Investor Activism and the Green Transition*

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January 28, 2026

Abstract

We study impact activism, where activist investors promote green transitions in firms. This activism faces two key challenges. First, an internal free-rider problem arises when insiders and activists free-ride on each other's efforts, weakening activism's effectiveness. Second, an external free-rider problem emerges when gains from activism are reflected in stock prices, discouraging activist investment or tilting it towards firms capable of transitioning independently. Our analysis highlights how factors such as investor preferences, carbon taxes, and firms' ownership structure—public versus private—shape the effectiveness of activism, clarifying the conditions under which activism supports, rather than hinders, firms' green transition.

Keywords: Activism, agency conflicts, contracting, sustainable finance, environmental policies

*We are grateful for helpful comments from an anonymous referee, the editor (Toni Whited), Bruno Biais, Thomas Geelen, Deeksha Gupta, Ivan Ivanov, Lars Kuehn, Augustin Landier, Ernst Maug, Lakshmi Naaraayanan, Marcus Opp, Sebastian Pfeil, Chris Telmer, Ernst Ludwig von Thadden, Felipe Varas, Paul Voss, Yi He Yoon, Lucy White, Josef Zechner, and seminar participants at Boston University, Carnegie Mellon University, Erasmus University Rotterdam, HEC Paris, the 2024 FTG Summer meetings in Barcelona, the 2024 Vienna Festival of Finance Theory, and the 2024 FIN-FIRE conference on "Challenges to Financial Stability" in Halle.

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There is widespread consensus that a green transition in production processes and technologies is necessary to address climate change (Acemoglu, Akcigit, Hanley, and Kerr, 2016; Besley and Persson, 2023). Over the past few years, financial markets have sought to foster this transition by directing companies toward environmental objectives through passive and active investment strategies. Passive strategies involve investing in "clean" firms and divesting from "dirty" firms to influence their cost of capital and incentivize investment in a green transition. In active strategies, investors exercise their control rights to impact firm outcomes, such as through board representation, management oversight, strategy development, or voting on proposals. Recent research suggests that passive strategies, despite their popularity, may have little impact on firm behavior (Heath, Macciocchi, Michaely, and Ringgenberg, 2023; Berk and Van Binsbergen, 2025; Pedersen, 2025) and could even have adverse environmental effects (Hartzmark and Shue, 2023). Investor activism has thus been increasingly advocated as a preferred and more effective approach to sustainable finance (Krueger, Sautner, and Starks, 2020; Broccardo, Hart, and Zingales, 2022).

Our objective in this paper is to understand whether and when investor activism can serve as an effective mechanism for advancing a firm's green transition. A defining challenge in this transition—whether in production processes or technology adoption—is overcoming pervasive free-rider problems that hinder effective activist engagement. This paper integrates two canonical free-rider problems—the external free-rider problem in dispersed ownership and the internal free-rider problem in effort provision—into a unified framework to assess the potential and limitations of investor-driven impact activism.

The external free-rider problem arises because activist investors, who invest time and resources to influence firm behavior, cannot fully capture the benefits of their efforts. These gains are reflected in the stock price, benefiting passive investors who do not contribute and discouraging activists from engaging with firms where their efforts could be most impactful. Meanwhile, the internal free-rider problem emerges from the interaction between activist investors and firm insiders, both of whom must exert effort to drive the green transition. Since efforts are unobservable and subject to moral hazard, each party has an incentive to free-ride on the other's contributions. This double moral hazard results in underinvestment in effort, potentially making activism ineffective or even counterproductive.

A key contribution of this paper is to show that, due to these free-rider problems, shareholder activism does not always make firms greener. In particular, its effect depends on how strongly passive investors benefit from a green transition relative to how strongly activists care about driving that transition. Depending on this ratio — which we term *sustainability benefit ratio* — activism can have three very different outcomes. *It can help*: activism increases the likelihood of transition. *It can hurt*: activism emerges but ends up reducing the transition rate. *It may not happen at all*: activists choose not to get involved, leaving the transition entirely in the hands of passive investors.

More specifically, we show that when the benefits of transitioning for passive investors are negative, there is no external free-rider problem and activism—when it occurs—always promotes the transition. However, when passive investors benefit from transitioning (e.g., the transition is financially profitable or passive investors have strong sustainability preferences), an external free-rider problem emerges: activists invest only if the benefits accruing to passive owners are not too large relative to activists' own gains from transitioning. Next, we show that, conditional on activism arising, it is most effective when either insiders or activists play a dominant role in the transition process. When both parties are key, the internal free-rider problem becomes severe, and activism can instead slow the transition.

We further show that activists tend to direct their investments toward firms that can transition largely on their own, neglecting those where they could have the greatest impact. Taken together, our results imply that the relation between activist ownership and firms' environmental outcomes may be weak or ambiguous. The effectiveness of activism depends critically on investor preferences, carbon pricing, and ownership structure, which jointly determine the benefits of transitioning for activists and insiders.

To capture the key determinants of green activism, we develop a model in which a "brown" or polluting firm can invest to transition toward cleaner production technology or processes, which we refer to as a *green transition*.[1] Transitioning to a cleaner technology or processes reduces externalities, such as CO2 emissions, and can also lead to an increase in (post-transition) cash flows, through mechanisms like carbon taxes or higher consumer demand. However, the transition is both uncertain and costly, potentially resulting in a negative net present value (NPV). The likelihood of a successful transition depends on the efforts of firm insiders—key personnel and executives who influence firm outcomes. Their

[1] Green investments can take the form of tangible green projects, such as the adoption of new technologies, or of less tangible, effort-based strategies, such as changes in business practices aimed at reducing CO2 emissions. In their survey, Anderson, Convery, and Di Maria (2010) document that in response to the adoption of the European Union Emissions Trading System (EU ETS) in 2005, 48% of responding firms employed new machinery or equipment while 74% made process or behavioral changes.

efforts may include implementing sustainability policies, investing in green technologies, and motivating employees to adopt sustainable practices. Since efforts are unobservable, costly, and subject to moral hazard, firm owners provide insiders with incentives to exert effort by making their compensation sensitive to the outcome of the transition process.[2]

Although the firm is initially owned by passive investors, an activist can acquire a stake by purchasing shares. Activists differ from passive investors in two ways. First, unlike passive investors, activists actively engage with the firm by exerting private, costly effort—alongside insider efforts—to drive the green transition. This effort reflects their involvement in activities such as monitoring management, appointing key personnel and board members, shaping strategic direction, or reforming business practices. Second, while all investors may value sustainability, activists derive greater non-pecuniary benefits from the firm's successful transition, thereby aligning their incentives more strongly with sustainable outcomes.[3]

We first demonstrate that, with observable efforts (i.e., absent the internal free-rider problem), the efforts of the activist and insiders complement each other in the transition process, such that activism unambiguously fosters the green transition. This is, however, no longer the case when efforts are unobservable, because activism introduces an internal free-rider problem that distorts incentives, which is not present under passive ownership.

Specifically, since both activists and insiders contribute to a firm's transition but face costly, unobservable efforts, they have an incentive to underinvest and free-ride on each other. While contracts can incentivize insiders, the interdependence of efforts makes it difficult to set them efficiently, resulting in suboptimal effort levels (Holmström, 1982). The stronger sustainability preferences of activists help mitigate this internal free-rider problem. However, when the sustainability preferences of the activist are not particularly strong, activism has little impact in firms capable of transitioning independently and can even be detrimental in firms that require joint efforts from activists and insiders. Ultimately, activists only have

[2]Since the transition affects cash flows, compensation does not need to be explicitly tied to sustainability goals. It is sufficient to base contracts on cash flows; that is, insiders' incentives to exert transition efforts may arise from both sustainability-linked compensation and standard performance-based compensation.

[3]We recognize that sustainability preferences are a specific form of broader non-pecuniary private preferences over firm outcomes—preferences that may also arise from social, political, or ideological motives. Heterogeneous preferences may additionally reflect differences in time horizons, taxation, or beliefs (e.g., Levit, Malenko, and Maug (2024)). While our model applies to any such motives, we focus on sustainability preferences because they are empirically prominent and form the conceptual core of the sustainable finance literature. Moreover, our model incorporates elements that are naturally suited to green finance—such as a transition process interpreted in terms of environmental change, explicit investor preferences over externalities, and a structure that captures the interplay between regulation and investor-driven engagement.

significant influence in firms that struggle to transition on their own.

Crucially, unless the benefits of transitioning for passive owners are negative, activism may fail to emerge, due to the external free-rider problem. Indeed, activists facilitate the transition through costly private effort. But if the transition creates value that is fully reflected in the stock price, activists may not be able to capture sufficient returns to justify their investment. As a result, activists are discouraged from investing in firms in which their impact is high. This leads to an endogenous exclusion mechanism, in which activists favor firms that can transition (independently) at lower cost, rather than those that would benefit most from their involvement.

Putting the two frictions together yields a sharp asymmetry across cases. When transitioning yields negative benefits for passive owners, the external free-rider problem is absent. In this case, activism always increases the transition rate when it arises, though its effectiveness is weakened by internal free-riding. By contrast, when transitioning yields positive benefits for passive owners, the two free-rider problems reinforce each other. The external free-rider problem confines activism to firms in which it has low impact, while the internal free-rider problem weakens the transition rate within those firms. Although activism can be effective in the presence of either friction alone, their combination stifles activism. Overall, the model implies a weak and ambiguous relation between activism and green transitions.

In our model, the pace of the green transition is influenced by three primary factors: (1) carbon taxation, which strengthens financial incentives for transitioning; (2) passive sustainable finance, shaped by the sustainability preferences of passive investors; and most crucially, (3) activist engagement, or active sustainable finance, which depends on activists' sustainability preferences and is constrained by two types of free-rider problems. This framework uniquely positions us to analyze the interplay between all three mechanisms.

We begin by showing that regulatory tools and sustainable finance affect activism in distinct, sometimes opposing, ways. Carbon taxes and passive investor sustainability preferences both expand the scope of transition under passive ownership, but they simultaneously reduce the parameter space in which activism can add value. For carbon taxes, the exemption from this rule is when transitions would not occur without policy support. In such cases, carbon taxes and activism are complementary, since taxation may render the transition valuable and activism becomes the mechanism that implements it. By contrast, stronger sustainability preferences of passive investors never play this complementary role—

they always crowd out activism by reducing the activist's relative advantage. Conversely, when activist preferences are stronger, both the likelihood and intensity of engagement rise, accelerating the transition.

In our baseline analysis, activists have value-alignment preferences and derive utility from the absolute level of externalities generated by their investments. Evidence on such preferences for sustainable investing is provided by Heeb, Kölbel, Paetzold, and Zeisberger (2023), and Bonnefon, Landier, Sastry, and Thesmar (2025). An alternative approach, explored in several papers (e.g., Oehmke and Opp (2025); Gupta, Kopytov, and Starmans (2025)), assumes that activists are consequentialists, evaluating externalities relative to a counterfactual scenario in which they do not invest in the firm. A key insight from our model is that only utility components contingent on outcomes (e.g., actual externalities reduced) influence the internal free-rider problem and the activist's post-entry effort, regardless of whether they also depend on ownership. In contrast, utility components contingent on either ownership or outcomes (i.e., at least one of the two) affect the entry decision and hence the external free-rider problem. We show in particular that while the type of sustainability preference—value-aligned versus consequentialist—does not impact the internal free-rider problem, consequentialist preferences tend to exacerbate the external free-rider problem, weakening incentives for activist entry.

We also show the robustness of our findings by (*i*) endogenizing the size of the activist's stake, (*ii*) considering that the activist does not incentivize insiders, (*iii*) letting passive investors design contracts, (*iv*) providing high-powered incentives to the activist, (*v*) allowing activists to capture some of the value created through their engagement, (*vi*) considering an arbitrarily large number of insiders, and (*vii*) allowing multiple trading rounds in a dynamic model extensions, potentially changing the activist's stake and effort incentives.

Finally, a key implication of our analysis is that impact activism and active sustainable finance are more likely to arise—and to foster the green transition—in private capital markets. As we argue, private markets feature less severe internal and external free-rider problems. Indeed, ownership is more concentrated, and activists (e.g., private equity sponsors) bargain over acquisition prices, both of which weaken external free riding. Moreover, in a dynamic extension, we show that the option to trade equity stakes—less prevalent in private markets—further exacerbates the external free-rider problem.

There is a vast literature on shareholder activism, reviewed in Edmans and Holderness

(2017). In related papers by Admati, Pfleiderer, and Zechner (1994), DeMarzo and Urošević (2006), and Back, Collin-Dufresne, Fos, Li, and Ljungqvist (2018), activists affect firm performance through their own effort. Grossman and Hart (1980), Shleifer and Vishny (1986), and Bolton and von Thadden (1998) focus on the "external" free-rider problem of dispersed shareholders associated with activist entry. Dasgupta, Jenter, Mathews, and Voss (2025) study the endogenous emergence of impact funds in the presence of socially responsible funds in the presence of an external free-rider problem. Our main contribution with respect to this literature is to develop a model with endogenous engagement and optimal contracting with insiders, in which both insiders and activists help foster change leading to an internal free-rider problem. We combine the two free-rider problems in a parsimonious model, shed light on their interactions, and show how they may jointly hinder the impact of activism.

Our paper relates to the rapidly growing literature on sustainable finance (see, e.g., Heinkel, Kraus, and Zechner (2001), Albuquerque, Kroskinen, and Zhang (2019), Green and Roth (2025), Gollier and Pouget (2022), Jagannathan, Kim, McDonald, and Xia (2023), Broccardo et al. (2022), Allen, Barbalau, and Zeni (2025), Edmans, Levit, and Schneemeier (2023), Huang and Kopytov (2024), Dangl, Halling, Wu, and Zechner (2023), Gupta et al. (2025), Landier and Lovo (2025), Oehmke and Opp (2025)). Models in this literature differ in how they incorporate sustainability preferences. Some assume that investors derive non-pecuniary benefits from holding shares in firms that align with their sustainability values, while others assume that investors only care about the consequences of *their* decisions on firms' negative externalities. Empirical studies in this literature generally show that socially conscious investors are driven more by the alignment of investment with their ethical values than by the perceived impact of their actions (see, e.g., Riedl and Smeets (2017), Cole, Jeng, Lerner, Rigol, and Roth (2023), Heeb et al. (2023), and Bonnefon et al. (2025)). Our modeling approach accords with these findings and features non-pecuniary payoffs that accrue to activist investors depending on the firm's externalities.

To the best of our knowledge, our paper is the first to explicitly model the role of activist investors in the green transition. As a result, it differs from existing frameworks in several key dimensions. First, both the activist and insiders contribute to the green transition by providing effort, generating an internal free-rider problem not present in existing papers. Second, the activist influences firm performance through the cash flow channel rather than the discount rate channel commonly emphasized in the literature. Third, an external free-rider problem hampers activist entry and endogenously leads activists to favor investments in firms that can more easily transition, effectively generating green tilts and exclusion of brown firms. Fourth and most importantly, we show how the combination of an internal and external free-rider problem hampers impact activism and leads activists to adopt a passive investment strategy with limited engagement and exclusion of brown firms.

Our analysis is motivated by the growing empirical literature on shareholder engagement and the green transition (Dimson, Karakaş, and Li, 2015; Kölbel, Heeb, Paetzold, and Busch, 2020; Cole et al., 2023; Wiedemann, 2025). According to a recent survey by Krueger et al. (2020), institutional investors consider engagement rather than divestment as a more effective approach to address climate risks. Akey and Appel (2020), Naaraayanan, Sachdeva, and Sharma (2023), Azar, Duro, Kadach, and Ormazabal (2021), and Bellon (2024) show that engagement by hedge funds, pension funds, large asset managers, and private equity funds causes firms to reduce their emissions. van der Kroft, Palacios, Rigobon, and Zheng (2024), Diaz-Rainey, Griffin, Lont, Mateo-Márquez, and Zamora-Ramírez (2023), and Li, Berentsen, Otneim, and Juranek (2024) find no significant effect of investor engagement on firms' carbon footprint. Taken together, the empirical evidence is mixed, in line with our findings.

1 A Model of Investor Activism and Green Transition

We present a model in which an activist can invest in a firm to change its production technology or processes into more sustainable ones, a process we refer to as a *green transition*. The activist investor can support this transition by putting in private effort and designing contracts that incentivize insiders to contribute their own efforts. The activist may represent a hedge fund, a private equity fund, or other types of active investors, such as wealthy individuals or philanthropists.[4] Insiders represent the key personnel and executives who are able to influence firm outcomes. Their transition efforts are interpreted broadly and may include implementing company-wide sustainability policies and business practices, investing in green technology, or motivating employees. The activist's private effort captures its engagement with the firm, for instance, by appointing board members, developing strategies, providing

[4] Some of these motivating examples (e.g., activist hedge funds) fit transparent markets better than others (e.g., private equity funds), but we discuss market transparency later in the paper. Importantly, while activist hedge funds generally do not hold controlling stakes (contrary to PE funds), recent research shows that activist hedge funds can achieve de facto control using voice (see Brav, Dasgupta, and Mathews, 2021) or trading (see Cvijanovic, Dasgupta, and Zachariadis, 2022; Gryglewicz, Mayer, and Morellec, 2025).

industry connections, implementing business practices, or voting on proposals.

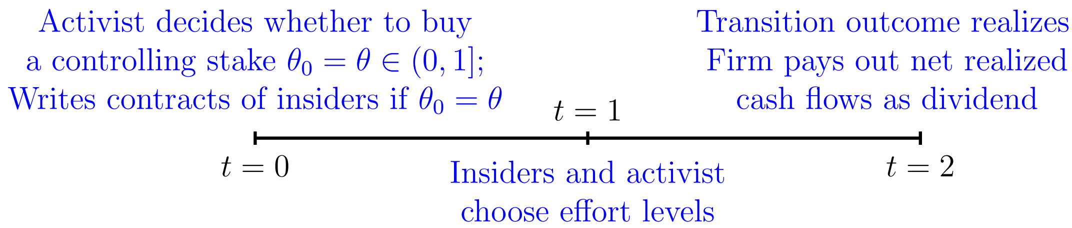

Figure 1: **Timeline of the model.**

Timing and Transition Process. We consider an economy with three dates, $t = 0, 1, 2$, and no discounting. There are three types of risk-neutral agents: an activist investor, a continuum of passive investors, and the insider(s). The baseline model considers, for simplicity, a single agent representing insiders. Section 6.4 extends the model to allow for an arbitrary number of insiders who contribute to the transition. We consider a single firm that is all equity-financed with a number of shares normalized to one. The firm is initially fully owned by competitive and dispersed passive investors. The activist decides at $t = 0$ whether to buy a controlling stake $\theta_0 = \theta \in (0, 1]$ where θ is a parameter; see Section 6.2 for the analysis with endogenous θ. If the activist does not enter, then $\theta_0 = 0$.

The firm is initially "brown" or polluting, but it can reduce its environmental damage (e.g., carbon emissions) by transitioning to a clean production technology or clean processes. The outcome of this green transition is captured by a state $\omega \in \{G, B\}$ that is realized and publicly observed at $t = 2$.[5] The probability of a green transition depends on both the activist's effort a, provided the activist has invested in the firm and $\theta_0 = \theta$, and the efforts of insiders i, both of which are chosen at $t = 1$. With probability $a + i$, state $\omega = G$ realizes and the firm becomes clean. With probability $1 - a - i$, state $\omega = B$ realizes and the firm remains dirty. To ensure that the probability of transitioning is well-defined, we impose that a and i are bounded from above by $\overline{a}$ and $\overline{i}$ respectively and that parameters are such that optimal efforts satisfy $a \in [0, \overline{a})$ and $i \in [0, \overline{i})$. In our baseline specification, efforts affect the transition probability symmetrically and independently. Section 6.1 shows that our key findings remain qualitatively similar when efforts are complements.

[5]This model is similar to an infinite horizon model in which the timing of the transition would endogenously depend on the efforts of management and the activist. For instance, one could model the transition process as a jump process whereby the successful completion of the transition process depends on the efforts of the manager and the insiders, similar to the modeling in Gryglewicz, Mayer, and Morellec (2021).

Preferences. In our baseline analysis, passive investors derive a non-pecuniary benefit $\pi^P \geq 0$ per unit of stock from owning the firm's stock after the green transition, as in, e.g., Pástor, Stambaugh, and Taylor (2022) and Landier and Lovo (2025). The activist derives a non-pecuniary benefit $\pi^A \geq 0$ per unit of stock from owning the firm's stock if the transition is successful. For both types of investors, non-pecuniary benefits scale with their stake in the firm, reflecting so-called values-aligned or narrow sustainability preferences. Intuitively, investors internalize part of the positive externality of transitioning, giving rise to a non-pecuniary benefit. As a consequence, investors may push for a green transition, even when the transition has a negative financial payoff. Riedl and Smeets (2017), Bonnefon et al. (2025), and Heeb et al. (2023) provide empirical evidence on such preferences.[6] We define

$$\pi = \pi^A - \pi^P, \tag{1}$$

as the *sustainability premium* of the activist investor. This sustainability premium can be positive or negative. However, as we will show, activism can only emerge in the former case.

Beyond non-pecuniary motives, meaningful heterogeneity in sustainable investment behavior can also arise from differences in beliefs or incentives, as highlighted by Goldstein, Kopytov, Shen, and Xiang (2024). For instance, some investors may believe that green transitions improve financial performance, while others do not—leading to divergent investment choices even in the absence of non-pecuniary motives. Alternatively, institutional investors (e.g., ESG fund managers) may pursue sustainability goals due to reputational concerns or contractual mandates. Our results are robust to these interpretations: what matters is that some investors act as if they internalize sustainability-related outcomes, regardless of whether their motivation is intrinsic, belief-driven, or incentive-based.

Cash flows and benefits of transitioning. The firm produces cash flows $X_\omega > 0$ at $t = 2$. A carbon tax is in place, which requires the firm to pay $T \geq 0$ dollars if $\omega = B$. More broadly, T may represent a pecuniary penalty or cost for causing environmental damage. That is, the firm's post-tax cash flows are X_G in state G and $X_B - T$ in state B, where the difference $X_G - X_B$ in pre-tax cash flows across states captures any gross financial payoff associated with a green transition. Such payoff may arise from a variety of sources, including consumer preferences for green products (see, e.g., Meier, Servaes, Wei, and Xiao (2023)) or

[6] Section 5.1 examines the consequences of assuming that investors have consequentialist preferences.

the level of legal liability that a company faces if it undertakes polluting projects (see, e.g., Bellon (2024)). We define

$$\Delta := X_G - X_B + \pi^P + T \tag{2}$$

as the gross benefit from transitioning for passive investors. We may have $\Delta > 0$ under one or more of the following conditions: a carbon tax is in place, passive shareholders exhibit sustainability preferences, or firm cash flows increase after the green transition, once transition costs have been incurred.[7] When $\Delta \leq 0$, the net benefit of transitioning is negative for passive investors, due to the cost of transitioning. In this case, the probability of transitioning is zero under passive ownership and activism is necessary for a green transition.

Moral Hazard and Optimal Contracting. The activist (insiders) chooses effort $a \geq 0$ ($i \geq 0$) against quadratic costs $\frac{\phi_a a^2}{2}$ ($\frac{\phi_i i^2}{2}$), where $\phi_a, \phi_i > 0$ are positive constants. Efforts at time $t = 1$ are unobservable and non-contractible, leading to an agency problem. To deal with this agency problem, the controlling shareholder—the activist (if $\theta_0 = \theta$) or the passive investor (if $\theta_0 = 0$)—can write at $t = 1$ (before efforts are chosen), a contract (C, R) to incentivize insiders. This contract stipulates a payment C to insiders in state B and a payment $C + R$ in state G. These payments are made out of the firm's cash flows, leading to net cash flows $X_G - C - R$ in state G and $X_B - C - T$ in state B. Given the contract and anticipating activist effort $\hat{a}$ (with $a = 0$ if the activist has not invested and $\theta_0 = 0$), insiders maximize

$$\max_{i \in [0, \bar{i}]} \left\{ C + (\hat{a} + i)R - \frac{\phi_i i^2}{2} \right\}, \tag{3}$$

leading to the incentive constraint

$$i = \frac{R}{\phi_i}. \tag{4}$$

assuming that effort is interior. We denote by $W \geq 0$ the outside option of insiders. Under

[7] As noted by World Bank (2024), there were 75 carbon taxes and emissions trading schemes in operation worldwide as of 2024, with carbon pricing mechanisms covering approximately 24% of global emissions. Furthermore, ESG investing has grown substantially over the past decade, reflecting investors' desire to align their investments with their ethical values. Lastly, while the above two conditions imply that $\Delta > 0$ can be consistent with cash flow-decreasing transition outcomes, green transitions can also lead to increased cash flows. For example, Derrien, Landier, Krueger, and Yao (2025) show that negative ESG incidents lead to downward earnings revisions due to expected declines in sales, suggesting negative consumer reactions. Meier et al. (2023) find a positive link between E&S ratings and local sales performance.

the optimal contract, the participation constraint of insiders binds and

$$W = C + (\hat{a} + i)R - \frac{\phi_i i^2}{2}. \tag{5}$$

Two points are worth mentioning. First, because the transition affects cash flows, compensation does not need to be explicitly tied to sustainability goals. It is sufficient to base contracts on cash flows; that is, insiders' incentives to exert efforts for the transition may arise from both sustainability-linked as well as standard performance-based compensation; see Section 4.4. Second, the activist does not need to contract with insiders. But incentivizing insiders is optimal for the activist and helps with impact; see Section 6.5.3.

Payoffs. Conditional on entry, the activist's expected payoff equals

$$V = \max_{a \geq 0, (C,R)} \Big\{ \big(1 - (a+i)\big)\theta(X_B - C - T) + (a+i)\theta\big(X_G + \pi^A - C - R\big) - \frac{\phi_a a^2}{2} \Big\}, \tag{6}$$

subject to (4) and (5) and where the activist exerts private effort to foster change.

The firm's stock price at time $t = 1$, that is, passive investors' valuation for the firm, depends on whether the activist enters and $\theta_0 = \theta$ (i.e., active ownership) or not and $\theta_0 = 0$ (i.e., passive investor ownership). Under activist ownership, the fair time-1 stock price from passive investors' perspective, anticipating the efforts of the activist and insiders (a, i), equals

$$P = \big(1 - (a+i)\big)\big(X_B - C - T\big) + (a+i)\big(X_G + \pi^P - C - R\big). \tag{7}$$

If the activist does not enter and $\theta_0 = 0$, then $a = 0$ and passive investors are in control of the firm and choose the manager's contract (C, R) to maximize firm value, i.e.,

$$P_0 = \max_{(C,R)} \big\{ \big(1 - i\big)(X_B - C - T) + i(X_G + \pi^P - C - R) \big\}, \tag{8}$$

subject to (4) and (5). P_0 is also the firm's stock price under passive investor ownership.

Activist Entry and the Free-Rider Problem. The activist improves firm value through private and costly effort. However, if this value creation is fully reflected in the price at which it acquires a stake in the firm, the activist cannot capture the gains from activism. That is, activist entry is subject to an external free-rider problem that reduces the incentives to invest (Grossman and Hart, 1980). The baseline model considers this external free-rider problem in its purest version by assuming that the activist cannot hide its trade in a public firm or has no bargaining power in a private firm. Section 6.3 relaxes this assumption.

In the baseline model, the activist's endogenous stake in the firm θ_0 can only take two values, 0 or θ, where $\theta \in (0, 1)$ is an exogenous parameter (Section 6.2 relaxes this assumption). Since there is no discounting, the activist acquires its stake at time $t = 0$ at the fair stock price P, reflecting the gains from activism. As a result, the activist enters and $\theta_0 = \theta$ only if

$$V - \theta P = (a + i)\theta\pi - \frac{\phi_a a^2}{2} \geq 0, \tag{9}$$

where we normalize the value of the activist's outside option to zero. Under optimal efforts (a, i), the payoff from entering equals simply the activist's expected non-pecuniary payoff from transitioning minus its cost of effort. Note that activism can reduce passive investors' valuation of the firm, i.e., we can have $P < P_0$. Importantly, our findings remain the same if the activist must acquire its stake at price $\max\{P, P_0\}$.[8]

Finally, in case of indifference (when the above inequality holds in equality), we break ties in favor of entry, when $a > 0$. In the special case $a = i = 0$ (which we analyze later), there is no transition effort (with and without activism), and the activist is mechanically indifferent between entering or not. In this case, we say the activist does not enter.

2 Solution

2.1 No Moral Hazard Benchmarks

We start by studying two benchmarks, i.e., passive ownership and active ownership without moral hazard, and characterize efforts a and i and the rate of green transition, $a + i$, in both benchmarks. First, consider that the activist owns a fraction θ of the firm's equity, but there is no moral hazard, in that the activist's and manager's efforts are observable and contractible. Then, efforts maximize the total surplus generated for the activist from the green transition, so that

$$(a^*, i^*) = \arg\max_{(a,i)} \left\{ \theta(\Delta + \pi)^+(a + i) - \frac{\phi_a a^2 + \theta\phi_i i^2}{2} \right\}, \tag{10}$$

[8]To see this, note that one can calculate $V - \theta P_0 \geq 0$; this follows for instance from Proposition 10 upon setting $\eta = 0$ in this Proposition. Thus, $V - \theta P \geq 0$ and $V - \theta \max\{P, P_0\} \geq 0$ are equivalent. When $P > P_0$, the equivalence is immediate as $\max\{P, P_0\} = P$. When $P \leq P_0$, we have that $V - \theta P \geq V - \theta P_0 \geq 0$.

where $(\Delta+\pi)^+$ is the activist's payoff per unit of ownership in case of a successful transition, with $x^+ = \max\{0, x\}$. This payoff consists of the payoff Δ of passive investors increased by the activist sustainability premium π, both of which increase engagement.

Second, suppose that the activist does not enter. Then, the firm is owned by passive investors, there is no activist effort and insiders' effort solves $i^P = \arg\max_i \left\{\Delta i - \frac{\phi_i i^2}{2}\right\}$.

Proposition 1 characterizes efforts and, thus, the rate of transition in both benchmarks.

Proposition 1 (Benchmarks)**.** *When there is no moral hazard and the activist owns a fraction θ of the firm's equity, the efforts of the activist and insiders are given by*

$$a^* = \frac{\theta(\Delta+\pi)^+}{\phi_a} \quad \text{and} \quad i^* = \frac{(\Delta+\pi)^+}{\phi_i}.$$

Insiders' effort under passive ownership satisfies

$$i = i^P = \frac{\Delta^+}{\phi_i} < a^* + i^*.$$

When there is no moral hazard, efforts a^* and i^* increase with the sustainability premium π and decrease with effort costs. The activist's effort also increases with its stake θ as even absent moral hazard, the activist only gets part of the benefits of the transition yet incurs the full cost of effort. The rate of transition a^*+i^* exceeds the transition rate that prevails under passive ownership, $i^P = \frac{\Delta^+}{\phi_i}$, for all θ. Absent moral hazard, the efforts of the activist and insiders complement each other so that activism unambiguously fosters the green transition.

Interestingly, the effort of insiders under passive ownership equals i^P irrespective of whether there is moral hazard. Indeed, since insiders are risk-neutral and there are no further frictions, optimal contracting can fully resolve the moral hazard problem under passive ownership. As we show below, this changes under active ownership.

When $\Delta \leq 0$, we have $i^P = 0$ and the transition cannot be achieved without the activist.

2.2 The Internal Free-Rider Problem and Effort Choices

Suppose that the activist has invested in the firm, in that $\theta_0 = \theta$. When choosing its own effort a, the activist takes the contract (C, R) and thus the effort i of insiders as given. The first-order condition with respect to a in the activist's objective (6) yields

$$a = \frac{\theta(\Delta + \pi - R)^+}{\phi_a}. \tag{11}$$

Having characterized the activist's effort a, we can now derive the contract (C, R) that maximizes the activist's payoff V in (6) subject to (4), (5), and (11). Using (5), we get $C = W - (a+i)R + \frac{\phi_i i^2}{2}$. Inserting C in (6), we can characterize the choice of the contract as follows

$$\max_R \left\{ -\left(\frac{\phi_a a^2 + \phi_i i^2}{2} \right) + \theta(a+i)(\Delta + \pi - R) \right\},$$

subject to (4) and (11). This yields the following result:

Proposition 2 (Investor activism and the green transition rate)**.** *Define the insiders' relative skills in fostering the transition as*

$$\xi := \frac{\phi_a}{\theta \phi_i}.$$

Optimal efforts with activist entry satisfy:

$$a = \frac{(\Delta + \pi)^+}{\phi_i} \left(\frac{1}{\xi(1+\xi)} \right) \quad \text{and} \quad i = \frac{(\Delta + \pi)^+}{\phi_i} \left(\frac{\xi}{1+\xi} \right), \tag{12}$$

with $a < a^*$ and $i < i^*$ for $\xi \in (0, \infty)$.

Proposition 2 shows that an activist's impact on the green transition depends on the relative effort costs, $\xi = \frac{\phi_a}{\theta \phi_i}$, capturing the relative ability of insiders to speed up the transition via their own effort. Keeping ϕ_a constant, we have $\xi \to 0$ when $\phi_i \to +\infty$ and the firm cannot transition without the activist. On the other hand,[9] the activist plays no role in the transition when $\xi \to \infty$, e.g., when $\theta \to 0$ or $\phi_a \to \infty$ (with ϕ_i such that $a + i < 1$).

Interestingly, when $\Delta + \pi > 0$ and the activist enters, the optimal contract implies that insiders exert effort even when $\Delta \leq 0$ and it is optimal not to exert effort with passive owners. In addition, while the activist and insiders efforts complement each other when there is no moral hazard, they endogenously arise as substitutes with moral hazard, because efforts are unobservable and each party free-rides on the other's efforts. Increasing i requires a higher compensation R, thus lowering a, and vice versa (as shown by incentive condition

[9] In what follows, we analyze how Δ, π, and ξ shape activist engagement. In this analysis, one can always pick ϕ_i sufficiently large (holding all else equal) to ensure the restriction $a + i < 1$. That is, efforts scale linearly with $1/\phi_i$ and picking large ϕ_i comes at no loss, as we are primarily interested in relative changes.

(11)). Consequently, the optimal contract incentivizes insiders' effort below the optimal level without moral hazard, in that $i < i^*$. Put differently, due to double moral hazard, the activist's and insiders' effort incentives are interconnected, so they generally cannot be set efficiently and fall below their optimal levels. This internal free-rider problem reduces the transition rate, with the extent of this distortion depending on the relative significance of the efforts of the activist and the insider in the transition process.

2.3 Activist Entry and the External Free-Rider Problem

Using the closed-form expressions for the activist's value function and the firm's stock price (see Appendix A.2), we can characterize the activist's entry decision in terms of the relative skill ratio, ξ and the *sustainability benefit ratio* $\frac{\Delta}{\pi}$. The latter ratio represents the (gross) benefits that passive investors receive from the firm's green transition (Δ) relative to the sustainability premium captured by the activists (π). Notably, we have that:

Proposition 3 (Activist entry)**.** *The activist only enters when the sustainability premium π is strictly positive. In this case, the following holds:*

1. *When $\frac{\Delta}{\pi} > 0$ and the gross payoff Δ of transitioning for passive shareholders (and the probability of transitioning without the activist) is positive, the activist enters if and only if*
$$\frac{\Delta}{\pi} \leq 1 + 2\xi(1 + \xi + \xi^2), \tag{13}$$
With no internal free-rider problem, the activist enters if and only if
$$\frac{\Delta}{\pi} \leq 1 + 2\xi. \tag{14}$$

2. *When $\frac{\Delta}{\pi} \in (-1, 0]$, the probability of transitioning without the activist is zero, and the activist always enters.*

3. *When $\frac{\Delta}{\pi} \leq -1$, the probability of transitioning without the activist is zero, and the activist does not enter.*

Proposition 3 shows that the activist never enters for $\pi \leq 0$, i.e., a positive sustainability premium is a *necessary* condition for activism to emerge in our model. Thus, to focus on the interesting cases in which activism can arise, we assume in the following that:

Assumption 1. *The sustainability premium of the activist is (strictly) positive, i.e., $\pi > 0$.*

Given $\pi > 0$ and a positive benefit of transitioning Δ for passive investors, the activist enters if and only if the activist sustainability premium π is sufficiently large relative to Δ and condition (13) holds. In this case, engaging with the firm and accelerating the transition generates non-priced pecuniary benefits to the activist and incentivizes entry. Entry condition (14) without internal free riding is stricter than (13). Hence, the internal free-rider problem between firm insiders and the activist (analyzed in detail in Section 4 below) relaxes the entry constraint and raises the likelihood of activist entry.

When the gross payoff of transitioning for passive shareholders is negative ($\Delta \leq 0$), there is no external free-rider problem. Proposition 3 shows that the case $\Delta \leq -\pi$ is trivial: under both active and passive ownership, optimal efforts are zero and the transition never occurs. In this region, activists and passive investors are effectively identical in preferences and engagement, so ownership is indeterminate.

For the range $\Delta \in (-\pi, 0)$, passive ownership yields a zero transition rate, whereas activism induces positive effort and a strictly positive transition rate. That is, activism is necessary for the transition to occur. However, since transitioning requires costly effort, investment in the green transition has a negative NPV for passive owners. Consequently, the stock price under activism can be lower than under passive ownership ($P < P_0$). In this case, there is no external free-rider problem, and activist entry is facilitated. The following corollary formalizes precisely when activism reduces the stock price and confirms entry in that region.

Corollary 1. *The activist always enters when activism reduces the stock price relative to passive ownership. This happens if and only if*

$$\frac{\Delta}{\pi} \in \left(-1, \frac{\xi^3}{\xi^2 + \xi + 1 + \sqrt{(\xi+1)^2\,(2\xi^2+1)}}\right).$$

3 Can Investor Activism Foster the Green Transition?

This section characterizes the impact of activism in equilibrium, which depends on whether activism is feasible (i.e., the activist enters and $\theta_0 = \theta$), capturing the extensive margin of activism, and on the extent to which the activist changes the transition rate conditional on entry, capturing the intensive margin. Proposition 4 summarizes our headline result:

Proposition 4 (The Impact of Impact Activism). *Depending on the sustainability benefit ratio* $\frac{\Delta}{\pi}$*, the following cases can arise:*

0. **No transition.** *When* $\frac{\Delta}{\pi} \leq -1$*, there is no activism and the transition rate is zero.*

1. **Good activism.** *When* $\frac{\Delta}{\pi} \in (-1, 0]$*, the activist always enters, i.e.,* $\theta_0 = \theta$*, and improves the green transition rate in that* $\lambda(\theta_0) > \lambda(0) = 0$*.*

2. **Ambiguous activism.** *When* $\frac{\Delta}{\pi} \in (0, \Gamma^*]$*, where* $\Gamma^* = 1 + 2\xi(1 + \xi + \xi^2)$*, the activist enters (*$\theta_0 = \theta$*) and may or may not improve the green transition rate:*

   2A. **Good activism.** *The activist improves the transition rate in that* $\lambda(\theta_0) > \lambda(0)$ *if* $\frac{\Delta}{\pi} < \Gamma^{**}$*, where* $\Gamma^{**} = +\infty$ *for* $\xi \leq 1$ *and* $\Gamma^{**} = \frac{1+\xi^2}{\xi-1}$ *for* $\xi > 1$*.*

   2B. **Bad activism.** *The activist reduces the transition rate in that* $\lambda(\theta_0) < \lambda(0)$ *if* $\frac{\Delta}{\pi} > \Gamma^{**}$*.*

3. **No activism.** *When* $\frac{\Delta}{\pi} > \Gamma^*$*, there is no activist entry (*$\theta_0 = 0$*) and* $\lambda(\theta_0) = \lambda(0)$*.*

Proposition 4 shows how the impact of activism on the green transition varies with sustainability benefit ratio $\frac{\Delta}{\pi}$, which is the ratio of the benefits of transitioning to passive investors, capturing both the financial gains from transitioning (including the carbon tax) and their sustainability benefits, to the sustainability premium of the activist investor π.

The overall picture is nuanced, as there can be four relevant regions—0, 1, 2, and 3—where region 2 can be further divided into a "good activism" region (2A), in which activism improves the transition rate, and a "bad activism" region (2B), in which activism hampers the transition. The boundary between the two sub-regions 2A and 2B is determined by the critical value of the sustainability benefit ratio, Γ^{**}, the threshold beyond which activism has a negative impact on the transition process. Region 2B may be empty (when $\Gamma^{**} \geq \Gamma^*$), depending on the parameters, while all other regions are non-empty (due to $\Gamma^*, \Gamma^{**} > 0$). Figure 2 illustrates how the different regions are distributed across the parameter space of $\frac{\Delta}{\pi}$, showing how activism may affect the green transition process.

We now discuss the regions in more detail. When $\frac{\Delta}{\pi} \leq -1$ in region 0 (i.e., $\Delta + \pi < 0$), there is no gross benefit of transitioning for the activist or passive investors. As a result, the transition rate is zero irrespective of whether the activist enters. When $\frac{\Delta}{\pi}$ is sufficiently low (i.e., in regions 1 or 2A), activism emerges and is "good" in the sense that it raises the

Region 0	Region 1	Region 2A	Region 2B	Region 3
No Green Transition	Good Activism; Negative NPV Green Transition	Good Activism; Positive NPV Green Transition	Bad Activism Internal Free-Rider Problem	No Activism External Free-Rider Problem
$\frac{\Delta}{\pi} < -1$	$\frac{\Delta}{\pi} \in (-1, 0]$	$\frac{\Delta}{\pi} \in (0, \Gamma^{**}]$	$\frac{\Delta}{\pi} \in [\Gamma^{**}, \Gamma^{*}]$	$\frac{\Delta}{\pi} > \Gamma^{*}$

Figure 2: **Sustainability benefit ratio $\frac{\Delta}{\pi}$ and Impact Activism.**

transition rate relative to passive ownership. Under these circumstances, the external free-rider problem is mild, facilitating entry. The internal free-rider problem does not prevent a positive impact, although it limits the size of the activist's positive impact, i.e., without the internal free-rider problem, the activist's impact on the transition rate would be stronger.

When $\frac{\Delta}{\pi}$ is large (regions 2B and 3), activism has either a negative impact or no impact—which arises from the combination of the internal and external free-rider problem. In region 3, for sufficiently large $\frac{\Delta}{\pi}$, the external free-rider problem becomes so severe that it deters entry altogether. In region 2B, activist entry remains feasible, but the internal free-rider problem undermines the effectiveness of activism, ultimately reducing the transition rate relative to passive ownership. The size of the respective regions depends on the severity and interactions of the two free-rider problems, which we discuss in greater detail in Section 4.

Before proceeding, we examine how carbon taxation and the sustainability preferences of investors affect the impact of activism.

Carbon taxes. Since carbon taxes T raise the gross benefits of transitioning Δ for passive investors, they unambiguously increase $\frac{\Delta}{\pi}$. Thus, when $\Delta < -\pi$ and a green transition is unattainable, higher carbon taxes can move firms from region 0 into region 1 and promote both activism and green transitions. However, if a firm is already in the feasible activism region (i.e., $\Delta > -\pi$), an increase in carbon taxes can have the opposite effect by moving the firm into the region of ambiguous and even bad activism. Hence, carbon taxation interventions that appear to foster transition at first glance may, paradoxically, reduce the incremental impact of activism.

Overall, an increase in carbon taxes complements impact activism in fostering the green transition, when the gross benefits of transitioning, Δ, are low, while this increase substitutes for impact activism when the gross benefits of transitioning are large.

Sustainability preferences (passive investors). The sustainability preferences of passive investors π^P impact $\frac{\Delta}{\pi}$ through two channels. On one hand, they increase Δ by increasing the benefits of transitioning to passive investors; on the other hand, they reduce the relative activist sustainability premium π. This means that higher π^P increases $\frac{\Delta}{\pi}$ when $\Delta > -\pi$ and decreases it otherwise. Thus, in contrast to the effect of carbon taxes, the sustainability preferences of passive investors cannot move firms from "no transition" (region 0) to "good activism" (region 1). Instead, they can shift firms from the region of good activism to bad activism, or to the no-activism region (region 3). Overall, sustainability preferences of passive investors unambiguously limit the impact of activism.

Sustainability preferences (activist). Sustainability preferences of activist investors increase π—they increase (decrease) $\frac{\Delta}{\pi}$ if $\Delta < 0$ ($\Delta > 0$). Thus, the activist's sustainability preferences can move firms from region 0 to region 1 when $\Delta < 0$, thus facilitating impactful activism. On the other hand, when $\Delta > 0$, the activist's sustainability preferences reduce $\frac{\Delta}{\pi}$, thereby promoting activism (i.e., moving firms towards region 2A). Generally, these sustainability preferences promote good activism, as they move firms toward regions 1 and 2A, although there could be a transition from 3 to 2B that leads to bad activism.

Taken together, these observations show that regulatory tools and sustainable finance affect activism in distinct and sometimes opposing ways. Carbon taxes and passive investor sustainability preferences both expand the scope of transition under passive ownership, but they simultaneously reduce the space in which activism adds value. For carbon taxes, the exemption from this rule is when transitions would not occur at all without policy support ($\Delta < -\pi$). In such cases, carbon taxes and activism are complementary, since taxation makes the transition valuable and activism becomes the mechanism that implements it. By contrast, stronger sustainability preferences of passive investors never play this complementary role—they always crowd out activism by reducing the activist's relative advantage. Activist sustainability preferences, in turn, promote activism, generally "good activism," but can backfire in some instances too.

4 The Internal and External Free-Rider Problem

We now proceed to examine more closely the interaction between internal and external free-rider problems, which, respectively, shape the influence of activism along the intensive and extensive margins. As shown above, there are no meaningful interactions between the two free-rider problems when $\Delta \leq 0$ (equivalent to $\frac{\Delta}{\pi} \leq 0$). Indeed, when $\frac{\Delta}{\pi} \leq -1$, the transition rate equals zero, so, effectively, there is no internal or external free-rider problem (as there is also no activist effort). When $\frac{\Delta}{\pi} \in (-1, 0]$, the activist always enters and enhances the transition rate, whereas transition would not occur in the absence of activism. Therefore, the external free-rider problem has no bite, and the internal free-rider problem does not significantly hamper the impact of activism.

To focus on the parameter region where internal and external free-rider problems matter and can hinder the green transition, we make the following assumption.

Assumption 2. *The transition rate without activism is strictly positive, i.e.,* $\Delta > 0$.

4.1 Internal Free-Rider Problem and Impact: Intensive Margin

We start our analysis by characterizing the effects of activism on the rate of green transition, defined as the sum of efforts, i.e., $\lambda(\theta_0) = a+i$. The rate of green transition is a function of the activist's stake $\theta_0 \in \{0, \theta\}$. The intensive margin effect of activism on the green transition—relative to passive ownership—is characterized by the ratio of the transition rates with and without activism. Using Propositions 1 and 2, we can derive this ratio as:

$$\frac{\text{Green transition rate with activism}}{\text{Green transition rate without activism}} = \frac{\lambda(\theta)}{\lambda(0)} = \frac{a+i}{i^P} = \frac{1+\xi^2}{\xi+\xi^2}\left(1+\frac{\pi}{\Delta}\right). \qquad (15)$$

When $\frac{\lambda(\theta)}{\lambda(0)} > 1$, i.e., $\lambda(\theta) > \lambda(0)$, activism fosters the green transition (region 2A). When $\frac{\lambda(\theta)}{\lambda(0)} < 1$, i.e., $\lambda(\theta) < \lambda(0)$, activism hinders the green transition (region 2B).

Equation (15) demonstrates that the intensive margin effect of activism in the green transition is fully characterized by (i) the relative skills of insiders ξ and (ii) the sustainability benefit ratio $\frac{\Delta}{\pi}$ or, equivalently, its inverse $\frac{\pi}{\Delta}$. Activism can increase the green transition rate as the activist sustainability premium π induces higher managerial and activist efforts. However, the first factor on the right-hand side of (15) suggests that activism can reduce the transition rate, notably when both insiders and the activist are essential (ξ above one but not too high), due to the internal free-rider problem. Proposition 5 formalizes this intuition.

Proposition 5 (Intensive margin of activism)**.** *Activism hampers the green transition and leads to a lower transition rate than passive ownership, in that* $\frac{\lambda(\theta)}{\lambda(0)} < 1$*, whenever* $\xi \in$

(ξ_-, ξ_+), where

$$\xi_{\pm} = \left(\frac{1}{2} \pm \sqrt{\frac{1}{4} - \frac{\pi}{\Delta}\left(1 + \frac{\pi}{\Delta}\right)} \right) \frac{\Delta}{\pi}, \tag{16}$$

with $\xi_+ \geq \xi_- \geq 1$. Activism fosters the transition, i.e. $\frac{\lambda(\theta)}{\lambda(0)} > 1$, for $\xi \notin [\xi_-, \xi_+]$. In addition:

1. *The function $\frac{\lambda(\theta)}{\lambda(0)}$ is U-shaped in ξ with $\lim_{\xi \to 0} \frac{\lambda(\theta)}{\lambda(0)} = +\infty$ and $\lim_{\xi \to \infty} \frac{\lambda(\theta)}{\lambda(0)} = 1 + \frac{\pi}{\Delta}$. For $\xi \geq \xi_+$, we have $\frac{\lambda(\theta)}{\lambda(0)} \in (1, 1 + \frac{\pi}{\Delta})$.*

2. *In the limit $\frac{\Delta}{\pi} \to +\infty$, we have $\xi_- \to 1$ and $\xi_+ \to \infty$.[10] When $\frac{\Delta}{\pi}$ is sufficiently small, activism always fosters the transition and $\lambda(\theta) > \lambda(0)$ for any ξ.*

While activism fosters the green transition when there is no moral hazard (Proposition 1), Proposition 5 shows that this is not always the case under moral hazard. Notably, activism can reduce the transition rate when both activist and insider efforts are critical for success, as each party has an incentive to free-ride on the other's effort. This internal free-rider problem is most severe when ξ takes intermediate values $\xi \in (\xi_-, \xi_+)$, that is, when both the activist and insider contributions are essential, but neither party has a dominant role.

Indeed, when ϕ_a and ξ are large or, alternatively, ϕ_i is low, the activist's effort is unimportant relative to that of insiders. In the limit $\phi_a \to \infty$, i.e., $\xi \to \infty$, the activist exerts no effort, and the internal free-rider problem vanishes. Optimal contracting is able to fully resolve the moral hazard problem and efforts coincide with their optimal levels absent moral hazard. Likewise, when ξ is low, the effort of insiders is unimportant relative to the activist's effort; in the limit $\xi \to 0$, (a, i) converge to optimal levels absent moral hazard. Thus, when ξ is sufficiently low or high, activism increases the transition rate relative to passive investors owning the firm, i.e., $\lambda(\theta) > \lambda(0)$, giving rise to "good activism." In contrast, when both parties are essential (i.e., $\xi \in (\xi_-, \xi_+)$), optimal contracting cannot fully eliminate moral hazard, the internal free-rider problem is severe, and activism may reduce the transition rate: $\lambda(\theta) < \lambda(0)$, a case of "bad activism."

Two observations follow. First, although the quantitative impact of the internal free-rider problem depends on the specification for the effort cost function, the qualitative insight—that

[10] This limit can be taken by letting $\pi \to 0$ or $\Delta \to \infty$. While the limit $\Delta \to \infty$ in (16) is mathematically well-defined, this limit would make the expressions for efforts in (12) exceed one. However, since (16) does not depend on ϕ_i, one could always take the double limit $(\Delta, \phi_i) \to (+\infty, +\infty)$ in an appropriate manner to ensure that $a + i \in (0, 1)$ is satisfied in the limit.

the problem is greatest when both parties matter for the transition—is general.[11] Second, and crucially for understanding the limits of activist impact, the benefits of "good activism" are asymmetric. For low ξ, activism has large effects, with $\frac{\lambda(\theta)}{\lambda(0)} \to \infty$ as $\xi \to 0$. However, for high ξ, the impact is modest, bounded above by $1 + \frac{\pi}{\Delta}$. Thus, when the activist's sustainability premium π is small relative to the benefits of transitioning to passive investors Δ, activism's overall effect is characterized by three regions: strong positive impact at low ξ, negative impact at intermediate ξ, and modest positive impact at high ξ.

4.2 External Free-Rider Problem and Impact: Extensive Margin

We next turn to the entry decision. Using the entry condition (13), we can establish the following result regarding activist entry, i.e., the extensive margin of activism.

Proposition 6 (Extensive margin of activism)**.** *An activist's incentive to enter increases with the relative effectiveness ξ of insiders in advancing the green transition. There exists a unique threshold ξ_E such that entry occurs if and only if $\xi \geq \xi_E$. This threshold ξ_E is increasing in Δ and decreasing in π.*

Proposition 6 shows that an activist's incentives to enter increase as the relative skills of insiders improve. The reason is that, holding everything else equal, higher ξ reduces the activist's effort and impact, thereby mitigating the external free-rider problem. Hence, activists are more likely to invest in firms with high ξ (insider skills), but, conditional on investment, exert relatively low effort a (which decreases in ξ as shown in Proposition 2).

The mechanisms behind Proposition 6 also imply *green tilts*: activism is more likely in firms with high ξ, that is, with relatively low transition costs ϕ_i. That is, activists tilt their portfolios toward firms that can more easily transition on their own. We formalize this next.

Green Tilts. Suppose an activist with effort cost ϕ_a can invest in a single firm, choosing among firms with different levels of ϕ_i within some range $[\underline{\phi}_i, \overline{\phi}_i]$, where $a + i < 1$. The following corollary shows that, due to the external free-rider problem, the activist's payoff from investing, $V - \theta P$, decreases with ϕ_i. Thus, the activist optimally selects the firm with the lowest ϕ_i, tilting its investments toward firms that can easily transition on their own

[11] The closed-form results in equation (15) and Proposition 5 rely on quadratic cost functions, which ensure tractability. Numerical analysis using power cost functions of the form $\frac{1}{\alpha}\phi_i i^\alpha$ and $\frac{1}{\alpha}\phi_a a^\alpha$ confirms that the U-shaped effect of ξ and the potential for reduced transition persist. The U shape is sharper under lower convexity (smaller α) and flattens as convexity increases. See Appendix A.7 for details.

without activism. This result holds irrespective of the strength of sustainability preferences, highlighting the external free-rider problem's bite in hampering impact activism.

Corollary 2 (Green tilts)**.** *The activist's payoff from entering a firm $V - \theta P$ in* (9) *decreases in the firm's cost of transitioning ϕ_i.*

Green Tilts: Carbon taxes and Sustainable Finance. The comparative statics from Proposition 6 show that the entry threshold ξ_E rises with carbon taxes T and with passive investors' sustainability preferences. These comparative statics reinforce the green-tilt effect: higher carbon taxes or stronger sustainability preferences of passive investors make entry feasible only in firms with relatively low ϕ_i, pushing activists even more toward easy-to-transition firms. By contrast, stronger activist preferences for sustainability π relax the entry threshold, thereby weakening the tilting tendency.

4.3 Combining Internal and External Free-Rider Problems: Green Tilts, Brown Exclusion, and "Passive" Activists

When $\Delta > 0$ and the probability of transitioning without the activist is positive, the external free-rider problem discourages activists from investing in firms that need their intervention most—those with high transition costs ϕ_i and low insider skills ξ (Proposition 6). Instead, activists tilt their investments toward firms that can transition independently at low cost. This selection also reduces engagement: due to the internal free-rider problem, activists exert limited effort in these firms, leading to limited or even negative impact (Proposition 5).

This tension highlights the interplay between external and internal free-rider problems in shaping activist behavior. The external free-rider problem dictates where activists invest, leading to an *endogenous exclusion mechanism* or a *green tilt*—a tendency to target firms already positioned for transition. The internal free-rider problem, in turn, reduces the effectiveness of activist engagement in these firms, making activism resemble passive investing with limited engagement. As a result, activism often has minimal or even negative impact in equilibrium unless sustainability preferences are strong enough to overcome both frictions. While activism can be effective when only one free-rider problem is present, their combination undermines activist engagement and the transition process.

To illustrate these findings, Figure 3 plots the relative impact of activism on the transition rate—as captured by $\frac{\lambda(\theta)}{\lambda(0)}$—under different cases. The solid blue line represents the case

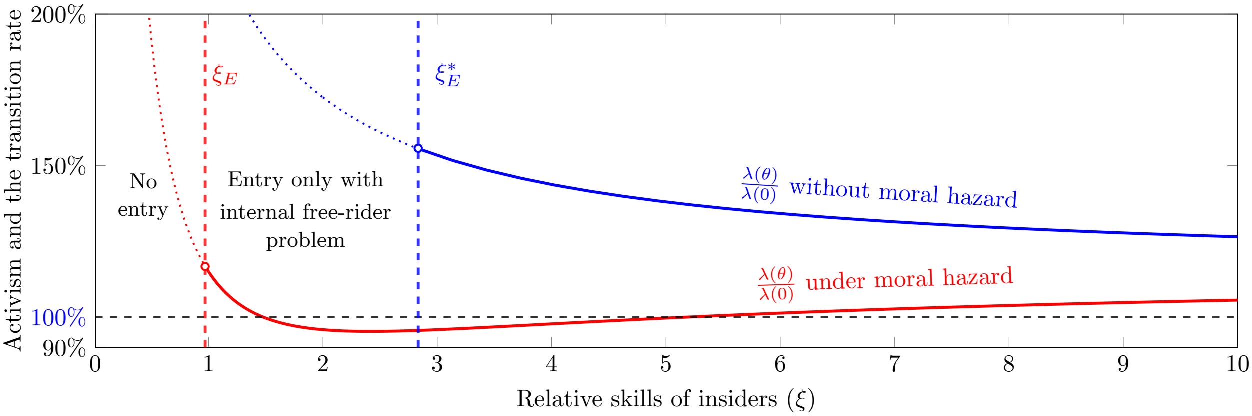

Figure 3: **Combining free-rider problems**: The figure plots the ratio of transition rates with and without activism in two cases: without moral hazard (solid blue line) and with moral hazard (solid red line). The entry thresholds without and with moral hazard ξ_E^* and ξ_E are also plotted as the vertical dashed blue and red lines. The figure assumes $\frac{\pi}{\Delta} = 0.15$.

without the internal free-rider problem, where activism consistently improves the transition rate. However, the external free-rider problem prevents activist entry when $\xi < \xi_E^*$, meaning activists fail to enter precisely when they could have the greatest impact.

The solid red line shows activist impact with both free-rider problems present. The external free-rider problem prevents entry when $\xi < \xi_E$. Because $\xi_E < \xi_E^*$, there is more entry than in the first-best case—relatively more skilled activists invest in firms that could benefit more from activism. However, it is among these firms that the internal free-rider problem reduces the effectiveness of activism the most, as both activist and insiders efforts are key to the transition in such firms. As a result, activism either has a limited or negative impact on the transition, with $\frac{\lambda(\theta)}{\lambda(0)}$ staying slightly above or below 1.

4.4 Mechanism and External Validity

Our analysis demonstrates that absent a large activist sustainability premium π, the combination of internal and external free-rider problems hinders activist engagement, effectively leading to a passive equilibrium investment strategy, featuring limited engagement and exclusion of brown firms. In this section, we discuss the external validity of the two frictions.

Internal free-rider problem. The internal free-rider problem emerges when the incentives of insiders and activists depend on overall transition outcomes, while individual actions cannot be contracted on. This means that, in practice, the internal free-rider problem is particularly pronounced when transition-relevant actions are difficult to contract upon or quantify. This is the case, for instance, when transition efforts involve multiple, less tangible actions by different insiders, such as organizational changes, process improvements, or behavioral shifts among employees, rather than tangible investments in green technologies, which are more easily contractible (see also footnote 1). Indeed, Section 6.4 and Appendix A.18 consider a model variant with many insiders who contribute to the transition through their unobservable efforts. We show that the presence of many insiders makes it harder to incentivize efforts and increases the severity of the internal and external free-rider problems.

The relevance of the internal free-rider problem is supported in both theory and evidence. In private markets, venture capitalists and private equity (PE) sponsors actively engage with portfolio firms, contributing effort alongside insiders. Theoretical models (e.g., Schmidt (2003); Casamatta (2003); Inderst and Müller (2004)) and empirical studies (e.g., Hellmann and Puri (2002); Bernstein, Giroud, and Townsend (2016); Ewens and Malenko (2025)) emphasize the importance of this joint influence and the resulting agency conflicts. In leveraged buyouts, PE sponsors' operational and governance engineering interacts with managerial effort, and evidence shows that insider incentives continue to matter post-buyout (e.g., Kaplan and Strömberg (2009); Gryglewicz and Mayer (2023); Cassel (2021)). Similar dynamics apply in public markets, particularly with activist hedge funds, whose engagement efforts—like those of VCs and PE sponsors—coexist with insider actions and thus are subject to internal free-rider problems (Brav, Jiang, Partnoy, and Thomas, 2008).

A possible critique of the internal free-rider mechanism is that sustainability-linked compensation for key employees and executives constitutes only a small fraction of total pay and of a firm's overall expenses in practice. However, because the transition affects firm cash flows, performance-based compensation indirectly ties executive incentives to the transition outcome, even in the absence of explicit sustainability-linked pay. That is, as long as the transition influences firm value or cash flows, performance-based insider compensation—for instance, related to equity-based compensation or employee bonuses—creates inter-dependencies between insider and activist incentives, generating the internal free-rider problem.[12] We also note that, because insiders can be numerous (see the model variant in Section 6.4), their aggregate compensation and incentive structures can signifi-

[12] Specifically, consider a model variant where the insider's cash flow-based compensation is exogenous—for instance because it is set to address incentive problems outside the model. This compensation component would then generate an internal free-rider problem through mechanisms analogous to those in our paper.

cantly influence the activist's incentives.

Overall, these arguments suggest that the internal free-rider problem is more likely to be severe in firms where (*i*) the success of the transition relies on the intangible contributions and efforts of insiders and activists, (*ii*) the transition influences the firm's cash flows and overall value, and (*iii*) insider compensation is tied to firm performance.

External free-rider problem. The external free-rider problem is particularly relevant in public markets, where ownership is highly dispersed among passive investors who will not coordinate to facilitate activism. In its extreme form, this coordination friction prevents activists from capturing any value gains from activism. However, even when activists retain a portion of these gains, as we allow in Section 6.3, the core mechanism remains intact. Empirical evidence, such as in Norli, Ostergaard, and Schindele (2015), supports the role of the external free-rider problem in hindering activist investment in publicly-traded firms. In contrast, the external free-rider problem is weaker under concentrated ownership or in private capital markets, where investors have greater control and face fewer coordination barriers. Without passive shareholders diluting returns, investors can better internalize the gains from activism, making it a more effective strategy.

5 Sustainable Finance and Preferences

5.1 (Generalized) Non-Pecuniary Preferences

In our model, the pace of the green transition is influenced by three factors: (1) environmental policies—such as carbon taxes, which create financial incentives for transitioning; (2) passive sustainable finance—driven by the sustainability preferences of passive investors; and (3) activist engagement, or active sustainable finance—shaped by activists' sustainability preferences and two distinct free-rider problems. Our analysis has assumed so far that investors have value-alignment sustainability preferences and experience corporate externalities of their portfolio companies as a non-pecuniary dividend. Studies like Riedl and Smeets (2017), Heeb et al. (2023), and Bonnefon et al. (2025) provide evidence of these preferences for sustainable investing. Other research, including Oehmke and Opp (2025) and Gupta et al. (2025), explores how activists' consequentialist preferences—considering externalities relative to a counterfactual scenario—affect their engagement.

We now present generalized non-pecuniary preferences, nesting value-alignment and consequentialist preferences as special cases, and show how they shape the impact of active sustainable finance. For this purpose, let $z \in \{0, 1\}$ represent the state of the transition, where $z = 1$ indicates that the transition has occurred, and $z = 0$ indicates that it has not.[13]

Activist. The activist derives non-pecuniary utility $u(\theta_0, z)$ which depends on their stake $\theta_0 \in \{0, \theta\}$ and the outcome of the transition, z. This utility comes in addition to the pecuniary payoff that the activist earns through firm cash flows and dividend payouts. We define the activist's utility function as:

$$u(\theta_0, z) = \theta_0(\pi_0^A + \pi^A z) + (\pi_0^{C,A} + \pi^{C,A} z). \tag{17}$$

The first term, $\theta_0(\pi_0^A + \pi^A z)$, reflects value-alignment sustainability preferences, which depend on both the activist's stake and the realization of the transition. We allow this preference to include a base utility of π_0^A—which can be positive or negative (e.g., depending on the firm's greenness)—and a (positive) additional utility π^A if the transition occurs. The second term, $\pi_0^{C,A} + \pi^{C,A} z$, represents consequentialist sustainability preferences, which depend on whether the transition occurs but are independent of ownership. Also here, we allow for a base utility of $\pi_0^{C,A}$ and a (positive) additional utility $\pi^{C,A}$ if the transition occurs.

Passive Investors. Next, consider passive investors, who are atomistic. We express an individual passive investor's (non-pecuniary) utility as a function of their ownership stake $\theta^P \geq 0$. Passive investors have both values-aligned and consequentialist sustainability, in that:

$$u^P(\theta^P, z) = \theta^P(\pi_0^P + \pi^P z) + \pi_0^{C,P} + \pi^{C,P} z. \tag{18}$$

The structure of these preferences parallels (17) for activist investors. A key observation is that, because passive investors are atomistic, the consequentialist component of their preferences drops out entirely for any outcomes determined by activism or the entry condition.

Pricing. To see why consequentialist preferences do not affect the stock price, note that the price is pinned down by the marginal passive investor's willingness to pay for an additional share. Passive investors are atomistic: when an individual investors buys or sells an

[13] That is, with $\omega \in \{B, G\}$ denoting the transition state, $\omega = G$ corresponds to $z = 1$, while $\omega = B$ corresponds to $z = 0$. We transform ω to a dummy variable to use it in our generalized preference formulation.

additional share, this does not change the transition rate. Hence, the utility from consequentialist preferences—which depends on outcomes only—does not change when an individual investor buys or sells a marginal share. The marginal valuation, and thus the stock price, is therefore independent of passive investors' consequentialist preferences. It reads

$$P = \underbrace{\big(1-(a+i)\big)\big(X_B - C - T\big) + (a+i)\big(X_G - C - R\big)}_{\text{Exp. Cash Flows}} + \underbrace{\frac{\partial}{\partial \theta^P}\mathbb{E}[u^P(\theta^P, z)]}_{\text{Marginal Holding Utility}} .$$

We note that the marginal holding utility satisfies $\frac{\partial}{\partial \theta^P}\mathbb{E}[u^P(\theta^P, z)] = \pi_0^P + \pi^P \mathbb{E}[z]$, where an individual passive investor takes $\mathbb{E}[z] = a + i$ as given when choosing its holdings.

The same logic applies to the entry decision at $t = 0$. When deciding whether to hold or sell, each individual, atomistic passive investor takes outcomes—including the transition rate—as given. Because their individual action cannot influence the transition rate, the associated consequentialist utility is a constant in the decision problem and drops out. Accordingly, the activist's entry decision is independent of the consequentialist component of passive investors's preferences. This finding reflects the (external) free-rider problem: Individual atomistic passive investors do not internalize the effects of giving up their shares.

Solution. We now show how to accommodate generalized preferences in the model solution. As in the baseline model, we define

$$\Delta = X_G - X_B + T + \pi^P.$$

In addition, we define $b = \pi_0^A - \pi_0^P$ and π such that $\theta\pi = \theta(\pi^A - \pi^P) + \pi^{C,A}$, i.e.:

$$\pi = \pi^A - \pi^P + \frac{\pi^{C,A}}{\theta}. \tag{19}$$

Appendix C formally redefines payoffs under these preferences and provides a formal model solution, generating two key insights. First, taking entry as given (i.e., $\theta_0 = \theta$), the post-entry equilibrium is unchanged relative to the baseline: the composite parameters Δ and π (now redefined) continue to characterize the choice of effort, the severity of the internal free-rider problem, and the firm's transition rate. Thus, holding fixed the total sustainability preferences-driven payoff from transitioning Δ and π, the specific nature of preferences—whether consequentialist or value-aligned—does not affect the transition rate. Importantly, preference-related utility components that are not contingent on outcomes—specifically, the base utilities in sustainability preferences—do not matter for the internal free-rider problem.

Second, the entry condition under generalized preferences becomes:

$$(a+i)\theta\pi - \frac{\phi_a a^2}{2} - \pi^{C,A} i^P + \theta b \geq 0, \tag{20}$$

and differs from that in the baseline model in several dimensions. Even when the overall sustainability-driven payoff from transitioning π is held fixed, the form of preferences matters: consequentialist preferences weaken entry incentives via the $\pi^{C,A}$ term, a point is examined in detail in section 5.2. In addition, the base utility level $\pi_0^{C,A}$ in consequentialist preferences has no effect on outcomes, since this utility is realized irrespective of entry.

In contrast, higher b clearly promotes activist entry. The term b captures any utility that is realized simply from holding a stake in the firm, regardless of whether a transition occurs. b encompasses (i) a base utility stemming from values-aligned preferences of activists, and (ii) a base utility stemming from values-aligned preferences of passive investors. This utility component is analogous to private benefits of control (Stulz, 1988). These base utilities may be positive or negative, rendering the overall sign of b ambiguous. Given this indeterminacy, we adopt an agnostic benchmark in the baseline model and set $b = 0$.

Summary. Taken together, these observations clarify which aspects of activist preferences matter for the internal and external free-rider problems. The preferences model we adopt in (17) is general, encompassing utility components that may depend on ownership, outcomes, both, or neither. A key insight from the above analysis is that only the utility components contingent on outcomes affect the internal free-rider problem and post-entry effort, regardless of whether they also depend on ownership. In contrast, components contingent on ownership or outcomes (i.e., at least one contingency) influence entry incentives and thus the external free-rider problem. Utility components that are entirely non-contingent (i.e., unrelated to either ownership or outcomes) are irrelevant. To identify these distinctions requires the joint presence of internal and external free-rider problems; models with only one cannot capture the nuanced role of generalized non-pecuniary preferences in shaping activist behavior.

5.2 Consequentialist versus Values-Aligned Preferences

One key insight of the previous section is that while the precise nature of sustainability preferences does not matter for post-entry outcomes, it affects entry incentives. To explore this distinction, we now decompose the activist's sustainability preferences while holding their total value fixed. Let $\alpha \in [0, 1]$ denote the share of non-pecuniary benefits derived from consequentialist preferences in total sustainability preferences π, so that $1 - \alpha = \frac{\theta \pi^A}{\theta \pi}$ and $\pi^{C,A} = \alpha \theta \pi$. When $\alpha = 1$, the activist has purely consequentialist preferences. When $\alpha = 0$, the activist has purely value-alignment preferences. To isolate the effects of sustainability preferences, we continue to assume that $\pi_0^A - \pi_0^P = b = 0$. Using equation (20) we get that:

Proposition 7. *With consequentialist preferences, efforts are as in the baseline model, characterized in* (12)*, and do not depend on* α*. The activist enters if and only if*

$$E^B := \frac{\pi}{\Delta}\left[\frac{\pi}{\Delta}\left(1 + 2\xi\left(1 + \xi + \xi^2\right)\right) + 2\xi\left(1 + \xi + \xi^2 - \alpha(1 + \xi)^2\right)\right] \geq 1. \tag{21}$$

E^B *decreases in* α *and increases (decreases) in* ξ *for* $\frac{\pi}{\Delta} \gtrless \frac{4\xi(2\alpha-1)-6\xi^2(1-\alpha)-2(1-\alpha)}{6\xi^2+4\xi+2}$*, whereby* $\alpha \leq \frac{1}{2}$ *implies* $\frac{\partial E^B}{\partial \xi} > 0$*. Entry incentives decrease in* $\frac{\Delta}{\pi}$ *(increase in* $\frac{\pi}{\Delta}$*).*

Consequentialist preferences hamper activist entry in that E^B decreases with α. This effect can be positive or negative for the transition rate, as reduced entry incentives arising from consequentialist preferences may prevent both good or bad activism. Specifically, sufficiently large values of α preclude bad activism. To see this, note that by (20), a necessary condition for activist entry under $\alpha = 1$ is that $a + i > i^P$; that is, activism increases the transition rate relative to passive ownership. In this sense, more consequentialist preferences raise the quality threshold for activism—entry becomes less likely, but when it does occur, activism is always beneficial. Put differently, consequentialist preferences raise activist selectivity and ensure positive impact, but may also prevent engagement.

6 Robustness and Other Results

We present a number of robustness checks and model extensions. To avoid case distinctions in these extensions (similar to those from Proposition 4), we assume, unless otherwise mentioned, $\pi > 0$ and $\Delta > 0$.

6.1 Complementarity of Efforts in the Transition Process

In our baseline model, the efforts of the activist and insiders affect the transition probability symmetrically and independently. We now examine the implications of assuming that efforts can be substitutes or complements in fostering the transition, in that the transition probability is given by $a + i + \sigma a i$ where $\sigma \gtrless 0$; the baseline is obtained for $\sigma = 0$. Denote by $\hat{a}$ the anticipated level of activist effort that coincides with a in optimum. Appendix A.11 shows that the incentive condition of insiders under a contract (W, R) becomes

$$i = \frac{R(1 + \sigma \hat{a})}{\phi_i}, \tag{22}$$

Note that the effort of insiders now depends on the activist's effort $\hat{a}$, which satisfies the incentive condition

$$a = \frac{\theta(\Delta + \pi - R)(1 + \sigma i)}{\phi_a}. \tag{23}$$

Higher effort incentives provided to insiders have an ambiguous effect. First, due to the assumed complementarity of efforts, higher effort by insiders incentivizes activist effort when $\sigma > 0$. Second, as in the baseline, insiders are incentivized via a reward R upon successful transition. When the activist increases its effort, part of the benefits accrue to insiders through the incentive contract, because activist effort is not contractible. Providing higher incentives to insiders by raising R therefore reduces the activist's incentives to exert effort, generating an endogenous substitutability between the two efforts under moral hazard.

Conditional on activist entry, the exogenous complementarity of efforts, which is not present under passive ownership, enhances the impact of activism on the transition rate. In contrast, the double moral hazard and endogenous substitutability of efforts limit the effectiveness of activism and potentially give rise to bad activism, i.e., activism that reduces the transition rate relative to passive ownership.

Whether activist engagement fosters or hampers the green transition when the transition rate without activism is strictly positive and $\Delta > 0$ ultimately depends on the strength of these two effects. To illustrate these effects, we solve the model numerically and plot in Figure 4 the ratio of transition rates with and without activism for various levels of σ against ξ. We find that greater complementarity increases the impact of activism when ξ is low, but decreases it when ξ is high. The results also confirm our main findings: the U-shaped

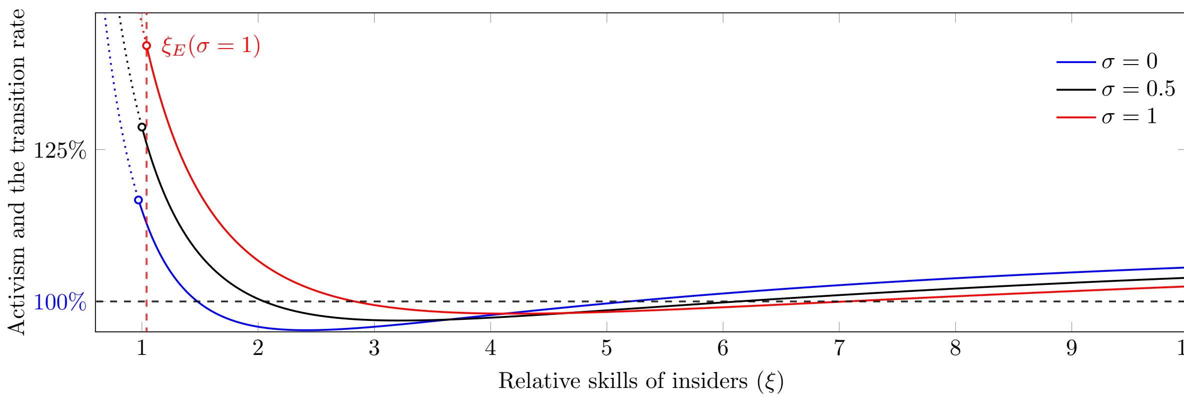

Figure 4: The figure plots the ratio of transition rates with and without activism, $\frac{\lambda(\theta)}{\lambda(0)}$, for different levels of exogenous complementarity σ. The constant parameters are $\frac{\pi}{\Delta} = 0.15$, $\phi_i = 4$, and $\theta = 0.25$. The x-axis represents changes in ϕ_a while keeping ϕ_i and θ fixed.

relationship between ξ and activist impact persists, and the potential for reduced transition continues to arise even when transition technologies are exogenously linked.

Moreover, because higher σ raises activist effort for lower levels of ξ, it also marginally intensifies the external free-rider problem. As a result, the activist's willingness to enter decreases with ξ. Taken together, these findings show that while complementarity can enhance or hinder the marginal impact of activism, it also reduces the likelihood of activist entry, particularly in regions where activist engagement would otherwise be most effective.

6.2 Endogenous Ownership Stake

Our analysis so far has assumed that the stake θ of activist investors was exogenous. We now endogenize the choice of θ by solving for the optimal activist stake

$$\theta^* = \arg\max_{\theta \in [0,1]} \left(V - \theta P\right).$$

Since $\theta \mapsto V - \theta P$ is zero for $\theta = 0$ and increases in a neighborhood of zero, we have $\theta^* > 0$, that is, the activist always enters the firm in this model variant, but its stake can be arbitrarily small. One could impose that the activist must acquire a minimum stake in the firm to be able to exert control, but for the sake of simplicity, we abstract from such an assumption here, as the qualitative findings would remain unchanged. We define the maximum ownership the activist could profitably acquire as $\overline{\theta} := \max\{\theta \in [0,1] : V - \theta P \geq 0\}$. Clearly, we also have $\overline{\theta} \geq \theta^*$. Solving the activist optimization problem yields the following results when θ^* is interior, where a sufficient condition for interior θ^* is $\frac{\phi_a}{\phi_i} \leq \xi_E$.

Proposition 8 (Transition rate with endogenous ownership)**.** *Define* $\Gamma^{\#} = \frac{5+3\sqrt{5}}{2}$*. When* $\theta^* \in (0,1)$*, we have that:*

1. *When* $\frac{\Delta}{\pi} \leq \Gamma^{\#}$*, then* $\lambda(\theta^*) \geq \lambda(0)$*, with equality when* $\frac{\Delta}{\pi} = \Gamma^{\#}$*.*
2. *When* $\frac{\Delta}{\pi} > \Gamma^{\#}$*, then* $\lambda(\theta^*) < \lambda(0)$*.*
3. *There exists* $\varepsilon > 0$ *such that* $\lambda(\theta^*) < \lambda(0) < \lambda(\overline{\theta})$ *for* $\frac{\Delta}{\pi} \in (\Gamma^{\#}, \Gamma^{\#} + \varepsilon)$*.*

Proposition 8 shows that when the sustainability benefit ratio is sufficiently small, i.e., when $\frac{\Delta}{\pi} \leq \Gamma^{\#} (\approx 5.85)$, activism always improves the green transition rate. When sustainability preferences are such that this constraint is not satisfied (i.e., $\frac{\Delta}{\pi} > \Gamma^{\#}$), the activist acquires an inefficiently low ownership stake θ^*, thereby hampering transition in that $\lambda(\theta^*) < \lambda(0)$. Strikingly, for intermediate levels of the activist sustainability premium π, we have $\lambda(\theta^*) < \lambda(0) < \lambda(\overline{\theta})$. In this case, the activist's entry and the acquisition of too small a stake θ^* hampers the transition, although the activist would be capable of profitably fostering the transition through the acquisition of a larger stake $\overline{\theta}$.

Next, we perform comparative statics in the endogenous ownership stake.

Proposition 9. *Suppose that* θ^* *is interior, i.e.,* $\theta^* \in (0,1)$*. Then,* θ^* *decreases in* ϕ_i*, increases in* ϕ_a*, increases in* π*, and decreases in* Δ*.*

Proposition 9 shows that upon entering, skilled activists, characterized by low ϕ_a, acquire smaller ownership stakes. Moreover, activists acquire a larger ownership stake when ϕ_i is low, and the firm can more easily transition on its own. Last, the ownership stake θ^* is larger when the activist has stronger sustainability preferences or the financial gains to transitioning are lower, resulting in a less severe free-rider problem.

Finally, we can jointly endogenize the choice of the ownership stake θ and the firm characterized by $\phi_i \in [\underline{\phi}_i, \overline{\phi}_i]$, maximizing $V - \theta P$. Notably, we have that:

Corollary 3. *The choice* $\phi_i = \underline{\phi}_i$ *solves* $\max_{\theta \in [0,1], \phi_i \in [\underline{\phi}_i, \overline{\phi}_i]} V - \theta P$*.*

Corollary 3 shows that the activist excludes investment in firms characterized by high ϕ_i. Instead, the activist invests in firms characterized by the lowest possible ϕ_i (i.e., $\phi_i = \underline{\phi}_i$). In light of Proposition 9, the activist selects a relatively large stake in such firms. In conclusion, we find that the activist tends to acquire large stakes in firms that can transition on their own at relatively low cost, but excludes investment in firms where it could have more impact.

6.3 External Free-Rider Problem and Bargaining Power

Activists can typically acquire substantial ownership stakes before publicly revealing their investments in public companies, and they may possess bargaining power when investing in private companies.[14] Consequently, we explore in this section the implications of allowing activists to capture a portion of the value gains from activism. To do so, we consider that the activist can acquire a fraction $1-\eta \in [0,1]$ of its stake θ at the price P_0 that prevails under passive ownership, defined in (8). The remaining fraction η is bought at a price P, defined in (7), that reflects the gains from activism. Relative to the baseline, the new acquisition price affects activist entry, but leaves all other model outcomes (conditional on the entry decision) unchanged. Thus, efforts are the same as in the baseline model so that Propositions 1, 2, and 5 still obtain. That is, the internal free-rider problem leads to underinvestment by the activist and insiders and activism leads to a lower transition rate than passive ownership whenever $\Delta > 0$ and $\xi \in (\xi_-, \xi_+)$. With an outside option normalized to zero, the activist enters if and only if

$$V - \underbrace{\theta P_0}_{\substack{\text{Cost without} \\ \text{Price Impact}}} - \underbrace{\eta\theta(P - P_0)}_{\substack{\text{Rents of Passive} \\ \text{Investors}}} \geq 0. \tag{24}$$

The following proposition uses this condition to characterize the activist's entry decision.

Proposition 10 (Bargaining Power and Entry)**.** *We have that*

1. *The activist enters, i.e.,* $V - \theta P_0 - \eta\theta(P - P_0) \geq 0$, *if and only if* $E \geq 0$ *with*

$$E := (\Delta+\pi)^2\left[\xi(1-\eta)+1-2\eta\right]+2(\Delta+\pi)\pi(1+\xi)\left[\eta+\xi(1-\eta)+\xi^2\right]-\pi^2(1-\eta)\xi(1+\xi)^2.$$

2. *The activist's incentives to enter increase as the skills of insiders improve in that* $\frac{\partial E}{\partial \xi} > 0$. *There exists unique* $\xi_B \in (0, \frac{2\eta-1}{1-\eta})$ *such that* $E(\xi) \geq 0$ *if and only if* $\xi \geq \xi_B$.

3. *A greater sustainability premium foster entry in that* $\frac{\partial E}{\partial \pi} > 0$. *There exists unique* $\pi_B \geq 0$ *such that an activist enters if and only if* $\pi \geq \pi_B$.

The key findings are similar to those in the baseline analysis, which is obtained upon setting $\eta = 1$. Notably, the activist's entry incentives increase with the sustainability pre-

[14] In the U.S., for example, Section 13(d) of the 1934 Act and Regulation 13D requires owners of more than 5% of the equity of a public firm to file a report with the SEC, at which point the identity of an activist gets revealed and the price adjusts to reflect this information.

mium π and decrease with its skills ξ. Thus, only activists who do not contribute much via their own effort and are characterized by $\xi \geq \xi_B$ have incentives to enter. Likewise, only activists with sufficiently strong sustainability preferences enter. Hence, our key findings are generally robust to relaxing the free-rider problem by allowing for $\eta < 1$.

Proposition 10 shows that when the bargaining power of activists is sufficiently strong, i.e., when $\eta \leq \frac{1}{2}$, activists always enter in that $V - \theta P_0 - \eta\theta(P - P_0) \geq 0$. That is, the activist's bargaining power fosters entry, suggesting that we should expect more activism in markets where activists have larger bargaining power, such as private capital markets.

6.4 Multiple Insiders

In our model, insiders represent key employees who contribute to the firm's green transition. The baseline model considers a single insider. Appendix A.18 presents a model variant in which the firm has N identical insiders contributing to the transition. To ensure comparability with the baseline model, we model the efforts of insiders such that the *first-best* efforts of the activist and insiders and the transition rate are independent of the number of insiders N. Crucially, we show that the transition rate under passive ownership is also independent of N, even though all of these N insiders are subject to moral hazard and free-ride on each others' efforts. Indeed, as in the baseline, the moral hazard problem can be fully resolved when the activist does not enter. Overall, we show that our key findings remain robust to allowing for many insiders, and the equilibrium is qualitatively similar for any N.

Interestingly, as in the baseline model, the insiders' moral hazard problem cannot be resolved with active ownership and efforts are subject to the internal free rider problem. Holding all else equal, it becomes harder to incentivize a given level of total insider effort when there are more insiders, as these insiders would like to free-ride on the activist's efforts as well as on each others' efforts. As a result, when insiders are sufficiently skilled and $\xi \geq 1$, the presence of $N > 1$ insiders (as opposed to a single insider) hampers activism on the intensive margin, thus reducing $\frac{\lambda(\theta)}{\lambda(0)}$ relative to the baseline. Intuitively, the presence of many insiders exacerbates the internal free-rider problem.

As efforts become hard to incentivize when there are many insiders, the activist optimally reduces incentives provided to insiders, potentially increasing its own efforts. These effects tend to worsen the external free-rider problem. As we show, when $N \to \infty$, incentivizing insiders is prohibitively difficult, insiders exert zero effort, and the external free-rider problem becomes highly severe, requiring the activist sustainability premium π to exceed the benefits from transitioning of passive investors. This reproduces the outcome of Section 6.5.3.

In summary, our model can accommodate an arbitrary number of insiders. Our key findings go through for any number of insiders N, with an increase in N exacerbating both the internal and external free-rider problems. Therefore, a larger number of insiders, N, hampers impact activism, both on the intensive and extensive margins. The mechanism underlying this result stems from the interplay between the external and internal free-rider problems. The external free-rider problem deters activist entry when insiders' relative skills are low—precisely when activism is most needed. This effect is amplified as the number of insiders increases. As a result, activists enter only firms that can transition relatively easily on their own. However, for these firms, a larger number of insiders exacerbates the internal free-rider problem, weakening activist impact compared to the case of a single insider.

6.5 Contracting and the Green Transition

6.5.1 Within-Fund Contracting and High-Powered Incentives

In our baseline model, activists derive incentives from their equity stake in the firm, which limits their ability to overcome the internal free-rider problem. In practice, fund managers—such as general partners (GPs) in hedge funds or private equity funds—often face high-powered, option-like incentive structures, such as high-water marks or carried interest. Consequently, when a hedge fund or a private equity fund acquires an equity stake in a firm, the compensation of the GP becomes convex, whereas the payoff to limited partners (LPs) and fund investors is concave. The combined stake of LPs and GPs remains straight equity.

In Appendix A.19.2, we extend the model to consider an activist structured as a fund in which a GP is responsible for exerting effort on the fund's behalf. The GP's compensation, as well as the payoff to LPs, may deviate from pure equity due to internal incentive contracts, yet the aggregate payoff of the fund as a whole remains equity. As we show, as long as these contracts are required to be monotonic in firm performance—a standard restriction in such settings—within-fund contracting cannot increase the activist's effort incentives and thus cannot mitigate the internal or external free-rider problem.

Finally, we note that our model is written "as if" the activist fund acts as a whole entity maximizing its total value, while we do not model other potential agency conflicts between

GPs and LPs. Any such conflicts of interest would likely further hamper the impact of activism. They would need to be addressed by within-fund contracting, but, as we have shown, within-fund contracting cannot achieve higher effort incentives than those obtained in the baseline.

6.5.2 Insiders' Contracts Set by Passive Investors

So far, we have considered that activists contribute to a firm's green transition by exerting effort and contracting with insiders. Assume now that the contracts of insiders are set by passive investors rather than activists. As in the baseline model, incentive conditions (4) and (11) apply as well as the participation constraint (5). Passive investors choose the contract (C, R) to maximize the stock price, in that

$$P = \max_{C,R} \left\{ \big(1 - (a + i)\big)\big(X_B - C - T\big) + (a + i)\big(X_G - C - R\big) \right\}.$$

The activist enters if and only if (9) is satisfied. Proposition 12 in the Appendix characterizes effort levels and the entry condition when passive investors set the contracts of insiders. Corollary 4 then shows that when the contracts of insiders are set by passive investors rather than activists: (i) the activist effort a is higher and the insiders effort m is lower than in the baseline, (ii) impact activism is negatively (positively) affected on the extensive margin when $\xi > 1$ ($\xi \leq 1$), and (iii) impact activism is negatively affected on the intensive margin.

To understand these results, recall that due to the internal free-rider problem, the efforts of the activist and the insiders function as substitutes. Because passive investors' payoff (the firm's stock price) does not directly reflect the activist's private cost of effort, it is cheap for passive investors to provide incentives to the activist. This effect results in lower incentives provided to insiders, when compared to the activist setting contracts.

Corollary 4 demonstrates that the impact of passive investors' control over the contracts of insiders on the transition rate $\lambda = a + i$ is influenced by the relative skills of insiders. When $\xi > 1$ and the relative skills of insiders are high, higher a and lower i result in a lower transition rate, relative to the baseline. This is because the contract designed by passive investors prioritizes the less efficient activist over insiders. Conversely, when $\xi \leq 1$, the activist is more efficient than insiders. The contract set by passive investors puts more weight on the more efficient party, thereby achieving a higher transition rate.

Crucially, the effect of passive investor control over insiders contracts on the extensive margin is unambiguously negative. As in the baseline model, the extensive margin interacts with the intensive margin: when the activist can effectively foster the transition, the activist does not enter. Thus, our findings suggest that for activism to effectively promote the green transition, it is beneficial for activists to have the authority to influence the compensation of insiders, especially by integrating sustainability objectives into it.[15]

6.5.3 What If Activists Do Not Incentivize Insiders?

We now consider the scenario in which the activist abstains from offering a contract to insiders, implying that $C = R = 0$. We refer to this setting as the no-contracting benchmark and compare its outcomes to those under passive ownership and our baseline. Under no-contracting, insiders exert no effort ($i = i^N = 0$), while the activist chooses effort $a = a^N$ to satisfy

$$a^N = \arg\max_{a \geq 0} \left\{ \theta(\pi + \Delta) - \frac{\phi_a a^2}{2} \right\} = \frac{\Delta}{\phi_a} \frac{1}{\xi} \left(1 + \frac{\pi}{\Delta}\right) = a^{FB}.$$

The following proposition summarizes the outcomes under this benchmark.

Proposition 11 (No Contracting)**.** *Suppose that $C = R = 0$, i.e., $i = 0$. Then, the activist's effort and the transition rate equal $\lambda^N(\theta) = a^{FB}$, with*

$$\frac{\lambda^N(\theta)}{\lambda(0)} = \frac{1}{\xi}\left(1 + \frac{\pi}{\Delta}\right) \quad \text{and} \quad \frac{\lambda^N(\theta)}{\lambda(\theta)} = \frac{1+\xi}{1+\xi^2}.$$

The activist enters if and only if $\frac{\Delta}{\pi} \leq 1$.

When the activist does not incentivize insiders, the internal free-rider problem is removed, and activist effort is at the first-best level a^{FB}. The transition rate can either increase or decrease compared to the baseline and passive ownership. Specifically, when insider skill is low ($\xi < 1$), the transition rate is higher. Conversely, when insider skill is high ($\xi \geq 1$), the transition rate is always higher under the baseline and is also higher under passive ownership when $\frac{\pi}{\Delta}$ is low. Intuitively, not contracting with insiders can lead to a higher transition rate by eliminating the internal free-rider problem. This is the case when insiders' skills are low.

[15] Appendix A.19.1 shows that introducing an incentive contract between the activist and passive investors mitigates the internal free-rider problem, but exacerbates the external free-rider problem.

However, not incentivizing insiders worsens the external free-rider problem, as activists must exert greater effort, making entry harder. When the activist does not incentivize insiders, it enters only if the non-pecuniary benefits of transitioning exceed the monetary incentives. Thus, avoiding insider incentives fails to enhance the overall impact of activism.

6.6 Dynamic Model with Trading

Appendix B presents a dynamic variant of the model, in which the activist can adjust its stake over time. The model is set in continuous time with an infinite horizon and a stochastic end time and nests the baseline static model. This is possible because, under universal risk neutrality, our static framework with a deterministic end time can be readily mapped into the dynamic setting. In this dynamic variant, we allow the activist to trade dynamically after entry, but introduce an exogenous trading friction: the activist cannot trade immediately after entry and must wait for a period of stochastic length. This modeling choice allows us to capture the role of trading frictions, characterized by a single parameter, thereby encompassing the baseline case and contrasting public markets (with frequent trading opportunities) and private markets (with less frequent trading opportunities).

We show that when given the opportunity to trade, the activist never sells its shares but instead buys additional shares over time, increasing its ownership stake after entry. Intuitively, the activist recognizes that a larger stake enhances both incentives and control, thereby mitigating the internal free-rider problem. As a result, the stock price rises over time as the activist acquires a larger stake in the firm. However, this very feature—that the activist increases its stake post-entry—raises the firm's expected future value, thereby boosting the stock price at entry. This makes it more costly for the activist to enter in the first place, exacerbating the external free-rider problem. In sum, the ability to trade after entry weakens the internal free-rider problem and strengthens activist engagement over time, but intensifies the external free-rider problem. The overall effect of trading opportunities is therefore ambiguous and may either enhance or hinder the effectiveness of activism.

Finally, the dynamic model yields rich and realistic trading patterns. In equilibrium, the activist trades both smoothly and lumpily over time. Specifically, following entry, the activist initially increases its stake gradually. At a critical point, the activist randomizes between making no further trades and acquiring the entire firm in a single transaction—effectively launching a takeover bid to take the firm private. In this way, the model endogenously generates public-to-private transactions. The model thus illustrates that, to maximize impact, an activist may ultimately take the firm private—but does so gradually, rather than through an immediate full acquisition.

7 Sustainable Finance: Public versus Private Markets

We have presented a general framework for studying the green transition, highlighting three key channels: (1) environmental regulation, (2) passive sustainable finance, and (3) active sustainable finance, namely, impact activism. Our baseline model and its extensions allow us to assess how capital market characteristics shape the green transition, specifically, the effectiveness of different channels in public versus private capital markets. A striking implication of our analysis is that impact activism and active sustainable finance are more likely to emerge and promote the green transition in private capital markets.

First, the external free-rider problem is likely mitigated in private markets, as activists (e.g., private equity sponsors) can bargain over the acquisition price, and ownership is less dispersed, facilitating activist entry (Section 6.3). Second, passive sustainable finance tends to crowd out activism (Sections 3 and 4). Since passive sustainable finance is predominantly concentrated in public markets, this mechanism gives private markets a comparative advantage. Third, contractual arrangements in private capital markets are typically more complex and flexible, which may help mitigate, though not eliminate, the internal free-rider problem (Section 6.5). Fourth, private firms are generally smaller, implying fewer insiders contribute to firm outcomes, thereby weakening the internal free-rider problem (Section 6.4). Fifth, the option to trade in public markets exacerbates the external free-rider problem (Section 6.6). In addition, smaller and private firms may face less stringent environmental regulation (e.g., exemptions for small firms), reducing the extent to which regulation (e.g., carbon taxation) crowds out activist engagement. This is not to suggest that public markets cannot facilitate the green transition; rather, the scope for impact activism is more limited.

8 Conclusion

This paper develops a model of investor activism with endogenous entry and engagement, in which activists contribute to a firm's green transition by exerting effort and contracting with insiders. We use this framework to analyze how investor activism shapes the pace of the green transition and how environmental policies influence shareholder engagement. Under the first best, activism accelerates the transition. However, two frictions can limit its effectiveness. First, the transition depends on costly and unobservable efforts by both activists and insiders, giving rise to an internal free-rider problem. Second, activists cannot fully appropriate the value they create, generating an external free-rider problem at entry.

Our results show that when firms cannot transition without activist intervention, activism reliably facilitates their green transition. By contrast, when firms can transition on their own, the internal and external free-rider problems jointly undermine activist engagement and impact. These frictions lead to a "passive" equilibrium in which activists avoid precisely the firms that stand to benefit most from their involvement. For such firms, the external free-rider problem either deters activist entry entirely or directs activists toward firms that can transition cheaply. Yet in these easy-to-transition firms, the internal free-rider problem induces activists to exert only limited effort, making them behave much like passive investors.

Although activism can meaningfully improve outcomes when only one of the free-rider problems is present, their combination results in activists having little—or even negative—impact on the green transition in equilibrium. Environmental policies such as carbon taxes and the sustainability preferences of passive investors can further aggravate these frictions. Taken together, our model predicts a weak and ambiguous empirical relationship between activist ownership and firms' progress toward greener technologies and practices.

Our analysis suggests that private capital markets are better suited to green activism. This is due to reduced external and internal free-rider problems arising from more concentrated ownership, a smaller number of insiders, and more flexible contractual arrangements. In contrast, public markets face greater obstacles to activism, mainly due to dispersed ownership and the presence of passive investing, which tends to crowd out activism.

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Appendix

A Proofs

A.1 Proof of Proposition 1

To solve for (a^*, i^*), take the first order conditions with respect to a and i in (10), that is $\theta(\Delta+\pi)-\phi_a a=0$ and $\theta(\Delta+\pi)-\theta\phi_i i=0$. When $\Delta+\pi\geq 0$, we can solve these for $a=a^*$ and $i=i^*$. Clearly, the second-order condition is satisfied. Otherwise, for $\Delta+\pi<0$, we have $a^*=i^*=0$, yielding the desired expression.

To solve for i^P and the optimization problem in (8), insert (5) into (8) to obtain (for $\hat{a}=0$):

$$
\begin{aligned}
P_0 &= \max_{(C,R)} \left\{ \big(1-i\big)(X_B-C-T)+i(X_G+\pi^P-C-R) \right\} \\
&= \max_R \left\{ X_B-T-W+iR-\frac{\phi_i i^2}{2}+i(\Delta-R) \right\} \\
&= \max_i \left\{ X_B-T-W-\frac{\phi_i i^2}{2}+i\Delta \right\},
\end{aligned}
$$

where we used $\Delta=X_G-X_B+\pi^P+T$. Due to incentive constraint (4), used in the last line, we can optimize with respect to i., The first-order condition with respect to i becomes $\Delta-\phi_i i=0$. When $\Delta\leq 0$, then $i^P=0$. When $\Delta>0$, we solve the first-order condition. Overall, we can solve for $i^P=\frac{\Delta^+}{\phi_i}$; here, $\Delta^+=\max\{\Delta,0\}$.

Suppose $i^P>0$. Then, under optimal effort $i=i^P$, the stock price under passive ownership becomes

$$
P_0=X_B-T-W+\frac{\Delta^2}{2\phi_i}. \tag{A.1}
$$

A.2 Proof of Proposition 2

To prove Proposition 2, we solve the optimization problem in (6) subject to (4), (5), and (11). For this sake, we insert (5) into (6) to rewrite the activist's optimization as

$$
\begin{aligned}
V &= \max_R \left\{ \theta\big[X_B-T-W+(a+i)R-\frac{\phi_i i^2}{2}+(a+i)(\Delta+\pi-R)\big]-\frac{\phi_a a^2}{2} \right\} \\
&= \max_R \left\{ \theta\big[X_B-T-W-\frac{\phi_i i^2}{2}+(a+i)(\Delta+\pi)\big]-\frac{\phi_a a^2}{2} \right\},
\end{aligned}
$$

subject to (4) and (11).

Case: $\pi+\Delta\leq 0$. We note that when $\Delta+\pi\leq 0$, it is optimal to set $a=i=0$. Next, we consider the case that $\Delta+\pi>0$.

Case: $\pi+\Delta>0$. Next, we use (4), i.e., $R=\phi_i i$, to rewrite (11) as $a=\frac{\theta(\Delta+\pi-\phi_i i)}{\phi_a}$. We insert this expression for a into the activist's optimization above to obtain:

$$V = \max_i \left\{ \theta \left[X_B - T - W - \frac{\phi_i i^2}{2} + \left(\frac{\theta(\Delta + \pi - \phi_i i)}{\phi_a} + i \right) (\Delta + \pi) \right] - \frac{\theta^2 (\Delta + \pi - \phi_i i)^2}{2\phi_a} \right\}.$$

The first-order condition with respect to i becomes

$$\frac{\partial V}{\partial i} = 0 \quad \Longleftrightarrow \quad -\phi_i i + (\Delta + \pi) \left[1 - \frac{\theta \phi_i}{\phi_a} \right] + \frac{\phi_i \theta (\Delta + \pi - \phi_i i)}{\phi_a} = 0.$$

Thus,

$$\frac{\Delta + \pi}{\phi_i} \left(1 - \frac{\theta \phi_i}{\phi_a} + \frac{\theta \phi_i}{\phi_a} \right) = i \left[1 + \frac{\theta \phi_i}{\phi_a} \right].$$

Using $\xi = \frac{\phi_a}{\theta \phi_i}$, we therefore obtain

$$i = \frac{\Delta + \pi}{\phi_i} \left(\frac{1}{1 + 1/\xi} \right) = \frac{\Delta + \pi}{\phi_i} \left(\frac{\xi}{1 + \xi} \right).$$

Inserting this expression for a into (11), we obtain

$$a = \frac{\theta(\Delta + \pi - \phi_i i)}{\phi_a} = \frac{\theta(\Delta + \pi)(1 - \frac{\xi}{1+\xi})}{\phi_a} = \frac{\Delta + \pi}{\phi_i} \left(\frac{1}{\xi(1 + \xi)} \right).$$

Efforts (a, i) lie below their levels without moral hazard from Proposition 1. As $\frac{\xi}{1+\xi} < 1$ for $\xi > 0$, we have $i < i^*$. Next, rewrite $a^* = \frac{\Delta + \pi}{\phi_i \xi}$, implying $a < a^*$ for $\xi > 0$.

Finally, we can solve for the activist's value function and the firm's stock price in closed form (under optimal efforts) as follows:

$$V = \frac{\theta \left(1 + \xi + \xi^2\right) (\Delta + \pi)^2}{2\xi(\xi + 1)\phi_i} + \theta(X_B - T - W) \tag{A.2}$$

$$P = \frac{(\Delta + \pi) \big[(2 + 2\xi + 2\xi^2 + \xi^3)\Delta - \xi^3 \pi \big]}{2\xi(\xi + 1)^2 \phi_i} + X_B - T - W. \tag{A.3}$$

A.3 Proof of Proposition 3

We first note that the activist only enters when the sustainability premium π is strictly positive. Suppose $\pi = 0$. If $\Delta > 0$, the entry objective derived below reduces to a strictly negative expression (since it is proportional to $-(\Delta)^2$), hence there is no entry. If $\Delta \leq 0$, then transition is weakly value-reducing for all shareholders and the activist has no additional private benefit from transition (since $\pi = 0$). Therefore, conditional on entering, the activist's optimal choice is to set transition efforts to zero, i.e., $a = i = 0$, and replicate passive ownership, which yields $V = \theta P_0$ and $P = P_0$, so $V - \theta P = 0$. Thus, entry is never strictly profitable. In case of $a = i = 0$, we adopt the tie-breaking convention of no entry when indifferent.[16] Therefore, entry requires $\pi > 0$.

[16] Recall that when indifferent but $a > 0$, we assume the activist enters.

We now assume $\pi > 0$ and derive the entry conditions.

Case $\frac{\Delta}{\pi} > 0$. Under optimal efforts, one can express the activist's value function as (A.2) and the stock price as in (A.3). Accordingly, the entry objective can be written as

$$V - \theta P = \frac{\theta(\Delta + \pi)\left((2\xi^3 + 2\xi^2 + 2\xi + 1)\,\pi - \Delta\right)}{2\xi(\xi + 1)^2\phi_i}. \tag{A.4}$$

Since $\theta > 0$, $\phi_i > 0$, $\xi > 0$, and $\Delta > 0$, the sign of $V - \theta P$ equals the sign of $\big(2\xi^3 + 2\xi^2 + 2\xi + 1\big)\pi - \Delta$. Thus, the entry condition becomes

$$\frac{\Delta}{\pi} \leq 1 + 2\xi(1 + \xi + \xi^2),$$

which is (13). If the inequality holds strictly, then $V - \theta P > 0$ and the activist enters. If it holds with equality, then $V - \theta P = 0$; since $\Delta > 0$ and $\pi > 0$ imply positive transition effort under the optimal contract (in particular $a > 0$), our tie-breaking rule selects entry.

Inserting the no-moral-hazard effort levels (as stated in Proposition 1) into the entry condition (9) yields that the activist enters if and only if

$$\frac{\Delta}{\pi} \leq 1 + 2\xi,$$

which is (14).

Case $\frac{\Delta}{\pi} \in (-1, 0]$. When $\Delta \leq 0$, passive investors exert no transition effort, so $i^P = 0$ and $P_0 = X_B - T - W$.

For any feasible (a, i) under activist ownership, we have:

$$P = X_B - T - W - \frac{\phi_i i^2}{2} + (a + i)\Delta \leq X_B - T - W = P_0,$$

because $\Delta \leq 0$ and $a, i \geq 0$. Hence $\theta P \leq \theta P_0$ and therefore

$$V - \theta P \geq V - \theta P_0. \tag{A.5}$$

To show that entry is strictly profitable, it suffices to show $V - \theta P_0 > 0$. Using the closed form (A.2),

$$V - \theta P_0 = \frac{\theta(1 + \xi + \xi^2)(\Delta + \pi)^2}{2\xi(\xi + 1)\phi_i}.$$

On $\Delta \in (-\pi, 0]$ we have $\Delta + \pi > 0$, so the right-hand side is strictly positive. Thus $V - \theta P_0 > 0$, and by (A.5) we conclude $V - \theta P > 0$. Hence, the activist strictly prefers to enter in this region.

Case $\frac{\Delta}{\pi} \leq -1$. If $\Delta \leq -\pi$, then $\Delta + \pi \leq 0$ and transition efforts are zero under any ownership structure. Hence, the probability of transitioning without the activist is zero, and the activist cannot increase it. The entry objective is therefore zero, so the activist is indifferent between entering and not. If $\Delta \leq -\pi$, then $\Delta + \pi \leq 0$, so the optimal transition efforts are $a = i = 0$ under any ownership structure. With the tie-breaking convention of no entry when indifferent and $a = i = 0$, the activist does not enter.

A.4 Proof of Corollary 1

We first characterize when activism (if it occurs) strictly reduces the stock price relative to passive ownership, i.e. $P < P_0$, and then show that in this region the activist enters.

When $\Delta \le 0$, passive investors exert no transition effort, so $i^P = 0$ and $P_0 = X_B - T - W$. If $\Delta \le -\pi$ (i.e., $\Delta + \pi \le 0$), then optimal transition efforts are zero under any ownership structure, so $P = P_0$. If instead $\Delta \in (-\pi, 0]$, then $\Delta + \pi > 0$ and under activism the optimal transition effort satisfies $a + i > 0$. Using

$$P = X_B - T - W - \frac{\phi_i i^2}{2} + (a+i)\Delta,$$

we obtain $P < P_0$ because $\Delta \le 0$ and $i > 0$.

Next, consider $\Delta > 0$. Using the closed-form expressions for P (see (A.3)) and P_0 (see (A.1)), it one can show that $P \le P_0$ is equivalent to

$$\frac{\Delta}{\pi} \le \frac{\xi^3}{\xi^2 + \xi + 1 + \sqrt{(\xi+1)^2(2\xi^2+1)}}.$$

Moreover, the inequality is strict (i.e. $P < P_0$) if and only if the above holds strictly. Combining the two cases gives the region for $\frac{\Delta}{\pi}$ on which $P < P_0$ as stated in Corollary 1.

Suppose that the activist must acquire its stake at price $\max\{P, P_0\}$, i.e., the larger of the stock price under passive ownership P_0 and the stock price under active ownership P. Using the expressions for V (see (A.2)) and P_0 (see (A.1)), one can show that we always have $V - \theta P_0 \ge 0$ under our assumptions, so that the activist always enters when $P \le P_0$. It follows that the activist would also always enter if we assumed that the acquisition price was P rather than $\max\{P, P_0\}$.

A.5 Proof of Proposition 4

Recall that the green transition rate is $\lambda(\theta_0) = a + i$, where $\theta_0 \in \{0, \theta\}$ denotes whether the activist enters. We proceed by cases in the sustainability benefit ratio Δ/π (assuming $\pi > 0$).

Case 0 (No transition): $\frac{\Delta}{\pi} \le -1$. This condition is equivalent to $\Delta + \pi \le 0$. Then transition efforts are zero under any ownership structure, so the transition rate is zero. Moreover, by Proposition 3.3 the activist does not enter.

Case 1 (Good activism): $\frac{\Delta}{\pi} \in (-1, 0]$. This condition is equivalent to $\Delta \in (-\pi, 0]$, so $\Delta \le 0$ and $\Delta + \pi > 0$. First, by Proposition 3.2, the activist always enters, i.e., $\theta_0 = \theta$. Second, when $\Delta \le 0$, passive shareholders exert no transition effort, so the probability of transitioning without the activist is zero and hence $\lambda(0) = 0$. Finally, since $\Delta + \pi > 0$, impact activism yields strictly positive transition effort and thus $\lambda(\theta_0) = \lambda(\theta) > 0$. Finally, since $\Delta + \pi > 0$ on $\Delta \in (-\pi, 0]$, the optimal effort expressions imply $a + i > 0$, hence $\lambda(\theta_0) = a + i > 0$. Therefore $\lambda(\theta_0) > \lambda(0) = 0$.

Case 2 (Ambiguous activism): $\frac{\Delta}{\pi} \in (0, \Gamma^*]$, where $\Gamma^* = 1 + 2\xi(1 + \xi + \xi^2)$. Here $\Delta > 0$. By Proposition 3.1, the activist enters if and only if

$$\frac{\Delta}{\pi} \leq 1 + 2\xi(1 + \xi + \xi^2) =: \Gamma^*.$$

Hence, for $\frac{\Delta}{\pi} \in (0, \Gamma^*]$ we have entry and therefore $\theta_0 = \theta$.

Since $\Delta > 0$, the transition rate without activism is positive, $\lambda(0) = i^P > 0$, and the ratio $\frac{\lambda(\theta)}{\lambda(0)}$ is well-defined. Using (15), we have

$$\frac{\lambda(\theta)}{\lambda(0)} = \frac{1 + \xi^2}{\xi + \xi^2}\left(1 + \frac{\pi}{\Delta}\right).$$

By Proposition 5, activism reduces the transition rate if and only if $\xi \in (\xi_-, \xi_+)$, where $\xi_\pm$ are given by (16), and increases the transition rate otherwise. Equivalently, expressing the condition in terms of $\frac{\Delta}{\pi}$ yields the threshold

$$\Gamma^{**} = +\infty \quad \text{for} \quad \xi \leq 1, \qquad \Gamma^{**} = \frac{1 + \xi^2}{\xi - 1} \quad \text{for} \quad \xi > 1,$$

so that $\lambda(\theta_0) > \lambda(0)$ when $\frac{\Delta}{\pi} < \Gamma^{**}$ and $\lambda(\theta_0) < \lambda(0)$ when $\frac{\Delta}{\pi} > \Gamma^{**}$. This proves parts 2A and 2B.

Case 3 (No activism): $\frac{\Delta}{\pi} > \Gamma^*$. If $\frac{\Delta}{\pi} > \Gamma^*$, then by Proposition 3.1 the activist does not enter, i.e., $\theta_0 = 0$. Hence $\lambda(\theta_0) = \lambda(0)$.

A.6 Proof of Proposition 5

Under Assumptions 1 and 2, throughout this proof we consider $\Delta > 0$ (and $\pi > 0$), so that $\lambda(0) = i^P > 0$ and the ratio $\frac{\lambda(\theta)}{\lambda(0)}$ is well-defined. Using (15), we have

$$\frac{\lambda(\theta)}{\lambda(0)} = \frac{1 + \xi^2}{\xi + \xi^2}\left(1 + \frac{\pi}{\Delta}\right). \tag{A.6}$$

Rewrite (A.6) as

$$\frac{\lambda(\theta)}{\lambda(0)} - 1 = \frac{(1 + \xi^2)(\Delta + \pi) - (\xi + \xi^2)\Delta}{(\xi + \xi^2)\Delta}.$$

For $\Delta > 0$ and $\xi > 0$, the denominator is strictly positive, so the sign is determined by the numerator

$$(1 + \xi^2)(\Delta + \pi) - (\xi + \xi^2)\Delta = \xi^2\pi - \xi\Delta + \Delta + \pi.$$

This is a strictly convex quadratic in ξ (since $\pi > 0$), which has real roots if and only if its discriminant is nonnegative:

$$\Delta^2 - 4\pi(\Delta + \pi) \geq 0 \quad \iff \quad \frac{1}{4} - \frac{\pi}{\Delta}\left(1 + \frac{\pi}{\Delta}\right) \geq 0.$$

Provided this condition holds, the two roots are

$$\xi_{\pm} = \frac{\Delta \pm \sqrt{\Delta^2 - 4(\Delta+\pi)\pi}}{2\pi} = \left(\frac{1}{2} \pm \sqrt{\frac{1}{4} - \frac{\pi}{\Delta}\left(1+\frac{\pi}{\Delta}\right)}\right)\frac{\Delta}{\pi},$$

which is (16). Clearly, $\xi_+ \geq \xi_-$ (with the inequality being strict if the term under the square root is strictly positive). We verify $\xi_- > 1$. The discriminant condition from above requires $\Delta^2 \geq 4\pi(\Delta+\pi)$, i.e., $\Delta^2 \geq 4\pi\Delta + (2\pi)^2$. Thus, when the discriminant condition holds (term under square root is non-negative), we have $\Delta > 2\pi$. We have $\xi_- > 1$ if and only if

$$\Delta - \sqrt{\Delta^2 - 4(\Delta+\pi)\pi} > 2\pi \quad \Longleftrightarrow \quad \Delta^2 + 4\pi^2 - 4\pi\Delta > \Delta^2 - 4\pi(\Delta+\pi).$$

This inequality simplifies to, $8\pi^2 > 0$, which holds for $\pi > 0$. Thus, $\xi_- > 1$.

The quadratic is negative if and only if $\xi \in (\xi_-, \xi_+)$. Therefore,

$$\frac{\lambda(\theta)}{\lambda(0)} < 1 \iff \xi \in (\xi_-, \xi_+), \qquad \frac{\lambda(\theta)}{\lambda(0)} > 1 \iff \xi \notin [\xi_-, \xi_+].$$

If the discriminant is negative, then the quadratic is strictly positive for all $\xi > 0$, and thus $\frac{\lambda(\theta)}{\lambda(0)} > 1$ for all ξ.

From (A.6), define $g(\xi) := \frac{1+\xi^2}{\xi(1+\xi)}$. Then $\frac{\lambda(\theta)}{\lambda(0)} = \left(1+\frac{\pi}{\Delta}\right)g(\xi)$. We have $\lim_{\xi\to 0} g(\xi) = +\infty$, so $\lim_{\xi\to 0}\frac{\lambda(\theta)}{\lambda(0)} = +\infty$. Also $\lim_{\xi\to\infty} g(\xi) = 1$, so $\lim_{\xi\to\infty}\frac{\lambda(\theta)}{\lambda(0)} = 1+\frac{\pi}{\Delta}$. Moreover,

$$g'(\xi) = \frac{\xi^2 - 2\xi - 1}{\xi^2(1+\xi)^2},$$

so g is decreasing on $(0, 1+\sqrt{2})$ and increasing on $(1+\sqrt{2}, \infty)$, hence the ratio is U-shaped in ξ. Finally, for any $\xi > 1$ we have $g(\xi) < 1$, implying that for $\xi \geq \xi_+ > 1$,

$$\frac{\lambda(\theta)}{\lambda(0)} \in \left(1,\, 1+\frac{\pi}{\Delta}\right),$$

as claimed.

In the limit $\frac{\pi}{\Delta} \to 0$, using (16), we get

$$\lim_{\frac{\pi}{\Delta}\to 0}\xi_+ = \lim_{\frac{\pi}{\Delta}\to 0}\frac{1+\sqrt{1-4\frac{\pi}{\Delta}\left(1+\frac{\pi}{\Delta}\right)}}{2\frac{\pi}{\Delta}} = +\infty.$$

In addition, by l'Hôpital's rule:

$$\lim_{\frac{\pi}{\Delta}\to 0}\xi_- = \lim_{\frac{\pi}{\Delta}\to 0}\frac{1-\sqrt{1-4\frac{\pi}{\Delta}\left(1+\frac{\pi}{\Delta}\right)}}{2\frac{\pi}{\Delta}} = \lim_{\frac{\pi}{\Delta}\to 0}\frac{4(1+2\frac{\pi}{\Delta})}{4\sqrt{1-4\frac{\pi}{\Delta}\left(1+\frac{\pi}{\Delta}\right)}} = 1.$$

When $\frac{\pi}{\Delta}$ is sufficiently large, the discriminant is negative, so there are no real roots and thus

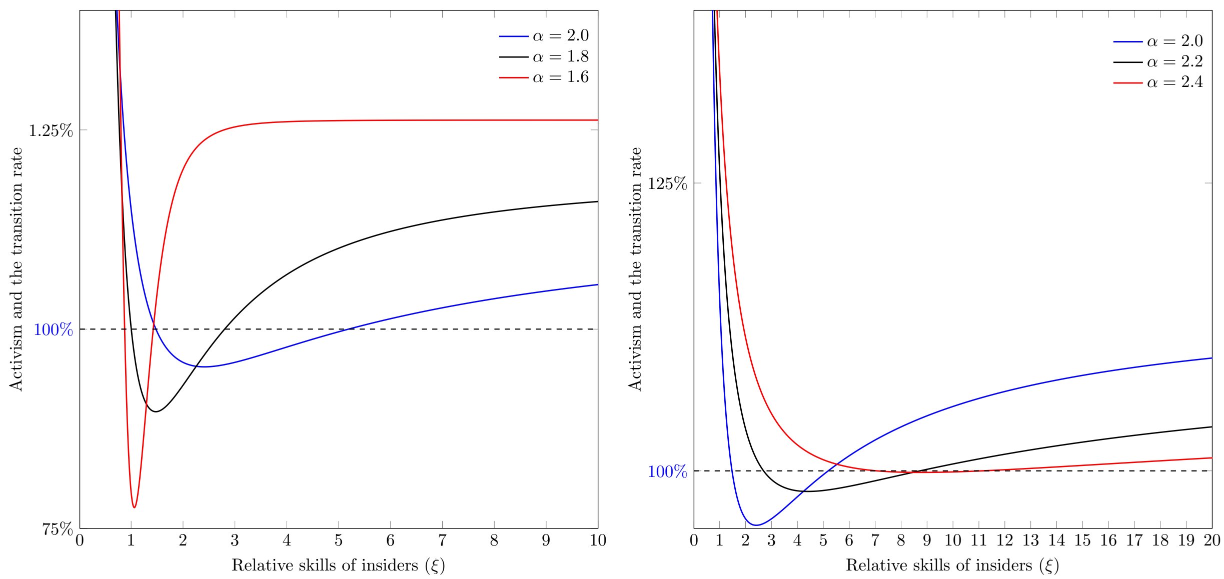

Figure A.1: **The ratio of transition rates under different cost specifications**: The figure plots the ratio of transition rates with and without activism, $\frac{\lambda(\theta)}{\lambda(0)}$, for different power cost functions of the form $\frac{1}{\alpha}\phi_i i^\alpha$ and $\frac{1}{\alpha}\phi_a a^\alpha$. The constant parameters are $\frac{\pi}{\Delta} = 0.15$, $\phi_i = 4$, and $\theta = 0.25$. The x-axis represents changes in ϕ_a while keeping ϕ_i and θ fixed.

$\frac{\lambda(\theta)}{\lambda(0)} > 1$ for any ξ.

A.7 Robustness to Generalized Convex Cost Functions

To assess the robustness of our results to the functional form of effort costs, we consider a generalized specification in which both insiders and activists face power cost functions of the form $\frac{1}{\alpha}\phi_i i^\alpha$ and $\frac{1}{\alpha}\phi_a a^\alpha$, respectively, with α specifying the degree of convexity. When $\alpha = 2$, this specification coincides with the quadratic benchmark analyzed in the main text.

The rest of the model setup and equilibrium characterization follow the same steps as in Sections 1 and 2. While closed-form solutions are no longer available, we solve the model numerically for different values of α to examine how the degree of convexity affects the key mechanism of the internal free-rider problem.

Figure A.1 presents the ratio of the transition rates with and without activism (equivalent to equation (15) in the baseline model) for a range of ξ and several values of α. Note that ξ is not generally a sufficient statistic for ϕ_a, ϕ_i, and θ when $\alpha \neq 2$. In our analysis, we vary ϕ_a while keeping ϕ_i and θ fixed, so changes in ξ reflect changes in activist effort cost. The results are consistent with the analytical results of Proposition 5 for the quadratic case. We find that the U-shaped relationship between ξ and activist impact persists across all specifications, and the potential for reduced transition continues to arise. Moreover, the curvature of this U shape depends systematically on α: for lower values of α (i.e., less convex cost functions), the U shape becomes deeper but narrower, while for higher α, it becomes broader but shallower.

A.8 Proof of Proposition 6

Under Assumptions 1 and 2, we assume that $\pi > 0$ and $\Delta > 0$. Using the closed-form expressions (A.2)-(A.3), the entry objective can be written as

$$V - \theta P = \frac{\theta(\Delta + \pi)\left((2\xi^3 + 2\xi^2 + 2\xi + 1)\,\pi - \Delta\right)}{2\xi(\xi+1)^2\phi_i}.$$

A direct calculation yields

$$\frac{\partial(V - \theta P)}{\partial \xi} = \frac{\theta(\Delta + \pi)}{2\phi_i} \cdot \frac{\Delta + (\xi^2 + 2\xi + 2)\pi}{\xi^2(\xi+1)^3} > 0$$

or all $\xi > 0$, since $\Delta > 0$ and $\pi > 0$. Therefore, an activist's incentive to enter increases with the relative effectiveness ξ of insiders.

Next, we show the existence and uniqueness of an entry threshold ξ_E. Recall that the activist enters if and only if

$$\frac{\Delta}{\pi} \leq 1 + 2\xi(1 + \xi + \xi^2).$$

The right-hand-side increases in ξ, and equals one for $\xi = 0$. Define

$$\xi_E := \inf\left\{\xi \geq 0 : \frac{\Delta}{\pi} \leq 1 + 2\xi(1 + \xi + \xi^2)\right\}.$$

When $\frac{\Delta}{\pi} \leq 1$ (equivalently $\pi \geq \Delta$), then $\xi_E = 0$. Otherwise, ξ_E is the unique solution on $(0, \infty)$ to

$$\frac{\Delta}{\pi} = 1 + 2\xi_E(1 + \xi_E + \xi_E^2), \tag{A.7}$$

where ξ_E clearly increases in Δ and decreases in π.

A.9 Proof of Corollary 2

Using the closed-form expressions (A.2)-(A.3), the entry objective can be written as

$$V - \theta P = \frac{\theta(\Delta + \pi)\left((2\xi^3 + 2\xi^2 + 2\xi + 1)\,\pi - \Delta\right)}{2\xi(\xi+1)^2\phi_i},$$

where $\xi = \frac{\phi_a}{\theta\phi_i}$. Thus $V - \theta P$ depends on ϕ_i directly through $1/\phi_i$ and indirectly through ξ. One can directly calculate that

$$\frac{\partial(V - \theta P)}{\partial \phi_i} = -\frac{\theta(\Delta + \pi)(\xi(\xi(\xi+3)+1)\pi + \Delta)}{(\xi+1)^3\phi_i^2} < 0.$$

Thus, the activist's ex-ante payoff $V - \theta P$ decreases in ϕ_i and, in particular, is maximized on $[\underline{\phi}_i, \overline{\phi}_i]$ for $\phi_i = \underline{\phi}_i$.

A.10 Proof of Proposition 7

Under Assumptions 1 and 2, we assume that $\pi > 0$ and $\Delta > 0$. Using (A.2)-(A.3), we can rewrite the activist's payoff from entering as

$$V - \theta P = \frac{\theta(\Delta + \pi)\left((2\xi^3 + 2\xi^2 + 2\xi + 1)\pi - \Delta\right)}{2\xi(\xi+1)^2\phi_i},$$

which does not depend on α, i.e., whether preferences are consequentialist or values-aligned, holding the composite π fixed. With consequentialist preferences characterized through the parameter α, the activist obtains payoff $i^P\alpha\theta\pi = \frac{\Delta\pi\alpha\theta}{\phi_i}$ when not entering, where $i^P = \frac{\Delta}{\phi_i}$ is the probability of transition under passive ownership.

We obtain that the activist enters if and only if $V - \theta P \geq \frac{\Delta\pi\alpha\theta}{\phi_i}$, which is equivalent to

$$\left(1 + \frac{\pi}{\Delta}\right)\left((2\xi^3 + 2\xi^2 + 2\xi + 1)\pi - \Delta\right) - 2\alpha\xi(\xi+1)^2\pi \geq 0.$$

The above inequality can be rewritten as

$$\left(1 + \frac{\pi}{\Delta}\right)\left((2\xi^3 + 2\xi^2 + 2\xi + 1)\frac{\pi}{\Delta} - 1\right) - 2\alpha\xi(\xi+1)^2\frac{\pi}{\Delta} \geq 0,$$

which we can simplify further to

$$E^B := \frac{\pi}{\Delta}\left[\frac{\pi}{\Delta}\left(2\xi^3 + 2\xi^2 + 2\xi + 1\right) + 2\xi^3(1-\alpha) + 2\xi^2(1-2\alpha) + 2\xi(1-\alpha)\right] \geq 1$$

Clearly, E^B decreases in α.

The derivative of E^B with respect to ξ reads

$$\frac{\partial E^B}{\partial \xi} = \frac{\pi}{\Delta}\left[\frac{\pi}{\Delta}\left(6\xi^2 + 4\xi + 2\right) + 6\xi^2(1-\alpha) + 4\xi(1-2\alpha) + 2(1-\alpha)\right]$$

which is positive if and only if

$$\frac{\pi}{\Delta} \geq \frac{4\xi(2\alpha - 1) - 6\xi^2(1-\alpha) - 2(1-\alpha)}{6\xi^2 + 4\xi + 2}.$$

A sufficient condition for $\frac{\partial E^B}{\partial \xi} > 0$ is $\alpha \leq \frac{1}{2}$.

Finally, we prove that $\mathbb{I}\{E^B \geq 1\}$ decreases in $\frac{\Delta}{\pi}$, meaning that entry incentives decrease in the sustainability benefit ratio. Note that

$$\mathcal{B} := \left[\frac{\pi}{\Delta}\left(2\xi^3 + 2\xi^2 + 2\xi + 1\right) + 2\xi^3(1-\alpha) + 2\xi^2(1-2\alpha) + 2\xi(1-\alpha)\right]$$

increases in $\frac{\pi}{\Delta}$, while $E^B = \frac{\pi}{\Delta}\mathcal{B}$. When $\mathcal{B} < 0$, then $\mathbb{I}\{E^B \geq 1\} = 0$. Otherwise, if $\mathcal{B} \geq 0$, then $\frac{\partial E^B}{\partial(\pi/\Delta)} \geq 0$ and strictly so, if $\mathcal{B} > 0$. Taken together, this implies $\mathbb{I}\{E^B \geq 1\}$ decreases in $\frac{\Delta}{\pi}$.

A.11 Effort Complementarity

We now assume that the probability of transition is given by

$$\lambda = a + i + \sigma a i,$$

where the parameter $\sigma \gtrless 0$ captures an exogenous complementarity (if $\sigma > 0$) or substitutability (if $\sigma < 0$) of efforts in the transition process. As we will see, the double-moral hazard problem, arising from the unobservability of efforts, will introduce an additional, endogenous substitutability of efforts. All other elements remain as in the baseline. Further, note that under passive ownership, i.e., $\theta_0 = 0$, the model solution coincides with that of the baseline, since $a = 0$ in this case. Assume, for simplicity, $\Delta, \pi > 0$.

We start by analyzing the manager's choice of effort who faces a contract (C, R) stipulating a base payment of C and a reward upon successful transition. Anticipating activist effort $\hat{a}$, the manager solves

$$\max_{i \in [0, \bar{i}]} \left(C + (\hat{a} + i + \sigma \hat{a} i) R - \frac{\phi_i i^2}{2} \right),$$

leading to the incentive constraint (under optimal interior effort)

$$i = \frac{R(1 + \sigma \hat{a})}{\phi_i},$$

which is (22) We denote by $W \geq 0$ the manager's outside option. Under the optimal contract that maximizes the controlling shareholders' value, the manager breaks even so that its participation constraint binds and

$$W = C + (\hat{a} + i + \sigma \hat{a} i) R - \frac{\phi_i i^2}{2}, \tag{A.8}$$

which we can solve for C.

The activist chooses (C, R) and to maximize

$$V = \max_{a \geq 0, (C,R)} \Bigg\{ \big(1 - (a + i + \sigma a i)\big) \theta (X_B - C - T) + (a + i + \sigma a i) \theta \big(X_G + \pi^A - C - R\big) - \frac{\phi_a a^2}{2} \Bigg\},$$

subject to (22) and (A.8). Recall $\Delta = X_G - X_B + T + \pi^P$. We now take the first-order condition with respect to a, yielding

$$(1 + \sigma i) \theta (\Delta + \pi - R) - \phi_a a = 0$$

which, upon solving for a, yields (23). When taking the first-order condition with respect to a, note that by (A.8) and (22), (C, R) and thus i depend on anticipated activist effort $\hat{a}$ but not on actual activist effort a (which is unobserved and not contractible).

Using (A.8), the activist's value function optimization can then be rewritten as

$$V = \max_R \left\{ \theta\big[X_B - W - T + \lambda R - \frac{\phi_i i^2}{2} + \lambda(\Delta + \pi - R)\big] - \frac{\phi_a a^2}{2} \right\}$$
$$= \max_R \left\{ \theta\big[X_B - W - T - \frac{\phi_i i^2}{2} + (a + i + \sigma a i)(\Delta + \pi)\big] - \frac{\phi_a a^2}{2} \right\},$$

subject to (22) and (23) and $\lambda = a + i + \sigma a i$. Unless $\sigma = 0$, the solution cannot be characterized analytically. We then solve for optimal efforts (a, i) numerically.

Analogously to the baseline, the entry condition then becomes under the optimal efforts (a, i)

$$V - \theta P = (a + i + \sigma a i)\theta\pi - \frac{\phi_a a^2}{2} \geq 0.$$

A.12 Proof of Proposition 8

Under the optimal interior $\theta = \theta^*$, let $\xi^* = \frac{\phi_a}{\phi_i \theta^*}$. When choosing the size of its stake, the objective of the activist is to maximize

$$V - \theta P = \frac{\theta(\Delta + \pi)\left(\left(2\xi^3 + 2\xi^2 + 2\xi + 1\right)\pi - \Delta\right)}{2\xi(\xi + 1)^2 \phi_i}.$$

If $\theta^* \in (0, 1)$, then $\theta = \theta^*$ solves the first-order condition $\frac{\partial(V - \theta P)}{\partial\theta} = 0$, which we can calculate as

$$\pi\big[1 + \xi(1 + \xi)(3 + \xi^2)\big] = \Delta(1 + 2\xi) \iff \frac{\pi}{\Delta} = A(\xi) := \frac{1 + 2\xi}{1 + \xi(1 + \xi)(3 + \xi^2)}, \tag{A.9}$$

with $A'(\xi) < 0$ for $\xi > 0$. Comparing the transition rates as in (15), we have that

$$\lambda(\theta) \gtrless \lambda(0) \iff \frac{\pi}{\Delta} \gtrless B(\xi) := \frac{\xi - 1}{1 + \xi^2}. \tag{A.10}$$

Thus, at $\theta = \theta^*$, $\lambda(\theta^*) > \lambda(0)$ if and only if $\frac{\pi}{\Delta} = A(\xi^*) \geq B(\xi^*)$. Next, define the function

$$F(\xi) := A(\xi) - B(\xi).$$

The function $F(\xi)$ has precisely five (complex or real) roots: $\xi = -1$, $\xi \pm i\sqrt{2}$, and $\xi = \frac{1}{2}(1 \pm \sqrt{5})$. In particular, the only positive, real root is the positive root of $\xi^2 - \xi - 1 = 0$, $\xi^\# = \frac{1}{2}(1 + \sqrt{5})$.

For $\xi = \xi^\#$, we have that $\frac{\Delta}{\pi} = \frac{1}{A(\xi^\#)} = \frac{1}{B(\xi^\#)} = \frac{5+3\sqrt{5}}{2} =: \Gamma^\#$. Since $A'(\xi) < 0$ for $\xi > 0$ and $B'(\xi^\#) > 0$, we have $F'(\xi^\#) = A'(\xi^\#) - B'(\xi^\#) < 0$, so F decreases through $\xi^\#$. With $F(\xi^\#) = 0$ and the uniqueness of the positive root, it follows that $F(\xi) > 0$ for $\xi < \xi^\#$ and $F(\xi) < 0$ for $\xi > \xi^\#$. Equivalently, $\lambda(\theta) > \lambda(0)$ if $\frac{\Delta}{\pi} < \Gamma^\#$ and $\lambda(\theta) < \lambda(0)$ if $\frac{\Delta}{\pi} > \Gamma^\#$.

For the maximal profitable stake $\overline{\theta}$, let $\overline{\xi} = \frac{\phi_a}{\phi_i \overline{\theta}}$. It holds by definition that $\overline{\xi} = \xi_E$. If $\pi \geq \Delta$, then $\overline{\xi} = 0$. Otherwise, as in (A.7), $\overline{\xi} = \xi_E$ is the unique solution to

$$\frac{\pi}{\Delta} = \frac{1}{1 + 2\xi(1 + \xi + \xi^2)} =: H(\xi),$$

with $H'(\xi) < 0$. We define a function that compares $\frac{\pi}{\Delta}$ for $\xi = \overline{\xi}$ and for $\xi = \xi^*$:

$$G(\xi) := H(\xi) - A(\xi) = -\frac{\xi(\xi+1)(3\xi^2+2\xi+1)}{\big(1+2\xi(1+\xi+\xi^2)\big)\big(1+\xi(1+\xi)(3+\xi^2)\big)} < 0$$

for $\xi > 0$. This immediately gives $H(\xi) < A(\xi)$ for all $\xi > 0$. Because $A(\xi)$ and $H(\xi)$ are both continuous and decreasing in ξ, $G(\xi) < 0$ implies that $\overline{\xi} < \xi^*$, hence $\overline{\theta} > \theta^*$.

Note that $\frac{\partial \lambda(\theta)}{\partial \theta} \gtreqless 0$ if and only if $\xi \lesseqgtr 1+\sqrt{2}$. At $\frac{\Delta}{\pi} = \Gamma^{\#}$, we have that $\xi^* = \xi^{\#} = \frac{1}{2}(1+\sqrt{5}) < 1+\sqrt{2}$. By continuity of $\xi^*(\cdot)$ and $\overline{\xi}(\cdot)$, there exists $\varepsilon > 0$ such that for all $\frac{\Delta}{\pi} \in (\Gamma^{\#}, \Gamma^{\#}+\varepsilon)$, we have $\overline{\xi} < \xi^* < 1+\sqrt{2}$, hence $\overline{\theta} > \theta^*$ and $\frac{\partial \lambda(\theta)}{\partial \theta} > 0$ on that range; therefore $\lambda(\overline{\theta}) > \lambda(\theta^*)$ on $(\Gamma^{\#}, \Gamma^{\#}+\varepsilon)$.

Since $B(\xi)$ increases in ξ for all $\xi < 1+\sqrt{2}$ and $\overline{\xi} < \xi^{\#} = \frac{1}{2}(1+\sqrt{5}) < 1+\sqrt{2}$, we have that at $\frac{\Delta}{\pi} = \Gamma^{\#}$ (i.e., at $\xi^* = \xi^{\#}$)

$$B(\overline{\xi}) < B(\xi^{\#}) = B(\xi^*) = \frac{\pi}{\Delta}.$$

Because ξ^* and ξ_E depend continuously on $\frac{\pi}{\Delta}$ (by the FOC and the entry equation) and B is continuous and increasing on $(0, 1+\sqrt{2})$, there exists $\varepsilon > 0$ such that for all $\frac{\Delta}{\pi} \in (\Gamma^{\#}, \Gamma^{\#}+\varepsilon)$:

$$B(\overline{\xi}) < \frac{\pi}{\Delta} < B(\xi^*).$$

The left inequality implies $\lambda(\overline{\theta}) > \lambda(0)$, and the right inequality implies $\lambda(\theta^*) < \lambda(0)$, yielding $\lambda(\theta^*) < \lambda(0) < \lambda(\overline{\theta})$ on $(\Gamma^{\#}, \Gamma^{\#}+\varepsilon)$.

A.13 Proof of Proposition 9

The objective function is

$$V - \theta P = \frac{\theta(\Delta+\pi)\left(\left(2\xi^3+2\xi^2+2\xi+1\right)\pi - \Delta\right)}{2\xi(\xi+1)^2\phi_i}.$$

If $\theta^* \in (0,1)$, then $\theta = \theta^*$ solves the first-order condition $\frac{\partial(V-\theta P)}{\partial \theta} = 0$, which we can calculate as

$$\frac{\pi}{\Delta} = \frac{1+2\xi}{1+\xi(1+\xi)(3+\xi^2)}. \tag{A.11}$$

Calculate

$$\frac{\partial}{\partial \xi}\left(\frac{1+2\xi}{1+\xi(1+\xi)(3+\xi^2)}\right) = -\frac{(1+6\xi+9\xi^2+8\xi^3+6\xi^4)}{(1+3\xi+3\xi^2+\xi^3+\xi^4)^2} < 0.$$

Thus, as $\frac{\pi}{\Delta}$ increases, the right-hand-side of the first-order condition (A.11) must increase, which requires ξ to decrease under the optimal $\theta = \theta^*$. Due to $\xi = \frac{\phi_a}{\phi_i \theta}$, this requires $\theta = \theta^*$ to increase. Consequently, θ^* increases with π but decreases with Δ, i.e., decreases with $\frac{\Delta}{\pi}$

Moreover, a change in ϕ_a or ϕ_i leaves the left-hand side of (A.11) unchanged. Thus, the right-hand side must remain unchanged, too. Due to $\xi = \frac{\phi_a}{\phi_i \theta}$, it therefore must be that $\frac{d}{dx}\left(\frac{\phi_a}{\phi_i \theta}\right) = 0$ under optimal $\theta = \theta^*$. Thus, θ^* increases in ϕ_a but decreases in ϕ_i.

A.14 Proof of Corollary 3

Corollary 2 shows that for any θ, $V-\theta P$ decreases in ϕ_i and, therefore, is maximized on $[\underline{\phi}_i, \overline{\phi}_i]$ for $\phi_i = \underline{\phi}_i$. Thus, $\phi_i = \underline{\phi}_i$ maximizes $V-\theta P$ under the optimal choice of θ, i.e., under $\theta = \theta^*$.

A.15 Proof of Proposition 10

By the proof of Proposition 3, we recall (A.2)-(A.3), that is,

$$V = \frac{\theta\left(1+\xi+\xi^2\right)(\Delta+\pi)^2}{2\xi(\xi+1)\phi_i} + \theta(X_B - T - W)$$
$$P = \frac{(\Delta+\pi)\left[(2+2\xi+2\xi^2+\xi^3)\Delta - \xi^3\pi\right]}{2\xi(\xi+1)^2\phi_i} + X_B - T - W.$$

The stock price under passive ownership becomes (see (A.1)): $P_0 = X_G - \Delta - W + \frac{\Delta^2}{2\phi_i}$. With $\Phi_A = \phi_a/\theta$, the entry condition $V - \theta P_0 - \eta\theta(P - P_0) \geq 0$ becomes

$$(\Delta+\pi)^2\left(\frac{\phi_i\left[\Phi_a(1-\eta)+\phi_i(1-2\,\eta)\right]}{2\,\Phi_a\left(\Phi_a+\phi_i\right)^2}\right) - \frac{\pi^2(1-\eta)}{2\phi_i} + \frac{\pi(\Delta+\pi)\eta(\phi_i-\Phi_a)}{\Phi_a(\Phi_a+\phi_i)} + \frac{\pi\Delta}{\phi_i} \geq 0.$$

Multiply both sides by $2\Phi_a\ (\Phi_a+\phi_i)^2$. Then, divide both sides by ϕ_i^2 and use $\xi = \Phi_a/\phi_i$ to obtain

$$(\Delta+\pi)^2\left[\xi(1-\eta)+1-2\,\eta\right] + 2\pi(\Delta+\pi)\eta(1-\xi^2) + 2\pi\Delta\xi\ (1+\xi)^2 - \pi^2(1-\eta)\xi\ (1+\xi)^2 \geq 0.$$

Collecting terms yields, we can rewrite the above inequality to $E \geq 0$ with

$$E := (\Delta+\pi)^2\left[\xi(1-\eta)+1-2\eta\right] + 2(\Delta+\pi)\pi(1+\xi)\left[\eta+\xi(1-\eta)+\xi^2\right] - \pi^2(1-\eta)\xi(1+\xi)^2.$$

Next, calculate for $1-\eta > 0$:

$$\begin{aligned}
\frac{\partial E}{\partial \xi} &= (\Delta+\pi)^2(1-\eta) + 2(\Delta+\pi)\pi\left[\eta+\xi(1-\eta)+\xi^2\right] \\
&\quad + 2(\Delta+\pi)\pi(1+\xi)\left[1-\eta+2\xi\right] - \pi^2(1-\eta)(1+\xi)^2 - 2\pi^2(1-\eta)\xi(1+\xi) \\
&> 2\pi^2(1+\xi)\left[1-\eta+2\xi\right] - \pi^2(1-\eta)(1+\xi)^2 - 2\pi^2(1-\eta)\xi(1+\xi) \\
&\propto 1 + \frac{4\xi}{1-\eta} - (1+\xi) - 2\xi > \xi \geq 0.
\end{aligned}$$

The sign "$\propto$" means that the third and fourth lines have the same sign, where the fourth line is obtained upon dividing the third line by $\pi^2(1+\xi)(1-\eta) > 0$. Note that when $\Delta > 0$ or $\pi > 0$, $\lim_{\xi\to\infty} E = +\infty$. Thus, there exists unique $\xi_E \geq 0$ such that $E \geq 0$ and the activist enters if and only if $\xi \geq \xi_E$. Furthermore, it follows that

$$2(\Delta+\pi)\pi(1+\xi)\left[\eta+\xi(1-\eta)+\xi^2\right] - \pi^2(1-\eta)\xi(1+\xi)^2 \geq 0,$$

Therefore, a necessary condition for $E < 0$ is that $\xi < \frac{2\eta-1}{1-\eta}$. This implies that $\xi_E \in \left[0, \frac{2\eta-1}{1-\eta}\right]$.

Finally, we calculate

$$\frac{\partial E}{\partial \pi} = 2(\Delta+\pi)\big[\xi(1-\eta)+1-2\eta\big] \\ + (2\Delta+4\pi)(1+\xi)\big[\eta+\xi(1-\eta)+\xi^2\big] - 2\pi(1-\eta)\xi(1+\xi)^2 > 0.$$

Thus, there exists π_E such that the activist enters if and only if $\pi \geq \pi_E$.

A.16 Insiders Contracts Set by Passive Investors

When passive investors determine the manager's contract, the incentive conditions (4) and (11) apply, as well as the participation constraint (5). Assume $\pi, \Delta > 0$. Then, passive investors maximize

$$P = \max_{C,R} \big\{\big(1-(a+i)\big)\big(X_B - C - T\big) + (a+i)\big(X_G + \pi^P - C - R\big)\big\} \\ = \max_i \left\{ X_B - W - T - \frac{\phi_i i^2}{2} + \left(\frac{\theta(\Delta+\pi-\phi_i i)}{\phi_a} + i\right)\Delta \right\}.$$

The first-order condition with respect to i becomes

$$-\phi_i i + \Delta\left(1 - \frac{1}{\xi}\right) = 0.$$

When $i > 0$ is interior, then

$$i = \frac{\Delta}{\phi_i}\frac{\xi - 1}{\xi}.$$

When $\xi \leq 1$, then $i = 0$. For $\xi > 1$, we can insert above expression for i into (11) to obtain

$$a = \frac{\theta(\Delta+\pi-\phi_i i)}{\phi_a} = \frac{\theta(\Delta/\xi+\pi)}{\phi_a} = \frac{1}{\phi_i}\frac{\Delta+\pi\xi}{\xi^2}.$$

For $\xi \leq 1$, we have $a = \frac{\Delta+\pi}{\phi_i}\frac{1}{\xi} > i^P = \frac{\Delta}{\phi_i}$. When $\xi > 1$, then

$$a + i = \frac{\Delta}{\phi_i}\left(1 - \frac{\xi-1}{\xi^2}\right) + \frac{\pi}{\phi_i \xi},$$

and, therefore,

$$a + i - i^P = \frac{1-\xi}{\xi^2}\frac{\Delta}{\phi_i} + \frac{\pi}{\phi_i \xi}. \tag{A.12}$$

This implies $\lambda(\theta) = a + i \geq \lambda(0) = i^P$ if and only if

$$\frac{\pi}{\Delta} \geq \Gamma_G^p := \frac{\xi - 1}{\xi}.$$

When $\xi \leq 1$, then $a + i = \frac{\Delta+\pi}{\phi_i \xi}$ and

$$a + i - i^P = \frac{1-\xi}{\xi}\frac{\Delta}{\phi_i} + \frac{\pi}{\phi_i \xi} \geq 0.$$

In this case, the activism improves the transition rate for all parameter values.

Using the effort levels calculated above, we can characterize the stock price under the optimal contract set by passive investors:

$$P = \frac{\Delta\left(2\xi\pi + \xi^2\Delta + \Delta\right)}{2\xi^2\phi_{,M}} + X_B - T - W$$

if $\xi > 1$, and

$$P = \frac{\Delta(\Delta+\pi)}{\xi\phi_M} + X_B - T - W$$

if $\xi \leq 1$. The activist's value function becomes

$$V = \frac{\theta\left(\xi^2\pi^2 + \left(\xi^3+\xi-1\right)\Delta^2 + 2\xi^3\Delta\pi\right)}{2\xi^3\phi_i} + \theta(X_B - T - W)$$

if $\xi > 1$ and

$$V = \frac{\theta(\Delta+\pi)^2}{2\xi\phi_i} + \theta(X_B - T - W)$$

if $\xi \leq 1$. Rearranging the entry condition $V - \theta P$ and simplifying, we obtain that the activist enters and $V - \theta P \geq 0$ if and only if

$$\frac{\pi}{\Delta} \geq \Gamma_E^p := 1 - \xi + \sqrt{\xi^2 - 2\xi + 1 + \xi^{-2}} = 1 - \xi + \sqrt{(1-\xi)^2 + \xi^{-2}}.$$

We then have the following:

Proposition 12. *When passive investors set the contracts of insiders, we have that:*

1. *Efforts satisfy* $a = \frac{1}{\phi_i}\frac{\Delta+\pi\xi}{\xi^2}$ *and* $i = \frac{\Delta}{\phi_i}\frac{\xi-1}{\xi}$ *when relative skills are such that* $\xi > 1$*; and* $a = \frac{\Delta+\pi}{\phi_i}\frac{1}{\xi}$ *and* $i = 0$ *when* $\xi \leq 1$*.*
2. *The activist enters if and only if* $\frac{\pi}{\Delta} \geq \Gamma_E^p = 1 - \xi + \sqrt{\xi^2 - 2\xi + 1 + \xi^{-2}}$ *— that is,* $\frac{\Delta}{\pi} \leq \frac{1}{1-\xi+\sqrt{\xi^2-2\xi+1+\xi^{-2}}}$ *— when* $\xi > 1$*, and* $\frac{\pi}{\Delta} \geq \Gamma_E^p = 1$ *when* $\xi \leq 1$*.*
3. *Investor activism improves the green transition rate in that* $\frac{\lambda(\theta)}{\lambda(0)} \geq 1$ *if and only if* $\xi \leq 1$ *or* $\frac{\pi}{\Delta} \geq \Gamma_G^p = \frac{\xi-1}{\xi}$ *when* $\xi \geq 1$*.*

Using these results, we then have that:

Corollary 4. *When the contracts of insiders are set by passive investors rather than activists:*

1. *The activist effort* a *is higher and the insiders effort* i *is lower than in the baseline.*
2. *Impact activism is negatively affected on the extensive margin* $\Gamma_E^p \geq \Gamma_E$*.*
3. *Impact activism is negatively affected on the intensive margin for* $\xi > 1$*. For* $\xi \leq 1$*, activism improves the transition rate in either scenario.*

First, we demonstrate that the activist's effort is higher and the manager's effort is lower than in the baseline. For $\xi \leq 1$, we have $i = 0$ (when passive investors set the contract, and it is clear that the manager's effort is lower than in the baseline. Moreover, $a = \frac{\Delta+\pi}{\phi_i}\frac{1}{\xi}$ clearly exceeds $\frac{\Delta+\pi}{\phi_i}\frac{1}{\xi(1+\xi)}$, i.e., the activist's effort in the baseline. Second, consider $\xi > 1$, so $i = \frac{\Delta}{\phi_i}\frac{\xi-1}{\xi} \leq \frac{\Delta+\pi}{\phi_i}\frac{\xi-1}{\xi}$. Next, note that $\frac{\xi-1}{\xi} \gtrless \frac{\xi}{1+\xi} \iff \xi^2 - 1 \gtrless \xi^2$. Thus, $\frac{\xi-1}{\xi} < \frac{\xi}{1+\xi}$, so managerial effort is lower than in the baseline. The activist's effort is $a = \frac{\Delta+\pi\xi}{\phi_i}\frac{1}{\xi^2} > \frac{\Delta+\pi}{\phi_i}\frac{1}{\xi^2}$. Clearly, $\frac{1}{\xi^2} > \frac{1}{\xi(1+\xi)}$, so the activist's effort is higher than in the baseline.

Second, we compare the transition rates both when passive investors set the contract and when activists set the contract. When $\xi < 1$, we have $\lambda(\theta) = a = \frac{\Delta+\pi}{\phi_i}\frac{1}{\xi}$. The transition rate from the baseline equals $\frac{\Delta+\pi}{\phi_i}\frac{1+\xi^2}{\xi(1+\xi)} < \frac{\Delta+\pi}{\phi_i}\frac{1+\xi}{\xi(1+\xi)} = \lambda$ where we used $\xi < 1$. For $\xi > 1$, the transition rate becomes $\lambda = \frac{1}{\phi_i}\frac{\Delta+\pi\xi+\Delta\xi(\xi-1)}{\xi^2} < \frac{\Delta+\pi}{\phi_i}\frac{1+\xi-1}{\xi} < \frac{\Delta+\pi}{\phi_i}\frac{1+\xi}{\xi(1+\xi)}$. This is smaller, due to $\xi > 1$, than the transition rate from the baseline, i.e., $\frac{\Delta+\pi}{\phi_i}\frac{1+\xi^2}{\xi(1+\xi)}$.

When active (passive) investors design the managerial contract, then $\lambda(\theta) \geq \lambda(0)$ if and only if $\frac{\pi}{\Delta} \geq \Gamma_G$ ($\frac{\pi}{\Delta} \geq \Gamma_G^p$. For $\xi > 1$, we have

$$\Gamma_G^p - \Gamma_G = \frac{\xi - 1}{\xi} - \frac{\xi - 1}{1 + \xi^2} > 0.$$

For $\xi \leq 1$, activism improves transition rate and $\lambda(\theta) \geq \lambda(0)$ regardless of whether active or passive investors design the managerial contract, i.e., $\Gamma_G, \Gamma_G^p \leq 0$.

Third, recall $\Gamma_E = \frac{1}{1+2\xi(1+\xi+\xi^2)}$, while $\Gamma_E^p = 1 - \xi + \sqrt{\xi^2 - 2\xi + 1 + \xi^{-2}}$ for $\xi \geq 1$ and $\Gamma_E^p = 1$ for $\xi < 1$. It is immediate that for $\xi \leq 1$, we have $\Gamma_E^p > \Gamma_E$.

Finally, we verify that

$$\Gamma_E^p - \Gamma_E = 1 - \xi + \sqrt{\xi^2 - 2\xi + 1 + \xi^{-2}} - \frac{1}{1 + 2\xi(1 + \xi + \xi^2)}$$

exceeds zero also for $\xi > 1$. We can readily show that $\lim_{\xi\to\infty}(\Gamma_E^p - \Gamma_E) = 0$, but otherwise $\Gamma_E^p - \Gamma_E$ is analytically fairly intractable on the whole domain. Since $\Gamma_E^p - \Gamma_E$ is a function of one variable ξ that does not involve any other model parameters, we use numerical evaluation to assess its sign. To evaluate $\Gamma_E^p - \Gamma_E$ on the whole unbounded domain of ξ in $(1, \infty)$, we use a monotonic increasing function $1 - \frac{1}{\xi}$ to transform the domain to a bounded interval on $(0, 1)$. Figure A.2 shows that $\Gamma_E^p - \Gamma_E$ is monotonically decreasing and positive on the whole domain, confirming the claim that $\Gamma_E^p - \Gamma_E$ is positive for $\xi > 1$.

A.17 Proof of Proposition 11

The claims regarding the transition rates follow from direct calculation. For the entry condition, note that no contracting is equivalent to setting $\xi = 0$ in condition (13), yielding the entry condition.

A.18 Solution With $N \geq 1$ Insiders

In our baseline, the insider is meant to represent many key employees and insiders who all contribute to the firm's transition. We now present a model variant that explicitly models $N \geq 1$ insiders. These insiders are symmetric and indexed by $n \in \{1, 2, ...N\}$. For this sake, we assume that the transition probability equals

$$\lambda = a + \underbrace{\sum_{n=1}^{N} i_n}_{\equiv i}.$$

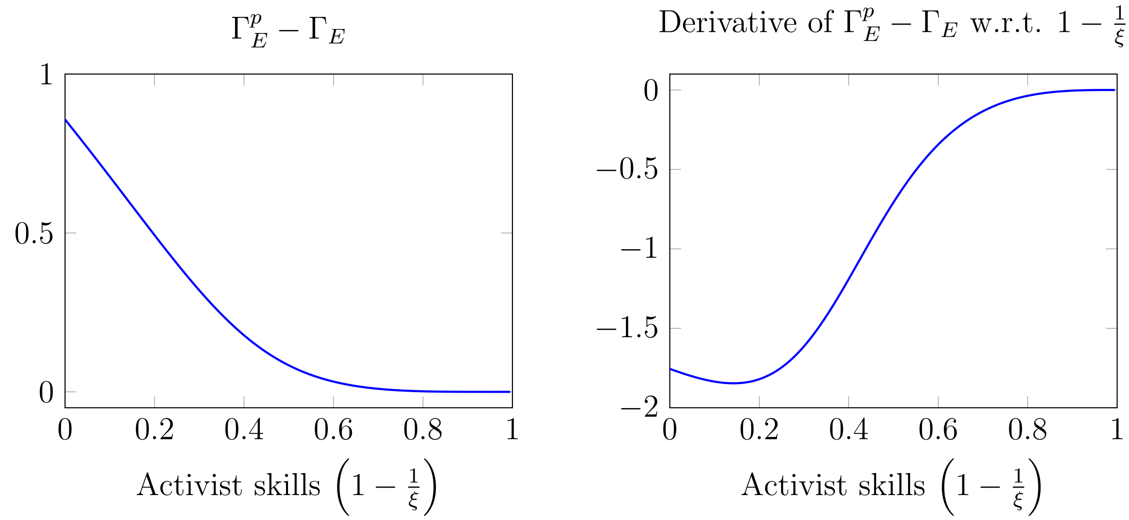

Figure A.2: $\Gamma_E^p - \Gamma_E$: The figure plots the difference $\Gamma_E^p - \Gamma_E$ between the entry threshold when the managerial contract is set by passive investors and the entry threshold when the managerial contract is set by activists in the case of $\xi > 1$. Both thresholds only depend on ξ. To show the whole unbounded domain of ξ in $[1, \infty)$, the figure uses a monotonic increasing function $1 - \frac{1}{\xi}$ to transform the domain to a bounded interval on $[0, 1)$. The right panel plots the derivative of $\Gamma_E^p - \Gamma_E$ with respect to $1 - \frac{1}{\xi}$.

Each insider n exerts unobservable effort i_n against quadratic cost $\frac{\hat{\phi}_i (i_n)^2}{2}$ with $\hat{\phi}_i > 0$, taking the efforts of the activist and other insiders as given. We define $i = \sum_{n=1}^{N} i_n$. It is natural to focus on symmetric efforts, so that total effort is given by $i = N i_n$.

In what follows, we solve the model with many insiders and highlight that the solution and outcomes are qualitatively similar to those in the baseline with $N = 1$. However, we also show that larger N generally hampers the impact of activism. We focus on $\pi > 0$ and $\Delta > 0$; further, unless otherwise mentioned, we focus on parameters that lead to positive transition efforts, $a > 0$ and $i > 0$, whenever the activist enters.

No-moral-hazard case. We start by solving no-moral-hazard efforts that maximize

$$\max_{a,(i_n)} \left\{ \lambda(\Delta + \pi) - \frac{\phi_a a^2}{2} - \sum_{n=1}^{N} \frac{\hat{\phi}_i i_n^2}{2} \right\}.$$

In this case, total insider effort and activist effort satisfy:

$$a^* = \frac{\Delta + \pi}{\phi_a} \quad \text{and} \quad i^* = \frac{N(\Delta + \pi)}{\hat{\phi}_i} \quad \text{where} \quad i_n^* = \frac{i^*}{N}.$$

To hold no-moral-hazard levels constant (for any N) and facilitate a comparison with our baseline, we assume that each insider's impact on the firm's transition diminishes as the number of insiders

N grows. We model this by stipulating that the cost increases with N, in that:[17]

$$\hat{\phi}_i = N\phi_i.$$

After imposing this, the effort levels a^* and i^* become "independent" of N.

Thus, the no-moral-hazard level above coincides with those in the baseline with one insider, shown in Proposition 1. As a result, any differences in transition rates that arise relative to the baseline must be attributable to the interaction between the number of insiders N and the internal free-rider problem, i.e., moral hazard. We now solve the model with moral hazard.

Incentive Constraints. In the problem with moral hazard, it is natural to restrict attention to symmetric contracts (C_n, R_n)—i.e., C_n, R_n are constant over n—offered to insiders where we define total base wage $C \equiv NC_n$ and total reward $R \equiv NR_n$. Likewise, each insider has an outside option $W_n = \frac{W}{N}$. Thus, we have $i = Ni_n$ and the incentive condition for an individual insider becomes

$$i_n = \frac{R_n}{\hat{\phi}_i} = \frac{R_n}{\phi_i N} \quad \Longleftrightarrow \quad i = \sum_{n=1}^{N} i_n = \frac{NR_n}{\phi_i N} = \frac{R}{N\phi_i}. \tag{A.13}$$

Upon transitioning, insiders are paid in total $R = NR_n$ dollars, so that the equity holder's monetary payoff of transitioning equals $\Delta - R = \Delta - N\phi_i i$. This leads to the activist's incentive constraint:

$$a = \frac{\theta(\Delta + \pi - R)}{\phi_a} = \frac{\theta(\Delta + \pi - i\phi_i N)}{\phi_a}. \tag{A.14}$$

Finally, each insider's participation constraint binds, i.e.,

$$W_n = C_n + (\hat{a} + i)R_n - \frac{\phi_i N i_n^2}{2}.$$

Accordingly, we can sum both sides over n and solve for $C = NC_n$ using $i_n = \frac{i}{N}$:

$$C = W - (\hat{a} + i)R + \frac{\phi_i N^2 i_n^2}{2} = W - (\hat{a} + i)R + \frac{\phi_i i^2}{2}. \tag{A.15}$$

Passive Ownership. Passive ownership implies $\hat{a} = a = 0$. Passive owners maximize

$$P_0 = \max_{(C,R)} \big\{ \big(1 - i\big)(X_B - C - T) + i(X_G + \pi^P - C - R)\big\}$$

subject to (A.14) and (A.15). After some algebra, one can show that effort i is chosen to maximize

$$\max_{i \geq 0} \left(\Delta i - \frac{N^2 \phi_i i_n^2}{2} \right) \quad \text{s.t.} \quad i = Ni_n.$$

[17] We could alternatively assume $\hat{\phi}_i = \phi_i$, but scale the contributions of insiders' efforts to the transition by $1/\sqrt{N}$, specifically, $\lambda = a + \frac{\sum_{n=1}^{N} i_n}{\sqrt{N}}$. Then, no-moral-hazard efforts—maximizing $\lambda(\Delta+\pi) - \frac{\phi_a a^2}{2} - \sum_{n=1}^{N} \frac{\phi_i i_n^2}{2}$ —would satisfy $i_n = \frac{\Delta+\pi}{\sqrt{N}\phi_i}$, i.e., $\frac{\sum_{n=1}^{N} i_n}{\sqrt{N}} = \frac{\Delta+\pi}{\phi_i}$, generating the same transition rate as in the baseline.

Noting that $\Delta i - N\frac{N\phi_i i_n^2}{2} = \Delta i - \frac{\phi_i i^2}{2}$, we get

$$i^P = \frac{\Delta}{\phi_i}, \tag{A.16}$$

which coincides with insider effort under passive ownership in the baseline; see Proposition 1.

Active Ownership. While the number of insiders does not matter without moral hazard or under passive ownership, it exacerbates the internal free-rider problem with the activist. Indeed, holding total insider effort i fixed, the activist's incentives to exert effort in (A.14) decrease with the number of insiders N. The reason is that when there are more insiders, incentivizing a given level of i becomes harder and requires higher rewards, diminishing the share of transition surplus accruing to the activist. We now solve for efforts and transition rate under active ownership.

After entry, the activist's expected payoff is given by (6). We can insert aforementioned expression for C, i.e., (A.15), to rewrite the activist's optimization as follows:

$$\begin{aligned} V &= \max_R \left\{ \theta\big[X_B - W - T + (a+i)R - \frac{\phi_i i^2}{2} + (a+i)(\Delta + \pi - R)\big] - \frac{\phi_a a^2}{2} \right\} \\ &= \max_R \left\{ \theta\big[X_B - W - T - \frac{\phi_i i^2}{2} + (a+i)(\Delta + \pi)\big] - \frac{\phi_a a^2}{2} \right\}, \end{aligned}$$

subject to (A.13) and (A.14). Next, we use (A.14), i.e., $a = \frac{\theta(\Delta + \pi - N\phi_i i)}{\phi_a}$. We insert this expression for a into the activist's optimization above to obtain:

$$V = \max_i \left\{ \theta\left[X_B - W - T - \frac{\phi_i i^2}{2} + \left(\frac{\theta(\Delta + \pi - \phi_i N i)}{\phi_a} + i \right)(\Delta + \pi) \right] - \frac{\theta^2(\Delta + \pi - \phi_i N i)^2}{2\phi_a} \right\}.$$

The first order condition with respect to i becomes

$$-\phi_i i + (\Delta + \pi)\left(1 - \frac{N}{\xi}\right) + \frac{N(\Delta + \pi - N\phi_i i)}{\xi} = 0,$$

leading to

$$i = \frac{\Delta + \pi}{\phi_i}\left(\frac{\xi}{\xi + N^2}\right).$$

Next, we use $a = \frac{\theta(\Delta + \pi - i\phi_i N)}{\phi_a} = \frac{(\Delta + \pi)/\phi_i - iN)}{\xi}$ to get

$$a = \frac{\Delta + \pi}{\phi_i}\left(\frac{[N^2 + \xi(1-N)]^+}{\xi(\xi + N^2)}\right),$$

where we account for the possibility that $a = 0$ via $[\cdot]^+ = \max\{0, \cdot\}$. We have $a > 0$ if and only if $N^2 + \xi(1-N) > 0$; we assume this is satisfied throughout to avoid case distinctions. Otherwise, when $N^2 + \xi(1-N) \leq 0$, then $a = 0$.

The transition rate, conditional on activist entry, then equals $\lambda(\theta) = a + i$. Note that i decreases with N. As N increases, insiders' moral hazard worsens, and incentive provision to them becomes more costly. As such, the activist reduces i when N increases.

Activism on the Intensive Margin and Internal Free-Rider Problem. Assume $a > 0$. We contrast the transition rate under active ownership to that under passive ownership, i.e., $i^P = \frac{\Delta}{\phi_i}$.

Thus,

$$\frac{\lambda(\theta)}{\lambda(0)} = \frac{\xi^2 + N^2 + \xi(1-N)}{\xi^2 + \xi N^2}\left(1 + \frac{\pi}{\Delta}\right) =: \mathcal{F}(N). \tag{A.17}$$

Note that $\frac{\lambda(\theta)}{\lambda(0)}$ is non-monotonic and U-shaped in N: It decreases for $N < \xi + \sqrt{\xi^2+\xi}$, it increases for $N > \xi + \sqrt{\xi^2+\xi}$ and thus has a unique minimum at $N = \xi + \sqrt{\xi^2+\xi}$. As $N \to \infty$, we have $\frac{\lambda(\theta)}{\lambda(0)} \to \mathcal{F}(\infty) := \frac{1}{\xi}\left(1 + \frac{\pi}{\Delta}\right)$.

Suppose now the unique minimum is larger than 1, in that $\xi + \sqrt{\xi^2+\xi} > 1$ (which clearly holds for $\xi > 1$). This implies that

$$\mathcal{F}(1) > \mathcal{F}(N) \quad \text{for all} \quad N > 1 \quad \iff \quad \mathcal{F}(1) > \mathcal{F}(\infty).$$

Note that $\mathcal{F}(1) = \frac{\xi^2+1}{\xi^2+\xi}\left(1 + \frac{\pi}{\Delta}\right) > \mathcal{F}(\infty) = \frac{1}{\xi}\left(1 + \frac{\pi}{\Delta}\right)$ is equivalent to $\xi^2 + 1 > \xi + 1$ and thus to $\xi > 1$. Thus, for $\xi > 1$, i.e., relatively skilled insiders, having $N > 1$ insiders always leads to lower $\frac{\lambda(\theta)}{\lambda(0)}$ than under baseline with $N = 1$ insider.

That is, the presence of many insiders hampers activism on the intensive margin. The intuition is that when there are many insiders, it becomes harder to incentivize a given level of total insider effort, i, compared to when there is a single insider. Holding i fixed, the total reward promised to insiders increases with N, which in turn reduces the activist's incentives to exert transition efforts. In other words, the internal free-rider problem becomes more severe with a large number of insiders, thereby impeding incentive provision.

Activism on the Extensive Margin and External Free-Rider Problem. Finally, the entry condition becomes

$$V - \theta P = (a+i)\theta\pi - \frac{\phi_a a^2}{2} \geq 0.$$

Using optimal i and a, we can rewrite the entry condition as:

$$\frac{\pi}{\Delta} \geq \frac{\left[N^2 + \xi(1-N)\right]^2}{N^4 + \xi(\xi+2)N^2 + \xi^2(2\xi+1)}. \tag{A.18}$$

This expression simplifies to (13) upon setting $N = 1$ and becomes $\frac{\pi}{\Delta} \geq 1$ in the limit $N \to \infty$. Thus, the limit $N \to \infty$ results in a very severe external free-rider problem with activist entry only if non-pecuniary benefits of transitioning exceed monetary benefits.

The limit cases $N = 1$ and $N \to \infty$ indicate that the right-hand side of (A.18) increases as N becomes large, although it could be non-monotonic under some circumstances. Figure A.3 confirms this intuition and plots the right-hand side of (A.18) against N for two different values of ξ, demonstrating that it increases with N for $\xi = 0.5$ and $\xi = 2$. Thus, larger N generally exacerbates the external free-rider problem. The intuition is that as N increases, it becomes more costly to incentivize insiders, thereby reducing the contracted values of i and i_n. Thus, for large N, the activist curbs insiders' incentives, reducing the transition rate and potentially boosting its own incentives to exert effort. Both effects worsen the external free-rider problem at entry.

As in the baseline, sufficiently high ξ facilitates entry and implies a relatively mild external free-rider problem. To see this, note that $\xi \to \infty$ implies that the right-hand side of (A.18) goes to zero for any N. Although we cannot show that the right-hand side decreases in ξ in general, the limit case shows that at least for large ξ, the right-hand side decreases in ξ. The activist does not enter for low values of ξ.

The Impact of Having Many Insiders, $N > 1$. Overall, our findings suggest that the presence

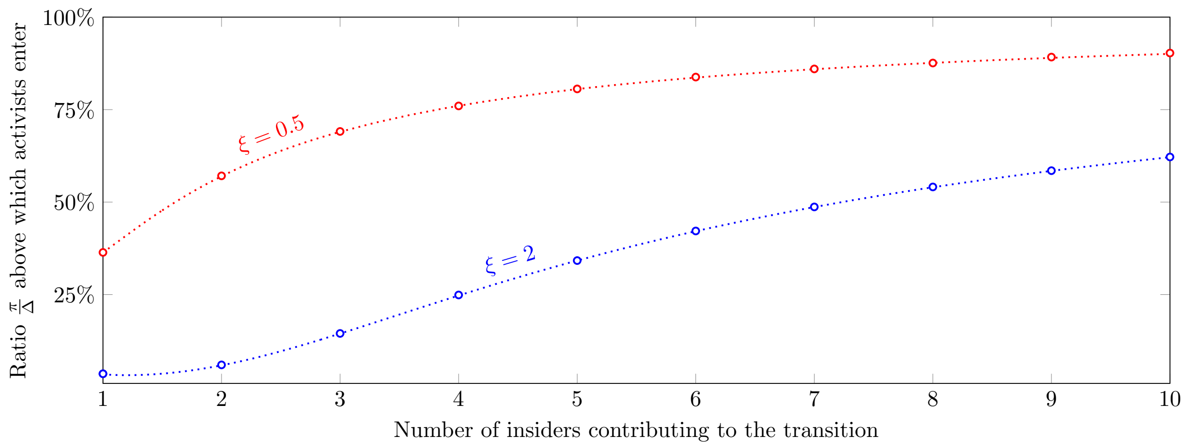

Figure A.3: The figure plots the right-hand-side of (A.18) against N for $\xi = 0.5$ and $\xi = 2$.

of many insiders, i.e., $N > 1$, hampers the impact of activism, relative to the baseline with one insider only. First, the external free-rider problem—which becomes more severe with higher N—prevents activists from entering when ξ is low. Thus, the activist only enters when ξ is high. Second, higher N makes it harder to incentivize insiders, worsening the impact of activism on the intensive margin for large ξ. This reflects that a higher number of insiders worsens the internal free-rider problem, making it more costly to provide incentives to insiders and reducing their incentives. Indeed, the total insider effort i declines with N. In the limit $N \to \infty$, the internal free-rider problem becomes so severe that the activist refrains from providing incentives to insiders, in that $i = 0$ and $a = a^{FB}$.

A.19 Incentivizing the Activist with a Contract

Our baseline model assumes that the activist holds a standard equity stake in the firm, which determines their incentives to exert effort as well as the severity of the internal free-rider problem. Here, we consider two alternative settings in which the activist receives additional incentives beyond those derived directly from equity ownership.

A.19.1 Additional Incentive Contract for the Activist

We now allow the activist to write an incentive contract with passive investors after entry and the acquisition of an equity stake $\theta_0 = \theta$. The incentive contract between the activist and passive investors is written *just before* the managerial contract is written and stipulates compensation contingent on the publicly observable transition state.

Without loss of generality, the contract pays the activist a wage of $Y \geq 0$ in case of transitioning and zero otherwise. Define $y := \frac{Y}{\theta}$. The activist pays the fair value of $v(Y)$ to the passive investors. Thus, the activist receives $Y - v(Y)$ in state G and $-v(Y)$ in state B, where $v(Y)$ is such that

$$v(Y) = (\tilde{a} + \tilde{i})Y,$$

where $\tilde{a}$ and $\tilde{i}$ are the levels of activist and insider efforts anticipated by the passive investors when signing the contract. These effort levels may differ from actual efforts a and i upon deviation, but will coincide with them in optimum. We note that $v(Y)$ is not affected by deviations in actual effort. Thus, when $\tilde{a} = a$ and $\tilde{i} = i$, the contract has zero cost for either party, and just constitutes a "risk transfer" at fair terms. To focus on the interesting cases, we assume that $\Delta, \pi > 0$.

Effort Choice and Internal Free-Rider Problem. We solve for the effort choice, taking y as given. Eventually, we discuss the determination of y. Conditional on entry, the activist's payoff equals

$$V = \max_{a \geq 0, (C,R)} \left\{ \big(1 - (a+i)\big)\theta(X_B - C - T) + (a+i)\theta\big(y + X_G + \pi^A - C - R\big) - \frac{\phi_a a^2}{2} - v(Y) \right\}. \tag{A.19}$$

Optimizing over a, we obtain

$$a = \frac{\theta(\Delta + \pi + y - R)}{\phi_a}. \tag{A.20}$$

while $i = \frac{R}{\phi_i}$, i.e., (4) holds. Note that (A.20) is the activist's incentive constraint.

As in the baseline, we can rewrite the activist's optimization problem as:

$$\max_R \left\{ \theta\big[X_B - W - \frac{\phi_i i^2}{2} + (a+i)(\Delta + \pi + y)\big] - \frac{\phi_a a^2}{2} - v(Y) \right\},$$

which is solved subject to (4) and (A.20).

We can solve this optimization analogously to the baseline to obtain:

$$a = \frac{\theta(\Delta + \pi + y)}{\phi_i} \left(\frac{1}{\xi(1+\xi)} \right) \quad \text{and} \quad i = \frac{\theta(\Delta + \pi + y)}{\phi_i} \left(\frac{\xi}{1+\xi} \right). \tag{A.21}$$

Thus, ceteris paribus, the contract leads to higher incentives and a transition rate, owing to $Y, y \geq 0$.

Entry and External Free-Rider Problem. Under the optimal efforts, we have $(a+i)Y - v(Y) = (a+i)\theta y - v(Y) = 0$. Thus, the activist's value function, conditional on entry and under optimal efforts (characterized above), becomes:

$$V = \theta\big[X_B - W - \frac{\phi_i i^2}{2} + (a+i)(\Delta + \pi)\big] - \frac{\phi_a a^2}{2},$$

while the stock price equals

$$P = X_B - W - \frac{\phi_i i^2}{2} + (a+i)\Delta.$$

Thus, the entry condition becomes (i.e., the activist enters if and only if):

$$V - \theta P = (a+i)\theta\pi - \frac{\phi_a a^2}{2} \geq 0.$$

The entry condition can be rewritten as:

$$\frac{\pi}{\Delta} \geq \frac{1 + \frac{y}{\Delta}}{1 + 2\xi(1 + \xi + \xi^2)}, \quad \frac{\Delta}{\pi} = \frac{1 + 2\xi(1 + \xi + \xi^2)}{1 + \frac{y}{\Delta}}. \tag{A.22}$$

Thus, the presence of the contract and incentive compensation exacerbates the external free-rider problem.

Determination of Y. The determination of Y (and y) is subject to constraints in practice, which we denote by $\mathcal{Y}$, i.e., $Y \in \mathcal{Y}$. We discuss several practically relevant constraints that determine the set of constraints $\mathcal{Y}$:

1. One could assume monotonicity, i.e., passive investors must be weakly better off in state H than in state B in terms of (gross) cash flows:

$$(1-\theta)(X_G - X_B + T) \geq y\theta$$

   Note that passive investors as a whole collect a fraction $(1-\theta)$ of the firm's entire cash flows, while they make a payment of θy to the activist in case of transition.

2. One could assume monotonicity in terms of net cash flows, in that

$$(1-\theta)(X_G - X_B + T - R) \geq y\theta$$

   where $R = \phi_i i$ and i is determined above. That is, when the contract is written, the level of R is anticipated.

3. Last, one could assume monotonicity in terms of cash flows and utility benefits: One could assume monotonicity in terms of gross cash flows, in that

$$(1-\theta)(X_G - X_B + T + \pi^P - R) = (1-\theta)(\Delta - R) \geq y\theta$$

4. The most generous constraint would be monotonicity in terms of gross cash flows and benefits: One could assume monotonicity in terms of gross cash flows, in that

$$(1-\theta)(X_G - X_B + T + \pi^P) = (1-\theta)\Delta \geq y\theta$$

   In this scenario, maximum incentives, that is, $(1-\theta)\Delta = y\theta$ would imply

$$a = \frac{\Delta + \theta\pi}{\phi_i}\left(\frac{1}{\xi(1+\xi)}\right) \quad \text{and} \quad i = \frac{\Delta + \theta\pi}{\phi_i}\left(\frac{\xi}{1+\xi}\right),$$

   These effort incentives are lower than those achieved in the baseline with $\theta = 1$.

Either way, it is plausible that y is limited, which in turn limits the additional incentives that could be provided to the activist through a contract with the firm. The activist's incentives under plausible monotonicity constraints are strictly lower than those achieved under full ownership. It follows that incentive contracting cannot eliminate the internal free-rider problem, intuitively, because the extent of additional incentives is limited.[18]

Summary. An incentive contract mitigates the internal free-rider problem, but exacerbates the external free-rider problem. As such, providing additional incentives to the activist can backfire and limit the impact of activism by precluding entry. Further, contractual constraints present in practice limit the choice of y. Either way, an incentive contract with the activist is unable to resolve both free-rider problems that limit the effectiveness of activism.

A.19.2 Within-Activist Contracting

Suppose now the activist represents a fund run by a manager (or general partner, GP). We note that total fund payoff (cash flow) in state G is $\theta(X_G - R - C)$ and in state B is $\theta(X_B - C)$. We now

[18] One could then further endogenize y, for instance, by considering the optimization: $\max_{y \in \mathcal{Y}} V$.

consider (in reduced form) that the fund is run by the GP, who exerts hidden and non-contractible effort. The GP privately incurs the effort cost, $\frac{\phi_a a^2}{2}$. The activist fund's remaining owners are referred to as limited partners (LPs).

Consider a *within-fund* contract between the LPs and the GP that pays the GP Y_G dollars in state G and Y_B dollars in state B, with $Y_G \geq Y_B$. Suppose that the GP is purely financially motivated, while the LPs derive utility benefits π^A from transitioning. Thus, the GP maximizes (for given (C, R)):

$$\max_{a \geq 0} a(Y_G - Y_B) - \frac{\phi_a a^2}{2}.$$

This leads to

$$a = \frac{Y_G - Y_B}{\phi_a}.$$

The claim for the remaining owners, e.g., LPs, must be monotonic in terms of cash flows and utility benefits:

$$\theta(X_G - R - C + \pi^A) - Y_G \geq \theta(X_B - T - C) - Y_B \quad \Longleftrightarrow \quad Y_G - Y_B \leq \theta(\Delta + \pi - R)$$

Thus, within-activist contracting cannot get higher effort incentives for the activist than $\theta(\Delta + \pi - R)$, which is equal to the equity incentives as a whole. Thus, within-activist contracting cannot resolve the internal free-rider problem.

Next, consider that the GP's contract maximizes its effort incentives, in that $Y_G - Y_B = \theta(\Delta + \pi - R)$, while, for simplicity and brevity, the contract terms to the firm manager (C, R) are chosen by the activist fund as a whole, maximizing activist fund payoff. The idea is that while the GP's private effort is hidden and non-contractible, the contract terms that the activist funds offers to the firm's insiders are observable (and contractable). For instance, for public firms, managerial compensation contracts and other compensation of high-level insiders is typically disclosed and publicly observable. This simplifies the analysis and allows us to abstract away from delegated contracting, which is beyond the paper's scope, for instance, studied in Gryglewicz and Mayer (2023).

Thus, within-fund contracting only affects the GP's effort. The activist fund's optimization becomes

$$\max_{R} \left\{ \theta \big[X_B - W - T - \frac{\phi_i i^2}{2} + (a + i)(\Delta + \pi) \big] - \frac{\phi_a a^2}{2} \right\},$$

subject to (4) and (11). The solution, therefore, remains unchanged relative to the baseline.

Summary. Under our assumptions, within-activist contracting cannot increase effort incentives beyond those generated by a straight equity stake. Notably, within-fund contracting cannot resolve the internal free-rider problem. It can also not resolve the external free-rider problem. However, higher incentives can be achieved if contracting occurs with an outside party, such as the passive investors, as shown above.

We note that our model is written "as if" the activist fund acts as a single entity maximizing its total value, while we do not model other potential agency conflicts between GPs and LPs. Any such conflicts of interest would likely further hamper the impact of activism. They would need to be addressed by within-fund contracting, but, as we have shown, within-fund contracting cannot achieve higher effort incentives than those obtained in the baseline.

B Dynamic Model Variant with Trading

We present a dynamic extension of the baseline model in continuous time, with $t \geq 0$, where we allow for trading as in DeMarzo and Urošević (2006); Hu and Varas (2025); Gryglewicz et al. (2025). This extension illustrates that the possibility to dynamically trade will exacerbate the external free-rider problem associated with entry, while alleviating the internal free-rider problem by making the activist acquire a larger stake over time.

B.1 Model Setup

Technology and Preferences. Time $t \in [0, \infty)$ is continuous and infinite. As in the static model, the activist, the manager, and the passive investors are risk-neutral. For simplicity, there is no discounting. At the onset at time $t = 0$, the firm has a polluting (or dirty) production technology, but its owners aim to transition to a clean or green production technology. We model the transition process as an innovation project that is completed at a random time τ arriving with intensity normalized to one. Thus, $\mathbb{E}[\tau] = 1$ — on average, the projects takes one "period" or unit of time to complete, analogously to the static model.

The outcome of the transition process—success or failure—depends on the activist's and manager's efforts $a_t \in [0, \bar{a}]$ and $i_t \in [0, \bar{m}]$. Specifically, over a short time interval $[t, t + dt)$, the process is completed with exogenous probability $1dt$. Upon completion, a transition is successful with probability $a_t + i_t$ and fails otherwise. Thus, over $[t, t + dt)$, the instantaneous probability of successful transition—i.e., the transition rate—equals $\lambda_t dt := (a_t + i_t)dt$, as in our baseline model. We focus on parameters that lead to optimal interior efforts, i.e., $a_t \in (0, \bar{a})$ and $i_t \in (0, \bar{m})$, and a well-defined probability $a_t + i_t \in (0, 1)$. Figure B.4 illustrates the transition process over an instant $[t, t + dt)$. We purposefully model a simple transition process, which allows us to analytically characterize the model solution and the dynamic effects of activism.[19]

The completion and outcome of the transition process are publicly observable and contractible. In case of success at time τ (state $\omega = G$), the firm successfully transitions and a cash flow of X_G is realized. In case of failure (state $\omega = B$), the firm does not transition and the cash flow (including carbon tax) equals $X_B - T$. At any time $t < \tau$, cash flows are zero.

In addition, at time τ, passive investors derive a (lump sum) utility benefit of π^P (per unit of ownership) in case of transition, while the activist derives a utility benefit of $\theta_\tau \pi^A$ from transitioning. As in the baseline, the utility benefit, reflecting values-aligned sustainability preferences, scales with the activist's ownership level at the time of transition. We define $\pi = \pi^A - \pi^P \geq 0$ and $\Delta = X_G - X_B + T + \pi^P$. In order to avoid case distinctions, we assume $\Delta, \pi > 0$ for this section.

Transition and Moral Hazard. Both the activist and insiders exert unobservable effort subject to (double) moral hazard, generating the internal free-rider problem from the baseline. The dynamic framework features an infinitely often repeated internal free-rider problem. Efforts a_t and i_t are chosen before it is known whether the project is completed over the next instant $[t, t + dt)$. Efforts a_t and i_t are hidden and come at private flow costs $\frac{\phi_a a_t^2}{2}$ and $\frac{\phi_i i_t^2}{2}$ to the activist and the insiders respectively. To deal with this agency problem, the controlling shareholder—which is either the activist or the passive investor—writes at each time t, a short-term contract that stipulates state-contingent compensation to the insider over the next instant $[t, t + dt)$. The formulation of the

[19] Board and Meyer-ter Vehn (2013), Mayer (2022), and Hu and Varas (2025) among others, employ similar modeling of uncertainty. Similar results would arise if we assumed that the transition occurred at a random time τ arriving with Poisson intensity $\lambda_t = (a_t + i_t)$. As the transition process is stationary, any time dynamics that arise in optimum are endogenous and attributable to activism.

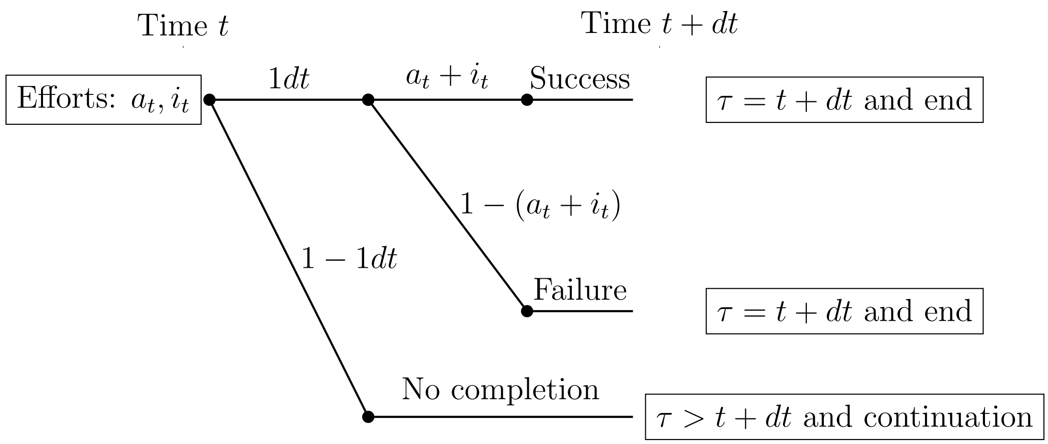

Figure B.4: Description of the transformation process and heuristic timing over $[t, t+dt)$. The branches of the tree contain the probabilities of the respective random event over $[t, t + dt)$.

short-term contracting problem in continuous time is similar to He and Krishnamurthy (2011). The short-term contract (R_t, C_t) stipulates a payout R_t in case the firm successfully transitions over $[t, t + dt)$ in addition to a base salary $C_t dt$. The payout R_t corresponds to a lumpy payment and therefore is "large" relative to the base salary, which is of order dt, i.e., infinitesimal. Without loss of generality, we normalize the manager's reservation utility to zero, so that its expected payoff from the contract must be positive.

Thus, given a contract (R_t, C_t) and expected activist effort $\hat{a}_t$, the insiders maximize:

$$\max_{i_t} \left(1dt\big[C_t dt + (\hat{a}_t + i_t)R_t\big] - \frac{\phi_i i_t^2}{2} dt + (1 - 1dt)C_t dt \right),$$

leading to

$$i_t = \frac{R_t}{\phi_i}. \tag{B.23}$$

We normalize the insiders' outside option W to zero. As in the baseline, the flow payment C_t is determined such that the insiders' participation constraint binds, leading to

$$W = 0 = C_t + (\hat{a}_t + i_t)R_t - \frac{\phi_i i_t^2}{2}. \tag{B.24}$$

Activist Stake and Trading. The activist acquires an endogenous ownership stake θ_0 in the firm at time $t = 0$. After entry, the activist cannot trade over a time period $(0, \tau^\beta)$, where τ^β is a stochastic time that arrives with intensity $\beta \geq 0$. Thus, after entry, the activist must wait on average $1/\beta$ units of time before being able to adjust its stake. When $\beta = 0$, the activist cannot trade after entry and maintains constant ownership up to time T. In the limit $\beta \to \infty$, trading post-entry is without friction.

When the activist can trade, i.e., after time τ^β, the heuristic timing over $[t, t+dt)$ is as follows. First, given an activist stake θ_t, the firm's controlling shareholders (i.e., the activist when $\theta_t > 0$) and the manager sign a contract (R_t, c_t) lasting over $[t, t + dt)$. Second, uncertainty as to whether the transition process is completed and succeeds or fails is resolved. The firm makes payments and the contract ends: The manager receives R_t in case of success, zero in case of failure, and $c_t dt$ in case of no completion. Upon completion, both active and passive investors receive terminal payoffs, and the model concludes. Third, in the event that the transition process is not completed, the activist trades the firm's stock and chooses $d\theta_t$, thereby determining the next-period stake as $\theta_{t+dt} = \theta_t + d\theta_t$. Then, at time $t + dt$ with activist stake θ_{t+dt}, controlling shareholders and the manager sign a contract over $[t + dt, t + 2dt)$, and so on.

As in DeMarzo and Urošević (2006) and Hu and Varas (2025), we restrict attention to Markov Perfect Equilibria with the activist stake $\theta_t = \theta$ as the state variable. Thus, the activist's value function at time t satisfies $V_t = V(\theta)$ and the stock price satisfies $P_t = P(\theta)$. Thus, optimal efforts and the trading strategy are also functions of θ only.

For the continuation game after time 0 (conditional on entry), we characterize an intuitive Markov equilibrium, where the activist does not trade before time τ^β. After time τ^β, the activist trades smoothly for $\theta \in (0, \overline{\theta})$, buys the entire firm at once when $\theta \in (\overline{\theta}, 1]$ (while stopping trading forever when $\theta = 0$), and randomizes between not trading at all or buying the entire firm at once when $\theta = \overline{\theta}$. The threshold $\overline{\theta}$ is endogenous and will be determined below.

The existence of the equilibrium follows by virtue of the closed-form solutions; we do not formally verify the optimality of the trading strategy and present a heuristic analysis. A formal argument could be constructed following Hu and Varas (2025); Gryglewicz et al. (2025).

Payoffs after time τ^β. At time $t \geq \tau^\beta$, the activist's expected payoff is characterized via (omitting time subscripts):

$$V(\theta)dt = \max_{a\geq 0,(C,R),d\theta} \Big\{ -\theta C dt + \big(1-(a+i)\big)\theta(X_B - T)dt + (a+i)\theta\big(X_G + \pi^A - R\big)dt - \frac{\phi_a a^2}{2}dt + \big[V(\theta+d\theta) - V(\theta) - d\theta P(\theta+d\theta)\big]\Big\}, \tag{B.25}$$

subject to (B.23) and (B.24). Here, $\big[V(\theta+d\theta) - V(\theta) - d\theta P(\theta+d\theta)\big]$ captures the activist's gains from trade over a short period of time. Note that the activist trades with price impact, in that the trade is executed at price $P(\theta + d\theta)$, taking into account the post-trade activist ownership $\theta + d\theta$. We will show that in equilibrium, these gains from trade are zero.

Under activist ownership, the fair stock price from passive investors' perspective, anticipating the efforts of the activist and insiders (a, i), equals

$$P(\theta)dt = -Cdt + \big(1-(a+i)\big)\big(X_B - T\big)dt + (a+i)\big(X_G + \pi^P - R\big)dt + \mathbb{E}[dP(\theta)]. \tag{B.26}$$

Payoffs before Time τ^β. At time $t \in (0, \tau^\beta)$, the activist's value function satisfies

$$V^\beta(\theta)dt = \max_{a\geq 0,(C,R)} \Big\{ -\theta C dt + \big(1-(a+i)\big)\theta(X_B - T)dt + (a+i)\theta\big(X_G + \pi^A - R\big)dt - \frac{\phi_a a^2}{2}dt + \beta(V(\theta) - V^\beta(\theta))dt\Big\}, \tag{B.27}$$

Under activist ownership, the fair stock price from passive investors' perspective, anticipating the efforts of the activist and insiders (a, i), equals

$$P^\beta(\theta)dt = -Cdt + \big(1-(a+i)\big)\big(X_B - T\big)dt + (a+i)\big(X_G + \pi^P - R\big)dt + \beta(P(\theta) - P^\beta(\theta))dt \tag{B.28}$$

Activist Entry and Entry Payoff. We model the activist's entry decision at time $t = 0$. The activist's initial stake in the firm θ_0 can only take two values, 0 or $\hat{\theta}$, where $\hat{\theta} \in (0, 1)$ is an exogenous parameter. As a result, the activist enters and $\theta_0 = \hat{\theta}$ if and only if

$$V^{\beta}(\hat{\theta}) - \hat{\theta} P^{\beta}(\hat{\theta}) \geq 0, \tag{B.29}$$

where we normalize the value of the activist's outside option to zero.

The interpretation is that $\hat{\theta}$ is the minimum level required for the activist to gain control and to be able to influence firm outcomes. We assume that the activist precisely acquires this minimum level. When β is sufficiently large, this can be shown to be optimal. We omit a formal analysis of this matter. All intuition can be highlighted by considering a fixed entry stake, i.e., $\theta_0 \in \{0, \hat{\theta}\}$.

The Dynamic Model and its Link to the Baseline. The dynamic model is set up in continuous time with infinite horizon and stochastic end date τ. However, as per our assumptions, the expected end date, i.e., the duration of the dynamic model after entry, is normalized to one, $\mathbb{E}[\tau] = 1$. Likewise, the post-entry continuation game in the static model, with contracting and efforts subject to moral hazard, lasts one period (see Figure 1) with a deterministic end date. Whether the end date is stochastic or deterministic has no bearing on our findings, since all agents in our model are risk-neutral, rendering the static and dynamic models comparable along this dimension.

Furthermore, our modeling ensures that the static and dynamic models are comparable in other aspects as well (e.g., the moral hazard problem and how effort affects the transition outcome). The only difference between static and dynamic models arises because the dynamic model allows the activist to dynamically trade and adjust its stake after entry. Trading opportunities are modeled for simplicity by assuming that the activist cannot trade over $(0, \tau^{\beta})$, while it can trade without friction thereafter—this modeling is more tractable than assuming infrequent trading opportunities or other frictions, while capturing similar economic trade-offs. The parameter β, therefore, captures the extent to which the activist can trade after entry. Notably, as will become clear below, when $\beta = 0$ and the activist cannot trade, the dynamic model becomes *isomorphic* to the static model, delivering essentially the same predictions and payoffs. We then show that increasing β mitigates the internal free-rider problem, but exacerbates the external free-rider problem.

B.2 Solution with Trading

We now demonstrate how the activist's dynamic trading strategy alters model outcomes. We define

$$\xi = \xi(\theta) = \frac{\phi_a}{\theta \phi_i}.$$

We construct an equilibrium with the following trading after time τ^{β}. First, the activist trades smoothly whenever $\theta < \overline{\theta}$. Second, at $\theta = \overline{\theta}$, the activist randomizes (at endogenous intensity γ) between not trading at all and buying the entire firm at once. Third, for $\theta > \overline{\theta}$, the activist buys the entire firm and stops trading thereafter. We show that in equilibrium, the activist never sells shares over time and buys more shares over time, if given the opportunity.

Activist Effort. We can solve for the optimal contract (C, R) and activist effort i in (B.27). The internal free-rider/effort/contracting problem is a repeated version of the baseline problem, so that

$$a = a(\theta) = \frac{\Delta + \pi}{\phi_i} \left(\frac{1}{\xi(1+\xi)} \right) \quad \text{and} \quad i = i(\theta) = \frac{\Delta + \pi}{\phi_i} \left(\frac{\xi}{1+\xi} \right). \tag{B.30}$$

Smooth Trading. Having obtained optimal efforts, $a(\theta)$ and $i(\theta)$, let us turn to analyzing the activist's trading. Assume for now that the activist trades smoothly, in that $d\theta = \dot{\theta} dt$. In light of the above discussion, we therefore focus on the "smooth trading region" with $\theta \in (0, \overline{\theta})$. Thus, $V(\theta + d\theta) = V(\theta) + V'(\theta)\dot{\theta}dt$ and $d\theta P(\theta + d\theta) = \dot{\theta}P(\theta)dt$ where terms of order $(dt)^2$ or higher vanish in continuous time. Thus, the activist chooses the trading rate $\dot{\theta}$ to maximize:

$$\dot{\theta}[V'(\theta) - P(\theta)]$$

For smooth trading to be optimal, i.e., $\dot{\theta} \in (-\infty, +\infty)$, it must be that

$$V'(\theta) = P(\theta),$$

in that gains from trade are zero in equilibrium in the smooth trading region. Indeed, the activist is willing to pay $V'(\theta)$ dollars for an additional unit of stock. The cost of purchasing such a unit equals the market price of stock $P(\theta)$, i.e., passive investors' valuation of the firm's stock. In equilibrium, the marginal benefit of buying equals the marginal cost.

The activist's value function in the smooth trading region is then determined "as if" the activist could not trade, satisfying $V(\theta) = \hat{V}(\theta)$ where $\hat{V}(\theta)$ is the value function under no trading. We can then rewrite the activist's value function (under optimal efforts) as

$$V(\theta) = \theta\big[X_B - T - \frac{\phi_i i^2}{2} + (a+i)(\Delta + \pi)\big] - \frac{\phi_a a^2}{2}.$$

The activist's value function in the smooth trading region can then be solved in closed form:

$$V(\theta) = \hat{V}(\theta) = \theta(X_G + \pi^P - \Delta) + \theta\,\frac{(\Delta+\pi)^2}{2\phi_i} \cdot \frac{\xi^2 + \xi + 1}{\xi(1+\xi)}.$$

In equilibrium, the stock price satisfies $V'(\theta) = P(\theta)$. We can therefore differentiate the above expression for the value function to obtain the stock price as:

$$\begin{aligned} P(\theta) &= X_B - T - \frac{\phi_i i^2}{2} + (a+i)(\Delta+\pi) + \theta(\Delta+\pi)(a'(\theta) + i'(\theta)) - \theta\phi_i i(\theta) i'(\theta) - \phi_a a(\theta) a'(\theta) \\ &= X_B - T - \frac{\phi_i i^2}{2} + (a+i)(\Delta+\pi) + \frac{(\Delta+\pi)^2}{\phi_i(1+\xi)^2}. \end{aligned}$$

At the same time, the stock price satisfies the pricing equation:

$$P(\theta) = X_B - T - \frac{\phi_i i^2}{2} + (a+i)\Delta + P'(\theta)\dot{\theta},$$

resulting from the cash flows of passive investors. It can be verified that $V''(\theta) > 0$ and $P'(\theta) > 0$.

Combining these two equations, we can solve for the trading rate as:

$$\dot{\theta} = \frac{1}{P'(\theta)}\left[(a+i)\pi + \frac{(\Delta+\pi)^2}{\phi_i(1+\xi)^2}\right] > 0. \tag{B.31}$$

Thus, in equilibrium, the activist never sells shares over time and buys more shares over time, if given the opportunity.

Lumpy Trading. Let $\hat{P}(\theta)$ be the stock price in the hypothetical scenario that the activist does not trade, in that:

$$\hat{P}(\theta) := X_B - T - \frac{\phi_i i^2}{2} + (a+i)\Delta.$$

Given θ, we note that $\hat{P}(\theta)$ coincides with the baseline price in that:

$$\hat{P}(\theta) = \frac{(\Delta+\pi)\big[(2+2\xi+2\xi^2+\xi^3)\Delta - \xi^3\pi\big]}{2\xi(\xi+1)^2\phi_i} + X_G + \pi^P - \Delta.$$

or equivalently

$$\hat{P}(\theta) = X_B - T + \frac{(\Delta+\pi)\Big[(2+2\xi+2\xi^2+\xi^3)\Delta - \xi^3\pi\Big]}{2\xi(1+\xi)^2\phi_i}.$$

Further, note that $\hat{P}(\theta) < P(\theta)$ due to $P'(\theta)\dot{\theta} > 0$.

Once θ reaches $\overline{\theta}$ (from below), the activist is indifferent and randomizes between not trading at all (i.e., $\dot{\theta} = 0$) and buying the entire firm, i.e., the remaining $1-\overline{\theta}$ units of stock, at price $\hat{P}(1)$. The threshold $\overline{\theta}$ satisfies $\overline{\theta} = \inf\{\theta \in [0,1] : \hat{V}(\theta) \le \hat{V}(1) - (1-\overline{\theta})\hat{P}(1)\}$ and the trading intensity γ at which the activist buys the entire firm is determined such that the price level equals $P(\overline{\theta}) = \hat{V}'(\overline{\theta})$. If $\overline{\theta} \in (0,1)$, then $\overline{\theta}$ solves:

$$\hat{V}(\overline{\theta}) = \hat{V}(1) - (1-\overline{\theta})\hat{P}(1). \tag{B.32}$$

We assume in what follows $\hat{V}(1) - \hat{P}(1) < 0$, which means that, starting from $\theta = 0$, the activist never acquires the entire firm at once. This implies that $\overline{\theta} \in (0,1)$.

Then, θ remains constant at $\overline{\theta}$ until it jumps to one. For $\theta \in (\overline{\theta}, 1)$, the activist immediately buys the entire firm, i.e., $d\theta = 1-\theta$. It can be shown that the randomization rate satisfies

$$\gamma = \frac{1}{\hat{P}(1) - P(\theta)}\left[(a+i)\pi + \frac{(\Delta+\pi)^2}{\phi_i(1+\xi)^2}\right] > 0.$$

Overall, we have

$$V(\theta) = \begin{cases} \hat{V}(\theta) & \text{for} \quad \theta \in [0,\overline{\theta}] \\ \hat{V}(1) - (1-\theta)\hat{P}(1) & \text{for} \quad \theta \in (\overline{\theta}, 1], \end{cases}$$

as well as

$$P(\theta) = \begin{cases} \hat{V}'(\theta) & \text{for} \quad \theta \in [0,\overline{\theta}] \\ \hat{P}(1) & \text{for} \quad \theta \in (\overline{\theta}, 1]. \end{cases}$$

Finally, note that after time τ^β, the activist will always buy additional shares, so that, in the limit $t \to \infty$, we have that $\theta_t \to 1$, i.e., the activist acquires the entire firm in the long run. The interpretation is that the ability to trade allows the activist to accumulate a larger stake over time, increasing its effort incentives and addressing the internal free-rider problem.

B.3 Solution before time τ^β

When $\theta \in [0,\overline{\theta}]$, the value function satisfies $V^\beta(\theta) = V(\theta) = \hat{V}(\theta)$, since the value function either is determined "as if" there is no trade. When $\theta \in [0,\overline{\theta}]$, the price before time τ^β satisfies

$$P^\beta(\theta) = \frac{1}{1+\beta}\hat{P}(\theta) + \frac{\beta}{1+\beta}P(\theta) = \hat{P}(\theta) + \frac{\beta}{1+\beta}\left(P(\theta) - \hat{P}(\theta)\right).$$

Also note that

$$P(\theta) - \hat{P}(\theta) = P'(\theta)\dot{\theta} = \frac{\Delta+\pi}{\phi_i}\left[\frac{\pi(1+\xi^2)}{\xi(1+\xi)} + \frac{\Delta+\pi}{(1+\xi)^2}\right] > 0.$$

After time τ^β, the price in a given state is higher since the activist increases its stake over time.

When $\theta \in (\overline{\theta}, 1]$, the value function satisfies

$$V^\beta(\theta) = \frac{1}{1+\beta}\hat{V}(\theta) + \frac{\beta}{1+\beta}[\hat{V}(1) - (1-\theta)\hat{P}(1)]$$

In addition, the price before time τ^β satisfies: $P^\beta(\theta) = \frac{1}{1+\beta}\hat{P}(\theta) + \frac{\beta}{1+\beta}\hat{P}(1)$.

B.4 Entry

Suppose $\hat{\theta} \in (0, \overline{\theta})$ and consider the entry decision to acquire $\theta = \hat{\theta}$. (We write θ instead of $\hat{\theta}$ in the following expressions for notational convenience, while $\xi = \xi(\theta) = \xi(\hat{\theta})$.) The entry condition now becomes:

$$V^\beta(\theta) - \theta P^\beta(\theta) = (a+i)\theta\pi - \frac{\phi_a a^2}{2} - \frac{\theta\beta}{1+\beta}(P(\theta) - \hat{P}(\theta)) \geq 0.$$

Thus, the activist enters as long as:

$$\frac{\Delta}{\pi} \;\leq\; \frac{(2\xi^3 + 2\xi^2 + 2\xi + 1) - 2\overline{\beta}\Big((1+\xi^2)(1+\xi) + \xi\Big)}{1 + 2\overline{\beta}\,\xi}, \tag{B.33}$$

with $\overline{\beta} = \frac{\beta}{1+\beta}$ capturing trading opportunities. The numerator may turn negative, in which case entry is not feasible. Note that setting $\overline{\beta} = 0$, i.e., removing trading opportunities, yields the same condition for entry as in the baseline model, i.e., entry requires condition (13): $\frac{\Delta}{\pi} \leq 2\xi^3 + 2\xi^2 + 2\xi + 1$.

Results. Note that the right-hand-side declines in $\overline{\beta}$. That is, better trading opportunities lead to a worsening of the external free-rider problem. In particular, frictionless trading post-entry precludes activist entry. This stark outcome results from the combination of two assumptions: (*i*) frictionless trading, and (*ii*) an extreme external free-rider problem in which the full gains from activism are immediately reflected in the stock price at entry. Assumption (*ii*) is relaxed in Section 6.3, while our model allows for impediments for trading (lower $\overline{\beta}$).

B.5 Take-Away: Trading mitigates the internal free-rider problem but exacerbates the external free-rider problem

The parameter β (or its transform $\overline{\theta}$) captures the frequency of trading opportunities. The activist always buys a larger stake in the firm when given the opportunity to trade. A larger stake leads to higher effort from the activist. Overall, it tends to mitigate the internal free-rider problem, boosting the transition rate. At the same time, an increase in β increases the stock price at which the activist must enter, thus worsening the external free-rider problem.

C Solution with Generalized Preferences

We characterize the solution under generalized non-pecuniary preferences presented in Section 5.1 in (17). Unless otherwise mentioned, the remaining elements are specified as in the baseline. Recall that consequentialist preferences for passive investors drop out.

Contracting with Insiders. The contracting problem with insiders remains unchanged relative to the baseline. The reason is that we did not make any changes regarding insiders' preferences. Specifically, (4) and (5) apply and hold throughout.

Activist's and Passive Investors' Payoff (Post-Entry). We define the payoffs of the activist and passive investors conditional on entry (i.e., $\theta_0 = \theta$):

$$V = \max_{a \geq 0, (C,R)} \Big\{ \pi_0^{C,A} + \theta \pi_0^A + \theta\big(1 - (a+i)\big)(X_B - C - T) \\ + (a+i)\theta\big(X_G + \pi^A + \frac{\pi^{C,A}}{\theta} - C - R\big) - \frac{\phi_a a^2}{2} \Big\}, \tag{C.34}$$

and, recalling that passive investors' consequentialist preferences do not affect pricing (i.e., they drop out), we have:

$$P = \pi_0^P + \big(1 - (a+i)\big)\big(X_B - C - T\big) + (a+i)\big(X_G + \pi^P - C - R\big). \tag{C.35}$$

Taking the insiders' contract and effort as given, we take the first-order condition in (C.34) with respect to a (focusing on interior levels):

$$\theta \left[X_G - X_B + T + \pi^A + \frac{\pi^{C,A}}{\theta} - R \right] = \phi_a a.$$

Using (19) — that is, $\pi = \pi^A - \pi^P + \frac{\pi^{C,A}}{\theta}$ — as well as $\Delta = X_G - X_B + T + \pi^P$, we obtain that, as in the baseline, a solves (11) — that is, $a = \frac{\theta(\Delta + \pi - R)^+}{\phi_a}$.

Next, using (5), (19), as well as $\Delta = X_G - X_B + T + \pi^P$, we obtain:

$$V = \theta \pi_0^A + \pi_0^{C,A} + \max_R \left\{ \theta\big[X_B - T - W - \frac{\phi_i i^2}{2} + (a+i)(\Delta + \pi)\big] - \frac{\phi_a a^2}{2} \right\} \tag{C.36}$$

subject to (4) and (11). The optimization over R is the same as in the baseline (compare Appendix A.2, which presents the proof of Proposition 2). Note that b and $\pi_0^{C,A}$ do not affect the optimization. This shows that post-entry outcomes (specifically, efforts) only depend on the preferences via Δ and π, and remain analogous to the baseline. Specifically, efforts are characterized in (12).

Passive Ownership Payoff. The stock price under activist ownership equals

$$P = \big(1 - (a+i)\big)\big(X_B - C - T + \pi_0^P\big) + (a+i)\big(X_G + \pi_0^P + \pi^P - C - R\big) \\ = \pi_0^P + X_B - T - W - \frac{\phi_i i^2}{2} + (a+i)\Delta, \tag{C.37}$$

where the efforts are characterized in (12).

If the activist does not enter and $\theta_0 = 0$, then $a = 0$ and passive investors are in control of the firm and choose the manager's contract (C, R) to maximize firm value, i.e.,

$$P_0 = \max_{(C,R)} \big\{ \big(1 - i\big)\big(X_B - C - T + \pi_0^P\big) + i\big(X_G + \pi_0^P + \pi^P - C - R\big) \big\} \\ = \pi_0^P + X_B - T - W + \max_{i \geq 0} \left\{ -\frac{\phi_i i^2}{2} + i\Delta \right\}.$$

We can solve this optimization for $i = i^P = \frac{\Delta^+}{\phi_i}$.

The activist's expected payoff under passive ownership then becomes $V^P = i^P \pi^{C,A} + \pi_0^{C,A}$.

Entry Condition. The entry condition becomes: $V - \theta P \geq V^P$. That is, the activist enters and $\theta_0 = \theta$ if and only if this condition holds. Using $V^P = \pi_0^{C,A} + i^P \pi^{C,A}$, we obtain that the activist enters if and only if:

$$(a + i)\theta\pi - \frac{\phi_a a^2}{2} - \pi^{C,A} i^P + \theta b \geq 0,$$

which is (20), as desired, where $b = \pi_0^A - \pi_0^P$.