The Limits of Portfolio Primacy

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According to the "portfolio primacy" theory, large asset managers, and in particular large index funds, can and will undertake the role of "climate stewards" and will push corporations to reduce their carbon footprint. This theory is based on the view that index fund portfolios mirror the entire market and therefore have strong financial incentives to reduce market-wide threats, such as climate change.

But how much can we rely on portfolio primacy to mitigate the effects of climate change? In this Article, I provide a conceptual and empirical assessment of the potential impact of portfolio primacy on climate change mitigation by examining the scope of action, economic incentives, and fiduciary conflicts of index fund managers. The analysis reveals three major limits, each reinforcing the others, that undermine the promise of portfolio primacy.

First, the potential scope of index fund stewardship is narrow, as most companies around the world, including most carbon emitters, are private or controlled companies. Second, index funds internalize only a fraction of the social cost of climate change and therefore have very weak incentives to engage in ambitious climate stewardship. Third, index fund managers advise dozens

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of index funds with conflicting interests with respect to climate mitigation and therefore face serious fiduciary conflicts that would hamper any ambitious mitigation strategy. This analysis shows that we should have very modest expectations about the role of portfolio primacy in the fight against climate change.

TABLES AND FIGURES

INTRODUCTION

Climate change is one of the defining challenges of our time. In the absence of significant mitigation, the increasing concentration of greenhouse gases in the atmosphere will cause severe and irreversible damage to our societies and may also have catastrophic consequences for human life.[1]

Yet, governments around the world are failing to deliver adequate responses to this challenge. In the United States, no major federal environmental reform has been enacted since the 1990s,[2] and the growing partisan divide on environmental issues makes ambitious climate legislation difficult to pass.[3] As recently as June 2022, the U.S. Supreme Court deprived the Environmental Protection Agency ("EPA")

1. *See infra* notes 33–38 and accompanying text.

2. Michael P. Vandenbergh, *Private Environmental Governance*, 99 CORNELL L. REV. 129, 131 (2013).

3. *See* Jonathan M. Gilligan & Michael P. Vandenbergh, *A Framework for Assessing the Impact of Private Climate Governance*, 60 ENERGY RSCH. & SOC. SCI. 1, 2 (2020). Congress has approved, and President Biden has signed into law, the Inflation Reduction Act, which includes significant funding for clean energy and emission reduction. *See* Rebecca Leber, *The U.S. Finally Has a Law to Tackle Climate Change*, VOX, https://www.vox.com/policy-and-politics/2022/7/28/23281757/whats-in-climate-bill-inflation-reduction-act (last updated Aug. 16, 2022, 4:46 PM) [https://perma.cc/7ABG-HVKT]. If the new bill lives up to current expectations, the main normative implication of this Article—that we should invest in legislative and regulatory action rather than index fund stewardship—will be corroborated.

of a powerful regulatory tool to reduce industrial carbon emissions,[4] and many leading climate scientists believe that this ruling will result in an even weaker and slower response to climate change.[5]

In this context, there has been growing interest in the role that private actors can play to fill the regulatory gap and make progress on climate mitigation.[6] One of the leading theories in this field argues that large asset managers, and in particular index fund managers, can and will use their legal and economic power as shareholders of large corporations to push these corporations to reduce their carbon footprint. This theory is based on the view that the goal of index funds is not to maximize the value of individual companies (shareholder primacy) but rather to maximize the value of their entire investment portfolio (portfolio primacy). Under this "portfolio primacy" view, index fund portfolios mirror the whole market and therefore have strong financial incentives to reduce market-wide threats, such as climate change.[7]

The idea behind portfolio primacy is quite compelling. Diversified portfolios include both companies that externalize climate costs ("climate externalities") onto society and companies that bear those costs. Therefore, the argument goes, whenever these climate externalities result in a net loss for the market, "a portfolio-wide owner should be motivated to curtail those externalities at the source."[8] According to the portfolio primacy theory, we should expect index funds to undertake the role of "climate stewards" and push companies to reduce their climate externalities.

Portfolio primacy has received increasing support among public institutions, market players, and environmental activists. For example, in 2011, a report by the United Nations Principles for Responsible Investment argued that large asset managers are "universal owners,"

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4. West Virginia v. EPA, 142 S. Ct. 2587 (2022).

5. *See* Brief of Climate Scientists Michael Oppenheimer, Noah Diffenbaugh, Christopher Field, Stephen Pacala, Daniel Schrag & Susan Solomon as Amici Curiae Supporting Respondents, *West Virginia*, 142 S. Ct. 2587 (Nos. 20-1530, 20-1531, 20-1778, 20-1780), 2022 WL 228334.

6. *See supra* notes 2–3; *infra* note 17. Other scholars have proposed solutions that rely on the interaction between government policy and private sector initiatives. For an interesting proposal in this spirit, see Paul Rose, *Catalyzing Sustainable Investment*, 51 ENV'T L. 1221 (2021).

7. For an early economic model showing how diversified investors internalize externalities and want to maximize portfolio value, see Robert G. Hansen & John R. Lott, Jr., *Externalities and Corporate Objectives in a World with Diversified Shareholder/Consumers*, 31 J. FIN. QUANTITATIVE ANALYSIS 43 (1996). For recent academic articles arguing that index funds and other large, diversified owners can be expected to reduce companies' climate externalities, see Madison Condon, *Externalities and the Common Owner*, 95 WASH. L. REV. 1 (2020); Jeffrey N. Gordon, *Systematic Stewardship*, 47 J. CORP. L. 627 (2022); John C. Coffee, Jr., *The Future of Disclosure: ESG, Common Ownership, and Systematic Risk*, 2021 COLUM. BUS. L. REV. 602; and Luca Enriques & Alessandro Romano, *Rewiring Corporate Law in an Interconnected World*, 64 ARIZ. L. REV. 51 (2022).

8. Condon, *supra* note 7, at 6.

with "highly-diversified and long-term portfolios that are representative of global capital markets," and are therefore exposed to "costs from environmental damage caused by companies."[9] The report concluded, "It is in the financial interest of Universal Owners to address environmental impacts of business activities to reduce this exposure."[10]

In November 2017, the head of the Japanese Government Pension Fund stated that the main driver of return for the fund was market-wide performance, rather than company-level performance, and therefore the fund would hire social and environmental experts to try to improve market return by producing a positive impact on society and the economy.[11] In December 2021, the Shareholder Commons, a nonprofit organization engaged in shareholder advocacy on social and environmental issues, submitted a shareholder proposal at BlackRock, the world's largest asset manager, advocating a shift from traditional investment stewardship to portfolio primacy.[12] In doing so, the Shareholder Commons' explicit goal was to "find a way to deploy private capital in a manner that prioritizes vital environmental and social system[s] over individual company profits."[13]

In a recent survey, 861 finance academics, professionals, and public sector regulators and policy economists were asked to indicate the most important mechanisms in moving corporations to reduce their carbon footprint.[14] Of all respondents, 48% chose "institutional investors" as one of the three most important mechanisms, alongside carbon taxes and government subsidies.[15] Among respondents working in the private sector, 56% chose institutional investors.[16]

Portfolio primacy is appealing for many, as it promises to be a powerful market-based tool to bypass the political gridlock and government paralysis on climate policy. If governments do little to

9. U.N. PRINCIPLES FOR RESPONSIBLE INV. & UNEP FIN. INITIATIVE, UNIVERSAL OWNERSHIP: WHY ENVIRONMENTAL EXTERNALITIES MATTER TO INSTITUTIONAL INVESTORS 3 (2011), https://www.unpri.org/download?ac=5875 [https://perma.cc/F2BL-RCYF].

10. *Id.* at 9.

11. *See* JON LUKOMNIK & JAMES P. HAWLEY, MOVING BEYOND MODERN PORTFOLIO THEORY: INVESTING THAT MATTERS 88 (2021).

12. BlackRock, Inc., SEC No-Action Letter, 2022 WL 225966, at *2 (Apr. 4, 2022). For a detailed analysis of this proposal and its implications for corporate governance and fiduciary law, see Roberto Tallarita, *Fiduciary Deadlock*, 171 U. PA. L. REV. ONLINE (forthcoming 2023), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4197225 [https://perma.cc/J67U-PT2Y].

13. *About*, THE S'HOLDER COMMONS, https://theshareholdercommons.com/about/ (last visited Oct. 3, 2022) [https://perma.cc/JZM8-E2PY].

14. Johannes Stroebel & Jeffrey Wurgler, *What Do You Think About Climate Finance?*, 142 J. FIN. ECON. 487, 488.

15. *Id.* at 496.

16. *Id.*

tackle climate change, private actors must step in,[17] and index funds might very well be good candidates for this role.

This Article shares the deep concern and sense of urgency of portfolio primacy supporters with respect to the climate crisis. Precisely for this reason, however, it wants to assess the practical impact of portfolio primacy. To what extent can we rely on portfolio primacy to mitigate climate change? Can we expect index fund stewardship to become a meaningful tool for climate mitigation?[18]

To provide a conceptual and empirical assessment of portfolio primacy, I examine the scope of action, economic incentives, and fiduciary conflicts of index fund managers with respect to climate mitigation. Although portfolio primacy potentially applies to all large investors with broadly diversified portfolios, the largest index fund managers are the most obvious candidates to put the theory into practice and undertake the role of climate stewards. Index fund

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17. For a discussion of the role of private governance in addressing environmental concerns, see Sarah E. Light & Eric W. Orts, *Parallels in Public and Private Environmental Governance*, 5 MICH. J. ENV'T & ADMIN. L. 1, 3 (2015); Michael P. Vandenbergh, *The New Wal-mart Effect: The Role of Private Contracting in Global Governance*, 54 UCLA L. REV. 913 (2007); MICHAEL P. VANDENBERGH & JONATHAN M. GILLIGAN, BEYOND POLITICS: THE PRIVATE GOVERNANCE RESPONSE TO CLIMATE CHANGE (2017); and Ash Gillis, Michael Vandenbergh, Kaitlin Raimi, Alex Maki & Ken Wallston, *Convincing Conservatives: Private Sector Action Can Bolster Support for Climate Change Mitigation in the United States*, 73 ENERGY RSCH. & SOC. SCI. 1 (2021).

A recent work highlighting the quasi-regulatory role of asset managers is Dorothy Lund, *Asset Managers as Regulators*, 171 U. PA. L. REV. (forthcoming 2023), https://ssrn.com/abstract=3975847 [https://perma.cc/42MT-79KJ]. Professor Lund argues that "in light of their size and 'universal ownership'—the fact that they hold stakes in every company in the public market—the Big Three [(Vanguard, State Street, and BlackRock)] have been able to assume regulatory functions that typically reside in the hands of large government agencies like the EPA or SEC." *Id.* (manuscript at 1, 3) (footnotes omitted). Like the supporters of portfolio primacy, Professor Lund believes that index funds can and do play a role in climate risk mitigation; however, she attributes this role not to portfolio primacy but to the "demand for rules" "most likely to be embraced by a broad swath of their clients." *Id.* (manuscript at 3, 23–24).

On the potential role of corporate law in controlling environmental risk, see Sara E. Light, *The Law of the Corporation as Environmental Law*, 71 STAN. L. REV. 137, 140 (2019) ("[T]he law governing the corporation throughout its life cycle—corporate law, securities regulation, antitrust law, and bankruptcy law—should be understood as a fundamental part of environmental law.").

18. Throughout the Article, I use the term "portfolio primacy" to indicate the strategy to maximize the value of the portfolio even when doing so sacrifices the value of some individual companies. Other authors, by focusing on the active engagement of investment managers, use the terms "systemic stewardship" or "systematic stewardship." *See* Gordon, *supra* note 7 (using the term "systematic stewardship""); Marcel Kahan & Edward B. Rock, *Systemic Stewardship with Tradeoffs* (N.Y.U. L. & Econ. Rsch. Paper Series, Working Paper No. 22-01, 2022), https://ssrn.com/abstract=3974697 [https://perma.cc/N9SN-8V7W] (using the term "systemic stewardship"). Strictly speaking, systematic or systemic stewardship is a consequence of portfolio primacy, which is a prerequisite and a broader concept. The thesis presented in this Article is not only that systematic or systemic stewardship would have a very limited impact on climate change mitigation (Part II) but also that portfolio primacy creates very weak incentives to engage in climate-related stewardship in the first place (Part III), and additionally, it creates serious conflicts within fund families (Part IV).

managers—and especially the "Big Three," BlackRock, State Street Global Advisors, and Vanguard—have been gaining extraordinary shareholder power,[19] and they are programmatically focused on mirroring market indices rather than picking the best individual stocks.[20] In the popular shorthand, index funds "own the market,"[21] and therefore, they are interested in how the market does as a whole, rather than in the value of individual companies. If we conclude that the Big Three offer little hope for effective climate stewardship, the promise of portfolio primacy would appear unreliable.

The analysis presented here identifies and discusses three crucial limits of portfolio primacy, each reinforcing the others and ultimately undermining the practical impact of this approach on climate mitigation. The first limit is that the potential scope of index fund stewardship is narrow.[22] Publicly traded companies, the target of index fund stewardship, represent only a subset of the global economy. Furthermore, even within the subset of public companies, most companies have a controlling shareholder or an influential blockholder who can frustrate stewardship initiatives. I analyze the ownership structure of the 253 oil, gas, and coal companies included in the FTSE Global All Cap Index, one of the broadest indices tracked by index funds, and I estimate that two-thirds of the index is represented by companies in which insiders own more than 5% of the shares. Moreover, outside of the United States, Canada, and the United Kingdom, 94% of the index is represented by companies in which insiders own more than 20% of the shares.[23] Due to the presence of such influential insiders, these companies are effectively insulated from index fund stewardship.

The second limit of portfolio primacy is that index fund managers internalize climate externalities to a very limited degree and therefore have very weak incentives to engage in ambitious climate stewardship.[24] To begin with, index fund portfolios internalize only the effects of climate change on large corporations, not the effects on small and micro firms or on consumers. Climate costs borne by people but not by mega-capitalization companies are not internalized by index funds and therefore do not prompt them to act. In fact, under portfolio

19. *See infra* notes 59–60 and accompanying text.

20. *See infra* notes 52–58 and accompanying text.

21. *See, e.g.*, Julie Connelly, *The Ease of Index Funds: No Ins and Outs to Know*, N.Y. TIMES (Oct. 23, 2007), https://www.nytimes.com/2007/10/23/business/retirement/23INDEX.html [https://perma.cc/Y76R-74UF] ("The argument for indexing is that you cut your risk of being in the wrong stock at the wrong time because you own the market.").

22. *See infra* Part II.

23. *See infra* tbl.2 and accompanying text.

24. *See infra* Part III.

primacy, index funds would support climate strategies that would protect large corporations while creating negative effects for consumers and society.

Furthermore, index funds are disproportionately invested in richer economies, which are relatively less vulnerable to climate change. Based on an analysis of the geographic exposure of revenues of the portfolio companies of the thirty largest BlackRock exchange-traded funds ("ETFs"), which manage $1.4 trillion of assets worldwide, I show that these funds are massively overexposed to the United States and underexposed to developing and emerging countries. India, Africa, the Middle East, and Latin America, which account for 15% of the global gross domestic product ("GDP") and 52% of the global population, represent only 8% of the portfolio revenues of the thirty largest BlackRock ETFs.[25] Such a strong geographic bias toward richer countries means that these funds internalize only a portion of global climate externalities and therefore would likely oppose many potential climate mitigation measures that would be socially desirable on a global scale.

Finally, index funds likely discount the distant future at a much higher rate than what most experts believe is the correct social discount rate for climate damage. The consensus among experts is that society should discount future climate damage at a rate between 1% and 3%. By contrast, the stock market discount rate is 7% or higher.[26] Although we have little evidence on how the market discounts climate mitigation investments, it is plausible that this rate is much closer to the 7% average stock market rate than to the social discount rate. As a result, index funds massively underestimate the social value of climate mitigation and have very weak incentives to invest in it. For example, if index funds discounted the future at a 2% rate, an index fund owning 1% of the global economy would be willing to spend more than $809 million in 2023 in order to generate $1 trillion market-wide climate benefits in 2150. By contrast, at a 7% discount rate, the same index fund would be willing to spend no more than $2 million, only 0.2% of the socially desirable investment.

The third limit of portfolio primacy is that index fund managers advise hundreds of funds with different investment objectives and therefore face severe fiduciary conflicts that discourage aggressive climate stewardship. Based on the portfolio composition of the Big Three index funds with the twenty largest equity holdings in Exxon Mobil, I estimate that, under plausible assumptions, many of these

25. *See infra* tbl.3 and accompanying text.

26. *See infra* notes 128–129 and accompanying text.

funds would lose money if asset managers supported a climate mitigation measure that penalizes oil companies but benefits the stock market as a whole. Therefore, even if a climate mitigation measure results in a net gain for the stock market, some index funds within the same family will have incentives to oppose it, and the asset managers of the entire family of funds will face fiduciary conflicts that would hamper support for such a mitigation measure.

Taken together, the limits identified in this Article show that our expectations about portfolio primacy's impact on climate change should be very modest. We should not expect portfolio primacy to become a meaningful tool in the fight against climate change. On the contrary, public reliance on index fund stewardship might create a false sense of security and reduce the political capital for painful but necessary climate regulation. If citizens rely on index funds to internalize and reduce the costs of climate change, they might be less willing to support climate regulation that increases the cost of energy for households. If such an effect proved true, portfolio primacy would be not only ineffective but also actively damaging for climate progress.

The Article proceeds as follows. Part I discusses why climate change is a market failure, and it summarizes the main arguments in support of portfolio primacy. Part II examines the potential scope of action of climate stewardship, and it shows that even if index funds did want to pressure companies to decarbonize, the impact of such pressure would be very limited. Part III shows that index funds have very weak incentives to pressure companies to decarbonize in the first place, due to the misalignment between portfolio value maximization and social welfare maximization, the overexposure of index funds to richer economies, and the very low weight that index funds put on the distant future. Part IV examines the internal conflicts within fund families with respect to climate mitigation, and it shows that any serious climate mitigation strategies would be hampered by fiduciary conflicts. Part V discusses the policy implications of the analysis.

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Before proceeding, some clarifications are in order. First, the literature distinguishes two broad categories of climate-related risks: physical climate risk and transition risk.[27] Physical climate risk

27. *See, e.g.*, BASEL COMM. ON BANKING SUPERVISION, BANK FOR INT'L SETTLEMENTS, CLIMATE-RELATED RISK DRIVERS AND THEIR TRANSMISSION CHANNELS 5 (2021).

Sometimes, experts separately identify a third category of climate risk: liability risk, which arises from the company's management of other kinds of climate risk. *See, e.g.*, Mark Carney,

includes risks from rising temperatures, extreme weather events, and other changes in climate, whereas transition risk includes risks connected with the transition to a low-carbon economy due to regulation or changes in technology and social preferences. This Article uses the terms climate risk, climate externalities, and climate damage to refer to the effects of physical climate change. Transition risk derives not from climate change *per se* but from the social and political response to climate change.

It is possible that investors (including index funds) want companies to adopt climate mitigation measures in anticipation of environmental regulation or a change in consumer preferences.[28] Such a decision, however, is driven by a traditional company-level shareholder value–maximizing approach, not by a portfolio primacy approach. In this scenario, it is regulatory and social pressure that changes investors' incentives, not the portfolio-wide internalization of externalities. In order to examine the ability of portfolio primacy—as opposed to regulatory and social pressure—to drive climate mitigation, we must examine the willingness of index funds to address physical climate risk, not transition risk.

Second, recent academic literature and institutional and corporate manifestos have forcefully argued in favor of the view that corporate leaders should be expected to take into account the interests of all corporate stakeholders, including the environment and society at large, rather than only the interests of shareholders ("stakeholder governance").[29] An optimistic version of this view suggests that corporate leaders, perhaps through some ad hoc improvements to

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Governor of the Bank of Eng., Speech at Lloyd's of London: Breaking the Tragedy of the Horizon – Climate Change and Financial Stability (Sept. 29, 2015), https://www.bis.org/review/r151009a.pdf [https://perma.cc/8P3T-VTE9]. For our purposes, however, liability risk is a derivative risk, which is connected either to physical risk or to transition risk.

28. For a discussion of how companies are exposed to transition risks, see, for example, Ali A. Zaidi, *Mandates for Action: Corporate Governance Meets Climate Change*, 72 STAN. L. REV. ONLINE 122 (2020), https://review.law.stanford.edu/wp-content/uploads/sites/3/2020/04/72-Stan.-L.-Rev.-Online-Zaidi.pdf [https://perma.cc/HCV8-3BZ5]; and Cynthia A. Williams, *Fiduciary Duties and Corporate Climate Responsibility*, 74 VAND. L. REV. 1875, 1884–85 (2021). For a discussion of how private environmental governance initiatives (shareholder proposals, activism, company commitments, etc.) create "transition risk," see Michael P. Vandenbergh, *Disclosure of Private Climate Transition Risks*, 63 WM. & MARY L. REV. 1695 (2022).

29. This debate is as old as the corporate form itself but has recently regained centerstage in the academic and business discourse. For a compelling defense of shareholder primacy, see, for example, Jonathan R. Macey, *An Economic Analysis of the Various Rationales for Making Shareholders the Exclusive Beneficiaries of Corporate Fiduciary Duties*, 21 STETSON L. REV. 23 (1991). For a compelling critique of shareholder primacy, see KENT GREENFIELD, CORPORATIONS ARE PEOPLE TOO (AND THEY SHOULD ACT LIKE IT) 186–207 (2018). For an overview of the literature and of the recent debate, see Lucian A. Bebchuk & Roberto Tallarita, *The Illusory Promise of Stakeholder Governance*, 106 CORNELL L. REV. 91, 103–08 (2020).

corporate governance arrangements (such as climate-oriented compensation metrics or enhanced insulation from shareholder pressure), are likely to take meaningful steps toward decarbonization. In a series of articles co-authored with Lucian Bebchuk and Kobi Kastiel, I critically examine this view and its theoretical and empirical shortcomings.[30] Portfolio primacy, by contrast, is predicated on the view that the reduction of climate externalities is driven by the financial preferences of some shareholders. Therefore, in this Article I do not engage with the literature on stakeholder governance, and I do not consider the relevance of nonfinancial preferences of shareholders, but I exclusively engage with the literature on portfolio primacy.[31]

Third, some commenters, discussing earlier drafts of this Article, have argued that, due to congressional gridlock and bad political incentives, a carbon tax or other ambitious regulatory measures against climate change are unlikely to materialize in the near future. Therefore, these critics argue, index fund climate stewardship is at least a step in the right direction in the absence of better alternatives.

Matt Levine, for example, when discussing an earlier draft of this Article on Bloomberg, observed that while it is perhaps true, as I argue, that regulation would be a better response to climate change than index fund stewardship, "if policy makers *don't* want to fight climate change then BlackRock will probably do something anyway."[32] I agree with these commentators that legislative and regulatory action on climate has been lagging dramatically, and in assessing how to tackle the climate crisis best and more quickly, we need to consider the respective roles of private and public actors, not only of public actors.

In order to have a meaningful conversation on this crucial problem, however, we must be clear-eyed on the limits of index fund stewardship. The shortcomings of politics do not justify overreliance on private actors. The contribution of this Article is to help set more accurate expectations about what index funds can and will do with

30. *See* Bebchuk & Tallarita, *supra* note 29; Lucian A. Bebchuk, Kobi Kastiel & Roberto Tallarita, *For Whom Corporate Leaders Bargain*, 94 S. CAL. L. REV. 1467 (2021); Lucian A. Bebchuk & Roberto Tallarita, *Will Corporations Deliver Value to All Stakeholders?*, 75 VAND. L. REV. 1031 (2022); Lucian A. Bebchuk, Kobi Kastiel & Roberto Tallarita, *Stakeholder Capitalism in the Time of COVID*, 40 YALE J. ON REGUL. (forthcoming 2023), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4026803 [https://perma.cc/LH2H-89N7]; Lucian A. Bebchuk & Roberto Tallarita, *The Perils and Questionable Promise of ESG-Based Compensation*, 48 J. CORP. L. 37 (2022); Lucian A. Bebchuk, Kobi Kastiel & Roberto Tallarita, *Does Enlightened Shareholder Value Add Value*, 77 BUS. LAW. 1 (2022).

31. *See supra* note 7.

32. Matt Levine, *Money Stuff: Investment Banking Is Cheap If You're Rich*, BLOOMBERG (Sept. 20, 2021, 11:52 AM), https://www.bloomberg.com/news/newsletters/2021-09-20/money-stuff-investment-banking-is-cheap-if-you-re-rich [https://perma.cc/LY8R-LRP7].

respect to climate mitigation so that we, as a society, can make more effective choices in our fight against climate change.

I. INDEX FUNDS AS CLIMATE STEWARDS

A. Climate Change as a Market Failure

1. Climate Change as a Collective Action Problem

The scientific consensus is that human activity is the dominant cause of global warming and other observed changes in the climate system.[33] Fossil fuel combustion and certain industrial processes, as well as forestry and other land use, have led to unprecedented levels of carbon dioxide (CO_2) and other greenhouse gases in the earth's atmosphere.[34] The resulting effects include rising average temperatures, impacts on temperature extremes, changes in precipitation patterns, sea level rise, alterations in hydrogeological systems, wildfires, and more frequent extreme weather events.[35]

Without mitigation, the continued emission of greenhouse gases might cause "severe, pervasive and irreversible impacts for people and ecosystems."[36] In many plausible scenarios, climate change is a "major threat to humans and the natural world,"[37] and in some highly uncertain but possible scenarios, it may have catastrophic consequences for human life.[38]

From an economic standpoint, the problem of climate change is a classic market failure.[39] Individuals and firms engage in activities resulting in carbon emissions because they benefit from them.[40] For example, many people drive a car to work, and companies burn fossil fuels to generate the energy needed for their industrial processes. But while these individuals and firms benefit from these activities, they do not bear all the costs associated with the emissions of greenhouse gases resulting from these activities. In fact, since climate change affects

33. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2014: SYNTHESIS REPORT 47–49 (Core Writing Team, Rajendra K. Pachauri & Leo Meyer eds., 2014).

34. *Id.* at 45–46.

35. *Id.* at 49–54.

36. *Id.* at 56.

37. William Nordhaus, *Climate Change: The Ultimate Challenge for Economics*, 109 AM. ECON. REV. 1991, 1996 (2019).

38. Martin L. Weitzman, *On Modeling and Interpreting the Economics of Catastrophic Climate Change*, 91 REV. ECON. & STAT. 1 (2009).

39. For a general discussion of the economics of climate change, see NATHANIEL O. KEOHANE & SHEILA M. OLMSTEAD, MARKETS AND THE ENVIRONMENT (2d ed. 2016).

40. In this Article, I will use "carbon emissions" and "greenhouse gas emissions" interchangeably. Sometimes, for brevity, I will just use "emissions" to refer to carbon emissions.

firms and individuals globally, most costs of carbon emissions are effectively imposed on someone else. Climate change is a quintessential economic externality.[41]

As a result, individual actors lack the economic incentives to reduce carbon emissions. Despite the consensus that the current level of carbon emission is excessive, and that society as a whole would benefit from its reduction, individual actors would not benefit from the reduction of their own emissions. For example, companies that switch to renewable sources of energy would pay the costs associated with this switch, while most of the benefits would be reaped by someone else. Therefore, each company has an incentive to maintain its current level of emissions while benefitting from the mitigation measures implemented, and paid for, by others. The equilibrium resulting from this free riding problem is one in which the level of carbon emissions produced by economic activity is higher than what would be socially desirable.

2. Policy Remedies for Climate Change

A traditional policy remedy to an externality problem of this kind is the imposition of a tax equal to the social cost of the relevant activity.[42] With a "carbon tax," the individual firm would pay the entire social cost associated with the production of carbon emissions rather than imposing most of this cost on others. Therefore, the firm would internalize its own climate externalities and would have an economic incentive to set the level of carbon emissions at a socially desirable level.[43] Other examples of possible climate policies are abatement

41. In economic theory, externalities can be positive or negative. Carbon emissions impose negative externalities. For simplicity, since the externalities discussed here are negative externalities, I will use the phrase "climate externalities" to refer to climate change–related negative externalities.

42. These kinds of taxes are commonly named Pigouvian taxes, after the economist who first theorized them. ARTHUR C. PIGOU, THE ECONOMICS OF WELFARE 168–71 (1920). Pigou was, of course, unaware of the impact of greenhouse gases on climate, but one of his examples, of great concern for his contemporaries, was about industrial emissions. Pigou reported that in London, according to a recent study at the time, "there [was] only 12 per cent as much sunlight as [was] astronomically possible" due to the smoke produced by factory chimneys. *Id.* at 160 n.3. Pigou observed that although a "factory chimney [could] be made practically smokeless" through existing technologies, firms underinvested in the prevention of smoke because much of the cost of those emissions was borne not by the emitting firm but by the community "in injury to buildings and vegetables, expenses for washing clothes and cleaning rooms, expenses for the provision of extra artificial light, and in many other ways." *Id.* at 160–61, 160 n.3.

43. *See* A. Lans Bovenberg & Lawrence H. Goulder, *Environmental Taxation and Regulation*, *in* 3 HANDBOOK OF PUB. ECON. 1471 (Alan J. Auerbach & Martin Feldstein eds., 2002). For a criticism of carbon taxes, see, for example, Brian Berkey & Eric W. Orts, *The Climate Imperative of Business*, CAL. MGMT. REV. (Apr. 30, 2021), https://cmr.berkeley.edu/2021/04/climate-imperative/ [https://perma.cc/JYA9-BDZT].

subsidies (subsidies for the reduction of carbon emissions), cap-and-trade policies (which establish a total allowable quantity of emissions and allow firms to buy and sell emission permits), information-based policies (such as mandatory disclosure, ecolabeling, and certification programs), and traditional prescriptive regulation (such as mandatory technology standards and ceilings on emissions).[44]

Climate externalities may also lead to the emergence of social and cultural norms (including changes in consumer and investor preferences) that would put pressure on companies and financial intermediaries to accelerate the transition to a low-carbon economy.[45] For example, some consumers might prefer products sold by companies with better environmental standards, and investors might be willing to accept a somewhat lower financial payoff in order to reduce their company's carbon emissions.[46] Recently, large companies have seen a rise in support of shareholder activism on social and environmental issues, including climate disclosure and decarbonization.[47] Furthermore, according to some authors, younger investors and consumers are more likely to demand social and environmental responsibility from investment managers and corporations.[48] Changing social norms may also affect investment managers directly: for example, investment managers might follow, to some extent, their own prosocial and expressive preferences (rather than those of the beneficial owners) or might cave in to peer pressure on environmental issues.[49]

All these mechanisms—taxes, regulation, and social and cultural pressures—affect corporate decisions at the level of the individual company. They either modify the incentives or constrain the choices of the individual company. For example, a carbon tax might raise the price of fossil fuels to a point where the construction of a new

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44. For a discussion of various types of environmental policy instruments, see KEOHANE & OLMSTEAD, *supra* note 39, at 139–47.

45. For a discussion of the emergence of social norms as a response to negative externalities, see JAMES S. COLEMAN, FOUNDATIONS OF SOCIAL THEORY 250–51 (1990).

46. On the altruistic preferences of shareholders, see Oliver Hart & Luigi Zingales, *Companies Should Maximize Shareholder Welfare Not Market Value*, 2 J.L. FIN. & ACCT. 247 (2017).

47. For a discussion of this phenomenon, see Roberto Tallarita, *Stockholder Politics*, 73 HASTINGS L.J. 1699 (2022).

48. *See* 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. 143 (2020).

49. For a discussion of "image motivation," which is "the desire to be liked and respected by others," as a driver in prosocial behavior, see Dan Ariely, Anat Bracha & Stephan Meier, *Doing Good or Doing Well? Image Motivation and Monetary Incentives in Behaving Prosocially*, 99 AM. ECON. REV. 544, 544 (2009). For a discussion of social pressure as a driver of charitable giving (people would rather not donate but "dislike saying no . . . due to social pressure"), see Stefano DellaVigna, John A. List & Ulrike Malmendier, *Testing for Altruism and Social Pressure in Charitable Giving*, 127 Q.J. ECON. 1, 1 (2012).

petrochemical plant, which would have been profitable without the tax, becomes unprofitable and is abandoned. A government subsidy might turn an unprofitable investment in renewable energies into a profitable one. Consumers with environmentally friendly preferences might be willing to pay for the additional cost necessary to reduce carbon emissions and make such a measure profitable. And so forth. In all these cases, regulatory or social pressure changes the incentives or the available choices of the individual company in a direction that is socially more desirable.

By contrast, a theory that is gaining increasing support, and that is the subject of this Article, holds that climate externalities could be addressed at the level of investment portfolios rather than at the level of the individual company. According to this theory, large, broadly diversified investors, such as the most influential index fund managers, internalize climate externalities because they invest both in companies producing carbon emissions and in companies bearing the costs of those emissions. Therefore, by maximizing the value of their entire portfolio (portfolio primacy) rather than the value of the individual company (shareholder primacy), index fund managers have strong economic incentives to undertake the role of "climate stewards" and steer companies toward decarbonization.[50]

This theory is particularly appealing because it offers a tool to fight climate change that relies—not on regulation (which has become increasingly difficult to adopt)[51] or optimistic social and cultural changes but on the sheer power of financial incentives. If the theory holds true, portfolio primacy would alleviate the effects of an epochal market failure through a purely market-based mechanism.

This Article scrutinizes this view and exposes its many limits. Before proceeding, however, the next Section presents the case for portfolio primacy and index funds' climate stewardship.

B. The Case for Portfolio Primacy

Index funds are broadly diversified investment vehicles that seek to replicate the performance of an index, which is a basket of different securities.[52] Unlike active investment funds, they do not try to pick the stocks that will perform best; instead, they mechanically track the composition of an index, typically created by a third party. For example, Vanguard 500 seeks to track the performance of the S&P 500

50. *See supra* note 7.

51. *See supra* notes 2–16 and accompanying text.

52. *See* John C. Bogle, *The Index Mutual Fund: 40 Years of Growth, Change, and Challenge*, 72 FIN. ANALYSTS J. 9 (2016).

index, which includes large-capitalization companies in leading industries.[53] BlackRock's iShares Russell Mid-Cap Index Fund tracks the Russell Midcap Index, which includes the eight hundred smallest issuers in the Russell 1000 index.[54] And so on.

Behind such a passive investment strategy lies two fundamental insights. The first is the main insight of modern portfolio theory, according to which the investor's purpose should be to maximize risk-adjusted return.[55] By investing in a diversified portfolio, investors minimize (and potentially eliminate) the risk connected to company-specific decisions and events (so-called idiosyncratic risk) and therefore improve risk-adjusted return. The second insight is that, in the long run, the compound effect of fees charged by investment managers has a sizeable impact on returns. As compellingly illustrated by William Sharpe, "a person saving for retirement who chooses low-cost investments could have a standard of living throughout retirement more than 20% higher than that of comparable investors in high-cost investments."[56] Indexation allows managers to drastically reduce fees for investors.

This strategy has proven remarkably successful. According to some estimates, in 2020 mutual funds and exchange-traded funds[57] following an indexation strategy (in short, index funds) owned about 14% of the whole U.S. stock market, up from 7% in 2010.[58] The Big Three are together the largest shareholder in 40% of listed companies

53. *Vanguard 500 Index Fund Admiral Shares*, VANGUARD, https://investor.vanguard.com/mutual-funds/profile/VFIAX (last visited Oct. 6, 2022) [https://perma.cc/T95B-SWDC].

54. *iShares Russell Mid-Cap Index Fund*, ISHARES, https://www.ishares.com/us/products/280761/blackrock-mid-cap-index-fund-class-a (last visited Oct. 6, 2022) [https://perma.cc/N9GU-Y7X9].

55. *See* Harry Markowitz, *Portfolio Selection*, 7 J. FIN. 77 (1952); Harry Markowitz, *Foundations of Portfolio Theory*, 46 J. FIN. 469 (1991).

56. William F. Sharpe, *The Arithmetic of Investment Expenses*, 69 FIN. ANALYSTS J. 34, 34, 40 (2013).

57. The term "index funds" refers to a wide category of funds whose investment strategy is based on indexing (i.e., the mechanical tracking of a benchmark index provided by a third party). Generally, index funds have two structures: mutual funds and exchange-traded funds (ETFs). Index mutual funds are open-ended funds—i.e., funds that issue securities that are redeemable on a daily basis. ETFs combine characteristics of mutual funds (they issue securities that are redeemable on a daily basis, but only in large blocks) and of closed-end funds (their securities are traded on a secondary market). In this Article, I will use the term "index funds" to refer to both kinds of investment vehicles.

58. *2021 Investment Company Fact Book*, INV. CO. INST. 50 fig.2.9 (2021), https://www.ici.org/system/files/2021-05/2021_factbook.pdf [https://perma.cc/FZ4E-GQQ7].

in the United States and in 88% of S&P 500 companies.[59] By 2039, they are projected to vote 41% of the shares in S&P 500 companies.[60]

Many experts worry that such massive ownership concentration will soon lead to a scenario in which a very small number of individuals control the majority of the United States' largest companies, thus creating a politically unsustainable concentration of power,[61] potential antitrust problems,[62] increasing volatility,[63] and weaker indirect investor protection.[64] Portfolio primacy theorists, however, believe that large index fund managers can and will use their growing influence to reduce corporate climate externalities.

Broadly diversified investors, such as the Big Three and other index fund managers, are interested in the performance of their entire portfolio rather than the performance of an individual company. What is bad for a single company might be good for the portfolio as a whole, and vice versa. Index fund managers are incentivized to maximize the value of the entire portfolio, even if doing so means sacrificing the value of some individual companies.

An example of this portfolio primacy framework would be, according to the theory at hand, the internalization of within-portfolio climate externalities. For example, oil companies are responsible for a significant fraction of carbon emissions,[65] while companies in the hospitality industry are believed to be especially vulnerable to the effects of climate change.[66] Therefore, a portfolio that includes both oil and hospitality stocks internalizes the externalities imposed by one industry on the others. If these climate externalities result in a net

59. Bob Eccles, *Concentration in the Asset Management Industry: Implications for Corporate Engagement*, FORBES (Apr. 17, 2019, 7:44 AM), https://bit.ly/3viwp8v [https://perma.cc/LBX2-8XT3].

60. Lucian Bebchuk & Scott Hirst, *The Specter of the Giant Three*, 99 B.U. L. REV. 721, 724 (2019).

61. *See, e.g.*, John C. Coates IV, *The Future of Corporate Governance Part I: The Problem of Twelve* (Harv. Pub. L., Working Paper No. 19-07, 2019), https://ssrn.com/abstract=3247337 [https://perma.cc/D3L2-B573].

62. *See, e.g.*, José Azar, Martin Schmalz & Isabel Tecu, *Anticompetitive Effects of Common Ownership*, 73 J. FIN. 1513 (2018); Einer Elhauge, *Horizontal Shareholding*, 129 HARV. L. REV. 1267 (2016).

63. *See* Itzhak Ben-David, Francesco Franzoni, Rabih Moussawi & John Sedunov, *The Granular Nature of Large Institutional Investors*, 67 MGMT. SCI. 6629 (2021).

64. *See* Holger Spamann, *Indirect Investor Protection: The Investment Ecosystem and Its Legal Underpinnings*, 13 J.L. ANALYSIS 672 (2021).

65. *See, e.g.*, PAUL GRIFFIN, THE CARBON MAJORS DATABASE: CARBON MAJORS REPORT 2017, at 5–6 (2017), https://climateaccountability.org/pdf/CarbonMajorsRpt2017%20Jul17.pdf [https://perma.cc/V2UQ-USH6].

66. *See, e.g.*, Patrick Sisson, *Are Waterfront Hotels Ready for Climate Change?*, CURBED (May 28, 2019, 1:57 PM), https://archive.curbed.com/2019/5/28/18642701/hotel-resort-real-estate-insurance-climate-change [https://perma.cc/H4BW-XZTD].

portfolio loss (in the example, if the losses suffered by the hospitality industry are larger than the corresponding gains for oil companies), the holder of the portfolio will benefit from a reduction or elimination of such externalities, even if it would damage one subset of companies (in the example, oil companies). As a prominent scholar recently put it, "Owning the market, the 'universal' shareholder will protect the market."[67]

To illustrate, consider the following example, taken from a recent article by Madison Condon, which makes a compelling case for the portfolio internalization of climate externalities.[68] Suppose that BlackRock must decide whether to force Exxon and Chevron to cut 40% of their carbon emissions. According to Professor Condon's estimates, based on the widely used Dynamic Integrated Climate Economy model, this emissions cut would reduce climate damage by $385 billion over a hundred-year period.[69] If we assume that BlackRock benefits from such climate damage reduction in proportion to its share of the global economy, the emissions cut has a present value of $9.7 billion for BlackRock.[70] Therefore, if the 40% reduction of emissions cost Exxon and Chevron a 20% drop in their stock value—a plausible estimate, according to Professor Condon's calculations—BlackRock would still make a profit of $3.4 billion ($9.7 billion of reduction of climate change losses less $6.3 billion of losses from Exxon and Chevron stock decline).[71]

This rough estimate shows that, in theory, BlackRock might want to persuade some portfolio companies to make value-decreasing decisions at the company level that are value-increasing for BlackRock at the portfolio level. In this way, portfolio primacy would solve the collective action problem of climate change. Although individual companies in a shareholder primacy framework face a free riding problem and have no individual incentive to reduce climate externalities, large index funds in a portfolio primacy framework internalize the relevant externalities and have the incentives (and voting power) to pressure companies toward a reduction of climate externalities.

Portfolio primacy theory reveals an important fact: Broadly diversified investors are likely to be more incentivized than undiversified investors to address climate risk. But in order to have a

67. Coffee, *supra* note 7, at 603.
68. Condon, *supra* note 7, at 45–47.
69. *Id.* at 46 n.237.
70. *Id.*
71. *Id.* at 46–47, 46 n.237.

productive policy conversation on the respective roles of public and private actors on climate change mitigation, we must try to assess the potential impact of portfolio primacy.

The expectation that index funds' climate stewardship can play a significant role in mitigating climate change is necessarily based on three assumptions. One is if index funds did want to engage in climate stewardship, they would have a meaningful impact on climate change. If index funds could not have a meaningful effect on the decisions of global carbon emitters, the whole theory would be of very limited import. Another crucial assumption, however, is that index funds do want to engage in climate stewardship in the first place. Portfolio primacy argues that index funds are incentivized to engage in climate stewardship because their portfolios internalize climate externalities to a significant degree. A further assumption is that the legal and economic structure of index funds allows asset managers to engage in portfolio-driven stewardship, which would sacrifice the profits of individual companies for portfolio-wide gains.[72] The following Parts scrutinize each of these three assumptions and discuss their promise and their limits. On a close examination, I will contend, all three assumptions prove unreliable.

II. THE LIMITED SCOPE OF CLIMATE STEWARDSHIP

This Part examines the potential scope of action of index funds' climate stewardship. Even if index fund managers did engage in

72. In this Article, I will not discuss another important dimension of climate stewardship, namely the potential agency problems of index fund managers, which might have incentives not to engage in climate stewardship even if climate stewardship were in the interest of index fund investors. The agency problems of asset managers are a contentious issue and the focus of an extensive literature. For the argument that index fund managers lack the incentives to engage in stewardship, see Lucian A. Bebchuk, Alma Cohen & Scott Hirst, *The Agency Problems of Institutional Investors*, 31 J. ECON. PERSPS. 89 (2017); Lucian Bebchuk & Scott Hirst, *Index Funds and the Future of Corporate Governance: Theory, Evidence and Policy*, 119 COLUM. L. REV. 2029 (2019); and Bebchuk & Hirst, *supra* note 60. *See also* Sean J. Griffith, *Opt-In Stewardship: Toward an Optimal Delegation of Mutual Fund Voting Authority*, 98 TEX. L. REV. 983 (2020); Dorothy S. Lund, *The Case Against Passive Shareholder Voting*, 43 J. CORP. L. 493 (2018). For the opposite view, see Einer Elhauge, *The Causal Mechanisms of Horizontal Shareholding*, 82 OHIO ST. L.J. 1 (2021); Barbara Novick, *"The Goldilocks Dilemma": A Response to Lucian Bebchuk and Scott Hirst*, 120 COLUM. L. REV. F. 80 (2020); Marcel Kahan & Edward B. Rock, *Index Funds and Corporate Governance: Let Shareholders Be Shareholders*, 100 B.U. L. REV. 1771 (2020); and Jill Fisch, Assaf Hamdani & Steven Davidoff Solomon, *The New Titans of Wall Street: A Theoretical Framework for Passive Investors*, 168 U. PA. L. REV. 17 (2019). This Article does not take a position on this debate and will conservatively assume that index fund managers generally act in the interests of their clients, subject to regulatory constraints. Such an assumption biases the results of my analyses in favor of portfolio primacy; therefore, those who believe that index fund managers suffer from severe agency problems should be even more pessimistic than this Article about the promise of portfolio primacy.

aggressive climate stewardship, their impact on global climate change would be very limited, as most firms around the world—including most carbon emitters—are owned by state governments or have a controlling shareholder or influential blockholder.

Section A shows that public companies represent a limited subset of the economy, both in the United States and, more importantly, in emerging and developing economies. Section B shows that even public companies are often controlled by state governments or major shareholders or are otherwise influenced by insiders with a significant fraction of shares.

A. The Role of Public Companies in the Economy

Index funds are primarily invested in public equities. While the Big Three and other index fund managers also manage funds that invest in private companies, the size of their private investments is very small compared to their investments in public equities.[73] Yet, public companies represent only a subset of the entire economy. A climate mitigation tool that targets only a subset of the economy, leaving the vast majority of economic activities undisturbed, is a tool of very limited efficacy.

This is particularly true in emerging economies, some of which play a significant role in global carbon emissions. According to the EPA, the top CO_2 emitters are China, the United States, the European Union, India, and Russia.[74] But with the exception of the United States, these other countries have much less developed stock markets compared to the size of their economy. Using the most common indicator for the size of the stock market (the ratio of stock market capitalization to GDP), Table 1 reports data on the stock market size of these top CO_2 emitters.

73. *See, e.g.*, Sungjoung Kwon, Michelle Lowry & Yiming Qian, *Mutual Fund Investments in Private Firms*, 136 J. FIN. ECON. 407 (2020).

74. *Global Greenhouse Gas Emissions Data*, EPA, https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data (last updated Feb. 27, 2022) [https://perma.cc/9HTZ-AA72].

TABLE 1: STOCK MARKET SIZE OF TOP CO_2-EMITTING COUNTRIES

Country	*Listed Domestic Companies' Capitalization (as a % of GDP)*
Top 5 World CO_2 Emitters	
China	45.5%
United States	147.7%
European Union	51.5%
India	84.5%
Russia	34.8%
Top 5 EU CO_2 Emitters	
Germany	44.1%
*United Kingdom**	115.7%
France	84.8%
Italy	27.2%
Poland	27.3%

* The United Kingdom was still a member of the European Union as of the reference date of these data.

The Table reports the total market capitalization of listed domestic companies as a percentage of the country's GDP in constant U.S. dollars. Data are collected from the World Bank database and refer to 2018. The list of top five world CO_2 emitters is from the U.S. EPA. The list of top five European Union CO_2 emitters is from the European Parliament.[75]

The Table shows that in China and Russia, public companies represent a much smaller subset of the economy compared to the United States and the United Kingdom. Indeed, the literature on the international diversification of equity portfolios recognizes that equity indices of emerging economies do not provide an adequate exposure to these countries' economy.[76] Furthermore, the divergence between size

75. *World Bank Open Data*, WORLD BANK, https://data.worldbank.org (last visited Nov. 8, 2022) [https://perma.cc/5QF7-NQ6D]; EPA, *supra* note 74; *Greenhouse Gas Emissions by Country and Sector (Infographic)*, Eur. Parliament, https://www.europarl.europa.eu/news/en/headlines/society/20180301STO98928/greenhouse-gas-emissions-by-country-and-sector-infographic (last updated Oct. 28, 2021, 1:36 PM) [https://perma.cc/YMU3-PUAT].

76. *See* Joon Woo Bae, Redouane Elkamhi & Mikhail Simutin, *The Best of Both Worlds: Accessing Emerging Economies via Developed Markets*, 74 J. FIN. 2579, 2579–80 (2019).

of the economy and size of the equity market seems to be widening over time.[77]

China, in particular, provides the starkest contrast between the role of the country in global climate change and the role of its stock market within the country's economy. China is the single greatest emitter of CO_2 in the atmosphere,[78] and therefore, any effective climate stewardship strategy cannot ignore Chinese companies. The role of the stock market in the Chinese economy, however, remains "peripheral."[79]

Even in the United States, public companies have been playing an increasingly smaller role in the economy. In the last two decades, there has been a sharp decline in public equity.[80] In 1997, there were 7,576 publicly traded companies in the country; in 2018, their number had plummeted to 3,613.[81]

In a recent study, Frederik Schlingemann and René Stulz show that public companies have become increasingly less relevant for the overall U.S. economy.[82] They estimate that in the early 1970s more than 41% nonfarm workers in the private sector were employed by public companies in the United States, but in 2019, it was less than 30%.[83] Over the same period, public companies' contribution to the U.S. GDP fell, and at the end of the period, top market capitalization companies accounted for a much smaller fraction of the overall economy than at the beginning of the period.[84] As of 2019, the overall contribution of public companies to U.S. GDP was only slightly more than 25%.[85]

Not only are public companies a small subset of the economy as a whole, but they also account for a small subset of major emitters. According to the *Carbon Majors Report*, of all the carbon emissions produced by the 224 major fossil fuel producers in the world, only 30% are public companies.[86]

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77. Geert Bekaert & Campbell R. Harvey, Emerging Equity Markets in a Globalizing World 5 (Apr. 7, 2017) (unpublished manuscript), https://ssrn.com/abstract=2344817 [https://perma.cc/M33Q-BBZN].

78. *See* EPA, *supra* note 74.

79. Dan Luo, *What Role Does the Stock Market Play in the Chinese Economy?*, CONVERSATION (Aug. 26, 2015, 11:03 AM), https://theconversation.com/explainer-what-role-does-the-stock-market-play-in-the-chinese-economy-46691 [https://perma.cc/7K7U-7CHX].

80. *See* René M. Stulz, *Public Versus Private Equity*, 36 OXFORD REV. ECON. POL'Y 275 (2020) (describing the declining role of public equity in the United States and global economies).

81. *Id.* at 275.

82. Frederik P. Schlingemann & René M. Stulz, *Have Exchange-Listed Firms Become Less Important for the Economy?*, 143 J. FIN. ECON. 927 (2022).

83. *Id.* at 934.

84. *Id.*

85. *Id.*

86. GRIFFIN, *supra* note 65, at 10.

B. The Ownership Structure of Public Companies

Even within the subset of public companies, most firms, including most carbon emitters, are controlled by state governments or private shareholders or otherwise have an influential blockholder who can frustrate stewardship initiatives by institutional investors. In China, for example, of the 109 corporations listed on the Fortune Global 500, 85% are owned by the government.[87] According to a 2014 study by the World Bank, "[a]lmost all Chinese companies listed on the Shanghai stock exchange are majority owned by the government."[88] It is unrealistic to think that index fund managers can influence the climate policies of the governments of China or other major countries. In fact, institutional investors are less likely to engage with state-owned enterprises.[89]

In general, most companies around the world have controlling or influential shareholders. According to a recent study of the 10,000 largest publicly listed companies in the world, in 29% of the companies, the largest shareholder owns more than 50% of the stock; and in 21% of the companies, the largest shareholder owns between 30% and 49% of the stock.[90] Furthermore, in 49% of the companies, the three largest shareholders jointly own more than 50% of the stock.[91]

To examine this aspect, I collected detailed ownership data from the FactSet Ownership database on the portfolio companies of the Vanguard Total World Stock Index Fund, a global stock index fund that tracks the FTSE Global All Cap Index. This index includes 9,446 large-, medium-, and small-capitalization companies in forty-eight countries, including developed and emerging economies.[92] Its composition is a reasonable approximation of the universe of public companies in which index funds invest.

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87. Amir Guluzade, *The Role of China's State-Owned Companies Explained*, WORLD ECON. F. (May 7, 2019), https://www.weforum.org/agenda/2019/05/why-chinas-state-owned-companies-still-have-a-key-role-to-play/ [https://perma.cc/9LQT-9KCW].

88. WORLD BANK GRP., CORPORATE GOVERNANCE OF STATE-OWNED ENTERPRISES: A TOOLKIT 151 (2014), https://openknowledge.worldbank.org/handle/10986/20390 [https://perma.cc/3ZU6-GQ6E].

89. Ernest W.K. Lim, *Concentrated Ownership, State-Owned Enterprises and Corporate Governance*, 41 OXFORD J.L. STUD. 663, 685–88 (2021).

90. ADRIANA DE LA CRUZ, ALEJANDRA MEDINA & YUN TANG, OECD, OWNERS OF THE WORLD'S LISTED COMPANIES 17 fig.7 (2019), https://www.oecd.org/corporate/ca/Owners-of-the-Worlds-Listed-Companies.pdf [https://perma.cc/2FQU-MK4V].

91. *Id.*

92. *See FTSE Global All Cap*, FTSE RUSSELL (Aug. 19, 2022), https://research.ftserussell.com/Vanguard/Home/Indices [https://perma.cc/7TQU-S52U] (listing all constituents, their index weight, and their country).

Table 2 reports data on the ownership structures of the companies in the oil, gas, and coal industries. As the Table shows, more than 61% of the index capitalization is represented by companies with an insider owning more than 20% of the company shares, and more than two-thirds of the index capitalization is represented by companies with an insider owning more than 5% of the shares. If we exclude companies incorporated in the United States, Canada, or the United Kingdom, 94% of the index is represented by companies in which insiders own more than 20% of the shares.[93]

93. Even in the United States, where dispersed ownership has traditionally been the norm, controlled companies and companies with influential blockholders are increasingly more frequent. On this phenomenon, see Lucian A. Bebchuk & Assaf Hamdani, *Independent Directors and Controlling Shareholders*, 165 U. PA. L. REV. 1271, 1279 (2017); Albert H. Choi, *Concentrated Ownership and Long-Term Shareholder Value*, 8 HARV. BUS. L. REV. 53, 54–56 (2018); and Ronald J. Gilson & Alan Schwartz, *Corporate Control and Credible Commitment*, 43 INT'L REV. L. & ECON. 119, 119–20 (2015).

TABLE 2: BLOCKHOLDERS IN COAL, OIL, AND GAS COMPANIES IN THE FTSE GLOBAL ALL CAP INDEX

Countries	*Market Value ($ million)*	*No Block-holders*	*Block-holders 5%–20%*	*Block-holders >20%*
Middle East	$2,552,605	0%	0%	100%
United States	$1,970,430	88%	10%	2%
China	$493,823	0%	0%	100%
Canada	$485,519	72%	10%	18%
European Union	$363,270	7%	43%	49%
United Kingdom	$348,866	96%	1%	3%
India	$318,915	0%	0%	100%
Centr. & S. America	$281,290	0%	1%	99%
Russia	$242,364	7%	0%	93%
Other countries	$456,484	5%	10%	85%
Total	**$7,513,565**	**33%**	**6%**	**61%**
Total excl. USA, Canada, and UK	**$4,708,750**	**1%**	**5%**	**94%**

The Table reports the total market capitalization of companies included in the FTSE Global All Cap Index by country of incorporation as well as the percentage of market capitalization of companies in which no insiders own more than 5% of the company shares (No Blockholders column), insiders own between 5% and 20% of the company shares (Blockholders 5%–20% column), and insiders own more than 20% of the company shares (Blockholders >20% column). The analysis is based on ownership data of the portfolio companies in Vanguard Total World Stock ETF, which tracks the FTSE Global All Cap Index, as reported in the FactSet Ownership database as of June 1, 2022.

Just like private companies, controlled companies and companies with a major blockholder are unlikely to sacrifice company-level profits in exchange for portfolio-level gains. Insiders owning a significant fraction of the company shares are typically less diversified than institutional investors. In fact, they often have a large fraction of their wealth invested in that particular company.[94] To be sure, investor

94. *See* Dhammika Dharmapala & Vikramaditya S. Khanna, *Controlling Externalities: Ownership Structure and Cross-Firm Externalities* 38 (Eur. Corp. Governance Inst., Working Paper No. 603/2021, 2021), https://ssrn.com/abstract=3904316 [https://perma.cc/27ZN-X527]; *cf.* Alperen Afşin Gözlügöl, *Controlling Shareholders: Missing Link in the Sustainability Debate?*, OXFORD BUS. L. BLOG (July 16, 2021), https://blogs.law.ox.ac.uk/business-law-

stewardship and engagement in the presence of blockholders is possible, and there is evidence that institutional investors and even hedge funds do engage with companies with concentrated ownership.[95] The efficacy of this kind of engagement, however, is highly dubious.[96] Even BlackRock has recently acknowledged that its ability to monitor and influence controlled companies in Asia faces significant hurdles.[97] Since effective climate stewardship requires persuading major fossil fuel producers to transition toward decarbonization even if such a transition is costly to these companies, the picture reported in Table 2 shows that the task is likely to prove impractical.

* * *

This Part has shown that despite the significant shareholder power amassed by the Big Three and other large index fund managers, most firms around the world, including most carbon emitters, are effectively shielded from their climate stewardship. Therefore, even if index fund managers did engage in aggressive climate stewardship, the global impact of this strategy would prove very limited.

III. LIMITED INTERNALIZATION OF CLIMATE EXTERNALITIES

This Part shows that index fund portfolios internalize only a fraction of global climate externalities and therefore have very weak incentives to reduce them. Section A shows that the incentives of index funds are aligned with the stock value of large corporations but not necessarily with the welfare of small companies, micro firms, or individuals. Section B shows that index fund portfolios are significantly

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blog/blog/2021/07/controlling-shareholders-missing-link-sustainability-debate [https://perma.cc/2Q4U-MVZ4].

95. *See* Kobi Kastiel, *Against All Odds: Hedge Fund Activism in Controlled Companies*, 2016 COLUM. BUS. L. REV. 60, 84 (finding that "although the increase in ownership concentration reduces the likelihood of activism, controlled companies are not fully insulated from activist interventions, and the total number of companies subject to activism is not negligible"); Giovanni Strampelli, *Institutional Investor Stewardship in Italian Corporate Governance*, *in* GLOBAL SHAREHOLDER STEWARDSHIP 130, 131–33 (Dionysia Katelouzou & Dan W. Puchniak eds., 2022) (reporting evidence that despite the fact that dispersed ownership companies are a small minority in Italy, institutional investors do engage in voting and informal engagement).

96. For a discussion of the limits of investor stewardship in countries with concentrated ownership structures, see, for example, Dan W. Puchniak, *The False Hope of Stewardship in the Context of Controlling Shareholders: Making Sense Out of the Global Transplant of a Legal Misfit*, AM. J. COMP. L. (forthcoming), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3858339 [https://perma.cc/9CVN-C6WL].

97. BLACKROCK, INVESTMENT STEWARDSHIP ANNUAL REPORT 30 (2020), https://www.blackrock.com/corporate/literature/publication/blk-annual-stewardship-report-2020.pdf [https://perma.cc/LE35-U5MU].

overexposed to richer economies, which are relatively less vulnerable to climate change, and therefore do not internalize most climate externalities of developing and emerging countries. Section C shows that index funds give very low weight to the distant future and therefore massively underestimate the benefits of climate change mitigation.

A. Portfolio Value and Social Welfare

When we talk about the negative effects of climate change on society, we implicitly refer to what economists call "total welfare," meaning the totality of effects of climate change on the entire society. But index fund interests are aligned with the interests of their portfolio companies and not necessarily with the interests of society as a whole. Therefore, they will favor mitigation measures that are most profitable for large corporations (which make up a disproportionate part of their portfolios) over measures that will improve the welfare of small firms and consumers.

Large corporations can adapt to climate change more easily and more effectively than small firms and individuals.[98] For example, a multinational company can move the production of some of its products from countries more severely hit by rising temperatures to colder countries, whereas local family businesses, small farmers, and employees cannot. Large companies are also more likely to afford investing in mitigation technologies or adapting strategies that protect their business but do not necessarily alleviate the consequences of climate change for the general population. For example, a company can relocate its offices farther from the ocean, but this relocation would not lower the risk of flooding for local residents. A company can invest in expensive technology and engineering solutions to lower the temperature in its workplace (e.g., with new cooling capacity, changes in insulation, or cool buildings designs), but smaller firms, families, and other individuals would not benefit from this investment.[99] In other words, climate change mitigation can take different forms, but large corporations (and, consequently, index funds) will systematically prefer those that are privately efficient for them over those that are socially efficient.

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98. *See, e.g.*, MEG CRAWFORD & STEPHEN SEIDEL, CTR. FOR CLIMATE & ENERGY SOLS., WEATHERING THE STORM: BUILDING BUSINESS RESILIENCE TO CLIMATE CHANGE 22 (2013), https://www.c2es.org/wp-content/uploads/2013/07/weathering-the-storm-full-report.pdf [https://perma.cc/SC6B-83ZF].

99. Robert Mendelsohn, *Efficient Adaptation to Climate Change*, 45 CLIMATIC CHANGE 583, 584 (2000) (providing examples of private adaption measures).

To illuminate this problem, we can use the distinction, frequently used in antitrust law and economics, between producer welfare and consumer welfare.[100] A typical example in antitrust law regards the welfare effects of a merger between two companies. A merger can reduce operating costs for the participant companies, due to synergies, but can also result in higher prices and lower output, due to reduced competition. From a welfare perspective, lower costs and higher prices increase producer welfare but reduce consumer welfare; the effect of the merger on total welfare depends on whether the increase in producer welfare is greater than the reduction of consumer welfare.

Index fund portfolios benefit from increases in producer welfare but not necessarily from increases in consumer welfare. In fact, many observers worry that index funds' growing influence may lead to anticompetitive behavior that is profitable for aggregate producer welfare but detrimental to consumer welfare.[101] For example, a recent study by Florian Ederer and Bruno Pellegrino estimates that the rise of large investor ownership across companies from 1994 to 2018 has resulted in a massive transfer of welfare from consumers to producers.[102]

A similar problem, however, arises in the context of climate stewardship. The strategies that companies adopt to mitigate the effects of climate change are motivated by their private interests and therefore will be aimed at increasing "producer welfare." But the relationship between the company's welfare and consumer and social welfare can take different forms. It is possible that the best strategy for the company is also the best strategy for consumer welfare and for total welfare. It is also possible, however, that the best strategy for the company is the best strategy for total welfare but not for consumer welfare, or it is suboptimal both for consumer welfare and for total welfare. We can call the first type "symmetric mitigation," and the second and third types "asymmetric mitigation." The company, and the index funds that own its stock, have no incentives to favor symmetric mitigation over asymmetric mitigation. They only care that the chosen strategy is optimal for the company.

One crucial problem with relying on a climate mitigation tool, such as portfolio-driven climate stewardship, that is aligned exclusively with producer welfare is that it will prioritize mitigation strategies that

100. *See, e.g.*, Herbert Hovenkamp, *The Rule of Reason,* 70 FLA. L. REV. 81, 118 (2018).

101. *See supra* note 62 and accompanying text.

102. *See* Florian Ederer & Bruno Pellegrino, *A Tale of Two Networks: Common Ownership and Product Market Rivalry* 4 (Nat'l Bureau of Econ. Rsch., Working Paper No. 30004, 2022), https://ssrn.com/abstract=4098326 [https://perma.cc/SG6L-XW6A].

protect companies but not necessarily other market and social actors from climate change. In theory, if there is a mitigation strategy that protects portfolio companies but damages consumers, index funds will have incentives to support such a strategy.

Another crucial problem, however, is that index fund portfolios are disproportionately composed of very large companies, which are believed to be more resilient to climate change due to economies of scale and easier access to capital. Therefore, even within the set of "producers," index funds will favor the subset of very large corporations and will ignore the interests of small and micro firms not represented in equity indices.

Some of the most significant effects of climate change will be felt by small farmers, agricultural laborers in small farms, and other micro firms representing important parts of the country's economy but that are not represented in that country's equity indices. For example, "subsistence" or "smallholder" farmers are responsible for "90% [of the production] of rice, wheat, other food crops, cocoa, and cotton in Nigeria,"[103] and for greater than "70 percent of arable and permanent cropland in several West and Southern African and Pacific countries."[104] The economic activity of these farms is very vulnerable to extreme weather events and other climate change effects.[105] But stock market investors, including index funds, are not exposed to these risks and therefore have no incentives to mitigate them.

B. Geographic Bias

1. Geography and Climate Change

Index funds typically have a specific geographic focus. For example, Vanguard 500 almost exclusively includes companies incorporated in the United States,[106] whereas BlackRock's iShares ISCF ETF invests mostly in companies incorporated in Europe and Asia.[107] Because climate change is expected to create more damage in

103. John F. Morton, *The Impact of Climate Change on Smallholder and Subsistence Agriculture*, 104 PNAS 19680, 19681 (2007).

104. *Id.* at 19680–81.

105. *Id.* at 19684.

106. As of December 30, 2022, 97% of Vanguard 500 Index Fund portfolio companies are U.S. companies. *Vanguard 500 Index Fund (VOO-US)*, FACTSET OWNERSHIP (last accessed January 28, 2023).

107. As of December 30, 2022, 41% of iShares ISCF ETF's portfolio companies are European companies, 32% are Asian companies, and 15% are North American companies. *iShares Tr. – Edge MSCI Multifactor Intl. Small Cap ETF (ISCF-US)*, FACTSET OWNERSHIP (last accessed January 28, 2023).

some countries than in others, where index funds invest affects how much they are willing to spend to mitigate the effects of climate change.[108]

For example, a recent study by José-Luis Cruz and Esteban Rossi-Hansberg estimated that, in a baseline scenario with no climate policies, by 2200, world productivity would decline by 19% on average, but the effect would vary significantly across regions.[109] In some parts of the world (such as Alaska, Northern Canada, and Northern Russia) productivity would double relative to a scenario without global warming, while in other regions (such as Brazil, Africa, the Middle East, India, and Australia) productivity would decline by up to 60%.[110]

Furthermore, there is "near universal agreement that poorer countries are more vulnerable to climate change."[111] The Notre Dame Global Adaptation Initiative has developed an index measuring each country's vulnerability and resilience to climate change (the ND-GAIN Index), which shows enormous differences across countries.[112] According to these estimates, Norway, Finland, and Switzerland have the three highest scores and are therefore expected to suffer the least from climate change.[113] In general, the United States, Western European countries, and many other high-income countries are among the top 50 countries in the index, while the bottom 50 positions are occupied predominantly by low-income countries, with Chad, Central

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108. *See, e.g.*, William D. Nordhaus, *Revisiting the Social Cost of Carbon*, 114 PNAS 1518, 1521 (2017) (estimating that the country-level social cost of carbon for the United States, India, and Africa are 15%, 9%, and 3%, respectively, of the global cost of carbon); Katharine Ricke, Laurent Drouet, Ken Caldeira & Massimo Tavoni, *Country-Level Social Cost of Carbon*, 8 NATURE CLIMATE CHANGE 895, 897 (2018) (estimating that the country-level social cost of carbon for the United States and India are 11% and 21%, respectively, of the global cost of carbon); Richard S.J. Tol, *A Social Cost of Carbon for (Almost) Every Country*, 83 ENERGY ECON. 555, 560 (2019) (estimating that the country-level social cost of carbon for the United States, India, and Africa are 0.6%, 23.9%, and 30.4%, respectively, of the global cost of carbon). These estimates refer to the base case for each study. As of the end of 2019, the GDP of the United States, India, and Africa was 24.3%, 3.2%, and 2.8%, respectively, of the world GDP in current U.S. dollars. *GDP (Current US$) – India, United States, World, Sub-Saharan Africa, Algeria, Morocco, Tunisia, Libya, Egypt, Arab Rep.*, WORLD BANK, https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?end=2020&locations=IN-US-1W-ZG-DZ-MA-TN-LY-EG&start=2016&type=shaded&view=chart (last visited Nov. 14, 2022) [https://perma.cc/PX9N-DHLM].

109. José-Luis Cruz & Esteban Rossi-Hansberg, *The Economic Geography of Global Warming* 26 (Nat'l Bureau of Econ. Rsch., Working Paper No. 28466, 2021), https://www.nber.org/system/files/working_papers/w28466/w28466.pdf [https://perma.cc/7USJ-PCLK].

110. *Id.*

111. Tol, *supra* note 108, at 564.

112. The ND-GAIN database covers 181 countries over the period 1995–2018. *Country Index*, NOTRE DAME GLOB. ADAPTION INITIATIVE, https://gain.nd.edu/our-work/country-index/ (last visited Oct. 8, 2022) [https://perma.cc/Q95W-HWC2].

113. *Id.*

African Republic, and Guinea-Bissau as the most vulnerable.[114] Therefore, a fund investing exclusively in U.S. companies will have a very different exposure to the effects of climate change compared to a fund significantly exposed to companies located in emerging or developing economies.[115]

2. Countries of Incorporation

To examine this aspect, I analyze the geographic distribution of portfolio companies of the thirty largest ETFs managed by BlackRock (the "Top 30 BlackRock ETFs"). These funds track many different indices, including large-cap, mid-cap, and small-cap indices and U.S., developed markets, and emerging markets indices. Taken together, the Top 30 BlackRock ETFs have $1.4 trillion of assets under management, a majority of the $2.4 trillion managed by all BlackRock ETFs.[116]

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114. *Id.*

115. The distributional effects of climate change are the focus of a vast literature in both philosophy and economics. In an influential work, Henry Shue identified four distinct questions of international distributive justice raised by climate change: (1) how to allocate mitigation costs; (2) how to allocate the costs of coping with unavoidable consequences; (3) what is the background allocation of wealth that would allow fair bargaining among nations; and (4) how to allocate carbon emissions. Henry Shue, *Subsistence Emissions and Luxury Emissions*, 15 LAW & POL'Y 39, 40 (1993). For other perspectives on climate change and distributive justice, see ERIC A. POSNER & DAVID WEISBACH, CLIMATE CHANGE JUSTICE 73–98 (2010); Mathias Frisch, *Climate Change Justice*, 40 PHIL. & PUB. AFFS. 225 (2012); and PETER SINGER, ONE WORLD: THE ETHICS OF GLOBALIZATION 26–49 (2002).

An important aspect to consider is that the estimate of climate change costs for richer and poorer countries depends, among other things, on the marginal willingness to pay for climate risk mitigation. For an insightful discussion of this problem in cost-benefit analysis, see Daniel Hemel, *Regulation and Redistribution with Lives in the Balance*, 89 U. CHI. L. REV. 649 (2022). Generally speaking, money is more valuable to poorer people than to richer people; therefore, richer people are willing to pay more for a mitigation investment with an identical effect on individual welfare. *Id.* at 655. If we assess the costs and benefits of climate mitigation in the form of willingness to pay, the relative share of climate change costs of poorer and richer countries depends on our estimate of how people's willingness to pay change with income. *See id.* At the same time, however, the same increase in temperature is likely to have impacts of different magnitudes on richer and poorer countries. *See* SINGER, *supra*, at 18. How we should estimate income elasticity of willingness to pay and of impact is a difficult question, which few climate economists have tried to address so far. *See* Tol, *supra* note 108, at 564.

Another important problem is the extent to which income inequality within the same country affects the calculation of the social cost of carbon. *See* Ulrike Kornek, David Klenert, Ottmar Edenhofer & Marc Fleurbaey, *The Social Cost of Carbon and Inequality: When Local Redistribution Shapes Global Carbon Prices*, 107 J. ENV'T ECON. & MGMT. 102450 (2021). A further complication concerns the social welfare function used to estimate the costs of climate change. *See* Matthew Adler, David Anthoff, Valentina Bosetti, Greg Garner, Klaus Keller & Nicolas Treich, *Priority for the Worse-Off and the Social Cost of Carbon*, 7 NATURE CLIMATE CHANGE 443 (2017). For the purposes of this Article, I will ignore these various complications.

116. As of the end of 2021, BlackRock had $5.3 trillion of assets under management in equity funds, of which $2.4 trillion were held by ETFs. BlackRock, Inc., Annual Report (Form 10-K) 4, 6 (Feb. 25, 2022).

Table 3 reports, for each fund in the sample, the percentage of assets invested in portfolio companies incorporated in the United States, Canada, United Kingdom, Europe, China, India, Middle East, Africa, and other countries. As the Table shows, most funds invest almost exclusively in North American and European companies, and in the aggregate, more than 85% of the assets of the Top 30 BlackRock ETFs are invested in companies incorporated in North America or Europe.

Investments in India, Latin America, Africa, and the Middle East are disproportionately small compared to the size of these economies. These regions account for 15% of the global GDP and 52% of the world population but for less than 3% of the assets of the Top 30 BlackRock ETFs' portfolio companies.

TABLE 3: GEOGRAPHIC EXPOSURE OF THE TOP 30 BLACKROCK ETFS (COUNTRY OF INCORPORATION OF PORTFOLIO COMPANIES)

Fund	*N. Am. & Europe*	*China*	*India*	*Africa & Middle East*	*Latin Am.*	*Rest of the World*
Core S&P 500	100%	<1%	<1%	<1%	<1%	<1%
Core MSCI EAFE	64%	<1%	<1%	1%	<1%	35%
Core MSCI Emerg. Markets	5%	25%	13%	7%	5%	48%
Core S&P Small Cap	100%	<1%	<1%	<1%	<1%	<1%
Core S&P Mid-Cap	100%	<1%	<1%	<1%	<1%	<1%
Russell 1000 Growth	100%	<1%	<1%	<1%	<1%	<1%
Core S&P 500 UCITS	100%	<1%	<1%	<1%	<1%	<1%
Russell 1000 Value	100%	<1%	<1%	<1%	<1%	<1%
Russell 2000	100%	<1%	<1%	<1%	<1%	<1%
MSCI EAFE	64%	<1%	<1%	1%	<1%	36%
Core MSCI World UCITS	90%	<1%	<1%	<1%	<1%	10%
Core S&P Tot. U.S. Stock	100%	<1%	<1%	<1%	<1%	<1%
S&P 500 Growth	100%	<1%	<1%	<1%	<1%	<1%
Core MSCI Total Int. Stock	48%	8%	4%	4%	1%	36%
Russell Midcap	100%	<1%	<1%	<1%	<1%	<1%
Russell 1000	100%	<1%	<1%	<1%	<1%	<1%
MSCI Emerging Markets	5%	27%	11%	10%	4%	48%
MSCI USA Min Vol. Factor	100%	<1%	<1%	<1%	<1%	<1%
S&P 500 Value	100%	<1%	<1%	<1%	<1%	<1%
Select Dividend	100%	<1%	<1%	<1%	<1%	<1%
Core Dividend Growth	100%	<1%	<1%	<1%	<1%	<1%
ESG Aware MSCI USA	100%	<1%	<1%	<1%	<1%	<1%
MSCI USA Quality Factor	100%	<1%	<1%	<1%	<1%	<1%
MSCI ACWI	78%	3%	1%	1%	1%	15%
Core MSCI EM IMI UCITS	7%	25%	13%	10%	4%	43%
MSCI EAFE Value	63%	<1%	<1%	1%	<1%	36%
Russell Mid-Cap Value	100%	<1%	<1%	<1%	<1%	<1%
Core FTSE 100 UCITS GBP	100%	<1%	<1%	<1%	<1%	<1%
Core S&P 500 UCITS USD	100%	<1%	<1%	<1%	<1%	<1%
Core High Dividend	100%	<1%	<1%	<1%	<1%	<1%
Total	**85%**	**3%**	**1%**	**1%**	**<1%**	**10%**
World GDP	**51%**	**17%**	**3%**	**7%**	**5%**	**16%**
World Population	**14%**	**18%**	**18%**	**26%**	**8%**	**15%**

The Table reports the geographical exposure of the Top 30 BlackRock ETFs by assets under management, based on the country of incorporation of their portfolio companies (weighted by market capitalization). The analysis is based on ownership data as reported in the FactSet Ownership database as of June 10, 2022. The Data Appendix provides additional information on data and methodology.

3. Revenues

A company's country of incorporation does not necessarily reflect the geographic exposure of the company's business. Many large companies in which index funds invest are multinational enterprises with assets and sales all over the world. Therefore, a company incorporated in the United States or Europe might well have a significant exposure to the climate risk of developing or emerging economies.

To examine this aspect, I collected detailed data on the geographic distribution of revenues for the portfolio companies of the Top 30 BlackRock ETFs from FactSet GeoRev, and then I attributed to each fund the pro rata share of local revenues based on the ownership interest of the fund in the relevant company.

Table 4 reports the results of this analysis. The exposure of the Top 30 BlackRock ETFs to North America and Europe is still disproportionately high. For most funds, the vast majority of revenues are from North America and Europe; in the aggregate, only 8% of the revenues are from India, Latin America, Africa, or the Middle East, which account for 15% of the global GDP and 52% of the world population.

TABLE 4: GEOGRAPHIC EXPOSURE OF THE TOP 30 BLACKROCK ETFS (REVENUES OF PORTFOLIO COMPANIES)

Fund	*N. Am. & Europe*	*China*	*India*	*Africa & Middle East*	*Latin Am.*	*Rest of the World*
Core S&P 500	83%	4%	1%	3%	3%	6%
Core MSCI EAFE	52%	7%	2%	3%	4%	32%
Core MSCI Emerg. Markets	16%	46%	4%	5%	8%	21%
Core S&P Small Cap	87%	2%	1%	2%	3%	6%
Core S&P Mid-Cap	85%	3%	1%	2%	4%	5%
Russell 1000 Growth	78%	7%	1%	3%	3%	8%
Core S&P 500 UCITS	83%	4%	1%	3%	3%	6%
Russell 1000 Value	85%	3%	1%	2%	3%	5%
Russell 2000	88%	2%	1%	2%	3%	5%
MSCI EAFE	55%	7%	2%	3%	4%	29%
Core MSCI World UCITS	71%	6%	1%	3%	3%	16%
Core S&P Tot. U.S. Stock	84%	4%	1%	2%	3%	6%
S&P 500 Growth	77%	7%	1%	4%	3%	9%
Core MSCI Total Int. Stock	41%	20%	2%	4%	5%	27%
Russell Midcap	87%	3%	1%	2%	3%	5%
Russell 1000	83%	4%	1%	2%	3%	6%
MSCI Emerging Markets	16%	49%	3%	4%	8%	20%
MSCI USA Min Vol. Factor	89%	3%	1%	2%	2%	4%
S&P 500 Value	86%	3%	1%	2%	3%	5%
Select Dividend	89%	2%	1%	2%	2%	5%
Core Dividend Growth	81%	5%	1%	3%	3%	7%
ESG Aware MSCI USA	82%	5%	1%	3%	3%	7%
MSCI USA Quality Factor	84%	5%	1%	2%	2%	6%
MSCI ACWI	59%	15%	2%	3%	4%	17%
Core MSCI EM IMI UCITS	17%	45%	4%	5%	7%	21%
MSCI EAFE Value	56%	7%	2%	3%	4%	28%
Russell Mid-Cap Value	87%	3%	1%	2%	3%	5%
Core FTSE 100 UCITS GBP	68%	7%	2%	4%	4%	14%
Core S&P 500 UCITS USD	83%	4%	1%	3%	3%	6%
Core High Dividend	80%	5%	1%	3%	3%	8%
Total	**66%**	**12%**	**1%**	**3%**	**4%**	**14%**
World GDP	**51%**	**17%**	**3%**	**7%**	**5%**	**16%**
World Population	**14%**	**18%**	**18%**	**26%**	**8%**	**15%**

The Table reports the geographic distribution of revenues of the portfolio companies of each of the Top 30 BlackRock ETFs. The analysis is based on ownership data collected from the FactSet Ownership database and on revenues data collected from FactSet GeoRev, both as of June 10, 2022. Data on GDP and population are taken from the World Bank database

(https://data.worldbank.org). The Data Appendix provides additional information on data and methodology.

Even if we assume, for simplicity, that companies (and index funds as their investors) internalize all the local social costs of climate change, and they do so in proportion to their local revenues, then the Top 30 BlackRock ETFs will internalize less than half of their "fair share" of climate externalities. Figure 1 provides an estimate of this effect based on the revenues data I collected, data on GDP collected from the World Bank, and data on country-level social cost of carbon estimated by Richard Tol.[117]

The horizontal axis measures the overexposure or underexposure of the Top 30 Blackrock ETFs to local and global social cost of carbon compared to an ideal fund with no geographic bias. In other words, the horizontal axis measures what fraction of local and global climate externalities are internalized by the Top 30 BlackRock ETFs relative to the fraction of climate externalities that would be internalized by a geographically unbiased fund.

In a geographically unbiased fund, the geographic distribution of revenues of the portfolio companies would mirror the geographic distribution of the global GDP. Therefore, a geographically unbiased fund would score a value of 1 on the horizontal axis. A value greater than 1 means that a fund is overinvested in a given country or region, relative to the size of such country's or region's GDP. A value less than 1 means that a fund is underinvested in a given country or region, relative to the size of such country's or region's GDP.

The bottom bar, labeled "World," reports the aggregate bias of the Top 30 BlackRock ETFs. This value is not equal to 1 because it takes into account the (unequal) geographic distribution of the social cost of carbon. Since poorer countries are expected to suffer a disproportionately larger share of the global social cost of carbon, funds

117. Tol, *supra* note 108. Country-level estimates used in this simulation are taken from the study's dataset, on file with the author. All estimates are based on the study's base scenario. As of the time of this writing, Tol's is one of only two papers that try to estimate the country-level social cost of carbon for a very large number of countries. The other is Katharine Ricke, Laurent Drouet, Ken Caldeira, & Massimo Tavoni, *Country-Level Social Cost of Carbon, supra* note 108. The two papers offer very different estimates of the social cost of carbon both in absolute and relative terms. In particular, Tol's estimate of the global social cost of carbon is much lower than the one presented in Ricke et al., but Tol's estimate of geographic distribution of the social cost of carbon is much more unequal than the one presented in Ricke et al. In other words, according to Tol developing and emerging counties will suffer a much larger share of climate damages compared to the United States. Therefore, if I used the estimates of Ricke et al. the aggregate bias of the Top 30 BlackRock ETFs would be somewhat lower than the one represented in the bottom line of Figure 4. The main point, however, would remain the same: Index funds are biased toward relatively less vulnerable countries.

that are underinvested in poorer countries, such as the Top 30 BlackRock ETFs, will have an aggregate underexposure to the global social cost of carbon.

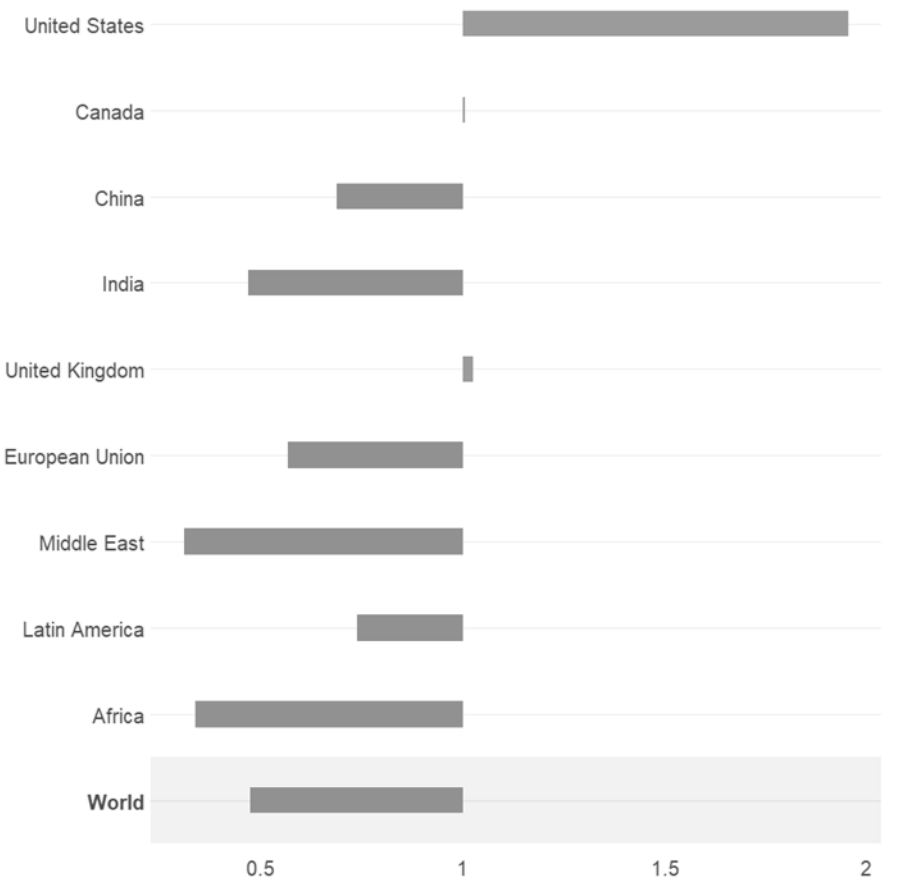
We know, however, that climate damage will materialize not only in the form of lower consumption but also in the form of deaths, poor health, and lower nonpecuniary well-being, in particular in developing economies.[118] As a recent study shows, "poor countries are projected to disproportionately experience [climate change effects] through deaths, while wealthy countries experience effects largely through costly adaptation investments."[119] The authors of the study estimate that under a high-emissions scenario the increase in global mortality rate at the end of the century will have a magnitude similar to "the current global mortality burden of all cancers or all infectious diseases."[120] Therefore, index funds' actual internalized share of climate externalities is likely to be even smaller than what the data on revenue distribution suggest.

118. *See* Tamma Carleton et al., *Valuing the Global Mortality Consequences of Climate Change Accounting for Adaptation Costs and Benefits*, 137 Q.J. ECON. 2037 (2022).

119. *Id.* at 2040–41.

120. *Id.* at 2040.

FIGURE 1: EXPOSURE OF THE TOP 30 BLACKROCK ETFS TO THE SOCIAL COST OF CARBON



Fraction of local and global social cost of carbon internalized by the Top 30 BlackRock ETFs. Data on country-level revenues were collected from FactSet GeoRev as of June 10, 2022. Data on GDP were collected from the World Bank database at https://data.worldbank.org and refer to 2020. Estimates of country-level social cost of carbon are taken from Richard Tol's study, *A Social Cost of Carbon for (Almost) Every Country*, *supra* note 108 (full dataset made available to the author). The Data Appendix provides additional information on data and methodology.

C. Discounting the Future

A fundamental problem in estimating the social value of climate mitigation is the determination of the appropriate discount rate.

Discounting is a required step in the evaluation of any future payoffs.[121] Companies discount expected future payoffs in order to decide whether a given investment is worthwhile. Investors discount companies' future cash flows to estimate today's value of the company's stock.[122] Likewise, federal agencies use discounting to evaluate whether the present cost of a policy is justified in light of the expected future payoffs.[123] In all these cases, choosing the correct discount rate is crucial for determining whether a given investment is sound or wasteful.

In climate economics, the "social discount rate" is the rate at which society as a whole is willing to substitute present payoffs with future payoffs across generations.[124] The determination of the social discount rate is particularly important for climate policy because the effects of climate change as well as of mitigation measures will occur well into the distant future. For example, the standard timeline used for long-term climate change projections extends to 2100.[125] Therefore, slightly different rates could lead to very different conclusions.[126]

Suppose that cutting 1% of carbon emissions costs us, as a society, $3 billion in 2023 and reduces climate damage by $1 trillion in 2100. Is the emissions cut socially desirable? The answer depends on the rate at which we discount the future climate benefits. At a discount

121. For a general overview of discounting in corporate finance, see JONATHAN BERK & PETER DEMARZO, CORPORATE FINANCE 63–69 (3d ed. 2014).

122. This valuation methodology (commonly known as discounted cash flow, or DCF, analysis) is often used also by Delaware courts to determine the fair value of company shares, at least since *Weinberger*. *See* Weinberger v. UOP, Inc., 457 A.2d 701, 712–13 (Del. 1983). For a description of the method and discussion of the relevant case law, see 1 R. FRANKLIN BALOTTI & JESSE A. FINKELSTEIN, THE DELAWARE LAW OF CORPORATIONS AND BUSINESS ORGANIZATIONS § 9.70[B][1] (4th ed. Supp. 2022).

123. *See* OFF. OF MGMT. & BUDGET, EXEC. OFF. OF THE PRESIDENT, OMB CIRCULAR A-94, GUIDELINES AND DISCOUNT RATES FOR BENEFIT-COST ANALYSIS OF FEDERAL PROGRAMS (1992).

124. For an overview of the topic, see David Weisbach & Cass R. Sunstein, *Climate Change and Discounting the Future: A Guide for the Perplexed*, 27 YALE L. & POL'Y REV. 433 (2009).

125. *See, e.g.*, Intergovernmental Panel on Climate Change, *Summary for Policymakers, in* CLIMATE CHANGE 2022: MITIGATION OF CLIMATE CHANGE 4 (P.R. Shukla et al. eds., 2022), https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf [https://perma.cc/XRT2-QVTK] ("The assessment of future pathways in this report covers near term (to 2030), medium term (up to 2050), and long term (to 2100) time scales").

126. The question has generated a vast literature. For a general overview, see Stefano Giglio, Matteo Maggiori, Johannes Stroebel & Andreas Weber, *Discounting Climate Change Investments*, *in* COMBATTING CLIMATE CHANGE: A CEPR COLLECTION 75–81 (Beatrice Weder di Mauro ed., 2021); NAT'L ACADS. SCIS., ENG'G & MED., VALUING CLIMATE DAMAGES: UPDATING ESTIMATION OF THE SOCIAL COST OF CARBON DIOXIDE (2017), https://nap.nationalacademies.org/read/24651/chapter/1#viii [https://perma.cc/4ZQF-K99U]; and CHRISTIAN GOLLIER, PRICING THE PLANET'S FUTURE: THE ECONOMICS OF DISCOUNTING IN AN UNCERTAIN WORLD (2012).

rate of 1%, the emissions cut is a net social gain; at a discount rate of 2%, the emissions cut is a net social loss.[127]

Despite the importance of the question, there is a persistent disagreement among climate experts on the correct social discount rate.[128] One reason for such different estimates is that there is significant uncertainty around the parameters used for the calculation of the social discount rate. For example, it is difficult to predict the growth rate of consumption over the very long run, which plays an important role in determining the willingness of a society to forego present benefits (the cost of mitigation) in order to obtain future benefits (reduced effects from climate change).[129]

Another important reason for the disagreement on the social discount rate is a purely normative question regarding the socially desirable distribution of resources across generations. One approach to the calculation of the social discount rate relies solely on the opportunity cost of capital, just like for the discounting of private investments. According to this approach, the market provides a reliable indication of the actual social preferences for the relative weights of present and future payoffs.[130] An alternative approach instead finds pure market measures morally inadmissible because they value the utility of future generations less than the utility of the current generation, thus violating the principle of intergenerational neutrality.[131] Others have tried to reconcile the two views by defending market discounting for the choice of the most efficient strategy and addressing intergenerational redistribution separately.[132]

Recent U.S. administrations have adopted very different estimates of the social discount rate to evaluate climate policies. During the Obama administration, the Interagency Working Group on the

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127. The present value of the emissions cut in 2023 is $4.6 billion at a 1% discount rate and $2.2 billion at a 2% discount rate.

128. *See, e.g.*, NAT'L ACADS. SCIS., ENG'G & MED., *supra* note 126, at 165 (reporting different social discount rates used in prominent academic studies and institutional reports in the 1990s and 2000s, with estimates ranging from 1.5% to 16%).

129. The intuition behind the relevance of the growth rate is that the same amount of money is worth more to someone when they are poorer and less when they are richer. *See* Hemel, *supra* note 115, at 655. Therefore, estimating how much richer future generations are is important to determine how valuable a certain benefit for them will be.

130. For a classic presentation of this view, see, for example, William D. Nordhaus, *A Review of the* Stern Review on the Economics of Climate Change, 45 J. ECON. LITERATURE 686, 689–90 (2007).

131. For a classic presentation of this view, see, for example, NICHOLAS STERN, THE ECONOMICS OF CLIMATE CHANGE: THE STERN REVIEW (2007). For a discussion of the social discount rate by moral philosophers, see JOHN BROOME, COUNTING THE COST OF GLOBAL WARMING (1992); and Tyler Cowen & Derek Parfit, *Against the Social Discount Rate*, *in* JUSTICE BETWEEN AGE GROUPS AND GENERATIONS 144 (Peter Laslett & James S. Fishkin eds., 1992).

132. *See, e.g.*, Weisbach & Sunstein, *supra* note 124, at 436–37.

Social Cost of Greenhouse Gases ("IWG") recommended three values of social discount rates: 2.5%, 3%, and 5%, with 3% being the "central value."[133] A few years later, however, during the Trump administration, the IWG was dismantled, and the EPA adopted significantly higher estimates of the social discount rate: 3% and 7%.[134] In 2021, President Biden reinstated the IWG, which reintroduced the previous rates of 2.5%, 3%, and 5%.[135]

As of today, although there is no consensus on a precise estimate of the social discount rate, most experts seem to agree that the correct social discount rate is between 1% and 3%, with 2% being the modal response.[136] By contrast, the stock market discounts future cash flows at a rate of 7% or higher.[137] Since index funds internalize the benefits of future climate mitigation through changes in stock prices, if these benefits are discounted on average at the stock market discount rate, index funds will assign to them a much lower value than their social value. In particular, since climate change occurs on a very long time horizon, such an underestimation would result in massive underinvestment in climate mitigation.

To illustrate, suppose that an index fund that "owns" 1% of the economy[138] must decide whether to support an aggressive climate change mitigation measure that would reduce global climate damage by $1 trillion in 2100. For simplicity, let us assume a stylized two-period

133. U.S. INTERAGENCY WORKING GRP. ON SOC. COST OF GREENHOUSE GASES, TECHNICAL SUPPORT DOCUMENT: TECHNICAL UPDATE OF THE SOCIAL COST OF CARBON FOR REGULATORY IMPACT ANALYSIS 3–4 (2016), https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/scc_tsd_final_clean_8_26_16.pdf [https://perma.cc/7LDZ-4WYH].

134. U.S. GOV'T ACCOUNTABILITY OFF., SOCIAL COST OF CARBON: IDENTIFYING A FEDERAL AGENCY TO ADDRESS THE NATIONAL ACADEMIES RECOMMENDATIONS COULD STRENGTHEN REGULATORY ANALYSIS 16–19 (2020), https://www.gao.gov/assets/gao-20-254.pdf [https://perma.cc/KB9S-36NY].

135. U.S. INTERAGENCY WORKING GRP. ON SOC. COST OF GREENHOUSE GASES, TECHNICAL SUPPORT DOCUMENT: SOCIAL COST OF CARBON, METHANE, AND NITROUS OXIDE 4 (2021), https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf [https://perma.cc/966D-4UZ7].

136. Moritz A. Drupp, Mark C. Freeman, Ben Groom & Frikk Nesje, *Discounting Disentangled*, 10 AM. ECON. J.: ECON. POL'Y 109, 118 (2018). The authors report that "92 percent of experts report that they would be comfortable with an SDR somewhere in the interval of 1 to 3 percent, and over three-quarters find an SDR of 2 percent acceptable." *Id.* at 111.

137. *See, e.g.*, Peter A. Diamond, *What Stock Market Returns to Expect for the Future?*, CTR. FOR RET. RSCH. AT BOS. COLL. 1 (Sept. 1999), https://crr.bc.edu/wp-content/uploads/1999/09/ib_2_508c.pdf [https://perma.cc/B43Q-PJGA] (reporting that the "Social Security Administration's Office of the Actuary . . . has generally used a 7.0 percent real return for stocks (based on a long-term historical average) throughout its 75-year projection period.").

138. I will assume that the index fund bears 1% of the cost and receives 1% of the benefits of the mitigation measure. This assumption is made *in arguendo* because, as explained *supra* Parts III.A and III.B, index funds are in fact significantly underexposed to the benefits of climate mitigation.

economy, in which the cost of the mitigation measure is entirely borne in 2023 and the climate benefits are entirely produced in 2100.

Figure 2 shows how much the index fund would be willing to pay in 2023 in order to produce a $1 trillion climate benefit in 2100, based on different discount rates. The graph identifies four different estimates based on different discount rates. At the 1.4% discount rate proposed by the Stern Review in 2007, the fund would be willing to pay up to $3.4 billion for climate mitigation.[139] At the "consensus" social discount rate between 2% and 3%,[140] it would be willing to pay a sum between $1 and $2 billion. At the 7% stock market rate, however, our hypothetical index fund would not be willing to pay more than $55 million for the proposed mitigation measure—a very small sum, equal to less than 3% of the socially desirable investment.

To be sure, it is difficult to measure how the stock market discounts climate mitigation cash flows, and it is possible that it does so at a very low rate, in line with the consensus social discount rate.[141] But it is more likely that the market discounts climate mitigation at a rate that is closer to the average market return for equity, given that stock market investors typically have a much shorter time horizon than society as a whole, they do not internalize all the hedging effects of climate mitigation investments, and the opportunity cost of their capital is the equity market return. Private investors also have heterogeneous beliefs with respect to climate changes,[142] and according to a recent survey, most investment managers believe that the stock market underestimates climate risk.[143] On this plausible assumption, in our hypothesis, index funds' willingness to pay for climate mitigation

139. WILLIAM NORDHAUS, A QUESTION OF BALANCE: WEIGHING THE OPTIONS ON GLOBAL WARMING POLICIES 177–78 (2008) ("The *Stern Review* assumes . . . an equilibrium real interest rate of 1.4 percent per year.").

140. Drupp et al., *supra* note 136, at 111.

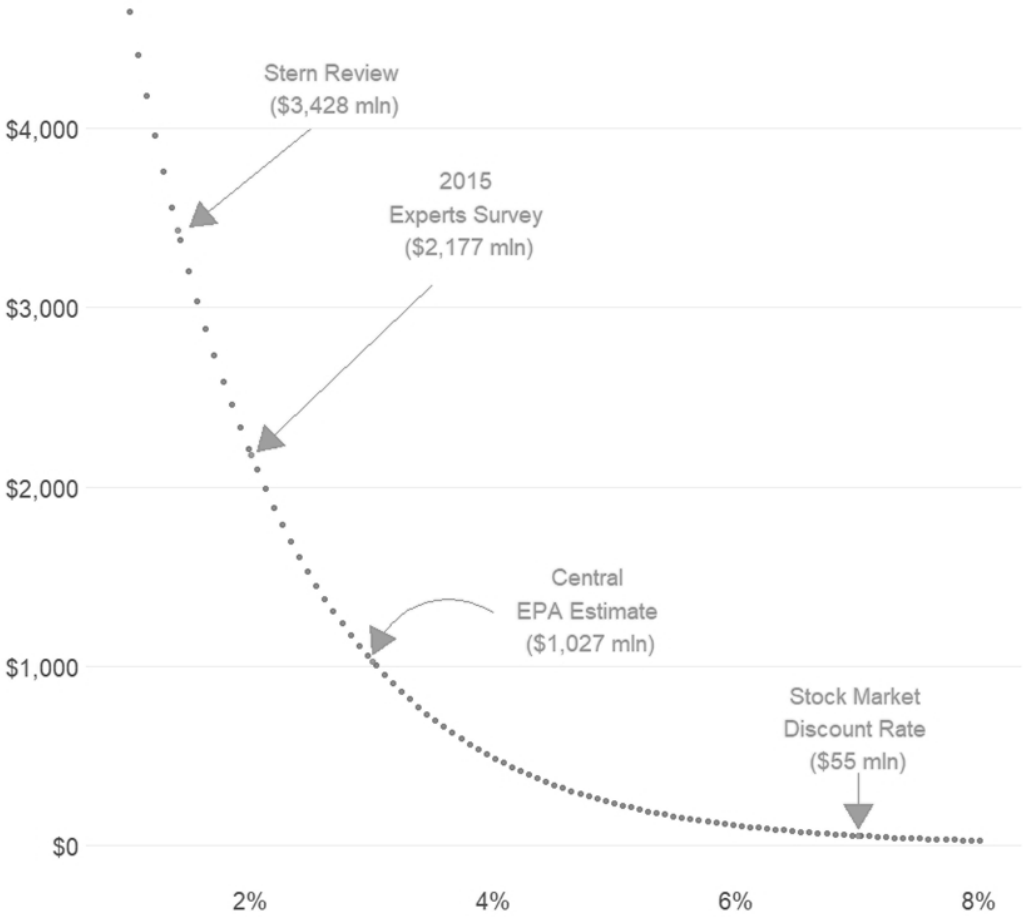
141. For a discussion of real estate market discount rates for climate mitigation investments, see Stefano Giglio, Matteo Maggiori, Krishna Rao, Johannes Stroebel & Andreas Weber, *Climate Change and Long-Run Discount Rates: Evidence from Real Estate*, 34 REV. FIN. STUD. 3527 (2021). *See also* Asaf Bernstein, Matthew T. Gustafson & Ryan Lewis, *Disaster on the Horizon: The Price Effect of Sea Level Rise*, 134 J. FIN. ECON. 253, 254 (2019) (finding that houses exposed to the risk of sea level rise sell for a discount compared to equivalent unexposed houses, after controlling for distance from the beach).

142. Two recent studies found that the price effect of physical climate risk on the housing market depends on whether local residents believe in climate change. Markus Baldauf, Lorenzo Garlappi & Constantine Yannelis, *Does Climate Change Affect Real Estate Prices? Only If You Believe in It*, 33 REV. FIN. STUD. 1256 (2020); Laura A. Bakkensen & Lint Barrage, *Going Underwater? Flood Risk Belief Heterogeneity and Coastal Home Price Dynamics*, 35 REV. FIN. STUD. 3666, 3673 (2022).

143. *Cf.* Philipp Krueger, Zacharias Sautner & Laura T. Starks, *The Importance of Climate Risks for Institutional Investors*, 33 REV. FIN. STUD. 1067, 1072 (2020).

is two or even three orders of magnitude smaller than the mitigation's social value.

FIGURE 2: WILLINGNESS TO PAY FOR CARBON MITIGATION



Maximum amount of money that an index fund would be willing to pay in 2023 in order to produce a $1 trillion gain in 2100 based on different discount rates. The calculation assumes that the index fund "owns" 1% of the economy and therefore captures 1% of all the positive externalities of the mitigation measure. The horizontal axis represents discount rates. The vertical axis reports figures in millions of dollars.

Many experts condemned the decision of the Trump administration to adopt a social discount rate of 7% because they worried that it would block many urgent and desirable climate

policies.[144] The same argument should lead those experts to recognize the limited ability of index funds (which likely use the same discount rates) to mitigate the effects of climate change.[145]

* * *

This Part has shown that index funds internalize climate externalities only to a very limited extent. First, they are exclusively exposed to "producer welfare" and not necessarily to total welfare; therefore, they will favor climate mitigation strategies that are profitable to producers (and, in particular, very large producers) but not necessarily those that are best for small firms or consumers. Second, their portfolios are significantly overexposed to richer economies and therefore they do not capture most of the global social cost of climate change. Third, they likely discount the distant future at a much higher discount rate than the social discount rate; therefore, even if they internalized the entire social cost of carbon, their willingness to pay for climate mitigation would still be much lower than what is socially desirable.

IV. PORTFOLIO CONFLICTS

This Part examines the internal conflicts of portfolio primacy. Index fund managers manage dozens of different funds with different portfolios and different incentives with respect to climate change mitigation. Under plausible assumptions, a mitigation measure that would be profitable for the stock market as a whole can still result in a loss for many index funds within the same family. These internal conflicts create significant legal and economic obstacles for aggressive climate stewardship.

144. *See, e.g.*, Brad Plumer, *Trump Put a Low Cost on Carbon Emissions. Here's Why It Matters*, N.Y. TIMES (Aug. 23, 2018), https://www.nytimes.com/2018/08/23/climate/social-cost-carbon.html [https://perma.cc/K6GD-9SLH]; Inst. for Pol'y Integrity, *How the Trump Administration Is Obscuring the Costs of Climate Change*, N.Y. UNIV. SCH. OF L. (Mar. 2018), https://policyintegrity.org/files/publications/Obscuring_Costs_of_Climage_Change_Issue_Brief.pdf [https://perma.cc/8YD3-DRFY]; Karl Hausker, *The Flawed Analysis Behind Trump Administration's Proposed Repeal of the Clean Power Plan*, WORLD RES. INST. (Oct. 16, 2017), https://www.wri.org/insights/flawed-analysis-behind-trump-administrations-proposed-repeal-clean-power-plan [https://perma.cc/LHF4-6SBR].

145. A different question, not discussed here, is whether stock prices accurately incorporate climate risk and, if not, whether they underestimate it. If stock markets underpriced climate risk, even with a correct discount rate, index funds would have weaker incentives to push for carbon mitigation. For the view that stock markets underestimate climate risk, see Madison Condon, *Market Myopia's Climate Bubble*, 2022 UTAH L. REV. 63.

Section A discusses how the specific composition of each index fund portfolio may affect the fund's incentives with respect to climate change mitigation. Section B presents a simulation of the net portfolio effect of a climate mitigation measure for each of the Big Three's index funds with the twenty largest holdings in Exxon, a major carbon emitter. Section C discusses the legal and economic issues raised by portfolio conflicts.

A. Portfolio Composition and Climate Incentives

Index funds are not created equal. A recent study by Adriana Robertson found that U.S. index funds track hundreds of different indices, many of which specialize in specific industries, companies of a certain size, or stocks with specific characteristics.[146] Furthermore, many indices select stocks based on a specific "investment style"[147] or weigh companies based on criteria[148] that give disproportionate representations to certain industries.[149] When we consider the economic incentives of an index fund to mitigate climate externalities, these differences matter.

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146. Adriana Z. Robertson, *Passive in Name Only: Delegated Management and "Index" Investing*, 36 YALE J. ON REGUL. 795, 815–16 (2019).

147. The most popular investment styles are growth investment and value investment. *See* Henrik Cronqvist, Stephan Siegel & Frank Yu, *Value Versus Growth Investing: Why Do Different Investors Have Different Styles?*, 117 J. FIN. ECON. 333, 333–34 (2015). Growth funds focus on stocks that have higher market value relative to earnings or book value and are believed to have above-average growth potential. *See id.* at 334. By contrast, value funds focus on stocks that have lower market value in relation to those measures and are believed to be undervalued by the market. *See id.* Other widely used investment styles focus on high dividend yields, earnings, or volatility. Robertson, *supra* note 146, at 820–21.

148. The most common weighting methodology is based on the market capitalization of the company. *How Are Indexes Weighted?*, FTSE RUSSELL, https://www.ftserussell.com/education-center/how-are-indexes-weighted (last visited Sept. 28, 2022) [https://perma.cc/7JNF-2GJX]. With this method, the index fund will own a roughly similar percentage of stock in each portfolio company and will have a roughly proportional exposure to the costs and benefits of carbon emissions. *Id.* There are, however, many funds using alternative weighting criteria, including equal weighting, weighting on the basis of revenues, cash flow or other fundamentals, weighting based on volatility, and so on. *See* Christopher B. Philips, Francis M. Kinniry Jr., David J. Walker & Charles J. Thomas, *A Review of Alternative Approaches to Equity Indexing*, VANGUARD app. at 17–18 (Nov. 2011), https://www.vanguard.ca/documents/alt-app-equity-indexing.pdf [https://perma.cc/7TDG-JXPW]. These alternative criteria may give the funds more exposure to carbon emitters and less exposure to companies with higher climate vulnerability, or vice versa.

149. For example, iShares Russell 1000 Value ETF, which focuses on "value stocks," invests 24% of the portfolio in financial companies, 13% in health technology companies, and 6% in energy companies. *iShares Russell 1000 Value ETF (IWD-US)*, FACTSET OWNERSHIP (last accessed Oct. 1, 2022). By contrast, iShares Russell 1000 Growth ETF, which focuses on "growth stocks," invests 26% in technology services companies, 20% in electronic technology companies, 11% in retail companies, and only 1% in energy companies. *iShares Russell 1000 Growth ETF (IWF-US)*, FACTSET OWNERSHIP (last accessed Jan. 28, 2023).

A portfolio that faithfully mirrors the entire stock market potentially has, as the portfolio primacy theory posits, a proportionate exposure to emitters and to externalities. By contrast, a portfolio that is overexposed to certain subsets of the market and underexposed to other subsets of the market might be biased with respect to climate change mitigation. In this case, the incentives of the funds to address climate change might be weaker than what society needs or even conflicting with the interests of society.

Many index funds, for example, specialize in specific industries or sectors. For example, among the fifteen most popular indices (i.e., those tracked by the largest number of index funds) are the Dow Jones U.S. Real Estate Index (which includes real estate investment trusts and other companies investing in real estate), the Dow Jones Basic Materials Index (which includes chemical companies, metal and mining companies, construction materials companies, and other companies in the materials sector), the Dow Jones U.S. Financial Index (which includes U.S. companies in the financial sector), the Dow Jones U.S. Oil & Gas Index (which includes U.S. companies that produce and distribute oil and gas), and the NASDAQ Biotechnology Index (which includes NASDAQ-listed companies in the biotech and pharmaceutical industries).[150]

It is widely believed that rising temperatures will have heterogenous effects across economic sectors.[151] For example, there is agreement among experts that climate change will materially affect recreation and tourism, insurance companies, the health sector, and the agricultural sector.[152] By contrast, absent any mitigation policies, technology shock, or change in social preferences, oil and gas companies will continue to profit from carbon emissions.[153] Thus, an index fund focusing on major carbon emitters (such as the energy sector) will have very different incentives to address climate change than an index fund focusing on industries vulnerable to carbon externalities.

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150. *See* Robertson, *supra* note 146, at 816 tbl.4.

151. See, for example, Bruno Conte, Klaus Desmet, Dávid Krisztián Nagy & Esteban Rossi-Hansberg, *Local Sectoral Specialization in a Warming World*, 21 J. ECON. GEOGRAPHY 493 (2021), for a model estimating different effects of global warming for the agricultural and nonagricultural sectors. *See also* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 33, at 56–74. (assessing the estimated impact of climate change on various economic sectors).

152. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 33, at 64–66.

153. The idea that, in the absence of regulatory pressure and portfolio-driven investor pressure, the oil and gas sector would find it profitable to continue to invest in fossil fuels is clearly accepted in the portfolio primacy literature. *See* Condon, *supra* note 7, at 29–31 (explaining that, from a financial standpoint, major oil companies have individual incentives to increase their emissions, especially when the government does not seem focused on climate mitigation).

Suppose, for example, that iShares U.S. Energy ETF, managed by BlackRock, is considering whether to urge its portfolio companies to reduce their carbon emissions in order to decrease long-term global damage from climate change. iShares U.S. Energy ETF is a fund invested mostly in energy companies. According to the portfolio primacy theory, the fund would be willing to cut emissions if doing so increases the value of its overall portfolio even if it decreases the value of the companies that most depend on carbon emissions. But in this case, the whole portfolio consists almost exclusively of oil and gas companies, which profit from fossil fuels.[154] It is unlikely that the fund would gain from cutting emissions of oil and gas emissions in order to reduce global climate losses.

Another possible portfolio bias concerns the size of portfolio companies. Many funds have a broad portfolio in terms of market capitalization of the individual companies—that is, they include large, medium, and small companies. Many others, however, focus on companies of a certain size. For example, Vanguard 500 focuses on large-capitalization companies. The vast majority of the fund (76.8%) is invested in companies with a market capitalization exceeding $50 billion, and less than 1% of the fund is invested in companies worth less than $10 billion.[155] By contrast, none of the portfolio companies of State Street's SPDR Portfolio Mid Cap ETF has a market capitalization larger than $50 billion, and most are worth less than $10 billion.[156]

Adaptation to climate change is relatively more difficult for smaller companies, which have more limited capital for investment in expensive climate resilience projects with long-term, uncertain payoffs.[157] Therefore, a portfolio with a disproportionate fraction of large companies may be underexposed to the total risk of climate change and thus have reduced incentives to address climate externalities.

A further portfolio characteristic that affects climate incentives is geography, as discussed in Part III.B. Portfolios focusing on developed economies have different incentives than portfolios focusing on developing and emerging economies.

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154. As of December 30, 2022, iShares U.S. Energy ETF (IYE-US) invested 95% of its portfolio in oil companies (integrated oil, oil and gas production, oil refining and marketing, contract drilling, oil and gas pipelines, and oilfield services and equipment) and 100% of its portfolio in U.S. companies. *iShares Tr. – U.S. Energy ETF (IYE-US)*, FACTSET OWNERSHIP (last accessed January 28, 2023).

155. *Vanguard 500 Index Fund (VOO-US),* FACTSET OWNERSHIP (last updated Dec. 30, 2022) (last accessed Jan. 28, 2023).

156. *SPDR Portfolio Mid Cap ETF (SPMD-US)*, FACTSET OWNERSHIP (last updated Dec. 30, 2022) (last accessed Jan. 28, 2023).

157. *See, e.g.*, CRAWFORD & SEIDEL, *supra* note 98, at 22.

Large asset managers, such as the Big Three, advise dozens of different index funds with different portfolio compositions. Despite the superficial characterization of all index funds as "universal owners," some of these funds may have incentives to support a given climate mitigation measure, whereas some other funds, advised by the same asset manager, may have incentives to oppose it.

These internal conflicts represent a formidable obstacle to climate stewardship. As explained in Section C, investment managers have a fiduciary duty to act in the interests of the investors in the fund and cannot trade off benefits for investors in some funds with benefits for investors in other funds.

B. Simulating Carbon Mitigation

To empirically test whether and how the different composition of portfolios may result in different incentives with respect to climate mitigation, I examine the investment of the Big Three in Exxon, one of the world's biggest carbon emitters.[158] All data cited in this Section and used for this analysis have been collected from the FactSet Ownership database. The Data Appendix provides details on how to replicate the relevant findings.[159]

Major emitters such as Exxon make significant profits from fossil fuels, and absent regulatory or social pressure, they do not have individual incentives to reduce climate externalities. If, following the portfolio primacy theory, the Big Three were to become climate stewards, we would expect them to persuade companies like Exxon to cut their emissions even if doing so is economically irrational at the company level. As of the end of June 2022, index funds advised by BlackRock, State Street or Vanguard owned, in the aggregate, 16.6% of Exxon stock, [160] and their influence is realistically bound to grow.[161] Therefore, they could exert significant influence on Exxon's climate policy.

The Big Three do not directly hold Exxon stock; however, they advise a large number of funds, including index funds, that hold the stock for the benefit of the fund investors. In particular, there are 298 mutual funds and ETFs advised by the Big Three that own Exxon

158. GRIFFIN, *supra* note 65, at 8 (listing Exxon among "the highest emitting companies since 1988 that are investor-owned").

159. *See* Data Appendix, *supra* note *.

160. Data collected from the FactSet Ownership database on June 24, 2022.

161. *See* Bebchuk & Hirst, *supra* note 60.

stock.[162] For my analysis here, I will focus on the Big Three equity index funds with the twenty largest stakes in Exxon (Top Big Three Funds).[163] In the aggregate, these funds own 13.6% of Exxon, equal to 82% of the entire Big Three holdings.

To examine the potential conflicts within the same fund families, I consider a hypothetical emissions cut that would reduce the value of oil companies by $1 trillion but would increase the value of non-oil companies by $1.2 trillion, thus netting a global stock market gain of $200 billion in present value terms. This is the typical scenario in which portfolio primacy predicts that index funds would have strong financial incentives to support the mitigation measure. Indeed, an investor holding the entire market would make a profit out of such a mitigation measure and would therefore be willing to support it even if it would entail significant losses for oil companies.

To simulate such a scenario, I assume that the entire costs and benefits of the proposed emissions cut are captured by the companies in which the Top Big Three Funds invest. In other words, I assume that the portfolios of the Top Big Three Funds, taken together, internalize all the positive and negative effects of the emissions cut. These funds invest in 11,512 different companies, of which 307 meet the definition criteria of oil company.[164] I also assume that oil companies bear the cost of the mitigation measure in proportion to their market capitalization (specifically, the measure reduces the market value of each oil company by about 16.8%), and likewise, all non-oil companies reap the benefits of climate mitigation in proportion to their market capitalization.

Figure 3 reports the result of the simulation. As the Figure shows, broad-based index funds, such as Vanguard Total Stock Market, Vanguard 500, and SPDR S&P 500 make substantial gains, whereas other energy funds and funds focused on "high dividend" stock take a hit. For example, State Street's Energy Select Sector SPDR Fund loses $4.2 trillion, Vanguard Energy loses $1.1 trillion, and BlackRock's iShares U.S. Energy loses $373 million. Interestingly, while for Vanguard and BlackRock the aggregate net effect of the proposed mitigation measure is positive, for State Street the measure would

162. Data collected from the FactSet Ownership database on June 24, 2022. *See* Data Appendix, *supra* note *.

163. *See* Data Appendix, *supra* note *.

164. Data on the portfolio composition of the Top Big Three Funds were collected from Factset Ownership on November 30, 2021. *See* Data Appendix, *supra* note *. In this Article, by oil companies I refer to companies in the following industries: integrated oil, oil and gas production, oil refining and marketing, oil and gas pipelines, oilfield services and equipment, and contract drilling. For simplicity, I use the classifications utilized in the FactSet Ownership database.

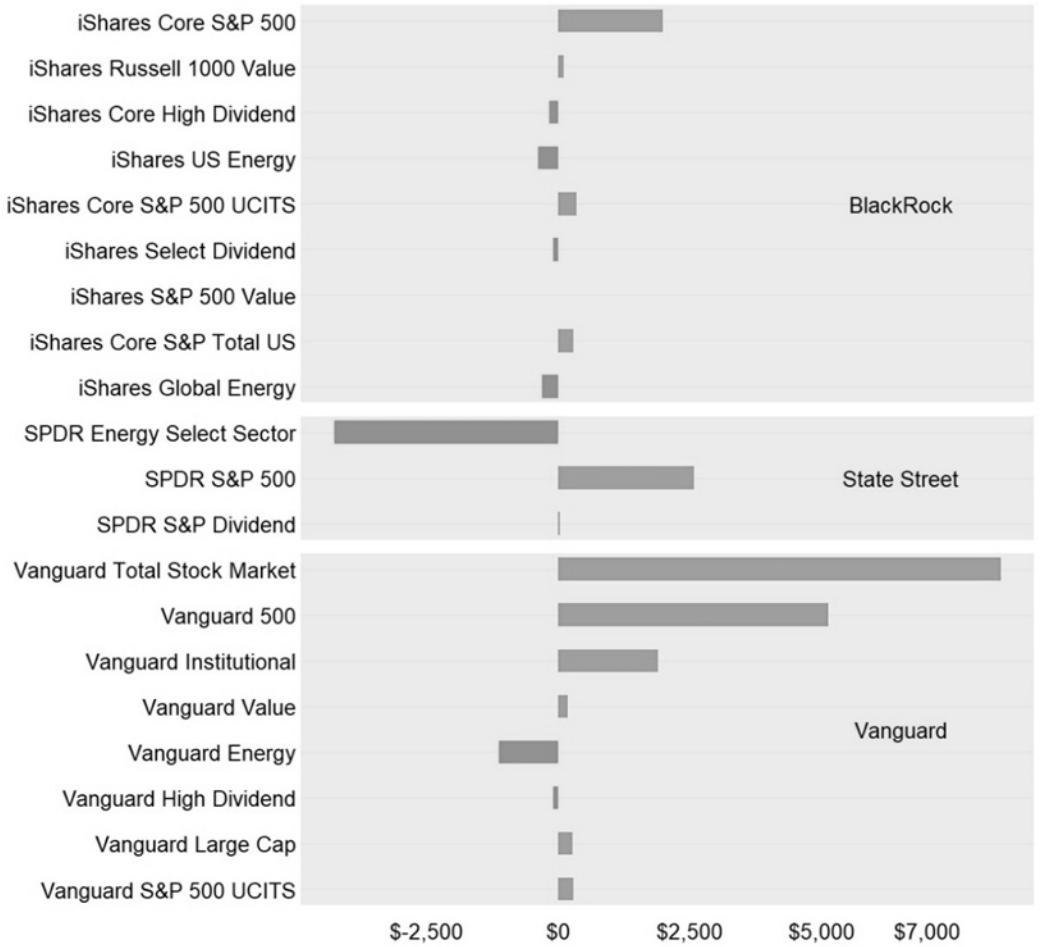
result in a net loss despite the huge positive effect for "the whole market."

Note that, even if SPDR S&P 500 is a much larger fund than SPDR Energy Select Sector ($411.5 billion versus $25.3 billion, respectively), the absolute value of losses suffered by the SPDR Energy Select Sector ($4.2 billion) is larger than the absolute value of gains made by SPDR S&P 500 ($2.6 billion). The reason for such a counterintuitive result is that although the market-wide gains from the emissions cut are larger than the market-wide losses, the losses are concentrated in a relatively small number of oil companies, while the gains are spread over thousands of non-oil companies.

In absolute terms, SPDR S&P 500 invests less money than SPDR Energy Select Sector in oil companies ($11.3 billion versus $25.3 billion, respectively), and much more money in non-oil companies ($399.6 billion versus $0). However, the gains made on non-oil companies are about 1.1% of the investment, whereas the losses made on oil companies are about 17.8% of the investment. Thus, SPDR Energy Select Sector captures $4.2 billion of losses and no gain, whereas SPDR S&P 500 captures $1.9 billion of losses and $4.5 billion of gains.

In other words, it takes a much larger investment in non-oil companies to produce a net gain larger than the net loss suffered by oil companies. SPDR S&P 500, despite having an investment in non-oil companies that is about 15 times the investment of SPDR Energy Select Sector in oil companies, makes a net gain that is smaller than SPDR Energy Select Sector's net loss. Vanguard 500, which has an investment in non-oil companies that is 31 times the investment of SPDR Energy Select Sector in oil companies, makes a net gain that is larger than SPDR Energy Select Sector's net loss.

FIGURE 3: NET PORTFOLIO EFFECT OF AN EMISSIONS CUT (LINEAR FUNCTION)

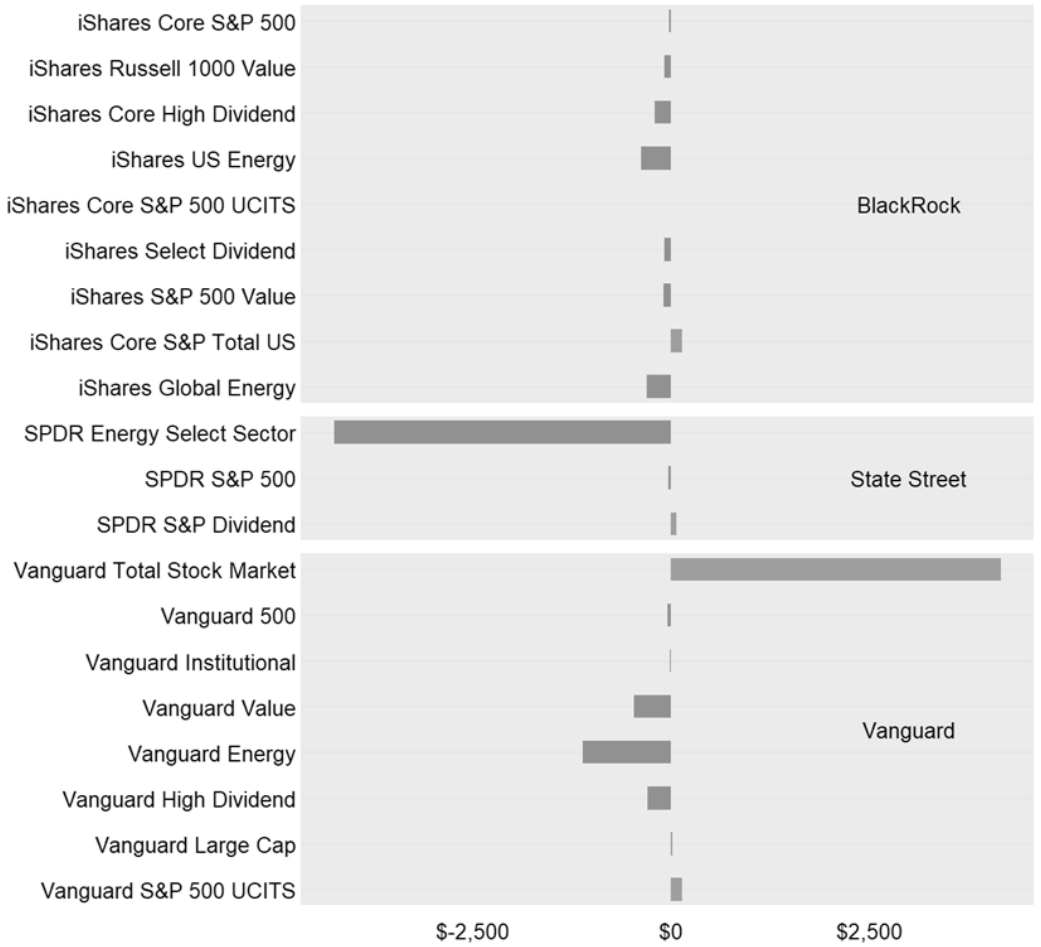


This Figure reports the result of a simulation of the net portfolio gains or losses from a hypothetical emissions cut that reduces the value of oil companies by $1 trillion and increases the value of all other companies by $1.2 trillion. The simulation assumes that the effects of the emissions cut are entirely captured by the 11,512 companies in which the above funds invest. All costs and benefits are proportional to market capitalization. Data on the portfolio composition of the various funds were collected from FactSet Ownership as of November 30, 2021. Values on the horizontal axis are in millions of dollars. The Data Appendix provides additional information on data and methodology.

The results of the simulation are highly sensitive to the specific assumptions. If, for example, we assume that the benefits of climate mitigation do not increase linearly with market capitalization, but

larger companies benefit from climate mitigation proportionally less than smaller companies, the gain for broad-based index funds is significantly reduced. To illustrate, Figure 4 reports the results of the same simulation but on the assumption that the benefits of climate mitigation are proportional to the square root of market capitalization. The assumption is not implausible: indeed, as discussed in Part III.A, larger companies are believed to be more resilient to climate change and therefore smaller companies are likely to benefit proportionally more from climate mitigation.

FIGURE 4: NET PORTFOLIO EFFECT OF AN EMISSIONS CUT (CONCAVE FUNCTION)



This Figure reports the result of a simulation of the net portfolio gains or losses from a hypothetical emissions cut that reduces the value of oil companies by $1 trillion and increases the value of all other companies by $1.2 trillion. The simulation assumes that the effects of the emissions cut are entirely captured

by the 11,512 companies in which the above funds invest. Costs for oil companies are proportional to market capitalization; benefits for non-oil companies are proportional to the square root of market capitalization. Data on the portfolio composition of the various funds were collected from FactSet Ownership as of November 30, 2021. Values on the horizontal axis are in millions of dollars.

Since most Top Big Three Funds focus on mega-capitalization companies, they end up losing from the emissions cut. If the real-world distributions of costs and benefits of climate mitigation are closer to the simulation in Figure 4 rather than to the simulation in Figure 3, most funds will have strong incentives to oppose the proposed emissions cut. But even if the real-world distribution is closer to the simulation in Figure 3, conflicts within the same family of funds pose difficult legal and economic problems for fund managers.

C. Fiduciary Conflicts

The simulations proposed in Section B are only *illustrations* of possible real-world scenarios. In the real world, estimating the costs and benefits of specific carbon mitigation measures for each public company is extremely difficult. Given the different portfolio compositions of the various funds, however, it is reasonable to believe that many measures that result in an aggregate net gain for the whole stock market will create a loss for many individual funds. In particular, within the same family of funds managed by the same asset manager, some funds will benefit from the measure while some others will lose.

Under the existing law, a mutual fund must be managed "on behalf of its investors."[165] In particular, the law makes it clear that mutual funds must operate in the interest of all classes of investors and that such a duty is violated when the fund acts in the interests of directors, officers, investment advisers, special classes of investors, other mutual funds, or entities engaged in other lines of business.[166]

The duty of loyalty not only prohibits fraud and misappropriation but also condemns conflicts of interests between directors and officers of the fund, or investment advisers and the

165. Investment Company Governance, Investment Company Act of 1940 Release No. IC-26520, 2004 WL 1672374 (July 27, 2004).

166. *See* Investment Company Act of 1940 § 1(b)(2), 15 U.S.C. § 80a-1(b)(2).

investors in the fund.[167] Therefore, the portfolio conflicts examined in this Part translate to conflicts of duties under fiduciary law.[168]

As shown in Section B, carbon mitigation measures might benefit some index funds and damage other funds advised by the same investment adviser. What should the investment adviser do in this case? From a legal standpoint, the answer seems straightforward. Directors and officers (or trustees)[169] of each fund, as well as their investment advisers,[170] must resolve any conflicts in the interests of the investors of that particular fund.[171] Hence, in our hypothesis, the investment adviser should vote and engage companies in opposite and conflicting ways on behalf of different funds.[172] In practice, however, index fund managers do not make this kind of decision at the level of the individual fund. They typically have centralized governance offices that make decisions on voting and other engagement issues at the level of the entire institution.[173]

Advocates of portfolio primacy find that the centralization of engagement decisions, although potentially problematic from a fiduciary standpoint, ultimately favors institution-level stewardship.[174] Indeed, according to this view, by making centralized decisions for the funds they manage, large asset managers will choose to maximize value

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167. *See generally* Arthur B. Laby, *The Fiduciary Structure of Investment Management Regulation*, *in* RESEARCH HANDBOOK ON THE REGULATION OF MUTUAL FUNDS 79–110 (William A. Birdthistle & John Morley eds., 2018).

168. For discussions of fiduciary conflicts within family of funds, see, for example, Ann M. Lipton, *Family Loyalty: Mutual Fund Voting and Fiduciary Obligation*, 19 TENN. J. BUS. L. 175, 176 (2017); Utpal Bhattacharya, Jung H. Lee & Veronika K. Pool, *Conflicting Family Values in Mutual Fund Families*, 68 J. FIN. 173 (2013); and José-Miguel Gaspar, Massimo Massa & Pedro Matos, *Favoritism in Mutual Fund Families? Evidence on Strategic Cross-Fund Subsidization*, 61 J. FIN. 73 (2006).

169. Most funds are organized as Delaware or Massachusetts trusts or as Maryland corporations (with a board-centric governance). *See* Deborah A. DeMott, *Fiduciary Contours: Perspectives on Mutual Funds and Private Funds*, *in* RESEARCH HANDBOOK ON THE REGULATION OF MUTUAL FUNDS, *supra* note 167, at 61.

170. Investment advisers owe fiduciary duties to the fund they advise under the Investment Advisers Act of 1940. SEC v. Capital Gains Rsch. Bureau, Inc., 375 U.S. 180, 191–92 (1963):

> The Investment Advisers Act of 1940 . . . reflects a congressional recognition "of the delicate fiduciary nature of an investment advisory relationship," as well as a congressional intent to eliminate, or at least to expose, all conflicts of interest which might incline as investment adviser—consciously or unconsciously—to render advice which was not disinterested.

(citations omitted).

171. *See* Lipton, *supra* note 168.

172. For a discussion of the conflicts of interests in mutual fund voting, see Sean J. Griffith & Dorothy S. Lund, *Conflicted Mutual Fund Voting in Corporate Law*, 99 B.U. L. REV. 1151 (2019).

173. Bebchuk & Hirst, *supra* note 72, at 2076–84.

174. *See* Condon, *supra* note 7, at 57–59.

across portfolios rather than at the level of a particular fund, also because this strategy has a low chance of being legally challenged.[175]

This view, however, seems to underestimate investment managers' incentives to maximize value for investors in order to attract capital (and fees). Although such incentives are not powerful enough to prevent all kinds of malfeasance,[176] they might be able to dissuade management companies from systematically and visibly harming the value of portfolio companies. If the Big Three overtly pressured energy companies to engage in value-decreasing strategies for the benefit of other companies, it is very likely that investors in their energy-focused funds would flee (and perhaps even take legal action). In fact, mutual fund shareholders' strong exit rights—stronger than in regular corporations—and the desire of investment managers to attract new investors force fund directors, officers, and investment advisers to pay careful attention to conflict-of-interest issues.[177]

* * *

This Part has shown that even if index fund portfolios had strong incentives to mitigate climate externalities, climate stewardship would create serious internal conflicts among funds advised by the same index fund manager. These conflicts translate to conflicts of duties under fiduciary law and disincentivize asset managers from engaging in aggressive climate stewardship.

V. POLICY IMPLICATIONS

This Article has tried to show that the promise of portfolio primacy for climate mitigation is severely constrained by three crucial limits, each reinforcing the others, and therefore our expectations on the potential impact of index fund stewardship on climate change

175. *Id.* at 58 (reporting that the Securities and Exchange Commission has brought only one enforcement action punishing conflicted proxy voting practices, in 2009, and that investment managers can provide a "plausible business-purpose cover" for their strategy, thus avoiding legal consequences).

176. In fact, the role of investment management law and of the Securities and Exchange Commission is justified on the grounds that market incentives are not enough to police investment managers' behavior.

177. *See* John Morley, *The Separation of Funds and Managers: A Theory of Investment Fund Structure and Regulation*, 123 YALE L.J. 1228, 1263 (2014) ("[Investment] [m]anagers must therefore constantly consider how conflict resolutions will affect their ability to attract new investors."). Another potential tension is the one between portfolio primacy and the fiduciary duties of corporate directors, which prohibit directors from damaging the company they manage for the benefit of some large, diversified investors. *See* Kahan & Rock, *supra* note 18. For a more in-depth analysis of the fiduciary implications of portfolio primacy, see Tallarita, *supra* note 12.

should be very modest. Such recognition has significant implications for policy decisions.

A. The Ineffectiveness of Portfolio Primacy

As discussed in Part I, regulators can use different tools to address climate externalities, including Pigouvian taxes, cap-and-trade systems, abatement subsidies, information-based policies, and traditional command-and-control regulation (such as standard setting or emissions ceilings).[178] Each of these tools presents advantages and disadvantages and raises complex legal and economic questions.[179] But a meaningful conversation about climate policy must also consider private sector initiatives and private-public collaborative efforts to address climate risk.

Portfolio primacy advertises itself as a powerful private sector tool for climate mitigation. Yet, the analysis presented in this Article has shown that portfolio primacy is unlikely to have a meaningful impact on climate. Therefore, the main normative implication of this analysis is that we should put very low weight on the expected benefits of portfolio primacy. Among the many possible strategies that our societies can choose to advance toward decarbonization, portfolio primacy is not one worth a significant investment.

B. The Potential Harm of Portfolio Primacy

Another, more worrying, hypothesis is that portfolio primacy proves not only ineffective but actively counterproductive for climate mitigation. As I have argued in prior work, unfounded reliance on the social impact of private actors may distract resources and political capital away from more promising regulatory solutions.[180] In the case of portfolio primacy, public opinion might become persuaded that the stock market on its own will be able to reduce climate externalities to a significant degree. This phenomenon might in turn reduce political support for more stringent regulation. Decarbonization will likely be costly for most people, with varying impacts on their habits,[181] and political support for effective decarbonization policies is reduced by

178. For a discussion of several policy tools and regulatory paths for climate policy, see SHALANDA H. BAKER ET AL., CTR. FOR PROGRESSIVE REFORM, CLIMATE, ENERGY, JUSTICE: THE POLICY PATH TO A JUST TRANSITION FOR AN ENERGY-HUNGRY AMERICA (2020), https://ssrn.com/abstract=3766500 [https://perma.cc/H4TW-GDJF].

179. *See supra* notes 44–46.

180. *See* Bebchuk & Tallarita, *supra* note 29, at 168–175.

181. *See, e.g.*, Michael P. Vandenbergh & Paul C. Stern, *The Role of Individual and Household Behavior in Decarbonization*, 47 ENV'T L. REP. NEWS & ANALYSIS 10941 (2017).

positive intergenerational externalities—that is, the fact that most of the benefits of decarbonization will be enjoyed by future generations. Therefore, portfolio primacy's flawed promise of an internalization mechanism might become a political argument to justify weaker support for painful but necessary regulation.

A recent experimental study presented mixed results on this issue. Reading about climate mitigation initiatives by the private sector increased general support for carbon reduction among conservative and moderate participants, but it also reduced concern about climate change and reduced support for at least certain types of climate regulation among conservatives and moderates.[182] Further research is needed to illuminate whether and how rhetoric on climate stewardship may affect support for climate regulation. If climate stewardship rhetoric did indeed reduce support for climate regulation, however, support for portfolio primacy would not only be an ineffective strategy but also an actively damaging one that would slow down social progress on climate change.

C. Portfolio-Level Strategies vs. Firm-Level Strategies

A further normative implication of the analysis derives from the distinction between portfolio-level internalization of climate externalities, which the Article has shown to be very limited, and company-level internalization of climate externalities, which might instead play an important role in climate mitigation. Let us start by examining a preliminary question: If portfolio primacy does not have a meaningful effect on climate stewardship, then what can explain the public statements and concrete engagement actions of the Big Three and other large asset managers in favor of climate risk disclosure and emissions reductions?[183]

One reason might be that asset managers use the promise of climate stewardship as a marketing tool to attract clients superficially interested in climate change (that is, with enough interest to attach value to climate stewardship rhetoric but not enough interest to monitor the actual impact of climate stewardship) or as a way to curry personal favor with elected officials or policymakers. There is also some initial evidence, however, that the increased ownership by the Big Three is associated with a subsequent reduction of carbon emissions.[184]

182. *See* Gillis et al., *supra* note 17, at 1.

183. For some anecdotal evidence, see, for example, Condon, *supra* note 7, at 18–25.

184. *See* José Azar, Miguel Duro, Igor Kadach & Gaizka Ormazabal, *The Big Three and Corporate Carbon Emissions around the World*, 142 J. FIN. ECON. 674, 674 (2021).

If such an effect were true, we should examine what motivates the Big Three to take some real action on climate mitigation.

One possible driver is investment managers' concern about regulatory and transition risk. If market participants anticipate a transition toward a low-carbon economy due to regulatory intervention, technological changes, or changes in social preferences, they have good economic reason to pressure companies into preparing for such a transition.[185]

Another driver might be fund investors' concern about climate issues, which creates a demand for environmentally conscious mutual funds and thus an incentive for investment managers to signal their commitment to climate mitigation.[186] A further driver might be the effect of moral and social norms on investment managers, either because they hold genuine beliefs that favor environmentally friendly behaviors or because they are forced to act in that way as a result of image concerns and social pressure.[187]

An important point, however, is that regulatory, technological, and moral or social drivers ultimately rely on government intervention and social or cultural changes rather than on direct financial incentives such as portfolio-level gains. In this framework, unlike in the portfolio primacy framework, financial incentives are not a direct driver of climate stewardship but, at best, the mere transmission mechanism through which the real drivers (that is, regulatory interventions and social and moral changes) affect investment and corporate decisions. In other words, financial incentives are more likely to operate as the proximate, but not ultimate, cause of climate stewardship. According to this view, the primary goal for climate mitigation should thus remain regulatory intervention and social mobilization, and not capital market law and policy.

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185. On the importance of anticipating regulatory interventions for private actors' decisions, see Jonathan S. Masur & Jonathan Remy Nash, *Promoting Regulatory Prediction*, 97 IND. L.J. 203 (2022). On the reasons why companies might want to engage in "forward compliance" and adjust to anticipated future regulation, see John Armour, *The Case for Forward Compliance*, BRIT. ACAD. REV., Autumn 2008, at 19.

186. *See* Barzuza et al., *supra* note 48 (describing the importance that the next generation of investors places on social issues).

187. *See supra* note 49 and accompanying text. Interestingly, a study by Alexander Dyck, Karl V. Lins, Lukas Roth, and Hannes F. Wagner on the effect of institutional investors' engagement in certain corporate environmental metrics finds that social and cultural norms are a decisive driver of this phenomenon. Alexander Dyck, Karl V. Lins, Lukas Roth & Hannes F. Wagner, *Do Institutional Investors Drive Corporate Social Responsibility? International Evidence*, 131 J. FIN. ECON. 693, 693 (2019). In particular, European institutional investors—based in countries with stronger social and cultural norms with respect to environmental protection and climate mitigation—affect companies' environmental scores, while U.S. investors do not. *See id.* at 695, 705–10.

CONCLUSION

Climate change is one of the most pressing issues facing our society. It is the product of a collective action problem: Individuals and firms would be better-off if the level of carbon emissions were lower but none of them has individual incentives to reduce their own emissions. Portfolio primacy theory claims that large asset managers, particularly index fund managers, can mitigate this collective action problem by internalizing climate externalities within their investment portfolios. This Article has provided a critical assessment of portfolio primacy's potential impact. The analysis has shown that our expectations about the role of portfolio primacy in climate change mitigation should be very modest. In fact, to the extent that reliance on portfolio primacy reduces support for government intervention, support for portfolio primacy might prove not only ineffective but also actively damaging.