

# Michigan Journal of Environmental & Administrative Law

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Volume 3 | Issue 1

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2013

## The Meaning of Green Growth

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### Recommended Citation

Michael A. Livermore, *The Meaning of Green Growth*, 3 MICH. J. ENVTL. & ADMIN. L. 33 (2013).

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# THE MEANING OF GREEN GROWTH

*Michael A. Livermore\**

*Although the term is still rarely used in the United States, in recent years “green growth” has become part of the lexicon of global environmental policy. Unfortunately, although it is frequently cited as a public policy goal, green growth has remained vague and ill-defined, leading to conflicting interpretations and confusion over the distinction between green growth and related concepts like sustainable development. This paper seeks to clarify the meaning of green growth as a distinct concept, defining a “green growth frontier” of policies that dominate along both environmental and economic dimensions. The green growth agenda can be understood as moving societies toward that frontier of cost-effective and environmentally effective policies. Because movements toward this frontier generate gains along multiple dimensions, they should be less controversial and may allow for some progress toward economic and environmental goals even in contexts where broader political consensus over environmental policies is difficult to form.*

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## INTRODUCTION

With the recent failure of climate change treaty negotiations in Copenhagen, Durban, and Doha to make substantial progress on establishing mandatory limits on greenhouse gas emissions,<sup>1</sup> hope for a global response to the climate change crisis in the near term has faded.<sup>2</sup> Current negotiations at the international level have focused largely on how to cope with the reality of climate change and establishing timelines for future efforts.<sup>3</sup> The need for a global response has become no less urgent, but political will in support of aggressive international efforts remains in short supply.

Partially in response to failures at the international level, the concept of green growth as a paradigm for domestic policymaking has grown in prominence. Although the term is rarely used in the United States,<sup>4</sup> in recent years green growth has joined other concepts like sustainable development, environmental justice, and the precautionary principle in the lexicon of

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1. The Durban conference concluded with an agreement to continue to study possible methods to combat climate change and with a resolution to develop a protocol by 2015, be implemented in 2020. Conference of the Parties to the United Nations Framework Convention on Climate Change, Durban, S. Afr., Nov. 28, 2011–Dec. 9, 2011, *Establishment of an Ad Hoc Working Group on the Durban Platform for Enhanced Action*, U.N. Doc. FCCC/CP/2011/L.10 (Dec. 10, 2011), available at <http://unfccc.int/resource/docs/2011/cop17/eng/l10.pdf> [hereinafter *Durban Platform*].

2. Many explanations have been offered for the difficulty of reaching a climate change bargain. See, e.g., Shi-Ling Hsu, *A Game-Theoretic Model of International Climate Change Negotiations*, 19 N.Y.U. ENVTL. L.J. 14, 24–28 (2011); *Why Did Copenhagen Fail to Deliver a Climate Deal?*, BBC NEWS (Dec. 22, 2009), <http://news.bbc.co.uk/2/hi/science/nature/8426835.stm>.

3. See *Durban Platform*, *supra* note 1. Under the Copenhagen Accord, developed countries have committed to spending \$100 billion USD annually to mitigate the effects of climate change. Conference of the Parties to the United Nations Framework Convention on Climate Change, Copenhagen, Den., Dec. 7–19, 2009, *Copenhagen Accord*, ¶ 8, U.N. Doc. FCCC/CP/2009/L.7, available at <http://unfccc.int/resource/docs/2009/cop15/eng/l07.pdf>.

4. A search on Lexis.com of the phrase “green growth” in federal and state courts turned up a single case where the concept was relevant: *American Trucking Ass’n v. City of Los Angeles*, 133 S. Ct. 2096 (2013). In that case, the Port of Los Angeles claimed that its Clean Truck Plan, which regulated the behavior of trucking companies using the Port with the goal of reducing pollution, was undertaken to promote its business interests as part of a “green growth plan.” *Id.* at 2103. The Court held that, regardless of the Port’s intentions, it was acting with “the force and effect of law” when it adopted criminal sanctions as part of the regulation, and its rule was therefore preempted under the Federal Aviation Administration Authorization Act of 1994. *Id.* at 2104–05. Nor is the phrase common in the secondary literature. But see Stuart Eizenstat, *The U.S. Role in Solving Climate Change: Green Growth Policies Can Enable Leadership Despite the Economic Downturn*, 30 ENERGY L.J. 1 (2009); *infra* note 5.

global environmental policy. There is hope in some quarters that the concept of green growth can provide a way forward in the absence of a global climate change treaty, or at least a bridge from the current situation, where there is an absence of even local climate change policy in most domestic contexts, to a comprehensive and binding global agreement.

Although the words “green growth” have become a common sight in business plans, international agreements, press statements, and government policy pronouncements, the meaning of the concept remains fuzzy, and often varies depending on the speaker and the context.<sup>5</sup> What it actually means for domestic policymaking—what green growth really looks like in terms of institutions or substantive outcomes—is still unclear. Unless this vagueness is resolved, the concept cannot actually structure decisionmaking and policy choices, and its utility for addressing climate change or any other environmental challenge will remain extremely limited.

This paper examines the term green growth and how it has been used in global environmental discourse, with the goal of identifying a concept that can be operationalized within domestic policymaking contexts, especially in developing and emerging economies. Reviewing the related concept of sustainable development as well as discussions of green growth by government officials, think tanks, and academics, a core definition of the green growth agenda is developed. This definition seeks to carve out a meaning of green growth that is distinct from similar ideas, achieves some degree of consistency with past statements about green growth, and is clear enough that it can be helpful for policymakers.

This paper argues that a useful definition of green growth centers on the goal of reducing conflicts between economic growth and environmental quality. This can be done in two ways. The first is through a version of economic cost-effectiveness analysis, a concept that seeks to identify how to achieve environmental goals with the lowest possible economic harm. Economic cost-effectiveness analysis has been around for decades and is a staple of public policy analysis. The second component of green growth is environmental-effectiveness analysis, which seeks to achieve economic goals in ways that cause the least environmental harm. Environmental

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5. In some contexts, “green growth” refers to job growth “in the green job creation movement.” Jonathan C. Augustine, *A National Model for Disaster Recovery: Growing Green Jobs in the Age of Energy Efficiency*, 37 T. MARSHALL L. REV. 179, 184–85 (2012). In other contexts, “green growth” means “the creation of economic value through environmentally protective actions.” Laura S. Henry et al., *From Smelter Fumes to Silk Road Winds: Exploring Legal Responses to Transboundary Air Pollution Over South Korea*, 11 WASH. U. GLOB. STUD. L. REV. 565, 625 (2012). The Organisation for Economic Co-operation and Development (OECD) defines green growth as “promoting economic growth while reducing pollution and GHG emissions, minimizing waste and inefficient use of natural resources, and maintaining biodiversity.” Ruth Gordon, *The Environmental Implications of China’s Engagement with Sub-Saharan Africa*, 42 ENVTL. L. REP. 11109, 11118 n.108 (2012).

cost-effectiveness analysis is simply the mirror image of economic cost-effectiveness analysis.

Unlike the somewhat related concept of sustainable development, the concept of green growth does not embed a particular aspiration for environmental quality or economic growth, but rather embodies the goal of achieving economic growth and environmental quality goals in ways that are effective—that is, at the lowest possible cost to the other social goal. The concept of green growth is not dispositive of social policy; it does not provide an answer to the appropriate levels of economic growth or environmental protection that ought to be achieved. That question must be answered independently by policymakers. What the green growth agenda does do, however, is encourage policymakers to choose a path toward economic or environmental goals that mitigates, to the extent possible, the negative side effects of those choices.

Stated another way, green growth can be defined as the frontier of policy choices between environmental quality and economic growth: at any point along that frontier, there are no ways to improve environmental quality or economic growth without sacrificing the other. At points interior to this frontier, it is possible to make gains along both dimensions simultaneously. This does not mean that movement toward this frontier is costless. It may affect the profitability of certain firms or displace workers in particular industrial sectors or regions; it may also involve tradeoffs between particular environmental goods. But, on net, any costs to growth or the environment would be compensated by benefits along the same dimension, so that, other things being equal, movement toward the frontier is socially beneficial. Unlike the concept of sustainable development, or ideas like environmental justice, the precautionary principle, or cost-benefit analysis, green growth has nothing to say about how choices should be made along the frontier. Yet while movement toward this frontier may seem like an uncontroversial goal, in many governmental contexts, policy options to do so have not yet been fully grasped.

Providing a useful definition of green growth is only the first step: governments must also realize the concept in practice for it to have any significant environmental effects. There are several institutional and substantive reforms that can be used to better incorporate green growth into policymaking. A core area for promoting green growth is through tools and institutions associated with regulatory quality initiatives, such as regulatory impact analysis and the use of market mechanisms for achieving environmental goals. Societies making decisions aimed at spurring economic growth can attend to environmental effects through widespread tools like environmental impact analysis, and can in addition choose development pathways that focus on the creation of sustainable industries and the protec-

tion of environmental resources. Focusing on development factors other than consumption growth by emphasizing the effect of policy on distributional goals, welfare, or human capabilities can also help societies reduce environmental impacts without sacrificing short-term human well-being.

This paper proceeds in three parts. In Part I, green growth is placed in the context of other international environmental norms, especially the concept of sustainable development. Part II provides a definition of green growth as the policies that fall along the frontier of tradeoffs between economic growth and environmental quality and discusses how that definition fits in with some of the rhetoric surrounding green growth as well as standard economic models of environmental policy. Part III provides a discussion of what governments can do to promote green growth by attending more carefully to the goals of development and implementing a set of institutional and substantive reforms concerning regulation and policymaking.

## I. GREEN GROWTH IN CONTEXT

As soon as green growth made its entrance on the international stage, the concept was overshadowed by older and more established ideas. For example, a Ministerial Declaration on Environment and Development in Asia and the Pacific, adopted in 2005 in Seoul, Korea, stated the following:

[T]here is a need to shift the development orientation from a “Grow first, clean up later” approach to one of Green Growth . . . [with] Green Growth . . . understood in this context to mean sustainable development, as elaborated in the Johannesburg Plan of Implementation.<sup>6</sup>

The Declaration goes on to equate “environmentally sustainable economic growth” with “Green Growth.”<sup>7</sup> In an address a few years later, President Lee Myung-bak of Korea defined green growth in a similar fashion as “sustainable growth which helps reduce greenhouse gas emission and environmental pollution.”<sup>8</sup>

Of course, the notion of sustainability invoked to define green growth has a multi-decade history in both international environmental discourse and in economics, with its own complex meanings and uses. If green growth

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6. Ministerial Conference on Environment and Development in Asia and the Pacific, Mar. 28–29, 2005, *Report of the Ministerial Conference on Environment and Development in Asia and the Pacific*, at 19, U.N. Doc. E/ESCAP/MCED(05) (Apr. 20, 2005).

7. *Id.*

8. President Lee Myung-bak, A Great People with New Dreams, Address on the 63rd Anniversary of National Liberation and the 60th Anniversary of the Founding of the Republic of Korea (Aug. 15, 2008), *available at* [http://english.president.go.kr/pre\\_activity/speeches/speeches\\_view.php?uno=270](http://english.president.go.kr/pre_activity/speeches/speeches_view.php?uno=270).

is equated directly to sustainable development then it has no independent meaning—it is nothing more than a case of the proverbial old wine in a new bottle. If green growth amounts to repackaging of a well-established concept, then it offers very little use for policymakers.

This part will discuss the evolution of the concept of sustainable development in international environmental discourse and in economics over the past several decades and will examine some of the political issues that have hampered its implementation in actual government policy. The failure of sustainable development to have a major influence in shaping domestic policymaking helped motivate the desire for a new agenda in the environmental area. But unless the new agenda is different from the old agenda, it is likely to meet a similar fate.

### *A. Sustainable Development in Law and Economics*

Because sustainable development remains a dominant concept in environmental discourse, especially on the international stage, it casts a long shadow over green growth. This section provides a brief overview of the concept of sustainable development in the areas of international law and economics to help provide some sense of the background understanding that informs interpretations of green growth.

The concept of sustainable development was formally presented on the global stage by the World Commission on Environment and Development's 1987 report *Our Common Future*, commonly referred to as the Brundtland Report.<sup>9</sup> The Commission defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."<sup>10</sup> The Brundtland Report introduced several elements that would become closely associated with the concept of sustainable development, including recognition of the importance of efforts to meet basic human needs and alleviate poverty despite the range of political, technological, cultural, and environmental constraints faced by human societies.<sup>11</sup>

The concerns expressed in the Brundtland Report themselves grew out of the "second wave of environmentalism," which is generally dated to the publication of Rachel Carson's *Silent Spring* in 1962.<sup>12</sup> This publication, along with *The Limits to Growth*, commissioned by the Club of Rome and

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9. See MARIE-CLAIRE CORDONIER SEGGER & ASHFAQ KHALFAN, SUSTAINABLE DEVELOPMENT LAW: PRINCIPLES, PRACTICES, AND PROSPECTS 18 (2004).

10. World Comm'n on Env't and Dev., *Report of the World Commission on Environment and Development: Our Common Future*, ¶ 1, U.N. Doc. A/42/427 (Aug. 4, 1987).

11. SEGGER & KHALFAN, *supra* note 9, at 18–19.

12. Kathryn Hochstetler, Book Review, 8 J. POL. ECOLOGY 82, 83 (2001) (discussing role of RACHEL CARSON, *SILENT SPRING* (1962)).

published in 1972,<sup>13</sup> and *The Population Bomb*, authored by Paul R. Ehrlich and published in 1968,<sup>14</sup> called global attention to the risks posed by industrialization and the expansion of the human population and called for some quite radical policy responses to reduce human impacts on the environment. These works themselves have roots in a set of concerns about natural limits on consumption that stretch at least as far back as Malthus.<sup>15</sup>

The 1992 United Nations Conference on Environment and Development, often referred to as the “Earth Summit,” carried forward the concept of sustainable development.<sup>16</sup> It also illustrates how political barriers have hampered efforts to more firmly integrate sustainability concerns into policymaking.<sup>17</sup> The proclamations produced by the conference—including the 1992 Rio Declaration and Programme of Action; *Agenda 21*, a comprehensive “plan of action” on sustainability; and a statement of principles on sustainable forestry management—were all non-binding, and states were careful to ensure that no legal obligations would arise from their participation.<sup>18</sup> These documents, which presented lofty goals, and even some specific policy tools, were ultimately aspirational and lacked even the limited action-forcing power of international law.

In the *Rio Declaration*, the concept of sustainable development incorporates a range of social goals within a general frame of “equitably meet[ing] developmental and environmental needs of present and future generations.”<sup>19</sup> The first two principles place human concerns at the center of the concept of sustainable development and carefully affirm the “sovereign right” of countries regarding their own natural resources.<sup>20</sup> A number of non-environmental considerations are brought within the fold of sustainable development, including “eradicating poverty”<sup>21</sup> and issues of “[w]arfare,” “[p]eace,” and interstate conflict.<sup>22</sup> The roles of “[w]omen,” “the youth of the world,” and “[i]ndigenous people” are also specifically men-

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13. DONELLA H. MEADOWS ET AL., *THE LIMITS TO GROWTH* (1972).

14. PAUL R. EHRLICH, *THE POPULATION BOMB* (1968).

15. See THOMAS MALTHUS, *AN ESSAY ON THE PRINCIPLE OF POPULATION* (Electronic Scholarly Publishing Project 1998) (1798).

16. DUNCAN FRENCH, *INTERNATIONAL LAW AND POLICY OF SUSTAINABLE DEVELOPMENT* 17–18 (2005).

17. *Id.* at 17.

18. *Id.* at 18 (noting rhetorical importance of the *Rio Declaration*, *infra* note 19).

19. United Nations Conference on Environment and Development, Rio de Janeiro, Braz., June 3–14, 1992, principle 3, *Rio Declaration on Environment and Development*, U.N. Doc. A/CONF.151/26/Rev.1 (Vol. I), Annex I (Aug. 12, 1992) [hereinafter *Rio Declaration*].

20. *Id.* principles 1–2.

21. *Id.* principle 5.

22. *Id.* principles 24–26.

tioned;<sup>23</sup> the importance of “participation” is emphasized; and the concept of “common but differentiated responsibilities” is endorsed.<sup>24</sup>

The declaration also includes some specific language that deals with policy design. The document discourages the export and import of hazardous waste and trade protectionism achieved through environmental regulation.<sup>25</sup> Liability regimes for victims of pollution, economic instruments to internalize environmental costs, environmental impact assessment, and a weak version of the precautionary principle are encouraged.<sup>26</sup> The declaration also calls on states to “reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies.”<sup>27</sup>

The World Summit on Sustainable Development, referred to as Earth Summit 2002,<sup>28</sup> with the resulting Johannesburg Declaration on Sustainable Development and the Plan of Implementation of the World Summit on Sustainable Development, included further discussion of sustainable development. The Johannesburg Declaration takes an expansive view of sustainable development and threats to sustainable development, listing a range of environmental threats, such as biodiversity loss, desertification, and climate change,<sup>29</sup> as well as economic challenges, including globalization<sup>30</sup> and poverty and inequality.<sup>31</sup> A large number of social ills were identified as “severe threats to . . . sustainable development” that required “priority attention,” including the following:

chronic hunger; malnutrition; foreign occupation; armed conflict;  
illicit drug problems; organized crime; corruption; natural disasters;  
illicit arms trafficking; trafficking in persons; terrorism;

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23. *Id.* principles 20–22.

24. *Id.* principles 7, 10.

25. *Id.* principles 12, 14.

26. *Id.* principles 13, 15–17. For a discussion of “weak” versus “strong” precautionary approaches, see Cass R. Sunstein, *The Paralyzing Principle*, REGULATION, Winter 2002–03, at 32.

27. *Rio Declaration*, *supra* note 19, principle 8.

28. See Sam Headon, *Whose Sustainable Development? Sustainable Development Under the Kyoto Protocol, the “Coldplay Effect,” and the CDM Gold Standard*, 20 COLO. J. INT’L ENVTL. L. & POL’Y 127, 132 n.18 (2009) (referring to the World Summit on Sustainable Development as Earth Summit 2002); see also, Shawkat Alam, *An Examination of the International Environmental Law Governing the Proposed Indian River-Linking Project and an Appraisal of Its Ecological and Socio-Economic Implications for Lower Riparian Countries*, 19 GEO. INT’L ENVTL. L. REV. 209, 218 n.42 (2007) (referring to World Summit on Sustainable Development as Earth Summit 2002).

29. World Summit for Sustainable Development, Aug. 26–Sept. 4, 2002, *Johannesburg Declaration on Sustainable Development*, principle 13, U.N. Doc. A/CONF.199/20, Annex PP 3 (2002), available at [http://www.un.org/jsummit/html/documents/summit\\_docs/131302\\_wssd\\_report\\_reissued.pdf](http://www.un.org/jsummit/html/documents/summit_docs/131302_wssd_report_reissued.pdf).

30. *Id.* principle 14.

31. *Id.* principles 11–12.

intolerance and incitement to racial, ethnic, religious and other hatreds; xenophobia; and endemic, communicable and chronic diseases, in particular HIV/AIDS, malaria and tuberculosis.<sup>32</sup>

The Millennium Development Goals (MDGs) also include a specific goal to “Ensure Environmental Sustainability.” The specific targets under this goal include “integrat[ing] the principles of sustainable development into country policies and programmes and revers[ing] the loss of environmental resources,” as well as improving access to sanitation and drinking water and improving the “lives of . . . slum dwellers.”<sup>33</sup> Indicators for sustainability include measures of forest preservation, species protection, and carbon intensity.<sup>34</sup>

As this brief survey suggests, over the course of its history within international environmental law and discourse, the concept of sustainable development has become incredibly capacious.<sup>35</sup> As early as 1992, only five years after the Brundtland Report, commentators were noting the proliferation of definitions of sustainable development, with dozens of potential definitions emanating from international legal documents and statements of academics and non-governmental organizations.<sup>36</sup> From the wide range of societal challenges discussed in the Johannesburg Declaration, it might be thought that sustainable development has come to represent a general set of human aspirations.

That said, many of the definitions and uses of the concept have maintained some definitional integrity, with notions of intergenerational responsibility and equity, especially in the context of balancing environmental resource use with human demands, forming a common core. This definition is the one that has been relied on when international courts have referenced sustainable development in determining whether the concept has any bearing on the obligations of states under their international agreements. For example, the International Court of Justice, in its *Gabcikovo-Nagymaros* decision, referenced the “need to reconcile economic development with protection of the environment [which] is aptly expressed

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32. *Id.* principle 19.

33. THE WORLD BANK GROUP, ICT AND MDGs: A WORLD BANK GROUP PERSPECTIVE 2 (2003).

34. *Official List of MDG Indicators*, U.N. STATISTICS DIV., <http://mdgs.un.org/unsd/mdg/Host.aspx?Content=Indicators/OfficialList.htm> (last visited June 26, 2012).

35. For a compilation of over forty definitions given to the term, see DAVID PEARCE, ANIL MARKANDYA, & EDWARD B. BARBIER, BLUEPRINT FOR A GREEN ECONOMY 173–85 (1987).

36. JOHN PEZZEY, SUSTAINABLE DEVELOPMENT CONCEPTS: AN ECONOMIC ANALYSIS 55–62 (1992) (presenting an extensive list of definitions).

in the concept of sustainable development.”<sup>37</sup> Similarly, the Appellate Body of the World Trade Organization noted in the *Shrimp/Turtle* case that sustainable development has “been generally accepted as integrating economic and social development and environmental protection.”<sup>38</sup>

Within the field of economics, there has been a parallel sustainability discourse. The focus within the economics community has been on formalizing concepts of sustainability to determine what consequences it has for economic variables like consumption growth. While often highly theoretical, debates about the exact meaning and contours of sustainability within the field of economics have helped clarify and illuminate some of the core challenges in developing coherent policies aimed at achieving sustainable development.

Three classic papers that helped define the field were published simultaneously by Dasgupta and Heal,<sup>39</sup> Stiglitz,<sup>40</sup> and Solow<sup>41</sup> in *The Review of Economic Studies* in 1974. These papers helped set the stage for the rich subsequent literature and preview some of the main concerns that arise in economic discussions over sustainability.

Dasgupta and Heal developed a model that was based on the principle that economic actors can be expected to maximize the net present value of their decisions. Net present value is a standard economic concept that helps facilitate comparison between the effects of a decision that occur at different times. Under the standard formulation, funds spent or received in the future are discounted to reflect the time value of money based on investment returns and consumer preferences. Under the Dasgupta and Heal model, even without population growth, with finite resources and no technological growth, net present value maximization results in the complete depletion of a limited natural resource stock.<sup>42</sup>

The Stiglitz model introduced technological growth and found that sustainability could be achieved as well as net present value optimization. The linchpin of this model was the assumption of continuing technological

37. SEGGER & KHAFLAN, *supra* note 9, at 48 (referencing Gabčíkovo-Nagymaros Project (Hung./Slovk.), Judgment, 1997 I.C.J. 7 (Sept. 25)).

38. *Id.* (internal quotation marks omitted) (referencing Appellate Body Report, *United States – Import Prohibition of Certain Shrimp and Shrimp Products*, WT/DS58/AB/R (Oct. 12, 1998)).

39. Partha Dasgupta & Geoffrey Heal, *The Optimal Depletion of Exhaustible Resources*, 41 REV. ECON. STUD. 3 (1974).

40. Joseph E. Stiglitz, *Growth with Exhaustible Natural Resources: The Competitive Economy*, 41 REV. ECON. STUD. 123 (1974).

41. R.M. Solow, *Intergenerational Equity and Exhaustible Resources*, 41 REV. ECON. STUD. 29 (1974).

42. *See generally* Dasgupta & Heal, *supra* note 39.

development, which allowed for ever-greater levels of consumption to be attained from the finite resource stock.<sup>43</sup>

Solow abandoned the net present value maximization framework for an alternative decisionmaking framework that required consumption to be maintained at current levels, or increased, indefinitely.<sup>44</sup> Solow found that consumption levels could be maintained indefinitely, so long as human capital is accumulated fast enough to offset resource depletion.<sup>45</sup> Building on Solow's work, John Hartwick developed a model showing that sustainability—that is, non-decreasing consumption levels—can be achieved if all rents from exhaustible resources are invested in man-made capital.<sup>46</sup> This rule is sometimes referred to as Hartwick's rule. One of the central linchpins of Hartwick's rule is the unlimited substitutability between natural resources and other forms of capital. With this assumption in place, a set of policies that maintain a constant stock of capital per capita will result in constant consumption, putting aside technological development.<sup>47</sup>

The Solow-Hartwick conception of sustainability was challenged by environmental economist Herman Daly, who proposed instead a version of "strong sustainability" that does not allow for unlimited substitution between natural resources and other capital.<sup>48</sup> Arguing that "the basic relation of man-made and natural capital is one of complementarity, not substitutability,"<sup>49</sup> Daly proposes three conditions for sustainability: harvest cannot exceed regeneration of renewable resources; waste emissions cannot exceed assimilative capacities of environmental media; and non-renewable natural resources may only be depleted if replaced by renewable natural resource substitutes.<sup>50</sup>

Discussions of sustainability within endogenous growth theory in the past two decades build on Stiglitz's solution to achieving sustainability through technology, but with greater emphasis on the determinants and consequences of technological growth. There are several characteristics of

43. See Stiglitz, *supra* note 40, at 141–45.

44. See generally Solow, *supra* note 41.

45. *Id.* at 37.

46. John M. Hartwick, *Intergenerational Equity and the Investing of Rents from Exhaustible Resources*, 67 AM. ECON. REV. 972 (1977).

47. Robert M. Solow, *On the Intergenerational Allocation of Natural Resources*, 88 SCANDINAVIAN J. ECON. 141, 144–45 (1986).

48. Herman E. Daly, *Operationalizing Sustainable Development by Investing in Natural Capital*, in INVESTING IN NATURAL CAPITAL: THE ECOLOGICAL ECONOMICS APPROACH TO SUSTAINABILITY 22, 24–25 (AnnMari Jansson et al. eds., 1994); Herman E. Daly, *Toward Some Operational Principles of Sustainable Development*, 2 ECOLOGICAL ECON. 1 (1990).

49. Daly, *Operationalizing Sustainable Development by Investing in Natural Capital*, *supra* note 48, at 26.

50. Herman Daly, *Can We Grow Our Way Into an Environmentally Sustainable World?*, in ECOLOGICAL ECONOMICS AND SUSTAINABLE DEVELOPMENT: SELECTED ESSAYS OF HERMAN DALY 57–58 (2007).

endogenous growth theory that have important ramifications for sustainability. One is that “decreasing returns with respect to man-made capital . . . are absent,”<sup>51</sup> which allows for perpetual growth. This is possible because capital includes knowledge, both technical know-how as well as a variety of social forms of knowledge that support economic productivity. This form of capital may escape diminishing returns “[i]f social interaction, economic activity, investment and problem solving yield new ideas and if knowledge spillovers inspire others.”<sup>52</sup>

Even with the possibility of unlimited technological development, endogenous growth models do not imply that markets will naturally tend toward sustainability or continuing growth absent government intervention. A variety of skewed incentives, including the externalization of pollution costs, can distort incentives for investment in the optimal basket of potential technologies and may lead to unsustainable levels of resource depletion.<sup>53</sup>

### B. Saving Green Growth from the Fate of Sustainability

Although, as discussed above, there are many disparate conceptions of sustainable development in the fields of law and economics, there are some contours that are generally shared, the most important being aspirations concerning the intergenerational distribution of resources and the balancing of environmental goals with a wide range of other social priorities.<sup>54</sup>

The aspirational elements of sustainable development—both with respect to intergenerational responsibility and environmental balance—track some prominent statements concerning green growth. For example, the Organisation for Economic Co-operation and Development (OECD) gave the following definition in its report on its Green Growth Strategy: “[G]reen growth can be seen as a way to pursue economic growth and development, while preventing environmental degradation, biodiversity loss and unsustainable natural resource use.”<sup>55</sup> The United Nations Economic and Social Commission for Asia and the Pacific states that “[g]reen growth

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51. Sjak Smulders, *Endogenous Growth Theory and the Environment*, in HANDBOOK OF ENVIRONMENTAL AND RESOURCE ECONOMICS 610, 613 (Jeroen C.J.M. van den Bergh ed., 1999).

52. *Id.*

53. *Id.* at 616.

54. Stavins et al. refer to these two sets of concerns as the “efficiency” and the “equity” sides of sustainable development. Robert N. Stavins et al., *Interpreting Sustainability in Economic Terms: Dynamic Efficiency Plus Intergenerational Equity*, 79 ECON. LETTERS 339, 340 (2003).

55. Meeting of the OECD Council at Ministerial Level, Paris, Fr., May 27–28, 2010, *Interim Report of the Green Growth Strategy: Implementing Our Commitments for a Sustainable Future*, at 13, OECD Doc. C/MIN(2010)5, available at <http://www.oecd.org/dataoecd/42/46/45312720.pdf>.

[is] . . . economic progress that fosters environmentally sustainable, low-carbon and socially inclusive development,”<sup>56</sup> while the United Nations Environmental Program defines it similarly as “[the] vision of greener, cleaner, low-carbon and resource-efficient economies and societies.”<sup>57</sup> Striking a similar chord, a European Union report defines green growth as growth that “results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.”<sup>58</sup>

Similar language infuses related concepts, such as “green GDP”<sup>59</sup> and other terms along what might be called the green spectrum,<sup>60</sup> including concepts like “zero waste,”<sup>61</sup> “eco-efficiency,”<sup>62</sup> and environmental “decoupling.”<sup>63</sup> Taken together, all of these ideas point in roughly the same direction: toward aspirations of reducing the impact of human societies on the natural environment, for the sake of both current and future

56. U.N. ECON. & SOC. COMM’N FOR ASIA & THE PAC. ET AL., GREEN GROWTH, RESOURCES AND RESILIENCE: ENVIRONMENTAL SUSTAINABILITY IN ASIA AND THE PACIFIC xv (2012), available at <http://www.unescap.org/esd/environment/flagpubs/GGRAP/documents/Full-Report.pdf>.

57. U.N. ENVTL. PROGRAMME, ANNUAL REPORT 2009: SEIZING THE GREEN OPPORTUNITY 15 (2010), available at [http://www.unep.org/pdf/UNEP\\_2009\\_ANNUAL\\_REPORT.pdf](http://www.unep.org/pdf/UNEP_2009_ANNUAL_REPORT.pdf).

58. *Opportunities and Options for Promoting a Green Economy in the Eastern Partnership Countries*, at 10 (June 2011), available at [http://ec.europa.eu/environment/international\\_issues/pdf/report\\_green\\_economy\\_en.pdf](http://ec.europa.eu/environment/international_issues/pdf/report_green_economy_en.pdf).

59. Though standard gross domestic product (GDP) represents the traditional measure of a state’s economic performance, “green GDP” is an attempt at a more robust figure that includes “the positive transactions that benefit well-being and the negative economic activities that diminish it.” Jianguo Wu & Tong Wu, *Green GDP*, in 2 BERKSHIRE ENCYCLOPEDIA OF SUSTAINABILITY 248, 248 (2010). For example, costs on economies such as pollution and groundwater contamination that are not included within the standard GDP figure are accounted for in “green GDP.” *Id.* at 249.

60. The “green spectrum” refers to a range of economic systems and business strategies as characterized by their environmental effects. Allan Johnson, Advisor, World Bank Grp., Remarks at the International Regulatory Reform Conference: Better Regulation for Green Growth (Mar. 10, 2011).

61. “Zero waste” refers to the idea that waste be reconceptualized as a “residual product” or “potential resource” to eliminate the acceptance of waste. *The Case for Zero Waste*, ZERO WASTE ALLIANCE, <http://www.zerowaste.org/case.htm> (last visited May 24, 2012).

62. “Eco-efficiency” refers to the integration of accounts for the outputs of industrial production, resulting in increased use of “demanufacturing” and “remanufacturing.” STEPHAN SCHMIDHEINY, BUS. COUNCIL FOR SUSTAINABLE DEV., CHANGING COURSE: A GLOBAL BUSINESS PERSPECTIVE ON DEVELOPMENT AND THE ENVIRONMENT 9–11 (1992).

63. “Decoupling” refers to the aspiration to divorce economic goods from environmental harms. OECD, *Indicators to Measure Decoupling of Environmental Pressure from Economic Growth*, at 4, OECD Doc. SG/SD(2002)1/FINAL (May 16, 2002), available at [http://www.oecd.org/officialdocuments/displaydocumentpdf/?cote=sg/sd\(2002\)1/final&doclanguage=en](http://www.oecd.org/officialdocuments/displaydocumentpdf/?cote=sg/sd(2002)1/final&doclanguage=en).

generations. Some point more fervently, others emphasize particular sub-sectors or perspectives, but all share a similar set of basic goals.

Yet, despite a great deal of sustainability talk, there are a large number of environmental problems that policymakers at the domestic and global levels have had substantial difficulty addressing. In addition to the well-documented threat of climate change,<sup>64</sup> there is a large list of other pressing environmental concerns, from loss of biodiversity<sup>65</sup> to collapsing fisheries,<sup>66</sup> desertification,<sup>67</sup> conventional air and water pollution,<sup>68</sup> and forest loss,<sup>69</sup> that have defied solution.

There are several explanations for why sustainable development goals are far more often stated than achieved. The appeal of sustainable development, especially as embodied in concrete policy solutions, is far from universal. Factual questions about the extent of environmental harm currently imposed on future generations<sup>70</sup> and normative questions about the

64. See, e.g., LENNY BERNSTEIN ET AL., INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: SYNTHESIS REPORT (2007) [hereinafter SYNTHESIS REPORT], available at [http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4\\_syr.pdf](http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf) (finding “[w]arming of the climate system is unequivocal,” and “[m]ost of the observed increase in global average temperatures since the mid-20th century is *very likely* due to the observed increase in anthropogenic [greenhouse gas] concentrations”).

65. *Why We Are Losing Biodiversity*, U.N. CONVENTION ON BIOLOGICAL DIVERSITY, <http://www.cbd.int/2011-2020/learn/#tab=1> (last visited Oct. 10, 2013) (“We are creating the greatest extinction crisis since the natural disaster that wiped out the dinosaurs 65 million years ago. These extinctions are irreversible and, given our dependence on food crops, medicines and other biological sources, pose a threat to our own well-being.”). For a primer on the relationship between climate change and biodiversity loss, see *Introduction to Climate Change and Biodiversity*, U.N. CONVENTION ON BIOLOGICAL DIVERSITY, <http://www.cbd.int/climate/intro.shtml> (last visited Oct. 10, 2013).

66. Cornelia Dean, *Study Sees ‘Global Collapse’ of Fish Species*, N.Y. TIMES, Nov. 3, 2006, at A21, available at [http://www.nytimes.com/2006/11/03/science/03fish.html?\\_r=0](http://www.nytimes.com/2006/11/03/science/03fish.html?_r=0) (“If fishing around the world continues at its present pace, more and more species will vanish, marine ecosystems will unravel and there will be ‘global collapse’ of all species currently fished, possibly as soon as midcentury, fisheries experts and ecologists are predicting.”).

67. United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, June 17, 1994, 33 I.L.M. 1328, 1332–34 (expressing concern about the impact of desertification and draught and acknowledging that the problem is of a global dimension).

68. Air pollution and water pollution continue to pose serious risks to the environment and human health. See generally *Air and Radiation: Basic Information*, U.S. ENVTL. PROTECTION AGENCY, <http://www.epa.gov/air/basic.html> (last visited Oct. 10, 2013) (providing background information on current threats to U.S. air quality); *Water Pollution—Overview*, EUR. ENV’T AGENCY, <http://www.eea.europa.eu/themes/water/water-pollution> (last visited Oct. 10, 2013).

69. Deforestation increases carbon dioxide emissions and creates a severe threat to biodiversity. *Emerging Issues: Forest Loss*, UNITED NATIONS SYSTEM-WIDE EARTHWATCH, <http://www.un.org/earthwatch/forests/forestloss.html> (last updated June 6, 2003).

70. For example, the forecasts presented in THE LIMITS TO GROWTH, *supra* note 13, and THE POPULATION BOMB, *supra* note 14, were heartily disputed by many economists,

importance of environmental values compared to other pressing social concerns<sup>71</sup> or the responsibilities of current generations to the future<sup>72</sup> are all hotly contested. These controversies may help explain why the definition of sustainable development has remained relatively fuzzy over time.

Even if a suitably clear definition of sustainable development could be developed and was largely endorsed as a correct normative aspiration, there are institutional difficulties that would hamper its implementation. There are substantial barriers to cooperation at the global level, where some policy challenges must be addressed. The costs and benefits of climate change, for example, are spread unequally across the globe.<sup>73</sup> Some regions, such as Southeast Asia, are extremely exposed to the negative effects of climate change, whereas others, like Russia, may even benefit from mild levels of warming.<sup>74</sup> In addition, because marginal abatement costs are heterogeneous across countries, an efficient carbon pricing policy would result in larger emissions reductions in some countries than others. Absent some mechanism to compensate the countries with relatively higher costs and smaller climate change risks, a unanimous international treaty will be extremely difficult to form.<sup>75</sup> This structure of unequal distribution of costs and benefits holds for many forms of global environmental threats.

Even in a purely domestic context, institutional failures arise. Those interests that are better able to organize to influence the political process are more likely to extract favorable policies from democratic governments.<sup>76</sup> In particular, large, diffuse interests are at a disadvantage against small, concentrated interests in overcoming the costs of collective action. This dynamic is especially pernicious in the environmental context, where the benefits of environmental policies tend to be particularly diffuse because

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who viewed the assumptions and specification in their analyses as “unnecessarily restrictive” and “not supported . . . by analysis of historical data or by general consensus regarding future trends.” NATHANIEL O. KEOHANE & SHEILA M. OLMSTEAD, *MARKETS AND THE ENVIRONMENT* 210 (2007).

71. See, e.g., *GLOBAL CRISES, GLOBAL SOLUTIONS* (Bjorn Lomborg ed., 2004).

72. See Eric A. Posner, *Agencies Should Ignore Distant-Future Generations*, 74 *U. CHI. L. REV.* 139 (2007).

73. See J.B. Ruhl, *The Political Economy of Climate Change Winners* 97 *MINN. L. REV.* 206, 207 (2012) (“The biophysical effects of climate change will be uneven around the globe and within the United States.”).

74. *Id.* at 207 n.2, 211 n.13 (citing national-scale integrated assessment model studies identifying North America, Russia, and Eastern Europe as best off under a range of climate change scenarios with small to substantial increases in GDP while finding Africa, parts of Asia, and small island states as likely to be worse off).

75. See J. Scott Holladay & Michael Livermore, *Regional Variation, Holdouts, and Climate Treaty Negotiations*, 4 *J. BENEFIT-COST ANALYSIS* 1, 131–57 (2013).

76. See generally MANCUR OLSON, JR., *THE LOGIC OF COLLECTIVE ACTION: PUBLIC GOODS AND THE THEORY OF GROUPS* (1965).

the entire population may be negatively affected by pollution, but the costs are often limited to particular industrial actors.<sup>77</sup>

Where environmental problems have intergenerational consequences, the failings of both global and domestic institutions are even more pronounced. For obvious reasons, future generations have no ability to directly influence the current political environment. Elected officials have far stronger incentives to respond to the short-term concerns of their existing constituents than the long-term future.<sup>78</sup> And while those same constituents may profess to have the interests of future generations at heart, voting behavior (at least in the United States) is strongly correlated with immediate economic indicators, like GDP growth.<sup>79</sup>

A focus on constraints may, some have argued, also have limited the political appeal of the concept of sustainable development. For example, Michael Shellenberger and Ted Nordhaus have argued that environmental leaders are guilty of a number of political blunders that diminish their ability to succeed in achieving large-scale structural reforms.<sup>80</sup> Chief among these is a faith that political support for scientifically supported policies will be forthcoming even when they challenge widely held norms or could jeopardize current lifestyles.<sup>81</sup> These authors argue that an alternative framing around the benefits of technological development is needed to generate the political will necessary to tackle large-scale environmental problems like climate change.<sup>82</sup>

To the extent that “green growth” amounts to a way to restate aspirations associated with sustainable development, it will be subject to the same political and rhetorical limitations that have hampered the appeal of sus-

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77. See Gabrielle Cuskelly, *Factors to Consider in Applying a Presumption Against Preemption to State Environmental Regulations*, 39 *ECOLOGY L.Q.* 283, 319 (2012) (“While industry groups are able to assert strong political pressure at the federal level, diffuse local and state environmental interests may be unable to demand the same level of responses and political accountability.”).

78. See Dennis F. Thompson, *Representing Future Generations: Political Presentism and Democratic Trusteeship*, 13 *CRITICAL REV. INT’L SOC. & POL. PHIL.* 17 (2010) (finding that voters tend to be partial toward immediate concerns); Phillip Y. Lipsky, *Democracy and Financial Crisis*, Paper Presented at the Annual Meeting of the International Political Economy Society (Nov. 12, 2011), at 10–11, available at <http://www.stanford.edu/~plipsky/democracycrisis.pdf> (asserting that term limits aggravate the tendency of representatives to favor short-term interests).

79. See MICHAEL S. LEWIS-BECK ET AL., *THE AMERICAN VOTER REVISITED* 365–93 (2008) (finding that perceptions of individual and national economic conditions affect voter behavior).

80. MICHAEL SHELLENBERGER & TED NORDHAUS, *THE DEATH OF ENVIRONMENTALISM: GLOBAL WARMING POLITICS IN A POST-ENVIRONMENTAL WORLD* 10 (2004), available at [http://www.thebreakthrough.org/images/Death\\_of\\_Environmentalism.pdf](http://www.thebreakthrough.org/images/Death_of_Environmentalism.pdf).

81. *Id.*

82. *Id.* at 26–28.

tainability within national and international policymaking. While embodying what may be a laudable, and perhaps even morally compelling, policy goal, its influence on actual decisionmaking by governments subject to political constraints may be limited absent substantial institutional change.

Indeed, discourse around green growth tends to deemphasize the constraints created by sustainability, perhaps in response to these practical and political concerns. If there is a common thread that links discussions of green growth, it is an emphasis on ways in which environmental quality improvements can be compatible with economic growth, rather than on the constraints of either economic growth or environmental quality on the other.<sup>83</sup> In this way, focus is taken away from the importance of limits to growth and is instead placed on “the private green innovation machine,”<sup>84</sup> a prospect that is more rhetorically appealing and avoids debates about environmental constraints on growth. But for this rhetorical move to be more than rebranding of an old concept, the content of green growth must also differ in some important substantive way that improves its chances of being implemented in domestic policymaking.

## II. GREEN GROWTH AS ENVIRONMENTAL COST-EFFECTIVENESS

The following part develops the concept of the green growth frontier. The first section discusses how standard economic models of environmental problems focus on tradeoffs that must be made between environmental quality and other economic goods. The second examines the deficiencies of certain claims associated with green growth rhetoric concerning the relationship between economic growth and environmental quality. The third section focuses on the concept of effectiveness, as applied to environmental and economic policy, and argues that the most useful definition of green growth is one that recognizes the existence of tradeoffs but encourages policymakers to make those tradeoffs along the frontier where all opportunities for policies that benefit both the environment and economic growth have been exhausted.

### *A. Standard Economic Models of Environmental Policy*

Underlying the standard economic theory of environmental policy is the fundamental concept of scarcity. In the environmental context, scarcity implies that, in a world of finite resources, the provision of higher levels of environmental quality (like clean air and water, climate stability, and protected natural habitats) implies less provision of other goods, such as

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83. See, e.g., Philippe Aghion et al., *No Green Growth Without Innovation*, BRUEGEL POL'Y BRIEF, Nov. 2009, at 6.

84. *Id.*

electricity, lumber, or industrial solvents. Following standard economic theory, private transactions will generate a set of optimal production and allocation decisions, so long as market failures do not interfere. Optimality, in this framework, is defined according to the Pareto-efficiency criteria, according to which no person can be made better off while leaving every other person at least as well off. When Pareto-efficiency is met, any improvement in any person's well-being must come at the expense of some other person.<sup>85</sup>

Economists have long recognized that markets do not always work perfectly and that real-world market equilibriums may not be optimal. Market failures can arise in a variety of contexts related to environmental protection. Some environmental amenities are public goods, meaning that there is very little incentive for private actors to provide them.<sup>86</sup> For example, in the case of climate stability, if a company were to reduce its greenhouse gas emissions, there would be no way for it to charge the beneficiaries: climate stability is non-excludable. Though the benefit of the emissions reduction may be higher than the costs, the company cannot recoup its investment, absent some policy mechanisms.

This same issue can be stated differently as one of externalities. An externality is an effect of a private exchange that is felt by third parties who are prevented, for whatever reason, from bargaining with the primary parties.<sup>87</sup> In the case of climate stability, the burning of fossil fuels for electricity generates negative effects (such as increased exposure to droughts due to climate change) and there are barriers that prevent the third parties exposed to those effects (future generations) from bargaining with the primary parties (electricity sellers and buyers).

The purpose of public policy in this framework is to correct for market failures and allow the economy to generate maximum economic value given finite resources.<sup>88</sup> The standard tool for evaluating policy is cost-benefit analysis, which seeks to estimate and compare the costs and benefits of a government intervention. Typically, cost-benefit analysis employs the potential-Pareto test, which asks whether the beneficiaries of the intervention could, in theory, compensate those burdened by the policy. For example, if an air quality rule imposes \$10 million in compliance costs on industry but

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85. See CENTO VELJANOVSKI, *THE ECONOMICS OF LAW* 65 (2d ed. 2006).

86. See generally Geoffrey Heal, *New Strategies for the Provision of Global Public Goods*, in *GLOBAL PUBLIC GOODS* 220, 220, 222–23 (Inge Kaul et al. eds., 1999) (describing public goods, including the “reduction of greenhouse gas emissions”).

87. See VELJANOVSKI, *supra* note 85, at 95.

88. *Id.* at 145–146.

reduces health costs valued at \$20 million by local residents, then the rule passes the potential-Pareto test (otherwise known as Kaldor-Hicks efficiency).<sup>89</sup>

Some degree of environmental protection is compatible, then, with economic well-being. Government intervention in the environmental arena is necessary to maximize overall economic well-being in the face of market failures. These government interventions are efficient if they maximize net benefits and are less than efficient if they fail to do so.

On the basis of the discussion above, it is clear that the maximization of net economic benefits implies a positive level of protection for valuable environmental amenities. In the case of climate change, the costs associated with the failure to control greenhouse gas emissions may be very high. Scientists predict a number of negative effects from global warming and climate instability, including rising sea levels, severe weather, and threats to agriculture and fisheries.<sup>90</sup> Emissions controls, while potentially costly, reduce those risks, so some level of mitigation is economically worthwhile.

This framework, which views environmental policy at least partially through the lens of the maximization of net economic benefits, has been embodied in a number of domestic policy settings. Cost-benefit analysis has been central to the U.S. regulatory system since 1981, when President Reagan directed all federal agencies to use this analysis prior to adopting new regulations.<sup>91</sup> While succeeding presidents have tinkered with the regulatory review policy, the commitment to cost-benefit analysis has remained remarkably consistent.<sup>92</sup> In Europe, the most prominent example of institutional cost-benefit analysis is the European Union's Better Regulation initiative, which the European Commission has been in the process of implementing since 2002. An important component of the Better Regulation program is a requirement that regulatory impact analyses be performed for all commission "initiatives which are likely to have a significant impact."<sup>93</sup> The purpose of the impact assessments is to "analyse both benefits and costs, and address in a balanced way all the significant economic, social and environmental impacts of . . . possible initiatives."<sup>94</sup>

It is important to note that this classic economic framework recognizes that there is a fundamental tradeoff between environmental quality and

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89. To truly be Kaldor-Hicks efficient, the marginal compliance costs must equal marginal benefits. Merely because a policy generates net benefits does not mean that it *maximizes* net benefits, which is the decision criteria employed by cost-benefit analysis. See Stavins et al., *supra* note 54, at 341.

90. SYNTHESIS REPORT, *supra* note 64.

91. Exec. Order No. 12,291, 46 Fed. Reg. 13,193 (Feb. 19, 1981).

92. RICHARD L. REVESZ & MICHAEL A. LIVERMORE, *RETAKING RATIONALITY* 152 (2008).

93. See Comm'n of the Eur. Cmty., *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions*, at 6, E.U. Doc. COM (2009) 15 final (Jan. 28, 2009).

94. *Id.*

other types of consumption. In this view, better environmental quality means less of something else. The goal is to arrive at the optimal balance of environmental quality and other goods. Of course, if the tradeoffs between environmental quality and other goods change—for example, if the cost of emissions reductions falls—then that will affect the level of protection that would be justified by cost-benefit analysis. But the overall framework applies whether the costs of controlling environmental impacts are low or high.

This standard framework evaluates environmental regulation through the lens of preference-maximization. The basic question is, given a set of productive capacities and preferences, how should resources be allocated to maximize utility, as measured by individual preferences? Effects on economic growth, employment, and international competitiveness are secondary, and are considered through their contribution to preference satisfaction.<sup>95</sup> Accounting for these second-order effects can have important consequences for estimating regulatory effects.<sup>96</sup> For developing countries especially, negative effects on economic growth or employment could outweigh even substantial gains in environmental quality. At the same time, predicting how environmental regulations will affect these outcomes is difficult, with studies often generating conflicting results.<sup>97</sup>

The standard environmental economics framework can be of some usefulness for refining the concept of green growth, but may not be able to provide a full definition. It is possible to define green growth as policy that maximizes the net benefits of economic activity, considering the full range of impacts of that activity on human well-being. This approach would equate mainstream cost-benefit analysis with green growth. But, as with sustainable development, the concept of green growth would lose any independent meaning, and it would also abandon the development orientation implied by the concept's focus on growth.

A more limited overlap between environmental economics and green growth situates the concept within the broader set of insights of environmental economics: policy involves tradeoffs, environmental goods have

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95. See generally Jonathan S. Masur & Eric A. Posner, *Regulation, Unemployment, and Cost-Benefit Analysis*, 98 VA. L. REV. 579 (2012). Typically, these other economic impacts are not directly factored into agency cost-benefit analysis of regulation, in part because of the difficulty of making accurate estimates about these effects. See generally Richard D. Morgenstern, *Analyzing the Employment Impacts of Regulation*, in DOES REGULATION KILL JOBS? 33 (Cary Coglianese et al. eds., 2013).

96. Masur & Posner, *supra* note 95.

97. See OFFICE OF MGMT. & BUDGET, EXEC. OFFICE OF THE PRESIDENT, 2011 REPORT TO CONGRESS ON THE BENEFITS AND COSTS OF FEDERAL REGULATIONS AND UNFUNDED MANDATES ON STATE, LOCAL AND TRIBAL ENTITIES 46–50 (2011), available at [http://www.whitehouse.gov/sites/default/files/omb/inforeg/2011\\_cb/2011\\_cba\\_report.pdf](http://www.whitehouse.gov/sites/default/files/omb/inforeg/2011_cb/2011_cba_report.pdf) [hereinafter OMB REPORT].

important value (which can be expressed in economic terms), and balancing competing considerations is at the heart of public policy. In this way, the “growth” component of green growth is not abandoned, and there remains potential for green growth to take on some independent meaning.

### *B. Green Growth’s Weakness as a Descriptive Account*

One of the defining characteristics of green growth discourse is a set of claims about the compatibility of environmental policy and economic growth. The claims associated with discussions of green growth can be divided roughly into two categories:

*Macroeconomic Claims:* Investment in environmental protection can achieve effective macroeconomic stimulus during business cycle downturns. Environmental policy can increase demand for local labor and reduce unemployment in developed countries.

*No Tradeoff Claims:* Environmental policy can achieve environmental goals with low, or even negative, economic costs, through productivity growth and technological innovation.

Each of these claims has been put forward by a range of supporters, including analysts, civil society organizations, and governmental actors,<sup>98</sup> but each has also drawn a number of detractors.<sup>99</sup> Ultimately, the shortcomings of these empirical claims about growth and environmental quality argue in favor of an interpretation of green growth that is more normative instead of descriptive. Rather than a positive account of the way the world is, green growth is better understood as providing a normatively desirable set of goals for policymakers, the contours of which are discussed further below.

## 1. Macroeconomic Claims

The concept of green growth has been closely associated with “green jobs” programs, especially those initiated in the wake of the 2008 global recession. These types of programs rely on Keynesian and neo-Keynesian

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98. See, e.g., Michael Faure et al., *Bucking the Kuznets Curve: Designing Effective Environmental Regulation in Developing Countries*, 51 VA. J. INT’L L. 95, 98 (2010) (asserting that there is a clear link between environmental performance and economic vitality); Michael E. Porter & Claas van der Linde, *Toward a New Conception of the Environment-Competitiveness Relationship*, 9 J. ECON. PERSP. 97, 101–04 (1995) (citing examples where corporations eliminated costly materials and redesigned products to reduce costs in response to environmental regulation).

99. See, e.g., ENVIRONMENTAL REGULATION AND THE U.S. ECONOMY 156 (Henry M. Peskin et al. eds., 1981) (finding a “small but perceptible and generally adverse effect on price level, economic growth, productivity, international trade, and an ambiguous effect on employment” due to environmental regulation).

macroeconomic models, which envision a strong role for government in reducing the negative effects of the business cycle.

In Keynes-based macroeconomic models, lags in aggregate demand result in underutilization of productive resources, including labor, causing increased unemployment during times of economic downturn.<sup>100</sup> In the aftermath of the global financial crisis during the late 2000s, central banks and governments worldwide engaged in a series of policies, based largely on recommendations generated by Keynesian macroeconomic models, to stimulate their economies through monetary and fiscal policy. For several major global economies, at least some portion of the fiscal stimulus packages enacted by governments included infrastructure or other projects that were designed to have environmentally beneficial results. Within the three largest economic zones—the European Union, the United States, and China—roughly \$330 billion in stimulus spending was directed to putatively green projects.<sup>101</sup>

Because environmental protection generates social benefits, green projects undertaken as part of stimulus programs may be economically beneficial regardless of the prevailing macroeconomic conditions. These net beneficial projects represent wise economic investments, even were they not to lead to demand stimulus. Investing in environmental projects as part of stimulus packages, then, can amount to a hedge that ensures social benefits from the spending, regardless of the macroeconomic effects.<sup>102</sup>

Indeed, spending on environmental infrastructure during a time of economic downturn can be justified according to fairly straightforward economic reasoning. During times of economic downturn, unemployment typically increases. The larger pool of unemployed, underutilized workers, which places downward pressure on wages, creates opportunities for labor-intensive projects. Even if wages are slow to respond to new economic conditions, the social opportunity costs of employing underutilized labor is small.<sup>103</sup> Because environmental projects, such as green infrastructure development, often rely on local labor, a period of economic recession represents an opportunity for government to maximize the economic value of its investment by taking advantage of favorable wage conditions. Regardless of stimulus effects, governments therefore have incentives to use lulls in the business cycle to maximize the social value for a given expenditure on

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100. See, e.g., Marc Nerlove, *Notes on the Production and Derived Demand Relations Included in Macro-Econometric Models*, 8 INT'L ECON. REV. 223, 224 (1967).

101. EDWARD B. BARBIER, A GLOBAL GREEN NEW DEAL: RETHINKING THE ECONOMIC RECOVERY 8–9 (2010).

102. *Id.*

103. See Michael A. Livermore & Jason A. Schwartz, *Analysis to Inform Public Discourse on Jobs and Regulation*, in DOES REGULATION KILL JOBS? 239, 241 (Cary Coglianese et al. eds., 2013).

labor inputs. Many green projects are good candidates for this type of spending because they are temporary—like infrastructure construction—and can be started up and wound down within relatively short time periods. They often also create benefits over long periods, so the value of the projects is largely unaffected by the point in the business cycle in which they are begun. Projects with long-term payoffs that would be marginally net beneficial during an economic boom will be much more profitable during economic downturns, when labor costs are lower.

There are several related green growth claims having to do with environmental protection and employment. One is that improvements in energy efficiency can result in increased labor demand. In the short term, energy efficiency policies would increase labor demand for various retrofitting and weatherization projects that firms would be required to undertake.<sup>104</sup> These projects must be accomplished by on-site domestic labor and cannot be outsourced overseas.<sup>105</sup> Over the long term, by reducing the cost of energy, energy efficiency programs create an income effect that increases consumer spending.<sup>106</sup> Engel and Kammen argue that improved energy efficiency will free up capital that would have otherwise been spent on energy costs. The effect could be to expand resources that are available to hire additional labor.<sup>107</sup> According to David Roland-Holst, energy efficiency programs have created more than one million jobs in California alone since 1972.<sup>108</sup>

These claims are controversial. Some critics argue that the labor demand increases from green growth initiatives are either exaggerated<sup>109</sup> or completely offset by the number of jobs that are lost or shifted by these

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104. See VAN JONES, *THE GREEN COLLAR ECONOMY: HOW ONE SOLUTION CAN FIX OUR TWO BIGGEST PROBLEMS* 8–11 (2008); see also Thomas L. Friedman, *The Green-Collar Solution*, N.Y. TIMES, Oct. 17, 2007, at A27.

105. JONES, *supra* note 104, at 13. See generally ROBERT POLLIN ET AL., *CTR. FOR AM. PROGRESS, GREEN RECOVERY: A PROGRAM TO CREATE GOOD JOBS AND START BUILDING A LOW-CARBON ECONOMY* (2008), available at [http://www.americanprogress.org/issues/2008/09/pdf/green\\_recovery.pdf](http://www.americanprogress.org/issues/2008/09/pdf/green_recovery.pdf).

106. JAMIE HOWLAND ET AL., *ENVIRONMENT NE., ENERGY EFFICIENCY: ENGINE OF ECONOMIC GROWTH* 3–5 (2009); DAVID ROLAND-HOLST, *UNIV. OF CAL. BERKELEY, ENERGY EFFICIENCY, INNOVATION, AND JOB CREATION IN CALIFORNIA* 26–29 (2008), available at [http://are.berkeley.edu/~dwrh/CERES\\_Web/Docs/UCB%20Energy%20Innovation%20and%20Job%20Creation%2010-20-08.pdf](http://are.berkeley.edu/~dwrh/CERES_Web/Docs/UCB%20Energy%20Innovation%20and%20Job%20Creation%2010-20-08.pdf).

107. Ditlev Engel & Daniel M. Kammen, *Green Jobs and the Clean Energy Economy* (Copenhagen Climate Council Thought Leadership Ser. No. 4, 2009), available at [http://climatechange.ca.gov/eaac/documents/member\\_materials/Engel\\_and\\_Kammen\\_Green\\_Jobs\\_and\\_the\\_Clean\\_Energy\\_Economy.pdf](http://climatechange.ca.gov/eaac/documents/member_materials/Engel_and_Kammen_Green_Jobs_and_the_Clean_Energy_Economy.pdf).

108. ROLAND-HOLST, *supra* note 106, at 10.

109. Sunil Sharan, Op-Ed., *The Green Jobs Myth*, WASH. POST (Feb. 26, 2010), available at <http://www.washingtonpost.com/wp-dyn/content/article/2010/02/25/AR2010022503945.html>.

policies.<sup>110</sup> Others question whether government expenditure in these areas could be better spent on other private ventures or if governments are capable of successfully implementing such a wide-scale initiative.<sup>111</sup> A more basic criticism is that dealing with two complex issues—unemployment and environmental protection—with one policy initiative is likely to miss the mark on both objectives.<sup>112</sup>

## 2. Low (or No) Cost Claims

A second green growth claim is that environmental policy can impose very low, or even negative, costs on industry. This claim is crystallized in the Porter hypothesis, according to which environmental regulations can induce more efficient production processes that actually increase productivity, putting aside environmental considerations.<sup>113</sup> These efficiencies are achieved when business managers are spurred to reevaluate production processes and rethink how best to utilize labor and capital inputs in addition to reducing environmental footprints. If this is the case, compliance with environmental goals can be achieved at zero, or even negative costs.<sup>114</sup>

The Porter hypothesis has been criticized on both theoretical and empirical grounds. From a theoretical perspective, some economists are uncomfortable with the Porter hypothesis's claim that profit maximizing firms fail to take advantage of productivity increasing innovations, which seems to conflict with economic rationality.<sup>115</sup> Empirically, there is a great deal of controversy over whether environmental rules tend to reduce or increase productivity, with studies finding effects in opposite directions.<sup>116</sup>

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110. See Jeffrey Sachs, *It Is Time To Plan for the World After Keynes*, FIN. TIMES, June 8, 2010, at 15, available at <http://www.ft.com/cms/s/0/24a4c72c-7295-11df-9f82-00144feabdc0.html#axzz2jbbxwIsh>; *The Grass Is Always Greener*, THE ECONOMIST, Apr. 2, 2009, at 78, available at <http://www.economist.com/node/13404568>.

111. See Edward L. Glaeser, *Why Green Energy Can't Power a Job Engine*, N.Y. TIMES (Jan. 18, 2011, 6:00 AM), [http://economix.blogs.nytimes.com/2011/01/18/why-green-energy-cant-power-a-job-engine/?\\_r=1](http://economix.blogs.nytimes.com/2011/01/18/why-green-energy-cant-power-a-job-engine/?_r=1); Sachs, *supra* note 110.

112. See Elizabeth Kolbert, *Greening the Ghetto: Can a Remedy Serve for Both Global Warming and Poverty?*, THE NEW YORKER, Jan. 12, 2009, at 22, 27–28, available at [http://www.newyorker.com/reporting/2009/01/12/090112fa\\_fact\\_kolbert](http://www.newyorker.com/reporting/2009/01/12/090112fa_fact_kolbert).

113. Michael E. Porter, *America's Green Strategy*, 264 SCI. AM. 168 (1991).

114. See Michael E. Porter & Claas van der Linde, *Toward a New Conception of the Environment-Competitiveness Relationship*, 9 J. ECON. PERSP. 97, 98 (1995).

115. Karen Palmer, Wallace E. Oates & Paul R. Portney, *Tightening Environmental Standards: The Benefit-Cost or the No Cost Paradigm?*, 9 J. ECON. PERSP. 119, 120–21 (1995).

116. Compare Eli Berman & Linda T.M. Bui, *Environmental Regulation and Productivity: Evidence From Oil Refineries*, 83 REV. ECON. & STAT. 498, 498–99 (2001) (finding that air quality regulations increased the productivity of oil refineries in the Los Angeles Air Basin), with Andrew A. King & Michael J. Lenox, *Does It Really Pay to Be Green? An Empirical Study of Firm Environmental and Financial Performance*, 5 J. INDUS. ECOLOGY 105 (2001) (finding that regulations did not increase the profitability of U.S. manufacturing firms between 1987–

It is worth noting that even if the Porter hypothesis holds in some cases, so that firms, in the course of complying with a new environmental regulation, discover a production process improvement that increases productivity, it does not necessarily indicate that the environmental regulation resulted in an efficient inducement of technological change. It is quite possible that, economy wide, there are many undiscovered opportunities for process improvements that have not been found because the search costs are not justified. This would be the case if the probability of discovery multiplied by the benefit of the discovery, minus the search costs, is negative. If the environmental rule induces the search nonetheless, then it would not be an efficient discovery unless some market inefficiency, such as the public good nature of information,<sup>117</sup> inhibited optimal investment in investigation.

A more expansive version of the no-tradeoff claim is that improving environmental performance can generate growth in traditional measures of economic productivity such as per capita GDP. According to this generative hypothesis, economic performance and environmental amenities are not truly scarce, in the standard sense, and instead can be mutually reinforcing.

There are several sources for this generative hypothesis. Some thinkers in endogenous growth theory postulate that investment in environmental quality can produce “productivity effects” that produce economic benefits in the form of increased environmental services, “but also productivity of human capital and other man-made assets [that] might increase through health effects or less physical depreciation.”<sup>118</sup> In a recent retrospective analysis of certain environmental programs under the Clean Air Act, the United States Environmental Protection Agency (EPA) attempted to include some of the productivity gains associated with environmental protection by modeling the macroeconomic effects of increased worker productivity from fewer work days lost from sickness.<sup>119</sup> By incorporating these effects into macroeconomic models, the EPA found that the GDP growth costs associated with the 1990 Amendments to the Clean Air Act (the centerpiece of which was a cap-and-trade program to control acid rain

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1996), and Stephen M. Meyer, *The Economic Impact of Environmental Regulation*, 3 J. ENVTL. L. & PRAC. 4 (1995) (arguing that regulations have little economic effect in either direction).

117. See Joseph E. Stiglitz, *Knowledge as a Global Public Good*, in GLOBAL PUBLIC GOODS, *supra* note 86, at 308, 311.

118. Smulders, *supra* note 51, at 617.

119. OFFICE OF AIR & RADIATION, U.S. ENVTL. PROT. AGENCY, THE BENEFITS AND COSTS OF THE CLEAN AIR ACT FROM 1990 TO 2020: SUMMARY REPORT, 6 n.4 (2011), available at <http://www.epa.gov/oar/sect812/feb11/summaryreport.pdf>.

pollution) were substantially lower than a “cost only” model that did not take those productivity gains into account.<sup>120</sup>

Energy efficiency is another area where productivity growth and environmental quality have been viewed as mutually reinforcing. In a comprehensive review of the U.S. economy that focused on opportunities to abate greenhouse gas emissions, the consulting firm McKinsey & Co. found that there are a number of energy efficiency technologies that could be implemented at zero or negative marginal costs.<sup>121</sup> For any number of hypothesized reasons, from information failure to high, context-specific discount rates, there appears to be systematic underinvestment in energy efficiency technology.<sup>122</sup> Efficiency rules, then, could produce both economic and environmental benefits.

Alternatively, commentators have argued that although investment in energy efficiency may produce productivity benefits, it is unlikely to improve environmental quality because of a phenomenon referred to as the “rebound effect.”<sup>123</sup> The rebound effect assumes that because energy productivity improvements reduce the price and increase the supply of energy, these improvements will inevitably lead to economic growth and new uses for energy.<sup>124</sup> The result is greater consumption of energy than would exist absent the productivity improvements.<sup>125</sup>

To summarize, the descriptive hypotheses associated with green growth—that environmental investment can serve as effective economic macroeconomic or employment stimulus, or that environmental quality goals can be achieved at zero or negative costs—are deeply controversial. If green growth is understood as only embodying these descriptive claims, it is subject to substantial contestation and, as an empirical matter, may ulti-

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120. *Id.* at 23–25.

121. MCKINSEY & CO., REDUCING U.S. GREENHOUSE GAS EMISSIONS: HOW MUCH AT WHAT COST? ix–xiii (2007), available at [http://www.mckinsey.com/Client\\_Service/Sustainability/Latest\\_thinking/Reducing\\_US\\_greenhouse\\_gas\\_emissions](http://www.mckinsey.com/Client_Service/Sustainability/Latest_thinking/Reducing_US_greenhouse_gas_emissions).

122. WILLIAM PRINDLE, NAT’L ACTION PLAN FOR ENERGY EFFICIENCY, ENERGY EFFICIENCY AS A LOW-COST RESOURCE FOR ACHIEVING CARBON EMISSIONS REDUCTIONS 1-1 (2009), available at [http://www.epa.gov/cleanenergy/documents/suca/ee\\_and\\_carbon.pdf](http://www.epa.gov/cleanenergy/documents/suca/ee_and_carbon.pdf) (noting that while “[s]avings from reduced energy consumption typically outweigh the cost of the energy efficiency investment,” increased energy costs are insufficient to incentivize investment in efficiency due to regulatory and market barriers).

123. See JESSE JENKINS ET AL., BREAKTHROUGH INST., ENERGY EMERGENCE: REBOUND & BACKFIRE AS EMERGENT PHENOMENA 4 (2011), available at [http://thebreakthrough.org/blog/Energy\\_Emergence.pdf](http://thebreakthrough.org/blog/Energy_Emergence.pdf).

124. *Id.*

125. For some empirical studies on the rebound effect see G. ALLAN ET AL., THE MACROECONOMIC REBOUND EFFECT AND THE UK ECONOMY (2006); David L. Greene, James R. Kahn & Robert C. Gibson, *Fuel Economy Rebound Effect for U.S. Household Vehicles*, 20 ENERGY J. 1 (1999); Joyashree Roy, *The Rebound Effect: Some Empirical Evidence from India*, 28 ENERGY POL’Y 433 (2000).

mately be proven incorrect. It also lacks any substantive meaning beyond a general (and potentially unjustified) optimism concerning the economic consequences of environmental protection.

A more productive and useful definition of green growth would steer clear of these descriptive claims and instead focus on a normative agenda of improved governmental decisionmaking in the environmental area. That is the focus of the following section.

### *C. The Green Growth Frontier as a Normative Goal*

Discussion around green growth can be understood as a reaction, to some degree, against the focus within both sustainability discourse and traditional environmental economics on the conflict between environmental quality and economic goals. While it is important not to attempt to wish this conflict away, as sometimes occurs when green growth is taken as a descriptive account of the world, it is also important to recognize that there are policy choices that governments can make to help reduce that conflict. These policies should be widely adopted in a range of development and political contexts. Certainly, there are hard, perhaps even “tragic” choices<sup>126</sup> that must sometimes be made between economic and environmental goals. But these hard choices can sometimes overshadow the easy ones where policy choices dominate across both domains.

Over the past several decades, a substantial empirical and theoretical literature has been developed on instrument choice and the cost-effectiveness of different forms of environmental policy.<sup>127</sup> In particular, market-based mechanisms, like pollution taxes and cap-and-trade systems, have been identified as achieving environmental goals at the lowest possible costs.<sup>128</sup> These findings, which are substantially less controversial than the

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126. GUIDO CALABRESI & PHILIP BOBBITT, TRAGIC CHOICES 18 (1978) (“Though scarcity can often be avoided for some goods by making them available without cost to everyone, it cannot be evaded for all goods. In the distribution of scarce goods society has to decide which methods of allotment to use, and of course each of these methods—markets, political allocations, lotteries, and so forth—may be modified, or combined with another. The distribution of some goods entails great suffering or death.”).

127. See, e.g., Lawrence H. Goulder & Ian W.H. Parry, *Instrument Choice in Environmental Policy*, 2 REV. ENVTL. ECON. & POL’Y 152 (2008); Kenneth R. Richards, *Framing Environmental Policy Instrument Choice*, 10 DUKE ENVTL. L. & POL’Y F. 221 (2000); Lawrence H. Goulder et al., *The Cost-Effectiveness of Alternative Instruments for Environmental Protection in a Second-Best Setting* (Res. for the Future, Discussion Paper No. 98-22, 1998).

128. See TODD SCHATZKI & ROBERT N. STAVINS, ANALYSIS GROUP, ADDRESSING ENVIRONMENTAL JUSTICE CONCERNS IN THE DESIGN OF CALIFORNIA’S CLIMATE POLICY (2009), available at [http://www.analysisgroup.com/uploadedFiles/Publishing/Articles/Environmental\\_Justice.pdf](http://www.analysisgroup.com/uploadedFiles/Publishing/Articles/Environmental_Justice.pdf) (discussing why cap-and-trade is an efficient mechanism of environmental regulation); A. Denny Ellerman, *Are Cap-and-Trade Programs More Effective in Meeting Environmental Goals than Command-and-Control Alternatives?*, in MOVING TO

Porter hypothesis and have achieved wide acceptance within the economics community,<sup>129</sup> do not go as far, but nevertheless point to ways that environmental and economic goals can be made more compatible.

A corollary to this literature examines how the design of government policy can affect innovation and technological development, which in turn affect the compliance costs associated with environmental protection.<sup>130</sup> Government policy that gives firms both flexibility in how environmental outcomes are achieved and incentives to continually reduce pollution can help spur development of lower-cost compliance mechanisms. This principle continues to serve as one of the primary justifications for market mechanisms, because these types of policies are viewed as best establishing the conditions for beneficial technological development.<sup>131</sup>

Environmental taxes and fees in particular have spurred excitement, both for the flexibility they give market actors and for the potential double dividend created when revenues generated by these instruments can be used to reduce other, more economically distortionary taxes.<sup>132</sup> Because the mechanisms used by governments to raise revenue—including income taxes, value added taxes, corporate taxes, capital gains taxes, sales taxes, and property taxes—all tend to distort incentives and reduce overall economic productivity, environmental taxes, where they replace taxes with greater distorting effects, can improve economic performance. The double dividend occurs when both productivity and environmental outcomes are improved.<sup>133</sup>

While flexible market mechanisms hold great promise, they should not be viewed as a panacea, or necessarily appropriate in every context. Markets require fungible commodities as their basis and enforcement infrastructure (often with sophisticated monitoring capacity) to ensure compliance. They are sometimes subject to manipulation and they benefit from the interaction of sophisticated parties engaging in arm's length transactions. In some

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MARKETS IN ENVIRONMENTAL REGULATION 30 (Jody Freeman & Charles D. Kolstad eds., 2007) (arguing that cap-and-trade is the most efficient mechanism of environmental regulation).

129. See, e.g., VELJANOVSKI, *supra* note 85, at 169–70 (“The obvious remedy to many of the problems identified above is to abandon the command-and-control approach and adopt market solutions or market-based regulation.”).

130. See Stefan Ambec et al., *The Porter Hypothesis at 20: Can Environmental Regulation Enhance Innovation and Competitiveness?* 7 (Res. for the Future, Discussion Paper No. 11-01, 2011).

131. See Adam B. Jaffe & Robert N. Stavins, *Dynamic Incentives of Environmental Regulations: The Effects of Alternative Policy Instruments on Technology Diffusion*, 29 J. ENVTL. ECON. & MGMT. S43, S43–46 (1995); Gaia J. Larsen, *Skewed Incentives: How Offshore Drilling Policies Fail to Induce Innovation to Reduce Social and Environmental Costs*, 31 STAN. ENVTL. L.J. 139, 157–60 (2012); Scott R. Milliman & Raymond Prince, *Firm Incentives to Promote Technological Change in Pollution Control*, 17 J. ENVTL. ECON. & MGMT. 247, 257–61 (1989).

132. See Lawrence H. Goulder, *Environmental Taxation and the Double Dividend: A Reader's Guide*, 2 INT'L TAX & PUB. FIN. 157 (1995).

133. *Id.*

contexts, these conditions might not be met. For example, markets to facilitate trading concerning effluent limitations for water bodies are notoriously difficult to build because of the limited fungibility of pollutants, the relatively small number of actors, and the difficulty of monitoring non-source pollution, which is a major contributor.<sup>134</sup> On the other hand, markets for emissions allowances for certain types of air pollutants have proved to be very successful, because the markets are thick, populated by sophisticated actors, and involve a (relatively) fungible commodity.<sup>135</sup>

Even where full-fledged market mechanisms are not feasible, governments have a wide variety of policy options that help reduce compliance costs, from allowing for flexible, performance-based standards to reducing permitting and paperwork burdens. Overall, the goal of achieving environmental quality goals at the lowest possible cost is standard fare in policy analysis and is generally referred to as “cost-effectiveness analysis.”<sup>136</sup> When analysts examine the costs per ton of greenhouse gas reduction<sup>137</sup> or per year of additional life expectancy<sup>138</sup> of a policy, these are essentially cost-effectiveness analyses. While cost-effectiveness does not provide a complete answer for a policy choice, the goal of the analysis to identify lowest-cost approaches is uncontroversial.

Cost-effectiveness analysis has generally focused on reducing the compliance burden associated with protecting other social goals like public health or the environment. But the mirror image of this economic cost-effectiveness analysis is environmental cost-effectiveness analysis, which seeks to reduce the burden placed on natural resources, ecosystems, or environmental health by policies that are designed to achieve economic goals. This type of analysis would take as a given some economic goal, perhaps associated with employment or productivity growth, and then seek to attain that goal in the most environmentally friendly manner. Indeed, the same policies that pass the economic cost-effectiveness test will pass the environmental cost-effectiveness test as well because they involve minimizing the rate of the tradeoff between the two goods. The difference is in the

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134. See Paul Quinlan, *Cap and Trade for Water Pollution—‘Trendy, Hip, Glitzy’ and Controversial*, GREENWIRE (May 8, 2012), available at <http://www.eenews.net/stories/1059964052>.

135. A prominent example is the EPA’s sulfur dioxide emissions permit program, which “minimizes the costs to society and promotes new technologies.” *Acid Rain Program SO<sub>2</sub> Allowances Fact Sheet*, U.S. ENVTL. PROTECTION AGENCY, <http://www.epa.gov/airmarkets/trading/factsheet.html> (last visited Sept. 12, 2013).

136. NAT’L CTR. FOR ENVTL. ECON., U.S. ENVTL. PROT. AGENCY, GUIDELINES FOR PREPARING ECONOMIC ANALYSES xi (2010), available at [http://yosemite.epa.gov/ee/epa/eerm.nsf/vwAN/EE-0568-50.pdf/\\$file/EE-0568-50.pdf](http://yosemite.epa.gov/ee/epa/eerm.nsf/vwAN/EE-0568-50.pdf/$file/EE-0568-50.pdf).

137. See generally MCKINSEY & CO., *supra* note 121.

138. See generally Tammy O. Tengs et al., *Five-Hundred Life-Saving Interventions and Their Cost-Effectiveness*, 15 RISK ANALYSIS 369 (1995).

starting point—whether the given is a particular level of environmental protection or an economic goal.

For example, pollution taxes are an extremely cost-effective way to achieve environmental goals because complying firms are given flexibility to achieve low-cost reductions. In a system where firms compete and are capable of innovation, this will lead to the lowest possible compliance costs per unit of pollution reduction. At the same time, pollution taxes can be an extremely environmentally effective way to achieve economic goals, like funding infrastructure or education. Revenue for government expenditures on these goods will need to be raised one way or another—selecting a pollution tax as a revenue-raising device achieves the government's economic goals of funding public goods while improving environmental quality. Pollution taxes are effective, then, from both an environmental and economic perspective.<sup>139</sup>

Cost- and environmental-effectiveness analyses do not provide guidance on the correct tax rate. Either an environmental or an economic goal must precede the analysis. For example, if a given level of permissible risk from particulate matter pollution is selected, the tax can be set to generate that risk at the lowest social cost. Alternatively, if a given amount of tax revenue is needed for public goods, the tax rate can be set to reach those revenue goals.

There are many ways that environmental or economic goals could be set. In the United States, the EPA is required to set ambient air pollution limits at levels that are sufficient to protect public health, with “an adequate margin of safety.”<sup>140</sup> Public revenue requirements are set with reference to necessary public goods like national defense.<sup>141</sup> Developing countries may have very specific economic growth targets for poverty reduction.<sup>142</sup> Cost-

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139. See, e.g., Janet E. Milne, *Environmental Taxation in the United States: The Long View*, 15 LEWIS & CLARK L. REV. 417, 438–39 (2011) (noting that “[i]f dedication of the revenue is not an essential part of the environmental role of the tax, government can use the revenue for other purposes”).

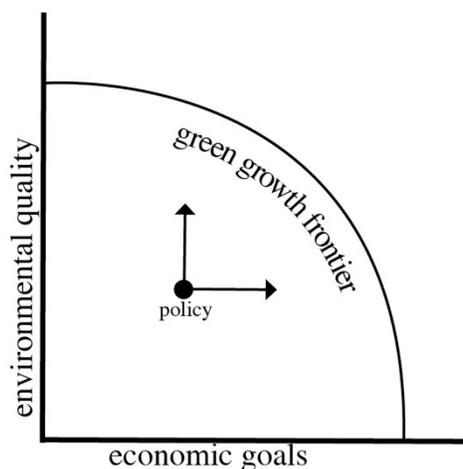
140. 42 U.S.C. § 7409(b)(1) (2012).

141. See OFFICE OF THE UNDER SEC’Y OF DEF. (COMPTROLLER), U.S. DEP’T OF DEF., *National Defense Budget Estimates for FY 2013* (2012), available at [http://comptroller.defense.gov/defbudget/fy2013/FY13\\_Green\\_Book.pdf](http://comptroller.defense.gov/defbudget/fy2013/FY13_Green_Book.pdf).

142. Prominent examples of programs successfully using growth targets to fight poverty are China’s Five Year Plans and the U.N.’s Millennium Development Goals. In China, 660 million people were removed from extreme poverty between 1981 and 2012. *Global Poverty: A Fall to Cheer*, THE ECONOMIST, Mar. 3, 2012, available at <http://www.economist.com/node/21548963>. Poverty decreased throughout Africa from 2008 to 2012, in part due to the contributions of international organizations like the World Bank. See *id.* See also *International Development Association Results*, THE WORLD BANK, <http://www.worldbank.org/ida/results.html> (last visited Sept. 13, 2013).

benefit analysis recommends maximizing preference satisfaction.<sup>143</sup> However economic or environmental goals are set, the purpose of effectiveness analysis is to achieve those goals in the least costly manner.

FIGURE 1



The green growth agenda, as illustrated in Figure 1, can be interpreted as encouraging government to make policy at the frontier where all possible policies have been selected that generate benefits along at least one dimension without causing costs in the other. This may sound like an unambitious agenda, and indeed it may be. But even though, in the aggregate, economic goals are met, green growth policies may nonetheless impose costs on particularly powerful economic actors, in which case controversy is likely to follow. Ideological commitments, divorced from economic incentives, may also pose challenges to adoption of green growth policies.

Recent history in the United States provides ample examples of opposition to green growth policies. For instance, in 2011, the EPA proposed a rule to address air pollution that travels between states, referred to as the Cross State Air Pollution Rule (CSAPR).<sup>144</sup> The rule relied heavily on market mechanisms to achieve pollution reductions, providing industry a high degree of flexibility to achieve low-cost reduction in air pollution. The

143. For a welfarist account of cost-benefit analysis, see MATTHEW D. ADLER & ERIC A. POSNER, *NEW FOUNDATIONS OF COST-BENEFIT ANALYSIS* (2006).

144. Federal Implementation Plans: Interstate Transport of Fine Particulate Matter and Ozone and Correction of SIP Approvals, 76 Fed. Reg. 48,208 (Aug. 8, 2011) (to be codified at 40 C.F.R. pts. 51, 52, 72, 78, and 97).

largest category of benefits associated with the rule was life savings from reductions in particulate matter exposure. The agency estimated benefits from the rule at between \$110 billion and more than \$280 billion per year, with costs of under \$1 billion.<sup>145</sup> Modeling of the rule by the agency found, in essence, that there would be negligible positive effects on employment.<sup>146</sup>

The rule was heavily justified on cost-benefit grounds, and seemed to promote green growth by achieving environmental benefits with no negative consequences for broad economic goals, but opposition was nevertheless stiff. Regulated industry was expected to face costs that had the potential to cause the reallocation of capital and displacement of workers.<sup>147</sup> Even though, on net, the rule did not sacrifice economic goals, there were distributional consequences that affected parties were unwilling to bear without a fight.

Many members of the Republican Party in the U.S. Congress proved a receptive audience for opponents of the rule. Republican members of the U.S. Senate forced a floor vote on a resolution under the Congressional Review Act to overturn the rule, gaining 41 votes.<sup>148</sup> Ultimately, the rule was challenged in court by regulated industry groups, as well as several states, including Texas. On August 21, 2012, a panel of the U.S. Court of Appeals for the District of Columbia Circuit held that the EPA had overstepped its statutory authorization under the Clean Air Act by adopting exactly those flexible, cost-effective market mechanisms that most promote green growth.<sup>149</sup> The Supreme Court has granted certiorari for that case,<sup>150</sup>

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145. OFFICE OF AIR & RADIATION, U.S. ENVTL. PROT. AGENCY, REGULATORY IMPACT ANALYSIS FOR THE FEDERAL IMPLEMENTATION PLANS TO REDUCE INTERSTATE TRANSPORT OF FINE PARTICULATE MATTER AND OZONE IN 27 STATES; CORRECTION OF SIP APPROVALS FOR 22 STATES, at 2 tbl.1-1 (2011).

146. *Id.* at 16 tbl.1-6.

147. Economic modeling done by representatives of regulated industry of CSAPR and a contemporaneous air pollution rule proposed by EPA to address mercury emission found that more than a million job losses would occur as the result of the rules, while similar modeling done by progressive defenders of the rule found similar levels of employment gains. Livermore & Schwartz, *supra* note 103, at 247. Although there are good reasons to doubt the accuracy of these estimates, it is very plausible that the rulemaking resulted in the reallocation of labor while having very little effect on overall employment. These competing analyses nicely demonstrate both how net effects on economic variables can hide important distributional consequences and how susceptible economic modeling can be to advocacy posturing. *See generally id.*

148. Halimah Abdullah, *Senate Defeats Rand Paul's Bid to Curb EPA Rules on Power Plant Emissions*, KENTUCKY.COM, (Nov. 11, 2011), <http://www.kentucky.com/2011/11/11/1954707/senate-defeats-rand-pauls-bid.html>. The Congressional Review Act requires a federal agency promulgating a rule to submit to each house of Congress a report containing a copy of the rule, a concise general statement relating to the rule, and the proposed effective date of the rule. 5 U.S.C. § 801(a)(1)(A) (2012). If Congress enacts a joint resolution of disapproval as described in § 802 of the Act, the rule does not take effect. § 801(g).

149. *EME Homer City Generation, L.P. v. EPA*, 696 F.3d 7 (D.C. Cir. 2012).

but whatever the ultimate resolution, CSAPR provides an illustrative case study of how intransigent opposition can slow or even derail green growth policies.

There are many cases of more purely ideological opposition to green growth policies as well. For example, as part of budget negotiations between President Barack Obama and the Republican House of Representatives in 2011, a major priority for the House was a provision to suspend enforcement of a 2007 law to encourage more energy-efficient lighting. Representative Michael Burgess was quoted at the time as saying, "When the American people gave Republicans control of the House in January, one of the major issues involved was the Democratic ban on the 100 watt bulb."<sup>151</sup> The House was ultimately successful in inserting this provision into the final budget.<sup>152</sup> Opposition to this green growth policy, which would have generated environmental benefits along with net savings for consumers, is hard to fathom except as a purely ideological exercise: the 2007 law in question was, in fact, signed by Republican president George W. Bush with broad, bipartisan majorities in both houses of Congress, and regulated industry supports enforcement of the requirements.<sup>153</sup>

Nor is opposition to green growth policies limited to one side of the political spectrum. Market mechanisms to reduce pollution remain controversial within a substantial segment of the environmental community. A recent high-profile example of opposition to market mechanisms occurred in California, when environmental justice groups protested the adoption of a cap-and-trade approach to limiting greenhouse gas emissions.<sup>154</sup> These groups preferred command-and-control style regulations that would have required more uniform emission reduction, even though they would have been more expensive and would have resulted in the same climate impact. The effort to stop California from adopting a cap-and-trade system was ultimately unsuccessful, but it shows that green growth policies can stir opposition for a diverse set of political actors.

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150. Am. Lung Ass'n v. EME Homer City Generation, L.P., 133 S. Ct. 2857 (2013).

151. Stephen Dinan, *Congress Overturns Incandescent Light Bulb Ban*, WASH. TIMES (Dec. 16, 2011), <http://www.washingtontimes.com/news/2011/dec/16/congress-overturns-incandescent-light-bulb-ban>.

152. Lori Robertson, *Refereeing the Republic Response*, FACTCHECK.ORG (Jan. 25, 2012), <http://www.factcheck.org/2012/01/refereeing-the-republican-response/>.

153. *Id.*

154. See Madeline Ostrander, *Is Cap and Trade Fair?*, THE NATION, Apr. 8, 2013, at 28.

FIGURE 2

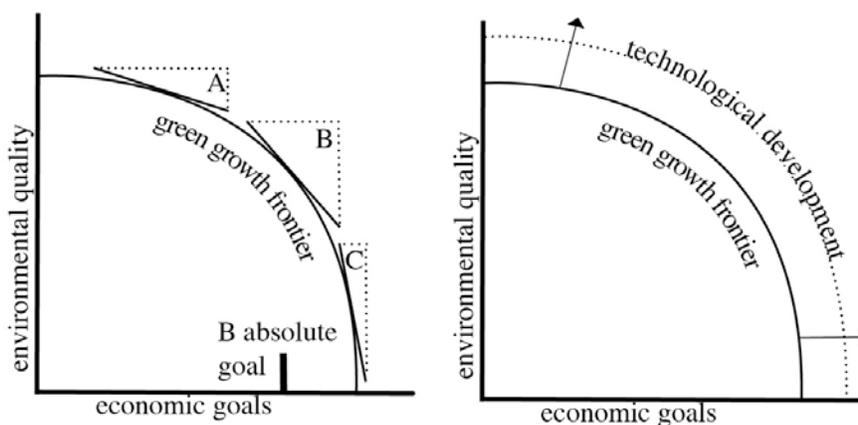


Figure 2 illustrates two additional elements of the green growth agenda. In the left panel, Countries A, B, and C will have different rates at which they are willing to trade environmental quality against economic goals. By selecting the point along the green growth frontier that corresponds to its preferred marginal rate of substitution between the two dimensions, each country can maximize its well-being. This rate of substitution is likely related to the level of development that a country has achieved; in this figure, Country A is likely the most economically advanced, while Country C would be the least developed. A rate of substitution can also be inferred in instances where policymakers set an absolute goal, such as achieving a given level of growth, and then work toward that goal along the green growth frontier. In the figure above, if Country B set some absolute economic goal, the rate of substitution could be inferred.

Green growth policies may also seek to push the frontier outward, as illustrated in the right panel. This is possible through technological development. The effectiveness frontier, which defines the most efficient possible tradeoffs between environmental and economic goals, is determined by the existing state of technology. As innovation occurs, that frontier can be moved. For example, reductions in greenhouse gases, no matter how efficient the government policy, will result in a certain level of economic costs. If radical new energy storage technology is developed, that cost would be substantially lower. The effect is to push the green growth frontier out by reducing the cost of environmental protection. Because technology itself is the result of government policy, it is sensible for the green growth agenda to focus on facilitating certain types of technological

growth. At the very minimum, the green growth agenda would include ensuring that the incentives for the development of technologies that push the effectiveness frontier outward are not undermined by externalized social costs or innovation spillover effects. For societies that are willing to make an additional investment in moving the green growth frontier outward, subsidies for technological development would be appropriate.

### III. THE GREEN GROWTH AGENDA

Achieving green growth, as defined above, requires that the conflict between environmental and economic goals be reduced to the absolute minimum. To achieve this, government decisionmakers will need to identify regulatory tools that involve the most favorable tradeoff between cost and benefits.

Over the past several decades, reform movements in both the United States and Europe have focused on a very similar set of issues. Experience from these attempts to improve regulatory quality offers important insights into how the green growth agenda can be implemented in practice.

#### *A. Growth of What?*

One question that can be asked when defining the green growth agenda is: Growth of what? Put another way, the appropriate measure of economic progress may itself be subject to scrutiny under the green growth lens.

Traditionally, aggregate production, and in particular the metric of GDP, has been the yardstick by which economic progress has been measured.<sup>155</sup> There are a number of well-known shortcomings of GDP as the measure of growth for setting social policy.<sup>156</sup> Among the many factors significantly affecting well-being that are not adequately captured by GDP are environmental quality, education, health, and leisure time.<sup>157</sup> Measures other than consumption, even broadly construed, may better track well-being.<sup>158</sup> One of the most persistently noted problems of GDP as a measure

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155. The GDP measure was developed in the United States by Simon Kuznets and his colleagues at the National Bureau of Economic Research during the 1930s as a way to provide policymakers with guidance on the extent of the effect of the Great Depression on the American economy. See Simon Kuznets, *National Income, 1929–1932*, NAT'L BUREAU ECON. RES., June 7, 1934, at 1, available at <http://www.nber.org/chapters/c2258.pdf>.

156. See JOSEPH E. STIGLITZ, AMARTYA SEN & JEAN-PAUL FITOUSSI, *MISMEASURING OUR LIVES: WHY GDP DOESN'T ADD UP* (2010); OMB REPORT, *supra* note 97, at 42–43; see also SIMON KUZNETS ET AL., *NATIONAL INCOME AND ITS COMPOSITION, 1919–1938*, at 3–60 (1941).

157. OMB REPORT, *supra* note 97, at 42–44; Daniel Kahneman et al., *Toward National Well-Being Accounts*, 94 AM. ECON. REV. 429, 430 (leisure time).

158. An alternative, National Time Accounting, measures day-to-day well-being using what is called the Day Reconstruction Method. See, e.g., Alan B. Krueger et al., *National*

of well-being is its insensitivity to the distribution of consumption.<sup>159</sup> Distribution matters to well-being because of the diminishing marginal utility of consumption.<sup>160</sup>

If the relevant economic variable to be maximized through public policy is understood to be well-being rather than aggregate consumption, policies that effectuate the redistribution of wealth may promote green growth: to the extent that low-utility consumption of luxury goods can be replaced by high-utility consumption of basic goods, there is growth in social well-being without increased environmental burden. This policy recommendation, however, may be controversial in some societies.<sup>161</sup>

Others have questioned the link between consumption and subjective well-being even at the individual level.<sup>162</sup> Richard Easterlin has observed that “at a point in time both among and within nations, happiness varies directly with income, but over time, happiness does not increase when a country’s income increases.”<sup>163</sup> The Easterlin paradox is related to, and can

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*Time Accounting: The Currency of Life*, in MEASURING THE SUBJECTIVE WELL-BEING OF NATIONS: NATIONAL ACCOUNTS OF TIME USE AND WELL-BEING 9 (Alan B. Krueger, ed., 2009).

159. See, e.g., Simon Kuznets, *Economic Growth and Income Inequality*, 45 AM. ECON. REV. 1, 27 (1955) (“Without better knowledge of the trends in secular income structure [i.e. distribution of income] and of the factors that determine them, our understanding of the whole process of economic growth is limited.”).

160. ENCYCLOPEDIA OF ECONOMICS 961 (Douglas Greenwald ed., 1982) (discussing social welfare function that reflects both aggregate consumption and distribution); see also Joseph Bankman & Thomas Griffith, *Social Welfare and the Rate Structure: A New Look At Progressive Taxation*, 75 CALIF. L. REV. 1905, 1905, 1918 n.56 (1987) (defending a welfarist approach to taxation). Diminishing marginal utility of consumption can also be incorporated into traditional cost-benefit analysis through the use of equity weighting. See David Anthoff & Richard S.J. Tol, *On International Equity Weights and National Decision Making on Climate Change*, 60 J. ENVTL. ECON. & MGMT. 14, 14 (2010); Chris Hope, *Discount Rates, Equity Weights and the Social Cost of Carbon*, 30 ENERGY ECON. 1011, 1011, 1015 (2008). However, altering legal rules to effectuate distribution goals may not be efficient in many cases. Michael A. Livermore & Jennifer S. Rosenberg, *The Shape of Distributional Analysis*, in THE GLOBALIZATION OF COST-BENEFIT ANALYSIS IN ENVIRONMENTAL POLICY 69, 76–78 (2013) (discussing Louis Kaplow & Steven Shavell, *Why the Legal System is Less Efficient than the Income Tax in Redistributing Income*, 23 J. LEGAL STUD. 667 (1994)).

161. The recent history of progressive income taxation in the United States is illustrative. Effective tax rates for the wealthiest segments of society have fallen precipitously in the past three decades. E.g., CONG. BUDGET OFFICE, HISTORICAL EFFECTIVE FEDERAL TAX RATES: 1979 TO 2005 (2007), available at <http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/88xx/doc8885/12-11-historicaltaxrates.pdf>.

162. Cf. Daniel Kahneman & Angus Deaton, *High Income Improves Evaluation of Life But Not Emotional Well-Being*, 107 PROC. NAT’L ACAD. SCI. 16,489, 16,489–90 (2010) (exploring the relationship between income level and subjective well-being).

163. Richard A. Easterlin et al., *The Happiness-Income Paradox Revisited*, 107 PROC. NAT’L ACAD. SCI. 22,463, 22,463 (2010). See also Richard A. Easterlin, *Does Economic Growth Improve the Human Lot? Some Empirical Evidence*, in NATIONS AND HOUSEHOLDS IN ECONOMIC GROWTH: ESSAYS IN HONOUR OF MOSES ABRAMOVITZ 89, 118 (Paul A. David

be partially explained by, the concept of the “hedonic treadmill” introduced by Brickman and Campbell.<sup>164</sup> According to these authors, human beings adapt to changes in their life circumstances, so that even extreme improvements or declines in the state of their material welfare will have only transitory effects on their subjective happiness.<sup>165</sup> Easterlin has also proposed that “[i]ndividuals assess their material well-being, not in terms of the absolute amount of goods they have, but relative to a social norm of what goods they ought to have.”<sup>166</sup> This phenomenon can exist not only for total consumption amounts, but also at the level of particular goods, often referred to as “positional goods.”<sup>167</sup>

If some types of consumption are driven by positional goods, there is another opportunity to make improvements in environmental quality without decreasing other elements of well-being. Measures like an automobile fuel economy standard that reduce the average size or weight for all vehicles on the road could achieve fuel savings for consumers (and generate environmental benefits) without reducing consumer welfare because the relative

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& Melvin W. Reder eds., 1974); Richard A. Easterlin, *Does Money Buy Happiness?*, 30 PUB. INT. 3 (1973). This finding has been the subject of lively empirical debate. Compare Michael R. Hagerty & Ruut Veenhoven, *Wealth and Happiness Revisited*, 64 SOC. INDICATORS RES. 1 (2003) (arguing that increasing national incomes increase national happiness), and Betsey Stevenson & Justin Wolfers, *Economic Growth and Subjective Well-Being: Reassessing the Easterlin Paradox* (Nat'l Bureau of Econ. Research, Working Paper No. 14,282, 2008) (arguing that increasing income is linked to increased self-reported happiness both within and between countries), with Richard A. Easterlin, *Feeding the Illusion of Growth and Happiness: A Reply to Hagerty and Veenhoven*, 74 SOC. INDICATORS RES. 429 (2005) (countering that Hagerty and Veenhoven misinterpreted the data and that the “paradox” still holds).

164. P. Brickman & D.T. Campbell, *Hedonic Relativism and Planning the Good Society*, in ADAPTATION LEVEL THEORY: A SYMPOSIUM 287 (M.H. Appley ed., 1971).

165. The hedonic treadmill is itself only one potential failure of “affective forecasting”—the attempt to predict how changes in consumption or circumstances will affect subjective well-being. See Daniel Kahneman & Richard H. Thaler, *Anomalies: Utility Maximization and Experienced Utility*, 20 J. ECON. PERSP. 221 (2006); Daniel Kahneman, *Objective Happiness*, in WELL-BEING: THE FOUNDATIONS OF HEDONIC PSYCHOLOGY 3, 13 (Daniel Kahneman, Ed Diener & Norbert Schwarz eds., 2003) (discussing research on P. Brickman, Dan Coates, & Ronnie Janoff-Bulman, *Lottery Winners and Accident Victims: Is Happiness Relative?*, 36 J. PERSONALITY & SOC. PSYCHOL. 917 (1978)); see also Ed Diener et al., *Beyond the Hedonic Treadmill: Revising the Adaptation Theory of Well-Being*, 61 AM. PSYCHOLOGIST 305, 313 (2006) (“Adaptation is a powerful force, but it is not so complete and automatic that it will defeat all efforts to change well-being.”). It is worth noting that there is obviously no theoretical reason why hedonic adaptation could not also operate with respect to environmental degradation as well.

166. Easterlin, *Does Money Buy Happiness?*, *supra* note 163, at 4.

167. See ROBERT H. FRANK, CHOOSING THE RIGHT POND: HUMAN BEHAVIOR AND THE QUEST FOR STATUS 7 (1985) (citing FRED HIRSCH, SOCIAL LIMITS TO GROWTH (1976)); Fredrik Carlsson et al., *Do You Enjoy Having More Than Others? Survey Evidence of Positional Goods*, 74 ECONOMICA 586, 587, 596 (2007); see also ROBERT H. FRANK, THE DARWIN ECONOMY: LIBERTY, COMPETITION, AND THE COMMON GOOD 68–74 (2011); RICHARD LAYARD, HAPPINESS: LESSONS FROM A NEW SCIENCE 45 (2005).

position of cars in a marketplace populated by smaller cars would be unaffected.<sup>168</sup>

While positional goods theory may provide some opportunities for policymakers to make environmental improvements at low cost, there are likely to be important limits. For countries at lower levels of development, consumption may not be particularly positional.<sup>169</sup> Even in high-income countries, there is some disagreement as to how important position is for many consumer goods.<sup>170</sup> Likewise, while an emphasis on increasing subjective well-being, rather than merely consumption, may have some important policy consequences,<sup>171</sup> there will remain many areas of economic life, especially in developing countries, where consumption and subjective well-being will be highly correlated. Nevertheless, additional research continues to yield valuable information about the relationship between economic activity and well-being.<sup>172</sup>

An alternative framework takes the focus of development to be increasing individuals' capabilities to lead autonomous and fulfilling lives. The leading proponent of the capabilities approach is economist and philosopher Amartya Sen. Grounded in a critique of moral theories that focus

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168. Inst. for Pol'y Integrity, *Are Passenger Vehicles Positional Goods? Consumer Welfare Implications of More Stringent CAFE Standards* 6–7 (Inst. for Pol'y Integrity, Working Paper No. 2012/4, 2012), available at [http://policyintegrity.org/files/publications/Are\\_Passenger\\_Vehicles\\_Positional\\_Goods.pdf](http://policyintegrity.org/files/publications/Are_Passenger_Vehicles_Positional_Goods.pdf).

169. Basic necessities like food and water are “pure private goods,” in that their utility is not in part derived from others' consumption. Only after demands for private goods are satisfied do demands for “social” or “positional” goods manifest. FRED HIRSCH, *SOCIAL LIMITS TO GROWTH* 3–5 (1976). The transition from private to positional consumption in developed countries may help to explain the Easterlin paradox. See Easterlin, *Does Economic Growth Improve the Human Lot?*, *supra* note 163; Easterlin, *Does Money Buy Happiness*, *supra* note 163.

170. Compare Robert H. Frank & Cass R. Sunstein, *Cost-Benefit Analysis and Relative Position*, 68 U. CHI. L. REV. 323, 336–55 (2001) (illustrating how positionality can affect willingness to pay), with Thomas J. Kniesner & W. Kip Viscusi, *Why Relative Economic Position Does Not Matter: A Cost-Benefit Analysis*, 20 YALE J. ON REG. 1 (2003) (arguing that positionality should not affect willingness to pay because decreased positional wealth should be offset by increased positional goods).

171. See John Bronsteen, Christopher Buccafusco & Jonathan S. Masur, *Well-Being Analysis vs. Cost-Benefit Analysis*, 62 DUKE L.J. 1603 *passim* (2013).

172. See, e.g., James K. Harter & Raksha Arora, *The Impact of Time Spent Working and Job Fit on Well-Being Around the World*, in *INTERNATIONAL DIFFERENCES IN WELL-BEING* 398, 398–402 (2010) (finding that perceived job fit is consistently associated with both increased life satisfaction and experienced well-being across countries); John Ifcher & Homa Zarghamee, *Happiness and Time Preference: The Effect of Positive Affect in a Random-Assignment Experiment*, 101 AM. ECON. REV. 3109 (2011) (finding that happier people report reduced time preference for consumption).

exclusively on utility or resources,<sup>173</sup> Sen proposes that economic prosperity not be understood as “the object of the entire exercise” of “planning and policy-making,” but rather as “an intermediate goal, the importance of which is contingent on what it ultimately contributes to human lives.”<sup>174</sup> That relevant ultimate goal he calls “capabilities.”

For Sen, capabilities represent the ability of people to do certain basic things such as “meet one’s nutritional requirements, [have] the wherewithal to be clothed and sheltered, [and have] the power to participate in the social life of the community.”<sup>175</sup> These capabilities “reflect[] a person’s freedom to choose between different ways of living”<sup>176</sup> and the “ability to do valuable acts or reach valuable states of being.”<sup>177</sup> The term capability “represent[s] the alternative combinations of things a person is able to do or be—the various ‘functionings’ he or she can achieve.”<sup>178</sup>

The capabilities approach has been influential and has, to a limited degree, been implemented into policy through such measures as the U.N. Human Development Index, which has been strongly influenced by Sen.<sup>179</sup> The index is “an aggregate measure of progress in three dimensions—health, education and income.”<sup>180</sup> While self-consciously an incomplete measure of capabilities, the index “was devised explicitly as a rival to GNP” for measuring development; Sen has praised the index for “work[ing] as a

173. Amartya Sen, *Equality of What?*, in THE TANNER LECTURES ON HUMAN VALUES, 195–220 (Sterling M. McMurrin ed., 1980), reprinted in AMARTYA SEN, CHOICE, WELFARE AND MEASUREMENT (1982).

174. Amartya Sen, *Development as Capability Expansion*, 19 J. DEV. PLAN. 41, 41–42 (1989), reprinted in READINGS IN HUMAN DEVELOPMENT 3 (Sakiko Fakuda-Parr & A.K. Shiva Kumar eds., 2005).

175. Sen, *supra* note 173, at 218.

176. Sen, *supra* note 174, at 44.

177. Amartya Sen, *Capability and Well-Being*, in THE QUALITY OF LIFE 30, 30 (Martha Nussbaum & Amartya Sen eds., 1993).

178. *Id.* Sen distinguishes the capabilities approach from ones that focus on “personal utility” (most akin to traditional welfare economics); “opulence” (presumably related to GDP, a common development index); purely freedom-based approaches (either negative freedom—i.e., libertarian—or positive freedom accounts); or “resource holdings as a basis of just equality” (distinguishing Dworkinian theories of distributive justice). *Id.* Philosopher Martha Nussbaum, a proponent of this approach, has identified ten general areas where capabilities are important: life; bodily health; bodily integrity; senses, imagination, and thought; emotions; practical reason; affiliation; other species; play; and control over one’s environment. Martha C. Nussbaum, *Capabilities and Human Rights*, 66 FORDHAM L. REV. 273, 287–88 (1997).

179. U.N. DEV. PROGRAMME, THE REAL WEALTH OF NATIONS: PATHWAYS TO HUMAN DEVELOPMENT, at 16 (2010), available at [http://hdr.undp.org/en/media/HDR\\_2010\\_EN\\_Complete\\_reprint.pdf](http://hdr.undp.org/en/media/HDR_2010_EN_Complete_reprint.pdf) (“Sen’s perspective deeply informs this Report”).

180. *Id.* at 15.

simple measure like GNP but, unlike GNP, without being oblivious of everything other than incomes and commodities.”<sup>181</sup>

Adoption of capabilities as the measure of economic progress may also create opportunities to move toward the green growth frontier. Because many of these capabilities have little or no relationship to consumption, well-being can be improved without consumption growth, helping to de-link, to some degree, development goals from environmental degradation. Redirecting government attention toward capabilities that can be increased in ways that place minimal burdens on the environment, perhaps by shifting investment resources toward improving educational opportunities, has the potential to move countries further upward across both growth and environmental dimensions.

In selecting policies that affect growth, countries have a choice among a variety of alternative development paths. Green growth is achieved by policies that—whatever their economic goals—achieve those aims at the lowest possible environmental cost. Green growth does not require sacrificing development, but it demands that thought and consideration go into the environmental costs of growth, and that wasteful policies that cause unnecessary environmental harm be avoided. Whether the goal of social policy is directed toward preference satisfaction, well-being, subjective happiness, increasing human capabilities, or some amalgam of all of these, careful attention to how policies affect those outcomes, to the alternative policies that are available, and to the relative environmental consequences of those policy choices can help countries achieve their growth goals in the greenest possible manner.

### B. Regulatory Quality

Improving the effectiveness of government regulation—sometimes referred to as “regulatory quality”<sup>182</sup>—has been the focus of two significant reforms efforts on opposite sides of the Atlantic over the past several decades. In the United States, the “regulatory reform”<sup>183</sup> movement, which began in the late 1970s, grew out of a general sense of dissatisfaction with the ability of government institutions to achieve social goals—like environmental and consumer protection—without imposing undue burdens on the

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181. *Id.* at vi.

182. See OECD, *Recommendation of the Council of the OECD on Improving the Quality of Government Regulation*, at 11, C(95)21/Final (Mar. 9, 1995), available at <http://acts.oecd.org/Instruments/ShowInstrumentView.aspx?InstrumentID=128>.

183. For summaries of regulatory reform efforts in the 104th Congress, see William B. Buzbee, *Regulatory Reform or Statutory Muddle: The “Legislative Mirage” of Single Statute Regulatory Reform*, 5 N.Y.U. ENVTL. L.J. 298, 302–12 (1996); Cass R. Sunstein, *Congress, Constitutional Moments, and the Cost-Benefit State*, 48 STAN. L.R. 247, 269–88 (1996).

private marketplace.<sup>184</sup> This regulatory reform movement, which had supporters from both sides of the political spectrum<sup>185</sup> (as well as some strong detractors, especially on the left<sup>186</sup>) developed a set of institutional and instrumental recommendations that have helped set the terms of the debate over regulatory issues in the United States for several decades. Though implementation of the prescriptions of the regulatory reform movement is far from universal, there are a large number of important areas where they have been extremely influential.

In Europe, the reform movement took place somewhat later, under the name “Better Regulation,” but many of the underlying concerns that drove the regulatory reform movement in the United States, including international competitiveness and economic stagnation, were also important motivations.<sup>187</sup> The Better Regulation movement has focused on a similar set of institutional and instrumental changes as were proposed in the United States, but it was shaped and tailored for the European context.<sup>188</sup>

Regulatory quality initiatives have traditionally been based on the assumption that, in general, private markets will be the most efficient arrangement for the production and delivery of goods and services.<sup>189</sup> Both economic theory and practical experience have shown that private markets, fostered and sustained by government institutions, can be extremely efficient at processing information, coordinating private actions, harnessing innovation, and dynamically responding to new developments. Whatever the shortfalls of private markets in any individual instance (from a domestic asset bubble to a global environmental externality) the usefulness of private markets for facilitating economic activity is widely recognized.

The advantages of private markets, and the need to avoid hampering those advantages, strongly inform these regulatory quality movements. Government policies can easily come into conflict with core elements of the market economy. Regulations that interfere with price signals, for example,

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184. REVESZ & LIVERMORE, *supra* note 92, at 21–27; see also Jerry L. Mashaw, *Reinventing Government and Regulatory Reform: Studies in the Neglect and Abuse of Administrative Law*, 57 U. PITT. L. REV. 405 (1996) (discussing the regulatory reform movement in light of the history of administrative reforms).

185. See, e.g., Sunstein, *supra* note 184, at 282 (describing efforts by key Democrats to enact compromise regulatory reform legislation); Doyle McManus, News Analysis, *Tacking to Right, Clinton Borrows GOP Core Issues*, L.A. TIMES, July 17, 1995, available at [http://articles.latimes.com/1995-07-17/news/mn-24851\\_1\\_bill-clinton](http://articles.latimes.com/1995-07-17/news/mn-24851_1_bill-clinton) (discussing President Clinton’s support for regulatory reform).

186. REVESZ & LIVERMORE, *supra* note 92, at 31–45.

187. See generally Jonathan B. Wiener, *Better Regulation in Europe*, 59 CURRENT LEGAL PROBS. 447 (2006).

188. *Id.* at 451–52.

189. See, e.g., Exec. Order No. 12,866, 3 C.F.R. § 638 (1993), reprinted as amended in 5 U.S.C. § 601 (2012).

are strongly disfavored by regulatory quality advocates because they have the potential to cause the misallocation of social resources and the distortion of production decisions.<sup>190</sup> Similarly, government regimes that favor existing market incumbents, impede trade, or subsidize specific technology have been criticized for undermining domestic and international competition.<sup>191</sup> Avoiding the conflict between government policy and smooth market functioning is one of the goals of regulatory quality initiatives.

At the same time, the role of governments in actively promoting private markets is broadly recognized.<sup>192</sup> For well-functioning private markets to flourish, governments must protect private property, courts must enforce contracts, infrastructure must be developed to encourage commerce, and investments must be made in education to promote worker productivity. Where private markets fail to maximize social goals because of externalized costs or benefits, macroeconomic effects, behavioral factors, or inequalitarian distribution of wealth or opportunity, government action may be required to maximize social well-being. Regulatory quality requires that the positive role of governments to foster efficient private markets be recognized alongside the need for policymakers to avoid market-frustrating actions.

Both regulatory reform in the United States and Better Regulation in Europe tend to take economic effectiveness as their central objective. The level of protection for social goods, like environmental quality or worker safety, was less of an emphasis than was achieving those goals at the lowest cost.<sup>193</sup> Tools like cost-effectiveness analysis have been promoted as a way to require government decisionmakers to carry out their mandates in the least burdensome manner possible.

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190. See, e.g., Robert Hahn & Scott Wallsten, *The Economics of Net Neutrality*, ECONOMISTS' VOICE, June 2006, at 1–7 (arguing against mandatory Internet non-discrimination rules). But see INIMAI M. CHETTIAR & J. SCOTT HOLLADAY, INST. FOR POLICY INTEGRITY, FREE TO INVEST: THE ECONOMIC BENEFITS OF PRESERVING NET NEUTRALITY (2010), available at [http://policyintegrity.org/files/publications/Free\\_to\\_Invest.pdf](http://policyintegrity.org/files/publications/Free_to_Invest.pdf) (arguing that non-discrimination rules can be defended on economic grounds).

191. See OECD, *The OECD Regulatory Indicators Questionnaire: Regulatory Structures and Policies in OECD Countries*, OECD Doc. No. SG/RR(98)2/FINAL (1998), available at <http://www.oecd.org/eco/reform/35862076.pdf> (listing ways in which regulatory systems can be deficient).

192. See, e.g., James Gustave Speth, *Foreword* to GLOBAL PUBLIC GOODS, *supra* note 86, at xiii.

193. See Unfunded Mandates Reform Act, 2 U.S.C. § 1535(a) (1995) (requiring U.S. agencies to choose the “least costly, most cost-effective or least burdensome alternative”); Eur. Comm’n, *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Smart Regulation in the European Union*, COM (2010) 543 final (Aug. 10, 2010) (focusing on the economic impacts of regulations). Of course, some commentators also seek to relax the stringency of protection as well. Cf. REVESZ & LIVERMORE, *supra* note 92, at 37–38.

Green growth, with its focus on achieving economic goals at the lowest possible environmental cost, should fit very comfortably within the tradition of these regulatory quality movements. Over the past several decades, regulatory quality initiatives have generated valuable experience about increasing governmental effectiveness, the institutions and instruments required, and how to tailor reforms can to specific circumstances. Although there have been failures as well as successes, and criticism as well as praise, the regulatory quality movements provide a useful template that can be drawn from by governments seeking to generate green growth policies.

Many of the core institutional reforms that are associated with regulatory quality movements are centered around ensuring that government decisionmakers have access to, and consider, information on regulatory impacts. The same type of institutional innovations that were developed to promote regulatory quality can also help governments select policy options on the green growth frontier.

One important avenue into which attempts to collect and process information has been channeled is the Regulatory Impact Assessment (RIA), probably the most widely recognized regulatory quality practice. RIA has become widespread in a number of domestic contexts, and its use continues to grow with support from international bodies like the OECD and strong traditions in the United States and Europe.<sup>194</sup> In addition, use of RIA “as an aid to environmental decision making has expanded in recent years in countries throughout Latin America, Asia, and Africa.”<sup>195</sup>

RIA has been defined by the OECD as “a systematic policy tool used to examine and measure the likely benefits, costs and effects of new or existing regulation.”<sup>196</sup> Important elements include “the objective and intended effect of the regulatory policy, an evaluation of the policy problem, consideration of alternative options, assessment of all their impacts [and] distribution, results of public consultation, compliance strategies, and processes for monitoring and evaluation.”<sup>197</sup> In a guidance document created by the U.S. Office of Information and Regulatory Affairs, components of a proper RIA include a statement of “an appropriate baseline (i.e., best

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194. See REGULATORY POLICY DIV., OECD, BUILDING AN INSTITUTIONAL FRAMEWORK FOR REGULATORY IMPACT ANALYSIS (RIA): GUIDANCE FOR POLICY MAKERS (2008) [hereinafter INSTITUTIONAL FRAMEWORK] (discussing the expansion and improvement of RIA in OECD countries).

195. Michael A. Livermore, A.J. Glusman & Gonzalo Moyano, *Global Cost-Benefit Analysis*, in THE GLOBALIZATION OF COST-BENEFIT ANALYSIS IN ENVIRONMENTAL POLICY 3, 3 (Michael A. Livermore & Richard L. Revesz eds., 2013); see also Michael A. Livermore, *Can Cost-Benefit Analysis of Environmental Policy Go Global?*, 19 N.Y.U. ENVTL. L.J. 146 (2011) (arguing that cost-benefit analysis, properly expanded, can provide important insights for decisionmakers in developing countries).

196. INSTITUTIONAL FRAMEWORK, *supra* note 194, at 14.

197. *Id.*

assessment of how the world would look in the absence of the proposed action)” and “a reasoned determination that the benefits of the intended regulation justify its costs (recognizing that some benefits and costs are difficult to quantify).”<sup>198</sup>

RIAs can take a number of different forms, depending on the scope of the proposed regulatory intervention, the information that is available, and the resources at the disposal of the analyst. Less extensive forms of RIA include cost-effectiveness analysis, which examines a range of regulatory alternatives and determines the cost-per-unit of different interventions.<sup>199</sup> For example, a cost-effectiveness analysis could determine the cost-per-life-saved of a measure to improve highway safety.<sup>200</sup> Regulatory budgeting, which allocates a certain amount of private costs that can be imposed by an agency, and requires the agency to maximize the public benefit that is generated by the imposition of those costs, is related to cost-effectiveness analysis and RIAs more generally.<sup>201</sup> Breakeven analysis is sometimes used when there is an absence of information about an important variable. For example, the U.S. Department of Homeland Security, recognizing that it does not know how effective security requirements at airports are in reducing terrorism risks, conducts breakeven analyses to determine how much of a risk reduction would be necessary for those rules to have greater benefits than costs.<sup>202</sup>

There are two ways in which a system of regulatory assessment can help promote the green growth agenda. First, regulatory assessment can be used to ensure that environmental protection initiatives are undertaken in ways that are the least costly from the perspective of economic growth. Assessment of the goals of a policy, the alternative methods for achieving those goals, and the costs associated with the different policy options give decisionmakers valuable information that can be used to push policy toward the green growth frontier. Second, regulatory assessment of economic policies and their impacts on the environment can ensure that choices fall along the green growth frontier. There are many different steps that policymakers can take to stimulate growth, including opening up protected areas for natural resource development, increasing educational opportunities for

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198. OFFICE OF INFO. & REGULATORY AFFAIRS [OIRA], EXEC. OFFICE OF THE PRESIDENT, AGENCY CHECKLIST: REGULATORY IMPACT ANALYSIS 1 (emphasis removed), available at [http://www.whitehouse.gov/sites/default/files/omb/inforeg/regpol/RIA\\_Checklist.pdf](http://www.whitehouse.gov/sites/default/files/omb/inforeg/regpol/RIA_Checklist.pdf).

199. See, e.g., *id.*

200. See generally Tengs et al., *supra* note 138 (reviewing cost-per-life-year-saved of “interventions” in transportation and other sectors).

201. See Nick Malyshev, *A Primer on Regulatory Budgets*, 10 OECD J. ON BUDGETING, no. 3, 2010 at 1, 10, available at <http://www.oecd.org/dataoecd/25/53/48170563.pdf>.

202. See STUART SHAPIRO, AM. ENTER. INST. CTR. FOR REGULATORY & MKT. STUDIES, ANALYSIS OF HOMELAND SECURITY REGULATIONS, SMALL STEPS FORWARD, GIANT LEAPS TO GO (2008), available at <http://ideas.repec.org/p/reg/wpaper/402.html>.

women, or promoting business loans to innovative start-up companies. These economic development policies can have a wide range of environmental effects, from severe depletion of natural resources to environmental quality improvements. As governments evaluate the choices they have for promoting economic growth, they can be sure to consider the full range of regulatory options and programs in light of their respective environmental costs.

It can be difficult to achieve significant regulatory reforms where the incumbent regulatory regime is wasteful, duplicative, and overly expansive, or where political gridlock stands in the way of efforts to improve regulatory quality. For nations transitioning from a state-controlled system to a market system, or where regulatory sprawl has resulted from a lack of institutional coordination, an important initial step is often the elimination of costly and outdated rules. One method that has proved successful in streamlining and modernizing regulatory regimes is the so-called regulatory guillotine.<sup>203</sup> This technique typically involves the passage of a law empowering a board to review existing rules and to recommend their repeal if those rules are illegal, unnecessary, or overly burdensome.

A “green guillotine” would be a variation on this idea. Rather than a board commissioned for the purpose of eliminating illegal and unnecessary regulations, the board’s goal would be to review rules to determine whether they, in whole or in part, impose an economic or environmental burden without a corresponding benefit. This procedure would effectively function as a check for common sense, taking both economic and environmental concerns into account.

Substantive information requirements have often been accompanied by independent institutions empowered to review agency decisionmaking. Review of regulatory initiatives in the United States is housed in all three branches of the federal government. Independent courts have played a very important historical role in policing the activities of federal agencies.<sup>204</sup> The U.S. Congress has a variety of formal and informal tools at its disposal, from the yearly budgetary process to the ability to demand information and hold public hearings that it uses to exercise some degree of review of agency decisions.<sup>205</sup>

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203. OECD ET AL., PROGRESS IN POLICY REFORMS TO IMPROVE THE INVESTMENT CLIMATE IN SOUTH EAST EUROPE: INVESTMENT REFORM INDEX 2006, at 160 box 9.2 (2006).

204. See generally Administrative Procedure Act, 5 U.S.C. §§ 556–57 (2012).

205. See Matthew D. McCubbins, Roger G. Noll & Barry R. Weingast, *Administrative Procedures as Instruments of Political Control*, 3 J.L. ECON. & ORG. 243, 248–49 (1987); see also Matthew D. McCubbins, Roger G. Noll & Barry R. Weingast, *Structure and Process, Politics and Policy: Administrative Arrangements and the Political Control of Agencies*, 75 VA. L. REV. 431, 431 (1989).

The most recent innovation in the United States, which coincided with the regulatory review movement, was the establishment of an executive review function within a White House office.<sup>206</sup> Starting under President Ronald Reagan, every president has required that administrative agencies conduct cost-benefit analyses of their proposed rulemakings and submit those documents to the White House for review. The institution of White House review of agency actions has received support from both major U.S. political parties, and is now firmly ingrained in the administrative process.<sup>207</sup>

In Europe, the ability to conduct regulatory review is also spread within different institutions. The European Court of Justice has the power under the Treaty on the Functioning of the European Union<sup>208</sup> to conduct oversight over regulatory actions.<sup>209</sup> More broadly, in 2006, the Impact Assessment Board (IAB) was created within the European Commission as part of its Better Regulation effort. The role of the IAB is to examine and issue opinions on the impact assessments that have been conducted by the directorates-general.<sup>210</sup> The IAB works directly under the authority of the Commission President, and is meant to be independent from the directorates-general, whose work the IAB reviews. Though they are not formally binding, the IAB has the power to offer recommendations and request that impact assessments be resubmitted after further analysis, giving it substantial informal force.<sup>211</sup>

An additional promising institutional innovation may be “expert consensus proposal systems,” which involve the use of expert panels to introduce consensus reforms for adoption by political bodies.<sup>212</sup> Typically, a legislative body, recognizing the need for action but unable to reach an agreement, commissions a diverse group of experts to assemble a package of reforms by consensus, which is later amended and either ratified or rejected by the legislature.<sup>213</sup> Informal panels not commissioned by the legislature can also be effective for introducing reform where the panel’s diversity and

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206. See REVESZ & LIVERMORE, *supra* note 92, at 25.

207. *Id.* at 31–42.

208. Consolidated Version of the Treaty on the Functioning of the European Union, Mar. 30, 2010, 2010 O.J. (C 83) 47 [hereinafter ECJ Treaty], available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2010:083:0047:0200:en:PDF>.

209. See *id.* arts. 263–64 (power to declare measure void).

210. *Impact Assessment Board (IAB)*, EUR. COMM’N, [http://ec.europa.eu/governance/impact/iab/iab\\_en.htm](http://ec.europa.eu/governance/impact/iab/iab_en.htm) (last visited Sept. 13, 2013).

211. Craig Robertson, *Impact Assessment in the European Union*, EIPASCOPE, no. 2, 2008, at 17, 19.

212. E. Donald Elliott, *Portage Strategies for Adapting Environmental Law and Policy During a Logjam Era*, 17 N.Y.U. ENVTL. L.J. 24, 26–27 (2008) (internal quotation marks omitted).

213. *Id.* at 51–52.

expertise are particularly weighty.<sup>214</sup> For green growth, expert panels might consist of scientists, lawyers, and business professionals who have a stake in reform. The object of their inquiry could be anything from eliminating barriers to entry for green industries and the facilitation of green finance to the reform of environmentally destructive legal rules or subsidies. Whether established formally by the legislature or informally by private initiative, expert panels can inform discussion of green growth in government.

Overall, attempts to improve regulatory quality can help facilitate green growth by maximizing the social value of investments in economic growth or environmental quality. Some tradeoffs must be made between these social goals, but regulatory quality initiatives can help ensure that those tradeoffs are made in the most efficient way possible. By collecting and aggregating information and subjecting regulatory decisionmaking to independent oversight, tools like regulatory impact analysis and institutions like the IAB have the potential to contribute to green growth by improving environmental and economic policymaking.

### *C. Green Growth in Practice*

Although the green growth agenda, as given here, has not been clearly articulated before, it represents, at some level, an obviously attractive public policy goal, and governments in a wide range of contexts have already begun putting it into practice. This section discusses some attempts to promote green growth.

#### 1. Environmental Impact Statements

Regulatory policies are an appropriate lever to promote green growth, but economic productivity itself often takes place at the micro level. For over forty years, environmental impact assessment has been used to estimate the environmental effects of projects and help avoid unnecessary environmental costs.<sup>215</sup> The United States was the first to adopt a broad environmental assessment requirement with the National Environmental Policy Act of 1969 (NEPA),<sup>216</sup> which sparked a global trend that has seen many jurisdictions around the world adopt some type of environmental assessment requirement.<sup>217</sup> While NEPA requires that agencies be informed with regard to the environmental effects of a proposal, it does not require that any specific action be taken to minimize negative effects or to

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214. *Id.* at 53.

215. INT'L ASSOC. FOR IMPACT ASSESSMENT, WHAT IS IMPACT ASSESSMENT? (2009), available at [http://www.iaia.org/publicdocuments/special-publications/What%20is%20IA\\_web.pdf](http://www.iaia.org/publicdocuments/special-publications/What%20is%20IA_web.pdf).

216. National Environmental Policy Act of 1969, 42 U.S.C. § 4332 (2006).

217. DAVID P. LAWRENCE, ENVIRONMENTAL IMPACT ASSESSMENT: PRACTICAL SOLUTIONS TO RECURRENT PROBLEMS 9 (2003).

abstain from plans likely to cause significant harm.<sup>218</sup> Nevertheless, the simple identification of environmental costs can spur deliberation about measures to achieve project goals while mitigating negative environmental consequences. These assessments, conducted at the level of public policy as well as for individual projects, are the most widely used tool of environmental law in the world<sup>219</sup> and provide a foundation for more ambitious efforts to incorporate green growth into government decisionmaking.

An important step would be the improvement of environmental assessment regimes as implemented on the ground. Perhaps the single largest challenge is the lack of post-implementation monitoring.<sup>220</sup> Monitoring is critical, both because it brings continued attention to the environmental effects of a project and because it aids in the development of better assessments in the future by testing the predictions made by past analyses. The United States does not have a consistent monitoring requirement,<sup>221</sup> and international lenders that require that environmental assessments be done for projects in developing countries often do not require ongoing monitoring.<sup>222</sup> There is, therefore, substantial room for improvement; increased monitoring in the environmental assessment process would be an important step in achieving green growth goals that builds on decades of relevant experience.

Expansion of environmental assessment to include policy-level choices has also been proposed, under the rubric of Strategic Environmental Assessment (SEA). The European Union has been at the forefront of adopting SEA requirements, with the European Parliament acting in 2001.<sup>223</sup>

In addition, the OECD,<sup>224</sup> World Bank,<sup>225</sup> and U.N. also advocate

218. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350–53 (1989).

219. See LAWRENCE, *supra* note 217.

220. See Eric Biber, *The Problem of Environmental Monitoring*, 83 U. COLO. L. REV. 1 (2011).

221. *Id.* at 60–62.

222. Christopher Wood, *Environmental Impact Assessment in Developing Countries: An Overview*, Presented at the Conference on New Directions in Impact Assessment for Development: Methods and Practice (Nov. 24–25, 2003), at 16–17. For more information on environmental assessment in developing countries, see Jesse L. Moorman & Zhang Ge, *Promoting and Strengthening Public Participation in China's Environmental Impact Assessment Process: Comparing China's EIA Law and U.S. NEPA*, 8 VT. J. ENVTL. L. 281, 286 (2007); Julie A. Lemmer, *Cleaning Up Development: EIA in Two of the World's Largest and Most Rapidly Developing Countries*, 19 GEO. INT'L ENVTL. L. REV. 275, 279–81 (2007); ECON. & TRADE BRANCH, U.N. ENV'T PROGRAMME, *STUDIES OF EIA PRACTICE IN DEVELOPING COUNTRIES* (2003) (discussing the application of EIA in developing countries).

223. Directive 2001/42/EC, of the European Parliament and of the Council of 27 June 2001 on the Assessment of the Effects of Certain Plans and Programmes on the Environment, 2001 O.J. (L 197) 30, 31.

224. OECD, *APPLYING STRATEGIC ENVIRONMENTAL ASSESSMENT: GOOD PRACTICE GUIDANCE FOR DEVELOPMENT CO-OPERATION* 32 (2006).

wider use of SEA, especially in developing countries.<sup>226</sup> SEA could benefit from the use of the green growth frontier as a way to standardize and clarify the analysis. The OECD calls for the integration of social, economic, and environmental analysis in SEA,<sup>227</sup> and the concept of green growth can help clarify the policy goal that is promoted by this analysis. Amending SEA to include green growth could make environmental review more practical for the evaluation of local as well as national and international policies and programs.

## 2. Market Incentives

Market incentive-based regulatory approaches, such as environmental taxes and cap-and-trade systems, have been long promoted as an economically efficient approach that reduces pollution at the lowest possible economic cost.<sup>228</sup> Even though, from an economic standpoint, the desirability of market mechanisms are obvious,<sup>229</sup> there are many political decisions that must be made that can generate substantial roadblocks to implementation and can even interfere (sometimes substantially) with effectiveness. The history of environmental taxes shows their *sui generis* political origins: British Columbia introduced a carbon tax—the first in North America—in 2008, shortly after a 2006 Canadian winter that was the second warmest in recorded history.<sup>230</sup> In the United States, the Love Canal disaster, in which 200 homes in upstate New York built on top of a toxic waste dump were evacuated because of public health concerns, precipitated the creation of an environmental tax on hazardous chemicals.<sup>231</sup> Sweden's carbon tax was

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225. THE WORLD BANK GRP., STRATEGIC ENVIRONMENTAL ASSESSMENT IN THE WORLD BANK: LEARNING FROM RECENT EXPERIENCE AND CHALLENGES 19–20 (Fernando Loayza ed., 2012).

226. HUSSEIN ABAZA ET AL., U.N. ENV'T PROGRAMME, ENVIRONMENTAL IMPACT ASSESSMENT AND STRATEGIC ENVIRONMENTAL ASSESSMENT: TOWARDS AN INTEGRATED APPROACH 5–10 (2004).

227. OECD, *supra* note 224, at 34–39.

228. See, e.g., Nathaniel O. Keohane, Richard L. Revesz & Robert N. Stavins, *The Choice of Regulatory Instruments in Environmental Policy*, 22 HARV. ENVTL. L. REV. 313, 313–14 (1998).

229. The academic consensus behind market mechanisms is so strong that there is a related literature that seeks to explain why these tools are not more broadly put in place by governments. See, e.g., N. Gregory Mankiw, *The Pigou Club Manifesto*, GREG MANKIW'S BLOG (Oct. 20, 2006), <http://gregmankiw.blogspot.com/2006/10/pigou-club-manifesto.html>.

230. David G. Duff, *Carbon Taxation in British Columbia*, 10 VT. J. ENVTL. L. 87, 88–89 (2008).

231. CAROLE STERN SWITZER & LYNN A. BULAN, CERCLA: COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (SUPERFUND) 3, 9 (2002). That tax has since lapsed.

implemented in 1990 to fulfill its *Rio Declaration* commitments that required the country to stabilize its carbon emissions.<sup>232</sup>

Because market tools can be used to raise revenue, questions about the distribution of that revenue can impede, or even halt, political progress.<sup>233</sup> Interest groups can also seek exemptions from environmental taxes.<sup>234</sup> In British Columbia, the carbon tax applies primarily to transportation fuels, natural gas, and fuel used in industrial processes, with other sources excluded.<sup>235</sup> In Sweden's iterations of the tax, industries including manufacturing, agriculture, and forestry pay a lower rate than the general level.<sup>236</sup> In Norway, the pulp and paper, fishmeal, domestic aviation, and domestic shipping industries pay reduced rates as well.<sup>237</sup> Differential rates and broad exemptions can both undermine both the effectiveness and the efficiency of environmental taxes.

Although market-based mechanisms to control pollution are very desirable from a green growth perspective, political barriers often impede or distort their implementation. In part because countries have been slow to replace traditional pollution-control regimes with market tools, substantial gains remain to be had if these political barriers are overcome.

### 3. New Governance

The “new governance” approach to achieving public policy goals, which seeks alternatives to “top-down” government regulation such as “collaborative private-public rule-making efforts” and “the promotion of government-supported self-regulation,” has become increasingly popular in recent years.<sup>238</sup> While “[s]cholars have expressed very different views on the

232. GLENN W. HARRISON & BENGT KRISTRÖM, *CARBON TAXES IN SWEDEN* 1 (1997).

233. A study of revenue distribution from a potential carbon allowance auction system in the United States found a wide range of distributional results, ranging from moderately progressive to severely regressive, with important geographical distributional consequences as well. Dallas Burtraw, Rich Sweeney & Margaret Walls, *The Incidence of U.S. Climate Policy: Where You Stand Depends On Where You Sit* (Res. for the Future Discussion Paper No. 08–28, 2008).

234. JENNY SUMNER, LORI BIRD & HILLARY SMITH, NAT'L RENEWABLE ENERGY LAB. TECHNICAL REPORT NREL/TP-6A2-47312, *CARBON TAXES: A REVIEW OF EXPERIENCE AND POLICY DESIGN CONSIDERATIONS* iv (2009), available at <http://www.nrel.gov/docs/fy10osti/47312.pdf>.

235. *Id.* at 16.

236. For instance, in 1993 these industries in Sweden paid only \$11.28 per ton while the general rate stood at \$45.15. Today, while both the industry and general rates have risen, the industry rate is still 25 percent of the general rate. *Id.* at 11.

237. *Id.* at 10.

238. Orly Lobel, *New Governance as Regulatory Governance*, in *THE OXFORD HANDBOOK OF GOVERNANCE* 65, (David Levi-Four ed., 2012).

significance of new governance,”<sup>239</sup> prominent commentators have argued that any genuine understanding of the administrative and regulatory state must come to grips with the role that private actors play in the design, implementation, and enforcement of government policy.<sup>240</sup> At the most practical level, new governance is associated with a range of non-traditional regulatory tools such as those included within the EU Water Framework Directive, a “radical approach” that “mixes binding legal rules and standards with non-binding forms of cooperation, information pooling, and guidance.”<sup>241</sup>

New governance tools provide many opportunities for green growth considerations to be incorporated into policymaking. By shifting the focus away from zero-sum battles that pit environmental interests against economic actors and toward policy options that are mutually beneficial, green growth accords well with the emphasis within new governance on cooperation between the regulated community and government. And within the complex negotiations that are taken as a foundational premise of new governance, solutions on the green growth frontier can serve as points of agreement around which broader consensus on policy choices can be developed.

One recent major policy development in the United States that had elements of both green growth and new governance was the “car deal” negotiated by the Barack Obama Administration and embodied in a joint rulemaking by the EPA and Department of Transportation to substantially increase fuel-efficiency requirements for new automobiles.<sup>242</sup> The “deeply consultative and deliberative process” around the car deal, which heavily involved regulated industry, resulted in the dramatic step of “letters of commitment signed by each manufacturer” agreeing not to challenge the rule in court.<sup>243</sup> As discussed above, there are many reasons why energy efficiency policies can help move societies toward the green growth frontier, including the positional nature of certain goods and behavioral quirks that drive individuals to make consumer choices that not only impose external environmental costs but fail to maximize their own preferences over the long-term. The car deal—in both its new governance style of negotiation and cooperation as well as in the green-growth-promoting policy outcomes

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239. David M. Trubek & Louise G. Trubek, *New Governance & Legal Regulation: Complementarity, Rivalry, and Transformation*, 13 COLUM. J. EUR. L. 539, 541 n.4 (2006).

240. See generally Jody Freeman, *The Private Role in Public Governance*, 75 N.Y.U. L. REV. 543 (2000).

241. Trubek & Trubek, *supra* note 239, at 540.

242. Jody Freeman, *The Obama Administration's National Auto Policy: Lessons from the "Car Deal"*, 35 HARV. ENVTL. L. REV. 343 (2011).

243. *Id.* at 363, 369.

that resulted—provides a useful model for future efforts to advance the green growth agenda.

#### 4. National Industrial Policy

Many countries, to one extent or another, engage in some forms of national industrial policy in which domestic governments become “directly involved in establishing national industrial goals and in assuring that the goals are achieved.”<sup>244</sup> Industrial policy is controversial among economists. Fears include the creation of opportunities for special interest groups to capture government policymaking, the adoption of inefficient policies like trade protection and subsidies, and the inability of governments to identify, “before the fact, a ‘winning’ industrial structure.”<sup>245</sup> Industrial policy has supporters as well, with some recent work emphasizing the need for governments to support economic innovation in particular.<sup>246</sup> The sustained expansion of the Chinese economy, which features an extremely strong government role in setting industrial policy, has spurred renewed interest in how government support for specific economic sectors can help fuel growth, especially in developing countries.<sup>247</sup>

Green growth is highly relevant for structuring national industrial policy. Putting aside the merits of whether industrial policy is a wise course of action, once a government has committed to establishing and promoting industrial goals, there is vast room for the green growth concept to inform policy choices. The energy sector, in particular, provides opportunities for choices between more or less environmentally damaging industrial policy strategies. In the United States, for example, there are a number of tax and regulatory subsidies for highly polluting sources of energy such as coal.<sup>248</sup> The grandfathering of sources that pre-date modern emissions controls may be the largest such subsidy, but beneficial tax treatment is also important.

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244. Richard B. McKenzie, *Industrial Policy*, in THE CONCISE ENCYCLOPEDIA OF ECONOMICS (David R. Henderson ed., 1993), available at <http://www.econlib.org/library/Enc1/IndustrialPolicy.html>.

245. Charles L. Schultze, *Industrial Policy: A Dissent*, 2 BROOKINGS REV. 3, 7 (1983).

246. See, e.g., ROBERT D. ATKINSON & STEPHEN J. EZELL, INNOVATION ECONOMICS: THE RACE FOR GLOBAL ADVANTAGE (2012).

247. See, e.g., OECD Development Center, Perspectives on Global Development 2013: Industrial Policies in a Changing World 5, available at [http://www.oecd.org/dev/pgd/NEW%20Sixty%20secondsPGD\\_2013.pdf](http://www.oecd.org/dev/pgd/NEW%20Sixty%20secondsPGD_2013.pdf).

248. See generally ENVIRONMENTAL LAW INSTITUTE, ESTIMATING U.S. GOVERNMENT SUBSIDIES TO ENERGY SOURCES: 2002–2008 (2009), available at [http://www.policyinnovations.org/ideas/policy\\_library/data/01561](http://www.policyinnovations.org/ideas/policy_library/data/01561) (describing tax and other subsidies to coal, renewables and other energy sources); Frank Ackerman, et al., *Grandfathering and Coal Plant Emissions: The Cost of Cleaning up the Clean Air Act*, 27 ENERGY POLICY 929 (1999), available at <http://ase.tufts.edu/gdae/Pubs/rp/Grandfathering99.pdf> (discussing economic and environmental impact of “grandfathering”).

At the same time, new policies that promote renewable energy, including tax credits, have also been adopted. Countries, then, have a choice in how they design industrial policy geared toward the energy sector: they can prop up polluting technologies or encourage the adoption of cleaner, less polluting approaches.

Because, by definition, industrial policy involves deep intervention by the government into the economy, there are many opportunities for green growth to be promoted or undermined. If governments decide that the support of specific industrial goals is appropriate, the choice of competing goals and the selection of policies for achieving those goals can be informed by the concept of green growth: goals and policies that have the lowest environmental costs should be systematically preferred. The debate over industrial policy is likely to continue for some time, but there should be broad consensus around the desirability of policies that achieve the same economic results with fewer negative environmental consequences.

## CONCLUSION

This paper has discussed the meaning of green growth, including how it is distinct from concepts like sustainable development and cost-benefit analysis. It also examines how theoretical recommendations about desirable public policy choices can be put into practice. The core definition offered here is the green growth frontier, which is the set of policies that maximize economic goals and environmental quality. Along the frontier, tradeoffs between these two domains are necessary, but policy choices that move societies toward the frontier create opportunities for economic or environmental progress that does not come at the expense of the other social objective. Although policies that trade economic progress for environmental quality, or vice versa, are likely to generate substantial political controversy, movements toward the green growth frontier offer opportunities for broader consensus and acceptance. At a time when many governments face growing environmental risks, in addition to perpetual pressure to generate economic development, green growth policies allow societies to achieve the maximum return for their investment in economic or environmental progress, however they decide to balance these sometimes competing social priorities.

