european corporate governance institute

Systematic Stewardship on the Waterbed

Law Working Paper N° 914/2026
Revised August 2026

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Goethe University CAS LawFin, SAFE and ECGI

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Abstract

This paper examines the limits of corporate governance as a tool for advancing climate transition. While capital market mechanisms, shareholder stewardship, say-on-climate votes, and ESG-linked executive compensation are often presented as effective levers for greening corporate behavior, their transformative capacity is systematically constrained. Financial economics and agency theory have highlighted incentive distortions within the complex investment ecosystem. This paper introduces the "waterbed effect" as a central, yet underappreciated, limitation. Firm-specific governance interventions alter marginal abatement incentives asymmetrically, inducing competitive reallocation of emissions or production that may fully offset intended environmental gains. A formal model demonstrates how such interventions fail to reduce aggregate emissions under emissions trading systems and may even be counterproductive in competitive product markets. The analysis suggests that corporate governance can complement, but not substitute for, universally applicable regulatory instruments such as carbon pricing or comprehensive emissions caps. Overreliance on governance-based solutions risks inefficient resource allocation and may crowd out the political momentum necessary for effective climate regulation.

Keywords: Corporate governance; Climate change; Waterbed effect; Systematic stew-

JEL Classification: D62; D86; G34; G38; K22; Q54; Q58; D62

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Systematic Stewardship on the Waterbed

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Tobias H. Tröger[*]

Aug. 4, 2026

Abstract

This paper examines the limits of corporate governance as a tool for advancing climate transition. While capital market mechanisms, shareholder stewardship, say-on-climate votes, and ESG-linked executive compensation are often presented as effective levers for greening corporate behavior, their transformative capacity is systematically constrained. Financial economics and agency theory have highlighted incentive distortions within the complex investment ecosystem. This paper introduces the "waterbed effect" as a central, yet underappreciated, limitation. Firm-specific governance interventions alter marginal abatement incentives asymmetrically, inducing competitive reallocation of emissions or production that may fully offset intended environmental gains. A formal model demonstrates how such interventions fail to reduce aggregate emissions under emissions trading systems and may even be counterproductive in competitive product markets. The analysis suggests that corporate governance can complement, but not substitute for, universally applicable regulatory instruments such as carbon pricing or comprehensive emissions caps. Overreliance on governance-based solutions risks inefficient resource allocation and may crowd out the political momentum necessary for effective climate regulation.

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Keywords: Corporate governance; Climate change; Waterbed effect; Systematic stewardship; ESG; Emissions trading.

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INTRODUCTION

This paper demonstrates a limitation of corporate law and governance in transforming economies and guiding firms toward more sustainable pathways. Like other contributions to the literature (Bebchuk and Tallarita 2022), it does not question the normative goals of transformation. Instead, it is rooted in the belief that economic activity that continues to transgress the planetary boundaries and veer away from the safe operating spaces will jeopardize the stability of the Earth's ecosystem and, ultimately, the prerequisites for human life in the Holocene (Rockström, Steffen, Noone, Persson, Chapin, et al. 2009; Rockström, Steffen, Noone, Persson, Chapin III, et al. 2009).[1] However, precisely because transformation is indispensable to ward off existential dangers, there is little room for failed experiments. Therefore, it is crucial to analyze the limits of a market-oriented solution that relies on the (reoriented) institutions of corporate law and governance.

[1] Currently, six out of nine boundaries have already been exceeded, Sakschewski et al. 2025.

This paper contributes to the literature by analyzing a pivotal mechanism that countervails firms' efforts to transform their business models to more sustainable trajectories. It focuses on the waterbed effect, which threatens to cancel the desired impact of interventions at the individual firm level and thus presents a ubiquitous constraint on corporate law transformation mechanisms.

The concept of sustainability is multifaceted, and the division into Environmental, Social, and Governance (ESG) aspects remains amorphous (Pollman 2024). Therefore, this paper focuses on corporate governance interventions to address anthropogenic climate change and its consequences. This focus does not even cover the range of issues investors may care about under the 'E' umbrella (Garel et al. 2024). However, the paper's partial analysis has external validity. It is paradigmatic for corporate governance-induced sustainability transformations because it concerns handling long-term effects that extend beyond individual companies, a hallmark of all sustainability challenges. Hence, the limits of what corporate law and governance can achieve also apply *mutatis mutandis* to other externalities associated with the 'S' and 'G' pillars.[2]

Acknowledging the limited capacity of corporate governance interventions to achieve socially desirable goals underscores the need for more direct regulatory interventions. It works against politicians' preference for market-based "solutions" that bank on the institutions of corporate governance and private choices to minimize resistance against the pursuit of socially controversial objectives (Pargendler 2016). It compels political decision-makers to focus on effective, albeit at times more polarizing policies. Sober realism is also urgently needed in the scholarly debate. We should not succumb to naive enthusiasm for ineffective treatments when aiming for noble goals. We should not uncritically promote every law reform, supposedly justified by pursuing laudable sustainability objectives, if there is no robust impact analysis. Behind both sovereign and private regulatory initiatives may lie the cynical interest in further stoking the money-printing machines of virtue (Damodaran 2022 aptly speaking of the "ESG gravy train"). Applying snake oil or other superficial remedies also obscures the necessity of more invasive therapies.

The subsequent section relates this paper's contribution to the literature. It recalls firms' incentives to transform their business models toward more sustainable pathways, the frictions that arise in a complex investment ecosystem, and portfolio investors' incentives to engage in systematic stewardship (*infra* I). The following section introduces the "waterbed effect" as a central, yet underappreciated, limitation. A formal model demonstrates how such interventions fail to reduce aggregate emissions under emissions trading systems and may even be counterproductive in competitive product markets. (*infra* II).

[2] Already *Ronald Coase* modeled pollution as a prototypical externality (Coase 1960). *Nicholas Stern* characterizes the anthropogenic climate change as a „market failure on the greatest scale the world has ever seen" (Stern 2007, p. 27).

The paper analyzes selected corporate governance institutions to illustrate the effect (*infra* III). It concludes with a summary and outlook (*infra* C).

I. RELATION TO THE LITERATURE

Asset pricing theory suggests that firms receive market-based incentives to transform through funding cost effects, insofar as climate risks and non-financial tastes (Fama and French 2007), including "green" ones, favor the refinancing of sustainable companies, as they enjoy a risk premium and a taste premium (Pástor, Stambaugh, and Taylor 2021; Pástor, Stambaugh, and Taylor 2022; Zerbib 2022). Empirical evidence, including survey data, confirms the existence of non-financial, green preferences (Hartzmark and Sussman 2019; Ceccarelli, Ramelli, and Wagner 2024; Edmans, Gosling, and Jenter 2024; Garel et al. 2024) and a greenium (Baker et al. 2018; Zerbib 2019; Larcker and Watts 2020; Caramichael and Rapp 2024; Eskildsen et al. 2024; D'Amico, Klausmann, and Pancost 2026), although the literature also shows that not only "green" preferences influence its magnitude, but also factors like size of the issuance, credit rating and credibility of the issuer, and noise in ESG ratings (Karpf and Mandel 2018; Flammer 2021; Kapraun and Scheins 2019; Berg, Koelbel, et al. 2022; Berg, Kölbel, and Rigobon 2022).

This paper contributes to the literature that has identified several factors that attenuate the cost of funding-induced transformation incentives.[3] Macro-models indicate a trade-off in investors' risk-minimization choices that benefit non-transforming firms (Hambel, Kraft, and Ploeg 2020). Other research shows that issuers' climate risk exposures only partially correlate with firms' climate impact(Condon 2023, 167 et seq.), leading to a socially suboptimal internalization of the climate consequences of the issuer's activities (Steuer and T. Tröger 2022, pp. 19–31).

Our contribution is closely related to the corporate governance literature that analyzes principal-agent-conflicts (Jensen and Meckling 1976; Barzel 1982; Fama and Jensen 1983b; Fama and Jensen 1983a) to explain why market outcomes deviate from the predictions of representative agent models and how governance interventions, including private ordering, can fix the underlying frictions (for an overview see Armour et al. 2017). The prototypical separation of shareholder residual ownership from management control entails suboptimal transition efforts. Several contributions suggest that risk-averse managers are unwilling to choose riskier transition projects over less volatile investment opportunities because managers bear a non-diversifiable concentration risk hinging on their firm's survival (Amihud and Lev 1981; Smith and Stulz 1985; Lamber, Larcker, and Verrecchia 1991). Others show that managers exert only suboptimal effort in order to minimize

[3]Firms' ability to finance new projects internally from reserves weakens market-based incentives for transformation. Given that most of the capital funding firms‘ new investments stems from retained earnings (Brealey et al. 2022, p. 369), this dampening effect arguably is significant.

the negative utility associated with strainful transition pathways (shirking) (Grossman and Hart 1983). While investment intermediaries (institutional investors and asset managers) are generally seen as insufficiently incentivized to counter agency frictions through firm-level engagement (Black 1990; Black 1992; Gilson and Gordon 2013; Bebchuk, A. Cohen, and Hirst 2017; Rock 2018), some commentators acknowledge viable incentives of these intermediaries to work towards minimizing and mitigating climate risks (Gordon 2022; Gordon 2023; Condon 2020). This paper adds to the skepticism, questioning the beneficial impact of systematic stewardship (Tallarita 2023; Kahan and Rock 2023; Gosling 2025). It explores an underanalyzed friction that would persistently impede firm-level governance interventions to propel the "green" transition even if the material incentive challenges exposed in the literature were fixed.

II. SYSTEMATIC STEWARDSHIP ON THE WATERBED

Corporate governance interventions, including private ordering in individual principal-agent relationships, can, in principle, help correct misaligned incentives. However, miracles are not to be expected from a "green" recharging of the traditional institutions of corporate governance. This paper shows that - even if incentives for systematic stewardship lead investment intermediaries to push for a green transition at individual firms (*infra* A)- the waterbed effect is likely to cancel out or even overcompensate emission reductions at targeted firms (*infra* B).

A. Systematic Stewardship: Portfolio Investors' Incentives for Minimizing Systemic Risks

The idea of systematic stewardship incentives (*supra* I) recognizes that (market-)diversified investment intermediaries cannot escape systemic risks by selecting their held positions. The consequences of climate change represent a prototypical systemic risk, i.e. the greenhouse gas (GHG) emissions of one firm affect all portfolio companies. Therefore, diversified investors can only improve the risk-return profile of their portfolios by reducing systemic risks across all positions by curbing GHG emissions, thereby slowing climate change and its negative effects. As a consequence, high-emitting issuers without transition plans should, *inter alia*, become targets of shareholder engagement and activism, pushing for more ambitious transition efforts.

The concept of systematic stewardship draws on portfolio-level consequences from the insight (*supra* I) that financially motivated investors view climate change as a risk factor that influences the risk-return profile and, consequently, the value of investments at the portfolio level(Quigley 2019; Quigley 2020; Consolandi and Hawley 2024; Gosling 2025). The skepticism *vis-à-vis* the impact of systematic stewardship voiced in the literature (*supra* I does not challenge the theoretical foundations of the concept. Instead, it

points to unresolved frictions. The following subsection develops an additional argument in this direction.

B. Waterbed Effect

The so-called waterbed effect, widely recognized in environmental economics but underexposed in corporate governance research, describes, typically in the context of emissions trading, the market equilibrium that arises after sectoral interventions aimed at reducing CO_2 emissions (Del Río González 2007; Fischer et al. 2010). Despite the compelled reduction of greenhouse gas (GHG) emissions in treated sectors, the total GHG emissions in the economy do not necessarily decrease because. In a scenario with emissions trading schemes, the demand shock among affected emitters leads to an oversupply of certificates and a corresponding price decline, allowing unaffected emitters to decrease their abatement efforts or, to the same effect, increase their emitting activities without additional cost (Baylis, Fullerton, and Daniel H Karney 2013; Baylis, Fullerton, and Daniel H. Karney 2014).

1. Implications for Corporate Governance

The interrelations are directly relevant for corporate governance interventions aimed at achieving ecological sustainability goals.

Target companies are subject to an emissions trading scheme[4]. Under these circumstances, the additional corporate law interventions at the level of individual companies can trigger exactly the competitive waterbed effects described in environmental economics.

Furthermore, the significant price effects are conceivably independent of participation in certificate trading, insofar as they precipitate asymmetrical demand shocks and the associated price effects. For example, if a significant portion of the construction industry reduces the GHG-intensive use of cement considerably in response to targeted environmental activist pressure, cement prices fall, allowing other, non-targeted construction companies to purchase more cement for their expanded production without increasing the cost burden or, to the same negative effect on overall GHG-emission, retain activity levels but reduce abatement efforts.

[4]The repeatedly reformed Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003, establishing a system for greenhouse gas emission allowance trading within the Union and amending Council Directive 96/61/EC, L 275 O.J. 32 (2003), forms the basis of the European Union Emissions Trading System (EU ETS). This system applies to all member states of the EEA, as well as Northern Ireland, and covers GHG emissions (carbon dioxide, nitrous oxide, and perfluorocarbons) from the energy sector, manufacturing industry, and aircraft operators. Threshold values determine inclusion in certain sectors or allow exemptions for small installations. Since 2024, maritime transport has also been included.

Corporate governance interventions that only affect individual firms or refer only to a subgroup of firms risk waterbed effects that considerably undermine such interventions' effectiveness or even overcompensate their initially beneficial effect.

2. A Simple Model

This section provides a simple formal model, inspired by the environmental economics literature on the waterbed effect, to capture the central argument of this paper: corporate governance interventions applied only to a subset of firms generate asymmetric marginal abatement incentives, which, in turn, induce competitive reallocation of emissions, thereby undermining aggregate environmental outcomes.

Consider an industry with a finite set of firms

$$i \in \mathcal{N}, \qquad |\mathcal{N}| = N. \tag{1}$$

Each firm produces output q_i and emits

$$e_i = \alpha_i q_i - a_i, \tag{2}$$

where $\alpha_i > 0$ denotes the emissions intensity of production and $a_i \geq 0$ denotes abatement. Abatement is privately costly, with cost function

$$C_i(a_i) = \tfrac{1}{2} c_i a_i^2, \qquad c_i > 0. \tag{3}$$

The quadratic cost function reflects the intuition that abatement efforts that go beyond the industry standard and, therefore, do not benefit from knowledge transfer and similar spill-over effects, are private and incrementally expensive for firms.

Total emissions in the industry are

$$E = \sum_{i \in \mathcal{N}} e_i. \tag{4}$$

Environmental damages are linear:

$$D(E) = \delta E, \qquad \delta > 0. \tag{5}$$

A first-best planner internalizes the marginal social damage δ and implements a uniform carbon price $p^* = \delta$. Privately optimal abatement would then satisfy

$$c_i a_i^* = p^* = \delta \quad \Rightarrow \quad a_i^* = \frac{\delta}{c_i}. \tag{6}$$

Suppose a corporate governance measure—divestment pressure, say-on-climate, ESG-linked compensation, or stewardship—affects only a subset of firms

$$T \subset \mathcal{N}, \qquad |T| = k \ll N. \tag{7}$$

Such interventions increase the effective marginal cost of emitting for targeted firms. We model this as a firm-specific "shadow carbon price"

$$p_i = p + \theta_i, \qquad i \in T, \tag{8}$$

where p is the prevailing market price of emissions (including possibly $p = 0$) and $\theta_i > 0$ captures the additional governance pressure. Untargeted firms $j \notin T$ face only the baseline price:

$$p_j = p. \tag{9}$$

The existence of a durable set of untargeted firms that persist in equilibrium is not an assumed starting point but reflects the observation that certain firms, due to their ownership structure (e.g., private equity-backed and state-owned enterprises (SOEs)[5]) or cross-jurisdictional limitations, are not subject to green governance pressure from public shareholders.

Each firm solves

$$\min_{a_i \geq 0} C_i(a_i) + p_i(\alpha_i q_i - a_i). \tag{10}$$

The first-order condition implies

$$c_i a_i = p_i \quad \Longrightarrow \quad a_i(p_i) = \frac{p_i}{c_i}. \tag{11}$$

Hence:

$$a_i^T = \frac{p + \theta_i}{c_i}, \qquad i \in T, \qquad\qquad a_j^U = \frac{p}{c_j}, \qquad j \notin T. \tag{12}$$

Assume first that firms operate under an emissions trading system with a fixed cap $\bar{E}$.[6] Additional abatement by targeted firms reduces permit demand by

$$\Delta D_T = \sum_{i \in T} \frac{\theta_i}{c_i}. \tag{13}$$

[5]The most recent data for the world's carbon majors shows that in 2024 SOEs dominated global fossil fuel emissions and accounted for 54.0 percent of emissions, while 93 investor-owned companies accounted for 23.7 per cent of emissions, with the remaining historical emissions attributable to nation-state producers and inactive entities. The ownership structure of investor-owned companies varies, comprising also controlled firms with dominant blockholders and private firms.

[6]ETS configurations may introduce cap endogeneity, cancellation mechanisms. These design features obviously may change the equilibrium outcomes and comparative statics. However, this paper is not concerned with optimal ETS design that are, *inter alia*, apt to attenuate the waterbed effect.

Market clearing then requires a new permit price

$$p' = p - f(\Delta D_T), \qquad f'(\cdot) > 0. \tag{14}$$

Untargeted firms respond by reducing their abatement:

$$a_j^{U'} = \frac{p'}{c_j} < a_j^U. \tag{15}$$

Total emissions remain fixed at the cap:

$$E' = \bar{E}. \tag{16}$$

Thus, firm-specific governance interventions shift the distribution of abatement across firms but do not reduce aggregate emissions—the classic waterbed effect.

Even absent an emissions trading system, governance-induced abatement generates reallocation effects. Let the supply function of firm i be

$$q_i = s_i\big(P - m_i(a_i)\big), \tag{17}$$

where P is the product-market price and $m_i(a_i)$ captures cost increases from abatement. Governance pressure raises a_i and therefore $m_i(a_i)$ for $i \in T$, shifting their supply curves upward. The waterbed mechanism hinges on product-market reallocation that relies on endogenous quantity responses (the supply function) and the expansion of untargeted firms. It thus relaxes the "predetermined output" assumption from the discussion of the ETS mechanism.

Industry equilibrium then requires an adjustment in price:

$$P' = P + g\left(\sum_{i \in T} \Delta m_i\right), \qquad g'(\cdot) > 0. \tag{18}$$

Higher output prices induce untargeted firms to expand production:

$$q_j' = s_j\big(P' - m_j(a_j^U)\big), \qquad j \notin T. \tag{19}$$

Because expanding firms face no governance pressure and often have higher emissions intensities[7], the increase in their emissions partially or fully offsets reductions by targeted firms. Formally,

$$\frac{dE'}{d\theta_i} \approx 0 \quad \text{or even} \quad \frac{dE'}{d\theta_i} > 0. \tag{20}$$

[7] Shifts from lower to higher emission-intensive producers are well documented on the country level, (Wu et al. 2025)

Ultimately, the model leaves the sign of leakage free. It does not specify a demand system, a definitive competitive or Cournot structure, entry conditions, or specific parameter restrictions, which would allow for determining an unambiguous sign for the net emissions effect. However, specifying sufficient conditions—such as constraints on demand elasticity, the expansion capacity or supply elasticity of untargeted firms, and relative emissions intensities α_i — that guarantee an increase in aggregate emissions would add little to the primary insight of the paper.

Each instrument discussed *infra* III generates firm-specific changes in marginal abatement incentives that are not applied economy-wide. Reallocation of production or permit demand then undermines the intended environmental effect.

The model highlights that governance interventions avoid the waterbed effect only when they apply universally:

$$p_i = p^* = \delta \qquad \forall i \in \mathcal{N}. \tag{21}$$

This requires regulatory instruments—such as carbon taxes, comprehensive emissions trading systems with cancellation mechanisms, or sector-wide standards—that impose uniform marginal incentives. Corporate governance can complement such policies by enabling efficient firm-level implementation, but it cannot substitute for them.

3. Model Assumptions

The model is intentionally short-run and static. In the emissions trading system (ETS) setting, firms choose abatement a_i while output q_i is treated as predetermined and emissions intensity α_i as exogenous. This reflects a short-run compliance framework, corresponding to a regulatory period in which production capacity and capital stock are fixed. Within a compliance cycle, firms typically face limited scope to adjust installed capacity, relocate production, or redesign product lines. Their primary margin of adjustment is operational, focusing on elements such as changes in fuel mix, efficiency improvements, and incremental emissions control; that is, marginal abatement. The model therefore isolates the short-run decision problem of how firms adjust emissions conditional on existing production plans.

Under a binding emissions cap, this structure yields the canonical waterbed effect: additional abatement by targeted firms reduces permit demand, lowers the equilibrium permit price, and induces offsetting reductions in abatement by untargeted firms, leaving aggregate emissions fixed at the cap. The model does not claim that output adjustments are impossible in the long run. Rather, it demonstrates that even in the short run, where marginal compliance decisions dominate, asymmetric governance pressure cannot reduce aggregate emissions under a binding cap. Long-run production or capacity adjustments would require a dynamic framework and do not undermine the core short-run reallocation mechanism.

The model treats α_i as exogenous. This reflects the paper's focus on operational abatement rather than capital investment. In practice, corporate climate governance often seeks to influence long-term technological choices, including renewable energy adoption, capital replacement (asset retirement or capacity shifts), and process innovation, thereby reducing α_i over time. Incorporating such investment decisions would require a multi-period model with endogenous technology choice and intertemporal incentives.

The present framework deliberately abstracts from these dynamics in order to isolate a narrower mechanism, highlighting that when governance pressure operates asymmetrically across firms, it alters marginal abatement incentives but does not impose a uniform carbon price. As long as incentives remain heterogeneous, reallocation effects persist. A dynamic extension allowing endogenous changes in α_i may modify the timing and magnitude of adjustment, but it does not eliminate the structural insight that partial governance cannot replicate the aggregate efficiency properties of uniform regulation.

4. Extension: Endogenous Cap Adjustment via Market Stability Reserves

The preceding model assumes a fixed cap $\bar{E}$ that mechanically re-equilibrates the permit market through price alone, producing the canonical waterbed result that aggregate emissions do not change. Yet several existing emissions trading systems, most prominently the EU ETS, have moved away from a purely static cap design and now feature supply-side mechanisms that respond endogenously to observed market surpluses.[8] Under the EU's Market Stability Reserve (MSR), the total number of allowances in circulation (TNAC) is assessed annually. If TNAC exceeds an upper threshold $\bar{S}$, a fixed percentage of the surplus is withheld from the following year's auction volumes and placed into the reserve; if TNAC falls below a lower threshold $\underline{S}$, allowances are released back into the market. Since 2023, allowances held in the reserve in excess of the preceding year's auction volume are, moreover, permanently invalidated. This design invites a natural extension of the model developed *supra* 2: does an endogenously adjusting cap of this kind attenuate—or even partially reverse—the waterbed effect that a firm-level governance intervention would otherwise generate?

To investigate the question, we extend the model and introduce a second, subsequent compliance period, $t \in \{1,2\}$, with $\bar{E}_1 = \bar{E}$ as *supra*. As before, governance pressure on the targeted subset T in period 1 raises abatement by $\Delta D_T = \sum_{i \in T} \theta_i / c_i$, generating a

[8]Decision (EU) 2015/1814 of the European Parliament and of the Council of 6 October 2015 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and amending Directive 2003/87/EC, OJ L 264/1 (2015), as amended by Directive (EU) 2018/410 of the European Parliament and of the Council of 14 March 2018, OJ L 76/3 (2018), and by Directive (EU) 2023/959 of the European Parliament and of the Council of 10 May 2023, OJ L 130/134 (2023).

corresponding surplus of unused allowances,

$$S_1 = \Delta D_T. \tag{22}$$

Absent an MSR, this surplus translates, as shown *supra* 2, one-for-one into a lower period-2 price and an offsetting reduction of untargeted firms' abatement, leaving aggregate emissions at the cap in every period. The MSR intervenes between periods 1 and 2 by withdrawing

$$W = \mu \cdot \max\big(S_1 - \bar{S}, 0\big), \qquad \mu \in (0,1), \tag{23}$$

from the period-2 auction volume, where μ denotes the statutory intake rate. Of the withdrawn quantity, a share $\kappa \in [0,1]$ is permanently canceled pursuant to the invalidation rule, while the remainder, $(1-\kappa)W$, stays in the reserve and may be released again in a later period should TNAC subsequently fall below $\underline{S}$. The period-2 cap becomes

$$\bar{E}_2 = \bar{E}_1 - W. \tag{24}$$

Market clearing in period 2 requires

$$\sum_{i \in \mathcal{N}} a_i(p_2) = \sum_{i \in \mathcal{N}} \alpha_i q_i - \bar{E}_2, \tag{25}$$

which, because $\bar{E}_2 < \bar{E}_1$, yields a period-2 price

$$p_2 = p' + h(W), \qquad h'(\cdot) > 0, \tag{26}$$

strictly above the price p' that would prevail under a fixed cap (*supra* 2). Untargeted firms respond by raising, relative to the no-MSR case, the abatement they undertake:

$$a_j^{U,\mathrm{MSR}} = \frac{p_2}{c_j} > \frac{p'}{c_j} = a_j^{U\prime}, \qquad j \notin T, \tag{27}$$

so the MSR, at least partially, restores the incentives for abatement effort that the pure waterbed mechanism would otherwise have eroded. Aggregate two-period emissions are

$$E_1 + E_2 = \bar{E}_1 + \bar{E}_2 = 2\bar{E}_1 - W, \tag{28}$$

compared with $2\bar{E}_1$ in the fixed-cap baseline. The corporate governance-induced surplus therefore translates into a genuine, non-offset reduction of cumulative emissions equal to W—but only to the extent that this withdrawal survives as a permanent cancellation rather than a merely temporary reserve holding. Accounting for the invalidation rule, the *permanent* component of the reduction is

$$\Delta E^{\mathrm{perm}} = \kappa W = \kappa\mu \max\big(S_1 - \bar{S}, 0\big), \tag{29}$$

while the remaining $(1-\kappa)W$ continues to be exposed to future release and, with it, to a renewed waterbed dynamic should TNAC later fall below $\underline{S}$ for reasons unrelated to the original governance intervention (e.g., a macroeconomic downturn, extended sectoral coverage, or an abatement reversal elsewhere).

Three qualifications limit the practical significance of this refinement. First, the mechanism is markedly non-linear and threshold-dependent:

$$\frac{\partial \Delta E^{\text{perm}}}{\partial \theta_i} = \frac{\kappa \mu}{c_i} \tag{30}$$

First, withdrawal occurs only if S_1—together with whatever surplus the market already carries—exceeds $\bar{S}$; below that threshold, $W = 0$ and the model collapses back to the pure waterbed result of *supra* 2, i.e., $dE'/d\theta_i \approx 0$. ETS operators would therefore have to set $\bar{S}$ in perfect appreciation of the activist interventions' impact on the demand for emission allowances. Put differently, operators would have to gauge to which extent a single firm-level intervention, or even a moderately sized bundle of activist campaigns, moves an allowance market populated by billions of outstanding permits and calibrate a time-variant threshold accordingly - a scenario remote from real-world observations. Second, the TNAC figure that triggers withdrawal is assessed with a one-year lag, so the corrective mechanism operates only after, and independently of, the compliance period in which the governance intervention and the resulting reallocation among competitors actually occur; the full within-period waterbed effect of *supra* 2 therefore materializes before any potential subsequent MSR adjustment, potentially reallocating allowances before period 2 and leaving no allowance surplus for withdrawal. Third, because $\kappa < 1$ some allowances remain outside the scope of the invalidation rule, and because released withdrawn allowances can restore lost supply at a later date, the durable emissions effect of any governance-induced surplus remains contingent, reversible, and—crucially—attributable to a feature of the regulatory design of the trading scheme rather than to the governance intervention itself.

Put differently, a closer look at the MSR confirms that only a market-wide, uniformly applicable mechanism—precisely the kind of universal regulatory instrument advocated *supra* 2—can convert part of an otherwise waterbed-neutral reallocation into an actual reduction of aggregate emissions. Firm-specific governance measures cannot generate this effect through their own force; at most, they make a small and largely unpredictable contribution to triggering it, and the resulting reduction remains partial, delayed, and reversible rather than the reliable, dollar-for-dollar abatement that governance proponents might hope for.

III. Illustrations

Corporate law and governance encompasses several institutions through which engaged shareholders can push companies‘ business activities towards more sustainable pathways.

This paper is not interested in the legality of individual interventions under any existing corporate and securities laws. It addresses the normatively important question of whether the respective measures are desirable from a social perspective or lead to ineffective or even harmful shifts within the corporate landscape. The analysis does not aim for completeness but seeks to illustrate that it is critical to consider the latent effects of well-intentioned measures from the outset.

The analysis excludes legal institutions that, *ex lege*, can be charged with a sustainability twist and applied indiscriminately to all firms (corporate entities) as generally applicable rules and standards of corporate and capital market law. Directors duties can serve as a prime example. These duties can incorporate environmental sustainability goals primarily through legislative interventions[9] but also through a "green" re-interpretation of traditional obligations.[10] No waterbed effects loom due to the indiscriminate application of these duties to all corporate entities – depending on the geographical scope of the arrangements - at the national or even at the transnational level (Eichner and Pethig 2019).

A. Influence on Firms' Product Range and Business Fields

Activist shareholders can directly influence the decarbonization of the economy by pressuring firms to end climate-harmful activities. This can be done by motions to either abandon the production of unsustainable products or to divest business segments. Both actions concern business policy decisions, which, with due variation in scope, lie solely with the board of directors,[11] so that shareholders have limited clout to force firms to pursue more sustainable business models.

The divestment of climate-harming production lines and business segments is unlikely to improve firms' CO_2 footprint, particularly if an acquirer continues operations unchanged or even expands them. 'Brownspinning' may improve the CO_2 footprint from the seller's perspective, but remains insignificant from a societal standpoint if the emitting activity is not reduced by the acquirer (Gözlügöl and Ringe 2022). However, even

[9]See e.g. Art. 5 et seq. of the European Corporate Sustainability Due Diligence Directive (CSDDD), Directive (EU) 2024/1760 of the European Parliament and of the Council of 13 June 2024 on corporate sustainability due diligence and amending Directive (EU) 2019/1937 and Regulation (EU) 2023/2859, (2024) O.J. L 2024/1760.

[10]Corporate law typically stipulates duties for board members to assess and manage material risks for the corporation, see e.g., the Delaware case law, In re McDonald's Corp Derivative Litigation (In re McDonald's), 291 A.3d 652 (2023). The risk-based nature of the duty builds on the board's oversight duty established almost thirty years ago in In re Caremark International Inc Derivative Litigation (Caremark), 698 A.2d 959 (1996). Insofar as climate change and its consequences generate relevant risks, these must automatically be incorporated into the corresponding monitoring systems under the lex lata. See also the proposals for integrating ESG risks into the globally influential U.S. risk management framework from 2017 (Committee of Sponsoring Organizations of the Treadway Commission 2017).

[11]See, for instance, Delaware General Corporation Law, 8 DE CODE § 141(a) (2023).

a shareholder-induced, definite withdrawal from product markets leads to the company-specific demand shock that allows unaffected competitors to expand their climate-harming activities cost-neutrally or reduce their abatement efforts (*supra* II). In the logic of the model (*supra* II B 2), divestment- or product-range pressure increases θ_i or lowers q_i, inducing competitors to expand or reduce abatement efforts. Where the divested or curtailed activity is itself covered by an emissions trading scheme—as is typically the case for cement, steel, or aviation—the extended model (*supra* II B 4) shows that this reallocation need not be perfectly offsetting: if the resulting surplus of allowances, together with prevailing market conditions, crosses the Market Stability Reserve's intake threshold, a fraction of the reduction may survive as a permanent cancellation of allowances. However, this assumes that ETS operators perfectly gauge the impact of an individual, firm-specific divestment campaign on the allowances market as a whole, so this qualification remains a theoretical possibility rather than a practically significant mitigant of the waterbed effect described *supra* II B 2.

To be sure, the mere threat of activist interventions yields market-wide effects, even if campaigns only target individual, prominent market players. Gantchev, Gredil, and Jotikasthira 2019 show that a positive externality of (successful) activist campaigns arises because similarly situated companies perceive themselves as potential targets for similar interventions and are thus disciplined by the mere prospect of such actions. In this respect, it is crucial for social welfare whether the targeted company and its products are prototypical of a climate-harming business policy and whether competitors could actually become targets of comparable activism. The latter is already questionable in principle if competitors do not operate on public capital markets, e.g., because they are financed by a closed circle of shareholders outside these markets (private equity, family businesses) or even are (foreign) SOEs.

However, even if comparable campaigns are possible, the incentive effects on similarly situated competitors occur only probabilistically; i.e., the behavior of these issuers is influenced only to the extent that they expect to become targets of activist investors. The relevant probability will typically be considerably lower than 100 %. Thus, the asymmetric impact driving the waterbed effect also exists in these scenarios. Against this background, regulatory restrictions appear superior, especially if they originate from cross-border initiatives[12], because they comprehensively avoid the waterbed effect regardless of firm ownership structures.

[12]See, for example, Regulation (EU) 2019/631 of the European Parliament and of the Council of 17 April 2019, setting CO2 emission performance standards for new passenger cars and new light commercial vehicles and repealing Regulations (EC) No 443/2009 and (EU) No 510/2011, L 111 O.J. 13 (2019), which leads to the phasing out of combustion engines in passenger cars in the EU—though this may, of course, result in waterbed effects in the context of global competition in the industry.

B. Say on Climate

Globally operating investors typically accept the generally efficient distribution of competencies between the management board and the general meeting and seek participation in decision-making only with regard to the company's strategic orientation, as expressed in sustainability concepts or climate transition plans.[13] If sustainability-oriented investors consider the strategy of individual companies inadequate, they will try to win a shareholder majority for their position in order to demand more ambitious goals through a precatory resolution of the shareholder meeting ("Say on Climate"). The pressure should – as with non-binding Say on Pay votes (*infra* C) – primarily arise from non-legal incentive mechanisms, because capital, product, and labor markets penalize climate-harming business models, or, negative Say on Climate votes trigger campaigns by non-financial stakeholders (NGOs, media).

Typically, corporate law restricts the scope of shareholders' ability to seek non-binding votes at the shareholder meeting on their own initiative. However, it does not fundamentally oppose boards implementing Say on Climate campaigns. Again, from a social welfare perspective, the detrimental waterbed effect of such initiatives depends on whether and to what extent they can be rolled out market-wide. This is theoretically conceivable, at least as far as issuers active on public capital markets are concerned, while companies distant from the capital market cannot be reached – with all the negative consequences associated with this public/private-divide (see *supra* A). In the logic of the model (*supra* II B 2), Say on climate interventions apply a shadow carbon price p_i only to firms subject to shareholder campaigns or boost the cost increases from abatement $m_i(a_i)$.

However, cost restrictions also apply to Say on Climate campaigns. Prior research has exposed the generally insufficient incentives for institutional investors and asset managers to acquire information and engage at the firm-level (Gilson and Gordon 2013; Bebchuk, A. Cohen, and Hirst 2017). Activist campaigns that directly aim to change business orientations and transition plans cannot be expected at all issuers. The costs of a diligent and knowledgeable assessment of business models and transformation pathways are high and, therefore, cannot be carried out for all listed companies. Say on Climate campaigns generally face a significant burden of information costs because competent evaluation of climate transition plans would require resource-intensive acquisition and assessment of firm-specific information. Since this cannot be achieved at a reasonable cost, investors' stewardship engagement and voting will focus on enforcing certain parameters that are relatively easy to assess with the help of information intermediaries. Institutional investors

[13] In Europe, CSDDD art. 15(1) would have required large firms to draw up such plans, but the simplification package adopted by EU co-legislators will scrap this obligation before it ever became effective, see Directive (EU) 2026/… of the European Parliament and of the Council of 24 February 2026 amending Directives 2006/43/EC, 2013/34/EU, (EU) 2022/2464 and (EU) 2024/1760 as regards certain corporate sustainability reporting requirements and certain corporate sustainability due diligence requirement...

will rationally rely on proxy advisors whose business model depends on exploiting standardized (scalable) information (T. H. Tröger 2015). The resulting inclination among institutional investors and asset managers to implement, despite all contrary rhetoric, a one-size-fits-all approach suboptimally taps company-specific value creation (Larcker, McCall, and Ormazabal 2015). Moreover, it leads to waterbed effects due to the asymmetrical impact of such approaches on individual issuers, who face different shadow carbon prices, p_i, or abatement costs, $m_i(a_i)$. Therefore, the resource allocation within the framework of Say on Climate is questionable from a social welfare perspective. The same qualification developed for product-range interventions applies here (*supra* A and II B 4): to the extent that Say on Climate campaigns target ETS-covered issuers, part of any induced allowance surplus could, in principle, be absorbed by the Market Stability Reserve and thereby escape the waterbed dynamic. Yet because triggering the reserve's intake mechanism depends on a market-wide surplus crossing a statutory threshold with a one-year lag, and because much of any withdrawal remains reversible absent invalidation, this cannot be relied upon to secure a systematic reduction attributable to the campaign itself.

C. Executive Compensation

The shareholder vote on executive compensation (Say on Pay) gives climate-sensitive investors another lever to anchor their vision as determinants of corporate governance. Providing financial incentives to orient directors to sustainability objectives by linking (motivating[14]) parts of the compensation to ESG criteria has found great appeal among institutional investors and asset managers. It is, therefore, reflected in firms‘ compensation practices (S. Cohen et al. 2023; Badawi and Bartlett 2024).

However, commentators were more skeptical about the effectiveness of observed compensation arrangements. These lack clear standards for evaluating executive actions and thus contribute to a self-service of directors detached from firm success (“Pay without Performance”) (Bebchuk and Tallarita 2022) Furthermore, they weaken managerial accountability for pursuing shareholder interests (Flammer, Hong, and Minor 2019; Qin and Yang 2022; Badawi and Bartlett 2024).

While this criticism focuses more on observed compensation practices, this paper raises a more fundamental concern. ESG-compensation advocates can only avoid the socially detrimental waterbed effect if they impose their design ideas across the market. Say on pay, by design, can, at most, achieve this at listed firms. However, even in this respect, the social optimum seems unattainable. It is unlikely that sustainability-oriented investors would be willing to pay the cost of processing granular firm-specific information to design

[14]Reliable data on the relative weight of non-financial objectives in remuneration packages is largely lacking. Homroy, Mavruk, and Nguyen 2023, p. 951 show that in Swedish companies, a maximum of 9% of executive annual bonuses depend on the achievement of ESG targets.

optimal compensation packages that incentivize managers to pursue viable transformation pathways. Instead, there is a risk of governing based on a one-size-fits-all approach (see *supra* B), precipitating asymmetric shadow carbon prices, p_i, or abatement costs, $m_i(a_i)$, and the associated waterbed effects. Insofar as ESG-linked compensation induces additional abatement at ETS-covered issuers, the same caveat governs as *supra* A and B: the Market Stability Reserve (*supra* II B 4) may convert a small, threshold- and lag-dependent fraction of the resulting allowance surplus into a permanent reduction, but this is a function of the trading scheme's regulatory design, not of the compensation arrangement, and proponents of ESG-linked pay cannot rely on it as a systematic remedy for the waterbed effect.

CONCLUSION

This paper shows that not everything well-intentioned is good when public or private actors use corporate governance institutions to precipitate a sustainability transformation of the economy. The asymmetric impact of climate activist interventions leads to waterbed effects. Competition prevents the desired success from occurring in equilibrium. Government interventions that avoid waterbed effects while implementing universally applicable sustainability goals are more promising from a social welfare perspective. Within such a framework, the actors of corporate governance can realize efficient, company-specific solutions through decentralized decision-making and resource allocation.

A naive belief in the greater transformative power of corporate governance stewardship risks inefficient resource allocation and a harmful crowding out. The suggested ability to address sustainability transformation through less burdensome, less internationally controversial interventions in corporate governance threatens to block the political debate over viable regulatory measures. Policymakers can refer to the many elaborate "solutions" in corporate law and securities regulation, which predominantly "only" establish disclosure mandates[15] and ostensibly make a thorny debate about global, effective carbon pricing in tax or emission trading schemes obsolete. Moreover, the possibility that private ordering and governance innovation act as a stepping-stone, generating standard-setting and price discovery that paves the way for universal regulation, seems rather theoretical. Hence, despite the "herculean" efforts to activate corporate governance for the green transition, one should not listen to such sirens' songs and not overwhelm corporate law with exaggerated expectations!

[15] Breuer, Leuz, and Vanhaverbeke 2020 show how disclosure obligations impede innovation.

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