GREEN PILLS: MAKING CORPORATE CLIMATE COMMITMENTS CREDIBLE

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Many of the world's largest firms are now announcing plans to reduce their carbon emissions over the coming decades. Against the backdrop of lackadaisical climate policy, this development is widely held out as positive. But ubiquitous allegations of corporate and investor greenwashing raise the question of just how credible these announcements really are. After all, even when firms propose rigorous emission reduction targets, the shifting sands of investor preferences raise the risk that companies eventually renege. Given the rising proportion of investors with climate-conscious preferences, this leaves money on the table: firms engaging in a genuine transition away from high-emission activity should benefit from higher valuations, creating a business case to commit credibly.

Conventional mechanisms to generate such credible climate commitments—climate disclosures, corporate governance reforms, or changes to the corporate purpose—are inadequate to achieve that goal. Instead, we propose a suite of contractual mechanisms, which we term "green pills," to make climate commitments credible by endogenizing incentives to meet climate targets. We argue that their adoption

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does not contravene directors' fiduciary duties and requires no change to corporate law. Green pills thus help firms and their investors undertake credible climate commitments and show other stakeholders how serious they really are about their contribution to tackling climate change.

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INTRODUCTION

Many of the world's largest firms have recently announced their intention to reduce carbon emissions over the coming decades. The financial sector claims to have mobilized over $130 trillion in support of the net zero transition, and 33% of the G20's largest companies by revenue have set a net zero target in alignment with the goals of the Paris Agreement.[1] Even Shell, an oil major and for a long time a bête noir of climate campaigners, has set itself the target to "become a net-zero emissions energy business by 2050."[2]

Against a backdrop of lackadaisical climate policy, that sounds like a rare piece of good news for climate campaigners. But Shell's "target," which was announced with great fanfare,[3] turns out to be anything but a credible commitment. A quick look into the fine print suggests that Shell's net zero emissions target qualifies at best as an aspiration that may not even be consistent with Shell's current plans, strategies, budgets, and pricing assumptions.[4] It should be no surprise, then, that anything stated in the page outlining Shell's net zero target, other than statements of historical fact, and including, therefore, Shell's statements on emission targets themselves, is explicitly qualified as a forward-looking statement.[5] Actual outcomes, as Shell hastens to clarify, are subject to known and unknown risks and

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1. *See* Thomas N. Hale et al., *G20: Net Zero Stocktake*, NET ZERO TRACKER (Oct. 26, 2021), https://zerotracker.net/analysis/g20-net-zero-stocktake/ [https://perma.cc/ANE2-HQHD].

2. *See* Royal Dutch Shell, *Our Climate Target*, SHELL GLOB., https://www.shell.com/energy-and-innovation/the-energy-future/our-climate-target.html#iframe=L3dlYmFwcHMvY2xpbWF0ZV9hbWJpdGlvbi8 [https://perma.cc/UN4L-LZ5D] (last visited June 13, 2022).

3. *See* Royal Dutch Shell, *Shell Accelerates Drive for Net-Zero Emissions with Customer-First Strategy*, SHELL GLOB., https://www.shell.com/media/news-and-media-releases/2021/shell-accelerates-drive-for-net-zero-emissions-with-customer-first-strategy.html [https://perma.cc/TQC6-J6EU] (last visited Nov. 24, 2022).

4. If one opens the Legal Disclaimer hyperlink at the bottom of the webpage describing Shell's emissions target, one reads that "Shell's operating plans cannot reflect our 2050 net-zero emissions target and 2035 NCF target, as these targets are currently outside our planning period. In the future, as society moves towards net-zero emissions, we expect Shell's operating plans to reflect this movement. However, if society is not net zero in 2050, as of today, there would be significant risk that Shell may not meet this target." *See* Royal Dutch Shell, *Our Climate Target, Legal Disclaimer*, SHELL GLOB., https://www.shell.com/energy-and-innovation/the-energy-future/our-climate-target.html#iframe=L3dlYmFwcHMvY2xpbWF0ZV9hbWJpdGlvbi8 [https://perma.cc/5FYL-X93M] (last visited November 24, 2022).

5. *Id.*

uncertainties that could cause them to "differ materially from those expressed or implied in these statements."[6]

This practice is far from unique to Shell.[7] Allegations of widespread corporate and investor greenwashing cast doubt on the credibility of laudatory net zero pledges, suggesting that in reality, they are rife with fudge.[8] A recent study scrutinized the climate pledges of 25 major multinational companies representing a cross-section of industries and found that only 3 of them are planning for "decarbonization of over 90% of their full value chain emissions by their respective target years."[9] Thirteen of the 25 provide detailed plans, but their implementation would on average only curb emissions by 40% over the next few decades.[10] Compounding the problem of loopholes inherent to the net zero concept,[11] many of these targets are set for 2040, 2050, or beyond—when the managers that set them are unlikely to be held accountable. The lack of credibility in net zero target announcements raises the two central questions motivating this Article: can we expect shareholders and managers to coalesce around sufficiently timely and ambitious climate transition pledges? And if so, can firms *credibly* commit to them?

A focus on what business is doing and could do to mitigate climate change is warranted. Human-induced global warming has already increased the earth's

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6. *Id.* As Shell's disclaimer puts it, "Forward-looking statements are statements of future expectations that are based on management's current expectations and assumptions and involve known and unknown risks and uncertainties that could cause actual results, performance or events to differ materially from those expressed or implied in these statements." *Id.* An additional qualification in Shell's legal disclaimer notes, for completeness, that "[e]ach forward-looking statement speaks only as of the date of this content, April 20, 2022." *Id.*

7. For example, oil major BP uses similar language in a "cautionary statement" in its February 12, 2020, announcement setting its "*ambition* for net zero by 2050" (emphasis added: the word *ambition*, as opposed to, e.g., pledge or commitment, is repeated throughout the relevant BP document, and instrumental to it are ten "aims"). *See BP Sets Ambition for Net Zero by 2050, Fundamentally Changing Organization to Deliver*, BP (Feb. 12, 2020), https://www.bp.com/en/global/corporate/news-and-insights/press-releases/bernard-looney-announces-new-ambition-for-bp.html [https://perma.cc/LH85-PDQH]. The words *commitment* and *committed* are only used there to refer to BP's commitments "to safe and reliable operations," and "to delivering BP's investor proposition, including commitments on: growing sustainable free cash flow and shareholder distributions over long term; maintaining strong financial frame and cost and capital discipline, and deleveraging the balance sheet; [and] delivering 2021 free cash flow targets." *Id.*

8. Leaders, *Sustainable Finance Is Rife with Greenwash. Time for More Disclosure*, ECONOMIST (May 22, 2021), https://www.economist.com/leaders/2021/05/22/sustainable-finance-is-rife-with-greenwash-time-for-more-disclosure [https://perma.cc/YUX3-E25T].

9. THOMAS DAY ET AL., CORPORATE CLIMATE RESPONSIBILITY MONITOR 2022: ASSESSING THE TRANSPARENCY AND INTEGRITY OF COMPANIES' EMISSION REDUCTION AND NET-ZERO TARGETS 5 (2022), https://newclimate.org/wp-content/uploads/2022/02/CorporateClimateResponsibilityMonitor2022.pdf [https://perma.cc/ZC69-VZ9F].

10. *Id.*

11. *See, e.g.*, Sam Fankhauser et al., *The Meaning of Net Zero and How to Get It Right*, 12 NATURE CLIMATE CHANGE 15, 17–18 (2022).

average surface temperature by 1.1°C above pre-industrial levels, and warming is accelerating.[12] Attribution studies have concluded that higher temperatures are virtually impossible without human-caused climate change.[13] The physical consequences can already be seen in the form of melting ice and glaciers and extreme weather patterns triggering deadly floods, heatwaves, and wildfires.[14]

The international scientific consensus is that the severity of these consequences will increase dramatically with further increases in temperature.[15] For this reason, in Paris in 2015 the vast majority of world governments agreed to seek to limit temperature increases to 1.5°C, which requires a shift to net zero emissions[16] by 2050 at the latest.[17] Because climate change is driven by carbon emissions,[18] a policy imperative is to *mitigate* the extent of global warming by reducing greenhouse gas emissions, particularly carbon dioxide.[19] But current policies will not be enough to meet the Paris target: estimates suggest our trajectory without further policy change is an increase of 2.7°C by 2100.[20]

Failure to meet the targets under the Paris Agreement is expected to be costly. There is scientific consensus that the long-term costs of managing the impacts of higher emissions will likely exceed the near-term costs of reducing those emissions to mitigate climate change in line with the Paris targets. The social cost–benefit calculus, in other words, favors rapid action.[21] A fundamental problem for society is that the costs and benefits of reducing emissions and adapting to climate change have different footprints—across individuals, across generations, across

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12. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, AR6 CLIMATE CHANGE 2021: THE PHYSICAL SCIENCE BASIS, SUMMARY FOR POLICYMAKERS (SPM) 5–6, 6 fig.SPM.1 (2021) ("Global surface temperature was 1.09°C [0.95°–1.20°C] higher in 2011–2020 than 1850–1900.").

13. *Western North American Extreme Heat Virtually Impossible without Human-Caused Climate Change*, WORLD WEATHER ATTRIBUTION (July 7, 2021), https://www.worldweatherattribution.org/western-north-american-extreme-heat-virtually-impossible-without-human-caused-climate-change/ [https://perma.cc/7K6U-NX8Q].

14. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 12, at 26 fig.SPM.9.

15. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2022: IMPACTS, ADAPTATION AND VULNERABILITY, SUMMARY FOR POLICYMAKERS (SPM) (2022).

16. The concept of "net zero" emissions refers to the idea, now widely adopted and embedded in the Paris Agreement, that carbon emissions and removals must balance. *See* Fankhauser et al., *supra* note 11.

17. Paris Agreement to the United Nations Framework Convention on Climate Change, Dec. 12, 2015, art. 2(1)(a) (2015) (Signatories commit to "[h]olding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels.").

18. *See, e.g.*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 12, at 22–23, 22 fig.SPM.8.

19. *Id.* at 27–31 (and especially at 28 fig.SPM.10).

20. *The CAT Thermometer*, CLIMATE ACTION TRACKER, https://climateactiontracker.org/global/cat-thermometer/ [https://perma.cc/TYT9-MKPR] (last updated Nov. 10, 2022). This estimate is the midpoint of a wide range—from 2.0°C to 3.6°C. Outcomes are dramatically worse at the top than at the bottom of this range. *Id.*

21. Simon Dietz et al., *The Economics of 1.5°C Climate Change*, 43 ANNUAL REV. ENV'T & RES. 455 (2018).

firms, and across nations. Environmental economists have long argued that these asymmetries doom international action on climate change mitigation to failure because of free-rider problems,[22] a dismal result that is so far borne out in the absence of credible international (or even national) action on carbon pricing.[23] Recent work has suggested that the best chance of success lies not in waiting for international agreement and top-down implementation, but rather in bottom-up action taken by decentralized institutions—including businesses.[24]

There is ample discussion by academics and practitioners around corporate climate commitments, but that discussion focuses on the clarity, rigor, and ambition of the transition *plans* that firms have announced,[25] not on the *credibility* of the commitment that firms and their investors make, however implicitly, to implement those plans. In this Article, we intend to fill that gap.

A starting point is to ask whether traditional firm-value-maximizing arguments could compel managers and shareholders to credibly commit to reducing emissions. Classical corporate governance mechanisms exhort managers to maximize shareholder value, as represented by the stock price.[26] An important question, therefore, is how climate change might affect a firm's valuation.

From this perspective, climate change plays out as an increasingly significant risk factor for businesses, which are confronted by rising costs of physical risks (the costs of climate change on firms' assets and operations, through flood, drought, fire, extreme temperatures, disease, and the like) and transition risks (e.g., regulatory initiatives such as carbon taxes or emission caps, but also changes

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22. *See, e.g.*, Carlo Carraro & Domenico Siniscalco, *The International Dimension of Environmental Policy*, 36 EUR. ECON. REV. 379 (1992); Scott Barrett, *Self-Enforcing International Environmental Agreements*, 46 OXFORD ECON. PAPERS 878 (1994); Scott Barrett, *Climate Treaties and "Breakthrough" Technologies*, 96 AM. ECON. REV. 22 (2006).

23. *See, e.g.*, David Klenert et al., *Making Carbon Pricing Work for Citizens*, 8 NATURE CLIMATE CHANGE 669, 669, 675 (2018). Economists regard carbon pricing, which would effectively raise the price of emissions to their social cost, as the most effective policy to mitigate emissions. *See* WILLIAM D. NORDHAUS, A QUESTION OF BALANCE (2014); Martin L. Weitzman, *Can Negotiating a Uniform Carbon Price Help to Internalize the Global Warming Externality?*, 1 J. ASS. ENV'T RES. ECON. 29 (2014); Harrison Hong, Frank Weikai Li & Jiangmin Xu, *Climate Risks and Market Efficiency*, 208 J. ECONOMETRICS 265, 265–81 (2019); Heather Long, *'This Is Not Controversial': Bipartisan Group of Economists Calls for Carbon Tax*, WASH. POST (Jan. 16, 2019, 7:17 PM), https://www.washingtonpost.com/business/2019/01/17/this-is-not-controversial-bipartisan-group-economists-calls-carbon-tax/ [https://perma.cc/H3XB-DNHU].

24. *See* Vítor V. Vasconcelos et al., *A Bottom-Up Institutional Approach to Cooperative Governance of Risky Commons*, 3 NATURE CLIMATE CHANGE 797 (2013); *Race to Zero Campaign*, UNITED NATIONS CLIMATE CHANGE, https://unfccc.int/climate-action/race-to-zero-campaign [https://perma.cc/6ZYJ-2UYL]; Thomas N. Hale et al., *Sub- and Non-State Climate Action: A Framework to Assess Progress, Implementation and Impact*, 21 CLIMATE POL'Y 406, 406–20 (2021); Alessandro Tavoni, *Game Theory: Building Up Cooperation*, 3 NATURE CLIMATE CHANGE 782 (2013).

25. Joeri Rogelj et al., *Three Ways to Improve Net-Zero Emissions Targets*, 591 NATURE 365 (2021).

26. *See, e.g.*, Jeffrey N. Gordon, *Independent Directors and Stock Market Prices: The New Corporate Governance Paradigm*, 59 STAN. L. REV. 1465, 1526–35 (2007).

in market demand, technological change, reputational concerns, and potential litigation).[27] At the same time, the transition to a net zero economy also offers commercial opportunity, as the advent of Tesla vividly illustrates.[28] Given the growing costs of climate change and the opportunities associated with a transition to a net zero economy, it is likely that at some point firms will reach a tipping point and conclude their future profits will be maximized by aligning their business model with net zero.[29] Such firms will be able to justify their transition using a conventional business case, fully aligned with traditional shareholder value maximization norms. As transition pathways solidify, more firms can be expected to identify such a business case over time. However, there is much uncertainty about when this point will be reached.

Despite this uncertainty, a growing number of investors appear to be keen on taking firms' transition plans into account in their valuations, beyond the extent implied by conventional assessments of expected profitability.[30] These "climate-conscious" investors may prefer firms to transition toward net zero before a conventional business case for doing so can be made.[31]

Within the framework described above, we make four contributions to the debate on corporate governance and climate change. First, we show that rational climate-conscious investors will discount climate-related undertakings that are not credible.[32] Without a binding commitment, firms face a time inconsistency problem. Changes in the costs of transition, or in the mix of shareholders in the firm's register (green vs. non-green), may lead the firm to renege on transition "pledges" when the time comes to incur significant costs. Rational climate-conscious investors, cognizant of this risk, would discount the premium they are willing to pay for a firm's shares accordingly. Assuming that a sufficiently large proportion of investors are climate-conscious, making a more credible commitment to transition may thus increase a firm's valuation.

Second, we show that the corporate governance mechanisms so far proposed to generate corporate commitments to transition have limited credibility.[33] Liability-based mechanisms such as disclosures to shareholders are constrained by the assessment of shareholder losses in purely financial terms, leaving out the value climate-conscious investors place on emission reduction. Governance-based

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27. *See, e.g.*, TASK FORCE ON CLIMATE-RELATED FIN. DISCLOSURES, RECOMMENDATIONS OF THE TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES 5–6 (2017), https://www.fsb-tcfd.org/recommendations/ [https://perma.cc/8X7Q-RM2F].

28. *See infra* text accompanying note 51.

29. Matthias J. Pickl, *The Renewable Energy Strategies of Oil Majors—From Oil to Energy?*, 26 EN. STRAT. REV. 100370, § 6 (2019); Ensieh Shojaeddini et al., *Oil and Gas Company Strategies Regarding the Energy Transition*, 1 PROG. EN. 012001, § 2 (2019); Paul Stevens, *International Oil Companies: The Death of the Old Business Model*, 37 (Chatham House, Rsch. Paper, May 16, 2016), https://www.chathamhouse.org/sites/default/files/publications/research/2016-05-05-international-oil-companies-stevens.pdf [https://perma.cc/LQ69-Y7F5].

30. *See infra* Section I.B.

31. *See infra* Section I.C.

32. *See infra* Subsection I.D.3.

33. *See infra* Part II.

mechanisms such as executive compensation, board structure, Say on Climate votes, and tweaks to the company's purpose rest ultimately on the board's discretion for their effectiveness, but shareholders elect the board. Hence, such mechanisms can be undermined by changes in the mix of shareholders and their preferences.

Third, we show how a firm *can* credibly commit by introducing the idea of "green pills": mechanisms that firms could deploy using private law to deliver credible commitments to transition.[34] We characterize the extent of, and limits to, commitment by these means. Contract-based mechanisms deliver a degree of commitment that can be tailored to the firm's circumstances. Once a green pill is in place, standard corporate governance mechanisms work to support transition, instead of creating potential obstacles. In particular, green pills serve to align the interests of shareholders focused solely on profits with those of climate-conscious investors, thereby greatly strengthening an adopting firm's commitment to transition.

Finally, we show that adopting a green pill is in line with directors' fiduciary duties.[35] Its adoption is subject to scrutiny by Delaware courts under the business judgment standard of review.

This Article proceeds as follows. Part I sets the scene by outlining the challenges of climate change and the evolution of investor preferences and their impact on demand for transition. Part II introduces the corporate transition commitment problem, explains how credible commitments to carbon reduction may benefit firms and investors, and shows that many mechanisms conventionally discussed in the literature are inadequate to deliver such commitments. Part III introduces the idea of the green pill as a mechanism for making a carbon transition promise credible. It explains how such a commitment can be achieved. It also analyzes the application of directors' fiduciary duties to the adoption of a green pill, showing that it would be subject to business judgment review, and articulating a rational basis for its adoption.

I. DEMAND FOR TRANSITION AND IMPLICATIONS FOR BOARDS

A. Climate Change and Corporate Climate Risks

The principal cause of climate change is carbon dioxide produced by the burning of fossil fuels. To stop the rise in temperatures, if not revert the trend, humanity needs to put the brakes on further fossil fuel emissions.

However, delivering a widespread transition away from fossil fuels requires an unprecedented level of social and economic change, which can realistically only be delivered through coordinated political action. Despite the high salience of the climate crisis, the challenge of political coordination is enormous. This plays out in multiple overlapping ways: between politicians with short time horizons and the rest of humanity, between present and future generations, and between citizens and countries who benefit more from carbon-related activities and those who will suffer more from climate change. Hence, there is an apparent inability to enact public policy solutions and an increasing focus on the role that the

34. *See infra* Part III.
35. *See infra* Section III.B.

private sector can play in advancing transition goals. This has led to a plethora of policy initiatives and a burgeoning body of literature suggesting that businesses might take a leading role in jumpstarting the move away from high carbon emissions.[36]

For legal scholars, this raises questions about the extent to which the institutions of corporate governance may help or hinder such leadership roles. The traditional perspective on businesses' relationship with society—famously articulated by Milton Friedman[37]—offers little prospect of business taking a leadership role. It emphasizes the importance of focusing business leaders' attention on maximizing profits.[38] This is premised on the assumption that where business activity may be harmful for society, it is reflected in the "rules of the game" with which firms must comply.[39] If the regulatory framework sets firms' private costs of emissions equal to their social costs, then profit maximization is aligned with social welfare.[40]

This "climate-indifferent" perspective is neither in favor of nor against reducing carbon emissions: it is neutral on this and any other socially contentious issue, relying on politicians and regulators to stipulate the rules of the game. Investors can encourage firms to focus solely on profit maximization, safe in the knowledge that this will also promote social welfare.[41] Yet political intervention lags far behind what is needed to internalize the social costs of carbon emissions. Hence, the traditional perspective suggests that business will lag, rather than lead, on carbon transition.

Business leaders face an imperative to act in part because physical and transition risks related to climate change are increasingly significant for businesses.[42] The relative extent of physical and transition risks depends on which pathway policymakers follow going forwards: more vigorous action to reduce emissions (such as higher carbon taxes) means lower physical risks over time but greater transition risks in the short run, and vice versa.[43] The costs of climate change for business, as well as how they affect individual firms and industries, therefore depend on key uncertainties such as the speed at which policymakers introduce

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36. *See, e.g.*, UNITED NATIONS CLIMATE CHANGE, *supra* note 24; Hale et al., *supra* note 24.

37. MILTON FRIEDMAN, CAPITALISM AND FREEDOM 133 (1962).

38. *Id.*

39. *Id.*

40. *Id.*

41. REINIER KRAAKMAN ET AL., THE ANATOMY OF CORPORATE LAW: A COMPARATIVE AND FUNCTIONAL APPROACH 23–24 (3rd ed. 2017).

42. *See supra* text accompanying note 27.

43. NETWORK FOR GREENING THE FIN. SYS., NGFS CLIMATE SCENARIOS FOR CENTRAL BANKS AND SUPERVISORS 9 (2021) (showing a roughly inverse correlation between intensity of physical risk and transition risk).

carbon taxes and the pace of technological change that, for instance, reduces the cost of renewable energy.[44]

Engaging with the climate transition can also confer benefits. Mark Carney, former Governor of the Bank of England and UN Special Envoy on Climate Action and Finance, has argued that the transition to a net zero economy is "the greatest commercial opportunity of our time."[45] This is because getting there will require a wholesale rewiring of the economy and vast investments in energy and transport systems. Rapid technological progress, which for example is already lowering the costs of renewable energy relative to fossil fuel alternatives,[46] will accelerate this process.[47] Renewables already account for nearly a third of global electricity generation[48] and are forecast by the International Energy Agency to account for over 90% of global electricity capacity expansion up to 2027.[49] Technological advances have exponentially reduced the costs of electric batteries over the last three decades.[50] And Tesla, a trailblazer in these technologies, is, as we write, the world's most valuable auto company.[51]

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44. *See, e.g.*, Rupert Way et al., *Empirically Grounded Technology Forecast and the Energy Transition*, 6 JOULE 2057 (2022), https://www.inet.ox.ac.uk/publications/no-2021-01-empirically-grounded-technology-forecasts-and-the-energy-transition/ [https://perma.cc/7WYQ-K9FZ].

45. Alastair Marsh & Benjamin Robertson, *Carney Calls Net-Zero Ambition "Great Commercial Opportunity,"* BLOOMBERG (Nov. 9, 2020, 5:35 AM), https://www.bloomberg.com/news/articles/2020-11-09/carney-calls-net-zero-ambition-greatest-commercial-opportunity [https://perma.cc/3QJN-9HAF]. *See also* THE INVESTING AND SAVING ALLIANCE, RESPONSIBLE AND SUSTAINABLE INVESTING (2021), https://www.tisa.uk.com/policy-technical/social-responsibility-resources-old/responsible-sustainable-investing/ [https://perma.cc/9ABJ-X3CD]; MARK CARNEY, BUILDING A PRIVATE FINANCE SYSTEM FOR NET ZERO: PRIORITIES FOR PRIVATE FINANCE FOR COP26 (2020), https://custom.cvent.com/8644FD66069649369747A352DBAB07C3/files/d59172883a85415fb14311fd6eecb072.pdf [https://perma.cc/ML3R-QXXY].

46. *See, e.g.*, Max Roser, *Why Did Renewables Become So Cheap So Fast?*, OUR WORLD IN DATA (Dec 1, 2020), https://ourworldindata.org/cheap-renewables-growth [https://perma.cc/755W-6W4U] (detailing 89% decline in cost of solar electricity and 70% decline in cost of onshore wind electricity over period 2009–2019).

47. Michael E. Porter & Claas Van der Linde, *Toward a New Conception of the Environment–Competitiveness Relationship*, 9 J. ECON. PERSP. 97 (1995); Philippe Aghion et al., *Path Dependence, Innovation and the Economics of Climate Change*, *in* HANDBOOK ON GREEN GROWTH (2019); Way et al., *supra* note 44, at 2063.

48. *See, e.g.*, INTERNATIONAL ENERGY AGENCY, WORLD ENERGY OUTLOOK 2022 292 (2022) (renewables accounted for 29% of global electricity generation in 2021).

49. INTERNATIONAL ENERGY AGENCY, RENEWABLES 2022: ANALYSIS AND FORECAST TO 2027, at 20 (2022).

50. *See, e.g.*, Micah S. Ziegler & Jessika E. Trancik, *Re-examining Rates of Lithium-Ion Battery Technology Improvement and Cost Decline*, 14 ENERGY ENV'T SCI. 1635, 1638 Fig. 1 (2021) (presenting decline in lithium-ion cell prices from 1990 to 2020 with logarithmic scale).

51. James Morris, *How Did Tesla Become the Most Valuable Car Company in the World?*, FORBES (June 14, 2020, 6:00 AM), https://www.forbes.com/sites/jamesmorris/2020/06/14/how-did-tesla-become-the-most-valuable-car-company-in-the-world/?sh=39ed6168f473 [https://perma.cc/HYR5-6UTD].

Given the growing costs of climate change and the opportunities associated with a transition to a net zero economy, it is therefore likely that at some point firms will reach a tipping point and conclude that their future profits will be maximized by aligning their business model with net zero.[52] Such firms can justify their transition using a conventional business case: as the price of renewables goes down and the cost of carbon goes up, transition will look increasingly attractive from the standpoint of profit maximization. To be sure, there is much uncertainty about when this point will be reached. Assets and processes of firms that procrastinate transition are at risk of becoming uneconomic or "stranded," with no time left to make investments in alternatives. While early transition strategies risk incurring additional costs from pioneering sustainable technologies and business models, they also offer the opportunity to develop a first-mover advantage.[53]

Be that as it may, there is no *a priori* reason to think that if the rules of the game do not function to align profit maximization with social welfare all investors will still want firms to focus exclusively on profit maximization. Some investors may prefer firms to cut back on socially harmful activities, even if this appears to reduce profits.[54] As climate change intensifies, investors have recently become much more concerned about the issue. Large constituencies of investors now have the appetite to encourage firms to take steps to reduce emissions at a faster pace than traditional cost–benefit perspectives or government intervention dictate. The 2021 ExxonMobil shareholder revolt, which led to the appointment of more climate-conscious directors that were opposed by the board, is a case in point.[55]

In this Part, we set out a framework for understanding the way in which these climate-conscious investors affect corporate managers' incentives to reduce emissions. We begin by focusing purely on the traditional perspective. As regulatory measures to control climate change grow in intensity, they eventually become relevant to firms (even if investors are solely concerned with profits), albeit at a pace too slow to deliver sufficient change. However, if there is a significant volume of climate-conscious investment, this will generate investor demand for firms to accelerate transition more quickly than if investors were solely concerned with profits. Either way, firms are already considering the risks of climate change for their business. The difference between these scenarios is the pace of transition.

Climate-conscious investors will want firms to change faster than they otherwise would. If they do not see or anticipate sufficient change happening, they will lower their valuations. On the other hand, accelerating transition will cost more up front than climate-indifferent investors would be willing to pay. This creates incentives for firms to try to please all parties by making lofty promises about

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52. *See supra* note 29.

53. On the concept of "first-mover advantage," see generally Marvin B. Lieberman & David B. Montgomery, *First-Mover Advantages*, 9 STRATEGIC MGMT. J. 41 (1988).

54. Oliver Hart & Luigi Zingales, *Companies Should Maximize Shareholder Welfare Not Market Value*, 2 J.L. FIN. & ACCT. 247, 248 (2017).

55. For an account of Engine No. 1's successful proxy fight at ExxonMobil, see John C. Coffee Jr., *The Coming Shift in Shareholder Activism: From "Firm-specific" to "Systematic Risk" Proxy Campaigns (and How to Enable Them)*, 16 BROOK. J. CORP. FIN. & COM. L. 45, 54–59 (2021).

change in the future without sacrificing any profits today. This, in turn, is part of a more general phenomenon of "greenwashing": making overbroad claims about the climate-consciousness of an activity or product. Rational climate-conscious investors should therefore want to see firms that wish to attract their investment making *credible commitments* to accelerated transition.

B. Transition and Shareholder Value Maximization

1. Framing the Issues

It is useful to begin by considering the extent to which the traditional perspective of shareholder value maximization may push firms to engage with carbon transition. If shareholders focus purely on profit maximization, firms' incentives to transition away from high carbon emissions depend on the relative size of the costs of carbon emissions versus the costs of cleaner business models.

To help clarify the factors driving firms' decision-making, we can distinguish between the costs of carbon emissions and the costs of avoiding emissions. The costs of operating at a particular level of carbon emissions are mainly a function of current and future carbon taxes (a term used here loosely to refer to regulatory measures pushing toward lower emissions more generally), the risk of stranded assets, and changes in demand as the structure of the economy changes. These costs increase with the level of carbon emissions. So far, political progress in taxing carbon has been slow, but these costs can be expected to increase over time.[56]

The cost of avoiding emissions can be understood as the amount a firm must pay to avoid producing a given level of emissions. It increases with the amount of emissions avoided and depends in part on the nature of the firm's business as well as on technological advances. Consider, for example, the availability of renewable energy sources to which the firm would switch instead of fossil fuels, or the means of capturing the carbon produced by fossil fuel energy production. Renewables encompass solar, wind, and water (hydro and wave) power technologies, as well as battery and transmission technologies to facilitate handling time mismatches in the supply and demand for renewable energy. Progress in developing these technologies has been rapid in recent years: the costs of solar and energy production, for example, declined by 81% over the decade prior to 2020.[57] Moreover, taking the costs of prospecting and extracting fossil fuels into account, the lifecycle cost of most types of renewable electricity is now cheaper than fossil fuels.[58]

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56. *See supra* note 23 and corresponding text. Of course, if the extant rules of the game set the cost of carbon payable by firms below the social cost of emissions, then firms seeking to maximize profits have incentives to produce excessive carbon emissions from the standpoint of social welfare.

57. INTERNATIONAL RENEWABLE ENERGY AUTHORITY, RENEWABLE POWER GENERATION COSTS IN 2020 (2021), data available at https://www.irena.org/Statistics/View-Data-by-Topic/Costs/Global-Trends [https://perma.cc/E7TZ-AE8Y] (last accessed May 19, 2022).

58. *See, e.g.*, *Levelized Cost of Energy*, LAZARD (Nov. 2, 2017), https://www.lazard.com/perspective/levelized-cost-of-energy-2017/ [https://perma.cc/EXK9-QEM7].

Managers aiming to maximize financial returns should seek to optimize their firm's climate risk exposure by minimizing the sum of both their firm's costs of carbon emissions and its costs of avoiding emissions.[59] As a rough proxy, the total values of these optimized exposures will vary depending on the firm's starting level of emissions: high-emissions firms will face both higher total costs of emissions and higher total costs of avoiding emissions. Evidence is emerging that investors are already pricing the likely impact of expected emission costs on firms' cashflows. Bolton and Kacpercyzk report that firms currently deliver excess returns to investors (compared to pricing based on standard factors), which are correlated with their carbon emissions.[60] The strong inference is that investors demand higher returns from firms with higher emissions to compensate them for the future costs of carbon taxes.[61] Similarly, for debt finance, Kleimeier and Viehs report that firms with higher carbon emissions pay higher loan spreads.[62] These findings are consistent with survey evidence that a majority of institutional investors believe climate risks associated with regulation have already begun to materialize for firms.[63] These findings imply that climate risks and transition strategy are now becoming live issues for corporate boards. However, as we shall see, decisions about

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59. We can describe this formally as follows. Let $p(e)$ (where $p = f(e)$) be the firm's expected costs associated with a given emissions level e. Let $c(e)$ be the cost to the firm of achieving emissions level e. To reflect the idea that it is costly in the short run to reduce emissions, we assume that c is an inverse function of e; that is, $c = f(1/e)$. Managers seeking to maximize firm value consequently face the following optimization function:

$$e^* = \arg\min_{e} \quad \big(p(e) + c(e)\big) \qquad (1)$$

60. Patrick Bolton & Marcin T. Kacperczyk, *Do Investors Care About Carbon Risk?*, 142 J. FIN. ECON. 517 (2021); *see also* Ella Mae Matsumura et al., *Firm-Value Effects of Carbon Emissions and Carbon Disclosures*, 89 ACC. REV. 695 (2014); *cf.* Maximilian Görgen et al., *Carbon Risk* (2020), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2930897 [https://perma.cc/X9LR-2YGB].

61. Bolton & Kacperczyk, *supra* note 60. In contrast, markets seem not yet to have priced in expected physical risks associated with climate change. *See* Hong et al., *supra* note 23 (reporting that food companies' stock prices do not correlate with expected physical risks to production associated with climate change).

62. Stefanie Kleimeier & Michael Viehs, *Pricing Carbon Risk: Investor Preferences or Risk Mitigation?*, 205 ECON. LETTERS 109936 (2021). However, the literature does not report consistent results. *Cf.* Tinghua Duan et al., *Is Carbon Risk Priced in the Cross-Section of Corporate Bond Returns?* (2021), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3709572 [https://perma.cc/MC8N-R24G] (finding no evidence that firms with higher carbon emissions pay a premium in bond markets); Winta Beyene et al., *Too-Big-to-Strand? Bond Versus Bank Financing in the Transition to a Low-Carbon Economy*, VOXEU (Dec. 4, 2021), https://voxeu.org/article/bond-versus-bank-financing-transition-low-carbon-economy [https://perma.cc/KYQ2-RCK5] (fossil fuel firms face higher bond financing costs associated with transition risk, but less so for bank finance).

63. Philipp Krueger et al., *The Importance of Climate Risks for Institutional Investors*, 33 REV. FIN. STUD. 1067, 1082 (2020). This survey also reports that institutional investor respondents believe that climate risks are already financially material for firms. *Id.* at 1080.

these matters are made much thornier by the pervasive uncertainty over key variables.[64]

2. Uncertainties over Costs and Benefits of Transition

The future costs both of emissions and of avoiding them by switching to cleaner energy sources are highly uncertain.

Consider first emissions costs: no one can be sure over what time frame carbon taxes will be introduced or at what terminal value; the best one can do is to estimate ranges. Moreover, as the fallout from Russia's invasion of Ukraine has starkly demonstrated, fossil fuel prices are highly volatile. The costs of reducing emissions are also uncertain. While short-run costs of reducing emissions using present technology and existing business models can be estimated, long-run costs cannot. In particular, it is uncertain how much new clean technologies will lower the costs of reducing emissions and how profitable the exploitation of new opportunities enabled by changes in business models will prove to be.[65] For example, changes in battery technology in the past decade have had a dramatic impact on the costs of electric vehicles and the viability of new business models for auto manufacturers.[66] Overall, quantifying the financial costs associated with transition is extremely complex—both because of the complexity and uncertainty of the transition itself[67] and because of a lack of data.[68]

These uncertainties are compounded by the way in which the valuations of these factors—such as the costs of carbon emissions and firms' business models—interact with the value of investments in complementary assets. Investments in renewable energy infrastructure like batteries, solar panels, and wind farms are subject to the risks associated with the speed of policy change as regards carbon taxes. They are also impacted by fluctuations in expectations about carbon prices—for example, because of leadership transition in major economies or other geopolitical events.[69] This volatility means that firms that capitalize transition

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64. *See, e.g.*, Michael Barnett et al., *Climate Change Uncertainty Spillover in the Macroeconomy* (Nat'l Bureau of Econ. Rsch., Working Paper No. 29064, 2021), available at https://www.nber.org/system/files/working_papers/w29064/w29064.pdf [https://perma.cc/NCC5-VFPA].

65. *See* J. Doyne Farmer et al., *Sensitive Intervention Points in the Post-Carbon Transition*, 364 SCI. 132, 132–33 (2019).

66. *See supra* notes 50–51.

67. *See, e.g.*, J. Doyne Farmer et al., *A Third Wave in the Economics of Climate Change*, 62 ENV'T RES. ECON. 329, 334, 336–37 (2015); J. Doyne Farmer, Alissa M. Kleinnijenhuis & Thom Wetzer, *Stress Testing the Financial Macrocosm*, *in* HANDBOOK OF FINANCIAL STRESS TESTING 678–80 (J. Doyne Farmer et al., eds., 2022) (outlining the challenges associated with the modelling of climate-related risks).

68. *See* John Armour, Luca Enriques & Thom Wetzer, *Mandatory Corporate Climate Disclosures: Now, but How?*, 2021 COLUM. BUS. L. REV. 1085, 1099–1104 (2021).

69. *See, e.g.*, Stefano Ramelli et al., *Stock Price Rewards to Climate Saints and Sinners: Evidence from the 2016 Climate Policy Shock* (Nat'l Bureau of Econ. Rsch., Working Paper No. w25310, Dec. 2018), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3294878 [https://perma.cc/YT4S-J4PN]; Stefano Ramelli et al., *Stock Price Effects of Climate Activism: Evidence from the First Global Climate Strike*, 69 J. CORP. FIN. 102108 (2021).

expenses may find they must later write them off because they moved too quickly relative to the rest of the economy. By the same token, "dirty" assets such as fossil fuel reserves may become "stranded" if the costs of renewables go down more quickly than expected.[70] These complementarities increase the stakes for getting transition timing right. Depending on the circumstances, they can serve either to hold back or to accelerate firms' transition decisions.

A further complementarity relates to lobbying. Corporations are highly effective political actors that expend considerable resources to influence policy. Empirical research reports that corporate lobbying and political spending are generally associated with greater shareholder returns,[71] and especially so for firms in regulated industries.[72] Firms have incentives to lobby in favor of regulations that ensure the profitability of their current business models.[73] Many carbon-intensive firms have expended considerable resources seeking to persuade both politicians and the public of doubts regarding the significance of climate science—a strategy of disinformation echoing that of tobacco companies.[74] For example, a content analysis study of Exxon and Mobil's communications on climate change over 1977–2014 contrasted the positions taken in its internal memos and peer-reviewed scientific publications with advertorials and other communications they published in major news media.[75] This lobbying investment has served to delay transition; looking

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70. *See, e.g.*, Ben Caldecott, *Introduction to Special Issue: Stranded Assets and the Environment*, 7 J. SUSTAINABLE FIN. & INV. (SPECIAL ISSUE) 1, 3 (2017); J.-F. Mercure et al., *Macroeconomic Impact of Stranded Fossil Fuel Assets*, 8 NATURE CLIMATE CHANGE 588, 591–92 (2018).

71. Neil J. Mitchell et al., *The Determinants of Domestic and Foreign Corporate Political Activity*, 59 J. POL. 1096 (1997); Sean Lux et al., *Mixing Business with Politics: A Meta-Analysis of the Antecedents and Outcomes of Corporate Political Activity*, 37 J. MGMT. 223 (2011); Hui Chen et al., *Corporate Lobbying and Firm Performance*, 42 J. BUS. FIN. & ACCT. 444 (2015). In the United States, direct political contributions by corporations to political parties or candidates are prohibited. However, the Supreme Court has ruled that the First Amendment protects the rights of corporations to make "indirect" contributions—spending money on political speech that tends to support, or undermine, a candidate or policy position. *Citizens United v. Fed. Election Comm'n*, 558 U.S. 310 (2010).

72. John C. Coates, IV, *Corporate Politics, Governance, and Value Before and After* Citizens United, 9 J. EMPIRICAL LEGAL STUD. 657 (2012).

73. Indeed, lobbying to weaken applicable regulations often appears to be more profitable for firms than complying with them. KARTHIK RAMANNA, POLITICAL STANDARDS: CORPORATE INTEREST, IDEOLOGY, AND LEADERSHIP IN THE SHAPING OF ACCOUNTING RULES FOR THE MARKET ECONOMY (2015).

74. Dario Kenner & Richard Heede, *White Knights, or Horsemen of the Apocalypse? Prospects for Big Oil to Align Emissions with a 1.5 °C Pathway*, 79 ENERGY RSCH. & SOC. SCI. 102049 (2021); Benjamin Franta, *Early Oil Industry Knowledge of CO2 and Global Warming*, 8 NATURE CLIMATE CHANGE 1024 (2018).

75. Geoffrey Supran & Naomi Oreskes, *Assessing ExxonMobil's Climate Change Communications (1977–2014)*, 12 ENV'T RSCH. LETTERS 084019 (2017); Geoffrey Supran & Naomi Oreskes, *Addendum to 'Assessing ExxonMobil's Climate Change Communications (1977–2014),'* 15 ENVTL. RSCH. LETTERS 119401 (2020). Supran and Oreskes report that both companies' internal memos and peer-reviewed papers acknowledged the seriousness of the problem of climate change consistently with contemporary scientific consensus, while their public and news media communications consistently cast doubt on the underlying science.

forward, we may expect firms that have already shifted to clean business models to lobby for faster action on transition. It should come as no surprise that Tesla, for example, has lobbied for higher taxes on gasoline.[76]

3. Drivers of Managerial Inaction

The difficulties in estimating the long-run costs and benefits of transition interact poorly with the way in which corporate managers are generally incentivized. Managers are paid in stock, which leads them to focus on increasing the stock price. Managers' time horizons tend to be quite short: U.S. CEO tenure is approximately six years, which puts the median CEO at three years from the end of their term.[77] Managers, therefore, have incentives to focus on actions that will increase the stock price over a relatively short period.

Investors in stock markets tend to discount corporate investments that are hard to value because they depend on private information or are subject to pervasive uncertainty. In the context of corporate transition strategy, the uncertainties surrounding key variables mean that long-run gains to transition are much harder to assess than short-run costs. The implication is that managers are likely to be highly conservative in their transition policy. They will underinvest in transition actions and be less willing to commit their firm to a future transition pathway relative to what would be seen as value-maximizing if future gains were more certain.

These predictions change, however, when we consider a further factor that overlays this base case: the impact of climate-conscious investors.

C. Climate-Conscious Investors

A growing body of evidence suggests that an expanding subset of investors place a higher valuation on firms that are making headway toward reducing emissions. We refer to these collectively as "climate-conscious investors." Some are motivated by nonfinancial preferences regarding climate change—that is, they have a "taste" for emission reduction, an effect we term "green preferences." For others, the motivation is purely financial. These investors place a higher valuation on corporate action that reduces emissions than does the median investor, an effect we term "green valuations."

A body of theoretical literature shows how asset prices can respond to the preferences of a subset of investors who have either expectations about payoffs that differ from those of the median investor or particular nonfinancial tastes.[78] If climate-conscious investors more highly value the stocks of firms that are "clean"—

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76. *See, e.g.*, Simon Alvarez, *Tesla Lobbies for Higher Tax on Petrol and Diesel Vehicles in the UK*, TESLARATI (Mar. 16, 2021), https://www.teslarati.com/tesla-petrol-and-diesel-tax-lobby/ [https://perma.cc/JA52-LKVP].

77. *See* Steven N. Kaplan, *CEO Pay and Corporate Governance in the US: Perceptions, Facts, and Challenges*, 25 J. APPLIED CORP. FIN. 8, 15 (2013) (reporting that the average CEO can expect to hold her job for roughly six years).

78. A seminal paper in this literature is Eugene Fama & Kenneth R. French, *Disagreement, Tastes, and Asset Prices*, 83 J. FIN. ECON. 667 (2007). More recent contributions include Ľuboš Pástor et al., *Sustainable Investing in Equilibrium*, 142 J. FIN. ECON. 550 (2021); Lasse Heje Pedersen et al., *Responsible Investing: The ESG-Efficient Frontier*, 142 J. FIN. ECON. 572 (2021).

in the sense that they have low emissions levels, lower emissions levels than industry peers, or credible plans to reduce emissions (hereinafter, "low-emissions firms")—demand for these stocks increases and demand for "dirty" stocks decreases. Where the prices of clean stocks are bid up by climate-conscious investors, other ("climate-indifferent") investors will now view these stocks as overvalued. However, it may be difficult for climate-indifferent arbitrageurs to implement trades based on their assessment that these stocks are overvalued.[79] As a consequence, the prices of low-emission firms will exhibit a premium generated by climate-conscious investors, sometimes referred to as a "greenium."

1. Green Preferences

Consider first the case where climate-conscious investors' valuations are driven by green preferences—that is, a taste for low-emissions firms.[80] To them, the value of securities has two components: the investment return and a consumption benefit from the satisfaction of their preference for lower emissions.[81] Such investors will be willing to pay more—as compared to a climate-indifferent investor—for the securities of low-emissions firms.

A growing body of evidence documents how green preferences affect investing decisions.[82] For example, investor flows into Environmental, Social, and Governance ("ESG") funds are much less sensitive to the financial performance of these funds than are flows into traditional mutual funds,[83] and changes in

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79. *See infra* text accompanying notes 92–93.

80. *See, e.g.*, Daniel Brodback et al., *Altruism and Egoism in Investment Decisions*, 37 REV. FIN. ECON. 118 (2019) (survey evidence of altruistic investors' preferences for socially responsible investment); Arno Riedl & Paul Smeets, *Why Do Investors Hold Socially Responsible Mutual Funds?*, 72 J. FIN. 2505 (2017). *See also* Hart & Zingales, *supra* note 54 (modeling shareholders as having preference functions including non-financial components). On the characterization of values as "tastes" for the purposes of preference functions, see generally GARY S. BECKER, ACCOUNTING FOR TASTES (1996).

81. See Fama & French, *supra* note 78, at 688.

82. Summarized in Robin Döttling & Sehoon Kim, *ESG Investments and Investors' Preferences*, 22 CESIFO FORUM 12 (2021), https://www.cesifo.org/DocDL/CESifo-forum-2021-3-doettling-kim-ESG-Investments-and-Investors-Preferences.pdf [https://perma.cc/66F9-JVPY]. The intensity of such preferences and their marginal substitution for financial returns likely varies among investors. *See, e.g.*, Florian Heeb et al., *Do Investors Care about Impact*, REV. FIN. STUD., 2022, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3765659 [https://perma.cc/5QXB-KDLU]; Jacquelyn Humphrey et al., *The Asymmetry in Responsible Investing Preferences* (Nat'l Bureau of Econ. Rsch., Working Paper No. 29288, 2021), https://www.nber.org/system/files/working_papers/w29288/w29288.pdf [https://perma.cc/B36V-HP8J] (experimental evidence regarding investor tastes for socially responsible investments).

83. Nicolas P.B. Bollen, *Mutual Fund Attributes and Investor Behavior*, 42 J. FIN. & QUANTITATIVE ANALYSIS 683, 703 (2007); Luc Renneboog et al., *Is Ethical Money Financially Smart? Nonfinancial Attributes and Money Flows of Socially Responsible Investment Funds*, 20 J. FIN. INTERMEDIATION 562, 563 (2011); *see also* Jie Cao et al., *ESG Preference, Institutional Trading, and Stock Return Patterns* (Nat'l Bureau of Econ. Rsch., Working Paper No. 28156, 2020), https://www.nber.org/system/files/working_papers/w28156/w28156.pdf [https://perma.cc/FAL4-RK4Z].

sustainability ratings of assets affect investment flows from private wealth investors.[84] Similarly, experimental studies report settings in which investors are willing to forego some level of expected returns for investments disclosed as being green.[85]

2. Climate-Conscious Valuations

The enormous uncertainty over the costs of climate change means that investors differ in their assessments of the relevant variables discussed in Subsection I.B.1. This feeds into asset pricing[86] because investors who expect transition risk to impact firms sooner—or estimate the consequences of transition as being more far-reaching—will place a higher expected cost on climate risk and, correspondingly, attribute a higher value to firms credibly preparing to transition.[87]

Climate-conscious valuations may also be boosted by reputational effects. A firm's transition agenda can generate positive reputational effects with consumers of its products.[88] The extent to which this is possible depends on the nature of the firm's products. Where firms develop a positive reputation with green consumers, their willingness to pay for the firm's products will increase, in an analogous way to the green investment preferences discussed in Subsection I.C.1. This will in turn push up the firm's expected valuation to investors.

Firms may also be concerned about managing their *political* reputations through their transition activities. Willingness to engage with transition may ensure that policymakers view the firm's efforts in a more positive light, and therefore would be less inclined to impose restrictive regulatory targets on the firm. In other words, political capital helps preserve the firm's social license. Of course, the extent to which such political capital is valuable to a firm depends on the credibility of policymakers' commitment to intervene in the absence of the firm's actions.

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84. *See* Amir Amel-Zadeh et al., *Do Sustainability Ratings Matter? Evidence from Private Wealth Investment Flows* (Mar. 23, 2022), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3576687 [https://perma.cc/T8KY-X3HG].

85. Patrick R. Martin & Donald V. Moser, *Managers' Green Investment Disclosures and Investors' Reaction*, 61 J. ACCT. & ECON. 239, 240 (2016). *See also* Bradford Cornell, *ESG Preferences, Risk and Return*, 27 EUR. FIN. MGMT. 12, 15–16 (2021).

86. *See, e.g.*, Michael Barnett et al., *Pricing Uncertainty Induced by Climate Change*, 33 REV. FIN. STUD. 1021, 1063 (2020).

87. Survey evidence suggests that institutional investors who view climate risk as relatively financially significant pursue a wider range of climate risk management strategies. *See* Krueger et al., *supra* note 63, at 1071.

88. *See, e.g.*, Maretno Agus Harjoto & Jim Salas, *Strategic and Institutional Sustainability: Corporate Social Responsibility, Brand Value, and Interbrand Listing*, 26 J. PROD. & BRAND MGMT. 545, 554 (2017) (increases in corporate social responsibility index ratings linked with subsequent increases in brand value). For a recent negative example of this phenomenon, see Oliver D. Hart, David Thesmar & Luigi Zingales, *Private Sanctions*, 1, 3 (Nat'l Bureau of Econ. Rsch., Working Paper No. 30728, 2022) https://www.nber.org/system/files/working_papers/w30728/w30728.pdf (representative survey of US citizens in which 53% responded that they would be willing to incur a cost of up to $100 to boycott a firm continuing to trade in Russia after the invasion of Ukraine).

3. Price Effects

As we have discussed, climate-conscious investors exhibit a higher willingness to invest in firms that reduce emissions than do climate-indifferent investors. Whether the higher valuations of climate-conscious investors can affect securities pricing depends in the first instance on the amount of capital these investors must invest relative to climate-indifferent investors. Climate-conscious investing is associated with the growth of ESG investment funds. Such funds market themselves as employing investment selection and management criteria that are based, among other things, on environmental concerns including over carbon emissions.[89] Funds labeled in this way have seen steep recent growth, with commentators predicting that by 2025 they will account for a third of global assets under management.[90] A recent empirical study of such funds reports that they do generally offer investors increased ESG exposure and vote their shares differently from non-ESG funds.[91]

Of course, climate-indifferent arbitrageurs may seek to counter upward price pressure from climate-conscious investors by shorting the stocks of emission-reducing firms. However, it will be difficult for individual actors to reverse price effects triggered by a large volume of capital coming from climate-conscious investors. The risks and costs of short positions are inherently greater than long positions.[92] Unlike a long position, where the maximum loss is limited by the price falling to zero, the maximum loss on a short position is in theory unlimited. Moreover, an investor wishing to sell short must "cover" their position by borrowing the security in question, which involves costs not incurred by investors holding long positions. Together, these factors imply that it is more difficult for arbitrageurs to profit from stocks they judge to be overvalued (which they would need to short) than from stocks they judge to be undervalued.[93]

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89. *See, e.g.*, Michal Barzuza et al., *Shareholder Value(s): Index Fund Activism and the New Millennial Corporate Governance*, 93 S. CAL. L. REV. 1243, 1300–01 (2020).

90. *See, e.g.*, Bloomberg Intelligence, *ESG Assets May Hit $53 Trillion by 2025, a Third of Global AUM*, BLOOMBERG PROF. SERVS. (Feb. 23, 2021), https://www.bloomberg.com/professional/blog/esg-assets-may-hit-53-trillion-by-2025-a-third-of-global-aum/ [https://perma.cc/73R2-FKQS] (reporting that ESG assets under management "jumped to $30.6 trillion in 2018 from $22.8 trillion in 2016"); U.N. CONF. ON TRADE & DEV., THE RISE OF THE SUSTAINABLE FUND MARKET AND ITS ROLE IN FINANCING SUSTAINABLE DEVELOPMENT 8 (2021), https://unctad.org/system/files/official-document/diae2021d1_en.pdf [https://perma.cc/SC5W-WUXB] (reporting growth of more than 250% in net investment inflows to sustainable funds between 2018 and 2019).

91. Quinn Curtis et al., *Do ESG Mutual Funds Deliver on Their Promises?*, 120 MICH. L. REV. 393 (2021); *see also* Krueger et al., *supra* note 63, at 1089–90 (showing that the extent to which an institutional investor's assets under management comprise ESG funds is positively correlated with their engagement with climate risk in making investment decisions).

92. This is the famous "limits of arbitrage" argument. Andrei Shleifer & Robert W. Vishny, *The Limits of Arbitrage*, 52 J. FIN. 35 (1997); *see also* Denis Gromb & Dimitri Vayanos, *Limits of Arbitrage*, 2 ANNUAL REV. FIN. ECON. 251 (2010).

93. *See* Alon Brav et al., *The Limits of the Limits of Arbitrage*, 14 REV. FIN. 157 (2010) (reporting that "limits of arbitrage" theory explains pricing "anomalies" associated with overvaluation, but not those leading to undervaluation).

The extent to which this theoretical result is matched by actual price movements depends on the empirical significance of climate-conscious investors. Studies find evidence of a pricing premium in securities that are especially appealing to climate-conscious investors. Several issuers recently offered "green bonds," i.e., debt issues for which the proceeds are specifically ringfenced for investment in green projects.[94] There are positive stock price announcement effects for issuers of green bonds,[95] which are typically not present for ordinary bond issues.[96] This is consistent with firms choosing to issue green bonds where it is value-increasing to do so. Several studies report that green bond yields are lower than yields for otherwise observationally identical matched non-green issues.[97] This implies that investors pay a premium for green bonds, and it is consistent with findings that green bonds are much more likely to be held by climate-conscious investors.[98] By contrast, other studies seek to isolate the effect of a bond's "greenness" by comparing pricing for green bonds issued simultaneously with otherwise identical conventional bonds by the same issuer.[99] These studies report no difference in the pricing at issue between the two types of security.[100] However, the bundling of the two issues together may lead investors to conclude that they are identical, as both are investments in firms that are committing to pursue green projects. Consistently with this, Baker et al. report that where green and non-green bonds are bundled in this way, the pricing of both is at a premium to observationally identical non-green bonds issued by firms not issuing green bonds.[101]

In sum, both theoretical predictions and empirical evidence suggest there is measurable potential for securities issued by firms that commit to carbon-reducing projects to attract a lower cost of capital, or a greenium, because of the higher valuations accorded by climate-conscious investors to these securities. The

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94. *See, e.g.*, Dion Bongaerts & Dirk Schoenmaker, *The Next Step in Green Bond Financing* 2 (Mar. 17, 2020) (unpublished manuscript), https://ssrn.com/abstract=3389762 [https://perma.cc/UC2T-E6ZA].

95. *See* Caroline Flammer, *Corporate Green Bonds*, 142 J. FIN. ECON. 499 (2021) (reporting positive announcement effect of green bond issuance); Dragon Yongjun Tang & Yupu Zhang, *Do Shareholders Benefit from Green Bonds?*, 61 J. CORP. FIN. 101427 (2020) (same).

96. B. Espen Eckbo et al., *Security Offerings*, *in* 1 HANDBOOK OF CORPORATE FINANCE: EMPIRICAL CORPORATE FINANCE 233 (B. Espen Eckbo ed., 2008)

97. *See* Malcolm Baker et al., *The Pricing and Ownership of US Green Bonds*, 14 ANNUAL REV. FIN. ECON. 415, 417 (2022) (reporting after-tax yields for green bonds 5–9 basis points (bps) below those for otherwise equivalent bonds); Olivier David Zerbib, *The Effect of Pro-environmental Preferences on Bond Prices: Evidence from Green Bonds*, 98 J. BANKING & FIN. 39, 40 (2019) (difference of 2–9 bps); Gianfranco Gianfrate & Mattia Peri, *The Green Advantage: Exploring then Convenience of Issuing Green Bonds*, 219 J. CLEANER PROD. 127, 132 (2019) (difference of 15–21 bps). *But see* Harrison Hong and Marcin Kacperczyk, *The Price of Sin: The Effects of Social Norms on Markets*, 93 J. FIN. ECON. 15, 17 (2009) (reporting that "sin stocks" such as weapons and tobacco trade at a discount and display higher average returns, consistent with a significant group of investors having a taste for not holding them).

98. Baker et al., *supra* note 97, at 417.

99. *See* David F. Larcker & Edward M. Watts, *Where's the Greenium?*, 69 J. ACCT. & ECON. 101312 (2010); Flammer, *supra* note 95, at 501.

100. Larcker & Watts, *supra* note 99, at 24; Flammer, *supra* note 95, at 513–14.

101. *See supra* note 97 and corresponding text.

economic significance of this effect to date is quite modest but growing with the volume of capital invested in ESG funds. Studies reporting impacts ranging from 2 to 21 basis points use data from up to 2018.[102] Since then, total assets under management in ESG funds have increased considerably.[103]

D. Managerial Reactions to Climate-Conscious Investors

1. Framing Incentives

How might managers be expected to react to the presence of climate-conscious investors among their firms' shareholders? As we have seen, actual or anticipated reductions in firms' emissions will increase climate-conscious investors' valuations, which in turn can have a price impact. Stock-compensated managers consequently have incentives to engage in such reductions or to persuade climate-conscious investors that they plan to do so in the future. The intensity of these incentives depends on the costs of emission reductions and the extent of the valuation benefits. We can analyze these components by extending the basic framework we set out above for analyzing firms' choices about emission reduction.[104]

We earlier argued that managers seeking purely to maximize financial returns to investors would aim to minimize the sum of both their firm's costs of carbon emissions and its costs of avoiding emissions.[105] Now we add into the picture a substantial fraction of investors who attribute value to emission reductions beyond the predicted reduction in emission costs. Like the climate-indifferent investors, these climate-conscious investors are exposed to the firm's costs of avoiding emissions through the firm's cashflows, which are offset by the firm's reduction in costs of emissions. However, the climate-conscious investors also offset the additional value they attribute to emission reductions.[106]

Managers who seek to maximize the stock price will now aim to minimize the sum of their firm's costs of carbon emissions and its costs of avoiding emissions,

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102. *See* sources cited *supra* note 97.

103. *See* U.S. SIF FOUND., REPORT ON US SUSTAINABLE AND IMPACT INVESTING TRENDS 2020 1 (2020) (ESG assets under management in US grew 42% over 2019, from $12 trillion to $17 trillion).

104. *See supra* Subsection I.B.1.

105. *See supra* note 59 and accompanying text.

106. We can describe this formally as follows. Let the fraction of investors in the market who are climate-conscious be θ, where $0 \leq \theta \leq 1$, the costs of transition be $p(e)$, and the costs of reducing emissions to level e be $c(e)$. Assume further that climate-conscious investors attribute an additional value to *lower* emissions $v(e)$ (where $v = f(1/e)$). We can interpret this either as satisfaction of their taste for lower carbon or their having a higher-than-average expectation of the future costs of emissions. Managers seeking to maximize the stock price face the following optimization function to set emissions e^*:

$$e^* = \arg\min_{e} \quad \big(p(e) + c(e) - \theta v(e)\big) \quad (2)$$

It can be seen from (2) that the extent to which managers respond to the preferences of climate-conscious investors depends on the incidence of these investors (θ) and the intensity of their valuation differential (v). This setup creates incentives for managers to pursue actions that will increase climate-conscious investors' subjective valuations of their stock (v) for the least possible additional cost c.

minus the additional value climate-conscious investors attribute to its lower emissions level.[107] This will impact their incentives regarding emissions strategy: a marginal reduction in the firm's emissions will lower the firm's costs arising from those emissions, and should also positively impact the greenium accorded to it by climate-conscious investors. However, because reducing emissions is costly, a marginal reduction will add to the total costs the firm incurs in avoiding emissions. It is the last component that distinguishes this case from the base case of incentives based purely on costs and benefits to the firm's cashflows. It follows that the extent to which managers respond to the preferences of climate-conscious investors depends on the significance of these investors' presence in the marketplace and the intensity of their valuation differential from that of climate-indifferent investors.

There is more than one way in which managers can seek to optimize under these constraints. Here we focus on two, which we present as ideal types while bearing in mind that real-world actions likely contain elements of both. The most obvious response is to treat the additional value for climate-conscious investors as a wedge that pushes the original optimization framework toward more emission reduction. Firms taking this approach would undertake *genuine* additional cuts in emissions. However, another response might be to focus on maximizing the greenium (subjective valuation from climate-conscious investors) while minimizing the cost of emission avoidance. Firms pursuing this approach will adopt whatever low-cost actions they can take that will generate satisfaction among climate-conscious investors. This is because what matters for valuations is ultimately not the firm's actual emissions, but the climate-conscious investors' perceptions as to its emissions trajectory. This creates incentives for "greenwashing": creating the impression that actual or proposed emission reductions are larger than they in fact are.

2. Greenwashing

Greenwashing firms try to have their cake and eat it too, capturing the benefits of climate-conscious investors' additional valuations without incurring the actual costs of associated emission reductions. Straightforward lying about current emission levels is likely to be found out quite quickly. Hence, firms trying to generate a greenium at low cost are more likely to make extensive pledges about future emission reductions. These cannot be falsified by evidence about current emissions. If climate-conscious investors are willing to adjust their valuations based on promises of future action, then it will be tempting for executives to make bold claims about this. For example, a firm might make a lofty pledge regarding its emissions targets without any effective plan for meeting it. Nonbinding aspirational statements will have little impact on climate-indifferent investors' valuation of the

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107. Observed managerial actions may lag the growth of green investors. Survey evidence in fact suggests that managers' awareness of green investors' preferences lag behind these investors' actual incidence and the intensity of their preferences. *See, e.g.*, Amir Amel-Zadeh, *The Financial Materiality of Climate Change: Evidence from a Global Survey* (July 8, 2021) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3295184 [https://perma.cc/2GCF-8BHN] (survey evidence reporting that investors consider climate risk to be financially material and to represent regulatory and litigation risk, whereas far fewer companies believe they are exposed to climate risks).

firm's stock but, at least in the short-term, may affect the assessment of climate-conscious ones.

Consistently with this account, and prompted also by the recommendations of the Task Force on Climate-related Financial Disclosures,[108] many firms have announced their emission reduction targets to align their business activities with the Paris Agreement.[109] As might be expected, these targets vary in their ambition, which has attracted attention from activists, investors, researchers, and even courts.[110] There is also variance in how detailed they are, especially regarding how to achieve those targets.[111] What they have in common is that they are announced with great fanfare and yet, on a closer look, turn out to be anything but credible commitments.[112]

3. Credible Commitments as Signals

We can now see how the presence of climate-conscious investors in the market strengthens the managerial rationale for credible climate commitments. They signal to climate-conscious investors that the firm is not engaging in greenwashing. The lack of credibility of most climate undertakings means that it is easy for other firms, whether genuinely committed to reaching these targets or not, to mimic the signal they generate.

As other firms jump onto the bandwagon, any upward effect on share prices will be short-lived. Rational climate-conscious investors would not be convinced by a noncredible commitment, and so managers will eventually need to do more to induce them to change their valuations. A credible commitment to reduce emissions would be a way to do this because it clearly signals the seriousness of a firm's future intentions regarding emission reduction. This yields a clear prediction: if climate-conscious investors' trading has an effect on share prices, directors' and managers' incentives to credibly commit to emission reductions will strengthen.

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108. *See* TASK FORCE ON CLIMATE-RELATED FIN. DISCLOSURES, RECOMMENDATIONS OF THE TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES 23 (2017), https://assets.bbhub.io/company/sites/60/2020/10/FINAL-2017-TCFD-Report-11052018.pdf [https://perma.cc/3J7C-D5ZX] (recommending that firms "describe their key climate-related targets such as those related to GHG emissions, water usage, energy usage, etc., in line with anticipated regulatory requirements or market constraints or other goals").

109. *See* RICHARD BLACK ET AL., TAKING STOCK: A GLOBAL ASSESSMENT ON NET ZERO TARGET 19 (2021), https://ca1-eci.edcdn.com/reports/ECIU-Oxford_Taking_Stock.pdf [https://perma.cc/8YUU-BEK7] (reporting that 417 of all companies in the Forbes Global 2000 list had announced a net zero target).

110. Rechtbank Den Haag [District Court of The Hague] 26 mei 2021, Vereniging Milieudefensie et al. v Royal Dutch Shell plc, C/09/571932/H ZA 19-379 (English version) (Neth.).

111. For an overview, see FREDERIC HANS ET AL., NET ZERO STOCKTAKE 2022: ASSESSING THE STATUS AND TRENDS OF NET ZERO TARGET SETTING ACROSS COUNTRIES, SUB-NATIONAL GOVERNMENTS AND COMPANIES (2022), https://ca1-nzt.edcdn.com/Net-Zero-Tracker/Net-Zero-Stocktake-Report-2022.pdf?v=1655074300 [https://perma.cc/7MZP-RH7F].

112. *See supra* text accompanying notes 4–10.

4. Credible Commitments as Insurance

A distinct, but complementary, rationale for credible corporate commitments to transition lies in their capacity to insure a firm against some of the volatility associated with the costs and benefits of transition. As we have seen, many of the key variables that pertain to the costs and benefits of transition are subject to considerable medium-term volatility. Firms that pursue transition purely based on present values of the relevant factors may consequently find themselves reversing policy midstream. This can end up costing the firm more in the long run than if it had committed vigorously to a particular transition pathway *ex ante*.

We can illustrate this point with a stylized numerical example. Assume that a firm is considering making an investment in renewables capacity. To deliver this, it must make two sequential investments, each of value $10 million, at t_0 and t_1; the capacity will then come onstream at t_2. Given these costs and the firm's expected usage of the capacity, the investment will "break even" (that is, its net present value will be equal to zero) if the price of oil at t_2 is higher than $100 per barrel.

At t_0, oil futures for delivery at t_2 are trading at $125 per barrel. This implies that the investment in renewables has a positive net present value—assume this is $15 million.[113] On this basis, it is worthwhile to go ahead with the project, so the firm makes the initial investment at t_0 of $10 million.

Now fast forward to t_1. Assume that at this point the price of oil futures for delivery at t_2 has fallen to only $75 per barrel. This now implies that the project has a negative net present value—let us say this is -$15 million. The firm must now choose whether to make the second investment of $10 million at t_1. If the oil price at t_2 remains at $75, then making the second investment will look like a bad idea. Having made both investments, the firm will have incurred an overall loss on the project of -$15 million. However, if the firm decided not to make the second sequential investment at t_1, then its overall loss is reduced to the amount invested at t_0—that is, $10 million.[114] Thus, *if the price of oil is $75 at* t_2, then it is value-maximizing for the firm to abandon the renewables project at t_1.

Unfortunately, it is by no means certain that the realized price of oil at t_2 will be the same as that predicted by the oil futures market at t_1. If the oil price were to rise again, then making the second investment would actually be value-maximizing for the firm. Foregoing the second investment at t_1 would in this case have caused the firm to "lose" both the possibility of earning the $15 million net return on the renewables project and the $10 million investment sunk at t_0, which now generates no return at all. Table 1 summarizes how the payoffs to the firm in this example vary according to the ultimate oil price at t_2 and whether the second investment is made at t_1.

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113. In our discussion of net present value in this example, we will abstract away from issues about the time value of money. In order to focus the analysis on the dynamics of the renewables investment decision, we also assume that the potential investment in renewables is the *only* positive net present value opportunity available to the firm.

114. The result of not making the second investment is to cause the first investment to be wasted. The project does not then come to fruition, so no return is generated on any investment.

Table 1: Net payoffs ($m) to t_1 investment decision.

Investment decision at t_1	Ultimate price of oil at t_2	
	$75/barrel	$125/barrel
Continue	-15	15
Abandon	-10	-25

This example captures the simple insight that the firm may do worse by see-sawing on its renewables investment strategy midway than by sticking with it. The worst possible outcome is if the firm abandons the project, and the price of oil ends up being high.

Of course, the rational approach to this investment decision would be to decide based on the probability-weighted payoffs. If the probability that the price of oil at t_2 will be $125 is greater than 1/9 (≈ 11.1%), the firm will maximize its expected returns (as assessed at t_1) by continuing with the project.[115] Decision-making of this type is not possible, however, if the firm cannot reliably assess these probabilities. The central challenge of transition is that the relevant parameters are highly volatile with distributions that are not knowable to actors in advance. Under these circumstances, it may seem that simply making decisions based on the oil futures price, because it incorporates all available information at a particular time, is the best that can be done. This, however, leaves the firm exposed to the possibility of achieving the worst outcome.

Faced with volatility of uncertain distributions in key investment parameters, it may be rational for the firm's decision-makers to decide at the very beginning of this process—that is, at t_0—to forego the option to abandon the project at t_1. This would involve making *at the outset* a credible commitment to make both the investment at t_0 and the second sequential investment at t_1. The firm thus ties its hands, reducing the set of possible outcomes to those displayed in Table 2.

115. The payoffs to continuation and abandonment are equal if the probability of the oil price being $125 at t_2 is 0.111 and that of it being $75 is 0.889. That is, (15 x 1/9) – (15 x 8/9) = – (10 x 8/9) – (25 x 1/9) = -105/9.

Table 2: Net payoffs ($m) to t_0 investment decision, with no exit option at t_1.

Investment decision at t_0	Ultimate price of oil at t_2	
	$75/barrel	$125/barrel
Invest	-15	15
Don't Invest	0	0

Of course, by tying its hands at t_0, the firm would also rule out the possibility of benefiting from the option to abandon the project, which would be valuable if exercised, and the oil price at t_2 is $75 (lower left quadrant of Table 1). It could therefore *also* be a rational decision for the firm to elect not to tie its hands, but to retain flexibility at t_1.

The purpose of this exercise is not to prescribe courses of action for firms' transition journeys. Rather, it serves to illustrate the challenge faced by corporate decision-makers in embarking on a transition to net zero—a process characterized by long time horizons, significant resource commitments, and high volatility with uncertain distributions. More specifically, it also illustrates that it *may* be rational for firms to elect to make hard commitments to transition at the outset, on the basis that this can avoid wasting resources under a sequential decision-making process.

This is not, by itself, enough to say that firms *ought* to make such commitments—or even to predict that they *will*. Rather, the more modest claim is simply that for some firms it *may* be rational within a value-maximizing framework to make such commitments to self-insure against the costs of managing uncertain volatility. Such commitments are unlikely to be appealing to managers of firms in the absence of climate-conscious investors because the relatively short time horizons of managerial pay would likely bias them in favor of retaining flexibility. However, climate-conscious investors are likely to place a greater weight on the potential long-term value of self-insurance against such volatility. This yields a second rationale for commitments to transition—one that goes beyond signaling.

E. Summary

We can now draw together the threads of the discussion in this Part. First, we have seen that climate risk is a real issue for both firms and investors and something with which corporate boards should concern themselves.[116] We have argued that because the long-term costs and benefits of transition are hard to quantify, managers are unlikely to face strong incentives to make such commitments where investors all adopt a traditional perspective on valuation.

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116. *Cf.* Maria Castañón Moats & Tracey-Lee Brown, *The Push to Net Zero Emissions: Where the Board Comes in*, HARV. L. SCH. F. ON CORP. GOVERNANCE (Feb. 6, 2022), https://corpgov.law.harvard.edu/2022/02/06/the-push-to-net-zero-emissions-where-the-board-comes-in/ [https://perma.cc/9YG4-VHLX] (outlining the role of boards in ensuring that companies consider climate change-related risks and opportunities and define targets in line with the Task Force on Climate-Related Financial Disclosures framework).

Second, the advent of climate-conscious investors may be expected to trigger changes in corporate policy. Climate-conscious investors place a higher-than-average valuation on emission reductions—whether because of nonfinancial preferences or heterogeneous expectations about the costs and benefits of transition. Climate-conscious investors will value credible commitments to emission reduction because these clearly signal the seriousness of the firm's climate strategy. As the proportion of climate-conscious investors grows, we expect this to generate stock price incentives for managers to undertake such commitments.

If there is a business case for corporate commitments to transition, the next question is how this can be implemented. In Part II, we consider the extent to which a range of existing mechanisms can deliver credible commitments.

II. THE CORPORATE CLIMATE COMMITMENT PROBLEM

We have argued that to capture valuation uplifts from climate-conscious investors, firms need to make *credible* commitments regarding future emission reduction pathways. That is, such claims must be ones that firms cannot easily abandon without adverse consequences—more than just greenwashing cheap talk. This points to a practical question. How can firms deliver such credible commitments to investors over their long-term emissions targets and transition policies? In this Part, we argue that doing so is much harder than one may think at first. We review several existing tools that firms may seek (and, in some cases, have sought) to deploy. We consider, in turn, disclosures, stakeholder-oriented fiduciary duties, corporate governance arrangements, and corporate purpose initiatives. By and large, we find each of them to be ineffective as a credible commitment device.

A. Disclosures

An increasing number of jurisdictions now mandate or are about to mandate[117] some sort of climate risk disclosure by certain issuers.[118] In addition, a growing number of firms now make voluntary disclosures about their assessment of climate risks and their planned responses.[119]

Disclosures by public companies may attract securities fraud liability for both companies and their officers if they contain material misrepresentations or omissions.[120] Making disclosures against the background of such potential liability may therefore be thought of as a means by which firms can signal the credibility of these statements.[121] Where firms disclose details of their current actions and plans regarding carbon emissions, they may face liability if these disclosures are false. Might disclosure, therefore, offer firms an opportunity to make a credible

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117. *See* Securities and Exchange Commission, Release Nos. 33-11042; 34-94478, Proposed Rule: The Enhancement and Standardization of Climate-Related Disclosures for Investors, Mar. 21, 2022.

118. *See* Armour, Enriques & Wetzer, *supra* note 68, at 1108–17.

119. *Id.* at 1114–15.

120. *See, e.g.*, Urska Velikonja, *The Cost of Securities Fraud*, 54 WM. & MARY L. REV. 1887, 1897–99 (2013).

121. *See, e.g.*, John C. Coffee, Jr., *Law and the Market: The Impact of Enforcement*, 156 U. PA. L. REV. 229, 284–87 (2007) (articulating a "bonding hypothesis" for the role of securities law enforcement in committing firms not to defraud investors).

commitment? For this to be so, reneging on an undertaking to reduce emissions would need to attract liability. However, this turns out to be beyond the reach of securities law.[122]

Most obviously, statements about planned future reductions in emissions are *forward-looking*; that is, they relate to "plans and objectives . . . for future operations."[123] Such statements attract the benefit of a statutory safe harbor from securities fraud liability.[124] This has two aspects. The most commonly used component is where the forward-looking statement is identified as such and accompanied by appropriate cautionary statements identifying factors that could cause actual results to differ from those in the forward-looking statement.[125] Such forward-looking statement disclaimers are routinely found in corporate disclosures relating to climate risks.[126]

The other aspect of the forward-looking safe harbor is that, even if the statement is not qualified by a suitable disclaimer, a plaintiff in a securities fraud lawsuit can only succeed in establishing liability if they can show that the corporate officer who approved the forward-looking statement had "actual knowledge . . . that the statement was false or misleading."[127] This interacts with the core feature of securities fraud liability: that it is based on untrue statements of *fact*.[128] A company disclosing that it has adopted an emissions target for a future date can be taken to imply a statement of fact that the company is actually seeking to achieve the target or possibly that the company has reasonable grounds for thinking that the target is achievable.[129] But a firm could downgrade or abandon a previously disclosed emissions target without facing securities fraud liability following a change in control or other material change in circumstances. Investors consequently cannot rely on disclosure of such targets as commitments by the firm.

A second reason why disclosures are unlikely to generate credible commitments for firms relates to the question of "materiality." It is a basic feature

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122. We focus below on private enforcement. However, the concerns raised in the discussion below are also relevant to public enforcement. Moreover, it is unclear to what extent the intensity of such enforcement would be correlated with the degree of violation of environmental commitments.

123. Securities Exchange Act of 1934 § 21E(i)(1)(B), 15 U.S.C. § 78a (defining the term "forward-looking statement").

124. § 21E.

125. § 21E(c)(1)(A).

126. *See supra* note 6 and accompanying text.

127. § 21E(c)(1)(B), 15 U.S.C. § 78a. *See also* Slayton v. Am. Exp. Co., 604 F.3d 758, 766 (2d. Cir. 2010) ("The safe harbor is written in the disjunctive; that is, a defendant is not liable if the forward-looking statement is identified and accompanied by meaningful cautionary language *or* is immaterial *or* the plaintiff fails to prove that it was made with actual knowledge that it was false or misleading.") (emphasis in original).

128. *See, e.g.*, Omnicare, Inc. v. Laborers Dist. Council Constr. Indus. Pension Fund, 575 U.S. 175, 182–84 (2015).

129. *See Slayton*, 604 F.3d at 774 (a forward-looking statement may be understood as containing implicit factual assertions: "(i) that the statement is genuinely believed; (ii) that there is a reasonable basis for that belief; and (iii) that the speaker is not aware of any undisclosed facts tending to seriously undermine the accuracy of the statement"); *see also In re* Apple Computer Sec. Litig., 886 F.2d 1109, 1113 (9th Cir. 1989).

of the cause of action for securities fraud that the misstatement must have been material, in the sense that a reasonable investor would consider that it "significantly alter[ed] the total mix of information made available."[130] In *James v. Exxon Mobil Corp.*,[131] the State of New York brought a securities fraud action under state law against ExxonMobil, alleging that the firm's public disclosures indicated that it was planning for the future based on an expected cost of carbon of up to $80 per ton by 2040 but that the internal models applied by its project teams allowed for much lower expected costs of carbon to be used.[132] The Supreme Court of New York found that there was no misstatement.[133] However, it also opined that, even if there had been a misstatement, it was not material because "no reasonable investor . . . would make investment decisions based on speculative assumptions of costs that may be incurred 20+ or 30+ years in the future."[134]

As a result of these factors, disclosures of emissions targets and plans are a rather less binding commitment than one might have imagined.[135]

B. Stakeholder-Oriented Fiduciary Duties

Several policy proposals assert a significant role for a redefined version of directors' fiduciary duties to promote corporate sustainability. For example, the European Union's proposed Corporate Sustainability and Due Diligence Directive proposes widening the scope of directors' fiduciary duties to include "the consequences of their decisions on sustainability issues, including where relevant on human rights, climate change and the environment, including in the short, medium and long term."[136] Similarly, the Business Roundtable of America delivered a statement of policy in 2019 in which its members evinced a "fundamental commitment to all . . . stakeholders," including customers, employees, suppliers, and communities, as well as shareholders.[137]

Can these reshaped fiduciary duties reinforce the credibility of net zero commitments? We doubt it. Where they articulate powers to promote the interests

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130. Singh v. Cigna Corp., 918 F.3d 57, 64 (2d Cir. 2019).

131. James v. Exxon Mobil Corp., 452044/2018, 2019 WL 6795771 (N.Y. Sup. Ct. Dec. 10, 2019).

132. *See id.* at *19–22.

133. *Id.* at *54–55.

134. *Id.* at *34.

135. As we have argued in a companion paper, detailed disclosures on targets and pledges by systemically important carbon emitters would still help investors distinguish between credibly and non-credibly committing firms. *See* Armour, Enriques & Wetzer, *supra* note 68, at 1139–42. The point here is that disclosure alone is not sufficient to ensure the credibility of any commitment.

136. European Commission, *Proposal for a Directive on Corporate Sustainability Due Diligence and Amending Directive (EU) 2019/1937*, at art. 25(1), COM (2022) 71 final (Feb. 23, 2022).

137. BUS. ROUNDTABLE, STATEMENT ON THE PURPOSE OF A CORPORATION (2019), https://system.businessroundtable.org/app/uploads/sites/5/2023/02/WSJ_BRT_POC_Ad.pdf [https://perma.cc/C6EZ-WD9H].

of non-shareholder constituencies,[138] stakeholder-reoriented fiduciary duties are likely to be counterproductive because they increase decision-making costs without any guarantee that the newly empowered constituencies will be more climate-conscious than shareholders.[139] In particular, there is no guarantee that employees will be more willing to promote carbon transition than shareholders. Indeed, possibly less so: within many firms, transition will necessitate a large-scale retooling of human capital, which will likely be opposed by employees whose existing human capital would be devalued. The travails of the German automotive industry, subject to employee codetermination at board level and late to adjust to the challenges and opportunities posed by the twilight of the internal combustion engine, are arguably a case in point. Volkswagen, responsible for one of the most egregious corporate environmental violations in history, is among the firms in which employees are co-owners.[140]

C. Corporate Governance

Can other tweaks to traditional corporate governance arrangements do the trick? Obvious candidates are compensation structures for executives that include emissions-related key performance indicators, instituting a climate committee with adequate expertise on climate change, and giving shareholders a say on their companies' climate plans.

1. Executive Compensation

Executive compensation directly affects management's incentives, so by committing to pay its managers according to green performance targets, the firm would bond its managers to implementation. While it is now becoming more common for firms to include some sustainability-related criteria among performance targets, this is far from ubiquitous even in sectors that are already subject to external regulation giving firms incentives to reduce emissions.[141] To help move things

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138. *See* U.K. CO. L. REV. STEERING GRP., MODERN COMPANY LAW FOR A COMPETITIVE ECONOMY: THE STRATEGIC FRAMEWORK (1999), https://webarchive.nationalarchives.gov.uk/ukgwa/20030731101312/http://www.dti.gov.uk:80/cld/comlawfw/index.htm [https://perma.cc/N8FE-7LND]; Jill E. Fisch & Steven Davidoff Solomon, *Should Corporations Have a Purpose?*, 99 TEX. L. REV. 1309, 1330 (2020) (distinguishing between instrumental and non-instrumental versions of stakeholder obligations: instrumental or "long-term shareholder value" approaches permitting or requiring consideration of non-shareholder constituencies only insofar as this tends to promote shareholder value; non-instrumental or "long-term stakeholder value" approaches permitting or requiring such consideration even to the detriment of shareholder value).

139. *See, e.g.*, Lucian A. Bebchuk, Kobi Kastiel & Roberto Tallarita, *For Whom Corporate Leaders Bargain*, 94 S. CAL. L. REV. 1467, 1535 (2021).

140. *See* John Armour, *Volkswagen's Emissions Scandal: Lessons for Corporate Governance? (Part 2)*, OXFORD BUS. L. BLOG (May 18, 2016), https://blogs.law.ox.ac.uk/business-law-blog/blog/2016/05/volkswagen%E2%80%99s-emissions-scandal-lessons-corporate-governance-part-2 [https://perma.cc/QF6G-3AK5].

141. *See, e.g.*, Cleyton M. Cavallaro et al., *Decarbonizing the Boardroom? Aligning Electric Utility Executive Compensation with Climate Change Incentives*, 37 ENERGY RSCH. & SOC. SCI. 153 (2018) (although U.S. electrical power utilities are given state-level incentives to reduce emissions, their executives lack direct incentives to do so); Karen

along, the E.U. has proposed requiring large companies to align variable remuneration with delivery of firms' (also to-be-mandated) net zero plans.[142]

However, there are well-known problems in the effective design of executive compensation because the incentives are highly sensitive to the exact specification of the contract and because the design of compensation contracts is itself subject to significant agency problems.[143] And there are particular problems with incentive contract design where agents are expected to pursue multiple goals,[144] which may make it appropriate to reduce the overall reliance on incentive targets.[145]

2. Board Structure

In light of the rapidly growing salience of climate risk, it seems desirable for firms to seek to add capacity to their boards to engage with this challenge. For most firms, climate risk is currently a matter for which the board takes responsibility as a whole.[146] However, a firm might go beyond this by restructuring its board so as to include a particular focus on climate risk—for example, by revamping the charter of its audit committee[147] or implementing a sustainability committee—and giving it responsibility for safeguarding the firm's commitment to its transition plan. While a significant number of public companies have already introduced sustainability

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Maas, *Do Corporate Social Performance Targets in Executive Compensation Contribute to Corporate Social Performance?*, 148 J. BUS. ETHICS 573, 581 (2018) (corporate social performance outcomes not linked to corporate social performance targets in executive compensation).

142. European Commission, *supra* note 136, at art. 15(3).

143. LUCIAN A. BEBCHUK & JESSE M. FRIED, PAY WITHOUT PERFORMANCE: THE UNFULFILLED PROMISE OF EXECUTIVE COMPENSATION (2004); Lucian A. Bebchuk & Roberto Tallarita, *The Perils and Questionable Promise of ESG-Based Compensation*, 48 J. CORP. L. 37 (2022).

144. Bengt Holmstrom & Paul Milgrom, *Multitask Principal–Agent Analyses: Incentive Contracts, Asset Ownership, and Job Design*, 7 J.L. ECON. & ORG. 24 (1991).

145. Christopher Geczy et al., *Contracts with (Social) Benefits: The Implementation of Impact Investing*, 142 J. FIN. ECON. 697 (2021) (showing that where agents are expected to deliver both financial gains and nonfinancial impact, fewer performance-related pay targets are used).

146. *See, e.g.*, LABRADOR, 2020 PROXY STATEMENT TRENDS AND ANALYSIS 7 (2021), https://www.labrador-company.com/wp-content/uploads/2020/12/LABRADOR_BENCHMARK_2020-PROXY-STATEMENT-TRENDS-AND-ANALYSIS.pdf [https://perma.cc/7W3T-TPP6] (76% of US 2020 proxy statements surveyed identified sustainability as a risk that the board as a whole oversees); DELOITTE, THE AUDIT COMMITTEE FRONTIER—ADDRESSING CLIMATE CHANGE 14 (2021), https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Risk/gx-the-audit-committee-frontier-climate-change-nov-2021.pdf [https://perma.cc/7TLZ-LECQ] (global client survey reporting that 61% of respondents indicated climate risks were currently a matter for the board as a whole); CORPORATE BOARD MEMBER & EY, RESEARCH REPORT: FOUR OPPORTUNITIES FOR ENHANCING ESG OVERSIGHT 6 (2021), https://www.ey.com/en_us/board-matters/enhancing-esg-oversight (survey of 400 public company directors; 47% report that oversight of climate-related risks reside with the full board in their firms).

147. *See* DELOITTE, *supra* note 146, at 22–26 (recommending agenda for significant restructuring of audit committee roles and responsibilities to engage with oversight of climate risk).

committees or similar bodies,[148] their remit in the absence of an agreed transition agenda is more commonly to provide specialist oversight of the risks associated with climate change.[149]

Where transition commitments are announced, a relevant specialist board committee could provide leadership and advocacy for its implementation. In particular, if circumstances emerged such that executives felt tempted to pull back on the firm's transition agenda, the sustainability committee could function as an advocate for retaining that agenda. However, the incentives of the relevant board members to do so are a function of their compensation arrangements. The past two decades have seen growth in the use of equity-based compensation for directors, which tends to undermine the potential for board members to act as a check on actions pursued by management that increase the stock price performance in the short run.[150] Further, even assuming that climate committee members may otherwise have the incentives to stand up to attempts to renege on climate commitments (for instance, to protect their reputation as climate change experts), what difference can they make? In the presence of a majority of directors siding with the firm's managers and possibly, as further argued below,[151] a climate-indifferent majority of shareholders, it is hard to see how they could effectively oppose the move.

3. Shareholder Voting

Another possible governance mechanism for climate risk that is gaining attention is a "Say on Climate" vote.[152] Similar to the now well-established "Say on Pay" votes, the idea is that firms should present their climate strategies to shareholders on a regular basis, with shareholders passing an advisory resolution in response.[153]

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148. *See* LABRADOR, *supra* note 146, at 7 (32% of US 2020 proxy statements indicate that the firm's board has a dedicated sustainability or public responsibility committee).

149. *See, e.g.*, LOWE'S, 2021 NOTICE OF ANNUAL MEETING OF SHAREHOLDERS & PROXY STATEMENT 19–20 (2021), https://corporate.lowes.com/sites/lowes-corp/files/2021-04/low-2021-proxy-statement.pdf [https://perma.cc/FSN7-E2K5] (detailing board structure including a sustainability committee with "primary responsibility for more frequent and in-depth oversight of the Company's environmental and social strategy, risks and risk mitigation").

150. *See, e.g.*, John Armour et al., *Taking Compliance Seriously*, 37 YALE J. ON REGUL. 1, 34–38 (2020) (detailing growth of stock compensation for US public company directors and impact on monitoring incentives).

151. *See infra* Subsection II.C.4.

152. *See generally* SAY ON CLIMATE, https://sayonclimate.org/ [https://perma.cc/BBJ6-E6DP] (last visited June 27, 2022).

153. That the resolution is advisory rather than binding means that the shareholders do not encroach on the board's jurisdiction to manage the company. *See, e.g.*, DEL. CODE ANN. tit. 8, §§ 101–398 (2022).

The idea was first popularized by British hedge fund activist Chris Hohn[154] and has recently been adopted by several U.K. and U.S. public companies.[155] The rationale is to ask companies to develop plans for transition, and then put these to shareholders for a vote.[156] Insofar as this encourages companies to engage with the transition challenge, this mechanism is desirable and yet, as argued immediately below, insufficient to make any net zero commitment credible.

4. The Common Problem: Time Inconsistency

Say on Climate votes, like executive compensation and board structure, remain subject to the preferences of the current shareholders. Executive compensation is regularly put to shareholders for a Say on Pay vote; board members are elected by shareholders; and a Say on Climate vote would by design be a matter for shareholders. The *corporate* commitment they embed is therefore conditional on the preferences of shareholders for the time being. This can lead to firms reneging on commitments when shareholders no longer view them as in their own interest. In other words, the inherent mutability of the shareholder register creates the potential for a time inconsistency problem.[157]

The volatility in costs and benefits associated with transition implies that the expected value of transition—and consequently shareholder support for it—will fluctuate over time, as discussed in Subsection I.D.4. Alongside these fluctuations, the composition of the shareholder body can be expected to change over time, with variation in the mix of climate-conscious and climate-indifferent investors. In particular, a firm that has embarked on a transition strategy that involves a commitment to future investments may find itself vulnerable to an activist campaign asserting that the commitment is value-decreasing and pushing an agenda that will undo it.[158] If it is possible for the commitment to be undone by a shareholder vote,

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154. Attracta Mooney & Billy Nauman, *'Say on Climate' Campaign Faces First Big Test at Investor Meetings*, FIN. TIMES (May 17, 2021), https://www.ft.com/content/cc409667-e048-4246-808c-9cdf8e41ac77.

155. These include Unilever, Moody's, Shell, S&P Global, and Nestlé. *See Supporters*, SAY ON CLIMATE, https://sayonclimate.org/supporters/ [https://perma.cc/8MLH-WYVC] (last visited Feb. 3, 2022), for a current list of companies voluntarily granting shareholders a Say on Climate vote.

156. *See* SAY ON CLIMATE, *supra* note 152; *see also* Mooney & Nauman, *supra* note 154.

157. A "time inconsistency" problem arises where a decision-maker has incentives to make inconsistent choices at different points in time in a way that is welfare-reducing for the parties affected by the decision. The idea was first developed in the context of monetary policy. *See, e.g.*, Finn E. Kydland & Edward C. Prescott, *Rules Rather than Discretion: The Inconsistency of Optimal Plans*, 85 J. POL. ECON. 473 (1977). However, it has since been applied very widely, including in the context of climate policy. *See, e.g.*, Jon Hovi et al., *Implementing Long-Term Climate Policy: Time Inconsistency, Domestic Politics, International Anarchy*, 9 GLOBAL ENV'T POL. 20 (2009).

158. *See also* Dorothy S. Lund, *Corporate Finance for Social Good*, 121 COLUM. L. REV. 1617, 1628–30 (2021) (hedge fund activism may impede companies' ability to honor pro-social commitments).

then it will not be robust to the possibility of this type of activism.[159] This in turn will reduce the value that climate-conscious investors would attach to a commitment at the outset. For some firms, it may be valuable to offer a stronger commitment that binds not only managers to shareholders but also the firm against fluctuating shareholder preferences. Such "hands-tying" commitments are indeed common in many commercial contexts where one party is concerned about the risk of opportunistic withdrawal by the other partway through an agreement.[160]

D. Corporate Purpose as Commitment?

Another potential mechanism might be a corporate "statement of purpose" encompassing a commitment to emissions reduction. The idea of a statement of purpose as a commitment device has received considerable scholarly and policy attention in recent years.[161] While these are proposed as commitment mechanisms, they suffer from significant weaknesses that make them unsuitable for the kind of climate commitment we argue firms may wish to make.

A corporate purpose is conceived as a statement by the firm of a particular course for the development of its business. For example, Coca-Cola's corporate purpose is expressed to be "to refresh the world and make a difference,"[162] whereas Tesla's is to "accelerate the world's transition to sustainable energy."[163] Corporate purpose advocates argue that a statement of purpose can generate a credible commitment by a firm to deliver on its mission in a way that is consistent with social welfare.[164] In the context of climate change, this would entail reduction of emissions (most commonly, a commitment to a net zero target) to deliver a sustainable future.[165]

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159. In companies without staggered boards, hostile takeovers might be another context in which such commitments could be reneged upon. While defensive measures such as the poison pill permit U.S. boards to commit to a particular business strategy even in the face of a hostile bidder, the latter may wage a proxy contest and obtain control of the company after redeeming the pill. *See, e.g.*, Yakov Amihud, Markus Schmid & Steven Davidoff Solomon, *Settling the Staggered Board Debate*, 166 U. PA. L. REV. 1475, 1480–81 (2018).

160. *See, e.g.*, Henry Hansmann & Reinier Kraakman, *Hands-Tying Contracts: Book Publishing, Venture Capital Financing, and Secured Debt*, 8 J.L. ECON. & ORG. 628, 629 (1992).

161. *See, e.g.*, COLIN MAYER, PROSPERITY: BETTER BUSINESS MAKES THE GREATER GOOD (2018); Colin Mayer, *The Future of the Corporation and the Economics of Purpose*, 58 J. MGMT. STUD. 887 (2021); Fisch & Davidoff Solomon, *supra* note 138; Jill E. Fisch & Steven Davidoff Solomon, *The Value of a Public Benefit Corporation*, *in* RESEARCH HANDBOOK ON CORPORATE PURPOSE AND PERSONHOOD 68 (Elizabeth Pollman & Robert B. Thompson eds., 2021); David Kershaw & Edmund Schuster, *The Purposive Transformation of Corporate Law*, 69 AM. J. COMPAR. L. 478 (2021).

162. *Our Purpose*, COCA-COLA CO., https://investors.coca-colacompany.com/about/our-purpose [https://perma.cc/JR6U-STSS] (last visited Feb. 22, 2023).

163. *Impact Report 2020*, TESLA 1, 2, https://www.tesla.com/ns_videos/2020-tesla-impact-report.pdf [https://perma.cc/EW3F-SA4P] (last visited Feb. 25, 2023).

164. *See, e.g.*, MAYER, PROSPERITY, *supra* note 161, at 154–56.

165. A list of benefit corporations making such commitments is available at *Supporters*, B CORP CLIMATE COLLECTIVE, https://www.bcorpclimatecollective.org/supporters [https://perma.cc/3PP7-5WH9] (last visited Feb. 22, 2023).

As generally deployed, statements of purpose are not legally binding.[166] They do not restrict the actions that a firm may take or impose any legal consequences on a firm that steps outside its stated purpose. Indeed, in many cases, they appear to be little more than a marketing statement.[167] The strongest case for a non-legally binding statement of purpose is that it facilitates reputational commitments by a firm.[168] However, reputational mechanisms work most effectively in constraining firms from harming their contractual counterparties, such as customers and investors.[169] In contrast, they fare poorly with respect to control of externalities such as environmental harm.[170] Hence an effective legal constraint would be necessary to deliver meaningful commitment.[171]

A stronger way of making a purpose statement legally binding is by inserting it in the corporate charter and setting the corporation up as, or converting it into, a public benefit corporation.[172] By doing so, a corporation signals that it is willing to temper maximization of profits (still one of the goals of the public benefit corporation)[173] by taking actions, for instance, to mitigate climate change. Yet not even the inclusion of a climate-focused purpose in the company's charter would be sufficient to commit it credibly to net zero goals. The reasons are three-fold.

First, the power structure and decision-making apparatus of public benefit corporations are no different from those of traditional for-profit corporations.[174] Hence in "balanc[ing] the stockholders' pecuniary interests . . . and the public benefit"[175] of transitioning to net zero, directors will be subject to shareholders' pressures, which may go one direction or the other depending on the preferences of the majority of the shareholders. As we analyzed in Subsection II.C.4, those preferences may fluctuate over time and hence steer the company away from its

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166. *See* Fisch & Davidoff Solomon, *supra* note 138, at 1336–38 (describing corporate statements of purpose as "neither concrete nor enforceable").

167. Lucian A. Bebchuk & Roberto Tallarita, *Will Corporations Deliver Value to All Stakeholders?*, 75 VAND. L. REV. 4 (2021).

168. Fisch & Davidoff Solomon, *supra* note 138, at 1339–44.

169. Jonathan M. Karpoff et al., *The Cost to Firms of Cooking the Books*, 43 J. FIN. & QUANTITATIVE ANALYSIS 581 *passim* (2008); John Armour et al., *Regulatory Sanctions and Reputational Damage in Financial Markets*, 52 J. FIN. & QUANTITATIVE ANALYSIS 1429 *passim* (2017).

170. Jonathan M. Karpoff et al., *The Reputational Penalties for Environmental Violations: Empirical Evidence*, 48 J.L. & ECON. 653 *passim* (2005).

171. *See* Kershaw & Schuster, *supra* note 161, at 499–511.

172. *See* B CORP CLIMATE COLLECTIVE, *supra* note 165. Note that inserting the other-regarding purpose in the corporate charter would not affect the validity of the corporate agents' acts like early corporate law purpose clauses used to do. *See* Elizabeth Pollman, *The History and Revival of the Corporate Purpose Clause*, 99 TEX. L. REV. 1423, 1433, 1452–53 (2021) (describing the *ultra vires* doctrine in connection with the precise purposes clauses of the first corporations and modern purpose clauses as serving a signaling function with no impact on the validity of a corporation's acts).

173. DEL. CODE ANN. tit. 8, § 362(a).

174. Fisch & Davidoff Solomon, *The Value of a Public Benefit Corporation*, *supra* note 161, at 76–77.

175. § 362(a).

climate ambitions, for instance, by delaying the deployment of costly technologies or postponing the demise of high-emissions ventures.

Second, a majority of the stockholders can amend the corporate charter, including to convert a public benefit corporation into a conventional one;[176] if desired, this can be entrenched through a supermajority requirement.[177] But even that requirement could not prevent a traditional shareholder activist or a hostile bidder from seizing control and converting into a conventional corporation to liberate returns for shareholders.

Finally, directors' fiduciary duties would achieve little in terms of ensuring that the company does not steer away from the climate-friendly goal. That is true whatever the degree of precision in identifying the goal; that is, either if the goal is generic (e.g., to minimize harm to the planet's climate) or if it is more specific (e.g., to reach net zero emissions by 2050). In either case, directors' and officers' actions failing to balance shareholder wealth with climate goals will be not only covered by the business judgment rule[178] but also exculpated under DGCL § 102(b)(7).[179] That may sound less intuitive in the case of a specific charter commitment to reaching net zero by a given date. But even in that case, the likely scenario is one where managers first devise strategies consistent with the net zero target; next, once it is clear that the company is unable to attain interim milestones, managers revise those strategies. Finally, at some point, it becomes clear that it is just impossible to achieve the final climate goal. Each of the decisions progressively leads to the failure to reach the target, and even those taken once failure is clear will be covered by the business judgment rule and the exculpation clause. In addition, the shareholder plaintiff in a derivative suit would have to prove that the corporation sustained losses due to directors' decisions,[180] when in fact the corporation will likely have profited from them.

E. Summary

This Part discussed a range of existing legal and governance strategies that might be thought to facilitate commitments by firms to transition toward lower carbon business models and found them wanting.

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176. DEL. CODE ANN. tit. 8, § 242(b)(1). A supermajority requirement (90%) to convert into a public benefit corporation or back into a conventional corporation was eliminated in 2020. *See* Michael R. Littenberg et al., *Delaware Public Benefit Corporations—Recent Developments*, HARV. L. SCH. F. ON CORP. GOVERNANCE (Aug. 31, 2020), https://corpgov.law.harvard.edu/2020/08/31/delaware-public-benefit-corporations-recent-developments/ [https://perma.cc/3DM5-Z99N].

177. DEL. CODE ANN. tit. 8, § 242(b)(4).

178. *See* Ronald J. Gilson, *Corporate Governance Versus Real Governance* 9 (John M. Olin Program in Law and Economics, Working Paper No. 565, 2022), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4007324.

179. DEL. CODE ANN. tit. 8, § 365(c) (providing that any failure on a director's part to satisfy the requirement to balance shareholder interests with the public benefit does not constitute an act or omission not in good faith or a breach of the duty of loyalty for purposes of § 102(b)(7) unless the certificate of incorporation provides otherwise).

180. *See, e.g.*, *In re* J.P. Morgan Chase & Co. S'holder Litig., 906 A.2d 766, 773 n.17 (Del. 2006) (citing Henne v. Balick, 146 A.2d 394, 396 (Del. 1958)).

Our analysis suggests that corporate disclosures, although subject to liability for misstatements, are unlikely to function as credible commitments because statements about transition will be forward-looking and the quantum of any liability is likely to be lowest at precisely the time when the firm has the greatest incentive to depart from a plan. Corporate governance mechanisms such as board structure, executive compensation, and shareholder Say on Climate votes are subject to a similar problem: these mechanisms commit boards to shareholders but do not constrain shareholder decision-making. Volatility in the expected costs of transition means that future shareholders may want to renege on corporate commitments, so commitments that are subject to the shareholders' continued majoritarian support are not especially credible. Corporate purpose statements, a much-vaunted commitment mechanism, are often not actually legal commitments at all; where they are, they too are capable of being unwound by a majority of the shareholders, whether by voting or by selling, and hence not robust to the volatility of transition costs.

This leads us to ask, in Part III, how firms can develop and implement commitments that address these concerns.

III. GREEN PILLS: TOWARD CREDIBLE CORPORATE CLIMATE COMMITMENTS

The key problem we have identified is that firms wishing to pledge to net zero targets need to find ways to make their green commitments sufficiently credible. That is, they need to demonstrate to investors, consumers, suppliers, competitors, and others that the firm will stick to its green pledges even if, at some later point in the commitment period, shareholders wish the firm to renege on its pledges, whether due to volatility in the costs and benefits of transition or to changes in the shareholder base.

At the same time, firms do not want to enter into commitments that are excessive. A "dead hand" commitment that requires the firm to deliver on transition *at whatever cost* would be hard to justify and likely counterproductive. That said, a commitment that goes some way beyond the vagaries of the wishes of the shareholders for the time being may be judged value-maximizing by boards *ex ante*, taking into account the valuation effects of climate-conscious investors and the value of self-insuring against fluctuations in transition costs. At a high level of generality, the challenge of delivering a sufficiently meaningful yet not excessive level of commitment resonates with boards' and courts' assessments of defenses against hostile takeovers, used as commitments to corporate business plans. We therefore term mechanisms that can deliver such credible commitments as "green pills."[181]

In this Part, we propose "green pill" mechanisms for making carbon reduction commitments that have *calibrated* credibility. We consider here arrangements that harness existing contract law mechanisms to align firms'

181. Despite the moniker—chosen because of its salience—the green pill mechanism actually has more in common with a classical "lockup" in the M&A context.

incentives with climate transition goals.[182] Crucially, these mechanisms could in principle be implemented tomorrow without requiring any change to corporate law or other laws, thus avoiding any reliance on lackadaisical climate policy.[183] Green pills, as we propose them, have the highly desirable quality of being capable of fine-grained calibration of the degree of commitment. Unlike standard contracts, green pills deliver commitment not through a remedy of damages for breach, but through the stipulation at the outset of two alternative obligations for the firm dependent on whether it meets specified emission-reduction milestones. We analyze and provide guidance in relation to a key design feature, namely the destination of the payment should the firm fail to meet the specified milestones. Finally, we consider the extent to which the adoption of a green pill would be compatible with boards' fiduciary duties under Delaware law.

A. Green Pills

1. Basis in Contract Law

In private law, contracts are generally rationalized as mechanisms to generate credible commitments. However, a standard contract committing the firm to attain a climate-related goal would not suffice in this context. The problem lies with the fact that any counterparty is going to bear only a minuscule fraction of the damages from a firm's emissions because a firm's emissions impact the whole planet. Even assuming that a court will accept that the damages in question are the financial value to the promisee of the firm's performance, a contractually binding promise of this kind—were it to rely on the default remedies of contract law for enforcement—would not deliver a credible commitment.[184]

A way to get around this limitation is to specify in the contract two alternative obligations for the firm: *either* to deliver its transition milestones *or* to make a specified payment to a specified party. For example, a payment made under escrow at the time of the net zero commitment, which is specified to be revocable on attaining the carbon reduction goal, would function to deliver commitment up to the value of the payment. Similarly, the grant of an option, exercisable on breach of the carbon reduction promise, to purchase new commercial paper issued at a deep

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182. Dorothy Lund has also made the case for firms using contractual mechanisms to commit to social goals. Lund, *supra* note 158. Our analysis situates these as part of a range of possible mechanisms firms could deploy. In a companion paper, we look into how asset partitioning and the separation between cash flow and voting rights may reinforce the green pill and/or serve the same function. *See* John Armour, Luca Enriques & Thom Wetzer, *Dark and Dirty Assets: Greening Climate-Driven Asset Partitioning*, OXFORD BUS. L. BLOG (June 14, 2022), https://blogs.law.ox.ac.uk/business-law-blog/blog/2022/06/dark-and-dirty-assets-greening-climate-driven-asset-partitioning [https://perma.cc/KE4A-Z3ST].

183. *See supra* Subsection I.B.2.

184. Where damages are not an adequate remedy, courts will consider an award of specific performance. *See, e.g.*, RESTATEMENT (SECOND) OF CONTRACTS §§ 357, 359(1) (AM. L. INST. 1981). However, specific performance will not be awarded in cases that would require extensive ongoing supervision by the court. *See, e.g.*, RESTATEMENT (SECOND) OF CONTRACTS § 366 (AM. L. INST. 1981); M. Leo Storch Ltd. P'ship v. Erol's, Inc., 620 A.2d 408, 412–14 (1993); Entergy Ark., Inc. v. Nebraska, 226 F. Supp.2d 1047, 1160–61 (D. Neb. 2002). Consequently, it seems unlikely a court would order specific performance for breach of such a contractual undertaking.

discount, would have the same functional impact on the promisee. These are just two examples of how green pills could be structured and implemented.

A technical concern grounded in contract law is that the "rule against penalty clauses" renders clauses for pre-agreed payments of damages unenforceable insofar as they require a payment that exceeds what, at the time of contracting, would have been a reasonable pre-estimate of the promisee's expected loss consequent to breach.[185] The response to this concern is that a firm's willingness to enter into such a commitment mechanism is largely motivated, in our analysis, by the desire to signal the seriousness of its intent to climate-conscious investors, and thereby deliver higher *ex ante* valuations for its securities. The amount of the "greenium" climate-conscious investors are willing to pay reflects the value to them of the firm's promised reduction in emissions; the firm should only be willing to commit to a payment that has an *ex ante* valuation equivalent to the climate-conscious investors' additional valuation of the commitment.

2. Calibrated Commitment Intensity

Once a green pill is in place, standard corporate governance mechanisms work to support implementation of transition policies, instead of creating potential obstacles. A green pill makes it costly for the firm to deviate from its transition path, and so management will be discouraged from doing so. This will increase climate-conscious investors' willingness to pay for the firm's securities *ex ante* and avoid the possibility of costly flip-flopping on climate policy.[186] Moreover, it will align the *ex post* preferences of shareholders who are focused solely on profits—and may for whatever reason not share managers' view that transitioning is indeed the best way to maximize firm value—with those of climate-conscious investors.

A key benefit of a green pill is to provide a finely calibrated level of commitment. That is, the extent of the commitment equals the amount of the promised payment. Managers can thus calibrate it to their firm's specific characteristics and strategic position, while investors can readily understand the extent of the commitment. Importantly, a green pill commitment does not prevent companies from adapting their transition strategies to changing circumstances but rather creates a hurdle rate against which a reversal in strategy must be judged.

3. An Example: Sustainability-Linked Bonds

An example of a green pill already in use by an increasing number of corporations around the globe is so-called "sustainability-linked bonds." Unlike most other "green bonds," these issues do not ringfence the funds for a particular project but instead provide for a coupon step-up (an increase in the interest rate) or an extra payment at maturity in case of failure to attain a given ESG (usually environmental) target.[187] The bond agreement contains no contractual undertaking

185. *See, e.g.*, RESTATEMENT (SECOND) OF CONTS. § 356 cmt. b (AM. L. INST. 1981).

186. *See supra* Subsection I.D.4.

187. *See, e.g.*, Marcin Liberadzki et al., *Spread Analysis of the Sustainability-Linked Bonds Tied to an Issuer's Greenhouse Gases Emissions Reduction Target*, 14 ENERGIES 7918, 7919 (2021).

to the bondholders to meet the sustainability target; rather, it simply stipulates an additional interest payment contingent on this event.

To take just one example of such an issuance, NRG Energy, a large American energy company, issued sustainability-linked bonds in 2020 and 2021.[188] The bonds make the rate of interest vary according to whether the firm meets "its goals to achieve a 50% reduction of absolute greenhouse gas (GHG) emissions by 2025."[189] One of NRG's sustainability-linked bonds has an 11-year term, but if the emissions target is not met within 2025, the rate of interest payable from 2026 to maturity will be higher by 25 basis points.[190] More generally, covenants by firms linked to environmental benchmarks have become much more common in the past few years.[191] In a study of the terms of such loans, Nakita Cuttino reports that they are generally linked to interest differentials in the region of 5–10 basis points.[192]

Notably, the extent of the financial commitments undertaken by firms in these examples to date is similar to the extent of the "greenium" identified in issues to climate-conscious investors.[193] This is consistent with firms being motivated to enter into such commitments to signal their credibility to climate-conscious investors to a degree that matches the value such investors put on it. Of course, commitments measured in a few basis points have only a modest overall impact on firms' incentives.[194] However, if climate-conscious investment continues to grow rapidly, then firms will need to consider enhancing the credibility of contractual commitments going forward. We turn next to problems with scaling such commitments.

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188. *See Fixed Income*, NRG ENERGY, https://investors.nrg.com/fixed-income. The issue, made in December 2020, was the first of its kind in North America. *See NRG Energy Becomes First North American Company to Issue Sustainability-Linked Bond*, NRG ENERGY (Dec. 9, 2020), https://www.nrg.com/about/newsroom/2020/39166.html [https://perma.cc/H3BF-NAC5] [hereinafter NRG Press Release]. For other examples of sustainability-linked bond issuances, see Christine Lellis, *15 Companies Issuing Sustainability Bonds*, EHS MGMT. BLOG (June 24, 2021), http://www.perillon.com/blog/companies-issuing-sustainability-bonds [https://perma.cc/T5T4-HZFZ].

189. NRG Press Release, *supra* note 188.

190. Zacks Equity Research, *NRG Energy (NRG) to Issue $1.1B Sustainability-Linked Bonds*, NASDAQ (Aug. 10, 2021, 3:28 PM), https://www.nasdaq.com/articles/nrg-energy-nrg-to-issue-%241.1b-sustainability-linked-bonds-2021-08-10.

191. *See* Nakita Cuttino, *Private Debt for Public Good* 4 (unpublished manuscript) (on file with authors) ("Global [sustainability-linked] loan volumes in 2021 more than tripled the prior year's issuances, exceeding $715 billion.").

192. *Id.* at 32–34.

193. *See supra* note 102 and corresponding text.

194. Cuttino, *supra* note 191, at 41 (characterizing price differentials as "nominal"). For a scathing critique of the lack of ambition of the goals companies choose for their sustainability-linked bonds see Priscila Azevedo Rocha, Akshat Rathi & Todd Gillespie, *Empty ESG Pledges Ensure Bonds Benefit Companies, Not the Planet*, BLOOMBERG (Oct. 4, 2022, 7:05 AM), https://www.bloomberg.com/news/features/2022-10-04/greenwashing-enters-a-22-trillion-debt-market-derailing-climate-goals?sref=7iliGpFt [https://perma.cc/YHB5-ZN7P].

4. Strategic Inducement of Default: "Dirty Voting?"

A challenge to scaling the commitment delivered by this form of green pill lies in the possibility for strategic behavior by the recipient of the coupon step-up (the holder of the sustainability-linked bond). Consider, for example, a security that promises investors a significant payout if the firm fails to meet a particular carbon reduction target. If the firm fails to meet its target, then holders of this type of security will benefit. The value of the securities will consequently rise as failure to meet the target becomes more likely.

If the amount at stake is sufficiently large, investors will have incentives to combine holding the green bond along with the firm's common stock and use the voting rights associated with the latter to try to cause the firm to fail to meet its carbon reduction commitment to secure themselves a payday.[195] The investors' incentives to engage in such "dirty voting" would actually make it less likely that the firm would meet its carbon reduction target.

As hinted, this problem only emerges if the payment is large enough to motivate security holders to build an equity stake in the company to force the change of strategy. This clearly implies a payoff much higher than the step-ups contemplated in current sustainability-linked bond issues. For example, the NRG bond issued in 2021 promises a 25 basis point increase on a principal of $1.1 billion, starting five years after issuance if interim emissions targets for 2025 are unmet and until maturity in 2032.[196] This amounts to a total increase in interest payments of $2.75 million per year or $16.5 million over the remaining five years after the assessment date for the sustainability target. This is unlikely to be enough to justify the costs of a shareholder activist intervention.[197]

However, identifying this as the reason the NRG bond would be unlikely to attract strategic behavior from investors also makes clear that its ability to commit the company to sustainable targets is commensurately limited. When firms (or their shareholders) want a stronger commitment, strategic behavior from investors may become a real concern. Moreover, considering the value of the payout in isolation misses an important point: parties could be motivated to engage in "dirty voting" not only by the value of the payout under the green bond but also by the increase in the stock price that a deviation from the climate commitment might, at that point in time, result in. In such a situation, "dirty voting" might take place even when the payout under the green bond is relatively modest. As such, "dirty voting" is an apparent constraint on the scalability of green pills to make large-scale corporate climate commitments credible.

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195. This echoes the problem of "empty voting" first analyzed by Henry T.C. Hu & Bernard Black, *The New Vote Buying: Empty Voting and Hidden (Morphable) Ownership*, 79 S. CAL. L. REV. 811 (2006).

196. *See* Zacks Equity Research, *supra* note 190.

197. One example, albeit extreme, was the proxy fight launched by Nelson Peltz against Procter & Gamble in 2017, estimated to have cost in excess of $100 million. More systematically, activists whose campaigns escalated to proxy fights in the period 2000–2007 incurred costs averaging around $10 million, which would surely be higher today. *See* Nickolay Gantchev, *The Costs of Shareholder Activism: Evidence from a Sequential Decision Model*, 107 J. FIN. ECON. 610 (2013).

However, even where the sums at stake are on a scale that might engender "dirty voting," there are solutions to that problem. One would be to structure the arrangement such that the conditional payment is made not to the holders of the green securities, but to a third party with no ability to influence the issuing firm's behavior. In the context of carbon reduction targets, a potentially suitable party that would satisfy this criterion might be an environmental services provider.[198]

5. Third-Party Green Pills

The idea of a third-party green pill is that a firm undertakes to make a payment (of sufficient magnitude) to a third party, which in turn, for example, undertakes to provide the firm with a given amount of carbon offsets, conditional on the firm's failure to meet its carbon performance targets.

For instance, the payment could be made to finance a carbon removal project development.[199] Voluntary carbon offset markets have grown significantly in the last few years.[200] Some U.S. companies, such as Anadarko Petroleum, Chevron, Boeing, and Delta, are among the largest buyers of carbon offsets globally.[201] To be sure, the effective contribution of carbon offsets to achieving net zero targets is well-known to be questionable,[202] but doubts about their impact on climate are of secondary importance when they are meant to be an element of a third-party green pill. That is because a third-party green pill providing for carbon offsets would not be part of how the firm would satisfy its net zero commitments. Rather, failure to attain its emissions goals would trigger the payment and the offsets. In other words, the main function of the conditional voluntary carbon offset contract would not be ensuring that an effective reduction in carbon emissions follows from the carbon offset project agreed upon, but rather it would be making the net zero

198. Making a payment to a disinterested third party is not the only way in which strategic investor behavior could be avoided, although it is the most straightforward. Another way would be making the payment only to investors whose investment criteria explicitly focused on ESG-compatible returns, which would be incompatible with opportunistic activism pushing the firm not to meet carbon reduction targets. Alternatively, bonds could be sold to classes of holders, such as banks, that regulation prevents from exercising influence over firms qua shareholders, with selling restrictions ensuring that they, in turn, can only sell to buyers subject to similar rules.

199. An additional requirement for this form of commitment device to be effective is that the third party has the right incentives to build a reputation as a long-term player in the third-party green pill services market. Otherwise, the third party may accept payment of a fraction of the amount stipulated in the green pill to free the company from its obligation.

200. *See, e.g.*, A. Bose et al., *Voluntary Markets for Carbon Offsets: Evolution and Lessons for the LNG Market* 1 (Oxford Inst. Energy Stud., Working Paper No. 03, 2021), https://www.econstor.eu/bitstream/10419/246581/1/978-1-78467-184-6_et03.pdf [https://perma.cc/9JBM-NYKH] (noting that "global markets for carbon offsets have become valued at more than $5 billion annually, doubling each year since 2018").

201. *See* Si Chen et al., *Voluntary Carbon Offsets: An Empirical Market Study* 11–12 tbl.2 (2021), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3981914 [https://perma.cc/7MG8-ZA89].

202. *See, e.g.*, Vittoria Battocletti, Luca Enriques & Alessandro Romano, *The Voluntary Carbon Market: Market Failures and Policy Implications* 24–25 (Eur. Corp. Governance Inst., Law Working Paper No. 688, Mar. 2023) https://ssrn.com/abstract=4380899 [https://perma.cc/TS6J-2WRW].

commitment credible to begin with, up to the amount promised to the third party. The third-party green pill would thus clearly signal the degree to which a firm has credibly committed to its climate pledges by reference to the amount at stake if it defaults.

B. Green Pills and Corporate Law

Green pills could deliver a credible commitment to pursue climate-related targets, such as those geared toward a reduction in carbon emissions. But would signing up for these commitments be compatible with directors' fiduciary duties under corporate law? Here, we explore the question of whether fiduciary duties constrain directors' and managers' ability to adopt a green pill. We also consider whether shareholders' express support for such a commitment changes the analysis.

Our starting point is that boards can be expected to justify the approval of a green pill on grounds that create no apparent issue with the goal of maximizing shareholder value, which is still a tenet of Delaware corporate law.[203] Hence we anticipate that directors would rely on rationales that are consistent with the financial interests of their corporation.

A green pill will be part of a broader net zero transition strategy adopted by the corporation. That, in turn, will be based on cash-flow projections showing how transitioning will be the best way to maximize shareholder value. However, the connection with a broader strategy would seem to make the justification for a green pill harder rather than easier. If transition is the best strategy, why would the company need to undertake a potential liability (e.g., higher interest rate payments) in case it fails to implement its strategy according to the milestones it sets for itself? According to the company's own evaluations, not meeting those milestones will already be harmful and, hence, something managers will have sufficient incentives to avoid. Yet it is one thing to have rational plans and strategies to avoid scrutiny from courts and another to persuade the market that the strategy is indeed the best one moving forward. Climate-indifferent investors may have different expectations about the trajectory of climate, society, the economy, and the company's industry from those of climate-conscious investors and managers aligning with the latter. Such alternative expectations may, further down the road and depending on the vagaries of the shareholder register, prompt a move away from the transition strategy devised by the company. As shown in Subsection III.A.2, green pills increase the cost of deviating from a transition strategy and, hence, act as a lock-in of the same.

But the question remains: why is the lock-in in the interest of the corporation rather than just in accordance with the preferences of its green shareholders? Section I.B has laid out the case for credible carbon reduction commitments: as outlined, first, green pills reduce the risk that a firm will bear transition reversal costs. Second, they facilitate coordination among firms in the direction of lobbying in favor of emission-reducing public policies. Third, once the relevant stakeholders (investors, customers, and suppliers) see through the empty promises of nonbinding and incentive-incompatible carbon pledges, green pills enhance a firm's reputation, with positive effects on its goodwill and the cost of

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203. *See, e.g.*, Leo E. Strine, Jr., *Corporate Power Is Corporate Purpose I: Evidence from My Hometown*, 33 OXFORD REV. ECON. POL'Y 176, 178–79 (2017).

financing via debt or equity. Similarly, if public opinion and politicians come to share the same skepticism about empty pledges, green pills can help companies retain the social license and the political goodwill they will need to progress toward their transition targets according to the multi-year timeline they will have set for themselves.

At the same time, one cannot completely rule out the possibility that the true motive for directors, looking behind their stated rationales for the green pill, will rather be to meet the preferences of what may be a mere majority of the shareholders, a motive which in turn could be seen as driven by directors' desire to retain their seats. Nor can one rule out that directors adopt green pills because they share the concerns of investors with green preferences. In such a case, directors may choose to pursue green strategies even when they come to the detriment of firm value maximization.

Directors' motives behind the adoption of a green pill may be relevant, depending on which standard of review Delaware courts will use to scrutinize directors' approval of green pills.

1. Standards of Review of Fiduciary Actions

Corporate directors and officers must act according to their fiduciary duties.[204] Deficiencies in the performance of their duties generally trigger personal liability only if an actual conflict of interest or absence of good faith can be demonstrated. This is because Delaware law permits corporations to introduce a charter provision, which Delaware corporations have universally adopted, waiving personal liability except in those circumstances.[205] However, the Delaware Chancery Court may still offer rescission or injunctive relief for a transaction tainted by fiduciary misconduct even in circumstances that do not warrant personal liability.[206] Hence, a distinction is drawn between the court review of a transaction and the personal liability of directors.

Delaware corporate law recognizes three levels of review for "evaluating director decision-making: the business judgment rule, enhanced scrutiny, and entire fairness."[207] The default standard of review is the business judgment rule, whereby it is presumed that "in making a business decision the directors of a corporation acted on an informed basis, in good faith, and in the honest belief that the action taken was in the best interests of the company."[208] The court's scrutiny of transactions subject to the business judgment rule is limited to "whether the business decision made was rational in the sense of being one logical approach to advancing

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204. *See* Guth v. Loft, Inc., 5 A.2d 503, 510 (Del. 1939).

205. DEL CODE ANN. tit. 8, § 102(b)(7).

206. *See, e.g.*, Nguyen v. Barrett, C.A. No. 11511-VCG, 2016 WL 5404095, at *3 (Del. Ch. Sept. 28, 2016); Morrison v. Berry, C.A. No. 12808-VCG, 2019 WL 7369431, at *12 (Del. Ch. Dec. 31, 2019); Firefighters' Pension Sys. Tr. v. Presidio, Inc., 251 A.3d 212, 250–52 (Del. Ch., 2021).

207. Reis v. Hazelett Strip-Casting Corp., 28 A.3d 442, 457 (Del. Ch. 2011).

208. Aronson v. Lewis, 473 A.2d 805, 812 (Del. 1984). *See also In re* Walt Disney Co. Derivative Litig., 906 A.2d 27, 74 (Del. 2006) ("[W]here [the] business judgment [rule's] presumptions are applicable, the board's decision will be upheld unless it cannot be 'attributed to any rational business purpose.'")

the corporation's objectives."[209] Conversely, "Only when a decision lacks any rationally conceivable basis will a court infer bad faith and a breach of duty."[210]

The enhanced scrutiny standard applies when "there is a basis for concern that directors without a pure self-dealing motive might be influenced by considerations other than the best interests of the corporation and other stockholders."[211] This encompasses a wide range of contexts, including the sale of the company or a contest for control by proxy fight or tender offer.[212] Where this standard is applied, the defendant fiduciaries "bear the burden of persuasion to show that their motivations were proper and not selfish" and that "their actions were reasonable in relation to their legitimate objective."[213]

Finally, the entire fairness standard is applied where the board's decision-making is tainted by an actual conflict of interest.[214] For directors to be interested in a transaction it has to be the case that they "will receive a personal financial benefit from a transaction that is not equally shared by the stockholders."[215] Where the entire fairness standard is applied, the defendants must establish "to the court's satisfaction that the transaction was the product of both fair dealing and fair price."[216]

Which standard of review would apply to a board's decision to implement a green pill?

2. Entire Fairness

It seems unlikely that a green pill would raise any considerations of actual conflict of interest. Directors and officers would derive no personal benefit from a green pill.[217] More to the point, even evidence of their sharing the green preferences of climate-conscious shareholders would not give them a *financial* interest in the adoption of the pill.[218] Nor would sharing such preferences, without more, be sufficient to conclude that directors approving the green pill are not acting "in the good faith belief that [their] actions are in the corporation's best interest."[219] Directors adopting a green pill for the reasons outlined above—that they believe it is the best way to signal credibility to climate-conscious investors and for the firm to self-insure against transition reversal costs—would be doing so consistently with what they in good faith believe are the company's interests.

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209. *In re* Dollar Thrifty S'holder Litig., 14 A.3d 573, 598 (Del. Ch. 2010).
210. *In re* Orchard Enters., Inc. S'holder Litig., 88 A.3d 1, 34 (Del. Ch. 2014).
211. *In re Dollar Thrifty S'holder Litig.*, 14 A.3d at 599 n.181.
212. *Reis*, 28 A.3d at 457–59.
213. Mercier v. Inter-Tel (Del.), Inc., 929 A.2d 786, 810 (Del. Ch. 2007).
214. *In re* Trados Inc. S'holder Litig., 73 A.3d 17, 44 (Del. Ch. 2013).
215. Rales v. Blasband, 634 A.2d 927, 936 (Del. 1993).
216. Cinerama, Inc. v. Technicolor, Inc., 663 A.2d 1156, 1163 (Del. 1995) (quoting Cede & Co. v. Technicolor, Inc., 634 A.2d 345, 361 (Del. 1993)).
217. A possible exception might be if the green pill provided for a third-party organization with material links to a director or officer.
218. *See Rales*, 634 A.2d at 936 (articulating "personal financial benefit that is not equally shared by the shareholders" as indicia of director's "interest" in a transaction).
219. Guttman v. Huang, 823 A.2d 492, 506 n.34 (Del. Ch. 2003).

3. Enhanced Scrutiny

Turning to the enhanced scrutiny standard, this was originally articulated in the context of the deployment of defensive tactics in the face of a hostile tender offer.[220] On the one hand, target boards may have objectively defensible reasons for being concerned that the offer is contrary to shareholders' interests—whether because its structure is coercive, or because the board has access to private information that leads them to conclude the offer price is too low. On the other hand, defensive tactics might be used by target directors to entrench their control of the company.[221] The counterbalancing of considerations—one plausibly promoting the company's interests, the other potentially undermining it—led to the articulation of an intermediate standard under which the board's rationales for their actions are subject to greater scrutiny than ordinary business decisions but less than the scrutiny applied to transactions where there is a clear conflict of interest.[222]

A green pill does not raise concerns about entrenchment of board members. In implementing it, the board would not be motivated by the desire to avoid removal any more than they are when making any business decision, be that in normal times or in the presence of an activist campaign agitating for a change in the firm's strategy or capital structure. In other words, if sensitivity to shareholder preferences to reduce the risk of a contested election was sufficient for enhanced scrutiny to kick in, this standard of review would extend to most, if not all, of the domains currently covered by the business judgment rule.

It might be thought that an analogy could be drawn instead with mechanisms that strongly commit boards not to redeem a poison pill—so-called "dead hand" and "no hand" poison pills, which Delaware courts have repeatedly struck down.[223] In addition to being successfully challenged as disproportionate responses to the threat of a hostile takeover,[224] such provisions have also been characterized as invalid constraints on the board's ability to exercise their fiduciary duties. In *Quickturn Design Systems, Inc. v. Shapiro*,[225] the Delaware Supreme Court struck down a poison pill provision that purported to restrict the board's power

220. *See* Unocal Corp. v. Mesa Petroleum Co., 493 A.2d 946 (Del. 1985).

221. *See In re* Dollar Thrifty S'holder Litig., 14 A.3d 573, 597 (Del. Ch. 2010) ("The heightened scrutiny that applies in the Revlon (and Unocal) contexts are, in large measure, rooted in a concern that the board might harbor personal motivations in the sale context that differ from what is best for the corporation and its stockholders. Most traditionally, there is the danger that top corporate managers will resist a sale that might cost them their managerial posts, or prefer a sale to one industry rival rather than another for reasons having more to do with personal ego than with what is best for stockholders.")

222. *See Unocal*, 493 A.2d at 957.

223. Carmody v. Toll Brothers, Inc. 723 A.2d 1180 (Del. Ch. 1998); Quickturn Design Sys., Inc. v. Shapiro, 721 A.2d 1281 (Del. 1998).

224. *See, e.g.*, *Carmody*, 723 A.2d at 1194–95; Mentor Graphics Corp. v. Quickturn Design Sys., 728 A.2d 25 at 44–52 (Del. Ch., 1998). *See also* Firefighters' Pension Sys. Tr. v. Presidio, Inc., 251 A.3d 212, 252 n.4 (Del. Ch. 2021).

225. *Quickturn Design Sys., Inc.*, 721 A.2d 1281.

to redeem the pill in favor of a hostile bidder for a period of six months.[226] The Court held that this was an invalid attempt to restrict a board from exercising their fiduciary duties on an ongoing basis.[227] This was, at least on its face, expressed not to be so much a concern about entrenchment, but rather about the board's need to be free to exercise its fiduciary duties.[228]

Unlike the poison pill in *Quickturn*, a green pill would place no specific restrictions on the powers of the board,[229] as the board would be free to procure the company to breach the agreement. The consequence would rather be that the company would then be subject to an obligation to pay the relevant sum. The distinction between a restriction on the powers of the *directors* and an agreement that commits the *company* to a course of action was considered by Chief Justice Veasey in *Grimes* v. *Donald*:[230]

> [B]usiness decisions are not an abdication of directorial authority merely because they limit a board's freedom of future action. A board which has decided to manufacture bricks has less freedom to decide to make bottles. In a world of scarcity, a decision to do one thing will commit a board to a certain course of action and make it costly and difficult (indeed, sometimes impossible) to change course and do another. This is an inevitable fact of life and is not an abdication of directorial duty.

To conclude, there seems to be no basis in prior Delaware caselaw for concluding that such a transaction would be subjected to enhanced scrutiny review. Rather, it would be reviewed under the "default" standard: business judgment review.

4. Business Judgment Review

Under business judgment review, the court would simply need to content itself that the green pill transaction had *a* rationally conceivable basis.[231] Gross

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226. *See id.* at 1289 n.21 ("The 'no hand' or Delayed Redemption Provision is found in a new § 23(b) of the Rights Plan, which states: '(b) Notwithstanding the provisions of § 23(a), in the event that a majority of the Board of Directors of the Company is elected by stockholder action at an annual or special meeting of stockholders, then until the 180th day following the effectiveness of such election (including any postponement or adjournment thereof), the Rights shall not be redeemed if such redemption is reasonably likely to have the purpose or effect of facilitating a Transaction with an Interested Person.'").

227. *Id.* at 1291–92.

228. Similarly, English company law articulates a doctrine restricting the ability of directors to enter agreements that fetter their ability to discharge their fiduciary duties. John Crowther Group plc v. Carpets International plc [1990] BCLC 460 at 465–66 (Eng.); Fulham Football Club Ltd v. Cabra Estates plc [1994] 1 BCLC 363 at 375–76 (Eng.).

229. *Cf. Carmody*, 723 A.2d at 1190–92 (restriction on redemption of poison pill by any director appointed by hostile bidder); *Quickturn Design Sys., Inc.*, 721 A.2d at 1291–92 (amendment restricted power of redemption, which was otherwise exercisable by the company's board of directors subject to their fiduciary duties); CA, Inc. v. AFSCME Emps. Pension Plan, 953 A.2d 227, 238–40 (Del. 2008) (addressing bylaw amendment purporting to restrict power of board of directors to reimburse costs of proxy contests).

230. Grimes v. Donald, 673 A.2d 1207, 1214–15 (Del. 1996).

231. *See supra* note 210 and accompanying text.

negligence aside,[232] the business judgment rule would preclude courts from second-guessing the rationality, let alone the reasonableness, of adopting a green pill. But there is a longstop limit to directors' discretion under the business judgment rule: they are not permitted to commit the corporation to "waste." Because a green pill, if triggered, would involve a large payment for no obvious *ex post* benefit to the corporation, could it be challenged as "waste"?

Earlier case law on "waste" focused on transactions where the company gave away valuable assets for nothing in return or entered into a transaction that is so one-sided against the company that "no person of ordinary sound business judgment would say that the consideration received [by the company] was a fair exchange for the [consideration given]."[233] Only the most egregiously one-sided transactions will be capable of satisfying this test and consequently open to challenge on grounds of waste. This reflects the deference given to the board's good faith business judgment. As Chancellor Allen explained in *Lewis* v. *Vogelstein*:[234]

> The judicial standard for determination of corporate waste is well developed. Roughly, a waste entails an exchange of corporate assets for consideration so disproportionately small as to lie beyond the range at which any reasonable person might be willing to trade. Most often the claim is associated with a transfer of corporate assets *that serves no corporate purpose*; or for which no consideration at all is received. Such a transfer is in effect a gift. If, however, there is any substantial consideration received by the corporation, and if there is a good faith judgment that in the circumstances the transaction is worthwhile, there should be no finding of waste, even if the fact finder would conclude ex post that the transaction was unreasonably risky.

A firm setting up a third-party green pill would commit to give a large sum of money to, for example, a carbon offsets provider if it failed to achieve stated targets regarding carbon transition.[235] The relevant question, according to the waste doctrine as currently applied by Delaware courts, is whether directors acted in good faith when they entered into the third-party green pill agreement.[236]

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232. In the unlikely scenario of a board that makes the decision to adopt the green pill in a way that a court may find grossly negligent, this would still entail no personal liability for directors because of exculpations from duty of care violations clauses that all Delaware companies opt into. *See, e.g.*, DEL. CODE ANN. tit. 8, § 102(b)(7); Lawrence A. Hamermesh, *Fiduciary Duty, Limited Liability, and the Law of Delaware: Why I Do Not Teach* Van Gorkom, 34 GA. L. REV. 477, 490 (2000).

233. Michelson v. Duncan 407 A.2d 211, 224 (Del., 1979) (quoting Kaufman v. Shoenberg, 91 A.2d 786, 791 (Del. Ch. 1952)); *Grimes*, 673 A.2d at 1215 (quoting Saxe v. Brady 184 A.2d 602, 610 (Del. 1962)); Brehm v. Eisner 746 A.2d 244, 262 (Del. 2000).

234. Lewis v. Vogelstein, 699 A.2d 327, 336 (Del. Ch. 1997) (emphasis added).

235. *See supra* Section III.A.5.

236. *See, e.g.*, Cancan Dev., LLC v. Manno, C.A. No. 6429-VCL, 2015 WL 3400789, at *46 (Del. Ch. May 27, 2015). On the overlap between the waste doctrine and good faith review in recent Delaware case law see Harwell Wells, *The Life (and Death) of Corporate Waste*, 74 WASH. & LEE L. REV. 1239, 1279–87 (2017).

The appropriate point in time for assessing whether a transaction constitutes waste is surely at the point the firm enters into it: this reflects the risk allocation taken on by the firm.[237] We have shown in Part I that a business case can be made both for a net zero transition strategy and for transactions that create a credible commitment not to deviate from that strategy. A green pill, by *credibly* committing the firm to its transition strategy, would help it lower its cost of capital, by signaling to climate-conscious investors that the firm is serious about transition. It would also enable the firm to avoid the costs associated with see-sawing on transition investments owing to volatility in the relevant external variables—that is, to self-insure against this volatility. These expected benefits must be weighed against the expected cost of paying out on the green pill if the firm fails to keep to its transition targets. Because the firm intends to transition, rather than to make the payment, the expected cost of paying out the green pill will at the outset be much lower than the face value agreed. Moreover, in adopting a green pill the board will seek to calibrate the size of the payment to optimize the commitment,[238] balancing the benefits of a stronger signal and more comprehensive self-insurance against the costs of having to pay out if the firm does not stick to its transition path. Provided the board has considered these factors, the difference between expected benefits and expected costs to the firm is therefore unlikely to be large enough to constitute waste.

Hence, where boards plausibly motivate their choice of strategy and the transactions ancillary to it as the best way to pursue the company's interests, absent specific reasons to cast doubt on directors' good faith,[239] courts will be highly unlikely to qualify even a third-party green pill as wasteful.

5. Shareholder Approval

Does the foregoing analysis change if the board's decision to set up a green pill is catalyzed by shareholder activism? A plausible scenario under which a firm might adopt a green pill would be following an activist shareholder campaign in which a coalition of investors, led by a climate-conscious hedge fund and supported by ESG funds and passive index funds, run a successful pro-climate campaign. This scenario seems far from purely hypothetical: in 2021, a small activist hedge fund called Engine No. 1, with only a 0.02% stake in ExxonMobil, launched a successful proxy fight for four directorships on ExxonMobil's 12-member board, promising to push the oil major to diversify beyond oil and transition to combat climate change.[240]

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237. To assess this *ex post* would potentially undermine the integrity of corporate transactions, by allowing the firm to sidestep deals that turned out to be bad.

238. *See supra* Subsection III.A.2.

239. *See supra* note 219 and accompanying text.

240. *Proxy Statement of Engine No. 1, LLC*, EXXON MOBIL (Mar. 16, 2021), https://www.sec.gov/Archives/edgar/data/0000034088/000090266421001931/p21-0957defc14a.htm [https://perma.cc/HBW2-N97K]; *see* Saijel Kishan & Joe Carroll, *The Little Engine That Won an Environmental Victory over Exxon*, BLOOMBERG (June 9, 2021, 10:19 AM), https://www.bloomberg.com/news/articles/2021-06-09/engine-no-1-proxy-campaign-against-exxon-xom-marks-win-for-esg-activists [https://perma.cc/22J8-CXZ7]; *see also* Svea Herbst-Bayliss, *Little Engine No.1 Beat Exxon with Just 12.5 Mln*, REUTERS (June 29, 2021, 3:45 PM), https://www.reuters.com/business/little-engine-no-1-beat-exxon-with-just-125-mln-sources-2021-06-29/ [https://perma.cc/G26W-AZ6N].

How would the expressed support of shareholders change the analysis of directors' and officers' fiduciary duties? The simple answer is not much. Directors are always subject to their fiduciary duties; the fact that they were appointed by a particular shareholder or following a proxy campaign in which a particular agenda was advanced does not absolve them of the need to comply with their duties. To the extent that the board lacks the power to deliver a particular commitment, a shareholder vote could implement a bylaw or charter amendment expressly conferring on the board the power to make such a commitment. However, the board would still be subject to fiduciary duties in the exercise of this power.

What if the specific transaction were put to a shareholder vote? Shareholder support is never likely to be unanimous; rather, the "best" that could be achieved might be a majority vote in support of a transition agenda. Under these circumstances, corporate law remains concerned with the interests of the minority shareholders. Yet no shareholders other than controlling ones owe fiduciary duties to the company or to minority shareholders[241] that could warrant entire fairness review of the green pill transaction, hypothetically approved by the shareholder meeting by the vote of (the noncontrolling) ESG-minded shareholders. In fact, noncontrolling shareholders are entirely free to vote as they please, including to pursue their idiosyncratic nonfinancial interests.[242]

C. Summary

To summarize: we consider that a corporate board that adopts a green pill based on a plausible business case will do so consistently with its fiduciary duties. Such a business case, as discussed in Part I, would be based on a desire to commit credibly to an articulated transition plan.

Making such a credible commitment might be in the company's interest *ex ante* because it helps the firm lower its cost of capital by signaling to climate-conscious investors that it is not just greenwashing but is serious about transition. It is also rational for a board to conclude, as discussed in Subsection I.D.4, that such a commitment will permit the firm to avoid costly see-saws in transition investment due to short-term volatility in key variables. These kinds of rationales are consistent with the board acting in good faith and with pursuing both long-term value and short-term share price maximization.

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241. *See, e.g.*, Ivanhoe Partners v. Newmont Mining Corp., 535 A.2d 1334, 1344 (Del. 1987) ("[I]t is well established law that nothing precludes . . . a stockholder from acting in its own self-interest.").

242. *See* Hewlett v. Hewlett–Packard Co., No. CIV.A. 19513–NC, 2002 WL 549137, at *4 (Del. Ch. Apr. 8, 2002) ("Shareholders are free to do whatever they want with their votes, including selling them to the highest bidder."); Matteo Gatti, *Interested Voting* 38 (2021), https://ssrn.com/abstract=3975633 [https://perma.cc/N66J-VUGF] ("[T]he law, at least in Delaware, seems to . . . simply focus[] on whether the given corporation is subject to one's control. If it is, heightened scrutiny on the controller-sponsored resolution/transaction ensues; if it is not, 'anything goes.'"); Sean J. Griffith, *Opt-In Stewardship: Toward an Optimal Delegation of Mutual Fund Voting Authority*, 98 TEX. L. REV. 983, 1110–11 (2020) ("[S]hareholders [as opposed to managers] remain free to invest and vote according to other interests and objectives.").

Against this background, we do not see a case for reviewing such transactions other than under the business judgment rule. Under this standard of review, the only relevant question would be whether a large *ex post* payment if a green pill is triggered might constitute "waste." There are, we argue, clear reasons for thinking this would not be the case, even for a very large payment. The test of "waste" should be applied not simply to the *ex post* payment, but to the green pill commitment as a whole at the point it is entered into.

CONCLUSION

This Article has made the case for credible corporate commitments to net zero transition plans. Corporate boards are already beginning to consider the impact of climate risk on their firms. Their focus on these issues is being sharpened by the presence of an increasing volume of climate-conscious capital—from investors whose valuations increase where firms reduce or promise to reduce their emissions. Climate-conscious investors want firms to reduce emissions faster than they otherwise would. At the same time, accelerating transition costs firms more upfront. This creates incentives for firms to try to have their cake and eat it too by making lofty promises about change in the future without actually sacrificing any profits today. Such practices are part of a more general phenomenon of greenwashing: making overbroad claims about the climate-consciousness of an activity or product. Rational climate-conscious investors should therefore want to see firms that wish to attract their investment make credible commitments to accelerated transition and adjust their valuations accordingly. Firms that make credible commitments to transition can thereby lower their cost of capital by signaling the seriousness of their intentions to reduce emissions.

However, the corporate governance mechanisms commonly proposed for managing climate risk have limited power to generate credible commitments. Liability-based mechanisms such as disclosures to shareholders are constrained by the assessment of shareholder losses in purely financial terms, leaving out the value climate-conscious investors place on emission reduction. Governance-based mechanisms such as executive compensation, board structure, Say on Climate votes, and tweaks in the company's purpose rest ultimately on the board's discretion for their effectiveness, but the board of directors is elected by shareholders. Hence, such mechanisms are not robust enough to withstand the problems caused by changes in the mix of shareholders.

In response, we introduced the idea of green pills: mechanisms that firms could deploy using private law to deliver credible commitments to transition. We characterize the extent of, and limits to, commitment by these means. Contract-based mechanisms deliver a degree of commitment that can be tailored to the firm's circumstances. Once a green pill is in place, standard corporate governance mechanisms work to support transition, instead of creating potential obstacles. In particular, green pills serve to align the interests of shareholders focused solely on profits with those of climate-conscious investors. We have also shown that adopting a green pill is in line with directors' fiduciary duties and that the adoption of the mechanism is subject to scrutiny by Delaware courts under the business judgment standard of review. In short, these mechanisms require no change to corporate law

(unlike alternative suggestions) or broader (and sometimes heavy-handed) policy interventions.

Green pills would clarify where a business stands on the issue of climate change. If firms adopt credible commitments to reduce emissions, we know they are serious. If they do not, it would raise serious questions about the willingness or ability of business to help drive the climate transition and would suggest that efforts toward implementing government climate policy should be redoubled.