the largest owner $F$ to each of the smaller owners $A$, $D$ and $E$ (Panels $ii$ - $iv$).

In Panel $ii$, F has transferred 6% to $A$, changing the weighted median owner from $E$ to $D$. This

Table 1: Robin Hood Transfers and Changes in Firm Decisions

| Owners and their Ownership Shares (%) | | | | | |
|---|---|---|---|---|---|
| A | B | C | D | **E** | F |
| 7 | 10 | 15 | 15 | **20** | 33 |

(*i*) Initial Ownership Allocation

| | | | | | |
|---|---|---|---|---|---|
| B | A | C | **D** | E | F |
| 10 | 13 | 15 | **15** | 20 | 27 |

(*ii*) $F$ Transfers 6%-pt to $A$

| | | | | | |
|---|---|---|---|---|---|
| A | B | C | **E** | D | F |
| 7 | 10 | 15 | **20** | 21 | 27 |

(*iii*) $F$ Transfers 6%-pt to $D$

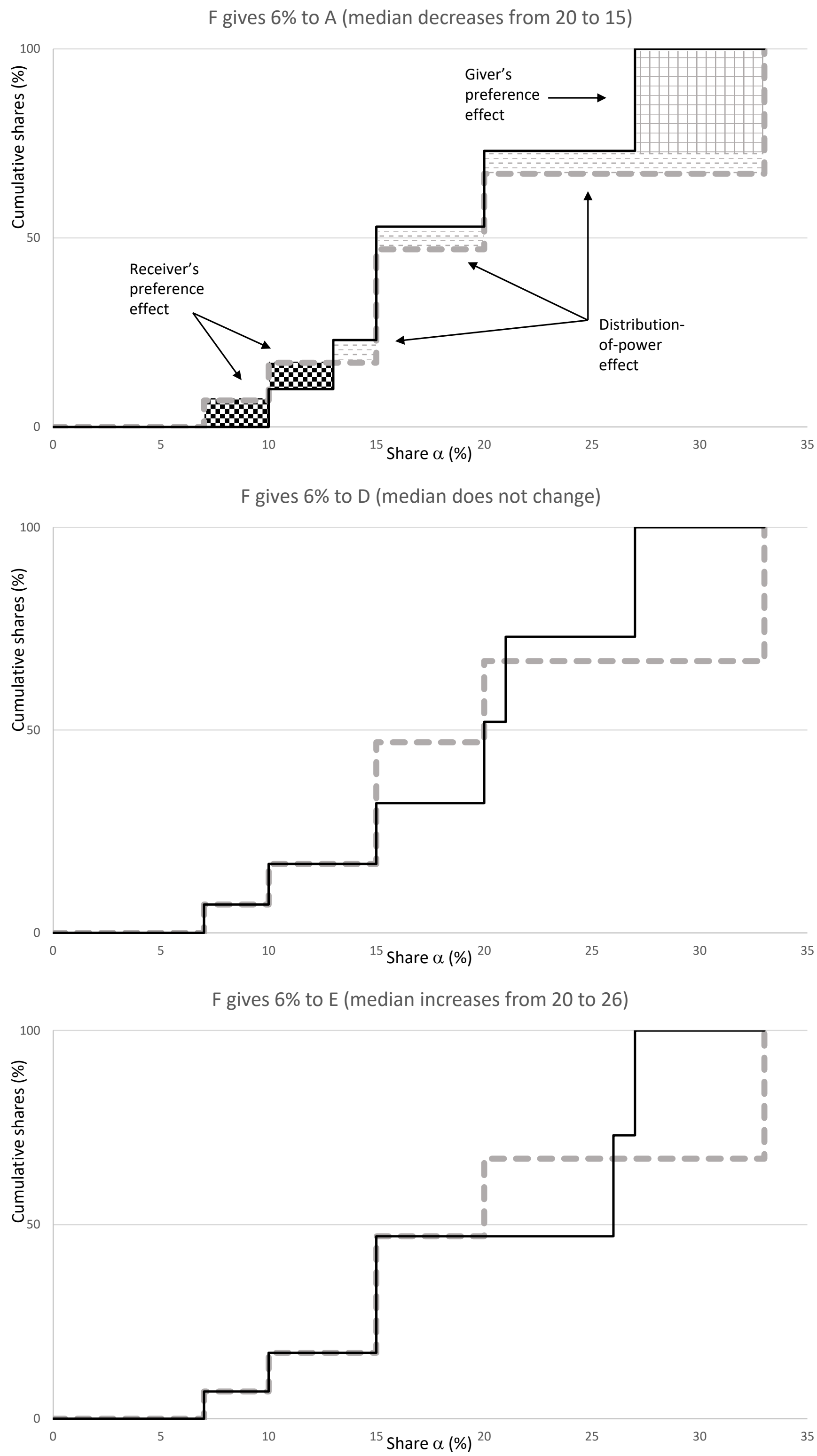
| | | | | | |
|---|---|---|---|---|---|
| A | B | C | D | **E** | F |
| 7 | 10 | 15 | 15 | **26** | 27 |

(*iv*) $F$ Transfers 6%-pt to $E$

is visualized in the upper graph in Figure 1 where the dashed line represents the initial cumulative distribution of shares (y-axis) as a function of the size of the owners (x-axis). The solid line is the new distribution. To see how this shift affects the environmental performance of the firm, note that the x-axis represents an owner's share and therefore, by Proposition 1, its environmental preference. The ownership share at which the distribution passes the 50% mark on the y-axis represents the share of the weighted median voter. In the upper graph, the new distribution crosses the 50% mark earlier; at the share of owner $D$ instead of $E$.

The same panel illustrates the three effects. The shift down on the left represents the preference effect of the receiver: $A$ gets weaker environmental interests. This downshift corresponds to $A$'s initial size (7%). At the new size of the receiver (7+6=13%), the distribution then shifts up above the initial one. The distance between the distributions immediately to the right of the vertical shift equals the size of the transfer (6%). This represents the distribution-of-power effect in favor of more abatement. Finally, on the right, the new distribution jumps far above the old, as $F$'s share has decreased so its environmental preferences are stronger. This is the preference effect of the giver. In this example, the distribution-of-power effect is the one that matters.

Figure 1: Illustration of Robin Hood Transfers



Next, in Panel *iii*, $F$ transfers 6% to $D$. The middle figure illustrates that the weighted median ($E$, who owns 20%) remains unchanged. Finally, in panel *iv* of the table and bottom figure, we transfer 6% from $F$ to $E$. Here the preference effect of the receiver dominates: $E$ remains the weighted median but since their share increases to 26%, abatement goes down.

The proposition and examples illustrate how decreased ownership inequality can have ambiguous effects. However, if the transfer of shares goes to a non-owner, the effect is unambiguous:

**Corollary 4** (Robin Hood Transfer to Non-Owner)**.** *Suppose owner $j$ makes a Robin Hood transfer of $\epsilon > 0$ shares to a non-owner $i$ who had zero ownership. The firm's cutoff $b/c$ for passing a project cannot increase. The firm will pass projects with strictly lower $b/c$ if and only if either:*

$$\begin{cases} \epsilon \leq \alpha_j - \epsilon < \alpha_\phi \\ S_1^{\phi-1} + \alpha_j > 1/2, \end{cases} \quad or \quad \begin{cases} \epsilon < \alpha_\phi \leq \alpha_j - \epsilon \\ S_1^{\phi-1} + \epsilon > 1/2. \end{cases}$$

The explanation for this clear-cut result is that the counteracting preference effect of the receiver is nonexistent when the receiver has no shares; the new distribution is never below the old one. The only thing that matters is that larger owners lose power and get stronger environmental preferences. This suggests that the entry of small activist owners should always improve a firm's environmental performance.

## 4 A country's abatement

We now aggregate Proposition 2 across multiple firms to analyze pollution at a country level. Such aggregation is complicated to do generally so for simplicity we assume that owners in a firm have equal ownership shares. Consider a country consisting of a mass 1 of infinitely small individuals, of which a fraction $\lambda \in (0, 1]$ hold all wealth. There is a mass 1 of identical firms. Each firm can implement a project. The cost of implementation is $c$ and is borne by the owners. The project generates a benefit $b$ distributed evenly in the population. Clearly, a social planner would implement the project if $b/c > 1$. Not every wealth holder owns shares in each firm, instead, let $p \in (0, 1]$ denote the share of wealth holders that own (equal) shares in a particular firm.

$\lambda$ measures a country's wealth equality at the population level. When $\lambda = 1$ there is complete equality while when $\lambda \to 0$ there is extreme wealth inequality. $p$ denotes how individualized ownership is. When $p = 1$ all wealth holders hold shares in all firms and when $p$ is small then each wealth holder has shares in few firms.

Each firm will be owned by a share $p\lambda$ of the population. Since owners in the firm have equal share, the weighted median owner is equivalent to its representative owner. The private cost of project implementation for the representative owner is $c/(p\lambda)$ while the private benefit is $b$. From this, by Proposition 2 and since all firms are identical, directly follows:

**Proposition 4.** *Firms in a country implement an abatement project if and only if* $b/c > 1/(p\lambda)$*. Environmental performance increases in* $\lambda$ *and increases in* $p$*.*

This proposition expresses that wealth inequality ($\lambda$) increases pollution. Holding other things fixed, the more concentrated wealth is, the fewer people own firms and the larger their shares. Thus the firms will implement fewer abatement projects. It is, however, not only the concentration of wealth that matters but also the structure of ownership within firms. If capital holders own few firms each ('individualized' ownership, small $p$) then pollution will be high. But if each firm has many owners or, equivalently, each capital owner is spread over many firms (large $p$), then there will be less pollution. The next corollary expresses an important implication.

**Corollary 5.** *Suppose* $\lambda = 1$*. Firms in the country will implement all socially-optimal projects and reject all non-socially-optimal projects if and only if* $p = 1$*. The firms will reject all environmental projects if and only if* $p \to 0$*.*

The corollary shows that in a representative-agent framework (i.e., where there truly is no heterogeneity), if agents own all firms equally ($p \to 1$), then the social benefit of abatement will be perfectly internalized. Standard models considering externalities in environmental economics or macroeconomics (e.g., those consisting of a representative agent and firms that do not internalize any pollution) are thus either internally inconsistent or not fully specified. It is only if each of the firms are owned by a single agent ($p \to 0$) that pollution becomes a perfect externality as is commonly assumed.

## 5 Conclusions

This paper provides a theoretical micro foundation for how much negative externalities a firm will internalize based on its shareholders' interests. The key assumption is that shareholders, like others in society, bear a cost when the environment is degraded. If so, then small shareholders of a firm will want it to incur higher costs to avoid environmental harm, since their profit loss is less consequential than for a large shareholder, while all, presumably, bear a similar environmental harm. As a result, firms will internalize some externalities. How much depends on the distribution of its shares. Firms with many small owners will pollute less; those with few owners pollute more.

This conclusion, however, comes with some subtleties. When the ownership distribution becomes more equal through the transfer of shares from an existing shareholder to individuals who do not own shares yet, pollution (weakly) decreases. Yet if shares are transferred from larger to existing smaller owners, three partly countervailing effects play out. First, the bloc of small owners sees its power increase, which will induce the firm to pollute less (the distribution-of-power effect). But, as a second effect, when these small owners receive more shares, their interests change. They incur a higher profit loss from environmental abatement and now want the firm to pollute more (the receiver's preference effect). Finally, as the larger owner now owns fewer shares, it wants the firm to pollute less (the giver's preference effect). While we show that the receiver's preference effect may dominate the other two effects in some instances, we conjecture that the distribution-of-power effect and giver's preference effect will mostly dominate (e.g., if considering many changes towards more equal shareholding), because they are two effects versus just one, so that a more even distribution of shares will improve environmental performance.

Aggregating the results of a single firm to a country level, we show that wealth inequality drives environmental degradation. Holding all else equal, more concentration of wealth implies fewer owners of each firm. But extensive environmental harm may arise also under a more even distribution of wealth if firm ownership is individualized so that each firm has few owners. A technical implication of this analysis is that representative-agent models containing externalities—in macroeconomics or environmental economics—are either internally inconsistent or not fully specified. This is the case since, if a firm is owned equally by the entire population (the representative agent), then the interests of each owner align with the social planner's.

Are these results empirically testable? Yes, but a serious examination would need to have access to specific data and avoid some pitfalls. Since cross-country comparisons are notoriously problematic, and the ownership structure of a firm may be correlated with various confounders (e.g., industry), the cleanest test of our prediction might exploit shareholdings and voter behavior data on individual owners of individual firms. Our theory predicts that small owners will vote in favor of environmental projects more frequently than large owners will, within the same firm.

What constitutes a large or small owner is relative to how 'society' is defined. A single owner in a society consisting of 100 people would internalize more externalities than two owners in a society consisting of 1000 people. Furthermore, what defines society here is not the country under consideration. Rather it is determined by the physical properties of pollution. A highly localized pollutant affects few people, so even if the firm is owned by few, they will consistute a relatively large part of society. For global pollutants, however, society is the world population. So if a firm goes from say, 1,000 to 10,000 owners, they still only represent a miniscule part of society. For this reason, our predictions probably apply less to carbon dioxide than, say, particulate matter. Finally, owners of a firm can live in a separate society altogether (in our framework, $b = 0$). This suggests that, for instance, firms engaged in FDI will internalize externalities less.

## References


Baumgärtner, S., Drupp, M. A., Meya, J. N., Munz, J. M., & Quaas, M. F. (2017). Income inequality and willingness to pay for environmental public goods. *Journal of Environmental Economics and Management*, *85*, 35–61.

Berk, J. B., & van Binsbergen, J. H. (2025). The impact of impact investing. *Journal of Financial Economics*, *164*, 103972.

Bernheim, B. D., Peleg, B., & Whinston, M. D. (1987). Coalition-proof nash equilibria i. concepts. *Journal of Economic Theory*, *42*(1), 1–12.

Boyce, J. K. (1994). Inequality as a cause of environmental degradation. *Ecological Economics*, *11*(3), 169–178.

Broccardo, E., Hart, O., & Zingales, L. (2022). Exit versus voice. *Journal of Political Economy*, *130*(12), 3101–3145.

Chuah, K., DesJardine, M., Goronova, M., & Henisz, W. (2024). Shareholder activism research: A system's level view. *Academy of Management Annals*, *18*(1), 82–120.

ClientEarth. (2020). BP greenwashing complaint sets precedent for action on misleading ad campaigns [Accessed: 2024-10-10]. https://www.clientearth.org/latest/news/bp-greenwashing-complaint-sets-precedent-for-action-on-misleading-ad-campaigns/

Dimson, E., Karakas, O., & Li, X. (2015). Active ownership. *Review of Financial Studies*, *28*(12), 3225–3268.

Drupp, M. A., Kornek, U., Meya, J., & Sager, L. (forthcoming). The economics of inequality and the environment. *Journal of Economic Literature*.

Goranova, M., & Ryan, L. V. (2015). Shareholder activism: A multidisciplinary review. *Journal of Management*, *40*(5), 1230–1268.

Hänsel, M. C., Franks, M., Kalkuhl, M., & Edenhofer, O. (2022). Optimal carbon taxation and horizontal equity: A welfare-theoretic approach with application to German household data. *Journal of Environmental Economics and Management*, *116*, 102730.

Hausman, C., & Stolper, S. (2021). Inequality, information failures, and air pollution. *Journal of Environmental Economics and Management*, *110*, 102552.

Heerink, N., Mulatu, A., & Bulte, E. (2001). Income inequality and the environment: Aggregation bias in environmental kuznets curves. *Ecological Economics*, *38*(3), 359–367.

Kornek, U., Klenert, D., Edenhofer, O., & Fleurbaey, M. (2021). The social cost of carbon and inequality: When local redistribution shapes global carbon prices. *Journal of Environmental Economics and Management*, *107*, 102450.

Kräussl, R., Oladiran, T., & Stefanova, D. (2024). A review on esg investing: Investors' expectations, beliefs and perceptions. *Journal of Economic Surveys*, *38*(2), 476–502.

Oehmke, M., & Opp, M. M. (2024). A theory of socially responsible investment. *The Review of Economic Studies*, *92*(2), 1193–1225.

The Wall Street Journal. (2023). Shareholder activism around ESG is rising—just ask the Church of England [Accessed: 2024-10-10]. *The Wall Street Journal*. https://www.wsj.com/articles/shareholder-activism-around-esg-is-risingjust-ask-the-church-of-england-565f90ed

Zhao, J., & Mattauch, L. (2022). When standards have better distributional consequences than carbon taxes. *Journal of Environmental Economics and Management*, *116*, 102747.

## Online Appendix

This appendix contains the proofs of Propositions 2 and 3.

Proof of Proposition 2:

**If:** Suppose the set of weighted median owners $\phi$ have an ownership share $b/c > \alpha_\phi$ thus desires a project to be passed, i.e., $P \succ R$. According to Proposition 1, all owners with shares lower than $\alpha_\phi$ also prefer the project to pass. Since $S_1^\phi > 1/2$, it follows that a subset of the weighted median owners with share $\alpha_\phi$ can form or join a coalition that coordinates on voting $P$ (to pass) and guarantee a win. This agreement is self-enforcing, constituting a CPNE. Now consider a candidate equilibrium with outcome $R$. A coalition that coordinates on voting $R$ cannot succeed without support from some agents in the set $S_1^\phi$. But they are strictly better off to deviate and join the opposition coalition that coordinates on voting $P$. Consequently, there cannot exist an equilibrium where the project is rejected while $b/c > \alpha_\phi$.

**Only if:** Suppose $b/c \leq \alpha_\phi$, implying $P \prec R$ for all weighted median owners and those who have more shares. Since $S_\phi^G \geq 1/2$, a subset of the weighted median owners can form or join a coalition that coordinates on voting $R$ (to reject) and guarantee a win. This agreement is self-enforcing, constituting a CPNE. Now consider a candidate equilibrium with outcome $P$. This requires that some agents in the set $S_\phi^G$ vote $P$. But they are strictly better off to deviate and join the opposition coalition that coordinates on voting $R$. Consequently, there cannot exist an equilibrium where the project is passed while $b/c \leq \alpha_\phi$.

□

Proof of Proposition 3:

The proof of the proposition hinges on characterising all feasible combinations of parameters for which a Robin Hood transfer would lead to an upward or downward change in the ownership share of the weighted median owner(s). By Proposition 2, a firm with a weighted median owner who has less shareholding will pass abatement projects with a lower $b/c$. It means a Robin Hood transfer, which shifts the weighted median to someone with a lower ownership share, would lead the firm to pass abatement projects with a lower $b/c$, and vice versa. We divide our proof into two parts: Statement 1, and Statement 2.

**Statement 1**

**If:** Statement 1 outlines two possible cases in the shares of owners $i$ and $j$ post-transfer. In Case 1, we have $\alpha_i + \epsilon \leq \alpha_j - \epsilon < \alpha_\phi$. The Robin Hood transfer does not raise the receiver's post-transfer share higher than the original weighted median owners, but the donor's post-transfer share drops below the weighted median. Hence, the net change in cumulative shares of owners below the original weighted median is $(\alpha_j - \epsilon) + \epsilon = \alpha_j$. If $S_1^{\phi-1} + \alpha_j > 1/2$, the post-transfer cumulative sum of shares below the original weighted median exceeds the simple majority, meaning the weighted median share will decrease.

In Case 2, we have instead $\alpha_i + \epsilon < \alpha_\phi \leq \alpha_j - \epsilon$. The net change in cumulative shares of owners below the original weighted median is now $\epsilon$. If $S_1^{\phi-1} + \epsilon > 1/2$, the post-transfer cumulative sum of shares below the original weighted median exceeds the simple majority, the weighted median share will therefore decrease too.[5] As a result, the firm will pass abatement projects with strictly lower cutoff $b/c$ in both cases.

**Only if:** Note that the first inequality in both cases is necessary for the second inequality to be relevant, meaning the negation of the first automatically invalidates the second. Therefore, we will first focus on the scenarios in which the first inequality holds while the second fails in Statement 1. If we have $\alpha_i + \epsilon \leq \alpha_j - \epsilon < \alpha_\phi$, but $S_1^{\phi-1} + \alpha_j \leq 1/2$, or if $\alpha_i + \epsilon < \alpha_\phi \leq \alpha_j - \epsilon$, but $S_1^{\phi-1} + \epsilon \leq 1/2$, the Robin Hood transfer does not change the position of the weighted median owner. This is because the cumulative shares of owners below the original weighted median do not exceed the simple majority post-transfer,

[5] Note that none of the agents in the set $S_1^{\phi-1}$ is larger than the old weighted median because $\alpha_i + \epsilon < \alpha_\phi$.

either way, and the position of the weighted median owner remains unchanged.

Second, suppose now that none of Case 1 and Case 2 hold, that is $\alpha_\phi \leq \alpha_i + \epsilon \leq \alpha_j - \epsilon$. Since $j$ will now join the weighted median owners or become one of the larger owners, the post-transfer cumulative sum of shares below the original weighted median will weakly decrease while the cumulative sum of shares of larger owners will weakly increase.

Since the weighted median owner cannot decrease in any of the above cases, we have shown that conditions outlined in Case 1 and Case 2 in Statement 1 are exclusive cases for the firm to pass abatment projects with strictly lower cutoff $b/c$.

**Statement 2**

**If:** Suppose $\alpha_\phi < \alpha_i + \epsilon \leq \alpha_j - \epsilon$, the Robin Hood transfer raises the receiver's post-transfer share higher than the original weighted median owners. The donor's post-transfer share does not drop below the weighted median because $\alpha_i + \epsilon \leq \alpha_j - \epsilon$. The transfer causes a net increase in cumulative shares of owners above the original weighted median equal to $\alpha_i + \epsilon - \epsilon = \alpha_i$. If $S^G_{\phi+1} + \alpha_i \geq 1/2$, the post-transfer cumulative sum of shares above the original weighted median weakly exceeds simple majority, shifts the weighted median share upward thus the cutoff $b/c$ upwards.

**Only if:** Note that, the first inequality is necessary for the second inequality to be relevant. So first we focus on the case where $\alpha_\phi < \alpha_i + \epsilon \leq \alpha_j - \epsilon$, but $S^G_{\phi+1} + \alpha_i < 1/2$. The cumulative shares of owners above the original weighted median do not exceed the simple majority post-transfer in this case; hence, the weighted median does not increase. Second, if the first inequality does not hold, so $\alpha_i + \epsilon \leq \alpha_\phi \leq \alpha_j - \epsilon$, receiver $i$ does not join the larger owners post-transfer. Instead, the cumulative sum of larger owners weakly decreases, making it impossible to shift the weighted median upwards. As a result, the conditions outlined in Statement 2 are the exclusive conditions under which the firm passes abatement projects with a strictly higher cutoff $b/c$.

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