Governing Global Externalities: Investor Voice Amid Fragmented Policy

Finance Working Paper N° 1157/2026
September 2026

Robin Döttling
Erasmus University Rotterdam and CEPR

Doron Levit
University of Washington and ECGI

Nadya Malenko
Boston College and ECGI

Magdalena Rola-Janicka
Imperial College London

ECGI Working Paper Series in Finance

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Erasmus University Rotterdam

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Abstract

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*Robin Döttling is at Erasmus University Rotterdam. Doron Levit is at the University of Washington. Nadya Malenko is at Boston College. Magdalena Rola-Janicka is at Imperial College London. We are grateful to Patrick Bolton, Marcin Kacperczyk, seminar participants at Imperial College London, University of Cambridge, and Erasmus University Rotterdam, and conference participants at CEPR CCES for helpful comments.

1 Introduction

Many externalities generated by firms are global in scope. Carbon emissions, AI safety risks, financial instability, and illicit financial flows generate costs that spill across borders, while regulation tends to remain fragmented across countries. This fragmentation is particularly challenging given firms' ability to operate across jurisdictions. National regulators have limited reach over firms' activities abroad, and uncoordinated policies create scope for regulatory arbitrage. As a result, even when one country attempts to regulate an externality, firms may respond by shifting activity toward less regulated jurisdictions. This production leakage limits the effect of local policy on global outcomes.[1]

Shareholders in multinational firms can influence corporate decisions across borders. Institutional investors increasingly engage with firms on issues whose consequences extend beyond any single market or jurisdiction, making corporate stewardship a potential channel for addressing global externalities when regulation is fragmented.[2] At the same time, recent arguments call for investors to rebalance their efforts away from stewardship and toward policy advocacy (Gosling et al., 2026). The rationale is that investors may have greater impact by pushing governments to adopt stronger regulation than by trying to change firm behavior directly.[3]

This paper asks whether investor voice can mitigate the adverse effects of global policy miscoordination, and whether it is more effective through corporate stewardship or policy advocacy. We study this question in a model of cross-border externalities in which

[1]For evidence of environmental production leakage, see Aichele and Felbermayr (2015), Ben-David et al. (2021), Bartram et al. (2022), He et al. (2025), and Känzig et al. (2024). For relocation concerns in AI, financial regulation, and money laundering, see *Time* on OpenAI's response to EU AI rules, *Bloomberg* on banks' efforts to avoid Dodd-Frank trading restrictions, and FATF (2026), respectively.

[2]For example, investors have targeted climate change through direct dialogue, shareholder proposals, and initiatives such as Climate Action 100+ (Dimson et al., 2015; Dyck et al., 2019; Azar et al., 2021; Hoepner et al., 2024). Investors have also engaged multinational firms on forced labor in cross-border supply chains, including concerns about Uyghur forced labor, and AI-related risks, such as AI concerns at Meta, Apple, and Microsoft. Other examples include engagement with financial institutions on money-laundering controls and with pharmaceutical companies on technology transfers. See Section 5.3.

[3]In the climate context, the PRI calls for greater emphasis on policy advocacy (PRI, 2026); see also Volans (2026), Waygood (2023), and Schwartz and Finighan (2021). In practice, investors have advocated for stronger climate policy through the Investor Agenda and a recent EU ETS investor statement. Examples of investor advocacy in other domains, including AI safety and prudential regulation, are discussed in Section 5.3.

national policy is shaped by local political constraints and can be undermined by regulatory arbitrage through production relocation. The central distinction is that stewardship acts on firms' global operations, whereas advocacy targets local policymaking.

Our main conclusion is that the relative value of stewardship and advocacy depends on the severity of production leakage and political frictions abroad. When political frictions are severe enough to prevent foreign regulation, leakage weakens the effectiveness of policy advocacy but strengthens the effectiveness of stewardship. When foreign political frictions are moderate, however, these channels also affect whether foreign regulation is adopted. In this case, stewardship can make foreign regulation less likely, thereby sustaining policy miscoordination, whereas local policy advocacy can crowd in regulation abroad, mitigating the effects of global policy miscoordination and reducing externalities across jurisdictions.

In our framework, a multinational firm operates in two countries, each with its own national regulator. To fix ideas, we focus on environmental externalities, modeled as carbon emissions generated by the firm's production in each country, and discuss applications to other global externalities in Section 5.3. We represent environmental regulation as a local emissions tax, set unilaterally by each regulator on emissions within its own jurisdiction. The firm can affect emissions in each country through two margins: relocating production across countries and undertaking abatement. Both are costly, but they have different effects on global emissions. Relocation shifts production and emissions from one jurisdiction to another, generating production leakage without lowering global emissions—a form of regulatory arbitrage. Abatement, in contrast, reduces global emissions.

Regulators care about emissions, domestic shareholders' profits, and the local benefits of production, which make them reluctant to lose production to other jurisdictions. The internal cost a regulator assigns to emissions captures the extent to which the political process leads it to internalize the externality. Because regulation is national and uncoordinated, this weight may differ from the global social cost of emissions. In addition, adopting an emissions tax entails a political cost; this political friction may prevent regulation altogether. Together, these forces can generate differences in the strength of environmental regulation across countries, or leave some countries unregulated. Such fragmented policy creates incentives for regulatory arbitrage through production leakage.

The internalized costs of emissions in the regulator's and firm's objectives can be affected through two channels of investor voice. Policy advocacy increases the emissions weight in the regulator's objective, capturing investor pressure on public policy. Stewardship increases the emissions weight in the firm's objective: when this weight is zero, the firm behaves as a pure profit maximizer; when it is positive, the firm partially internalizes the global externality when choosing relocation and abatement.[4] Importantly, because regulators choose environmental regulation anticipating the firm's response, stewardship can also shape the firm's behavior indirectly by changing the taxes regulators set.

The key mechanism is that firms respond differently to environmental regulation and stewardship. A higher emissions tax in one country induces the firm to abate more in that country. But since emissions taxes are miscoordinated, it also makes production in the relatively higher-tax country less attractive, inducing relocation toward the lower-tax jurisdiction. This relocation is inefficient: it is costly and does not reduce global emissions, but merely shifts emissions across borders. Stewardship, in contrast, leads the firm's management to internalize emissions across its global operations. It therefore encourages abatement without creating the same incentive for inefficient relocation.

This distinction matters for the effects of investor voice. We first consider the case in which political frictions abroad are severe enough to leave the foreign country unregulated. Policy advocacy increases the local regulator's internalized cost of emissions and pushes it toward a higher emissions tax. The higher tax raises domestic abatement, but it also increases leakage to the unregulated foreign jurisdiction. The easier it is for the firm to relocate production, the less advocacy translates into domestic abatement and the more it translates into production shifting abroad.

Stewardship works differently. Because of shareholders' global scope, it applies to

[4]In our baseline analysis, we focus on the case in which investors with voice are pro-social (suffer relatively high harm from emissions). However, the framework is flexible and could accommodate voice by investors who seek to reduce the emissions weights in the regulator's and firm's objectives.

emissions across the firm's operations and raises abatement in both countries. Moreover, it *reduces* production leakage because local regulation responds to stewardship. Intuitively, when setting the domestic tax, the regulator trades off raising abatement against limiting leakage. Stewardship eases this trade-off: it directly strengthens the firm's abatement incentives and allows the domestic regulator to rely less on the emissions tax. The resulting tax reduction narrows cross-country tax differences, in turn lowering leakage. This effect is strongest when relocation is easier, because the value of easing the abatement-leakage trade-off is then greatest.

Thus, under fragmented policy, both forms of investor voice are valuable, but production leakage affects them in opposite ways. Leakage weakens policy advocacy because part of the higher domestic tax is dissipated through relocation rather than abatement. By contrast, leakage strengthens stewardship because stewardship raises abatement incentives and allows the domestic regulator to narrow the cross-country tax difference that drives relocation.

The analysis changes when political frictions abroad are less severe, so that the foreign regulator may adopt its own emissions tax if the gains from doing so are sufficiently large. In this case, investor voice affects not only domestic regulation, but also whether foreign regulation is adopted and how stringent it is. We show that local policy advocacy can then crowd in foreign regulation, mitigating policy miscoordination, whereas stewardship can crowd it out, sustaining the most severe form of policy fragmentation.

The key reason is that leakage makes environmental regulation across countries strategic complements. When one country sets a low tax, the other regulator also has an incentive to set a low tax, because a much higher tax would induce production to relocate toward the lower-tax jurisdiction.[5] Applied to policy advocacy, local advocacy raises the domestic tax and thereby reduces the downward pressure on foreign regulation. As a result, advocacy affects foreign regulation through two margins. First, conditional on adoption, the optimal foreign tax is higher. Second, adoption becomes more likely be-

[5] Consistent with such strategic policy interactions, Steinebach et al. (2021) find that countries are more likely to adopt carbon pricing, and to set more ambitious policies, when their trade partners and export-market competitors do so, and emphasize concerns about competitive disadvantage.

cause the higher optimal tax increases the gains from moving away from the status quo. Thus, local advocacy "leaks" abroad and can encourage the foreign regulator to adopt emissions pricing, thereby mitigating the adverse effects of global policy miscoordination.

Stewardship has the opposite effect. By making the firm internalize emissions directly, it increases abatement abroad even without foreign regulation. This reduces the foreign regulator's incentive to incur the political cost of adopting an emissions tax. Moreover, because stewardship allows the domestic regulator to rely less on its own tax, it weakens the strategic-complementarity channel that would otherwise support foreign regulation. Thus, when foreign regulation is possible but politically costly, stewardship can sustain the severe form of policy miscoordination by making foreign regulation less likely.

We also examine how the geographic scope of stewardship shapes its effects. In an extension, we allow investors to place different weights on domestic and foreign emissions, for example because domestic emissions are more salient, more visible to their clients and beneficiaries, or easier to monitor. We show that differences in investors' geographical focus can themselves create leakage: if stewardship places greater weight on domestic than foreign emissions, firms have an incentive to shift production abroad. This relates to evidence that investor pressure can lead firms to shift emissions rather than reduce them (Duchin et al., 2025; Berg et al., 2026; Dai et al., 2024). More generally, the extension shows that the baseline effects of stewardship under fragmented regulation come from shareholders' ability to influence emissions outside the domestic regulator's jurisdiction.

Taken together, our results imply that stewardship and advocacy should be evaluated in light of the regulatory environment in which firms operate. Which channel is more effective depends on the strength of foreign regulation and the scope for production relocation, and the effects of investor voice can extend beyond the firm or regulator it directly targets. The two channels also interact: as we show, stewardship weakens the extent to which local policy advocacy crowds in foreign regulation, and the resulting regulatory regime feeds back into investors' choice between the two channels. These forces generate new empirical predictions, which we discuss in Section 5.2.

Although we use carbon emissions to give the model a concrete interpretation, the same basic forces arise in other settings, including AI safety, illicit finance and money laundering, systemic financial risk, and the global diffusion of innovation. In each case, regulation remains at least partly fragmented across countries, and firms can shift activity across jurisdictions. The severity of policy miscoordination and the balance between corporate stewardship and policy advocacy differ across these settings. Section 5.3 discusses these applications and provides examples of investor activity.

Related Literature. This paper bridges the literatures on global public goods, regulatory arbitrage, and responsible investing to show how investors can mitigate cross-border coordination failures through two channels: firm-level stewardship and policy advocacy.

In settings where externalities are global but regulation remains national, Kaul et al. (1999) characterize the underprovision of global public goods as a coordination failure. In environmental contexts, this failure can stem from free-riding among national governments (Barrett, 1994; Carraro and Siniscalco, 1993; Nordhaus and Yang, 1996). While prior work focuses on institutional mechanisms to promote international cooperation, such as climate clubs, trade sanctions, and international finance (Harstad, 2012; Nordhaus, 2015; Bolton and Kleinnijenhuis, 2025), we study how investors can mitigate this coordination failure through stewardship and policy advocacy, and how their relative effectiveness depends on production mobility and foreign political frictions.

By focusing on investors' role in addressing corporate externalities, our paper relates to the literature on responsible investment, which studies several channels through which investors influence firms, including the cost of capital, financing terms, and engagement.[6] Our stewardship channel captures engagement, and we introduce policy advocacy as a distinct channel through which investors affect firms indirectly by shaping regulation. This allows us to compare the two channels, speaking to the practitioner debate over

[6] For the cost-of-capital channel, see, e.g., Heinkel et al. (2001), Pástor et al. (2021), Green and Roth (2025), and Edmans et al. (2023). For financing terms, see, e.g., Chowdhry et al. (2019), Barbalau and Zeni (2023), Oehmke and Opp (2025), Landier and Lovo (2025), and Hoffmann and Vladimirov (2025). For engagement and other forms of direct influence, see, e.g., Gollier and Pouget (2022), Broccardo et al. (2022), Levit et al. (2024), Bisceglia et al. (2026), Dasgupta et al. (2026), and Gupta et al. (2026).

shifting resources from stewardship toward advocacy (Gosling et al., 2026; PRI, 2026). Our key contribution to this literature is to study the role of responsible investors in a global setting with multinational firms and production leakage across jurisdictions.[7]

The global focus also distinguishes our paper from work on the interaction between sustainable finance and environmental regulation (Biais and Landier, 2022; Bensoussan et al., 2024; Döttling and Rola-Janicka, 2025; Inderst and Opp, 2025; Piatti et al., 2025; Huang and Kopytov, 2026; Oehmke and Opp, 2026). A further feature of our setting is that regulation is endogenous: regulators optimally respond to investor actions and the changes in firm behavior they induce. This connects us more closely to a growing subset of this literature that endogenizes regulatory or political outcomes. Allen et al. (2024) study how sustainability-linked debt affects political support for carbon taxes; Carlson et al. (2023) show how divestment can build support for regulating brown assets; Döttling et al. (2026) find that endogenous public policy can offset shareholder influence and generate political backlash; and Cassidy (2024) studies the interaction between electoral politics, climate policy, and financial markets. Relative to these papers, our global setting adds cross-country regulatory interactions generated by production relocation. In particular, leakage creates strategic complementarity between national policies, so advocacy can crowd in foreign regulation while stewardship can crowd it out.

Fragmented policy environments create scope for regulatory arbitrage. The jurisdictional competition literature studies whether mobile capital drives standards to the bottom (Oates and Schwab, 1988; Ogawa and Wildasin, 2009), whereas trade-and-environment models show how regulation in one region shifts dirty activity across borders (Hoel, 1991; Markusen et al., 1993; Copeland and Taylor, 1994; Babiker, 2005). Similar arbitrage arises in banking (Acharya, 2003; Houston et al., 2012) and in firms' responses to differences in tax and disclosure rules (Fleischer, 2010), so the leakage in our model reflects fragmented regulation more generally, rather than climate policy specifically. Closer to our setting

[7] See Allen et al. (2025) for a broader discussion of how multinational firms can help address climate change by leveraging their global reach. Gupta et al. (2026) also study how economic integration links firms' decisions across regions, focusing on climate-insurance choices. Chebotarev and Pugachev (2026) examine how local externalities shape investors' portfolio and voting choices across locations.

are models in which governments set environmental policy strategically when regulation shifts production or emissions across countries (Kennedy, 1994; Markusen et al., 1995; Hoel, 1997; Conconi, 2003; Copeland and Taylor, 2005; Roelfsema, 2007; Farrokhi and Lashkaripour, 2025) and work on how lobbying shapes environmental policy (Fredriksson, 1997; Aidt, 1998; Conconi, 2003; Habla and Winkler, 2013; Besley and Persson, 2023). A key difference is that in these papers the only lever for changing firm behavior is national policy: each government reaches the firm only within its own borders. Stewardship works differently because investors can affect firms' operations across countries. Stewardship also feeds back into national policies: by changing the multinational's behavior across countries, it changes regulators' incentives at home and abroad and thereby affects the adoption and stringency of regulation, which in turn shapes investors' choice between the two channels.

Fragmented regulation has also motivated a literature on border carbon adjustments as a response to carbon leakage.[8] Whereas this literature studies public instruments chosen by governments, we study private channels of influence through investors: stewardship operates directly on firms across borders, while advocacy works through national regulation, which, as we show, can spill over to regulation abroad.

More broadly, our paper connects to the literature on corporate social responsibility, which studies how firms respond to social concerns through self-regulation (Maxwell et al., 2000; Baron, 2001; Besley and Ghatak, 2007; Egorov and Harstad, 2017) and how firms incorporate broader social objectives (Bénabou and Tirole, 2010; Magill et al., 2015; Hart and Zingales, 2017). We extend this work by studying how investor influence shapes firms' internalization of externalities and how this interacts with fragmented national regulation when firms can relocate production across jurisdictions.

[8]Border carbon adjustments typically tax the carbon embodied in imports and rebate exports to level the playing field. See Fischer and Fox (2012); Böhringer et al. (2012); Branger and Quirion (2014); Böhringer et al. (2016, 2017); Fowlie and Reguant (2022); Clausing et al. (2025).

2 Model Setup

There are two countries $i = 1, 2$ (home and abroad), each with a local regulator that sets an emissions tax τ_i. In each country, there is a unit mass of shareholders and a unit mass of workers, who together constitute the country's population.[9] There is one multinational firm, a share α_1 of which is owned by shareholders in country 1, and the remaining share, $\alpha_2 = 1 - \alpha_1$, is owned by shareholders in country 2.

The firm's total production $\bar{Y} = \bar{y}_1 + \bar{y}_2$ is fixed and sold on a global market at a constant marginal price p. However, the firm can relocate production across countries. This is captured by the leakage variable l, with production $y_1 = \bar{y}_1 - l$ in country 1 and $y_2 = \bar{y}_2 + l$ in country 2. The cost of relocation is $\frac{\theta}{2}l^2$, where $\theta > 0$.

Emissions in country i are given by $e_i = y_i - x_i$, where x_i is abatement effort. The cost of abatement in country i is $\frac{\phi}{2}x_i^2$, where $\phi > 0$. The firm's total relocation and abatement costs are therefore

$$C(x_1, x_2, l) = \tfrac{1}{2}\phi(x_1^2 + x_2^2) + \tfrac{1}{2}\theta l^2. \tag{1}$$

Thus, the firm can reduce emissions in country i either by relocating production to the other country or by investing in abatement. However, only abatement reduces total emissions E, which are given by

$$E = e_1 + e_2 = \bar{y}_1 + \bar{y}_2 - x_1 - x_2. \tag{2}$$

In contrast, production relocation is a form of regulatory arbitrage: it is a costly response that lowers the firm's exposure to local regulation without reducing total emissions.

Preferences. Workers and shareholders may differ in the disutility they derive from global emissions. The representative shareholder in country i obtains disutility $\gamma_i^s \geq 0$ per unit of global emissions, while the representative worker's disutility is γ_i^w. The local

[9] While we label the latter group as workers, they could include any citizens without an ownership stake in the firm who derive some benefits from the firm's local production.

social cost of emissions for country i is therefore $\gamma_i = \gamma_i^s + \gamma_i^w$. The global social cost of emissions is $\gamma = \gamma_1 + \gamma_2$.

Workers in each country also obtain a benefit β_i per unit of local production y_i, capturing economic and employment gains.

Firm Objective. The firm's profits are given by

$$\Pi(x_1, x_2, l) = p\bar{Y} - C(x_1, x_2, l) - \tau_1 e_1 - \tau_2 e_2 + T_1 + T_2, \tag{3}$$

where $\tau_i e_i$ is the tax payable on emissions in country i and T_i is the associated lump-sum rebate of country i's tax revenue. The government budget is balanced, so $T_i = \tau_i e_i$, but the firm takes T_i as given. This assumption ensures that we can abstract from the direct redistributive effects of emissions taxes.

We assume that the firm maximizes profits net of an internal cost of emissions $\Gamma^f E$:

$$W_{\text{firm}} = \Pi(x_1, x_2, l) - \Gamma^f (e_1 + e_2). \tag{4}$$

The parameter Γ^f captures the weight management places on the firm's global emissions. This weight may reflect management's own preferences, investors' stewardship, or pressure from other stakeholders. The case $\Gamma^f = 0$ represents the pure profit-maximization benchmark. To study corporate stewardship, we treat changes in Γ^f as driven by stewardship. Shareholders can increase Γ^f through activist campaigns, shareholder proposals, voting, or engagement with management.

Regulator Objective. Each regulator sets his country's local tax τ_i. We formulate the regulator's objective flexibly to capture political forces that may lead him to internalize emissions to a different degree. Specifically, the regulator of country i maximizes

$$W_i = \alpha_i \Pi(x_1, x_2, l) + \beta_i y_i - \Gamma_i^r (e_1 + e_2). \tag{5}$$

Here, $\alpha_i \Pi(x_1, x_2, l)$ captures the firm profits accruing to country i's citizens, while $\beta_i y_i$ captures the local employment benefits generated by production. The last term, $\Gamma_i^r(e_1 + e_2)$, reflects the cost of emissions internalized by the regulator. The case $\Gamma_i^r = \gamma_i$ thus corresponds to the standard utilitarian local planner benchmark. The regulator's objective may differ from this benchmark because political incentives and pressure from organized interests, including investors, can affect the cost of emissions internalized by the regulator. Paralleling our treatment of stewardship as increasing Γ^f, we capture investor policy advocacy as increasing Γ_i^r.

We assume that introducing emissions pricing is subject to a friction. Each country starts from a status quo with no emissions pricing, which corresponds to $\tau_i = 0$. The regulator adopts his optimal emissions tax only if the resulting gain in his objective exceeds $\kappa_i \geq 0$; otherwise, the policy remains at the status quo.

Section B.1 in the Online Appendix provides a political microfoundation for both Γ_i^r and κ_i using a model of electoral competition with political contributions. Investor advocacy affects politicians' electoral incentives and thus the effective weight placed on emissions. At the same time, politicians' attention constraints and electoral competition over an alternative policy issue create an opportunity cost of addressing emissions equal to κ_i. Therefore, we refer to κ_i as country i's *political friction* in what follows.[10]

Timeline. The game has two stages. In the first stage, the regulators simultaneously choose whether to adopt an emissions-pricing regime and, conditional on adoption, the level of their emissions taxes. Regulator i adopts only if the resulting gain in his objective exceeds κ_i. In the second stage, after taxes are set, the firm chooses its optimal abatement and leakage levels.

[10]Beyond this political interpretation, κ_i may represent the institutional investment required to introduce and enforce emissions pricing, including monitoring infrastructure, enforcement capacity, legal frameworks, and emissions-measurement systems. Under this interpretation, the status quo may persist even when policymakers value emissions reductions because the fixed cost of implementation is substantial.

Stewardship and Policy Advocacy. The two channels of investor influence operate through the objectives (4) and (5) defined above. To conceptualize the effect of shareholders' *stewardship*, we analyze the marginal effect of Γ^f on equilibrium outcomes. Similarly, to study the role of *policy advocacy*, we analyze the marginal effect of Γ_i^r. This reduced-form approach enables us to cleanly isolate the effects of investor influence at the firm and regulatory levels.

3 Analysis

3.1 Global and Domestic Benchmarks

To assess the inefficiencies created by fragmented regulation and production leakage, we consider two benchmarks.

First-Best Benchmark. We first consider a global planner who internalizes the effects of production and emissions in both countries. Global utilitarian welfare is given by

$$W^{FB} = \Pi + \beta_1 y_1 + \beta_2 y_2 - \gamma\, E. \tag{6}$$

The following lemma characterizes the first-best allocation chosen by a planner who can directly set x_1, x_2, and l to maximize W^{FB}.

Lemma 1. *The first-best allocation is characterized by*

$$x_1^{FB} = x_2^{FB} = \frac{\gamma}{\phi}, \qquad l^{FB} = \frac{\beta_2 - \beta_1}{\theta}. \tag{7}$$

In the first-best allocation, abatement in each country is chosen to equate its marginal cost with the *global* social cost of emissions $\gamma = \gamma_1 + \gamma_2$. Under this allocation, production is relocated towards the country with a higher β_i, trading off the redistributive gains against the cost of relocation. If the local benefits from production are equal across countries ($\beta_1 = \beta_2$), there is no production relocation in the first best – in this case any leakage is socially inefficient.

Unconstrained Local Regulator Benchmark. We next consider a second benchmark: an unconstrained *local* regulator (e.g., regulator 1) who can choose x_1, x_2, and l directly. This benchmark highlights what determines each regulator's preferred levels of abatement and relocation, and how they differ from the global first-best allocation.

Lemma 2. *If regulator* 1 *could choose* x_1*,* x_2 *and* l *directly, he would set*

$$x_1^U = x_2^U = \frac{\Gamma_1^r}{\alpha_1 \phi}, \qquad l^U = \frac{-\beta_1}{\alpha_1 \theta}. \tag{8}$$

Regulator 1's preferred level of abatement in both countries is determined by the ratio Γ_1^r/α_1. If the local regulator is utilitarian with respect to his own citizens, so that $\Gamma_1^r = \gamma_1$, he exhibits the standard underinternalization of a global externality: he accounts for the harm borne in country 1, but not the harm borne abroad. At the same time, the globally dispersed ownership of the firm leads the local regulator to internalize only the share α_1 of abatement costs borne by his country's shareholders. Thus, although he may underinternalize the global benefits of abatement, he also underinternalizes its costs. Whether he prefers more or less abatement than the first-best level therefore depends on whether Γ_1^r/α_1 is smaller or larger than γ.

The regulator would also optimally relocate some production from country 2 to country 1, i.e., set a negative level of leakage, $l^U < 0$. His preferred level of leakage trades off the local production benefit β_1 against the share α_1 of relocation costs borne by country 1's shareholders. Relative to the global planner, he places too much weight on attracting production home ($l^U < l^{FB}$) because he ignores the production benefit lost by the foreign country and internalizes only part of the relocation cost.

Having established these benchmarks, we now solve the model backward, starting with the firm's problem.

3.2 Firm Problem

The firm chooses l, x_1, and x_2 to maximize W_{firm}, taking as given τ_1, τ_2, T_1, T_2. The first-order conditions for abatement and leakage in country i are, respectively,

$$\frac{\partial W_{\text{firm}}}{\partial x_i} = -\phi x_i + \tau_i + \Gamma^f = 0 \quad \Rightarrow \quad x_i^* = \frac{\tau_i + \Gamma^f}{\phi}, \tag{9}$$

$$\frac{\partial W_{\text{firm}}}{\partial l} = -\theta l + \tau_1 - \tau_2 = 0 \quad \Rightarrow \quad l^* = \frac{\tau_1 - \tau_2}{\theta}. \tag{10}$$

Eq. (10) shows that fragmented regulation induces relocation of production to the country with a lower emissions tax. A larger θ raises relocation costs and thus reduces the resulting leakage. Eq. (9) shows that the firm invests in abatement in each country until the marginal abatement cost (ϕx_i) equals the sum of the local emissions tax τ_i and the internal cost of emissions Γ^f. Thus, emissions taxes (τ_i) and stewardship (captured by a higher Γ^f) are substitutes in inducing abatement. However, while local emissions taxes also encourage the relocation of production abroad, stewardship places an internal price on emissions in both countries and therefore does not induce leakage.

3.3 Domestic Regulator Problem

We now analyze the problem of the domestic regulator, who takes the foreign tax τ_2 as given and anticipates the firm's response. Throughout the remainder of the analysis, we set $\kappa_1 = 0$, so the domestic regulator is always active and chooses τ_1 to maximize his objective (5). The first-order condition yields the following optimal tax and firm policies.

Lemma 3. *For a given τ_2, the domestic regulator sets the emissions tax*

$$\tau_1^*(\tau_2) = \frac{\theta}{\theta + \phi}(\Gamma_1^r/\alpha_1 - \Gamma^f) + \frac{\phi}{\theta + \phi}(\tau_2 - \beta_1/\alpha_1). \tag{11}$$

The resulting abatement and leakage are

$$x_1(\tau_1^*(\tau_2)) = \frac{\theta\Gamma_1^r - \phi\beta_1 + \phi\alpha_1(\tau_2 + \Gamma^f)}{\alpha_1\phi(\theta+\phi)}, \tag{12}$$

$$x_2(\tau_2) = \frac{\tau_2 + \Gamma^f}{\phi}, \tag{13}$$

$$l(\tau_1^*(\tau_2)) = \frac{\theta(\Gamma_1^r - \alpha_1\Gamma^f) - \phi\beta_1 - \theta\alpha_1\tau_2}{\theta\alpha_1(\theta+\phi)}. \tag{14}$$

Because the regulator can tax only *local* emissions, raising the tax increases local abatement but also induces production to relocate abroad. He therefore trades off local abatement against limiting leakage. Indeed, Eqs. (8)–(10) imply that the optimal tax (11) is a weighted average of two tax levels: the first, $\Gamma_1^r/\alpha_1 - \Gamma^f$, implements the regulator's unconstrained optimal abatement level x_1^U, while the second, $\tau_2 - \beta_1/\alpha_1$, implements his unconstrained optimal leakage level l^U.

This abatement-leakage trade-off gives rise to two important features of the optimal emissions tax. First, $\tau_1^*(\tau_2)$ increases in τ_2, so the two countries' taxes are strategic complements. This complementarity is due to leakage: because relocation depends on the tax differential in Eq. (10), a higher foreign tax allows regulator 1 to raise τ_1 with less production shifting abroad. This effect weakens as leakage becomes more costly: as $\theta \to \infty$, the slope $\frac{\phi}{\theta+\phi}$ in (11) approaches zero.

Second, the tax partly offsets the effects of corporate stewardship: an increase in the firm's internal cost of emissions Γ^f reduces τ_1 by $\frac{\theta}{\theta+\phi} < 1$. Intuitively, a higher Γ^f directly induces the firm to abate more, reducing the need for regulatory incentives. Effectively, the regulator responds to shareholders' prosocial stance by taking a less prosocial stance. Without leakage ($\theta \to \infty$), this offset would be one-for-one because the regulator would already induce his optimal abatement level. With leakage, however, the regulator restrains the tax to limit production relocation abroad and thus generally implements less than his preferred abatement.[11] The partial offset then allows stewardship to raise abatement toward x_1^U, while the accompanying reduction in τ_1 narrows the cross-country tax

[11] In particular, Eqs. (12) and (14) imply that $x_1(\tau_1) = x_1^U - \Delta$ and $l(\tau_1) = l^U + \Delta$, where $\Delta \equiv \frac{(\Gamma_1^r/\alpha_1 - \Gamma^f) - (\tau_2 - \beta_1/\alpha_1)}{\theta+\phi}$. Thus, whenever $\Delta > 0$, local abatement is below x_1^U and leakage exceeds l^U.

gap and moves leakage toward l^U. Stewardship thus shifts both margins closer to the regulator's unconstrained optimum and eases the abatement-leakage trade-off.

3.4 Possible Equilibria

With $\kappa_1 = 0$, country 1 is always active, so only two pure-strategy equilibria may arise:

(i) **Equilibrium** I: country 2 remains inactive and sets its status quo tax $\tau_2^I = 0$ (where superscript I stands for "inactive"). Country 1 then sets its best response to τ_2^I, which yields the equilibrium tax τ_1^I.

(ii) **Equilibrium** A: country 2 is active, and both regulators play their best response strategies simultaneously. Each country adopts its Nash equilibrium tax, which we denote τ_i^A (where A stands for "active").

We next examine how investor voice affects outcomes in each of these two equilibria, as well as when each equilibrium emerges. We focus on parameter values such that each regulator's optimal emissions tax is positive when the other country's tax is zero.[12]

4 Policy Advocacy and Corporate Stewardship

This section derives our main results on policy advocacy and corporate stewardship. We first take country 2's adoption decision as given and study the effects of investor voice in equilibria I and A. Section 4.1 examines equilibrium I, in which country 2 remains without emissions pricing, while Section 4.2 considers equilibrium A, in which both countries set their optimal emissions taxes. Section 4.3 then endogenizes country 2's adoption decision and derives the conditions under which each equilibrium arises.

4.1 Foreign Country Without Emissions Pricing

We first consider the inactive equilibrium, where country 2's tax remains at its status quo level $\tau_2^I = 0$. As we show in Section 4.3, it exists when the political friction κ_2 is

[12] Using Eq. (11) and its analogue for country 2, this requires $\theta(\Gamma_i^r - \alpha_i \Gamma^f) > \phi\beta_i,\ i = 1, 2$.

sufficiently high. Country 1's emissions tax is then given by the best response in Eq. (11) evaluated at 0, i.e., $\tau_1^I = \tau_1^*(0)$.

Here and throughout, we refer to a marginal increase in Γ_1^r as the effect of policy advocacy, and the marginal increase in Γ^f as the effect of corporate stewardship.

Proposition 1 (Investor Voice with Inactive Foreign Regulation)**.** *Suppose country 2 is inactive, so its emissions tax remains at its status quo level $\tau_2^I = 0$.*

1. *Policy advocacy raises abatement in country 1 but increases leakage, while leaving abatement in country 2 unchanged:*

$$\frac{\partial x_1^I}{\partial \Gamma_1^r} = \frac{\theta}{\alpha_1 \phi(\theta+\phi)} > 0, \qquad \frac{\partial x_2^I}{\partial \Gamma_1^r} = 0, \qquad \frac{\partial l^I}{\partial \Gamma_1^r} = \frac{1}{\alpha_1(\theta+\phi)} > 0.$$

   In contrast, stewardship raises abatement in both countries and reduces leakage:

$$\frac{\partial x_1^I}{\partial \Gamma^f} = \frac{1}{\theta+\phi} > 0, \qquad \frac{\partial x_2^I}{\partial \Gamma^f} = \frac{1}{\phi} > 0, \qquad \frac{\partial l^I}{\partial \Gamma^f} = -\frac{1}{\theta+\phi} < 0.$$

2. *As the cost of leakage θ decreases:*

   - *policy advocacy raises abatement at a slower rate and leakage at a faster rate;*
   - *stewardship raises local abatement and reduces leakage at faster rates.*

Proposition 1 shows that, while policy advocacy is effective in increasing abatement by tightening local policy, it fails to encourage abatement abroad. Most critically, by increasing the tax in country 1 but not country 2, it also has the unintended consequence of inducing production leakage to country 2.

In contrast to policy advocacy, corporate stewardship raises not only local abatement x_1 but also foreign abatement x_2. Intuitively, local policy advocacy operates through local regulation, changing the local tax and hence only the incentives for local abatement. Stewardship, by contrast, has global reach: it changes the firm's abatement incentives at the corporate level, encouraging it to internalize emissions across borders.

Moreover, even though shareholders do not directly target leakage, stewardship also reduces leakage due to the endogenous response by the regulator in country 1. As shareholders encourage the firm to increase local abatement, the regulator responds by lowering the domestic emissions tax τ_1 (see Eq. (11)). This lowers the gap between taxes in the two countries, mitigating leakage incentives.

The second part of Proposition 1 shows that policy advocacy becomes *less* effective as leakage becomes less costly. The firm's stronger relocation response to tighter environmental regulation generates more production relocation abroad. At the same time, greater leakage concerns induce the regulator to raise the emissions tax by less in response to advocacy, resulting in a smaller increase in abatement. In contrast, stewardship becomes *more* effective. Intuitively, stewardship directly increases abatement, thereby easing the regulator's abatement–leakage trade-off, and the gains from easing this trade-off are greater when leakage concerns are stronger.[13]

Overall, both policy advocacy and corporate stewardship can increase local abatement. However, as regulatory arbitrage becomes easier, the relative effectiveness of investor voice shifts away from policy advocacy and toward stewardship.

4.2 Both Countries with Emissions Pricing

We now consider the active equilibrium, in which both regulators set their optimal taxes. As we show in Section 4.3, it exists when the political friction κ_2 is sufficiently low.

Regulator 2's problem is symmetric to that of regulator 1, setting τ_2 to maximize $W_2 = \alpha_2 \Pi + \beta_2 y_2 - \Gamma_2^r E$. Solving regulator 2's first-order condition yields his best-response function $\tau_2^*(\tau_1)$, which is symmetric to $\tau_1^*(\tau_2)$ in Eq. (11).

For convenience, define τ_i^{solo} as the tax rate that regulator i would set if he alone

[13]More precisely, when leakage is cheap, the domestic tax responds less to stewardship: τ_1 falls less sharply as Γ^f increases. Because the regulator offsets stewardship less through a tax reduction, stewardship produces a larger increase in abatement. Moreover, because production relocation is more responsive to tax differences, even the smaller reduction in τ_1 produces a larger decline in leakage.

adopted emissions pricing, with the other country's tax remaining at zero, $\tau_{-i} = 0$:

$$\tau_i^{solo} \equiv \tau_i^*(0) = \frac{\theta(\Gamma_i^r - \alpha_i\Gamma^f) - \phi\beta_i}{\alpha_i(\theta + \phi)}. \tag{15}$$

For the inactive equilibrium studied above, $\tau_1^I = \tau_1^{solo}$. When both regulators are active, their Nash equilibrium taxes are instead jointly determined by their best responses. The next result characterizes these taxes and derives the firm's equilibrium choices.

Lemma 4. *In the active equilibrium, the equilibrium emissions tax in country i is:*

$$\tau_i^A = \frac{(\theta + \phi)\left[(\theta + \phi)\tau_i^{solo} + \phi\tau_{-i}^{solo}\right]}{\theta(\theta + 2\phi)}, \tag{16}$$

and satisfies $\frac{\partial^2 \tau_i^A}{\partial \tau_{-i}^{solo}\partial\theta} < 0$, $\lim_{\theta\to\infty} \tau_i^A = \frac{\Gamma_i^r}{\alpha_i} - \Gamma^f$, *and* $\frac{\partial \tau_i^A}{\partial \Gamma^f} = -1$.

The resulting equilibrium abatement and leakage are:

$$x_i^A = \frac{1}{(\theta + 2\phi)\phi}\left((\theta + \phi)\frac{\Gamma_i^r - \frac{\phi}{\theta}\beta_i}{\alpha_i} + \phi\frac{\Gamma_{-i}^r - \frac{\phi}{\theta}\beta_{-i}}{\alpha_{-i}}\right), \tag{17}$$

$$l^A = \frac{(\theta + \phi)(\tau_1^{solo} - \tau_2^{solo})}{\theta(\theta + 2\phi)}. \tag{18}$$

The tax τ_i^{solo} reflects regulator i's preferences over abatement and leakage when the other regulator sets a zero tax. Because leakage makes emissions taxes strategic complements, the equilibrium tax in country i is a weighted sum of τ_i^{solo} and τ_{-i}^{solo}. Thus, even though the regulators choose their taxes non-cooperatively, the tax in each country reflects the preferences of *both* regulators. The coefficient on regulator i's own τ_i^{solo} is larger than that on τ_{-i}^{solo}, and as leakage becomes more costly, the strategic interaction weakens: the coefficient on τ_{-i}^{solo} decreases in θ and converges to zero as $\theta \to \infty$.

An important insight is that, when both regulators are active, each equilibrium emissions tax decreases one-for-one with the firm's internal cost of emissions, $\partial\tau_i^A/\partial\Gamma^f = -1$. Thus, stewardship (captured by higher Γ^f) is fully offset by lower taxes. To understand why, it is useful to define the *effective* cost of emissions faced by the firm in country i, $\omega_i \equiv \Gamma^f + \tau_i$, which combines the emissions cost the firm internalizes through stewardship and the emissions tax in that country. Since $x_i = \omega_i/\phi$ and $l = (\omega_1 - \omega_2)/\theta$ (see Eqs. (9)–(10)), Γ^f affects the firm's choices only through these effective costs. Thus, for a given Γ^f, choosing τ_i is equivalent to choosing ω_i, and the regulators' problem can be stated in terms of effective costs. Substituting $\tau_2 = \omega_2 - \Gamma^f$ into (11),

$$\omega_1(\omega_2) = \frac{\theta}{\theta+\phi}\frac{\Gamma_1^r}{\alpha_1} + \frac{\phi}{\theta+\phi}\left(\omega_2 - \frac{\beta_1}{\alpha_1}\right). \tag{19}$$

Stewardship thus affects regulator 1's choice only through its effect on the foreign effective emissions cost ω_2. When regulator 2 is inactive, stewardship raises ω_2, which eases regulator 1's leakage concern and allows some of the increase in Γ^f to translate into higher abatement (see Proposition 1). When regulator 2 is also active, however, he lowers his country's tax τ_2 as Γ^f rises. This limits the increase in the effective foreign emissions cost ω_2, so the benefit to regulator 1 from allowing stewardship to increase abatement is smaller, and he lowers his tax further. The same logic applies to regulator 2. In the end, their mutual responses fully offset the increase in Γ^f, leaving the effective costs of emissions unchanged.[14]

These properties of equilibrium taxes directly shape the equilibrium abatement and leakage. First, because of the strategic complementarity between emissions taxes, abatement is affected by the environmental and production location preferences of both regulators, as reflected in $\Gamma_i^r, \Gamma_{-i}^r$ and β_i, β_{-i} in (17). Second, because each regulator's tax fully offsets Γ^f, neither equilibrium abatement nor leakage is affected by stewardship. Leakage instead depends on the equilibrium tax gap between countries. This tax gap is proportional to $\tau_1^{solo} - \tau_2^{solo}$, which, using the preferred choices characterized in Lemma 2, can be expressed as a sum of differences between the two regulators in preferred abatement and in the benefits of local production:

$$\tau_1^{solo} - \tau_2^{solo} \sim \theta\left(\frac{\Gamma_1^r}{\alpha_1} - \frac{\Gamma_2^r}{\alpha_2}\right) - \phi\left(\frac{\beta_1}{\alpha_1} - \frac{\beta_2}{\alpha_2}\right).$$

[14] Formally, Eq. (19) and its analog for country 2's best response show that, when expressed in terms of ω_1 and ω_2, the two best-response functions remain unchanged when Γ^f changes. Hence, their solution (ω_1^A, ω_2^A) remains unchanged as well.

Thus, leakage goes from country 1 to country 2 when the regulator in country 1 internalizes a higher cost of emissions or places a lower value on local production.

These insights allow us to formulate the following result on the effects of stewardship and advocacy.

Proposition 2 (Advocacy Leakage)**.** *In the active equilibrium:*

1. *Policy advocacy leads to "advocacy leakage:" it increases abatement both locally and abroad:*

$$\frac{\partial x_1^A}{\partial \Gamma_1^r} = \frac{\theta + \phi}{(\theta + 2\phi)\phi\alpha_1} > 0 \qquad \frac{\partial x_2^A}{\partial \Gamma_1^r} = \frac{1}{(\theta + 2\phi)\alpha_1} > 0 \qquad \frac{\partial l^A}{\partial \Gamma_1^r} = \frac{1}{(\theta + 2\phi)\alpha_1} > 0.$$

   In contrast, stewardship has no impact on equilibrium abatement or leakage: $\frac{\partial x_1^A}{\partial \Gamma^f} = \frac{\partial x_2^A}{\partial \Gamma^f} = \frac{\partial l^A}{\partial \Gamma^f} = 0$.

2. *Advocacy leakage disappears in the no-production-leakage limit:* $\lim_{\theta \to \infty} x_2^A = \frac{\Gamma_2^r}{\phi\alpha_2}$.

Proposition 2 shows that, when country 2's regulator responds by also setting an optimal tax, the effectiveness of corporate stewardship and policy advocacy changes compared to the case where country 2 is inactive (cf. Proposition 1). Stewardship no longer affects abatement or leakage, while local policy advocacy now also affects abatement abroad. The cross-border effect of advocacy arises because emissions taxes are strategic complements: stronger advocacy at home raises the domestic emissions tax, which eases leakage concerns for the regulator abroad and leads him to set a higher emissions tax as well. Through this channel, local policy advocacy "leaks" across borders.

4.3 Endogenous Policy Adoption

We now solve for the endogenous adoption decision of country 2's regulator. We maintain the assumption that regulator 1 faces no adoption friction, $\kappa_1 = 0$, and hence always sets τ_1 optimally. Regulator 2 begins at the status-quo tax $\tau_2 = 0$. He can choose to change it to his own optimal tax, but only if the benefit from doing so exceeds $\kappa_2 \geq 0$, reflecting political frictions. We characterize the pure-strategy Nash equilibria as a function of κ_2.

We first characterize regulator 2's gain from adopting his optimal tax. As shown in Appendix A.7,

for any given τ_1, setting $\tau_2^*(\tau_1)$ instead of the zero status-quo tax yields the payoff gain of

$$\Delta W_2(\tau_2^*(\tau_1)) = W_2(\tau_2^*(\tau_1)) - W_2(0) = \frac{\alpha_2(\theta+\phi)}{2\theta\phi}[\tau_2^*(\tau_1)]^2 \geq 0. \tag{20}$$

Thus, a larger optimal tax $\tau_2^*(\tau_1)$ makes regulator 2 more likely to adopt emissions pricing.

Eq. (20) allows us to characterize the conditions under which equilibria I and A exist. In the inactive equilibrium, regulator 1 sets τ_1^I, so regulator 2's optimal active deviation is to setting his best-response tax $\tau_2^*(\tau_1^I)$. Therefore, the inactive equilibrium exists if and only if

$$\underline{\kappa} \equiv \Delta W_2(\tau_2^*(\tau_1^I)) \leq \kappa_2. \tag{21}$$

Similarly, in the active equilibrium, regulators set emissions taxes (τ_1^A, τ_2^A), which are best responses to each other. For regulator 2, a deviation to any other non-zero tax incurs the same adoption friction and is therefore weakly unprofitable by optimality of τ_2^A, so the only relevant deviation is to remain at the status quo, $\tau_2 = 0$, in which case the adoption friction is not incurred. Thus, the active equilibrium exists if and only if $W_2(\tau_2^A) = W_2(\tau_2^*(\tau_1^A)) \geq W_2(0) + \kappa_2$, or equivalently,

$$\bar{\kappa} \equiv \Delta W_2(\tau_2^A) \geq \kappa_2. \tag{22}$$

The following result summarizes the equilibria in different regions.

Lemma 5 (Equilibrium Regions and Multiplicity)**.** *The thresholds $\underline{\kappa}$ and $\bar{\kappa}$ satisfy $\underline{\kappa} < \bar{\kappa}$. The set of pure-strategy Nash equilibria is characterized as follows:*

1. *If $\kappa_2 < \underline{\kappa}$, A is the unique equilibrium.*

2. *If $\kappa_2 \in [\underline{\kappa}, \bar{\kappa}]$, both A and I are equilibria.*

3. *If $\kappa_2 > \bar{\kappa}$, I is the unique equilibrium.*

The reason why $\underline{\kappa} < \bar{\kappa}$, and hence multiple equilibria arise, is the strategic complementarity between emissions taxes induced by leakage. When country 2 is active and sets a positive emissions tax, country 1's optimal tax is higher, $\tau_1^A > \tau_1^I$, which in turn makes a higher tax optimal for country 2. As a result, country 2 gains more from being active (see Eq. (20)). By contrast, when country 2 is inactive, country 1 sets a lower tax, making the gain from becoming active smaller. For intermediate adoption frictions, both activity and inactivity can therefore be self-sustaining.

With the thresholds defined in Lemma 5, we can now analyze how corporate stewardship and policy advocacy shape the equilibrium adoption decision.

Proposition 3 (Investor Voice and Foreign Policy Adoption). *The thresholds $\underline{\kappa}$ and $\bar{\kappa}$ decrease in Γ^f and increase in Γ_1^r. Consequently:*

- *Stewardship shrinks the "Unique A" region and widens the "Unique I" region.*
- *Advocacy widens the "Unique A" region and shrinks the "Unique I" region.*

Stewardship crowds out foreign regulation: it lowers both adoption thresholds, making the inactive equilibrium more likely and the active equilibrium less likely. By discouraging foreign regulatory activity, stewardship can thus sustain the severe form of policy miscoordination. The reason is that stewardship lowers country 2's gain from adopting an emissions tax. As Eq. (20) shows, the gain from adoption increases with country 2's optimal tax. Stewardship lowers this optimal tax through two channels. First, by inducing the firm to internalize emissions directly, it reduces the need for regulator 2 to intervene. Second, stewardship lowers country 1's tax, which further reduces regulator 2's optimal tax through the strategic complementarity between emissions taxes.[15]

Policy advocacy has the opposite effect: it crowds in foreign regulation. By increasing the cost of emissions internalized by regulator 1, advocacy raises country 1's emissions tax. Strategic complementarity then raises regulator 2's optimal tax, increasing the gain

[15]This decline holds in both equilibria. In equilibrium A, τ_2^A falls one-for-one with Γ^f by Lemma 4. In equilibrium I, the optimal deviation tax satisfies $\frac{d\tau_2^*(\tau_1^I)}{d\Gamma^f} = -\frac{\theta(\theta+2\phi)}{(\theta+\phi)^2} < 0$ by Eqs. (11) and (15).

from moving away from the status quo and making foreign regulation more likely.[16] Thus, local policy advocacy can mitigate the effects of policy miscoordination.

5 Implications and Applications

We now discuss broader implications of our framework. Section 5.1 discusses how stewardship and policy advocacy interact and how the geographic scope of stewardship shapes its effects. Section 5.2 develops empirical implications of the model. Section 5.3 discusses applications of the framework to other settings involving global externalities.

5.1 Interaction Between Stewardship and Advocacy

Recent practitioner discussions call for greater emphasis on policy advocacy (PRI, 2026; Volans, 2026; Waygood, 2023). As Gosling et al. (2026) put it, "Under a policy-led narrative the role of investors changes: rather than trying to dictate corporate changes. . . , investors support and enable the policy environment." Our model provides a way to study how investors can use these two channels together. It shows how each channel shapes the regulatory environment in which the other operates, whether one weakens the other, and how these interactions feed back into investors' choice between the two channels.

Interactions through policy adoption. Our results in Sections 4.1–4.2 show that the relative effectiveness of these channels depends critically on the regulatory regime abroad and on the scope for production leakage. Endogenous policy adoption reinforces these differences: stewardship makes foreign regulation less likely and is most effective precisely when the foreign regulator remains inactive (Propositions 1 and 3), whereas advocacy makes foreign regulation more likely and is more effective when the foreign regulator is active (Propositions 2 and 3). Thus, each channel shifts the regulatory regime in a direction that increases its own relative importance.

[16] This increase again holds in both equilibria. In equilibrium A, Eqs. (15)–(16) imply $\frac{\partial \tau_2^A}{\partial \Gamma_1^r} = \frac{\phi}{\alpha_1(\theta+2\phi)} > 0$. In equilibrium I, Eqs. (11) and (15) imply $\frac{\partial \tau_2^*(\tau_1^I)}{\partial \Gamma_1^r} = \frac{\theta\phi}{\alpha_1(\theta+\phi)^2} > 0$.

The two channels also interact in how strongly they affect foreign policy adoption. As we show in Online Appendix B.2, the foreign-regulation thresholds (21)–(22) satisfy

$$\frac{\partial^2 \underline{\kappa}}{\partial \Gamma^f \partial \Gamma_1^r} < 0, \qquad \frac{\partial^2 \bar{\kappa}}{\partial \Gamma^f \partial \Gamma_1^r} < 0. \tag{23}$$

Since advocacy makes foreign adoption more likely by raising both thresholds, Eq. (23) implies that stewardship dampens this effect. In other words, stewardship reduces the extent to which domestic policy advocacy crowds in foreign regulation. Intuitively, stewardship reduces the foreign regulator's desired tax, so a given increase in domestic advocacy generates a smaller increase in the gains from foreign regulation (see Eq. (20)).

Stewardship can thus reinforce policy fragmentation in two ways: it directly reduces the foreign regulator's incentive to adopt regulation and also makes advocacy less effective at offsetting this effect. Accordingly, when foreign regulation is politically feasible, adding advocacy on top of stewardship may be less effective than shifting some effort from stewardship toward advocacy. This raises a natural question: when investors can direct their influence toward either channel, which one do they prefer?

Which channel will investors use? In Online Appendix B.3, we study investor choice directly. To make the comparison independent of the pre-existing levels of stewardship and advocacy, we start from the no-voice benchmark, $\Gamma^f = \Gamma_1^r = \Gamma_2^r = 0$, and ask where investors would direct their first unit of influence. The domestic investors' utility is

$$W_{s,1} = \alpha_1 \Pi(x_1, x_2, l) - \gamma_1^s E, \tag{24}$$

and they prefer local policy advocacy to stewardship when $\frac{\partial W_{s,1}}{\partial \Gamma_1^r} > \frac{\partial W_{s,1}}{\partial \Gamma^f}$.[17]

When the foreign regulator is inactive, investors benefit from using either channel and

[17]This exercise abstracts from differences in the costs of using the two channels. In a richer model in which investors allocate a budget between them, the relevant comparison would be marginal benefit per unit of cost.

prefer advocacy to stewardship if and only if

$$\frac{\theta}{\phi} > \frac{2\alpha_1 - \beta_1/\gamma_1^s}{1-\alpha_1}. \tag{25}$$

Thus, investors favor advocacy when relocation is costly (θ is high) and favor stewardship when relocation is easy. This mirrors the intuition in Proposition 1: leakage weakens the effect of domestic advocacy, while stewardship eases the abatement-leakage trade-off.

Investors' preferred channel also depends on the firm's ownership structure. When $\beta_1 < 2\gamma_1^s$, the threshold in Eq. (25) increases in α_1, so advocacy is relatively more attractive when domestic ownership is low. The reason is that ownership changes the regulator's willingness to impose costs on the firm. When domestic investors own a smaller share, the regulator is less concerned about the reduction in firm profits caused by a higher emissions tax and therefore responds more strongly to advocacy.[18]

When the foreign regulator is active, advocacy clearly dominates. Stewardship has zero marginal value because regulators fully offset its effect on the firm's operating decisions (Proposition 2), whereas advocacy remains strictly valuable. Investors therefore direct their first unit of influence toward advocacy.

More generally, these results show that investor voice shapes whether and how strongly foreign countries regulate, and this regulatory response in turn affects the relative attractiveness of stewardship and advocacy to investors.

Geographic scope of stewardship. The relative attractiveness of stewardship also depends on its geographic reach. Our baseline model assumes that investors place the same weight on emissions across the firm's operations. Online Appendix B.4 relaxes this assumption and allows stewardship to differ in intensity across domestic and foreign emissions. This may capture situations in which investors place greater weight on emissions that are more salient to them, more visible to their clients and other stakeholders, or

[18] Our reduced-form specification isolates this regulatory channel by holding the effect of stewardship fixed with respect to ownership. In a richer model, larger ownership stakes by domestic investors could also make their stewardship efforts more effective, so ownership could affect investors' choice through an additional channel.

generated in jurisdictions where their stewardship efforts are concentrated.

This extension shows that our baseline comparison between stewardship and advocacy is robust, while also clarifying the key role of stewardship's global reach. When the foreign country is unregulated, stewardship directed only at domestic emissions is offset by a reduction in the domestic emissions tax and has no effect on abatement or leakage. In contrast, stewardship directed at foreign emissions generates the effects in our baseline model. By reducing the firm's incentive to relocate production abroad, foreign stewardship allows the domestic regulator to set a higher tax, thereby raising domestic abatement, while also directly increasing foreign abatement and reducing leakage. Thus, stewardship's relative advantage under fragmented regulation comes from its global reach: advocacy works through national regulation and is weakened by leakage, whereas stewardship directly affects emissions abroad.

The result that stewardship's relative advantage reverses when foreign regulation is active or politically feasible also remains robust, and again highlights the key role of stewardship's global reach. When both countries regulate emissions, neither domestic nor foreign stewardship affects equilibrium abatement or leakage, preserving our baseline result in Proposition 2. The crowding-out result in Proposition 3 is also preserved and is driven by foreign stewardship: stewardship directed at foreign emissions reduces the foreign regulator's incentive to adopt emissions pricing, whereas stewardship directed only at domestic emissions has no effect on the adoption thresholds.

Finally, the extension shows that geographic differences in stewardship can themselves create incentives for production leakage. Prediction 4 in Section 5.2 discusses this implication and how it can be distinguished empirically from regulation-driven leakage.

5.2 Empirical Implications

Our analysis yields several new predictions that can be taken to the data.

1. Stewardship should be more effective when fewer of the firm's foreign operations are subject to emissions regulation.

Propositions 1 and 2 show that stewardship affects abatement when the foreign country is unregulated, but not when both regulators are active. Thus, stewardship should be more effective when fewer of the firm's foreign operations are subject to emissions regulation. Establishment-level data could provide a more direct test: the same stewardship activity should have larger effects on operations located in unregulated jurisdictions.

As evidence broadly consistent with this prediction, Drobetz et al. (2024) find that foreign institutional ownership is associated with lower environmental costs among firms in emerging economies, which they attribute to weaker environmental regulation in these economies. Our prediction is more specific: holding a multinational firm's domestic environmental regulation fixed, stewardship should be more effective when its foreign operations face weaker regulation. To test this prediction, stewardship could be measured using direct engagement records, as in Dimson et al. (2015) and Hoepner et al. (2024), or through shareholder proposal sponsorship and voting on environmental and social issues, as in Flammer (2015) and Dikolli et al. (2022). Ideally, such data would identify whether stewardship concerns the firm's foreign operations, allowing its geographic scope to be matched to those operations' regulatory exposure, as emphasized in Section 5.1.

2. Stewardship should reduce foreign regulatory stringency and adoption.

Our model predicts that stewardship lowers regulatory stringency in the domestic country, as the regulator offsets greater firm-level internalization of emissions (Lemma 4). More distinctively, it also predicts a response by foreign regulators: stewardship lowers the foreign emissions tax when the foreign regulator is active (Lemma 4) and reduces the foreign regulator's incentive to adopt regulation in the first place (Proposition 3). Thus, stronger stewardship, particularly when it targets emissions globally, should be associated with weaker foreign regulation along both the intensive and extensive margins.

Related evidence on domestic regulatory responses to private environmental action comes from Malhotra et al. (2019), who find experimentally that voluntary environmental programs reduce support for stringent public regulation. This is consistent with the domestic regulatory response in our model. To our knowledge, the corresponding cross-border prediction—whether stewardship directed at a multinational firm weakens regulation in foreign countries where the firm operates—has not yet been tested.

3. Investor policy advocacy in one country should generate regulatory spillovers abroad, especially when firms can readily relocate production across countries.

Proposition 2 shows that, when the foreign regulator is active, local policy advocacy raises policy stringency and abatement abroad, and Proposition 3 shows that it also shifts the foreign country toward adopting regulation. Thus, local policy advocacy can affect foreign regulation and emissions along both intensive and extensive margins. Both effects arise from the strategic complementarity of emissions taxes induced by production leakage. Hence, cross-border spillovers from investor policy advocacy should be stronger in industries with lower relocation costs.

This prediction provides a way to distinguish our mechanism from policy comovement driven by common political preferences or other forms of policy diffusion. Empirical evidence points to strategic interactions in environmental policy. Steinebach et al. (2021) find that carbon-pricing adoption and policy stringency are positively associated with those of trade partners and export-market competitors, and emphasize concerns about competitive disadvantage, which are closely related to the leakage considerations underlying our mechanism. Fredriksson and Millimet (2002) document related strategic interactions across U.S. states. To our knowledge, however, existing work does not examine whether investor policy advocacy generates such cross-border spillovers.

4. Production leakage should be greater when stewardship is more concentrated on domestic emissions.

Our baseline model emphasizes regulation-driven leakage: differences in emissions taxes induce firms to relocate production toward less regulated jurisdictions. The extension in Online Appendix B.4 identifies a second driver: geographic differences in the focus of stewardship. If Γ_i^f denotes the internal cost that stewardship places on emissions in country i, the firm responds to the total effective cost of emissions, $\tau_i + \Gamma_i^f$. Thus, holding regulation fixed, the firm should be more likely to leak emissions abroad if stewardship places greater weight on domestic than foreign emissions ($\Gamma_1^f > \Gamma_2^f$).

Existing literature provides evidence of leakage in response to both environmental regulation and private environmental pressure. Ben-David et al. (2021) and Bartram et al. (2022) document shifts in production and emissions in response to differences in environmental regulation. Duchin et al. (2025) and Berg et al. (2026) show that investor pressure can be associated with divestitures of polluting assets, while Dai et al. (2024) document the outsourcing of emissions to foreign suppliers. Our model highlights another margin through which stewardship can generate leakage: relocation of production across countries within the same multinational firm. This mechanism is consistent with evidence in Gianinazzi et al. (2026) which shows that higher ownership by PRI signatory investors (who are predominantly OECD-based investors), reduces local externalities around firms' facilities in OECD countries, but increases them in the non-OECD countries.

More importantly, our model shows that testing the effects of investor pressure on leakage requires accounting for the endogenous response of regulation. Holding regulation fixed, stewardship-driven leakage should increase with the domestic tilt of stewardship. But regulation adjusts in response to stewardship, and this adjustment can weaken the direct leakage effect. In our model, stewardship directed at domestic emissions has no effect on leakage once the domestic regulator adjusts, and neither form of stewardship affects leakage when both regulators are active. Thus, stewardship-driven leakage should be stronger in settings where regulation is harder or slower to adjust.

5.3 Broader Applications of the Framework

Although we use carbon emissions to provide a concrete interpretation of the model, its key mechanisms are not specific to environmental externalities. The framework applies whenever activity y_i conducted in country i generates a globally relevant externality e_i; the firm can undertake a costly action x_i that mitigates this externality; regulatory policies differ across jurisdictions; and the firm can respond to these differences by shifting activity across borders. The parameter γ then represents the global social cost of the externality—or, in applications involving positive externalities, the global social benefit. We illustrate this broader applicability in several settings and discuss the additional considerations needed to capture the distinctive features of each.

5.3.1 AI Development and Safety

Mapping to the model. The regulation of risks from artificial intelligence provides a natural application. Here, y_i can be interpreted as the scale of advanced AI development and training conducted in country i, while x_i captures investments in model evaluation, security, monitoring, and other safety measures. Anthropic's Responsible Scaling Policy illustrates such firm-level safety investment. The resulting e_i captures the risk that AI systems are misused, behave unpredictably, or cause large-scale economic, security, and societal harm. Differences across countries in testing, security, and reporting requirements can create incentives for AI firms to relocate model-development and training activities, or the associated computing infrastructure, to less regulated jurisdictions.[19]

Additional considerations. Both firms' location choices and governments' incentives to retain AI activity may be more discrete in AI than in our model. Because frontier AI development depends on concentrated computing infrastructure and specialized talent, a firm may locate most of its activity in one country rather than divide it smoothly across jurisdictions. Governments may likewise care primarily about winning the technological race (e.g., about whether $y_1 > y_2$) rather than simply about increasing domestic activity. The parameters β_i capture this arms-race motive in reduced form, but not its relative and possibly winner-take-all nature.[20]

[19] Industry statements indicate that firms perceive this margin as relevant. For example, OpenAI has argued that implementation of the EU AI Act should avoid "pushing research out of Europe" (OpenAI, 2025). During the debate over California's proposed SB 1047, the software-industry trade association BSA similarly warned that the bill risked "stifling, if not eliminating, the development of frontier models in California—even as those models continue to be developed elsewhere" (BSA, 2024).

[20] Another potential difference is that AI technology developed in one country can be incorporated into models developed in other jurisdictions, weakening the link between the location of the original development, y_i, and the location where the resulting risks, e_i, arise.

5.3.2 Financial Regulation and Systemic Stability

Mapping to the model. The framework also applies to financial institutions operating across jurisdictions. Here, y_i denotes the scale of lending, trading, or other financial intermediation conducted in country i. The action x_i represents measures that reduce the institution's contribution to systemic risk, including larger equity-capital and liquidity buffers and stronger monitoring and risk management. The externality e_i is the institution's contribution to systemic risk, while γ captures the global social cost of financial distress and contagion. Differences in financial regulation can induce financial institutions to shift lending, trading, or other risk-taking activities to less regulated jurisdictions. Such relocation may reduce an institution's regulatory burden without reducing the aggregate risk imposed on the global financial system.

Additional considerations. International coordination is relatively strong in financial regulation, as reflected in the Basel standards and the Financial Stability Board. Our model abstracts from such explicit coordination, but it points to another reason why regulation may be more prevalent in this setting: political frictions to adopting regulation may be relatively low. Past financial crises have made the costs of systemic risk highly salient, increasing the perceived need for regulation relative to the status quo, which can be thought of as low κ within the model. Even in this setting, coordination remains incomplete, so financial stability is best viewed as an application with less severe, rather than absent, regulatory miscoordination.[21] Another important feature of this application is the network structure of the financial system, which can make systemic risk (e_i) compound non-linearly across jurisdictions.

[21] Cross-border swaps provide one illustration. Following the CFTC's 2013 guidance, several U.S. banks removed guarantees from their foreign affiliates, allowing some overseas swap activity to escape Dodd–Frank requirements and prompting scrutiny from the CFTC (see House Financial Services Committee). When the CFTC later proposed a narrower cross-border framework, Commissioner Berkovitz objected that it "would allow U.S. banks to evade swap regulation by booking swaps in non-U.S. affiliates" without eliminating the underlying systemic risk (Berkovitz, 2019).

5.3.3 Illicit Finance and Money Laundering

Mapping to the model. Money laundering can be mapped into the model by treating a bank, payment provider, or cryptocurrency exchange as the regulated firm. The variable y_i represents the scale of transaction-processing or other financial activity that creates opportunities for illicit finance in country i, while x_i represents investments in customer due diligence, transaction monitoring, and suspicious-activity reporting. The externality e_i is the illicit financial activity facilitated by the intermediary's operations, while γ captures the global social cost generated by that activity, such as drug trade, corruption, human trafficking, and terrorism. Leakage arises when stricter anti-money-laundering requirements in one country shift intermediaries and transactions toward jurisdictions with weaker monitoring and enforcement, limiting the effect of local regulation on global illicit finance.[22] Governments may nevertheless value hosting these intermediaries because they bring investment, tax revenues, and technological activity.

Additional considerations. In this setting, the financial intermediary facilitates rather than directly produces the ultimate harm. A fuller model would also involve modeling the behavior of criminal organizations and their demand for financial services.

5.3.4 Global Diffusion of Innovation

Mapping to the model. The framework can also be used to study positive externalities, such as knowledge spillovers generated by pharmaceutical, clean-technology, and other forms of innovation. Here, y_i denotes the scale of innovative activity conducted in country i. The action x_i captures costly firm efforts to diffuse the knowledge generated by this activity, including publishing research results, granting broad licenses to patented technologies at low royalty rates, and sharing the technical know-how needed to implement them. The externality can then be expressed as $e_i = y_i + x_i \geq 0$: it represents the global knowledge spillover originating from country i and enters agents' utilities as a benefit,

[22]For example, the Financial Action Task Force (FATF) reports that cryptocurrency providers "may relocate, incorporate, or route customer activity through jurisdictions with weak regulatory and supervisory controls." (FATF, 2026)

i.e., as "$+\gamma_i e_i$". Regulation takes the form of policies requiring firms to disclose or share knowledge produced there, such as EU mandates to register locally conducted clinical trials and report their results.[23]

Additional considerations. Because total innovative activity, $y_1 + y_2$, is fixed in our model, this mapping captures the allocation of innovative activity across countries and the diffusion of the knowledge it generates, but not the underprovision of innovation itself. It therefore does not capture the main purpose of policies such as R&D tax credits and advance market commitments: increasing the overall level of innovation.

5.3.5 Role of Investors

Investor voice is present across these applications, but the relative importance of corporate stewardship and policy advocacy varies. Climate change provides the clearest evidence of both channels. Investor activity on AI is also emerging along both dimensions. On the stewardship side, Norges Bank has urged companies developing or using AI to strengthen board oversight, transparency, and risk management, while shareholder proposals at Alphabet have sought greater disclosure and oversight of AI-related misinformation, discrimination, and data use.[24] On the advocacy side, 149 institutional investors representing more than \$1.6 trillion in assets supported stronger protections in the EU AI Act in 2023 (IAHR, 2023).

In other applications, investor voice is also present, though the balance between the two channels is less clear. Stewardship is evident in anti-money laundering, where Norges Bank has engaged with banks concerning measures to mitigate money-laundering risk (NBIM, 2019), and in global access to medicines, where investors have encouraged voluntary licensing and technology transfer.[25] Policy advocacy is visible in financial stability,

[23]Under Regulation (EU) No. 536/2014, clinical-trial sponsors, including pharmaceutical companies, must submit a summary of the trial results to the EU database, generally within one year after the trial ends. Another form of regulation ties diffusion requirements to public R&D funding. For example, corporate beneficiaries of Horizon Europe must provide immediate open access to any peer-reviewed scientific publications arising from the funded project.

[24]See Norges Bank Investment Management's expectations on responsible AI and Alphabet's 2025 proxy statement. See also "Meta, Apple, Microsoft Expand AI Risk Transparency Amid Pressure."

[25]For example, ICCR-affiliated investors urged Merck to share intellectual property related to its

where asset managers and investor associations participate in debates over bank capital and prudential regulation (BlackRock, 2024; ICI, 2024; SIFMA, 2024).

Because the extent of policy miscoordination and the scope for leakage vary across these settings, our model provides broad implications for when corporate stewardship and policy advocacy are most effective and how they interact with national regulation.

6 Conclusion

This paper studies the role of investor voice when firms generate global externalities and regulation is fragmented across jurisdictions. We distinguish between two forms of investor influence: stewardship, which targets firm behavior directly, and policy advocacy, which targets regulation. Our results highlight a two-way interaction between private governance and public policy. Fragmented regulation and the resulting scope for regulatory arbitrage shape the relative effectiveness of stewardship and advocacy, while investor voice in turn affects not only firm behavior and local regulation, but also the incentives of regulators in other jurisdictions.

We show that stewardship can partially compensate for weak regulation under severe miscoordination, but can also sustain miscoordination when foreign regulation is politically feasible. Conversely, advocacy may appear locally limited, especially in the presence of leakage, but can have global effects by encouraging regulatory coordination across countries. Overall, whether investor voice helps govern global externalities or instead reinforces fragmented policy depends on the source and severity of policy frictions and firms' ability to shift activity across jurisdictions.

COVID-19 treatments and welcomed its subsequent licensing of an antiviral treatment through the Medicines Patent Pool; see ICCR. Many investors also use the Access to Medicine Index to assess and engage pharmaceutical companies on their licensing and technology-transfer practices.

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A Proofs

A.1 Proof of Lemma 1

Proof. Using the balanced-budget expression for profits and substituting $y_1 = \bar{y}_1 - l$, $y_2 = \bar{y}_2 + l$, and $E = \bar{Y} - x_1 - x_2$:

$$W^{FB} = p\bar{Y} - \tfrac{1}{2}\theta l^2 - \tfrac{1}{2}\phi x_1^2 - \tfrac{1}{2}\phi x_2^2 + \beta_1(\bar{y}_1 - l) + \beta_2(\bar{y}_2 + l) - \gamma(\bar{Y} - x_1 - x_2).$$

The planner chooses l, x_1, and x_2. The first-order conditions are:

Leakage:

$$\frac{\partial W^{FB}}{\partial l} = -\theta\, l - \beta_1 + \beta_2 = 0 \quad \Longrightarrow \quad l^{FB} = \frac{\beta_2 - \beta_1}{\theta}.$$

With $\beta_1 = \beta_2 = \beta$, we obtain a clean benchmark where leakage is always socially wasteful. This implies that the first-best production levels are:

$$y_1^{FB} = \bar{y}_1 - \frac{\beta_2 - \beta_1}{\theta} = \bar{y}_1, \qquad y_2^{FB} = \bar{y}_2 + \frac{\beta_2 - \beta_1}{\theta} = \bar{y}_2.$$

Abatement:

$$\frac{\partial W^{FB}}{\partial x_i} = -\phi\, x_i + \gamma = 0 \quad \Longrightarrow \quad x_i^{FB} = \frac{\gamma}{\phi}, \quad i = 1, 2$$

Abatement is symmetric across countries and equates the marginal abatement cost to the social cost of carbon. Global emissions are:

$$E^{FB} = \bar{Y} - 2\,\frac{\gamma}{\phi}.$$

□

A.2 Proof of Lemma 2

Proof. With a balanced budget, $T_i = \tau_i e_i$, profits reduce to $\Pi = p\bar{Y} - \frac{1}{2}\phi(x_1^2 + x_2^2) - \frac{1}{2}\theta l^2$. Substituting this together with $y_1 = \bar{y}_1 - l$ and $E = \bar{Y} - x_1 - x_2$ into the regulator's objective (5) for $i = 1$ gives

$$W_1 = \alpha_1 \left[p\bar{Y} - \tfrac{1}{2}\phi(x_1^2 + x_2^2) - \tfrac{1}{2}\theta l^2\right] + \beta_1(\bar{y}_1 - l) - \Gamma_1^r(\bar{Y} - x_1 - x_2). \tag{26}$$

The unconstrained regulator chooses x_1, x_2 and l directly.

Abatement:

$$\frac{\partial W_1}{\partial x_i} = -\alpha_1 \phi x_i + \Gamma_1^r = 0 \quad \Longrightarrow \quad x_i^U = \frac{\Gamma_1^r}{\alpha_1 \phi}, \qquad i = 1, 2. \tag{27}$$

Leakage:

$$\frac{\partial W_1}{\partial l} = -\alpha_1 \theta l - \beta_1 = 0 \quad \Longrightarrow \quad l^U = \frac{-\beta_1}{\alpha_1 \theta}. \tag{28}$$

□

A.3 Proof of Lemma 3

Proof. Substituting the firm's responses (9) and (10) into $W_1 = \alpha_1 \Pi + \beta_1 y_1 - \Gamma_1^r E$ gives

$$W_1(\tau_1) = \alpha_1 \left[p\bar{Y} - \frac{(\tau_1 + \Gamma^f)^2}{2\phi} - \frac{(\tau_2 + \Gamma^f)^2}{2\phi} - \frac{(\tau_1 - \tau_2)^2}{2\theta} \right] + \beta_1 \left[\bar{y}_1 - \frac{\tau_1 - \tau_2}{\theta} \right]$$
$$- \Gamma_1^r \left[\bar{Y} - \frac{\tau_1 + \Gamma^f}{\phi} - \frac{\tau_2 + \Gamma^f}{\phi} \right].$$

Emissions tax:

$$\frac{\partial W_1}{\partial \tau_1} = -\frac{\alpha_1}{\phi}(\tau_1 + \Gamma^f) - \frac{\alpha_1}{\theta}(\tau_1 - \tau_2) - \frac{\beta_1}{\theta} + \frac{\Gamma_1^r}{\phi} = 0.$$

Multiplying by $\theta\phi$ and collecting terms in τ_1,

$$\alpha_1(\theta + \phi)\tau_1 = \theta \Gamma_1^r - \alpha_1 \theta \Gamma^f - \phi \beta_1 + \alpha_1 \phi \tau_2 \quad \Longrightarrow \quad \tau_1^*(\tau_2) = \frac{\theta(\Gamma_1^r - \alpha_1 \Gamma^f) - \phi \beta_1 + \alpha_1 \phi \tau_2}{\alpha_1(\theta + \phi)},$$

which rearranges to (11).

Abatement:

$$x_1(\tau_1^*(\tau_2)) = \frac{\tau_1^*(\tau_2) + \Gamma^f}{\phi} = \frac{\theta(\Gamma_1^r - \alpha_1 \Gamma^f) - \phi \beta_1 + \alpha_1 \phi \tau_2 + \alpha_1(\theta + \phi)\Gamma^f}{\alpha_1 \phi(\theta + \phi)} = \frac{\theta \Gamma_1^r - \phi \beta_1 + \phi \alpha_1(\tau_2 + \Gamma^f)}{\alpha_1 \phi(\theta + \phi)},$$

while $x_2(\tau_2) = (\tau_2 + \Gamma^f)/\phi$ follows directly from (9) and is independent of τ_1.

Leakage:

$$l(\tau_1^*(\tau_2)) = \frac{\tau_1^*(\tau_2) - \tau_2}{\theta} = \frac{\theta(\Gamma_1^r - \alpha_1 \Gamma^f) - \phi \beta_1 + \alpha_1 \phi \tau_2 - \alpha_1(\theta + \phi)\tau_2}{\theta \alpha_1(\theta + \phi)} = \frac{\theta(\Gamma_1^r - \alpha_1 \Gamma^f) - \phi \beta_1 - \theta \alpha_1 \tau_2}{\theta \alpha_1(\theta + \phi)}.$$

□

A.4 Proof of Proposition 1

Proof. Setting $\tau_2 = 0$ in (12)–(14),

$$x_1 = \frac{\theta\Gamma_1^r - \phi\beta_1 + \phi\alpha_1\Gamma^f}{\alpha_1\phi(\theta+\phi)}, \qquad x_2 = \frac{\Gamma^f}{\phi}, \qquad l = \frac{\theta(\Gamma_1^r - \alpha_1\Gamma^f) - \phi\beta_1}{\theta\alpha_1(\theta+\phi)}. \tag{29}$$

Part 1: Differentiating (29) with respect to Γ_1^r,

$$\frac{\partial x_1}{\partial \Gamma_1^r} = \frac{\theta}{\alpha_1\phi(\theta+\phi)} > 0, \qquad \frac{\partial x_2}{\partial \Gamma_1^r} = 0, \qquad \frac{\partial l}{\partial \Gamma_1^r} = \frac{\theta}{\theta\alpha_1(\theta+\phi)} = \frac{1}{\alpha_1(\theta+\phi)} > 0,$$

and with respect to Γ^f,

$$\frac{\partial x_1}{\partial \Gamma^f} = \frac{\phi\alpha_1}{\alpha_1\phi(\theta+\phi)} = \frac{1}{\theta+\phi} > 0, \qquad \frac{\partial x_2}{\partial \Gamma^f} = \frac{1}{\phi} > 0, \qquad \frac{\partial l}{\partial \Gamma^f} = \frac{-\theta\alpha_1}{\theta\alpha_1(\theta+\phi)} = -\frac{1}{\theta+\phi} < 0.$$

Part 2: Differentiating these marginal effects with respect to θ,

$$\frac{\partial}{\partial\theta}\frac{\partial x_1}{\partial \Gamma_1^r} = \frac{1}{\alpha_1\phi}\cdot\frac{(\theta+\phi)-\theta}{(\theta+\phi)^2} = \frac{1}{\alpha_1(\theta+\phi)^2} > 0, \qquad \frac{\partial}{\partial\theta}\frac{\partial l}{\partial \Gamma_1^r} = -\frac{1}{\alpha_1(\theta+\phi)^2} < 0,$$
$$\frac{\partial}{\partial\theta}\frac{\partial x_1}{\partial \Gamma^f} = -\frac{1}{(\theta+\phi)^2} < 0, \qquad \frac{\partial}{\partial\theta}\frac{\partial l}{\partial \Gamma^f} = \frac{1}{(\theta+\phi)^2} > 0.$$

Part 2 concerns a *decrease* in θ, which reverses these signs. For policy advocacy, a lower θ lowers $\frac{\partial x_1}{\partial \Gamma_1^r}$ and raises $\frac{\partial l}{\partial \Gamma_1^r}$, both of which stay positive: abatement still increases in Γ_1^r but by less per unit, while leakage increases by more per unit. For stewardship, a lower θ raises $\frac{\partial x_1}{\partial \Gamma^f} > 0$, so abatement increases by more per unit of Γ^f. Since $\frac{\partial l}{\partial \Gamma^f} < 0$ and $\frac{\partial}{\partial\theta}\frac{\partial l}{\partial \Gamma^f} = \frac{1}{(\theta+\phi)^2} > 0$, a lower θ makes $\frac{\partial l}{\partial \Gamma^f}$ more negative, so leakage falls at a faster rate. Finally, $\frac{\partial x_2}{\partial \Gamma^f} = \frac{1}{\phi}$ does not depend on θ, so the statement on stewardship and abatement refers to x_1. □

A.5 Proof of Lemma 4

Proof. By (11) and its country-2 counterpart, regulator i's best response is

$$\tau_i^*(\tau_{-i}) = \tau_i^{solo} + \frac{\phi}{\theta+\phi}\tau_{-i}, \tag{30}$$

with $\tau_i^{solo} = \tau_i^*(0)$ given by (15).

Equilibrium taxes: Substituting country $-i$'s best response into country i's,

$$\tau_i^A = \tau_i^{solo} + \frac{\phi}{\theta+\phi}\left(\tau_{-i}^{solo} + \frac{\phi}{\theta+\phi}\tau_i^A\right) \implies \left(1 - \frac{\phi^2}{(\theta+\phi)^2}\right)\tau_i^A = \tau_i^{solo} + \frac{\phi}{\theta+\phi}\tau_{-i}^{solo}.$$

Since $\frac{\phi^2}{(\theta+\phi)^2} < 1$, the solution is positive. Using $(\theta + \phi)^2 - \phi^2 = \theta(\theta + 2\phi)$,

$$\frac{\theta(\theta + 2\phi)}{(\theta + \phi)^2}\tau_i^A = \frac{(\theta + \phi)\tau_i^{solo} + \phi\tau_{-i}^{solo}}{\theta + \phi} \quad \Longrightarrow \quad \tau_i^A = \frac{(\theta + \phi)\left[(\theta + \phi)\tau_i^{solo} + \phi\tau_{-i}^{solo}\right]}{\theta(\theta + 2\phi)}.$$

Comparative static in θ: Differentiating $\frac{\partial \tau_i^A}{\partial \tau_{-i}^{solo}} = \frac{\phi(\theta+\phi)}{\theta(\theta+2\phi)}$ with respect to θ,

$$\frac{\partial^2 \tau_i^A}{\partial \tau_{-i}^{solo} \partial \theta} = \phi \cdot \frac{(\theta^2 + 2\theta\phi) - (\theta + \phi)(2\theta + 2\phi)}{(\theta^2 + 2\theta\phi)^2} = -\phi \cdot \frac{\theta^2 + 2\theta\phi + 2\phi^2}{\theta^2(\theta + 2\phi)^2} < 0.$$

No-leakage limit: Substituting (15) into τ_i^A, the factor $(\theta + \phi)$ cancels:

$$\tau_i^A = \frac{(\theta + \phi)\frac{\theta(\Gamma_i^r - \alpha_i\Gamma^f) - \phi\beta_i}{\alpha_i} + \phi\frac{\theta(\Gamma_{-i}^r - \alpha_{-i}\Gamma^f) - \phi\beta_{-i}}{\alpha_{-i}}}{\theta(\theta + 2\phi)}. \tag{31}$$

Numerator and denominator are both quadratic in θ. In the numerator the second summand is linear in θ, so the θ^2 term is $\theta^2\frac{\Gamma_i^r - \alpha_i\Gamma^f}{\alpha_i}$; in the denominator $\theta(\theta + 2\phi)$ it is θ^2. Hence

$$\lim_{\theta \to \infty} \tau_i^A = \frac{\Gamma_i^r - \alpha_i\Gamma^f}{\alpha_i} = \frac{\Gamma_i^r}{\alpha_i} - \Gamma^f.$$

Response to Γ^f: In (31) the coefficient α_i cancels in each Γ^f term, so these terms sum to $-(\theta + \phi)\theta\Gamma^f - \phi\theta\Gamma^f = -\theta(\theta + 2\phi)\Gamma^f$. Dividing by $\theta(\theta + 2\phi)$,

$$\tau_i^A = \frac{(\theta + \phi)\frac{\theta\Gamma_i^r - \phi\beta_i}{\alpha_i} + \phi\frac{\theta\Gamma_{-i}^r - \phi\beta_{-i}}{\alpha_{-i}}}{\theta(\theta + 2\phi)} - \Gamma^f, \tag{32}$$

so that $\frac{\partial \tau_i^A}{\partial \Gamma^f} = -1$.

Abatement: By (9) and (32),

$$x_i^A = \frac{\tau_i^A + \Gamma^f}{\phi} = \frac{1}{\theta\phi(\theta + 2\phi)}\left[(\theta + \phi)\frac{\theta\Gamma_i^r - \phi\beta_i}{\alpha_i} + \phi\frac{\theta\Gamma_{-i}^r - \phi\beta_{-i}}{\alpha_{-i}}\right].$$

Writing $\theta\Gamma_i^r - \phi\beta_i = \theta(\Gamma_i^r - \frac{\phi}{\theta}\beta_i)$ and cancelling θ gives

$$x_i^A = \frac{1}{(\theta + 2\phi)\phi}\left((\theta + \phi)\frac{\Gamma_i^r - \frac{\phi}{\theta}\beta_i}{\alpha_i} + \phi\frac{\Gamma_{-i}^r - \frac{\phi}{\theta}\beta_{-i}}{\alpha_{-i}}\right),$$

as in (17).

Leakage: By (10), $l^A = (\tau_1^A - \tau_2^A)/\theta$. Applying (16) in both countries,

$$\begin{aligned}\tau_1^A - \tau_2^A &= \frac{(\theta+\phi)}{\theta(\theta+2\phi)}\left[(\theta+\phi)\tau_1^{solo} + \phi\tau_2^{solo} - (\theta+\phi)\tau_2^{solo} - \phi\tau_1^{solo}\right] \\ &= \frac{(\theta+\phi)(\tau_1^{solo} - \tau_2^{solo})}{\theta+2\phi},\end{aligned}$$

and dividing by θ gives l^A in (18). □

A.6 Proof of Proposition 2

Proof. By (9), equilibrium abatement is $x_i^A = (\tau_i^A + \Gamma^f)/\phi$. By Lemma 4, $\frac{\partial \tau_i^A}{\partial \Gamma^f} = -1$, so

$$\frac{\partial x_i^A}{\partial \Gamma^f} = \frac{1}{\phi}\left(\frac{\partial \tau_i^A}{\partial \Gamma^f} + 1\right) = 0,$$

which proves the first part.

For the second part, differentiating x_i^A from (17) in Lemma 4 with respect to Γ_i^r gives

$$\frac{\partial x_i^A}{\partial \Gamma_i^r} = \frac{\theta+\phi}{\alpha_i\phi(\theta+2\phi)} > 0, \qquad \frac{\partial x_{-i}^A}{\partial \Gamma_i^r} = \frac{\phi}{\alpha_i\phi(\theta+2\phi)} = \frac{1}{\alpha_i(\theta+2\phi)} > 0.$$

Finally, since $\frac{\theta+\phi}{\theta+2\phi} \to 1$, $\frac{\phi}{\theta+2\phi} \to 0$ and $\frac{\phi}{\theta}\beta_i \to 0$ as $\theta \to \infty$,

$$\lim_{\theta\to\infty} x_i^A = \frac{\Gamma_i^r}{\phi\alpha_i}, \qquad \lim_{\theta\to\infty} \frac{\partial x_{-i}^A}{\partial \Gamma_i^r} = 0.$$

□

A.7 Adoption Gain Derivation

We derive regulator 2's gain from adopting his optimal emissions tax, given by Eq. (20). For this, we prove a more general result, for a generic (i.e., not necessarily zero) status quo tax τ_2^I of country 2.

Lemma. *For any given τ_1, the gain for regulator 2 from deviating from a status-quo tax τ_2^I to his optimal tax $\tau_2^* = \tau_2^*(\tau_1)$, which maximizes W_2, is given by*

$$\Delta W_2(\tau_2^*, \tau_2^I) = W_2(\tau_2^*) - W_2(\tau_2^I) = \frac{\alpha_2(\theta+\phi)}{2\theta\phi}(\tau_2^* - \tau_2^I)^2 \geq 0. \tag{33}$$

Proof. Using $\Pi = p\bar{Y} - \frac{\phi}{2}(x_1^2 + x_2^2) - \frac{\theta}{2}l^2$, $y_2 = \bar{y}_2 + l$, $E = \bar{Y} - x_1 - x_2$, together with the firm's responses $x_2 = (\tau_2 + \Gamma^f)/\phi$ and $l = (\tau_1 - \tau_2)/\theta$ (with x_1 independent of τ_2),

$$\begin{aligned} W_2(\tau_2) &= \alpha_2 \Pi(x_1, x_2, l) + \beta_2 y_2 - \Gamma_2^r E \\ &= \alpha_2 \left[p\bar{Y} - \frac{\phi}{2} x_1^2 - \frac{1}{2\phi}(\tau_2 + \Gamma^f)^2 - \frac{1}{2\theta}(\tau_1 - \tau_2)^2 \right] + \beta_2 \left[\bar{y}_2 + \frac{\tau_1 - \tau_2}{\theta} \right] \\ &\quad - \Gamma_2^r \left[\bar{Y} - x_1 - \frac{\tau_2 + \Gamma^f}{\phi} \right]. \end{aligned}$$

Subtracting the same expression evaluated at two levels τ_2' and τ_2'', every term without τ_2 cancels:

$$\begin{aligned} W_2(\tau_2'') - W_2(\tau_2') = &-\frac{\alpha_2}{2\phi} \left[(\tau_2'' + \Gamma^f)^2 - (\tau_2' + \Gamma^f)^2 \right] - \frac{\alpha_2}{2\theta} \left[(\tau_1 - \tau_2'')^2 - (\tau_1 - \tau_2')^2 \right] \\ &- \frac{\beta_2}{\theta}(\tau_2'' - \tau_2') + \frac{\Gamma_2^r}{\phi}(\tau_2'' - \tau_2'). \end{aligned}$$

Using $a^2 - b^2 = (a-b)(a+b)$ on the first two brackets and factoring out $(\tau_2'' - \tau_2')$,

$$W_2(\tau_2'') - W_2(\tau_2') = (\tau_2'' - \tau_2') \left[-\frac{\alpha_2(\theta + \phi)}{2\theta\phi}(\tau_2' + \tau_2'') + \frac{\alpha_2 \tau_1 - \beta_2}{\theta} + \frac{\Gamma_2^r - \alpha_2 \Gamma^f}{\phi} \right].$$

To simplify, use the first-order condition that pins down the optimal tax τ_2^*. Differentiating $W_2(\tau_2)$ yields

$$\begin{aligned} \frac{\partial W_2}{\partial \tau_2} &= -\frac{\alpha_2}{\phi}(\tau_2 + \Gamma^f) + \frac{\alpha_2}{\theta}(\tau_1 - \tau_2) - \frac{\beta_2}{\theta} + \frac{\Gamma_2^r}{\phi} \\ &= -\frac{\alpha_2(\theta + \phi)}{\theta\phi}\tau_2 + \frac{\alpha_2 \tau_1 - \beta_2}{\theta} + \frac{\Gamma_2^r - \alpha_2 \Gamma^f}{\phi}. \end{aligned}$$

Evaluating at the optimum $\tau_2^*(\tau_1)$, where $\partial W_2 / \partial \tau_2 = 0$,

$$\frac{\alpha_2 \tau_1 - \beta_2}{\theta} + \frac{\Gamma_2^r - \alpha_2 \Gamma^f}{\phi} = \frac{\alpha_2(\theta + \phi)}{\theta\phi}\tau_2^*.$$

Substituting this into the bracket,

$$\begin{aligned} W_2(\tau_2'') - W_2(\tau_2') &= (\tau_2'' - \tau_2') \left[-\frac{\alpha_2(\theta + \phi)}{2\theta\phi}(\tau_2' + \tau_2'') + \frac{\alpha_2(\theta + \phi)}{\theta\phi}\tau_2^* \right] \\ &= \frac{\alpha_2(\theta + \phi)}{2\theta\phi}(\tau_2'' - \tau_2') \left[2\tau_2^* - \tau_2' - \tau_2'' \right]. \end{aligned}$$

Setting $\tau_2'' = \tau_2^*$,

$$W_2(\tau_2^*) - W_2(\tau_2') = \frac{\alpha_2(\theta + \phi)}{2\theta\phi}(\tau_2^* - \tau_2') \left[2\tau_2^* - \tau_2' - \tau_2^* \right] = \frac{\alpha_2(\theta + \phi)}{2\theta\phi}(\tau_2^* - \tau_2')^2 \geq 0,$$

which is the claim for $\tau_2' = \tau_2^I$. □

A.8 Proof of Lemma 5

Proof. Since $\kappa_1 = 0$, regulator 1 is active in any equilibrium and plays the best response (30), so only regulator 2's adoption decision is at issue and only equilibria A and I can arise as pure strategy equilibria. By Eq. (33),

$$\Delta W_2(\tau_2^*) = \frac{\alpha_2(\theta + \phi)}{2\theta\phi}(\tau_2^* - \tau_2^I)^2, \tag{34}$$

which is increasing in τ_2^* whenever $\tau_2^* > \tau_2^I$, which is always satisfied for a status quo tax normalized to $\tau_2^I = 0$.

Ordering of the thresholds: In equilibrium I, regulator 1 sets $\tau_1^I = \tau_1^{solo}$, so regulator 2's best deviation tax is $\tau_2^*(\tau_1^I) = \tau_2^{solo} + \frac{\phi}{\theta+\phi}\tau_1^{solo}$. By (16), $\tau_2^A = \frac{(\theta+\phi)^2}{\theta(\theta+2\phi)}\tau_2^*(\tau_1^I)$, which gives

$$\tau_2^*(\tau_1^I) = \tau_2^{solo} + \frac{\phi}{\theta + \phi}\tau_1^{solo} = \frac{\theta(\theta + 2\phi)}{(\theta + \phi)^2}\tau_2^A. \tag{35}$$

Since $(\theta + \phi)^2 - \theta(\theta + 2\phi) = \phi^2 > 0$, we have $0 < \frac{\theta(\theta+2\phi)}{(\theta+\phi)^2} < 1$, and hence $\tau_2^*(\tau_1^I) < \tau_2^A$. Since, whenever $\tau_2^*(\tau_1^I) > \tau_2^I$, (34) increases in τ_2^*, we have

$$\underline{\kappa} = \Delta W_2(\tau_2^*(\tau_1^I)) \leq \Delta W_2(\tau_2^A) = \bar{\kappa}.$$

Equilibrium regions: Combining the two conditions (21)–(22) with $\underline{\kappa} \leq \bar{\kappa}$, we get: if $\kappa_2 < \underline{\kappa}$, then also $\kappa_2 < \bar{\kappa}$, so A is an equilibrium and I is not; if $\kappa_2 \in [\underline{\kappa}, \bar{\kappa}]$, both conditions hold; if $\kappa_2 > \bar{\kappa}$, then also $\kappa_2 > \underline{\kappa}$, so I is an equilibrium and A is not. The multiplicity region is non-degenerate whenever $\tau_2^A \neq 0$, since then

$$\bar{\kappa} - \underline{\kappa} = \frac{\alpha_2(\theta + \phi)}{2\theta\phi}(\tau_2^A)^2 \left[1 - \left(\frac{\theta(\theta + 2\phi)}{(\theta + \phi)^2}\right)^2\right] > 0.$$

□

B Additional Results and Derivations

B.1 Microfoundation for Political Friction

In this section we provide a micro-foundation for the optimal policy of country i for a given policy implemented by country $-i$.

To simplify the exposition we assume that instead of a mass of shareholders and a mass of workers, we have a unit mass of shareholder-workers, who derive benefits from both firm ownership and local economic activity. We index the shareholders by j.

There are two politicians A and B who compete in elections by announcing a policy that they will implement upon victory. Due to limited attention, time, and resources, a politician can only commit to one policy: an emissions tax $\tau > 0$, or a fixed alternative policy that yields utility κ to every shareholder. We therefore write a policy as a pair $p = (\tau, a)$, where $a \in \{0, 1\}$ indicates whether the alternative policy is implemented, and where $a = 1$ requires that the tax remains at its status quo level $\tau = 0$.

Let $U_j^s(p)$ denote the utility of shareholder j as a function of a policy p in their home country:

$$U_j^s(p) = a\kappa + \alpha\Pi(x_1, x_2, l) + \beta y - \gamma_j^s(e_1 + e_2),$$

where γ_j^s is the emissions disutility of shareholder j. Below we write $E \equiv e_1 + e_2$ for global emissions and make the dependence of y, Π and E on the tax explicit where it matters.

We model the elections using a probabilistic voting model with political contributions: voters may have a random bias towards one of the politicians and the bias can be influenced by political contributions. Specifically, at the time of elections each agent j draws their bias towards politician A, according to $\delta_j \sim U[-1/2, 1/2]$. Moreover, their bias can be shifted up by Δ using political contributions or campaign effort, with $\Delta = L_A - L_B$ denoting the excess contributions towards politician A. Each agent j votes for politician A if and only if the utility they get from electing him exceeds the utility they get if politician B wins, i.e.:

$$U_j(p_A) + \delta_j + \Delta > U_j(p_B) \tag{36}$$

Suppose that shareholders can be divided into two equal-sized groups, each of mass 1/2: financially motivated shareholders, who have $\gamma_j^s = \gamma^{sf} = 0$, and responsible shareholders, who have $\gamma_j^s = \gamma^{sr} \geq 0$. Assume that responsible shareholders can coordinate and offer their campaign effort $L_A(p_A)$ and $L_B(p_B)$ at a cost $\frac{\chi}{2}L_A^2$ and $\frac{\chi}{2}L_B^2$.

The timeline is: 1) Responsible shareholders commit to offer $L_A(p_A)$ and $L_B(p_B)$ in response to politicians announcing p_A and p_B; 2) Politicians announce their promised policy; 3) The random bias is realized and voters vote; 4) The policy of the winner is implemented.

Below, we first show the condition for the optimal policy when both politicians compete on emissions taxes and how this can be mapped to an objective function of a politician $W(\tau)$. Next, we show that a condition $W(\tau^*) > W(0) + \left(1 + \frac{1}{\chi}\right)\kappa$ determines whether politicians compete by announcing emissions taxes or the alternative policy (the active vs inactive policy cases in the model).

B.1.1 Emissions taxes and politician's objective function

Suppose both politicians choose to compete on emissions taxes, so that $a_A = a_B = 0$ and a policy is summarized by its tax alone. The bias of the swing voter of each group (financial shareholders and responsible shareholders) is:

$$\begin{aligned}
\delta^{sf} &= \alpha\Pi(\tau_A) - \alpha\Pi(\tau_B) + \beta y(\tau_A) - \beta y(\tau_B) + \Delta(\tau_A, \tau_B) \\
\delta^{sr} &= \alpha\Pi(\tau_A) - \alpha\Pi(\tau_B) + \beta y(\tau_A) - \beta y(\tau_B) - \gamma^{sr} E(\tau_A) + \gamma^{sr} E(\tau_B) + \Delta(\tau_A, \tau_B)
\end{aligned}$$

The share voting for A in each group is:

$$\begin{aligned}
P(\delta_j < \delta^{sf}) &= \frac{1}{2} + \alpha\Pi(\tau_A) - \alpha\Pi(\tau_B) + \beta y(\tau_A) - \beta y(\tau_B) + \Delta(\tau_A, \tau_B) \\
P(\delta_j < \delta^{sr}) &= \frac{1}{2} + \alpha\Pi(\tau_A) - \alpha\Pi(\tau_B) + \beta y(\tau_A) - \beta y(\tau_B) - \gamma^{sr} E(\tau_A) + \gamma^{sr} E(\tau_B) + \Delta(\tau_A, \tau_B)
\end{aligned}$$

Politician A chooses τ_A to maximize the probability of winning which is given by:

$$q_A = \frac{1}{2} P(\delta_j < \delta^{sf}) + \frac{1}{2} P(\delta_j < \delta^{sr})$$

The FOC is:

$$\alpha \frac{\partial \Pi}{\partial \tau_A} + \beta \frac{\partial y}{\partial \tau_A} + \frac{\partial \Delta}{\partial \tau_A} - \frac{\gamma^{sr}}{2} \frac{\partial E}{\partial \tau_A} = 0 \tag{37}$$

In the absence of advocacy, $\Delta = 0$, the FOC corresponds to the optimality condition of a planner with a social welfare function given by:

$$W^{NA} = \alpha\Pi + \beta y - \Gamma^r E,$$

where $\Gamma^r = \frac{\gamma^{sr}}{2}$. In the absence of advocacy both politicians weigh the preferences of the two types of shareholders equally. The policy that they propose is thus equivalent to the one set by a local, utilitarian social planner.

Campaign effort. Now consider the problem of responsible shareholders deciding to engage in campaign effort $\Delta > 0$. They choose this to maximize:

$$q_A(\Delta) U^{sr}(\tau_A) + (1 - q_A(\Delta)) U^{sr}(\tau_B) - \frac{\chi}{2} \Delta^2$$

The FOC is:

$$\Delta = \frac{1}{\chi} [U^{sr}(\tau_A) - U^{sr}(\tau_B)]$$

Using this we can rewrite the politician's FOC as:

$$-\frac{\gamma^{sr}}{2}\frac{\partial E}{\partial \tau_A}+\alpha\frac{\partial \Pi}{\partial \tau_A}+\beta\frac{\partial y}{\partial \tau_A}-\frac{1}{\chi}\gamma^{sr}\frac{\partial E}{\partial \tau_A}+\frac{\alpha}{\chi}\frac{\partial \Pi}{\partial \tau_A}+\frac{\beta}{\chi}\frac{\partial y}{\partial \tau_A}=0$$

$$\left(1+\frac{1}{\chi}\right)\alpha\frac{\partial \Pi}{\partial \tau_A}+\left(1+\frac{1}{\chi}\right)\beta\frac{\partial y}{\partial \tau_A}-\left(\frac{1}{2}+\frac{1}{\chi}\right)\gamma^{sr}\frac{\partial E}{\partial \tau_A}=0$$

Thus, the problem of the politician is equivalent to that of maximizing the following social welfare function:

$$V(\tau)=\alpha\left(1+\frac{1}{\chi}\right)\Pi(\tau)+\beta\left(1+\frac{1}{\chi}\right)y(\tau)-\left(\frac{1}{2}+\frac{1}{\chi}\right)\gamma^{sr}E(\tau),$$

which is equivalent to maximizing:

$$W(\tau)\equiv\alpha\Pi(\tau)+\beta y(\tau)-\Gamma^r E(\tau),$$

where

$$\Gamma^r\equiv\gamma^{sr}\frac{\chi+2}{2\chi+2}$$

with

$$\frac{\partial \Gamma^r}{\partial \chi}=\gamma^{sr}\frac{2\chi+2-2\chi-4}{(2\chi+2)^2}=-\gamma^{sr}\frac{2}{(2\chi+2)^2}$$

When the cost of campaigning is infinite $\chi=\infty$, the politicians optimize the same objective as in the absence of advocacy since $1/\chi=0$. When χ is finite, so that campaign effort by responsible shareholders becomes feasible, politicians increase the weight they attach to the costs of emissions γ^{sr}. This provides a micro-foundation for how "policy advocacy" in the baseline model increases Γ^r.

B.1.2 Policy choice

Announcing the alternative policy means announcing $p=(0,1)$: the tax remains at its status quo level and every shareholder receives κ. If both politicians announce $p=(0,1)$, every voter is indifferent between them, responsible shareholders have nothing to gain from campaign effort so $\Delta=0$, and each politician wins with probability one half.

To ease notation, let $q_A^{\tau a}$ denote the probability that A wins when A runs on an emissions tax and B runs on the alternative policy, and define q_A^{aa}, $q_A^{\tau\tau}$ and $q_A^{a\tau}$ analogously. The previous paragraph established $q_A^{aa}=\frac{1}{2}$, and symmetry of the tax competition gives $q_A^{\tau\tau}=\frac{1}{2}$.

Now suppose that A announces $(\tau_A,0)$ while B announces $(0,1)$. The bias of the swing voter of each group is:

$$\begin{aligned}\delta^{sf} &= \alpha[\Pi(\tau_A) - \Pi(0)] + \beta[y(\tau_A) - y(0)] - \kappa + \Delta \\ \delta^{sr} &= \alpha[\Pi(\tau_A) - \Pi(0)] + \beta[y(\tau_A) - y(0)] - \gamma^{sr}[E(\tau_A) - E(0)] - \kappa + \Delta\end{aligned}$$

Because κ, $y(0)$, $\Pi(0)$ and $E(0)$ do not depend on τ_A, the derivative of each cutoff with respect to τ_A is the same as in the case where both politicians compete on emissions taxes. Politician A's first-order condition is therefore unchanged, and his optimal announcement is $\tau_A = \tau^*$.

The campaign effort of responsible shareholders is obtained exactly as before, now comparing the tax to the alternative policy:

$$\begin{aligned}\Delta &= \frac{1}{\chi}[U^{sr}(\tau^*, 0) - U^{sr}(0, 1)] \\ &= \frac{1}{\chi}\left(\alpha[\Pi(\tau^*) - \Pi(0)] - \gamma^{sr}[E(\tau^*) - E(0)] - \kappa\right)\end{aligned}$$

Note that the alternative policy also benefits responsible shareholders, which is why κ lowers their campaign effort on behalf of A.

Politician A wins with probability

$$q_A^{\tau a} = \frac{1}{2} + \frac{1}{2}\delta^{sf} + \frac{1}{2}\delta^{sr},$$

which simplifies to

$$\begin{aligned}q_A^{\tau a} - \frac{1}{2} =& \alpha\left(1 + \frac{1}{\chi}\right)[\Pi(\tau^*) - \Pi(0)] + \beta\left(1 + \frac{1}{\chi}\right)[y(\tau^*) - y(0)] \\ & - \left(\frac{1}{2} + \frac{1}{\chi}\right)\gamma^{sr}[E(\tau^*) - E(0)] - \left(1 + \frac{1}{\chi}\right)\kappa\end{aligned}$$

The first three terms are exactly $V(\tau^*) - V(0)$. Hence

$$q_A^{\tau a} > \frac{1}{2} \iff V(\tau^*) > V(0) + \left(1 + \frac{1}{\chi}\right)\kappa$$

Since $q_A^{aa} = \frac{1}{2}$, running on the tax is a best response to B running on the alternative policy if and only if the condition above holds. By symmetry $q_A^{a\tau} = 1 - q_A^{\tau a}$, and $q_A^{\tau\tau} = \frac{1}{2}$, so running on the tax is a best response to B running on the tax under the same condition. Both politicians therefore compete on emissions taxes if and only if

$$V(\tau^*) > V(0) + \left(1 + \frac{1}{\chi}\right)\kappa$$

and both compete on the alternative policy if the inequality is reversed. To see that this condition is equivalent to the one that the regulator follows when deciding whether to adopt the emissions tax in the baseline model, we divide both sides of the inequality by $\left(1+\frac{1}{\chi}\right)$ to get:

$$W(\tau^*) > W(0) + \kappa.$$

B.2 Interaction Between Stewardship and Advocacy

Lemma 6 (Interaction between Stewardship and Advocacy)**.** *The foreign-regulation thresholds $\underline{\kappa}$ and $\bar{\kappa}$ satisfy*

$$\frac{\partial^2 \bar{\kappa}}{\partial \Gamma^f \partial \Gamma_1^r} = -\frac{\alpha_2(\theta+\phi)}{\alpha_1 \theta(\theta+2\phi)} < 0, \tag{38}$$

$$\frac{\partial^2 \underline{\kappa}}{\partial \Gamma^f \partial \Gamma_1^r} = -\frac{\alpha_2 \theta(\theta+2\phi)}{\alpha_1(\theta+\phi)^3} < 0. \tag{39}$$

Both cross-derivatives converge to zero as $\theta \to \infty$.

Proof. By Eqs. (21) and (22),

$$\bar{\kappa} = \frac{\alpha_2(\theta+\phi)}{2\theta\phi}(\tau_2^A)^2, \qquad \underline{\kappa} = \frac{\alpha_2(\theta+\phi)}{2\theta\phi}\left[\tau_2^*(\tau_1^I)\right]^2. \tag{40}$$

By Lemma 4,

$$\frac{\partial \tau_2^A}{\partial \Gamma^f} = -1, \qquad \frac{\partial \tau_2^A}{\partial \Gamma_1^r} = \frac{\phi}{\alpha_1(\theta+2\phi)}. \tag{41}$$

Moreover, Eq. (35) implies

$$\tau_2^*(\tau_1^I) = \frac{\theta(\theta+2\phi)}{(\theta+\phi)^2}\tau_2^A, \tag{42}$$

and hence

$$\frac{\partial \tau_2^*(\tau_1^I)}{\partial \Gamma^f} = -\frac{\theta(\theta+2\phi)}{(\theta+\phi)^2}, \qquad \frac{\partial \tau_2^*(\tau_1^I)}{\partial \Gamma_1^r} = \frac{\theta\phi}{\alpha_1(\theta+\phi)^2}. \tag{43}$$

Since both τ_2^A and $\tau_2^*(\tau_1^I)$ are linear in Γ^f and Γ_1^r, for either threshold κ and its associated tax τ_2,

$$\frac{\partial^2 \kappa}{\partial \Gamma^f \partial \Gamma_1^r} = \frac{\alpha_2(\theta+\phi)}{\theta\phi}\frac{\partial \tau_2}{\partial \Gamma^f}\frac{\partial \tau_2}{\partial \Gamma_1^r}. \tag{44}$$

Substituting the derivatives above yields Eqs. (38)–(39). Both expressions converge to zero as $\theta \to \infty$. □

B.3 Extension: Which Channel Will Investors Use?

To compare the two channels from investors' perspective and understand which channel they will choose, consider the domestic investor's utility,

$$\begin{aligned} W_{s,1} &= \alpha_1 \Pi(x_1, x_2, l) \;-\; \gamma_1^s E \\ &= \alpha_1 W_{\text{firm}} \;+\; \big(\alpha_1 \Gamma^f - \gamma_1^s\big) E, \end{aligned} \tag{45}$$

where the second line expresses the investor's payoff in terms of the firm's objective.

Starting from the no-voice benchmark, in which investors exercise neither stewardship nor policy advocacy ($\Gamma^f = \Gamma_1^r = \Gamma_2^r = 0$), we evaluate how a marginal increase in each channel affects $W_{s,1}$. The investor prefers advocacy over stewardship if

$$\left.\frac{\partial W_{s,1}}{\partial \Gamma_1^r}\right|_{\Gamma=0} > \left.\frac{\partial W_{s,1}}{\partial \Gamma^f}\right|_{\Gamma=0}. \tag{46}$$

This comparison abstracts from differences in the costs of using the two channels.

Proposition 4. *Consider the no-voice benchmark ($\Gamma^f = \Gamma_1^r = \Gamma_2^r = 0$). In the inactive regime, a marginal increase in either channel raises the investor's utility, and advocacy provides a larger marginal benefit than stewardship if and only if*

$$\frac{\theta}{\phi} > \frac{2\alpha_1 - \beta_1/\gamma_1^s}{1-\alpha_1}. \tag{47}$$

In the active regime, stewardship has zero marginal benefit while advocacy has a strictly positive marginal benefit, so investors always direct the first unit of influence to advocacy.

Proposition 4 ranks the two channels from the investor's perspective. To compare this ranking with their effects on the externality, note that in the inactive regime of the no-voice benchmark, the marginal reductions in total emissions are

$$-\frac{\partial E^I}{\partial \Gamma^f} = \frac{\theta + 2\phi}{\phi(\theta+\phi)}, \tag{48}$$

$$-\frac{\partial E^I}{\partial \Gamma_1^r} = \frac{\theta}{\alpha_1 \phi(\theta+\phi)}, \tag{49}$$

as immediately follows from the proof of Proposition 4. Comparing these two effects implies that advocacy reduces total emissions more than stewardship if and only if

$$\frac{\theta}{\phi} > \frac{2\alpha_1}{1-\alpha_1}. \tag{50}$$

The comparison between Eq. (47) and (50) shows that investors' preferred channel may not always coincide with the one that reduces emissions more. The reason is that investors evaluate the two channels based on their overall payoff, taking into account both their effects on emissions and their financial consequences. In our model, these financial consequences arise through the fiscal system.[26]

Proof of Proposition 4

Proof. Throughout, Γ denotes either Γ^f or Γ_1^r, and $\gamma_1^s > 0$. Notice that the firm chooses (x_1, x_2, l) to maximize

$$W_{\text{firm}} = p\bar{Y} - \frac{\phi}{2}\left(x_1^2 + x_2^2\right) - \frac{\theta}{2}l^2 - \tau_1 e_1 - \tau_2 e_2 + T - \Gamma^f\left(\bar{Y} - x_1 - x_2\right),$$

taking $(T, \tau_1, \tau_2, \Gamma^f)$ as given. Differentiating the equilibrium value of W_{firm} with respect to Γ, the terms in the firm's own choices vanish by the first-order conditions (9)–(10), leaving the direct effects through $(\tau_1, \tau_2, T, \Gamma^f)$. Imposing budget balance $T = \tau_1 e_1 + \tau_2 e_2$,

$$\frac{\partial W_{\text{firm}}}{\partial \Gamma} = -\sum_i e_i \frac{\partial \tau_i}{\partial \Gamma} + \sum_i \left(e_i \frac{\partial \tau_i}{\partial \Gamma} + \tau_i \frac{\partial e_i}{\partial \Gamma}\right) - \frac{\partial \Gamma^f}{\partial \Gamma}E = \sum_i \tau_i \frac{\partial e_i}{\partial \Gamma} - \frac{\partial \Gamma^f}{\partial \Gamma}E.$$

The transfer terms $e_i \frac{\partial \tau_i}{\partial \Gamma}$ cancel against the rebate, but the terms $\tau_i \frac{\partial e_i}{\partial \Gamma}$ do not cancel. Differentiating (45) and substituting,

$$\frac{\partial W_{s,1}}{\partial \Gamma} = \alpha_1 \sum_i \tau_i \frac{\partial e_i}{\partial \Gamma} + \left(\alpha_1 \Gamma^f - \gamma_1^s\right)\frac{\partial E}{\partial \Gamma}, \tag{51}$$

where for $\Gamma = \Gamma^f$ the term $-\alpha_1 E$ cancels against the $+\alpha_1 E$ generated by differentiating $\left(\alpha_1 \Gamma^f - \gamma_1^s\right)E$. Evaluated at the no-voice benchmark, (51) becomes

$$\left.\frac{\partial W_{s,1}}{\partial \Gamma}\right|_{\Gamma=0} = \alpha_1 \sum_i \tau_i \frac{\partial e_i}{\partial \Gamma} - \gamma_1^s \frac{\partial E}{\partial \Gamma}. \tag{52}$$

Next, from (29), with $\tau_2 = 0$,

$$x_1^I + l^I = \frac{\theta\Gamma_1^r - \phi\beta_1 + \phi\alpha_1\Gamma^f}{\alpha_1\phi(\theta+\phi)} + \frac{\theta\left(\Gamma_1^r - \alpha_1\Gamma^f\right) - \phi\beta_1}{\theta\alpha_1(\theta+\phi)} = \frac{(\theta+\phi)\left(\theta\Gamma_1^r - \phi\beta_1\right)}{\alpha_1\phi\theta(\theta+\phi)} = \frac{1}{\alpha_1}\left(\frac{\Gamma_1^r}{\phi} - \frac{\beta_1}{\theta}\right),$$

Hence $e_1^I = \bar{y}_1 - l^I - x_1^I = \bar{y}_1 - \frac{1}{\alpha_1}\left(\frac{\Gamma_1^r}{\phi} - \frac{\beta_1}{\theta}\right)$, so that

$$\frac{\partial e_1^I}{\partial \Gamma^f} = 0, \qquad \frac{\partial e_1^I}{\partial \Gamma_1^r} = -\frac{1}{\alpha_1\phi}. \tag{53}$$

Stewardship raises x_1 and lowers l by the same amount $\frac{1}{\theta+\phi}$, leaving country 1's tax base untouched; advocacy shrinks it through both margins.

[26]In particular, the two channels have different effects on tax payments and rebates. At the no-voice benchmark, this fiscal effect tilts investors toward advocacy.

These responses imply that the marginal effects of the two channels on total emissions are

$$\frac{\partial E^I}{\partial \Gamma^f} = -\left(\frac{1}{\theta+\phi}+\frac{1}{\phi}\right) = -\frac{\theta+2\phi}{\phi(\theta+\phi)}, \tag{54}$$

$$\frac{\partial E^I}{\partial \Gamma_1^r} = -\frac{\theta}{\alpha_1\phi(\theta+\phi)}. \tag{55}$$

Moreover, evaluating (11) at the no-voice benchmark,

$$\tau_1^I\big|_{\Gamma=0} = -\frac{\phi\beta_1}{\alpha_1(\theta+\phi)} \leq 0. \tag{56}$$

Next, since $\tau_2 = 0$, only the $i = 1$ term of (52) is present.
For $\Gamma = \Gamma^f$, (53) gives $\tau_1^I \frac{\partial e_1^I}{\partial \Gamma^f} = 0$, so

$$\left.\frac{\partial W_{s,1}^I}{\partial \Gamma^f}\right|_{\Gamma=0} = \underbrace{\gamma_1^s\left(\frac{1}{\theta+\phi}+\frac{1}{\phi}\right)}_{\text{benefit from lower emissions}} = \gamma_1^s\frac{\theta+2\phi}{\phi(\theta+\phi)} > 0. \tag{57}$$

For $\Gamma = \Gamma_1^r$, using (53) and (56),

$$\begin{aligned}\left.\frac{\partial W_{s,1}^I}{\partial \Gamma_1^r}\right|_{\Gamma=0} &= \underbrace{\gamma_1^s\frac{\theta}{\alpha_1\phi(\theta+\phi)}}_{\text{benefit from lower emissions}} + \underbrace{\left(-\frac{\tau_1^I}{\phi}\right)}_{\text{effect through tax revenues}} \\ &= \frac{1}{\alpha_1\phi}\frac{\theta}{\theta+\phi}\left[\gamma_1^s+\frac{\phi}{\theta}\beta_1\right] > 0. \end{aligned} \tag{58}$$

By (57) and (58), advocacy provides a larger marginal benefit than stewardship if and only if

$$\frac{1}{\alpha_1\phi}\frac{\theta}{\theta+\phi}\left[\gamma_1^s+\frac{\phi}{\theta}\beta_1\right] > \gamma_1^s\frac{\theta+2\phi}{\phi(\theta+\phi)},$$

which is equivalent to (25).

Next, consider the active regime. By Proposition 2, $\frac{\partial x_1^A}{\partial \Gamma^f} = \frac{\partial x_2^A}{\partial \Gamma^f} = \frac{\partial l^A}{\partial \Gamma^f} = 0$, hence $\frac{\partial e_i^A}{\partial \Gamma^f} = \frac{\partial E^A}{\partial \Gamma^f} = 0$ and (52) gives

$$\left.\frac{\partial W_{s,1}^A}{\partial \Gamma^f}\right|_{\Gamma=0} = 0.$$

For advocacy, with $\frac{\partial x_1^A}{\partial \Gamma_1^r} = \frac{\theta+\phi}{(\theta+2\phi)\phi\alpha_1}$ and $\frac{\partial x_2^A}{\partial \Gamma_1^r} = \frac{\partial l^A}{\partial \Gamma_1^r} = \frac{1}{(\theta+2\phi)\alpha_1}$,

$$\frac{\partial e_1^A}{\partial \Gamma_1^r} = -\frac{\partial l^A}{\partial \Gamma_1^r} - \frac{\partial x_1^A}{\partial \Gamma_1^r} = -\frac{\phi+(\theta+\phi)}{(\theta+2\phi)\phi\alpha_1} = -\frac{1}{\alpha_1\phi}, \qquad \frac{\partial e_2^A}{\partial \Gamma_1^r} = \frac{\partial l^A}{\partial \Gamma_1^r} - \frac{\partial x_2^A}{\partial \Gamma_1^r} = 0,$$

and $\frac{\partial E^A}{\partial \Gamma_1^r} = -\left(\frac{\partial x_1^A}{\partial \Gamma_1^r}+\frac{\partial x_2^A}{\partial \Gamma_1^r}\right) = -\frac{1}{\alpha_1\phi}$. The production that relocates abroad is exactly matched by the additional abatement the higher foreign tax induces, so the foreign tax base is unchanged and τ_2^A drops out of (52):

$$\left.\frac{\partial W_{s,1}^A}{\partial \Gamma_1^r}\right|_{\Gamma=0} = \alpha_1 \tau_1^A \left(-\frac{1}{\alpha_1 \phi}\right) + \gamma_1^s \frac{1}{\alpha_1 \phi} = \frac{\gamma_1^s}{\alpha_1 \phi} - \frac{\tau_1^A}{\phi}.$$

Evaluating (16) at the no-voice benchmark,

$$\tau_1^A\big|_{\Gamma=0} = -\phi \frac{(\theta+\phi)\frac{\beta_1}{\alpha_1} + \phi\frac{\beta_2}{\alpha_2}}{\theta(\theta+2\phi)} \leq 0,$$

so that

$$\left.\frac{\partial W_{s,1}^A}{\partial \Gamma_1^r}\right|_{\Gamma=0} = \frac{\gamma_1^s}{\alpha_1 \phi} + \frac{(\theta+\phi)\frac{\beta_1}{\alpha_1} + \phi\frac{\beta_2}{\alpha_2}}{\theta(\theta+2\phi)} > 0.$$

Advocacy therefore provides a strictly larger marginal benefit than stewardship in the active regime for all parameters. □

B.4 Extension: The Geographical Focus of Stewardship

Our baseline model assumes that stewardship places the same internal cost on the firm's emissions in both countries. In this section, we allow the firm to place different weights Γ_1^f and Γ_2^f on emissions in countries 1 and 2. This extension allows us to separate the local and foreign components of stewardship and clarify which component drives its effects in the baseline model.

To clarify the economic intuition, we also allow each regulator to place different weights on emissions in the two countries. Regulator i places weight $\Gamma_{i,j}^r$ on emissions in country j. For convenience, we refer to a marginal increase in $\Gamma_{i,i}^r$ as local-emissions advocacy and a marginal increase in $\Gamma_{i,-i}^r$ as foreign-emissions advocacy. Both forms of advocacy are directed at the local regulator; the distinction refers to whether advocacy increases the regulator's weight on emissions generated locally or abroad. The baseline model is nested by setting $\Gamma_1^f = \Gamma_2^f = \Gamma^f$, $\Gamma_{i,1}^r = \Gamma_{i,2}^r = \Gamma_i^r$, and $\phi_1 = \phi_2 = \phi$.

The firm's objective becomes

$$W_{\text{firm}} = \Pi(x_1, x_2, l) - \left(\Gamma_1^f e_1 + \Gamma_2^f e_2\right), \tag{59}$$

while regulator i maximizes

$$W_i = \alpha_i \Pi(x_1, x_2, l) + \beta_i y_i - \left(\Gamma_{i,1}^r e_1 + \Gamma_{i,2}^r e_2\right). \tag{60}$$

Firm problem. The firm's first-order conditions imply

$$x_i^* = \frac{\tau_i + \Gamma_i^f}{\phi_i}, \tag{61}$$

$$l^* = \frac{\tau_1 + \Gamma_1^f - \left(\tau_2 + \Gamma_2^f\right)}{\theta}. \tag{62}$$

Thus, what matters for leakage is the difference between the effective emissions costs $\tau_1 + \Gamma_1^f$ and $\tau_2 + \Gamma_2^f$. In particular, leakage can arise even when emissions taxes are the same if the firm places different weights on emissions in the two countries. For example, if $\Gamma_1^f > \Gamma_2^f$, the firm has an incentive to shift production from country 1 to country 2.

We next consider the problem of regulator 1, who takes the foreign tax τ_2 as given. The first-order condition gives

$$\begin{aligned} \tau_1^*(\tau_2) = {} & \frac{\theta}{\theta + \phi_1}\left(\frac{\Gamma_{1,1}^r}{\alpha_1} - \Gamma_1^f\right) \\ & + \frac{\phi_1}{\theta + \phi_1}\left(\tau_2 - \frac{\beta_1}{\alpha_1} + \Gamma_2^f - \Gamma_1^f - \frac{\Gamma_{1,2}^r - \Gamma_{1,1}^r}{\alpha_1}\right). \end{aligned} \tag{63}$$

The resulting abatement and leakage are

$$x_1(\tau_1^*(\tau_2)) = \frac{\theta\Gamma_{1,1}^r - \phi_1\beta_1 + \phi_1\alpha_1(\tau_2 + \Gamma_1^f)}{\alpha_1\phi_1(\theta + \phi_1)} + \frac{\frac{\Gamma_{1,1}^r - \Gamma_{1,2}^r}{\alpha_1} - (\Gamma_1^f - \Gamma_2^f)}{\theta + \phi_1}, \tag{64}$$

$$x_2(\tau_2) = \frac{\tau_2 + \Gamma_2^f}{\phi_2}, \tag{65}$$

$$\begin{aligned} l(\tau_1^*(\tau_2)) = {} & \frac{\theta(\Gamma_{1,1}^r - \alpha_1\Gamma_1^f) - \phi_1\beta_1 - \theta\alpha_1\tau_2}{\alpha_1\theta(\theta + \phi_1)} \\ & + \frac{\frac{\phi_1}{\theta}\frac{\Gamma_{1,1}^r - \Gamma_{1,2}^r}{\alpha_1} + (\Gamma_1^f - \Gamma_2^f)}{\theta + \phi_1}. \end{aligned} \tag{66}$$

As in the baseline model, the regulator trades off local abatement against limiting production leakage. Three observations follow from Eq. (63). First, $\tau_1^*(\tau_2)$ increases in τ_2, so emissions taxes remain strategic complements.

Second, the tax fully offsets local stewardship. An increase in Γ_1^f reduces τ_1 one-for-one. A higher Γ_1^f directly induces the firm to abate more locally, reducing the need for regulatory incentives. It also directly increases the firm's incentive to shift production abroad, strengthening the regulator's incentive to restrain the local tax. As a result, local abatement and leakage are unchanged.

Third, the tax enhances the effects of foreign stewardship. An increase in Γ_2^f increases τ_1 by $\phi_1/(\theta + \phi_1)$. A higher Γ_2^f directly reduces the firm's incentive to shift production abroad. The regulator can therefore raise the local tax with less concern about leakage, inducing more local abatement. This effect becomes weaker when leakage is more costly, because the firm's incentive to relocate production is then smaller.

Foreign country without emissions pricing. We first consider equilibrium I, in which country 2 remains inactive and $\tau_2^I = 0$.

Proposition 5 (Investor Voice with Inactive Foreign Regulation)**.** *Suppose country 2 is inactive, so that $\tau_2^I = 0$.*

1. *Local-emissions advocacy raises abatement in country 1 and increases leakage, while leaving abatement in country 2 unchanged:*

$$\frac{\partial x_1^I}{\partial \Gamma_{1,1}^r} = \frac{1}{\alpha_1 \phi_1} > 0, \qquad \frac{\partial x_2^I}{\partial \Gamma_{1,1}^r} = 0, \qquad \frac{\partial l^I}{\partial \Gamma_{1,1}^r} = \frac{1}{\alpha_1 \theta} > 0, \qquad \frac{\partial \tau_1^I}{\partial \Gamma_{1,1}^r} = \frac{1}{\alpha_1} > 0.$$

Foreign-emissions advocacy reduces abatement in country 1 and decreases leakage, while leaving abatement in country 2 unchanged:

$$\frac{\partial x_1^I}{\partial \Gamma_{1,2}^r} = -\frac{1}{\alpha_1(\theta + \phi_1)} < 0, \qquad \frac{\partial x_2^I}{\partial \Gamma_{1,2}^r} = 0,$$

$$\frac{\partial l^I}{\partial \Gamma_{1,2}^r} = -\frac{\phi_1}{\alpha_1 \theta(\theta + \phi_1)} < 0, \qquad \frac{\partial \tau_1^I}{\partial \Gamma_{1,2}^r} = -\frac{\phi_1}{\alpha_1(\theta + \phi_1)} < 0.$$

Local-emissions advocacy dominates in absolute value:

$$\left| \frac{\partial x_1^I}{\partial \Gamma_{1,1}^r} \right| > \left| \frac{\partial x_1^I}{\partial \Gamma_{1,2}^r} \right|, \qquad \left| \frac{\partial l^I}{\partial \Gamma_{1,1}^r} \right| > \left| \frac{\partial l^I}{\partial \Gamma_{1,2}^r} \right|.$$

In contrast, local stewardship has no effect on equilibrium abatement or leakage:

$$\frac{\partial x_1^I}{\partial \Gamma_1^f} = \frac{\partial x_2^I}{\partial \Gamma_1^f} = \frac{\partial l^I}{\partial \Gamma_1^f} = 0, \qquad \frac{\partial \tau_1^I}{\partial \Gamma_1^f} = -1.$$

Foreign stewardship raises abatement in both countries and reduces leakage:

$$\frac{\partial x_1^I}{\partial \Gamma_2^f} = \frac{1}{\theta + \phi_1} > 0, \qquad \frac{\partial x_2^I}{\partial \Gamma_2^f} = \frac{1}{\phi_2} > 0,$$

$$\frac{\partial l^I}{\partial \Gamma_2^f} = -\frac{1}{\theta + \phi_1} < 0, \qquad \frac{\partial \tau_1^I}{\partial \Gamma_2^f} = \frac{\phi_1}{\theta + \phi_1} > 0.$$

Thus, all effects of stewardship on equilibrium quantities stem from its foreign component.

2. *As the cost of leakage θ decreases:*

   - *local-emissions advocacy raises leakage at a faster rate;*

- *foreign-emissions advocacy reduces local abatement and leakage at faster rates;*
- *foreign stewardship raises local abatement and reduces leakage at faster rates.*

Proposition 5 shows that local-emissions and foreign-emissions advocacy have opposite effects. Local-emissions advocacy increases local abatement by tightening local policy, while foreign-emissions advocacy reduces local abatement by relaxing it. Neither affects abatement in country 2. Because country 2's tax remains fixed, local-emissions advocacy also increases production leakage, whereas foreign-emissions advocacy reduces it.

The stewardship results clarify the source of stewardship's global reach in the baseline model. Local stewardship has no effect because the domestic regulator offsets it one-for-one. Foreign stewardship raises both local and foreign abatement and reduces leakage. A higher Γ_2^f directly makes foreign emissions more costly to the firm and therefore reduces its incentive to relocate production abroad. The regulator responds by raising the domestic emissions tax, which further increases local abatement.

As leakage becomes easier, the effect of foreign stewardship becomes stronger. Foreign stewardship directly reduces leakage and thereby eases the regulator's abatement–leakage trade-off. The gains from easing this trade-off are larger when leakage concerns are stronger.

Both countries with emissions pricing. We next consider equilibrium A, in which both regulators set their optimal emissions taxes. To understand the role of stewardship, define the effective cost of emissions faced by the firm in country i as

$$\omega_i \equiv \tau_i + \Gamma_i^f. \tag{67}$$

The firm's choices can then be written as

$$x_i = \frac{\omega_i}{\phi_i}, \qquad l = \frac{\omega_1 - \omega_2}{\theta}.$$

For a given Γ_i^f, choosing τ_i is therefore equivalent to choosing ω_i. Substituting $\tau_2 = \omega_2 - \Gamma_2^f$ into Eq. (63) gives

$$\omega_1(\omega_2) = \frac{\theta}{\theta+\phi_1}\frac{\Gamma_{1,1}^r}{\alpha_1} + \frac{\phi_1}{\theta+\phi_1}\left(\omega_2 - \frac{\beta_1}{\alpha_1} - \frac{\Gamma_{1,2}^r - \Gamma_{1,1}^r}{\alpha_1}\right). \tag{68}$$

The regulator's best response in effective costs is independent of Γ_1^f and Γ_2^f. When both regulators are active, equilibrium effective costs are therefore independent of stewardship. Equivalently,

$$\frac{\partial \tau_i^A}{\partial \Gamma_i^f} = -1, \qquad \frac{\partial \tau_i^A}{\partial \Gamma_{-i}^f} = 0.$$

Thus, both local and foreign stewardship are fully offset when both regulators are active.

These observations give the following result.

Proposition 6 (Investor Voice with Active Foreign Regulation)**.** *In the equilibrium in which both regulators adopt their optimal emissions taxes:*

1. *Local-emissions advocacy in country i increases abatement in country i and, through strategic complementarity, also increases abatement in country $-i$. The effects of the different advocacy weights on abatement are*

$$\frac{\partial x_i^A}{\partial \Gamma_{i,i}^r} = \frac{(\theta+\phi_{-i})(\theta+\phi_i)}{\theta(\theta+\phi_{-i}+\phi_i)\phi_i}\frac{1}{\alpha_i} > 0,$$

$$\frac{\partial x_i^A}{\partial \Gamma_{i,-i}^r} = -\frac{\theta+\phi_{-i}}{\theta(\theta+\phi_{-i}+\phi_i)}\frac{1}{\alpha_i} < 0,$$

$$\frac{\partial x_i^A}{\partial \Gamma_{-i,i}^r} = -\frac{\phi_{-i}}{\theta(\theta+\phi_{-i}+\phi_i)}\frac{1}{\alpha_{-i}} < 0,$$

$$\frac{\partial x_i^A}{\partial \Gamma_{-i,-i}^r} = \frac{\theta+\phi_{-i}}{\theta(\theta+\phi_{-i}+\phi_i)}\frac{1}{\alpha_{-i}} > 0.$$

For leakage,

$$\frac{\partial l^A}{\partial \Gamma_{1,1}^r} = \frac{\theta+\phi_1}{\theta(\theta+\phi_1+\phi_2)}\frac{1}{\alpha_1} > 0, \qquad \frac{\partial l^A}{\partial \Gamma_{1,2}^r} = -\frac{\phi_1}{\theta(\theta+\phi_1+\phi_2)}\frac{1}{\alpha_1} < 0.$$

In contrast, stewardship has no impact on equilibrium abatement or leakage:

$$\frac{\partial x_i^A}{\partial \Gamma_i^f} = \frac{\partial x_i^A}{\partial \Gamma_{-i}^f} = \frac{\partial l^A}{\partial \Gamma_i^f} = \frac{\partial l^A}{\partial \Gamma_{-i}^f} = 0.$$

2. *The cross-border effect of local-emissions advocacy disappears in the no-production-leakage limit:*

$$\lim_{\theta\to\infty} x_i^A = \frac{\Gamma_{i,i}^r}{\alpha_i\phi_i}.$$

Proposition 6 shows that the effect of stewardship changes once both regulators are active. Both local and foreign stewardship are fully offset by endogenous taxes, leaving equilibrium abatement and leakage unchanged. Local-emissions advocacy, in contrast, also affects abatement abroad. The reason is strategic complementarity between emissions taxes: stronger local-emissions advocacy raises the domestic tax, which eases leakage concerns for the regulator abroad and leads him to raise his tax as well. Thus, local-emissions advocacy "leaks" across borders.

Endogenous policy adoption. Finally, consider country 2's endogenous decision to adopt an emissions tax. The distinction between local and foreign stewardship sharpens the baseline result on policy adoption. The adoption thresholds $\underline{\kappa}$ and $\bar{\kappa}$ decrease in Γ_2^f and are invariant to Γ_1^f. Thus, foreign stewardship makes country 2 less likely to adopt an emissions tax, while local stewardship has no effect on its adoption incentives.

The intuition is the same as in the baseline model. Foreign stewardship reduces country 2's gain from adopting because it directly raises abatement in country 2 even when its regulator remains inactive. It also affects the domestic regulator's tax and, through strategic complementarity, the tax country 2 would optimally choose upon adoption. In the symmetric case $\phi_1 = \phi_2 = \phi$, the relevant tax response in the inactive equilibrium is

$$\frac{d\tau_2^*(\tau_1^I)}{d\Gamma_2^f} = -\frac{\theta(\theta + 2\phi)}{(\theta + \phi)^2} > -1. \tag{69}$$

When both regulators are active, the offset is one-for-one.

Allowing the regulator to distinguish between local and foreign emissions similarly sharpens the advocacy result. Local-emissions advocacy raises the adoption thresholds and makes active foreign regulation more likely, whereas foreign-emissions advocacy has the opposite effect.

Overall, this extension shows that the global reach of stewardship is central to its effects under fragmented regulation. When the foreign regulator is inactive, local stewardship is fully offset by local policy, while stewardship directed at foreign emissions raises abatement in both countries and reduces leakage. When both regulators are active, both components of stewardship are offset. The baseline effects of stewardship therefore arise from the firm's internalization of emissions outside the reach of the active local regulator.

About ECGI

ECGI is an international non-profit membership organisation that provides a platform for debate and dialogue among academics, policymakers, and business leaders, with a focus on major corporate governance, ESG, and stewardship issues.

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