

# Firms, Regulatory Uncertainty, and the Natural Environment

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*This introduction presents a framework managers can use to deal with regulatory uncertainty and also introduces and summarizes how the papers in this special issue address what managers can expect, do, and gain from regulatory uncertainty. (Keywords: Business and Society, Competitive Advantage, Environmental Policy, Government and Business, Public Policy, Regulation)*

**D**espite the growth of voluntary corporate social responsibility programs, the market for virtue is still limited.<sup>1</sup> In the final analysis, sustainability is a public, not a private goal. Corporations are likely to become more sustainable not just because of the voluntary activity they undertake; governments by their actions and inactions are likely to affect this development. This puts a great burden on the world's governments and their regulatory systems as well as on business decision makers. Since governments have created many different kinds of regulation and utilize many different ways to regulate business impact on the natural environment, there are also many different ways in which corporations are able to respond to such regulation.

Regulations shape the corporate environment and have a crucial effect on prices, factor costs, growth in demand, industry competitiveness, R&D progress, and the commercialization of new technologies. Many analysts have argued that without regulatory certainty, decision makers are unable to assess the risks and opportunities and make the trade-offs necessary for such investments.<sup>2</sup> Uncertainty adds to the difficulty of carrying out the discounted present value

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calculations managers must do if they are to invest in new technologies. To the extent that this is true, it can have tragic consequences. For without these investments, businesses will not fulfill their potential in helping to alleviate major environmental problems such as global climate change and world water shortages.

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Today's evidence suggests that regulatory uncertainty is growing. Not surprisingly, a recent *Economist* editorial argued that the most perilous problem currently facing U.S. business is regulatory uncertainty.<sup>3</sup> Politicians around the world are trying to decide how to act on multiple issues where the regulatory impact is large—such as the financial crisis, countries' credit ratings, unemployment, and debt. Standard & Poor's highlighted the perception that American policymaking is becoming increasingly less certain when it revoked America's triple-A credit.<sup>4</sup> The nuclear disaster in Fukushima led to unforeseen turnarounds in Japan's and Germany's energy policies, with governments backtracking on previous promises they

had made. No agreement, moreover, has been reached on how to tackle the ongoing climate change crisis. How will governments proceed on this issue in the coming years? What will the long-term consequences of a lasting deadlock in global policymaking be for business, and for the climate?<sup>5</sup>

Regulatory uncertainty has a particularly large role to play when it comes to issues relating to the natural environment. The science surrounding these issues is often complex, ambiguous, and confusing and the impacts are far off. Consumers are slow to change their behavior. Politically the issues are very contentious. In the midst of a financial crisis, the voting public does not react well to stringent environmental measures. Though challenges are widely accepted as serious, politicians do not act with urgency. Even when they agree to move ahead, they engage in lengthy debates about implementation.<sup>6</sup> What form should environmental regulation take? To what extent should it be in the form of taxes, emissions trading schemes, or subsidies rather than direct regulation?<sup>7</sup>

In different parts of the world regulatory agencies have implemented very different policies.<sup>8</sup> China, which has just surpassed the U.S. as being the world's largest consumer of fossil fuel-based energy, has but 400 employees in its national environmental protection agency in comparison to the close to 18,000 employees working for the U.S. EPA. Yet China has been subsidizing its solar and wind power companies on a scale unheard of in the rest of the world.<sup>9</sup> To what extent does it remain true that corporate decision makers are able to take advantages of lax regulation in countries with weak laws and enforcement to avoid burdensome requirements?

We expect environmental regulation will continue to play a very important role in the future with the situation actually being highly paradoxical. Regulations

will continue to grow but at the same time regulatory uncertainty also will grow. Anyone familiar with environmental economics is aware that public goods, externalities, the problems faced by future generations, and transboundary pollution will continue to provide a rationale for regulation and generate momentum for it and that the regulatory burden on business therefore is not likely to abate any time soon.

It is widely accepted that an optimal allocation of resources in the presence of public goods (e.g., clean air, forests, or oceans) is incompatible with the individual incentives that otherwise drive market economies. All individuals enjoy these public goods and prefer that they be maintained, but each person gets the maximum benefit if he/she relies on others' payment for these goods.

Pollution emitted by factories, noises generated by machinery, or traffic jams resulting from the transport of products generate externalities. Externalities are the benefits or costs generated as an unintended consequence of an economic activity that do not accrue to the parties involved and where no compensation takes place. The multiple social and environmental costs that emerge from the externalities typically are not paid for by polluters or final consumers unless the government intervenes.

Financial markets throughout the world pressure managers to make short-term decisions, while sustainable development introduces a long-term perspective of meeting the environmental and socio-economic needs of the present without compromising future generations' ability to meet these needs. Many stakeholder groups have shown they can influence firms to become more sustainable, but by itself stakeholder influence is not an effective way to deal with global environmental problems.<sup>10</sup> To understand consequences and devise effective solutions, we need the long-term perspective that governments are better at providing.<sup>11</sup> They must induce individuals to contribute to the common good. Economic theory suggests that they should search for ways to have polluters pay for pollution's costs through some form of regulation or taxation.<sup>12</sup> Taxing emissions directly is the preferred way to arrive at an efficient solution. For example, the resulting damage may be partially corrected by imposing a tax on the output of a product. Given the deep financial problems governments face it is possible they will try to increase the use of environmental taxes in the future, though they have been very reluctant to do so in the past.

Transboundary pollution is another important issue that is driving the growth in regulation. Examples of damages engendered by transboundary pollution are ozone layer depletion and climate change. Legal experts have paid increasing attention to it. Just to illustrate, the Songhua River incident in November 2005, when an explosion at a state-owned chemical plant in Jilin (China) resulted in downstream pollution both in China and Russia, has led to legal reforms and to increased regulation in China.<sup>13</sup>

The articles in this special issue analyze the evolution of environmental regulations that the problems of public goods, environmental externalities, future generations, and transboundary pollution engender. They suggest how managers may best cope with these dilemmas to create competitive advantage and avoid

damage to their legitimacy. To examine these issues, the articles in the special issue are divided into three sections that deal with:

- what managers can expect;
- what managers should do; and
- what managers can gain.

Before summarizing the articles and showing how they are connected, we present a framework managers can use to cope with regulatory uncertainty.

### How Managers Can Cope

It is unfortunate that regulatory uncertainty exists and managers cannot fully move ahead with sustainability investments; but given that the uncertainty is likely to persist, managers need a tool for coping.<sup>14</sup> We start from the premise that there are different types of regulatory uncertainty to which managers are advised to adjust their responses (see Figure 1).<sup>15</sup> The different types of uncertainty rest on the following. Can the outcome of the policy be forecast? Can quantitative odds be assigned to it? Can it be described in qualitative but not in quantitative terms? Or is the outcome entirely unknown? With regard to regulations affecting the natural environment, the outcomes in many instances are not well known. This predicament prevents long-term investments. With each level of uncertainty, a different strategy must be devised.

#### *Gamble on the “Most Probable”*

In some instances, managers will be able to act based on what they perceive to be the most likely regulatory outcome. They can make bets with confidence, only to be surprised if things do not turn as they assumed. If the regulatory trajectory seems certain (a single best forecast can be made or quantitative odds assigned), managers do not have to hedge. In well-established regulatory regimes, air

**FIGURE 1.** A Tool for Coping with Regulatory Uncertainty

<b>Coping with Policy Uncertainty</b>	<b>Regulatory Certainty</b> A single best forecast can be made	<b>Regulatory Risk</b> Quantitative odds can be given to outcomes	<b>Regulatory Ambiguity</b> Qualitative outcomes can be described	<b>Policy Unknowns</b>
<i>Gamble on the “Most Probable”</i>	*	*		
<i>Take the “Robust” Route</i>		*	*	
<i>Delay until Further Clarity Emerges</i>			*	
<i>Commit with Fallbacks</i>			*	
<i>Shape the Future</i>				*

pollution permitting for instance, it may make sense to assume that the past will continue into the future.<sup>16</sup> The feed-in tariff in Germany provided certainty to the solar power industry. It increased worldwide demand and stimulated the growth of this industry, as Haley and Schuler show in their article in this special issue. Rapid progress occurs when policies are this certain. However, climate change, energy efficiency, and renewable energy regulations rarely have been this certain. They are not fixed or stable. The policies that have been in place have switched with changes in administration, public opinion, political ideology, science, technology, and global security, and with changing economic conditions. Ghosh and Nanda argue that that the uncertainty is one of the most important factors in blocking private sector investment in clean energy.<sup>17</sup> An example would be a recent announcement by the Governor of the state of Pennsylvania. In the words of a local newspaper, he has decided to “turn off the lights on renewable energy:”

Quietly but systematically, the administration has all but shut down the state Department of Environmental Protection’s Office of Energy and Technology Deployment—the state’s primary energy office—and removed directors and re-assigned staff in the Office of Energy Management in the Department of General Services and the Governor’s Green Government Council. It has also forbidden state executive agencies from signing contracts that support clean energy supply.<sup>18</sup>

Under these conditions, what should managers who wish to make long-term investments in sustainable energy projects do?

### ***Take the “Robust” Route***

Rather than bet on a single future, they can choose to pursue a robust strategy, or one that is viable regardless of regulatory changes. They can make several bets simultaneously and employ what otherwise is called a “no regrets” policy.<sup>19</sup> Managers can make multiple bets without having to know for certain how the regulations will evolve. Electric utilities often take this route. Unsure of how government regulations will affect future energy prices, they bet on many options at once—coal, natural gas, wind, renewable, and nuclear. However, unless a company is large enough and has substantial enough slack, this approach is difficult to carry out. Only big companies are able to invest in ways that provide them with such protection, regardless of how regulations unfold. Startups in energy efficiency and renewable energy such as solar power, storage, electric cars, wind power, and fuel cells are not likely to have the capacity to make multiple bets. They have to focus and make one bet at a time. If the regulatory environment is uncertain, even large companies’ frustration with regulation will grow.

### ***Delay Until Further Clarity Emerges***

In the face of the uncertainty, managers may choose to delay until further clarity emerges. They choose to stay the course for now. Only when the situation is clearer are they confident enough to act. Because of high uncertainty over expected cash flows, they refuse to make long-term commitments. Delay may work in the case of a suspect technology that does not have real promise and could diffuse widely only with large-scale public commitment. An example would be petro-algae, a technology that is far from being mature today. It is unclear whether

sufficient progress ever will be made to justify its commercialization. Another example might be fuel cells, though for some applications this technology has considerable promise. Still another example might be second generation bio-fuels. They would come from genetically engineered plants designed optimally for fuel and not food. Such plants are not now in existence and never may come into existence. While in some cases delay makes sense, it is not always the best path to follow. While delay may minimize the downside risk, it prevents companies from achieving the upside gain. When they finally decide to put their stake in the ground, it might be too late. This pattern prevailed in the U.S. auto industry in the 1970s when U.S. automakers delayed making investments in small vehicles. In the early 1970s, the price of oil rose 400 percent in a matter of weeks and U.S. automakers found their mainstay full-sized product lines hard to sell, yet they decided to wait and see. It took them years to design, manufacture, and market more fuel-efficient models. Meanwhile, they lost market share to foreign competitors. It is not clear if there is a good way to postpone. The article by Engau, Hoffmann, and Busch in the special issue suggests that if a company only commits to slow change and incremental adjustment, it may miss out.

### ***Commit With Fallbacks***

An alternative to delay is to commit with fallbacks. Make a big bet and then hedge with contingent options that protect the business should the big bet fail. This path is not a refusal to commit. It is not avoidance of moving forward. However, it still begs the question—on what basis should the big bet be made? How do managers know what it should be? Though managers may not know what to expect from regulatory authorities, they can justify the big bet they are making because they are convinced that their companies have the capabilities to achieve competitive advantage. Their companies, for instance, have a lead in a key technology, which provides them with confidence that they can move forward, even in an unstable regulatory environment. They must analyze the risk—do their firm's capabilities justify it? But since they recognize that future regulatory policies may spoil their plans however careful the risk has been analyzed, they have to protect themselves with fallbacks. Even among fossil fuel companies there have been fallbacks, and thus the managers of these firms have invested in alternatives such as solar, geothermal, and algae-based products. They have created fallback positions in renewable energy in the event that regulatory policies severely constrain fossil fuel development.<sup>20</sup> BP's "beyond petroleum" initiative was a fallback position, which built the company's image, preserved flexibility, and symbolized a pioneering stance on climate change. Committing with fallbacks is a good way to deal with the uncertainties of regulation. Yet there are problems in these choices. It is not particularly clear what the main commitment should be and what the fallbacks should be and when to switch from one to the other. How many fallbacks does a company need? Committing to fallbacks works best if there is a payoff structure such that investments that fail entail tiny losses, while those that succeed yield high returns, but knowing this payoff structure in advance when regulations are likely to shift suddenly is far from simple.

### ***Shape the Future***

A last alternative is not to be passive in the face of the uncertainty, but to try to influence what government officials and regulators do. A firm uses the resources it commands to increase the odds that the outcomes it wants will prevail. Even small firms can do this if they have a compelling business model and rely on their industry associations. Energy efficiency, solar power, wind power, and biofuels all have strong trade associations. For a firm to shape the future, it must have more than just traditional technical capabilities. To assure success, it needs a capacity for cross-sector leadership.<sup>21</sup> It must be able to form coalitions and partnerships with supply chain partners and institutions ranging from social movements to civic associations. A host of partnerships, alliances, and joint ventures must be in place. Firms that shape the future influence key players and societal gatekeepers to create an environment that benefits their business. In their article in this special issue, Fremeth and Richter develop the idea that firms should not remain passive in the face of regulatory uncertainty, that they can, should, and have tried to shape the future. This strategy, of course, is also high risk, as the Boone Pickens story that Fremeth and Richter tell illustrates, but it is also a good way to realize high returns. Shapers enter situations in flux where the future is open. The opportunities are great but shapers can easily fail. They must have a clear vision of where things are likely to go.

For firms facing uncertain policy environments, the key issues are what can they expect from regulation, what can they do, and what advantages may they achieve? The purpose of this special issue is to shed light on these concerns. A review of the articles in the special issue, arranged according to these topics, follows.

### **What Managers Can Expect: Growing Involvement in Countries Where that Involvement Was Not Previously Found and Continued Uncertainty in Other Countries**

The first three papers in this volume address the issue of what managers can expect from regulation. They tell a story about the growing and continuing impact of government policies upon particular sectors like solar energy. Haley and Schuler, in their article “Government Policy and Firm Strategy in the Solar Photovoltaic Sector: Implications for Technology and Production,” demonstrate that without government policies the global solar photovoltaic (PV) industry would not even exist. Nonetheless, they also show that the varied policies that different governments have adopted to support the production and consumption of solar PV products have contributed to considerable uncertainty. This uncertainty has yielded unintended consequences, helping China to take the lead in solar photovoltaic production, while other countries have been confined to a more niche status in the industry.<sup>22</sup>

Though the U.S. retains technology leadership in solar photovoltaics, it has fallen behind China, which has become the commercialization leader, and Germany, which is the product development leader. The U.S.’s diminished role

in the solar photovoltaic industry, despite the country's technological prowess, largely stems from weak and uncertain national and state policies. Chinese firms have been able to take advantage of the consistent policy support they have received from their government. German firms have benefitted from the steady stream of consumption incentives that the German government has provided. On the other hand, uncertain U.S. policies have hobbled U.S. firms and robbed them of their potential for global leadership. Along with missing out on global leadership, U.S. firms have not been able to keep up in job creation in this sector. Without the steady hand of government, the U.S. is likely to play a diminished role in solar photovoltaic development.

Marquis, Zhang, and Yanhua, in their article "Regulatory Uncertainty and Corporate Responses to Environmental Protection in China: Implications of the Closing Gap between Regulation and Enforcement," point to a surprising development, one that is also related to China's role. They show how Chinese environmental regulatory policies have shifted toward greater enforcement. Enforcement has stiffened. It has grown in stringency because of factors such as growing government scrutiny and reporting and public awareness.

The old paradigm in China was oriented toward economic growth at all costs. It dominated all other objectives. Now, Marquis, Zhang, and Yanhua maintain that there is a growing focus of enforcing government regulations and giving them real teeth. Moreover, the authors suggest that by itself, the increased stringency of regulation in parts of the world like China, where such stringency previously was not found, is not preventing firms from entering markets such as China. Firms actually appreciate stringency so long as it eliminates uncertainty. They are adapting to the new Chinese environment by aligning more with official government goals and metrics and participating in government-encouraged programs designed to spur environmental innovation. They are willing to accept the added stringency so long as it is accompanied by the likelihood of greater future certainty.

What most firms have trouble dealing with is ongoing regulatory uncertainty. As noted, they have trouble confronting uncertain conditions where regulation is lacking, insufficient, and unpredictable. To invest and create jobs and build future industries that will be more environmentally benign, managers need a stable policy environment. Increasingly, it is in China and not in the U.S. that they are finding this stable environment for the growth of their environmentally benign businesses.

Delmas and Burbano highlight this argument about lack of certainty in the U.S. and other developed countries in their article "Regulatory Uncertainty, Green Communication, and Greenwashing." They investigate what takes place when regulation is lacking or insufficient. These authors maintain that the main reason for greenwashing's skyrocketing frequency is precisely such limited and uncertain regulation. There is great variation in how greenwashing is treated across countries and massive legal complexity. With regulation that is so limited, companies have had little to fear with respect to punishment.

Without adequate regulation, the authors maintain that rampant greenwashing hurts consumer confidence. Consumer confidence collapses, which erodes

the potential for green market expansion. It squashes the budding green product development. To spur green business growth, the authors argue for consistently applied, sure, and certain regulation in the place of the lax regulation that currently prevails. Firms themselves, the authors maintain, will benefit from increased transparency about their environmental performance.

### **What Should Managers Do: Build a Capacity for Flexibility**

The articles in this special issue show that managers face high levels of uncertainty about multiple issues related to regulation on topics such as the real effects of the Kyoto Protocol, the possibility of new international treaties, and treaty conformity by countries like China, India, and Brazil. They also face uncertainty when new champions and advocates for environmental causes emerge in domestic contexts, and government must respond to discoveries of new environmental risks or to unexpected accidents. Though regulatory uncertainty applies globally, it is felt acutely within countries where different policy makers at national and local levels have different plans for the businesses under their jurisdiction. These shifts at the local level can be very consequential as we pointed out earlier in reference to current developments in the state of Pennsylvania.

As we have also shown, the managerial response to uncertainty can go in many directions. Only under some circumstances will managers be able to transform the constraints into opportunities. In other circumstances, their firms will just lose. They will be unable to reverse the adverse impacts of regulations on their firms. How managers handle their relationship with regulators, thus, is very important. For example, in a period of less than a decade, the debate on climate change has dramatically gained in importance and then rapidly receded. Under these conditions only some firms have flourished, and they are not necessarily the firms that government regulations were meant to affect. In “Regulatory Uncertainty and Opportunity Seeking: The Climate Change Clean Development Case,” Kolk and Mulder provide an excellent review of the state of one of the Kyoto Protocol’s main market-based policy instruments—the Clean Development Mechanism—and how this has impacted various firms. Their article highlights which firms are likely and not likely to benefit and why. Firms not likely to benefit, they argue, have been mostly in the oil and gas, automobile, and utility businesses. Their fossil fuel-based models are not being threatened, because they almost all have been allocated enough credits so far. They have been allotted enough credits because EU targets have been lax and the economic slowdown has reduced the need to lower emissions. Thus, these traditional fossil fuel-based companies can count on the status quo to continue. Those likely to benefit from the Clean Development Mechanism, on the other hand, are utilities, banks, project development, carbon offset companies, brokers, exchanges, consultants, auditors, and legal services providers.

The authors provide a detailed analysis of how each of these types of firms stands to benefit. Thus, they argue that regulatory uncertainty does not always yield clear disadvantages to all firms. Indeed, it may benefit some companies if they recognize the opportunities they can grasp and if they move early. Their

argument is very consistent with the one that Fremeth and Richter make later in the special issue.

Why then is such little attention getting paid to the possible benefits of regulatory flux? Kolk and Mulder conjecture that managers emphasize the negatives of the flux more than the positives. They emphasize the negatives more than the positives because they need to show that there is a downside in order to capitalize on their status as regulatory victims.

For firms to flourish under such conditions of uncertainty, the articles in the special issue show that they must build very unique capabilities for flexibility. In “Regulatory Uncertainty: To Prepare or to React? Evidence from the Airline Industry in the Face of Post-Kyoto Uncertainty,” Engau, Hoffmann, and Busch argue that airlines in Europe can respond in two ways to the uncertainty of their becoming a part of the European Union Emissions Trading Scheme. On the one hand, they can anticipate what is to come next and endeavor to get ready before-the-fact. On the other hand, they can just wait and respond once the situation becomes clearer. Either way, the authors argue, they will need to develop capabilities in strategic flexibility. The capabilities for flexibility that the authors identify are those in diagnosis, coordination, integration, scanning, resource deployment, alliance formation, and resource transfer. Firm culture also must change. With these capabilities in hand, the authors maintain, the airlines will be much better off regardless of which direction the EU Emissions Trading Scheme is moving.

Rothenberg and Levy make a similar argument about the importance of strategic flexibility in the auto industry. In “Corporate Climate Strategies in the Automobile Industry: An Approach to Dealing with High Uncertainty,” Rothenberg and Levy show that much of the R&D in the auto industry has shifted from original equipment manufactures to suppliers. On this basis, they make the very cogent point that if the auto manufacturers are going to survive escalating regulatory uncertainty, they will need to acquire entirely new capabilities in technology resource integration across platforms. They also will need to acquire these capabilities in integration between functions on the value added chain from suppliers to retailers.

### **What Managers Can Gain from this Capacity: *Competitive Advantage and Legitimacy***

Thus, the articles in the special issue point out that government policies affect the competitive positions of firms in many ways and managers must consider their strategic options against the background of this shifting and diverse policy landscape. With regard to business profitability, governments often are the key market determiners; they are the market makers and breakers. Sometimes managers can proactively manage their relations with government to create a regulatory environment that they prefer and sometimes they have no choice but to manage it reactively and they can do nothing more than to respond in a belated way to public policy developments they cannot sway. Creating a strategic capability for flexibility puts a very great burden on managers. Not all managers will succeed in building this capability within their firms. Fremeth and Richter in their article show that if

firms acquire this capability, they can achieve such laudable goals as competitive advantage and legitimacy. On the other hand, firms that fail to create this capability will neither achieve competitive advantage under conditions of regulatory uncertainty nor avoid loss of reputation and legitimacy.

To create this capability, Fremeth and Richter hold that managers must consider strategies that improve their firms' bargaining positions with non-market forces, and thus alter the competitive dynamic. They introduce two strategies to accomplish these goals. *Advocating for a Pragmatic, Progressive Policy* enables firms to shape future policies around their existing environmental strengths and *Systematically Embracing Advancing Regulation* enables firms to satisfy activists who would place pressure on policy makers to force firms to conform to higher environmental standards. The authors outline a framework that allows managers to decide if they should move toward one of these strategies. It helps managers assess the public/private tensions underlying their current positions, diagnose their exposure to regulatory uncertainty, and forecast their long-run vulnerabilities. By following this approach, the authors argue that managers can achieve competitive advantage and enhanced legitimacy despite the uncertainty. They provide interesting case comparisons of firms that have been and have not been successful at using the strategies that they advocate.

### Ongoing Questions

In this introduction, we have set the stage for the articles in the special issue that follow. We have presented a framework managers can use to deal with regulatory uncertainty and introduced and summarized the articles in the special issue in terms of their contributions to answering the questions of what can managers expect, do, and gain from regulatory uncertainty. Finally, we have identified a set of questions still open for future research. It is our hope that this special issue is just the first step in the revival of interest in the questions posed about regulatory uncertainty and how managers can best cope with it. The conclusion one should reach on reading the articles in the special issue is that managers can expect involvement in countries where that involvement was not found before and continued uncertainty in other countries. The best coping strategy they can rely upon to deal with the continued uncertainty is flexibility, and to handle the uncertainty they will have to build a capability for flexibility. For some firms this will mean that there is still a chance of extracting competitive advantage and legitimacy from the uncertainty. The articles in the special issue suggest both which firms are in the best position to do so and how these goals can be accomplished.

Uncertain environmental regulation will continue to play a very important role. Thus, there is a need for governments to reform the regulatory process so that firms can make investments that will bring about a more environmentally benign future. There is also a need for managers to learn how to better cope with regulatory uncertainty, as it is not likely to be eliminated any time soon. It is our hope that the articles in this special issue will provide managers with a better understanding of the impacts of regulatory uncertainty, how they can cope and benefit from it.

## Notes

1. D. Vogel, *The Market for Virtue: The Potential Limits of Corporate Social Responsibility* (Washington, D.C.: Brookings Institution Press, 2005).
2. There is a large literature on this topic, but in particular see A. Marcus, "Policy Uncertainty and Technological Innovation," *Academy of Management Review*, 6/3 (July 1981): 443-448. Also see A. Marcus, *The Adversary Economy: Business Responses to Changing Government Requirements* (Westport, CT: Quorum Books, 1984).
3. "American Idiocracy," *The Economist*, August 13, 2011, p. 66.
4. Ibid.
5. For an overview of corporate responses to global climate change, see J. Pinkse and A. Kolk, *International Business and Global Climate Change* (London: Routledge, 2009).
6. A. Marcus, P. Sommers, and F. Morris, "Alternative Arrangements for Cost Effective Pollution Abatement: The Need for Implementation Analysis," *Policy Studies Review*, 1/3 (1982): 477-83.
7. T. Ikwue, and J. Skea, "Business and the Genesis of the European Community Carbon Tax Proposal," *Business Strategy and the Environment*, 3/2 (1994): 3-10; A. Jordan, R.K.W. Wurzel, and A.R. Zito. "'New' Instruments of Environmental Governance: Patterns and Pathways of Change," *Environmental Politics*, 12/1 (2003): 3-24.
8. J.A. Aragon-Correa and E. Rubio-Lopez, "Proactive Corporate Environmental Strategies: Myths and Misunderstandings," *Long Range Planning*, 40/3 (June 2007): 357-381; A. Marcus, "U.S. Firms' Responses to Regulation: Stonewalling and Opportunism," *Long Range Planning*, 20/3 (June 1987): 98-104.
9. K. Bradsher, "China Benefits as U.S. Solar Industry Withers," *New York Times*, September 2, 2011, p. B1.
10. Multiple works have found similar results. Among the pioneers are I. Henriques and P. Sadorsky, "The Relationship between Environmental Commitment and Managerial Perceptions of Stakeholder Importance," *Academy of Management Journal*, 42/1 (February 1999): 87-99.
11. Aragon-Correa and Rubio-Lopez, op. cit.
12. T. Groves and J. Ledyard: "Optimal Allocation of Public Goods: A Solution to the Free Rider," *Econometrica*, 45/4 (May 1977): 783-809.
13. M. Faure and S. Ying, eds., *China and International Environmental Liability: Legal Remedies for Transboundary Pollution* (Cheltenham, UK and Northampton, MA: Edward Elgar Publishing, 2008).
14. See A. Marcus, *Strategic Foresight* (New York, NY: Palgrave-McMillan, 2009), pp. 14-18.
15. Previous literature has already examined how the general business environment influences the managers' decision of using their corporate capabilities to be environmentally proactive. See, for example, J.A. Aragón-Correa and S. Sharma, "A Contingent Resource-Based View of Proactive Corporate Environmental Strategy," *Academy of Management Review*, 28/1 (January 2003): 71-88. We focus on the influence of regulatory uncertainty depending on the confronted level of uncertainty.
16. However, even in well-established regulatory regimes, firms can face delays that prevent them from introducing new products and changing their business processes, as shown by A. Marcus, D. Geffen, and K. Sexton, *Reinventing Environmental Regulation: Lessons from Project XL* (Washington, D.C.: Resources for the Future, 2002).
17. S. Ghosh and R. Nanda, "Venture Capital Investment in the Clean Energy Sector," Harvard Business School Working Paper, 11=020, 2010.
18. D. Hopey, "Corbett Quietly Turning Off the Lights on Renewable Energy," *Pittsburgh Post-Gazette*, August 14, 2011.
19. Marcus, *Strategic Foresight* (New York, NY: Palgrave-McMillan, 2009).
20. J. Pinkse and D. van den Buuse, "The Development and Commercialization of Solar PV Technology in the Oil Industry," *Energy Policy* (2011 in press).
21. A. Marcus, S. Sharma, P. Shrivastava, and S. Pogutz, eds., *Cross-Sector Leadership for the Green Economy* (New York, NY: Palgrave-McMillan, 2012).
22. See Bradsher, op. cit.

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