CONTROLLING SHAREHOLDERS AND SUSTAINABLE CORPORATE GOVERNANCE: THE ROLE OF DUAL-CLASS SHARES

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Low-carbon innovation is necessary to overcome the delay of governments in implementing the Paris agreement. However, large institutional investors only engage in climate risk management. They cannot commit to low-carbon innovation because that is fundamentally uncertain, short-term unprofitable, and their index-tracking strategy is incompatible with screening firm-specific breakthroughs. To pursue sustainable corporate governance, institutional investors should rather tie their hands with controlling shareholders. Controlling shareholders can contribute their entrepreneurial vision to low-carbon innovation while institutional investors allow them to scale this vision.

This article argues that institutional investors catering to the preferences of climate-conscious beneficiaries should finance controlling shareholders through conditional dual-class shares. Dual-class shares allow relaxing the financial conditions for control. To fulfil their mandate from climate-conscious beneficiaries, institutional investors can outcompete short-term profit-seeking investors by offering controlling shareholders a higher wedge between voting rights and economic interest and the possibility to cash in higher idiosyncratic private benefits of control, if successful, conditional on engaging in low-carbon innovation.

Having at stake welfare-increasing private benefits of control, as well as all or most of their wealth, controlling shareholders are incentivized to discover low-carbon breakthroughs or to acknowledge failure to do so. Corporate law should facilitate contracting between controlling shareholders and institutional investors to support this incentive. Target-contingent transfer sunsets should allow cashing in control premiums only if the low-carbon innovation succeeds. Divestment sunsets and other contractual safeguards should prevent controlling shareholders from increasing agency cost, without undermining equity capital raising. Dual-class recapitalizations should be allowed with a majority-of-minority vote.

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Introduction

Berkshire Hathaway is a dual-class shares publicly held company. It has two classes of common stock, a class A with one vote per share and a class B with 1/10.000 of the voting rights (and 1/1.500 of the economic rights) of class A shares. Warren Buffett is Berkshire Hathaway's controlling shareholder: by holding primarily class A shares, he has 32.1% of the voting rights but only 16.2% of the economic interest.[1] Warren Buffett's estimated net worth is about $100 billion, 98% of which is invested in Berkshire Hathaway.[2] Institutional investors own the majority of Berkshire Hathaway's equity; Blackrock, Vanguard, and State Street—the 'Big 3'—together hold more than 21%. However, because they hold primarily class B shares, their voting rights are negligible. Warren Buffett and his team have decided to acquire a controlling stake in Occidental Petroleum.[3] Occidental recently stepped up its commitment to building 100 direct air capture plants by 2035, portraying itself as a global market leader in the development of carbon storage and capture, potentially a key technology to address climate change.[4]

On the other side of the Atlantic, another controlling shareholder—the Porsche-Piëch family, which controls Volkswagen that, in turn, controls Porsche—has pulled off the largest European IPO in a decade.[5] In a spinoff from Volkswagen, Porsche raised €9.4 billion, albeit offering only 12.5% of the capital as nonvoting shares.[6] After the IPO, Porsche restated its commitment to producing 80% of global output as electric vehicles by 2030, which is higher than the already ambitious electrification target of Volkswagen.[7] Volkswagen and Porsche aim to become the top global producer of electric vehicles, which are another decarbonization technology. As in the previous example, institutional investors purchased significant stakes in Porsche without any chance to control it.[8] These examples reveal the potential of controlling

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1 Berkshire Hathaway Inc., Proxy Statement (Form DEF 14A) (May 1, 2021).

2 Warren Buffett, *An Owner's Manual*, Owner-Related Business Principles, https://www.berkshirehathaway.com/ownman.pdf (Mar. 2, 2015).

3 Yun Li, *Warren Buffet's Berkshire Hathaway Buys More Occidental Petroleum Shares*, CNBC, Mar. 7, 2023, https://www.cnbc.com/2023/03/07/warren-buffetts-berkshire-hathaway-buys-more-occidental-petroleum-shares.html.

4 Sabrina Valle & Ruhi Soni, *Occidental's Project to Capture CO2 Takes a Hit from Inflation*, Reuters, Nov. 10, 2022, https://www.reuters.com/business/energy/occidental-raises-costs-direct-air-capture-project-due-inflation-2022-11-09/.

5 Alexandra White & Peter Campbell, *Investors Rush to Snap Up Shares Ahead of Porsche IPO*, Fin. Times (Sep. 26, 2022), https://www.ft.com/content/7e59d4a6-0c01-49b8-9cad-62da3b50fb14.

6 Reuters, *Factbox-The structure of the Porsche IPO*, Euronews (Sep. 30, 2022), https://www.euronews.com/next/2022/09/30/volkswagen-porsche-ipo-structure.

7 *Compare* Advertisement, *Porsche Enters a New Era with Successful IPO*, Porsche Newsroom (Sep. 29, 2022), https://newsroom.porsche.com/en/2022/company/porsche-ag-initial-public-offering-p911-frankfurt-stock-exchange-29830.html, *with World Premiere of the ID. 2all^01 Concept: The Electric Car From Volkswagen Costing Less Than 25,000 Euros*, Volkswagen Newsroom (Mar. 3, 2023), https://www.volkswagen-newsroom.com/en/press-releases/world-premiere-of-the-id-2all-concept-the-electric-car-from-volkswagen-costing-less-than-25000-euros-15625 (electric vehicles only 80% of sales in Europe).

8 Victoria Waldersee, *Investors Mixed as Porsche Seeks Price Tag of Up to $75 Billion*, Reuters (Sep. 20, 2022), https://www.reuters.com/business/autos-transportation/porsche-ag-valuation-sends-volkswagen-shares-3-higher-premarket-trade-2022-09-19/. One of the key investors, Norway Sovereign Fund,

shareholders—and the dual-class shares supporting them—for sustainable corporate governance.

I define sustainable corporate governance as the decision-making mechanisms of publicly held corporations geared towards efficient internalization of catastrophic negative externalities, such as climate change.[9] I focus on climate change because this is less controversial than other dimensions of sustainability,[10] and its determinants are better measurable. However, apart from the need to reduce greenhouse gases—particularly CO2, the largest component—in the atmosphere, little is known about how to deal with climate change.

The starting point of this article is that disruptive innovations are necessary, albeit not sufficient,[11] to transition to a low-carbon world. Because the quality, timing, and interoperability of these innovations is unpredictable, this transition is fundamentally uncertain, in a Knightian sense.[12] Controlling shareholders are better positioned than managers to deal with Knightian uncertainty. In this article, I argue that controlling shareholders and institutional investors should cooperate to make corporate governance sustainable. The former should contribute their vision; the latter should contribute finance to scale the vision and screen its quality. Corporate law should support the mutual commitment of controlling shareholders and institutional investors to low-carbon innovation through contracting on dual-class shares.

Controlling shareholders, such as Warren Buffet and the Porsche-Piëch family, can be more daring than managers in disruptive innovation because they cannot be fired. They can be bold entrepreneurs, bet on innovative technologies, and—within the limits of bankruptcy—persevere until they are proved right or wrong. Having undisputed control, controlling shareholders do not have to abandon their vision even though the stock market undervalues the company. However, because controlling shareholders are wealth-constrained, they need outside investors to scale their vision.[13] Dual-class shares support innovation by allowing controlling shareholders to raise outside equity without diluting their voting power.[14]

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commented that although they usually invest where they have voting rights, the fund made an exception for Porsche because there are "other ways to exert influence," notably including persuasion. *See infra* note 77 and accompanying text.

9 Alessio M. Pacces, *Will the EU Taxonomy Regulation Foster Sustainable Corporate Governance?*, 13 Sustainability 12316 (2021).

10 Jeffrey N. Gordon, *Unbundling Climate Change Risk from ESG*, The CLS Blue Sky Blog (July 26, 2023), https://clsbluesky.law.columbia.edu/2023/07/26/unbundling-climate-change-risk-from-esg/.

11 Patrick Bolton, Marcin T. Kacperczyk & Moritz Wiedemann, *The CO2 Question: Technical Progress and the Climate Crisis* (May 5, 2023) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4212567.

12 The distinction between risk, which can be quantified by a probability distribution, and uncertainty, which cannot, is based on Frank H. Knight, Risk, Uncertainty and Profit, 20-21 (1921).

13 Mike Burkart & Samuel Lee, *One Share One Vote: The Theory*, 12 Rev. Fin. 1, 21 (2008).

14 Lindsay Baran et al. *Dual-Class Share Structure and Innovation*, 46 J. Fin. Res. 169 (2023).

Institutional investors invest in dual-class shares companies despite knowing that they cannot, even collectively, outvote a controlling shareholder.[15] Institutional investors also promote sustainable corporate governance.[16] Especially index-tracking investors—such as the 'Big 3' and comparable asset managers—hold large stakes in the largest publicly held companies worldwide and engage with them to reduce CO_2.[17] In previous work, I argued that institutional investor engagement can ameliorate publicly held companies' response to climate change, particularly in jurisdictions like the EU, where securities regulation curbs greenwashing and enables asset managers to cater to the preferences of climate-conscious beneficiaries.[18] However, institutional investors can only put pressure on listed companies to reduce CO_2; they cannot identify the technologies required to transition to a low-carbon world. To meet their clients' preferences, institutional investors should rather commit to low-carbon innovation by funding controlling shareholders with a vision regarding it.[19]

The case for controlling shareholders stems from institutional investors' inability to commit to low-carbon innovation. Institutional investors can influence their portfolio companies' decision to reduce CO_2 through exit or voice.[20] However, so far, their impact has been too small compared to the targets of the Paris agreement.[21] The commitments of publicly held companies to decarbonization are unambitious and their investment in low-carbon innovation is negatively correlated with CO_2

15 There has been public outcry about dual-class shares, particularly in the U.S. *See* Jill E. Fisch & Steven Davidoff Salomon, *The Problem of Sunsets*, 99 B.U. L. Rev. 1057, 1075-77 (2019). In 2017, several major index providers limited the inclusion of new issuers with dual-class shares. Albeit opposed to dual-class shares, Blackrock criticized this decision because it adversely affected their index-based funds. Arguably, institutional investors that complain about dual-class companies still invest in them to avoid missing the chance to benefit from the controller's vision. In April 2023, S&P withdrew from the exclusion of dual-class companies from their indices; it is doubtful whether the exclusion had any impact. *See* Patrick Temple-West & Antoine Gara, *S&P criticised by pension funds over dual-class shares decision*, Fin. Times (May 1, 2023), https://www.ft.com/content/0a09f926-86a2-4f6d-9b37-86ed98cc8a7a.

16 Alexander Dyck et al., *Do Institutional Investors Drive Corporate Social Responsibility? International Evidence*, 131 J. Fin. Econ. 693 (2018).

17 José Azar et al., *The Big Three and Corporate Carbon Emissions Around the World*, 142 J. Fin. Econ. 674 (2021).

18 Pacces, *supra* note 9.

19 Several controlling shareholder companies, in addition to the examples at the beginning of this article, have a vision regarding decarbonization. For instance, BMW (controlled by the Quandt family) is investing in hydrogen fuel cells. *See* Jennifer L., Hydrogen Fuel Cell Is Revving Up: BMW and Toyota Lead The Way to Zero-Emission Vehicles, Carbon Credits (Sep. 13, 2023), https://carboncredits.com/revving-up-for-the-hydrogen-fuel-cell-era-bmw-and-toyota-lead-the-way-to-zero-emission-vehicles-fhyd/. Another example is Maersk (controlled by the Møller family), which is investing in methanol fuels and engines for its hard-to-decarbonize shipping business. *See* Maersk, https://www.maersk.com/all-the-way-to-zero/ (last visited Oct. 2, 2023).

20 Albert O Hirschman, Exit, Voice, and Loyalty: Responses to Decline in Firms, Organizations, and States (1970). *See infra* text accompanying notes 84-101.

21 Azar et al., *supra* note 17, at 686, document that an increase in the ownership of the Big 3 by one standard deviation is associated with a 2% decrease in CO_2 emissions. This likely overestimates the real impact of institutional shareholdings and is anyway lower than the average 5% annual decrease (from CO_2 levels in 2019) that would be implied by the Paris agreement targets.

emissions, suggesting that the efficiency gains are offset by higher demand for CO_2 (the so-called Jevons paradox).[22]

Institutional investors have an incentive to attract fund beneficiaries and to manage systematic climate risk.[23] Climate risk management is not enough for institutional investors to pursue decarbonization beyond the foreseeable government policies,[24] which are, in turn, insufficiently aligned with the targets of the Paris agreement primarily because low-carbon technologies are insufficiently developed to meet the world's demand for energy.[25] Catering to the preferences of climate-conscious beneficiaries would allow investors to pursue decarbonization faster than governments commit to, forgoing the short-term profit of using high-carbon technologies, so long as these beneficiaries are willing to forgo short-term return for low-carbon innovation.[26] However, the uncertainty of the transition makes it impossible for profit-seeking institutional investors to commit to this strategy. The reason is threefold.

First, institutional investors are time-inconsistent. To decide whether to side with managers or activist hedge funds that challenge them, institutional investors rely on stock market signals. However, stock markets misprice climate risk and even more so low-carbon innovation, which is fundamentally uncertain.[27] The resulting short-term profit opportunities support mistargeting by activist hedge funds.[28] Second, index-tracking institutional investors, which command the bulk of investors' voting power,[29] are unable to screen firm-specific innovation. If the opportunity cost of high-carbon technologies increases, for instance because of a temporary increase in the demand for fossil fuels, activist hedge funds prefer companies to generally move away from low-carbon innovation and institutional investors, which maximize portfolio returns, are likely to support them. Third, diversified institutional investors have conflicting interests in pursuing breakthroughs. As common owners, they have

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22 *See*, respectively, Patrick Bolton, & Marcin T. Kacperczyk, *Firm Commitments* (Nat'l Bureau of Econ. Rsch., Working Paper no. 31244, 2023), https://www.nber.org/system/files/working_papers/w31244/w31244.pdf (on the unambitious commitment to reduce CO_2 emissions) and Bolton et al., *supra* note 11 (on the negative correlation between innovation and CO_2 emissions). The Jevons paradox is named after the 19th-century British economist William S. Jevons who observed that the increased efficiency of coal burning led to an increase of coal consumption.

23 Jeffrey N. Gordon, *Systematic Stewardship*, 47 J. Corp. L. 627 (2022).

24 Tom Gosling & Iain MacNeil, *Can Investors Save the Planet? – NZAMI and Fiduciary Duty*, 18 Cap. Mkt L. J. 172.

25 According to the Int'l Energy Agency, Net Zero by 2050 – A Roadmap for the Global Energy Sector, 16 (2021), iea.li/nzeroadmap, more than half of the required emission reductions by 2050 will call for technologies that are not yet on the market.

26 The existence of climate-conscious beneficiaries is supported by the empirical evidence, as shown e.g., by Samuel M. Hartzmark & Abigail B. Sussman, *Do Investors Value Sustainability? A Natural Experiment Examining Ranking and Fund Flows*, 74 J. Fin. 2789 (2019). *See also* Michal Barzuza, Quinn Curtis, & David H. Webber, *Shareholder Value(s): Index Fund ESG Activism and the New Millennial Corporate Governance*, 93 S. Cal. L. Rev. 1243 (2019).

27 Emirhan Ilhan, Zacharias Sautner, & Grigory Vilkov, *Carbon Tail Risk*, 34 Rev. Fin. Stud. 1540, 1541 (2021). *See also* Zacharias Sautner et al., *Pricing Climate Change Exposure*, 2023 Mgmt. Sci. 1, 2.

28 Zohar Goshen & Reilly S. Steel, *Barbarians Inside the Gates: Raiders, Activists, and the Risk of Mistargeting*, 132 Yale L.J. 411 (2022).

29 Lucian Bebchuk & Scott Hirst, *The Specter of the Giant Three*, B.U. L. Rev. 736 (2019).

an incentive to reduce not only nonpecuniary externalities, such as CO_2, but also pecuniary externalities, i.e., competition.[30] Imagine that a breakthrough, such as large-scale hydrogen electrolysis, succeeds. The portfolios of diversified investors may lose more from writing off 'stranded assets' (e.g., obsolete batteries, combustion engines, or oil refineries) than they gain from exposure to the successful low-carbon technology.[31]

Institutional investors may not need to commit to long-term breakthroughs. They could rather prod companies to adapt to low-carbon technologies developed by others, and can do that effectively because companies adapt more quickly to changes under short-term pressure.[32] Short-termism is not a problem per se.[33] However, given governments' delays in taxing and regulating CO_2 emissions, short-termism is likely responsible for the Jevons paradox: companies may cash in the benefit of incremental innovation by increasing emissions. Therefore, breakthroughs are incompatible with short-termism. To the extent that institutional investors cater to climate-conscious beneficiaries, I argue that they should tie their hands with controlling shareholders to pursue disruptive low-carbon innovation.

Dual-class shares conditional on the pursuit of low-carbon innovation can support both controlling shareholders' and investors' commitment. The entrepreneurial function of dual-class shares is potentially relevant not only for companies at the IPO stage, but also for already listed companies needing additional equity for innovation.[34] For instance, as the automotive business is much exposed to the uncertainty of transition, controlling shareholders may raise equity to finance breakthroughs such as disruptive battery technologies.[35] Volkswagen listing only nonvoting shares of Porsche suggests this kind of entrepreneurship.[36] Such arrangements are quite infrequent, however, reflecting two problems. First, it is hard to commit controlling shareholders to pursuing low-carbon innovation as opposed to a more profitable, CO_2-intensive vision.[37] Second, dual-class shares potentially enable control with very

30 Martin C. Schmalz, *Recent Studies on Common Ownership, Firm Behavior, and Market Outcomes*, 66 Antitrust Bull. 12 (2021).

31 Another way to put this argument is that the upside potential of (technological) climate risk is concentrated at the tail of a subjective probability distribution. Recent finance research confirms this. *See* Zacharias Sautner et al., *Firm-Level Climate Change Exposure*, 78 J. Fin. 1449, 1485 (2023).

32 Mariassunta Giannetti & Xiaoyun Yu, *Adapting to Radical Change: The Benefits of Short-Horizon Investors*, 67 Mgmt. Sci. 4032 (2021).

33 Alessio M. Pacces, *Exit, Voice and Loyalty from the Perspective of Hedge Funds Activism in Corporate Governance*, 9 Erasmus L. Rev. 199, 202 (2016).

34 Mike Burkart & Samuel Lee, *supra* note 13, 31-36.

35 Victoria Waldersee, *VW Masters Dry-Coating Battery Process with Potential to Slash Cell Costs*, Reuters (Jun. 16, 2023), https://www.reuters.com/business/autos-transportation/vw-masters-dry-coating-battery-process-with-potential-slash-cell-costs-2023-06-16/.

36 Olaf Storbeck & Peter Campbell, *Porsche Shares Climb After €75bn Listing to Defy Grim Market*, Fin. Times (Sep. 29, 2022), https://www.ft.com/content/11d7258d-9344-4aa3-94a0-e729a10d6c79 (reporting that "VW owner will use proceeds from one of Europe's largest IPOs to fund EV expansion").

37 *See* Vittoria Battocletti, Luca Enriques, & Alessandro Romano, *Dual Class Shares in the Age of Common Ownership*, 48 J. Corp. L. 541 (2023). *See also*, Oliver Hart & Luigi Zingales, *Companies Should Maximize Shareholder Welfare Not Market Value*, J.L. FIN. & ACCT. 247, 256 (2017) (ownership concentration leads to amoral drift).

little equity, increasing agency cost.[38] Insights from the theory of private benefits of control (PBC) reveal that corporate law could fix both problems with sunset clauses.

Controlling shareholders exist because they can extract PBC.[39] Therefore, contracting on PBC can commit controlling shareholders to low-carbon innovation. PBC can increase or decrease shareholder value. Private benefits from entrepreneurship unambiguously increase shareholder value, both pecuniary and nonpecuniary, because only a controlling shareholder can appropriate them. I have defined these benefits as idiosyncratic PBC as they account for the subjective value of the controller's vision.[40] At a minimum, these are nonpecuniary and reward controllers with the psychological satisfaction of succeeding in the enterprise. If success materializes, idiosyncratic PBC may become pecuniary as controlling shareholders claim a premium to part with control. When entrepreneurs have their idiosyncratic PBC at stake, they have an additional incentive to succeed than their economic interest. Thus, idiosyncratic PBC can be used to commit controlling shareholders to low-carbon innovation by stipulating that the security voting structure reverts to one-share-one vote (1S1V) if controlling shareholders sell their controlling block before achieving an ambitious decarbonization target, which would not be within reach with current technology. This target-contingent transfer sunset disallows cashing in a control premium—i.e., idiosyncratic PBC—until the CO_2 target is achieved, effectively conditioning the incentive of dual-class shares on this achievement.

Adding a divestment sunset minimizes agency cost. A divestment sunset prevents controlling shareholders from reducing their equity compared to the initial agreement with noncontrolling shareholders.[41] The agency cost of controlling shareholders depends on two kinds of value-decreasing PBC: first, stealing profit from minority shareholders (diversionary PBC); second, maximizing utilities, such as perks, at the expense of profit (distortionary PBC).[42] Because this agency cost is higher the lower the controlling shareholder's economic interest,[43] dual-class shares potentially exacerbate it by creating a wedge between voting rights and economic interest.[44] However, if controlling shareholders cannot strategically increase the wedge by cashing in their equity in midstream, the agency cost remains constant: the controlling shareholders' incentives remain as aligned with the non-controlling shareholders' interest as when the dual-class shares were issued.[45] An appropriately designed divestment sunset fulfils this condition. If the security voting structure reverts to 1S1V when

38 Lucian A. Bebchuk & Kobi Kastiel, *The Perils of Small-Minority Controllers*, 107 Geo. L. J. 1453 (2019).

39 As I argued in Alessio M. Pacces, Rethinking Corporate Governance: The Law and Economics of Control Powers (2012), PBC motivate the controlling shareholder's vision and compensate forgone risk diversification to pursue this vision.

40 *Id.*, at 109-15.

41 Bobby Reddy, Founders Without Limits: Dual-Class Stock and the Premium Tier of the London Stock Exchange, 382-3 (2021).

42 Pacces, *supra* note 39, *Rethinking*, at 87-103.

43 Michael C. Jensen & William H. Meckling, *Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure*, 3 J. Fin. Econ. 305 (1976).

44 Bebchuk & Kastiel, *supra* note 38, at 1469-71.

45 *See infra* text accompanying notes 67-68.

the controlling shareholder's equity falls below the level initially agreed upon with investors, controlling shareholders who want to cash in part of their equity prior to achieving the CO_2 target will have to give up control.

Controlling shareholders who commit to low-carbon innovation through these sunset clauses can get better financing conditions from institutional investors pursuing the interest of climate-conscious beneficiaries. Because the latter are willing to forgo short-term return for CO_2 abatement, institutional investors catering to their preferences can offer controlling shareholders a lower discount for noncontrolling stock in return for a commitment to low-carbon innovation. This is more attractive for controlling shareholders than selling dual-class shares, with no commitment, to financial investors who are not interested in reducing CO_2. Teaming up with socially responsible investors allows for larger-scale innovation, a higher wedge between voting rights and economic interest, and higher levels of idiosyncratic PBC given the controlling shareholder's wealth. This result builds upon the recent finding in economic theory that socially responsible investment must be initially unprofitable to have an impact,[46] extending it to the innovation context. Institutional investors (and their beneficiaries) only lose money before the low-carbon breakthrough is discovered, after which investors will share profit with the controlling shareholder.[47]

The article proceeds as follows. In Part I, I discuss how corporate law supports the controlling shareholder's commitment to low-carbon innovation by enabling dual-class shares with target-contingent transfer sunsets and divestment sunsets. In Part II, I explain why institutional investors should finance controlling shareholders. On the one hand, they have incentives to cater to the preferences of climate-conscious beneficiaries, who are willing to sacrifice short-term return for low-carbon innovation. On the other, institutional investors cannot identify which firm-specific innovation will be long-term profitable and lack a device to commit to it. In Part III, I argue that controlling shareholders can be such a commitment device: they are motivated to pursue breakthroughs by idiosyncratic PBC, which also set a limit to agency cost. In Part IV, I illustrate with a numerical example how institutional investors can attract controlling shareholders to low-carbon innovation by offering lower discounts for dual-class shares conditional on discovering new low-carbon technologies. Part V concludes.

I. Corporate Law to Support Low-Carbon Innovation

The fundamental claim of this article is that controlling shareholders and institutional investors can mutually commit to low-carbon innovation through dual-class shares. In this Part, I explain how corporate law can support this.

46 Martin Oehmke & Marcus Opp, *A Theory of Socially Responsible Investment*, 2024 Rev. Econ. Stud. 1.
47 *See infra*, text accompanying notes 118-119.

A. Target-Contingent Transfer Sunset

As controlling shareholders are motivated by idiosyncratic PBC, one may commit them by making idiosyncratic PBC appropriable only if a low-carbon breakthrough succeeds. Because of uncertainty, the type of innovation is not contractible, but only the innovation outcome. This feature parallels the definition of idiosyncratic PBC, which are nonpecuniary so long as the entrepreneur's vision is subjective and become pecuniary after the innovation has proven successful. To stimulate disruptive low-carbon innovation, controlling shareholders and investors should set an ambitious target in terms of CO_2 emissions, beyond what is foreseeable in the particular industry, and make it foolproof, that is, include all indirect upstream and downstream emissions.[48] A target-contingent transfer sunset allows controlling shareholders to cash in idiosyncratic PBC only if they meet this CO_2 target.

Corporate law should provide for target-contingent transfer sunsets to be a menu rule to issue dual-class shares. In this way, such a sunset clause would become standard and facilitate contracting on low-carbon innovation.[49] The sunset would stipulate that dual-class shares become permanent and the control block can be sold at a premium if controlling shareholders meet the target. If controlling shareholders miss the target, the security voting structure reverts to 1S1V upon controllers selling their block, effectively disallowing the control premium. Importantly, there is no deadline. Controllers could maintain control indefinitely despite being late with the CO_2 target. However, in the meantime, their control block would be illiquid. The only way for controllers to liquidate their investment is to trigger the target-contingent transfer sunset, acknowledging failure to develop the low-carbon innovation.

Target-contingent transfer sunsets fare better than alternative solutions. The obvious alternative is a time-based sunset, but that is problematic. First, in the context of near-term uncertainty that calls for financing by dual-class equity,[50] any deadline for innovation to succeed would be arbitrary.[51] Second, a deadline would create a cliff in control rights, incentivizing controllers to perform potentially value-destroying actions as the deadline approaches.[52] Third, although advocates of time-based sunsets point to investors' ability to extend the deadline,[53] extensions are inapplicable to our setting because institutional investors are time-inconsistent: as institutional investors support mistargeting by hedge funds, they are unlikely to extend control rights to fend them off.[54] Noting these problems, Battocletti, Enriques, and Romano propose to sunset the controller's super-voting rights gradually, based on a policy-calibrated algorithm that reduces the wedge between voting rights and

48 Madison Condon, *What's Scope 3 Good For?*, 56 UC Davis L. Rev. 1921 (2023).
49 Michael Klausner, *Corporations, Corporate Law, and Networks of Contracts*, 81 Va. L. Rev. 757 (1995).
50 Baran et al., *supra* note 14, at 6.
51 Zohar Goshen, *Against Mandatory Sunset for Dual Class Firms*, The CLS Blue Sky Blog (Jan. 2, 2019), https://clsbluesky.law.columbia.edu/2019/01/02/against-mandatory-sunset-for-dual-class-firms/.
52 Fisch & Solomon, *supra* note 15, at 1083-84.
53 Lucian A. Bebchuk & Kobi Kastiel, *The Untenable Case for Perpetual Dual-Class Stock*, 103 Va. L. Rev. 585, 623-24 (2017).
54 Goshen & Steel, *supra* note 28. *See also infra*, text accompanying notes 138-140.

economic interest over time, depending on CO_2 emissions.[55] A target-contingent transfer sunset is still preferable because it reflects contracting between socially responsible investors and profit-oriented entrepreneurs, rather than inevitably arbitrary regulation. Moreover, this sunset is not only triggered by a delay in CO_2 abatement, but also by the controller's exit acknowledging failure.[56]

B. Divestment Sunset

A target-contingent transfer sunset is necessary, but not sufficient to commit controlling shareholders because, over time, the latter may increase agency cost instead of pursuing low-carbon innovation. To avoid this, a divestment sunset is needed, committing the controlling shareholder to maintaining the economic interest agreed upon with investors when the dual-class structure was first set up. That economic interest, in turn, limits agency cost. A divestment sunset is triggered and the security voting structure reverts to 1S1V when the controlling shareholder's stake falls below a specific proportion of the company's equity *as of the IPO*.[57] Imposing the current value of IPO-equity as the trigger's denominator disincentivizes opportunistic exit without undermining capital raising. This divestment sunset also preserves the controlling shareholder's incentive to acknowledge failure and should be a default rule.[58]

Combined with the incentivizing role of idiosyncratic PBC, a target-contingent transfer sunset and a divestment sunset prevent agency cost from increasing ex-post, making dual-class shares acceptable for investors ex-ante.[59] Agency cost may increase with time for two reasons. First, the value of the controlling shareholder's vision may decrease.[60] Second, controlling shareholders may opportunistically increase the wedge between voting rights and economic interest, undermining the incentive to maximize the project's value or abandon it if unviable.[61] Controlling shareholders have incentives to acknowledge the vision's limitations and part with control if two conditions are met: a) ability to sell control at a premium; b) lack of wealth diversification.

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55 Battocletti et al., *supra* note 37, at 568-69.

56 The target-contingent transfer sunset is a commitment device comparable to the one proposed by John Armour, Luca Enriques & Thom Wetzer, *Green Pills: Making Corporate Climate Commitments Credible*, 65 Ariz. L. Rev. 285 (2023). In that article, the authors commit companies to CO_2 abatement through a pecuniary private sanction payable upon missing the target. This article's solution is simpler because idiosyncratic PBCs are only valuable to the controller and do not have a pecuniary equivalent in case of failure. This obviates the problem of third parties' strategic behavior to appropriate the sanction.

57 *See* the proposal by Reddy, *supra* note 41, at 382-83.

58 Divestment sunsets should be default because it is arguably cheaper for reputable entrepreneurs to opt out of agency cost safeguards, when they are inefficient, than for unknown entrepreneurs to opt into efficient agency cost safeguards. Conversely, the target-contingent transfer sunset discussed earlier should be a menu rule because only a few socially responsible investors may request it. This argument is based on Ian Ayres, *Regulating Opt-Out: An Economic Theory of Altering Rules*, 121 Yale L.J. 2032 (2012).

59 *See infra* text accompanying notes 158-163.

60 Bebchuk & Kastiel, *supra* note 53.

61 Bebchuk & Kastiel, *supra* note 38.

The target-contingent transfer sunset fulfils the first condition while incentivizing low-carbon innovation.[62] If the CO_2 target is met, but the company is not operating at full potential, controlling shareholders have an incentive to cash in both the pro-rata market value of the company and the unrealized value of their vision (idiosyncratic PBC) by selling the control block to a more talented acquirer. Selling the control block is allowed by corporate law in the U.S.[63] In Europe and the UK, regulation restricts the ability to cash in a control premium by selling high-voting shares at a different price than low-voting shares.[64] These restrictions foster entrenchment and potentially undermine the efficiency of dual-class shares over time.[65] Conversely, if the target-contingent transfer sunset is triggered, the controlling shareholder admits to idiosyncratic PBC being worthless. The visionary project has failed, and it is efficient also for the entrepreneur to liquidate it on the same terms as noncontrolling shareholders.[66]

A divestment sunset makes sure that however much of the controlling shareholder's wealth was initially invested in the company remains invested until the dual-class shares are in place. If this condition is met, even untalented controllers will not keep pursuing their vision when the stock market sends strong signals that this vision is failing. In terms of their undiversified wealth it would be better for controlling shareholders to acknowledge failure, accept parting with control for limited or even no compensation of idiosyncratic PBC, and possibly sell their economic interest so long as the equity is worth something.[67]

A divestment sunset prevents controlling shareholders from *opportunistically* increasing the wedge between voting rights and economic interest contracted upon with investors ex-ante, by selling the shares they do not need to maintain control. However, a divestment sunset does not discourage raising additional equity funds because the trigger's denominator (IPO-equity) is not affected by new issuances. Although these too could increase the wedge (for instance, if nonvoting shares are issued), they may be necessary to implement the controller's vision. Moreover, new equity is issued to willing buyers in a setting comparable to an IPO.[68] Divestment sunsets are preferable to other solutions because they screen for controlling shareholders' opportunistic exit, as opposed to equity capital raising.

Bebchuk and Kastiel have advocated ownership dilution sunsets to deal with the same problem. Their proposal would collapse the dual-class structure into 1S1V whenever the controlling interest falls below a certain proportion *of the current*

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62 If there is no need to direct innovation towards low-carbon technology, cashing in idiosyncratic PBC provides sufficient incentive to part with control and the target-contingent transfer sunset is unnecessary. Alessio M. Pacces, *Control Matters: Law and Economics of Private Benefits of Control* (Eur. Corp. Governance Inst., Law Working Paper No. 131/2009, 2009), https://ssrn.com/abstract=1448164.

63 Zohar Goshen & Assaf Hamdani, *Corporate Control and Idiosyncratic Vision*, 125 Yale L. J. 560, 602 (2016).

64 Reddy, *supra* note 41, 316-19, 407-12.

65 Pacces, *supra* note 62, at 37.

66 *See infra* text accompanying notes 50-56.

67 Elizabeth Pollman & Yifat Aran, *Ousted*, 25 Theoretical Inquiries L. __ (2024).

68 *See infra*, text accompanying notes 81-82 (arguing that coercion of large institutional investors is unlikely).

equity, including because new equity is issued. The authors' analysis of U.S. dual-class shares companies reveals that the wedge increased with time and could increase even further, reducing the controllers' stake to a very tiny economic interest.[69] Bebchuk and Kastiel, however, provide no evidence that the wedge increased because of exit by controlling shareholders. In a more recent study, Dharmapala and Khanna suggest the opposite, namely that controllers do not diversify their wealth although dual-class shares allow them to do so.[70] The wedge increase observed by Bebchuk and Kastiel could depend on the increase of equity funding, by way of seasoned equity offerings or other share issuances, which would reflect investors' consent and presumably be efficient strategies to scale the entrepreneur's vision.[71] Differently from divestment sunsets, ownership sunsets would discourage fundraising of this kind.

C. Other Safeguards

A more obvious way for controlling shareholders to increase agency cost than tweaking the wedge is tunneling, which is a kind of 'stealing' from minority shareholders (diversionary PBC). Tunnelling means syphoning off assets, cash flow, or equity to controlling shareholders through artificial transactions with related parties.[72] Because the focus of this article is on controlling shareholder's commitment to low-carbon innovation, I assume that corporate law and other institutions can curb tunneling. Diversionary PBCs are not high in jurisdictions, such as the U.S. and some European countries, in which courts do a decent job at constraining tunnelling.[73] Moreover, where good courts are not available, other mechanisms constrain the controller's ability to extract diversionary PBC.[74] Finally, tunneling can be efficiently policed by procedural constraints on related-party transactions, which could be tightened contractually when the risk of diversion is heightened by the wedge of dual-class shares.[75] On this perspective, a default rule that would

69 Bebchuk & Kastiel, *supra* note 38, at 1474-89.

70 Dhammika Dharmapala & Vikramaditya S. Khanna, *Controlling Externalities: Ownership Structure and Cross-Firm Externalities* (Eur. Corp. Gov. Inst., Law Working Paper No. 603/2021, 2023), https://ssrn.com/abstract=3904316.

71 As theorized by Thomas J. Chemmanur & Yawen Jiao, *Dual Class IPOs, Share Recapitalizations, and Unifications: A Theoretical Analysis* (Eur. Corp. Gov. Inst., Finance Working Paper No. 129/2006, 2006), https://ssrn.com/abstract=925236, dual-class recapitalizations can be value-enhancing when they are supported by the controller's post-IPO reputation. This theory is borne out by the empirical evidence. *See* Valentin Dimitrov & Prem C. Jain, *Recapitalization of One Class of Common Stock Into Dual-Class: Growth and Long-Run Stock Returns*, 12 J. Corp. Fin. 342 (2006).

72 Vladimir Atanasov, Bernard Black & Conrad S. Ciccotello, *Unbundling and Measuring Tunneling*, 2014 U. Ill. L. Rev. 1697 (2014).

73 *See* Luca Enriques et al., *Related-Party Transactions*, *in* The Anatomy of Corporate Law: A Comparative and Functional Approach 145 (Reinier Kraakaman et al. eds., 3rd ed. 2017).

74 Sang Yop Kang, *Generous Thieves: The Puzzle of Controlling Shareholder Arrangements in Bad-Law Jurisdictions,* 21 Stan. J.L. Bus. & Fin. 57 (2015).

75 Alessio M. Pacces, *Procedural and Substantive Review of Related Party Transactions: The Case for Non-Controlling Shareholder-Dependent Directors*, *in* The Law and Finance of Related Party Transactions 181 (Luca Enriques & Tobias H. Tröger eds., 2019).

facilitate investors' contracting on dual-class shares is a minority representation on the board to screen related-party transactions.[76]

If controlling shareholders cannot take out money from the company, by selling shares or by tunnelling, their incentives remain reasonably aligned with the investors' interest. This reveals another potential advantage of cooperation between controlling shareholders and institutional investors. As a low-carbon innovation proves unfeasible, controllers must decide whether to change or liquidate the project. Investors can influence this decision through engagement. In the following Parts, I will argue that institutional investors should commit to low-carbon innovation by giving up control. They should not give up persuasion, too. Because both controlling and minority shareholders receive price signals about the company's future profitability, investors without control (but possibly with a board representative) can persuade controlling shareholders to incorporate value-increasing feedback about continuing or terminating the project.[77] The interest alignment supported by appropriately designed dual-class shares should give large, index-tracking investors an additional reason to tie their hands. Investing in controlled companies not only commits institutional investors to low-carbon innovation, but also allows them to deflect allegations of common ownership.

D. Recapitalizations

The above considerations apply equally to dual-class recapitalizations. With the passage of time, entrepreneurship could not only become less relevant, but also more relevant because vision does not necessarily belong to founders.[78] In the interest of space, I refrain from extending this article's arguments to the midstream introduction of dual-class shares or increase of their wedge.[79] I only observe that controlling shareholders should be able to issue nonvoting equity for cash, subject to the contractual safeguards discussed above. Unilateral control enhancements based on issuing super-voting shares, which is restricted by U.S. listing rules,[80] should be allowed too, subject to a majority of the minority vote, effectively enabling institutional investors to request sunsets and other safeguards. The traditional argument against these recapitalizations was the risk of coercion for dispersed shareholders.[81] Ownership concentration by institutional investors makes this argument less relevant today. In addition, particularly in Europe, midstream control enhancements are already possible through loyalty shares, which can be introduced without a minority shareholder

76 *Id.*, at 209-12.

77 *See* Kobi Kastiel, *Against all Odds: Hedge Fund Activism in Controlled Companies*, 2016 Colum. Bus. L. Rev. 60 (2016); Doron Levit, *Soft Shareholder Activism*, 32 Rev. Fin. Stud. 2775 (2019). *See also supra* note 8.

78 Goshen, *supra* note 51. *See also* Baran et al., *supra* note 14 (finding that dual-class shares foster innovation when either the founders or inventor executives have disproportionate control).

79 A fuller analysis is in Claire A. Hill & Alessio M. Pacces, *The Neglected Role of Justification Under Uncertainty in Corporate Governance and Finance*, 3 Ann. Corp. Gov. 276, 375-92 (2018).

80 Stephen M. Bainbridge, *The Short Life and Resurrection of SEC Rule 19C-4*, 69 Wash. U. L. Q. 565 (1991).

81 Ronald J. Gilson, *Evaluating Dual Class Common Stock: The Relevance of Substitutes*, 73 Va. L. Rev. 807 (1987).

veto.[82] Loyalty shares are poor substitutes for dual-class shares because they do not support control premiums and contracting upon idiosyncratic PBC,[83] which is the main incentivizing mechanism discussed in this article.

In this Part, I have explained how, with appropriate corporate law safeguards, institutional investors may tie their hands with controlling shareholders to support low-carbon innovation. In the next Part, I will explain why institutional investors need controlling shareholders as a commitment device to cater to the preferences of climate-conscious beneficiaries.

II. The Institutional Investor Commitment Problem

In this Part, I discuss the potential and the incentives of institutional investors to mitigate climate change. I first discuss two ways for institutional investors to influence portfolio companies: exit and voice. I then move on to the incentives to care about climate change, analyzing two channels: climate risk management (doing well by doing good) and catering to the preferences of beneficiaries (delegated philanthropy). While doing well by doing good is insufficient reason for institutional investors to pursue decarbonization beyond the foreseeable government policies, delegated philanthropy could have more impact. However, institutional investors cannot commit to the low-carbon innovation necessary to achieve this impact.

A. Exit v. Voice

Institutional investors are the largest owners of the world's equity.[84] In the U.S., the biggest stock market of the world, they own approximately 71% of public equity, with 20% owned by the Big 3.[85] Because more than one-third of these assets and the majority of the Big 3's holdings are in funds that track market indices, big institutional investors are *automatically* the top shareholders of all large listed companies of the world. As climate change is certain to affect them in one way or another, it is straightforward that such powerful institutional investors engage in sustainable corporate governance.[86] However, it is questionable whether institutional investors can have an impact beyond foreseeable government policies.

One way to look at the climate change problem is to assume that governments will eventually impose larger carbon taxes and stricter regulations to meet the Paris agreement targets, such as limiting global warming to 1.5°-2.0° by the end of this

82 Marco Becht, *Loyalty Voting Structures: A Better Dual Class?*, 25 Theoretical Inquiries L. __ (2024).

83 Hill & Pacces, *supra* note 79, at 379-85 (comparing loyalty shares with dual-class shares).

84 Adriana De La Cruz, Alejandra Medina, & Yun Tang, Owners of the World's listed Companies (2019).

85 Bebchuk & Hirst, *supra* note 29, at 734-8 (projecting the Big 3 ownership of U.S. public equity to exceed 30% in about a decade).

86 Pacces, *supra* note 9.

century.[87] However, there is increasing awareness that the 1.5° goal is out of reach, and how to meet the 2.0° target is also unclear.[88] This creates Knightian uncertainty, which differently from risk cannot be managed. Uncertainty in turn limits the impact of institutional investors on sustainability.

Institutional investors can make portfolio companies reduce CO_2 in two ways: they may exit or threaten to exit from CO_2-intensive companies,[89] starving them of capital, or directly engage with them to reduce CO_2 (voice). Institutional investors may pursue a gradual portfolio decarbonization strategy: combining limited exit with voice, investors can reduce the systematic risk stemming from CO_2 emissions without undermining risk diversification.[90]

Portfolio decarbonization faces two limitations. First, in the absence of low-carbon innovation, bold actions by governments to curb emissions sound unrealistic. Without alternatives, governments are unlikely to impose sudden stops of CO_2-intensive energy production and transportation, because this could lead to unprecedented turmoil.[91] As the policy response to climate change is all but 'inevitable,'[92] the second limitation of portfolio decarbonization is the tradeoff between the short-term profitability of high-carbon technologies and the impact on climate change: investors must lose money to have impact.

Pursuing impact is hard to frame as risk management strategy so long as climate risk is mispriced, reflecting the uncertainty of low-carbon innovation and, relatedly, of government actions.[93] Exposure to climate risk, especially technological opportunities, is more an active bet on firm-specific technologies,[94] which despite being successful may imply forgoing profit if decarbonatization is slower than expected. If investors must sacrifice short-term returns for an indefinite time to have impact, investing in potentially profitable low-carbon innovations seems preferable to abating the CO_2 of current technologies; in the future, this approach could complement government subsidies and carbon taxes and become profitable.[95]

Given these conditions, it is difficult for institutional investors to have direct impact by exit. An overwhelming proportion of climate-conscious investors must be willing to forgo large returns for stock price to reward uncertain low-carbon

87 Patrick Bolton, Marcin Kacperczyk, & Frédéric Samama, *Net-Zero Carbon Portfolio Alignment*, 78 Fin. Analysts J. 19 (2022).

88 International Panel for Climate Change, Climate Change 2023 – A Synthesis Report (2023). *See also* International Energy Agency, *supra* note 25, at 16.

89 Alex Edmans & Gustavo Manso, *Governance Through Trading and Intervention: A Theory of Multiple Blockholders*, 24 Rev. Fin. Stud. 2395 (2011)

90 Patrick Bolton, Zachery Halem, & Marcin Kacperczyk, *The Financial Cost of Carbon*, 34 J. Corp. Fin. 17, 18 (2022).

91 Zohar Goshen & Assaf Hamdani, Will Systemic Stewardship Save the Planet? (Eur. Corp. Governance Inst., Law Working Paper No. 739/2023, 2023), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4605549.

92 Gosling & MacNeil, *supra* note 24, at 181.

93 Sautner et al, *supra* note 27, at 14-16, show that climate change uncertainty (physical, regulatory, and technological) is currently priced as tail risk in the option markets. Interestingly, ownership by the Big 3 is correlated with lower downside risk, reflecting climate risk management but likely little impact.

94 Sautner et al, *supra* note 31, 1452.

95 On the advantage of profit-seeking investment over subsidies, *see infra* text accompanying notes 118-119.

strategies. This is necessary to offset the gains of investors who only care about financial returns and bid up the price of carbon-intensive assets.[96] Empirical evidence suggests that we are far away from this theoretical requirement.[97] The impact of negative screening by climate-conscious investors on the cost of capital has been about half of a basis point, which is too small to affect anything. It is estimated that currently, for climate-conscious investors to increase the cost of capital by 1%, they should exceed 80% of the investable wealth. Currently, institutional investors can achieve very little by excluding carbon-intensive companies from their portfolios. The impact of exit could be indirect, however, and work symbolically to shape the preferences of more climate-conscious individuals and then their voice as voters and investors.[98]

Meanwhile, institutional investors can achieve more by voice, namely engaging with portfolio companies to reduce CO2 emissions. This is intuitive because the bulk of institutional investors' assets, particularly the Big 3's, are managed as index funds, implying both high voting power and a commitment not to exit.[99] Moreover, Broccardo, Hart, and Zingales demonstrated that, in a typical publicly held company, a vote to abate CO2 can succeed if there is a majority of weakly climate-conscious beneficiaries aggregated by institutional investors.[100] The intuition is that, because beneficiaries have an infinitesimal stake in every publicly held company, a modest prosocial preference is sufficient to offset the individual cost of forgoing profit from CO2-intensive technologies. For atomistic beneficiaries, as opposed to index fund managers, voting for a low-carbon technology only costs a few cents of forgone return, but brings sizeable benefit so long as they care a little about global CO2.

But why should institutional investors care about impact? Benabou and Tirole identify three models of corporate social responsibility, two of which are potentially applicable to institutional investors: Doing Well by Doing Good (DWDG) and delegated philanthropy.[101]

B. Doing Well by Doing Good

DWDG is a short-termism theory. Because the world will eventually reduce CO2 emissions to levels compatible with acceptable global warming, decarbonization is a strategy that will pay off in the long run. Companies that decarbonize earlier will enjoy a competitive advantage later. Investors that engage with companies to reduce CO2 are minimizing climate risk at the portfolio level.[102] As short-termism

96 Eleonora Broccardo, Oliver Hart, & Luigi Zingales, *Exit versus Voice*, 130 J. Pol. Econ. 3101 (2022).

97 Jonathan Berk & Jules H. van Binsbergen, *The Impact of Impact Investing* (Stan. Graduate Sch. Bus., Working Paper No. 3981, 2021), https://ssrn.com/abstract=3909166.

98 Marco Becht, Anete Pajuste, & Anna Toniolo, *Voice Through Divestment* (Eur. Corp. Governance. Inst., Finance Working Paper No. 900/2023, 2023), https://ssrn.com/abstract=4386469.

99 Pacces, *supra* note 33.

100 Broccardo et al., *supra* note 96, at 3116-7.

101 Roland Benabou & Jean Tirole, *Individual and Corporate Social Responsibility*, 77 Economica 1, 9-12 (2010).

102 Gordon, *supra* note 23, at 629,

is responsible both for intertemporal loss of profit and negative externalities, long-term index funds can fix both problems without giving up return.[103]

The problem with this reasoning is that because the path towards the Paris agreement targets is uncertain, climate risk is likely underpriced.[104] Consequently, investors that manage climate risk do not have sufficient incentives to correct short-termism. Not knowing when, if ever, fossil fuels will be discontinued, market participants bid up the price of high-carbon technologies relative to more uncertain low-carbon technologies. This implies that high-carbon stocks are overvalued which, in turn, leads to short-termism: managers pursue value that quickly shows up in stock price as opposed to larger and more uncertain value that might show up later.[105] Because index-tracking investors engage with managers based on stock prices, either spontaneously or prompted by activist hedge funds,[106] DWDG is not enough to close the gap between current emissions and the Paris agreement goals.

Short-termism and long-termism are two valuable forms of entrepreneurship. Institutional investors react to price signals. If the low-carbon technology is known or can be discovered incrementally, exposure to short-term reactions by institutional investors incentivizes managers to adapt quickly.[107] If the low-carbon technology is unknown, however, short-termism prevents managers from investing to discover it because markets are slow to recognize breakthroughs and meanwhile investors have incentives to replace managers. For example, the future of electric vehicles depends on profitable technologies to recycle batteries, which do not exist yet.[108] Until the uncertainty is resolved, the market misprices risk because there are limits to arbitrage and even long-term investors profit from high-carbon technologies despite knowing they are overvalued.[109] As investors will not wait for low-carbon technologies to prove viable, managers cannot wait either. If the stock price drops while managers invest in battery recycling, institutional investors will renege on their climate pledges and engage with managers to sell more internal combustion cars instead. On the one hand, the returns on current technologies are too tempting to let go; on the other, index-tracking investors are incompetent to judge firm-specific innovation.[110]

Because of short-termism, institutional investors do not support low-carbon breakthroughs, which could reduce CO_2 emissions significantly. Roe has contested framing the CO_2 problem as short-termism on the grounds that negative externalities do not depend on investor time horizon.[111] With given technology, negative externalities

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103 Benabou & Tirole, *supra* note 101, at 10.

104 Madison Condon, *Market Myopia's Climate Bubble*, Utah L. Rev. 63 (2022).

105 Patrick Bolton, Jose Scheinkman, and Wei Xiong, *Executive Compensation and Short-Termist Behaviour in Speculative Markets*, 73 Rev. Econ. Stud. 577 (2006).

106 Ronald J. Gilson & Jeffrey N. Gordon, *The Agency Costs of Agency Capitalism: Activist Investors and the Revaluation of Governance Rights*, 113 Colum. L. Rev. 863 (2013).

107 Giannetti & Yu, *supra* note 32.

108 *See* Andreas Breiter et al., *Battery Recycling Takes the Driver's Seat*, McKinsey Insights (Mar. 13, 2023), https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/battery-recycling-takes-the-drivers-seat.

109 Andrei Shleifer & Robert W. Vishny, *The Limits of Arbitrage*, 52 J. Fin. 35 (1997).

110 *See infra*, text accompanying notes 136-140.

111 Mark J. Roe, *What is Stock Market Short-Termism?*, 77 Bus. Law. 1039 (2022).

increase profit, so profit-seeking investors only internalize externalities to the extent that prices incorporate climate risk, which in turn depends on foreseeable government policies. But if technology can change, breakthroughs may materialize and disrupt both the price system and regulation. Short-termism undermines breakthroughs because of Knightian uncertainty. Stock prices, which guide institutional investors and the managers accountable to them, do not consistently incorporate hard-to-value information about the future.[112] A corollary of this finding is that portfolio value maximization is insufficient reason for institutional investors to internalize CO2.[113]

Portfolio value maximization is the engagement version of the portfolio decarbonization argument and suffers from similar limitations. To minimize systematic risk, while avoiding tracking error, index funds should engage broadly with their portfolio companies to reduce CO2.[114] This strategy maximizes risk-adjusted return for index fund beneficiaries. However, as I have explained, this strategy cannot internalize CO2 externalities to the extent that climate risk is underpriced. Another version of portfolio value maximization claims that because large institutional investors are universal owners with portfolios that mirror the global economy, they care about internalizing CO2 externalities beyond risk management (i.e., giving up return).[115] This version is more problematic from both a quantitative and a legal perspective.[116] First, even the largest institutional investors do not internalize all climate change externalities because some of the latter pop up in contexts remote from the stock market, for instance consumption on a Pacific island or production by private companies. Second, reducing climate externalities at the expense of financial return could be legally problematic in the absence of a mandate from beneficiaries to forgo profit to reduce CO2.[117] In sum, under both versions of portfolio value maximization, institutional investor engagement does not lead to the internalization of CO2 externalities, unless institutional investors are prompted to forgo financial return, which leads us to delegated philanthropy.

C. Delegated Philanthropy

Delegated philanthropy posits that firm stakeholders, including but not limited to shareholders, are willing to pay a price to internalize externalities and delegate a company to do so.[118] Subtly, delegated philanthropy is a for-profit strategy: at least initially, the cost of internalizing externalities is passed on to the demands by investors, customers, and employees. In the case of catastrophic negative externalities, such

112 The finance literature confirms that climate risk uncertainty, particularly technological, is priced as tail risk in the options market and this price has been changing over time, reflecting an ongoing path towards an unknown equilibrium. Sautner et al., *supra* note 27, at 2.

113 *Cf.* Battocletti et al., *supra* note 37, at 547-50 (arguing that portfolio value maximization supports the internalization of negative as positive externalities, such as innovation, though it undermines competition).

114 Gordon, *supra* note 23.

115 Madison Condon, *Externalities and the Common Owner*, 95 Wash. L. Rev. 1 (2020).

116 Roberto Tallarita, *The Limits of Portfolio Primacy*, 76 Vand. L. Rev. 511 (2023).

117 Marcel Kahan & Edward B. Rock, *Systemic Stewardship with Tradeoffs*, 48 J. Corp. L. 497 (2023).

118 Benabou & Tirole, *supra* note 101, at 10-11.

as climate change, these subsidies reflect anticipation of a future in which the social cost of CO_2 will be internalized.

Delegated philanthropy is a more powerful reason than DWDG for institutional investors to internalize CO_2. Granted that curbing negative externalities requires forgoing short-term return indefinitely, delegated philanthropy means that beneficiaries give institutional investors a mandate to do so. Because climate-conscious beneficiaries are willing to pay a premium to invest in a more sustainable future, institutional investors aggregating prosocial beneficiaries' preferences still maximize profit. This is efficient because, after a low-carbon technology has proven viable, profit-seeking investors can reallocate funds to other technologies and have more impact than finite government subsidies.[119] Attracting climate-conscious beneficiaries gives institutional investors an incentive to commit to low-carbon technologies.

Delegated philanthropy is borne out by the empirical evidence. Large institutional investors engage aggressively on topics dear to the millennial generation, such as climate and gender balance.[120] Moreover, the extreme ends of sustainability labels, reflecting albeit coarsely high-carbon and low-carbon mutual funds,[121] significantly affect fund flows, and the motivation for beneficiaries to move towards lower CO_2 emissions is also nonpecuniary.[122] Importantly, this evidence concerns the universe of mutual funds, not just the funds with an environmental social or governance (ESG) goal, which are smaller and may be labeled inconsistently.[123]

One may doubt whether there are enough climate-conscious beneficiaries in the world for institutional investors to internalize CO_2: the number of climate-conscious beneficiaries or the intensity of their preference may be too small. The question about the number can only be answered empirically and is still largely unresolved.[124] Beneficiaries' willingness to pay for climate-friendliness seems to be limited, reflecting a 'warm glow' effect rather than attention to actual impacts.[125] However, the theory of voice discussed earlier suggests that a weak preference is sufficient to internalize negative externalities, such as CO_2, so long as there is a majority of weakly climate-conscious beneficiaries and institutional investors vote on their behalf.

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119 Benjamin Roth, *Impact Investing: A Theory of Financing Social Enterprises* (Harv. Bus. Sch., Working Paper No. 20-078, 2021), https://www.hbs.edu/ris/Publication%20Files/20-078rev6-25-21_fe526a07-6ddc-4522-bbf3-2b3d6055cc1e.pdf.

120 Barzuza et al., *supra* note 26, at 1283-84.

121 Marco Ceccarelli, Stefano Ramelli, & Alexander F. Wagner, *Low Carbon Mutual Funds*, Rev. Fin. (forthcoming 2023), document the correlation between Morningstar globes and Morningstar low-carbon index.

122 Hartzmark & Sussman, *supra* note 26.

123 Florian Berg, Julian F. Koelbel, & Roberto Rigobon, *Aggregate Confusion: The Divergence of ESG Ratings*, 26 Rev. Fin. 1315 (2022).

124 Scott Hirst, Kobi Kastiel, & Tamar Kricheli-Katz, *How Much do Investors Care about Social Responsibility?* (Eur. Corp. Governance Inst., Law Working Paper No. 674/2023, 2023), https://ssrn.com/abstract=4115854, found moderate support for social responsibility in a lab experiment. *See also* Rob Bauer, Tobias Ruof & Paul Smeets, *Get Real! Individuals Prefer More Sustainable Investments*, 34 REV. FIN. STUD. 3976 (2021) (finding large support for social responsibility in a Dutch field survey). Answering this question with observational data is much more challenging.

125 Florian Heeb et al., *Do investors care about impact?*, 36 Rev. Fin. Stud. 1737 (2023).

Delegated philanthropy can be generalized to the case in which institutional investors purse a low-carbon technology to attract climate-conscious beneficiaries. Economic theory has demonstrated that socially responsible (SR) investors of this kind have a broad mandate to act in a prosocial manner and fund entrepreneurs at a loss to steer them towards the low-carbon technology, outcompeting financial investors who prefer the high-carbon technology.[126] Crucially, SR funding comes with the right to choose the low-carbon technology or a commitment to it. The SR investor's loss is passed on to climate-conscious beneficiaries and supports a 'bribe' to the entrepreneurs, which takes the form of higher PBC or bigger project scale, to forgo the larger profit of the high-carbon technology.

Given the existence of climate-conscious beneficiaries, the failure of institutional investors to act as SR investors is surprising. In what follows, I am arguing that this failure depends on institutional investors' inability to commit to low-carbon innovation.

D. Committing to Low-Carbon Innovation

Economic theory is more optimistic about sustainable corporate governance than the empirical evidence. Large, index-tracking institutional investors pursue decarbonization, but despite pressure from climate-conscious beneficiaries, do not seem able to go beyond climate risk management.[127] This outcome reflects the delays of governments in acting consistently with the Paris agreement. Institutional investors' impact is too small to limit global warming to 1.5°-2.0° by the end of the century.[128] Moreover, although institutional ownership is associated with commitments to reduce CO_2 by portfolio companies, which subsequently honor these commitments, these commitments are unambitious and only concern a minority of firms which are already decarbonizing.[129] Most worrisomely, CO_2 emissions are *negatively* associated with low-carbon innovation: improved CO_2 efficiency leads to higher emissions.[130] This picture suggests a Jevons paradox, which means that efficiency gains in CO_2 emissions are offset by the increased demand for CO_2-intensive goods and services. Therefore, despite the preferences of climate-conscious beneficiates, institutional investors are not fighting climate change more aggressively than foreseeable government policies.

Lack of impact may depend on greenwashing or 'impact washing.' Impact washing is a subtle way for purportedly socially responsible investors to appeal to climate-conscious beneficiaries (particularly to their 'warm glow') investing only in climate-friendly companies. While this selection strategy is borne out by the

126 Oehmke & Opp, *supra* note 46.

127 Tom Gosling, *Net Zero Asset Management and The Fiduciary Duty Dilemma*, Forbes, Jan. 10, 2023, https://www.forbes.com/sites/lbsbusinessstrategyreview/2023/01/10/net-zero-asset-management-and-the-fiduciary-duty-dilemma/.

128 Azar et al., *supra* note 17, at 686.

129 Bolton et al., *supra* note 22, *Firm Commitments*.

130 Bolton et al., *supra* note 11, *The CO_2 Question*.

empirical evidence,[131] it has hardly any impact,[132] confirming the limited effects of exit discussed before. Impact washing, however, is in principle not available for index-tracking investors that may not just exclude companies with high CO2 emissions. In fact, ownership by index funds reduces CO2 emissions, but may do so to a limited extent because of greenwashing.

By greenwashing, institutional investors can attract climate-conscious beneficiaries as they pretend to decarbonize portfolio companies, while just maximizing return subject to climate risk management.[133] Greenwashing is borne out by the empirical evidence.[134] However, as I have argued in related work, securities regulation is curbing it.[135] In the EU, climate change mitigation and adaptation are being framed into an ambitious taxonomy, which is reflected by mandatory sustainability disclosures for issuers and asset managers. Moreover, financial intermediaries are required to investigate their clients' sustainability preferences (also in terms of climate taxonomy) to recommend suitable financial products. As greenwashing becomes increasingly harder to do, I argue that lack of impact by large, indexed institutional investors depends on their inability to commit to low-carbon innovation.

It is costly for institutional investors to commit to low-carbon innovation. Economic theory assumes, simplistically, a binary technology—either low-carbon or high-carbon—which is known and recognizable to investors. But the CO2 problem is more complex and the technology to solve it is unknown. Institutional investors are unable to identify breakthrough technologies and ask managers to implement it because they cannot deal with Knightian uncertainty, are time inconsistent, and have a conflict of interest.

Because when, how, and by how much CO2 emissions will be reduced is unpredictable, the transition to a low-carbon world is uncertain in a Knightian sense. Not only does this uncertainty undermine government action, but it affects institutional investors too. If the world decarbonizes less quickly than expected, investing in low-carbon innovation may undermine relative performance more than an index-tracking investor is willing to bear. Breakthroughs, however, might suddenly alter relative prices in such a way that an externality today is no longer an externality tomorrow.[136] For instance, the invention of automobiles eliminated the externalities from horse manure. Likewise, profitable electric vehicles or carbon capture and sequestration might change transportation's negative externalities, its price, and government CO2 policies. Institutional investors cannot support breakthroughs

131 Davidson Heath et al., *Does Socially Responsible Investing Change Firm Behavior?*, 27 Rev. Fin. 2057 (2023).

132 *See* Nickolay Gantchev, Mariassunta Giannetti, & Rachel Li, *Sustainability or Performance? Ratings and Fund Managers' Incentives* (Eur. Corp. Governance Inst., Finance Working Paper No. 747/2021, 2023), https://ssrn.com/abstract=3731006.

133 Goshen & Hamdani, *supra* note 91, at 8.

134 *See, e.g.,* Aneesh Raghunandan & Shiva Rajgopal, *Do ESG Funds Make Stakeholder-Friendly Investments?,* 27 Rev. Acc. Stud. 822 (2022).

135 Pacces, *supra* note 9, at 8-12 (explaining how EU securities regulation could achieve this result).

136 Israel M. Kirzner, *Creativity and/or Alertness: A Reconsideration of the Schumpeterian Entrepreneur*, 11 Rev. Austrian Econ. 5 (1999).

of this kind because they cannot judge whether a specific low-carbon technology will become more profitable than current technologies that reflect timid climate regulations. While activist hedge funds are likely to push for the latter, index fund managers are not qualified to decide on the 'conflict of entrepreneurship' implied by the former.[137]

This leads to a second problem. Managers could, in principle, be entrepreneurial, but index-tracking institutional shareholders are unlikely to support them because they are time-inconsistent. When the expected returns on high-carbon technologies exceed those on low-carbon technologies, institutional investors with the voting power to replace management will renege on their commitments to CO_2 abatement—or else activist hedge funds will prompt them to do so.[138] Institutional investors are not competent to identify firm-specific innovations that could make CO_2 abatement profitable. As they hold stock in thousands of companies based on the indices they track, they have limited incentives to engage in firm-specific matters.[139] Conversely, the option value of climate uncertainty appears to be mainly firm-specific.[140]

Finally, institutional investors have a conflict of interest about low-carbon innovation because of common ownership. Big institutional investors have large stakes in multiple companies in one industry. These investors have an incentive to dim competition between portfolio firms to capture monopoly rents and increase portfolio return.[141] Even if common owners do not directly determine restrictions of competition, their sheer presence shapes managerial incentives in such a way that they do not compete aggressively.[142] Therefore, although common owners like to reduce the externalities from CO_2,[143] they are less inclined to support low-carbon innovation as it could lead to a winner-takes-all competition in which many portfolio companies suffer from the write-off of carbon-intensive assets (so-called 'stranded assets').

Institutional investors who want to attract climate-conscious investors should tie their hands with controlling shareholders. Controlling shareholders can commit investors to low-carbon innovation because they do not suffer from the three abovementioned problems. First, controlling shareholders deal with uncertainty as they pursue their entrepreneurial vision. Second, because they cannot be fired, controlling shareholders can resist the temptation of short-term return.[144] Third, because they are not or are only minimally diversified, controlling shareholders

137 Pacces, *supra* note 33, at 209-211.
138 Goshen & Steel, *supra* note 28.
139 Gilson & Gordon, *supra* note 106.
140 Sautner et al., *supra* note 31.
141 Battocletti et al., *supra* note 37.
142 Miguel Antón et al., *Common Ownership, Competition, and Top Management Incentives*, 131 J. Pol. Econ. 1294 (2022).
143 Condon, *supra* note 115.
144 Tom Vos, *The Missing Role of Controlling Shareholders in the Short-Termism Debate* (Eur. Corp. Governance Inst., Law Working Paper No. 728/2023, 2023), https://ssrn.com/abstract=4221137, astutely notes that controlling shareholders can be short term-oriented too. In this article, this possibility is ruled out by the divestment sunset and the corporate law safeguards against tunneling, preventing controlling shareholders from taking money out of the company. *See supra* text accompanying notes 66-76.

compete aggressively for breakthroughs. In the following two Parts, I will show that while idiosyncratic PBC motivate controlling shareholders to pursue their vision, institutional investors can steer this vision towards low-carbon innovation with dual-class shares.

III. The Controlling Shareholder Opportunity: Idiosyncratic PBC

Controlling shareholders can commit institutional investors to low-carbon innovation if the latter agree to finance their vision with no control over it, apart from the safeguards discussed in Part I. In this Part, I argue that idiosyncratic PBC incentivize controlling shareholders to pursue their vision while limiting agency cost.

Controlling shareholders are motivated to invest all or a significant part of their wealth in a company, giving up risk diversification, because of PBC.[145] With undisputed control over a company, controlling shareholders can extract benefits that are not shared pro-rata with noncontrolling shareholders. These PBC can be pecuniary or nonpecuniary and can be extracted inefficiently or efficiently.

PBC may be extracted inefficiently because of agency cost: as there is a separation of ownership and control, the incentives of controlling shareholders are imperfectly aligned with the interest of other shareholders.[146] Pecuniary PBC are diversionary and exemplified by tunneling: controlling shareholders may distribute part of the firm's assets, cash flow, or equity to themselves instead of pro-rata.[147] Nonpecuniary PBC are distortionary: they do not imply non-pro-rata distributions, but failure to maximize profit. Examples include control perquisites, pet projects, or simply being wrong. Extraction of these PBC is inefficient because it reduces the profit to be shared pro-rata with the other shareholders. Anticipating this, noncontrolling shareholders apply a discount on the stock's expected value. On this perspective, controlling shareholders reflect a corporate governance tradeoff.[148] On the one hand, because of larger stakes, controlling shareholders extract lower PBC than management as their incentives are more aligned with the noncontrolling shareholders' interest. On the other, controlling shareholders are harder to replace than management when they underperform, which may exacerbate inefficient extraction of PBC with time.

Dual-class shares potentially worsen the controlling shareholder tradeoff because they create a *wedge* between voting rights and the controllers' economic interest, reducing the alignment of incentives. Because dual-class shares enable control with lower stakes, they are regarded with suspicion by corporate law scholars.[149] Agency

145 *See, e.g.,* Philippe Aghion & Patrick Bolton, *An Incomplete Contracts Approach to Financial Contracting*, 59 Rev. Econ. Stud. 473 (1992).

146 Jensen & Meckling, *supra* note 43.

147 Atanasov et al., *supra* note 72.

148 Ronald J. Gilson, *Controlling Shareholders and Corporate Governance: Complicating the Comparative Taxonomy*, 119 Harv. L. Rev. 1641 (2006).

149 Bebchuk & Kastiel, *supra* note 38.

cost does increase in the wedge between voting rights and economic interest. However, PBC may also be value-increasing. When this is the case, dual-class shares are efficient because they allow controlling shareholders to increase company value. This prospective value increase, in turn, minimizes agency cost.

Goshen and Hamdani persuasively argue that controlling shareholders who have a long-term vision beyond the purview of the stock market can increase shareholder value.[150] On this perspective, dual-class shares allow controllers to scale their vision and secure it from activists and takeover bidders also if they are wealth-constrained.[151] As discussed in the previous Part, when the future is uncertain the stock market may undervalue breakthroughs. Conversely, a controlling shareholder may overvalue them. If the controller's vision proves successful, it will result in higher financial returns than anticipated by the market, which will be shared pro-rata with noncontrolling shareholders. While this theory explains well how controlling shareholders can increase firm value and why institutional investors fund them, their motivation to pursue their vision is unclear. After all, if successful, controlling shareholders would share the proceeds of their vision with noncontrolling shareholders who can just sit and wait.

In earlier work, I argued that controlling shareholders are motivated by idiosyncratic PBC, which are value-increasing, as they reflect the appropriation of valuable vision.[152] Idiosyncratic PBC include, for example, the personal satisfaction of implementing the vision, the pride and reputation of making it a success, and later on, the value of selling control at a premium. Ex-ante, idiosyncratic PBC are nonpecuniary, or psychological. They are idiosyncratic because only the controlling shareholder values them, as the market does not yet attach any opportunity cost to the vision. Ex-post, idiosyncratic PBC may become pecuniary. The possibility of cashing in a control premium provides controlling shareholders with a deferred compensation for their vision.

Idiosyncratic PBC allow the integration of corporate governance with the theory of entrepreneurship. This theory defines entrepreneurs as the agents who can make "a successful decision when no obviously correct model or decision rule is available or when relevant data is unreliable or incomplete."[153] Entrepreneurs deal with fundamental uncertainty, as defined by Knight, by exercising judgment.[154] Because this theory rewards entrepreneurship with profit, it has been difficult to reconcile with the corporate governance approach to separation of ownership and control. In corporate governance, profit is distributed pro-rata to controlling *and* noncontrolling owners. Idiosyncratic PBC fill this theoretical gap by providing entrepreneurs who are only partial owners (controlling shareholders) with a deferred compensation

150 Goshen & Hamdani, *supra* note 63, at 566-67.

151 Zohar Goshen & Assaf Hamdani, *Corporate Control, Dual Class, and the Limits of Judicial Review*, 120 Colum. L. Rev. 941 (2020).

152 Pacces, *supra* note 39, at 109-115.

153 *See* Mark Casson, *Entrepreneurship*, The Concise Encyclopedia of Economics, https://www.econlib.org/library/Enc1/Entrepreneurship.html (last visited Apr. 4, 2023).

154 Knight, *supra* note 12, at 359-60.

for their vision, in addition to the financial return on their equity. Idiosyncratic PBC also compensate controlling shareholders for forgoing risk diversification.[155] Differently from managers, including those receiving equity-based compensation, controlling shareholders substantiate their claim about vision by having all or a significant part of their wealth invested in the company.

Idiosyncratic PBC support the efficiency of dual-class shares. Idiosyncratic PBC incentivize controlling shareholders to succeed in their vision. Dual-class shares allow wealth-constrained entrepreneurs to implement their vision as a large project by maintaining idiosyncratic PBC as an incentive. It would be risky for controlling shareholders to use debt to scale their vision without giving up control: because of fundamental uncertainty, the near-term returns on the vision are unpredictable.[156] The advantage of equity is the indefinite time horizon to repay financiers. Dual-class shares make it possible to raise equity without undermining control and idiosyncratic PBC. To attract noncontrolling shareholders, controlling shareholders must commit to limiting the extraction of diversionary and distortionary PBC. As explained in Part I,[157] in this article I assume that corporate law allows curbing diversionary PBC, hence I focus on distortionary PBC.

Idiosyncratic PBC set an upper bound on distortionary PBC, minimizing agency cost. The worst case of distortionary PBC is the controlling shareholder's vision being proved wrong with time. Controlling shareholders, however, stand to lose comparatively more than managers from failure, and have higher incentives to acknowledge it, because of their higher stakes. Dual-class shares could eliminate this incentive advantage of controlling shareholders as they reduce the economic interest necessary to secure control, *potentially* near to zero.[158] Idiosyncratic PBC eliminate this potential drawback of dual class-shares by setting a lower bound to the economic interest that controllers will *actually* retain at the IPO stage.[159]

Anticipating distortionary PBC, investors discount the expected value of noncontrolling stock when they buy it. This discount increases with the amount of stock sold to the investing public relative to the controller's stake. Investors expect that controlling shareholders will be more likely to be wrong, or will have a different opinion on how to maximize firm value,[160] the lower the equity they retain. From the controlling shareholder's point of view, the discount on each share sold cannot be higher than the idiosyncratic PBC divided by the number of shares retained. Otherwise, controlling shareholders would be selling equity claims that are worth less to the investing public than to themselves.

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155 Burkart & Lee, *supra* note 13, at 26.

156 Baran et al., *supra* note 14.

157 *See supra* text accompanying notes 72-76.

158 Bebchuk & Kastiel, *supra* note 38, at 1465-68.

159 *See supra* text accompanying notes 57-68 (a divestment sunset is needed to maintain this restriction over time).

160 For this more nuanced approach to agency cost, *see* Goshen & Hamdani, *supra* note 63, at 566-68. *See also infra* text accompanying note 179.

Together with the entrepreneur's wealth constraint, idiosyncratic PBC set an upper limit to the amount of equity that controlling shareholders can raise from the investing public, and consequently, a lower limit to their economic interest. The level of idiosyncratic PBC and the discount applied by noncontrolling shareholders also determine the wedge between voting rights and economic interest necessary to keep control.[161] This wedge makes it possible to increase the scale of the visionary project compared to 1S1V but is not unlimited even in the absence of regulation. Idiosyncratic PBC claimed by the controlling shareholder, which determine the wedge, must lead to a reasonable investor discount.

Although idiosyncratic PBC reflect the vision's subjective value, they can be neither too high nor too low. Idiosyncratic PBC cannot be too high because, although increasing the wedge can in theory support any size of idiosyncratic PBC, a higher wedge also commands a higher discount, which limits both the funds that can be raised from investors and the controlling shareholder's economic interest. As controlling shareholders value not only their vision, but also their own investment in the company, they will likely stop selling stock when they judge the price to be too low. Idiosyncratic PBC also cannot be too low. Low idiosyncratic PBC would mean that controlling shareholders expect little from their vision, which implies a low wedge and eventually frustrates the purpose of dual-class shares. In this situation, the controller would be better off selling stock with a 1S1V voting structure as they would still manage to implement their vision and retain moderate idiosyncratic PBC with a positive probability.[162]

Therefore, in a dual-class shares company, the sale of noncontrolling stock stops when distortionary PBC are at the efficient level. In this situation, idiosyncratic PBC compensate the agency cost.[163] This finding aligns with the popularity of dual-class shares in businesses with high near-term uncertainty. Chemmanur and Jiao similarly derive the optimality of dual-class shares from a tradeoff between the controller's PBC and a project's long-term value, on the one hand, and agency cost from the controller's lower stake, on the other.[164] Differently from their model, here contracting for a higher wedge is always efficient because idiosyncratic PBC supporting this reflect additional value: idiosyncratic PBC do not reduce and potentially increase shareholder welfare.[165] In an extension of their model, Chemmanur and Jiao

161 In Part IV, I illustrate the equilibrium sale of noncontrolling stock with a numerical example. *See infra* text accompanying notes 175-178.

162 Thomas J. Chemmanur & Yawen Jiao, *Dual Class IPOs: A Theoretical Analysis*, 36 J. Bank. Fin. 305, 315 (2012), explain the relevant tradeoff. In their model, the controller's payoff is based on the IPO proceeds plus the expected value of PBC in the face of potential takeover bids, conditional on a bad intermediate signal about the performance of long-term projects. For an informal discussion of how low idiosyncratic PBC lead to managerial control, as opposed to controlling shareholders, see Pacces, *supra* note 39, at 133-138.

163 Pacces, *supra* note 62.

164 Chemmanur & Jiao, *supra* note 162.

165 In the model by Chemmanur & Jiao, *supra* note 162, 315, PBC are extracted at the expense of profit, which may lead to inefficient outcomes, such as a socially excessive wedge, to be ruled out by regulation. In contrast, according to Pacces, *supra* note 62, idiosyncratic PBC are always welfare-increasing.

demonstrated that dual-class recapitalizations are also efficient, as the controller's reputation lowers the investor discount.[166]

As discussed in Part I, dual-class recapitalizations may reflect the heightened importance of entrepreneurial vision in corporate governance. Therefore, corporate law should allow them, albeit with safeguards for minority shareholders.[167] Moreover, the efficiency of dual-class shares depends on idiosyncratic and distortionary PBC being in equilibrium. This might change with time. Preserving this equilibrium, a divestment sunset preserves the agency cost level initially agreed upon between controlling and noncontrolling shareholders.[168] Finally, a target-contingent transfer sunset directs the incentive effect of idiosyncratic PBC towards low-carbon innovation.[169] In the next Part, I will show with a numerical example that dual-class shares can make committing to low-carbon innovation attractive.

IV. Committing to Low-Carbon Innovation Through Dual-Class Shares: A Numerical Example

In this Part, I extend a recent economic model of socially responsible (SR) institutional investors to the case in which the low-carbon technology is unknown.[170] SR investors offer controlling shareholders a conditional dual-class arrangement to discover the low-carbon innovation: dual-class shares become permanent, allowing the appropriation of idiosyncratic PBC, only if the controlling shareholder discovers the low-carbon technology. Because the low-carbon innovation is not contractible, I assume a net-zero CO_2 target as the trigger of the target-contingent transfer sunset: the security voting structure reverts to 1S1V if the controlling shareholder sells the controlling block before reaching the target. The following numerical example reveals that profit-oriented controlling shareholders always prefer this arrangement with SR investors to selling noncontrolling stock unconditionally to financial investors (FI), which do not care about low-carbon innovation, because the former purchase dual-class shares with a lower discount than the latter.

I assume that investors are either SR or FI, and that they cannot greenwash. Based on delegated philanthropy, SR investors have a broad mandate to sacrifice short-term return to reduce CO_2 on behalf of weakly climate-conscious beneficiaries. This incentivizes SR investors to buy noncontrolling stock at a premium to outcompete FI investors and commit controlling shareholders to discovering low-carbon innovation. All else being equal, a lower discount allows controlling shareholders to increase the wedge between voting rights and economic interest, to scale their vision, and to extract higher idiosyncratic PBC if successful. So long as SR investors offer such

166 Chemmanur & Jiao, *supra* note 71.

167 *See supra* text accompanying notes 72-76.

168 *See supra* text accompanying notes 57-68.

169 *See supra* text accompanying notes 48-56.

170 *Cf.* Oehmke & Opp, *supra* note 46 (in which investors can choose between given clean and dirty technologies).

attractive financing conditions, wealth-constrained controlling shareholders will prefer committing to low-carbon innovation via a contingent contract, in which they lose the option to sell control at a premium if they do not reach the net-zero target.[171] While SR investors allow controlling shareholders to extract higher rents than FI investors, both controlling shareholders and SR investors keep the incentive to maximize the profit from low-carbon innovation; this is an advantage of sustainable finance over government subsidies.[172]

Imagine an entrepreneur considering setting up a company in Amsterdam to produce Trika, an enclosed tricycle. Her vision is that Amsterdam's inhabitants will demand Trika to protect themselves from extreme rainfall due to climate change. Trika could be developed with standard combustion engine or with two innovative technologies: (1) a CO2-positive battery technology; or (2) a net-zero solar panel technology, with negative CO2 emissions.[173] The two innovations are uncertain, but if successful, they would revolutionize mobility in Amsterdam, for which the entrepreneur would enjoy PBC = €50.000. The entrepreneur is indifferent between the two technologies,[174] but she cares about implementing Trika with a revolutionary technology (PBC = €50.000) because she regards standard combustion engines as trivial (PBC = 0).

The entrepreneur faces two kinds of investors: FI investors which only maximize return and SR investors which maximize return subject to carbon neutrality. Investors cannot distinguish between technologies 1 and 2 ex-ante, although they can observe CO2 emissions ex-post. To finance the company, the entrepreneur issues 1.000 shares worth €1.000 each. As an outside option, I assume it is always possible to realize €1.000 per share by developing Trika with a combustion engine (PBC = 0).

Let us initially consider an entrepreneur who is not wealth-constrained and maximizes her entrepreneurial return as PBC relative to the initial investment. This is on top of financial return, which is identical for controlling and noncontrolling shareholders and is equal to (€1000 – P)/P (P is the IPO price).[175] To secure PBC, the entrepreneur uses dual-class shares enabling control with stakes $\alpha \leq 50\%$, which is given by her k shares divided by the $n = 1.000$ shares issued ($\alpha = \frac{k}{n} = \frac{k}{1.000}$). I assume

171 *Id.*, Oehmke & Opp argue that the SR capital is finite (it depends on the preferences of climate-conscious beneficiaries) so not every entrepreneur can commit to low-carbon innovation. Moreover, in the spirit of Bhagwan Chowdhry, Shaun William Davies, & Brian Waters, *Investing for Impact*, 32 Rev. Fin. Stud. 864 (2019), profit-seeking entrepreneurs must commit to low-carbon innovation by offering investors a compensation if they fail to produce the social benefit.

172 Roth, *supra* note 119, at 20.

173 Negative emissions offset the Scope 3 CO2 emissions in the supply chain. *See e.g.* Peter Johnson, *This Zero Emission Mobility (ZEM) EV captures CO2, Cleaning the Air as it Drives*, Electrek (Sep. 14, 2022), https://electrek.co/2022/09/14/this-zero-emission-mobility-zem-ev-captures-carbon/.

174 The model could be extended by adding the entrepreneur's preference for low-carbon technology, making $PBC_2 > PBC_1$. This would only strengthen the results of the example. However, differently from Oehmke & Opp, *supra* note 46, the entrepreneur's preference for low-carbon technology is not essential because financiers cannot observe the technology ex-ante (thus they cannot choose it); they can only observe CO2 ex-post.

175 I assume no time value of money and no risk other than entrepreneurial uncertainty, reflected by PBC, and agency cost, reflected by the discount $D(\alpha)$. As the outside option is not attractive except in case of failure, the entrepreneur invests her wealth exclusively to maximize the entrepreneurial return.

that dual-class shares allow entrepreneurs to retain control with any α by adjusting the wedge between voting rights (VR) and economic interest (EI). Let me define this wedge as: $w = \frac{\text{VR}}{\text{EI}}$. For example, if there are two classes of shares, a class B in which each share carries 2 votes and a class A with 1 vote, and the entrepreneur only holds B shares, the wedge is 2:1 and control can be secured holding $\alpha \geq 25\%$. With a wedge of 100:1, the minimum α to maintain control via B shares becomes 0.99%.[176] Because investors do not have control, $n—k$ shares are sold at P = €1.000 – $D(\alpha)$, with the discount $D(\alpha)$ decreasing in α and equal to zero if $\alpha > 50\%$ (w = 1). The question is how much α the entrepreneur decides to retain, granted that the entrepreneur can always secure control by increasing the wedge.[177]

The entrepreneur retains an equilibrium stake α^* as follows:[178]

$$\alpha^* \mid \frac{PBC}{k} = D(\alpha) \tag{1}$$

From the entrepreneur's standpoint, noncontrolling stock is worth selling until the discount per share is equal to the PBC per share. At that point, what she misses in terms of investor valuation is equal to what she gains as subjective valuation of her vision. Before that point, investors overvalue Trika, so it's rational to sell additional shares. Beyond that point, investors undervalue Trika, so it's rational for the entrepreneur to keep the shares. The discount is the agency cost. Assuming, as in the preceding Parts, that diversionary PBC are ruled out by corporate law and idiosyncratic PBC minimize distortionary PBC, agency cost reflects a divergence between the entrepreneur's vision and investors' goals. For instance, the entrepreneur may choose to undercut e-bikes producers in which the investors have common ownership.[179]

I posit that SR investors will charge a lower discount $D(\alpha)^{SR}$ than FI investors $D(\alpha)^{FI}$, in exchange for the entrepreneur's commitment to net-zero. The entrepreneur credibly commits via a target-contingent transfer sunset disallowing the control premium until net-zero is achieved. In this way, cashing in idiosyncratic PBC is conditional on a successful low-carbon innovation. Below are different scenarios simulating the equilibrium sale of noncontrolling stock.

$$D(\alpha)^{FI} = 1.000 - 2\,k \tag{2}$$

$$D(\alpha)^{SR} = 1.000 - 4.1\,k \tag{3}$$

$$\frac{PBC}{k} = \frac{50.000}{k} \tag{4}$$

176 The minimum α stake to retain control given w is: $\alpha = \frac{1}{w+1}$.

177 I assume that the entrepreneur prevails if there is a tie. The minimum wedge supporting control given α (assuming that the controller holds all the high-voting shares) is: $w = \frac{1-\alpha}{\alpha}$.

178 This is based on Pacces, *supra* note 62. The notation is slightly different in this numerical example. $D(\alpha)$ is the discount per share.

179 This setup reveals that, by giving control to the entrepreneurs, investors commit against common ownership, passing on the cost to their beneficiaries. *See supra*, text accompanying notes 77-78.

Let us consider FI investors first. To protect her PBC, the entrepreneur could raise at most €500.000 investing as much (α = 50%) with an expected entrepreneurial return of 10% ($\frac{50.000}{500.000}$). Under 1S1V, the entrepreneur cannot raise more funds from FI investors without putting PBC in jeopardy. In this baseline scenario, the expected financial return is zero, because the expected share value is €1.000 and there is no discount on issuance.

Introducing dual-class shares, the entrepreneur can improve the entrepreneurial return selling low-voting shares at a discount, while maintaining control. From the combination of (2) and (4),[180] we have the following solution of (1) which is point A in Figure 1:

$$\alpha^* = 444/1000 = 44.4\% \qquad A\ (444;\ 112)$$

The entrepreneur retains control with 444 shares at P = €1000 – €112 = €888,[181] investing €394.272, which gives an entrepreneurial return from PBC of 12.7% (50.000/394.272). The entrepreneur raises from investors €493.728. Because shares are issued at discount, both the investors and the entrepreneur can expect a financial return at least equal to the entrepreneurial return if they take the outside option (developing Trika with a combustion engine). However, financial return does not affect decision-making because, ex-ante, the option is out-of-the-money for the entrepreneur. Ex-post, the entrepreneur would take the outside option only if she acknowledged failure (with stock worth less than €1.000 and PBC =0). Investors can never take the outside option because they do not have control.[182] Our entrepreneur is exclusively motivated by the entrepreneurial return, taking a chance at innovating. As the entrepreneur can choose any innovation, she picks the carbon-neutral technology 2 with a 50% probability.

Let us now introduce SR investors. SR investors demand a lower discount as in (3) on condition that the entrepreneur commits to zero CO_2. This framing is like the model by Oehmke & Opp, in which SR investors buy shares at a premium to induce the entrepreneur to forgo FI's offer to pick a dirty technology. Here, however, the 'bribe' is a lower discount and the entrepreneur, not investors, chooses the technology, which is not known ex-ante. To push entrepreneurs away from discovering the high-carbon technology, investors make it impossible for the controlling shareholder to cash in idiosyncratic PBC if CO_2 emissions exceed net-zero. To get the lower discount from SR investors, the entrepreneur must commit to technology 2.

From the combination of (3) and (4),[183] we have the following solution of (1) for SR investors, which is point C in Figure 1:

$$\alpha^* = 174/1000 = 17.4\% \qquad C\ (174;\ 287)$$

180 This is the smallest-discount solution of the polynomial equation of the 2nd degree: $-2k^2 + 1\,000k - 50\,000 = 0$

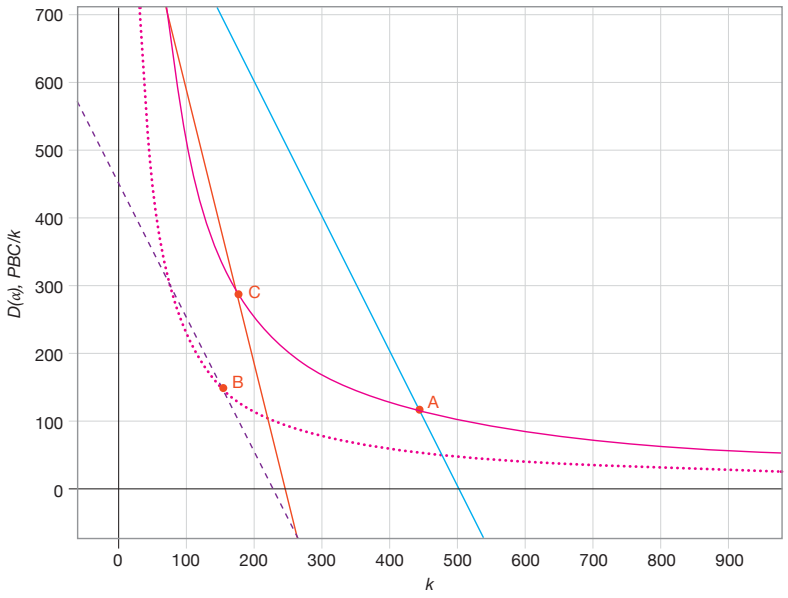
181 The minimum wedge to support control is $w = 1{,}27 \cong 1{,}5$.

182 This setup highlights investor commitment against short-termism.

183 This is the smallest-discount solution of the polynomial equation of the 2nd degree: $-4.1k^2 + 1.000k - 50.000 = 0$

The entrepreneur retains control with 174 shares at P = €1000 – €287 = €713,[184] investing €124.062, which gives an entrepreneurial return from PBC of 40,3% (50.000/124.062). Entrepreneurs raise from SR investors €589.000, which is more than can be raised from FI and almost five times higher than the entrepreneur's committed wealth. Therefore, the financial conditions of SR investors are more attractive than those of FI investors. However, the entrepreneur faces the risk of not being able to cash in her PBC if she fails to develop technology 2. This is riskier than the previous scenario, in which the entrepreneur could secure PBC also by developing the high-carbon technology 1. This risk is fundamental Knightian uncertainty, so it cannot be quantified, but a bold Schumpeterian entrepreneur could take up this challenge.

Figure 1 Equilibrium sale of noncontrolling stock



Note: The picture illustrates, on the horizontal axis, the k amount of noncontrolling stock sold to the investing public. On the vertical axis, there are both the discount per share, $D(\alpha)$, and the PBC per share. The two hyperbolic curves depict two levels of idiosyncratic PBC, €50.000 (solid) and €22.500 (dotted). The three downward sloping curves represent the three discount functions, respectively (from right to left): $D(\alpha)^{FI}$, $D(\alpha)^{SR}$, and $D(\alpha)^{FI\ 2}$.

184 The minimum wedge to support control is $w = 4{,}75 \cong 5$.

The comparison becomes more interesting if we assume, more realistically, that the entrepreneur is wealth-constrained and invests all her wealth in the company.[185] Assume, for example, that she has only W_E = € 130.000. In this case, she can only take the offer from SR investors. To highlight the tradeoff between SR and FI, let's bring the FI offer within reach of the wealth-constrained entrepreneur by reducing the scale of the project (and the number of shares) by 55%. I assume that idiosyncratic PBC decrease in the same proportion as entrepreneurs enjoy scaling their vision with linear utility. The new FI offer is the dotted line in Figure 1, calculated as follows.

$$D(\alpha)^{FI\,2} = 450 - 2\,k \tag{5}$$

$$\frac{PBC}{k} = \frac{22.500}{k} \tag{6}$$

From the combination of (5) and (6),[186] we have the following solution of (1) for FI investors, which is point B in Figure 1:

$$\alpha^* = 150/450 = 30\% \qquad B\ (150;\ 150)$$

The entrepreneur retains control with 150 shares at P = €1000 – €150 = €850,[187] investing €127.500, which gives an entrepreneurial return from PBC of 17,6% (22.500/127.500). The entrepreneur raises from investors €225.000. When funding comes from FI investors, the downsized project is slightly more attractive because it offers 17.6% entrepreneurial return as opposed to 12.7%. This is a small difference compared with what can be obtained from SR investors. SR investors allow the entrepreneur to more than double the scale of the project yet keep her own investment under the budget constraint (€130.000). Consequently, the PBC compensation is higher both in absolute terms (€50.000 vs €22.500) and as rate of return (40.3% vs 17,6%). If the entrepreneur is wealth-constrained, the relevant comparison is between the lower-scale project funded by FI, allowing for two innovative technologies, and the bigger-scale project funded by SR conditional on the carbon-neutral commitment. As both technologies are uncertain and the entrepreneur is indifferent between them, a 122% increase in the scale enabled by SR investors makes it likely that the entrepreneur will accept committing to the zero-carbon technology.

This numerical example supports the claim that dual-class shares can commit to low-carbon innovation. First, by protecting idiosyncratic PBC, dual-class shares incentivize entrepreneurs to innovate. Second, conditioning the appropriability of idiosyncratic PBC to a net-zero CO2 target incentivizes the entrepreneur to engage in low-carbon innovation. Third, if the entrepreneur is wealth-constrained, dual-class shares allow SR investors to commit to low-carbon innovation funding entrepreneurship on a larger scale than FI investors.

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185 The investment of all the entrepreneur's wealth is a standard assumption in financial contracting, which depends on agency cost. *See* Jean Tirole, *Corporate Governance*, 69 Econometrica 1 (2001).

186 This is the smallest-discount solution of the polynomial equation of the 2nd degree: $-2k^2 + 450k - 22\,500 = 0$.

187 The minimum wedge to support control is $w = 2{,}3333 \cong 2{,}5$.

Conclusion

In this article, I have argued that institutional investors can commit to low-carbon innovation through dual-class shares. This would allow institutional investors to cater to the preferences of their climate-conscious beneficiaries.

With dual-class shares, controlling shareholders can contribute their vision to low-carbon innovation while institutional investors provide the finance to scale this vision. Having at stake idiosyncratic PBC, as well as all or most of their wealth, controlling shareholders can be incentivized to discover low-carbon breakthroughs and to acknowledge failure to do so. Corporate law can support this incentive by providing for target-contingent transfer sunsets and divestment sunsets when dual-class shares are issued.