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Chapter 2

Convergence, Divergence, and Complexity in US and European Risk Regulation

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National comparisons, whether of cuisine, driving habits, romance, or law, are apt to invoke archaic stereotypes and provoke hurt feelings. The renewed interest of late in comparing US and European health and environmental regulatory policies has been spurred in part by a series of transatlantic conflicts--often rather acrimonious--over trade restrictions and international treaties. In the last year this discord has been compounded and largely eclipsed by the post-Cold War rift regarding terrorism, security, war and Iraq; there has been a corresponding rise in mutual nationalist antipathy to those on the other side of the Atlantic.¹ The comparative studies of environmental regulation themselves sometimes succumb to unkind stereotyping. But there is much to be gained from comparative analyses, if they can be serious, respectful, and open-minded.

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Differences in regulatory policies can be the source of insight rather than discord. Our goal should be constructive dialogue and mutual learning.

A prominent viewpoint nowadays is that US and European health and environmental policies have been diverging since roughly the 1980s, with Europe adopting more stringent regulations under the banner of the “precautionary principle” while the US resists precaution and focuses on regulatory reform.² Evidence for this proposition includes more stringent European restrictions on hormones in beef and genetically modified foods, the adoption of the precautionary principle in EU law, the US withdrawal from the Kyoto Protocol on climate change, the emphasis by US presidents on cost-benefit analysis of new regulations, the increasing influence of environmental organizations and parties in European regulatory politics, and the growing role of European institutions borne of European integration. These are clearly important developments; both US and European environmental policies are clearly evolving, and each can learn much from the other’s emerging policy experience.

I argue, however, that this picture is incomplete, and that the reality is much more dynamic and complex. The stereotype of risk-averse European precaution confronting blithe American technological optimism is hardly new; Oscar Wilde cheerfully lampooned that notion in 1887.³ Serious students of regulatory policy can see that caricature for what it is. The view is widely held, for example, that US environmental law was substantially more precautionary than European environmental law in the 1970s,⁴ contradicting the crude

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stereotype. But I dispute the claim that the situation since the 1980s has now reverted to the stereotype (though my point is not to claim that the US remains more precautionary than Europe). Today, both the US and Europe have quite active risk regulatory systems. The US has hardly ceased regulating. Both the US and Europe are often highly precautionary -- and on several prominent contemporary examples, including particulate air pollution and mad cow disease in blood, it is the US that is now regulating in the more precautionary manner. The reality is that the US and Europe do not diverge much – or as much as is claimed -- on the general embrace of precaution in regulation. But they often do diverge on the particular question of which risks they select to worry about and regulate most. This particularized divergence in risk selection can give rise to visible conflicts.

Moreover, convergence and divergence are both concepts too simple to capture the interactive reality of transatlantic regulatory relations. The US and European regulatory systems are not large unified blocs, like large horses racing to be more or less precautionary across the board; rather, they are multi-nodal webs, complex networks of multiple components that are evolving simultaneously in different ways and sharing elements with each other. Although there is divergence on some issues, there is much convergence on others, including the basic criteria for regulation (with Europe also moving to adopt cost-benefit analysis), the choice of policy instruments, and the hierarchical level of governmental authority. The reality is a process of “hybridization,” in which both

systems are borrowing legal concepts from each other in a complex and continuous mutual evolution.

Hazards of Hasty Comparisons

Quick and broad comparisons of national regulatory policies are fraught with peril. Recent efforts to compare US and European environmental policies illustrate these pitfalls. First, these comparisons frequently leap to macro-scale conclusions from just one or a few highly visible examples of conflict, such as the recent controversies over genetically modified (GMO) foods and climate change, thereby succumbing to the availability heuristic (exaggerated attention to recent crises) while failing to undertake the more serious study of a broad array of comparative data.

Second, comparisons written from one side or the other frequently commit the comparativist's cardinal sins of ignorance and even disrespect of foreign law,⁵ claiming that so much has happened over here while so little has happened over there, when the reality is hardly so one-sided. For example, it is not accurate to assert that Europe has enacted many important environmental measures since the 1980s while the US has done little or has retrenched.⁶ The reality is that in the last two decades, while Europe was indeed adopting many important measures, the US (across governments of both Democrat and Republican political parties) was enacting the 1984 Hazardous and Solid Waste Amendments, the 1986 Superfund Amendments (including tough cleanup standards and the path-breaking Toxics

Release Inventory), the 1990 Oil Pollution Act, the 1990 Clean Air Act Amendments (including tight technology controls on air toxics, and the hugely successful national SO₂ allowance trading system to combat acid rain), the 1996 Safe Drinking Water Act amendments, the 1996 Food Quality Protection Act, and numerous stringent agency regulations (including the 1987 Top-Down Best Available Control Technology [BACT] policy, the 1997 Ozone and PM_{2.5} national ambient air quality standards,⁷ the 2001 standard on arsenic in drinking water, and the 2002 standard on diesel engine emissions). This is not to say that all of these policies have been desirable, nor that countries should compete to enact more laws, nor to ignore differences among presidents; it is just to say that American inactivity is not the reality. Likewise, there may have been more policy action in Europe in the 1970s than is typically recognized today. That is, after all, when the notion of precaution blossomed in German, Swedish and Swiss environmental law.

Third, comparisons along one dimension, such as whether a particular principle (say, precaution) has been adopted in each legal system, frequently neglect the surrounding context of other principles, rules, institutions, and equivalent doctrines under other names, as well as the distinction between the law on the books and the law in action,⁸ so that the comparison falsely finds divergence when the reality *in toto* is functional similarity. For example, the claim that American regulation is governed by benefit-cost analysis, while European regulation is not, neglects several contextual facts: that despite requirements for such analysis issued by every president since Jimmy Carter, including both

Ronald Reagan and Bill Clinton, important areas of American regulation (such as the ambient air quality provisions of the Clean Air Act) remain statutorily immune to cost considerations;⁹ that European regulatory policy often also officially espouses benefit-cost or economic analysis, as it does in the European Commission's Communication on the Precautionary Principle,¹⁰ and often in member state law;¹¹ and that the principle of proportionality applied in European law¹² amounts to a weighing of benefits and costs that cabins the reach of the precautionary principle. Or, to take another example, countries may adopt a degree of precaution that reflects their combination of both ex ante regulation and ex post tort law remedies. Thus, criticism of US regulatory law as inadequately precautionary may neglect the active role of tort liability as a deterrent and as a backstop if preventive regulation misses new risks. Meanwhile, criticism of European regulatory law as excessively precautionary may neglect the relative absence (until recently) of strong tort law in Europe, so that ex ante regulation was the only real option.

Fourth, broad comparisons often neglect great variation within each legal system, such as among the EU member states and among the states of the US, or across different agencies and statutes within each system; that internal variation can exceed the claimed differences across the two aggregated systems.

Fifth, broad comparisons sometimes take a snapshot of current events but overlook dynamic changes through time, not only in the past but also into the future. Current events may seem to represent a climax or ending when in fact they are part of an ongoing transition which is difficult to perceive from within.

Sixth, compounding the above may be the tendency, observed by social psychologists, of group members to assert judgmental distinctions between one's own group and other groups, even when the members were sorted into the groups on a wholly arbitrary basis.¹³ The US and Europe may be citing contrasts that would be nearly indistinguishable to outside observers, or far less salient than the similarities and intermingling between US and European regulatory policies. This is particularly likely with regard to relative precaution, where (if such broad depictions have any validity) both the US and Europe undoubtedly lie at the highly precautionary end of the global spectrum. Debates between the US and Europe over who is “more precautionary than thou” may look baffling and hairsplitting to the billions of people who live in countries with (compared to either the US or Europe) less stringent environmental standards, less institutional capacity to enforce those standards, less scientific capacity to detect and warn of remote future risks, and much more pressing immediate crises in hunger, health and environmental quality.

To be sure, all of these shortcomings in comparative legal analysis may be unintended. But they may also be consciously or unconsciously committed, so that the comparative description becomes less an exercise in dispassionate social science than a vehicle for the author's normative argument about what kind of law is desirable.¹⁴ Advocates of precaution may be using the descriptive claim that Europe is now more precautionary than the US in order to pressure both systems to ratchet upward their regulatory postures. Critics of precaution may be using the

same descriptive claim, that Europe is now more precautionary, in order to warn against such a trend in the US.

Even utterly disinterested observers will find it methodologically vexing to buttress the descriptive claim that one legal system is more precautionary than the other (or not). We cannot “prove” such broad empirical claims unless we can select and compare a representative sample of policies from the population of relevant regulatory actions.¹⁵ Citing a few cases is insufficient to support a broad system-wide claim. A rebuttal based on several contrary cases casts doubt on the initial claim, but is not necessarily sufficient to support a contrary system-wide claim. Both sets may be subject to the critique that they are a skewed sample of the larger reality.

In short, the fundamental fact of comparative legal analysis is that things are “more complicated than you thought”.¹⁶ Broad and catchy depictions miss the true complexity and dynamism of vast and interactive social and legal systems. The same is true of regulatory policy itself: seductively simple prescriptions tend to fail when tested against the complexity of real-world systems.¹⁷ We need caution about precaution, and about comparisons of national precaution. That does not mean, however, that we should look only at the details and never step back to see the bigger picture; on the contrary, we must look at both details and whole systems. A main problem with the recent claimed distinctions between US and European environmental policies is that they focus narrowly on one issue (such as the precautionary principle, or GM foods, or climate change) and neglect

the broader systems (such as the proportionality principle, tort law, and a broader sample of risks).

Convergence, Divergence, and Hybridization

Thus, to the question whether US and EU environmental policies are “converging or diverging,” my answer is both and neither. US and EU environmental policies are *both* converging and diverging, because the reality differs in different strata of policy development and implementation. And US and EU environmental policies are *neither* converging nor diverging, because a better model is one of “hybridization”: iterative exchange of legal ideas, tools and approaches through a process not dissimilar to interbreeding among populations in nature. Hybridization involves “legal borrowing” or “legal transplantation”¹⁸ or “cross-fertilization,”¹⁹ earlier called “mimesis,”²⁰ and more generally the diffusion of social concepts.²¹ The social, cultural or legal concepts exchanged are sometimes called “memes,”²² as an analogy to the genes or traits exchanged in hybridization among populations. Hybridization in nature was long thought to be of minor evolutionary significance, but careful empirical investigations in the last few decades have revealed its widespread and often crucial role in survival, reproduction, and the emergence of new species.²³ In comparative regulatory policy, we are both observing and participating in the exchange of legal traits; we can both document and shape the process.

Hybridization can contribute to more efficient evolution than purely within-system selection pressures would. Exchange across species and across legal systems can foster success and efficiency by offering a wider array of choices; it helps diversify the portfolio of available tools and thereby helps equip the borrower to survive future challenges. Whereas within-system selection pressures leave surviving those who have survived past environments (potentially yielding local optima but not overall optima), inter-system exchange creates hybrid offspring which may be better suited to surviving in the environment yet to come. Most of the hybrid offspring do not prosper while the environment is stable, but when the environment changes (as it always does), the hybrids can become the basis for successful new species and new legal approaches. Indeed, hybridization is an especially appropriate model for the evolution of environmental law, because the essence of environmental problems is interconnectedness.

As a model for contemporary legal evolution, hybridization seems considerably more realistic than convergence or divergence. Whereas convergence and divergence can both occur with no interaction between the systems, hybridization necessarily involves exchange across systems, which seems obvious in an age of globalization and international trade. Whereas convergence and divergence imply curves heading toward or away from a single point (or line) on a plane, as though legal systems had some determinate and common starting or ending points and moved in large unified blocs, hybridization implies an interactive interface between two particle clouds or webs which are

continuously exchanging components across one or many planes, thereby reaching and even creating new points on an unfolding multidimensional frontier. Rather than two lines converging or diverging, one can envision two fractals interacting at many junctures as they both evolve. Whereas models of convergence or divergence depict each legal system as a discrete aggregate entity moving in one direction, a model of hybridization corresponds better to a view of legal systems as complex disaggregated multi-nodal webs or networks, with multiple actors pursuing multiple directions at once and interacting across system boundaries in many places at once.²⁴

Hybridization of law (or species) might look like convergence--the generation of a new approach shared by both systems--but it need not. Hybridization can imply a complex web of borrowings of particular features applied to different problems, institutions, and levels of government--a hodgepodge of “bricolage”²⁵--that yields a diffuse and cloudy pattern rather than a tight convergence to a new line. One might observe divergence as to one example, convergence as to another, many aspects heading in different directions all at once. Or hybridization might give rise to a new version that is quite different from both parental approaches, and that appears during the transitional process to be divergent from both original systems.

In order to understand US and European environmental policies in this context of complexity, the Duke Center for Environmental Solutions and the European Commission’s Group of Policy Advisers have undertaken a project on “The Reality of Precaution.”²⁶ The project engages participants from both the US

and Europe, in order to overcome the problems of ignorance of foreign legal systems. Initial products of this effort include a series of transatlantic dialogue meetings²⁷ and a jointly authored research paper.²⁸ A central finding from this work is that the US and Europe are not diverging or flip-flopping, with Europe becoming “more precautionary” than the US across the board. Rather, both the US and Europe are taking a precautionary approach to the regulation of many risks, but they differ on which risks they choose to worry about and regulate most. Examples are discussed below.

Comparisons at Several Strata

The complexity of both convergence and divergence between US and European environmental policies is apparent from a disaggregated analysis of several strata of the regulatory system. By dividing the analysis into component parts of the regulatory process—issue framing, risk assessment methods, risk management standards, choice of risks to regulate, choice of policy instruments, degree of integration across hazards and media, enforcement mechanisms, and hierarchical level of government--one can appreciate the more multifaceted relations between US and European environmental policies. There is both convergence and divergence, depending on the component being examined.

Issue Framing

The EU has advocated the precautionary principle in international fora, while the US (under both Bill Clinton and George W. Bush) has expressed reservations. This divergence at the level of issue framing or high rhetoric has led to frequent claims that Europe has become “more precautionary” than the US. The notion of precautionary regulation is not new; prominent endorsements have appeared in both Europe and the US since at least the 1970s.²⁹ But while US law continues to express an informal “precautionary preference,”³⁰ European law has formally adopted precaution as an overarching “principle” to govern risk regulation,³¹ and the European Environment Agency has published a book on the advantages of precaution.³² The EU has championed, and the US has resisted, statements of the precautionary principle in several international treaties, such as the Cartagena Protocol on Biosafety. At the same time, the US has agreed to statements endorsing precaution in the 1992 Rio Declaration, the 1992 Framework Convention on Climate Change, and the 2001 Stockholm Convention on Persistent Organic Pollutants (all signed by Republican President Bushes).

Today, the prominent view is that Europe endorses the precautionary principle and seeks proactively to regulate risks, while the US opposes the precautionary principle and waits more circumspectly for evidence of actual harm before regulating.³³ In 1999 the then-Trade Commissioner of the European Commission, Pascal Lamy, was quoted asserting that “in the US they believe that if no risks have been proven about a product, it should be allowed. In the EU we believe something should not be authorized if there is a chance of risk.”³⁴ As early as 1992, a senior environmental official of the European Commission had said

that the US “was definitely leading European policy back in the 1970s and early 1980s” but now “Europe has certainly managed to catch up” and on some issues “has taken over the role as world leader.”³⁵ Fifteen years ago, comparisons of US and European regulation found different procedural approaches but similar degrees of regulatory stringency.³⁶ Nowadays leading scholars of comparative regulation are describing a “flip-flop”: on this view, the US used to be more precautionary than Europe in the 1970s, but Europe has become more precautionary than the US since the 1990s.³⁷ David Vogel writes: “From the 1960s through the mid 1980s, the regulation of health, safety and environmental risks was generally stricter in the United States than Europe. Since the mid 1980s, the obverse has often been the case.”³⁸ He emphasizes that these trends “have not produced policy convergence. On the contrary, European and American regulatory policies are now as divergent as they were three decades ago. What has changed is the direction of this divergence. In a number of areas, Europe has become more risk-averse, America less so.”³⁹ Normative evaluations of this situation vary. Some observers see a civilized, careful Europe confronting a risky, reckless and violent America.⁴⁰ Others see a statist, technophobic, protectionist Europe challenging a market-based, scientific, entrepreneurial America.⁴¹ But clearly there is a divergence in the rhetorical objectives of environmental regulation.

This divergence may reflect real differences in regulatory policy. Or it may reflect conclusions drawn from a few visible cases (such as GMO foods), but not full characterization of the broad array of regulatory policies.⁴² It may also

reflect a new terrain of international rivalry after the end of the Cold War.⁴³ Given that the US and Europe are both at the highly precautionary end of the *global* spectrum, and given the finding of simultaneous actual precaution when viewed across a broader set of risks (below), the stark claimed divergence between European precaution and US policy seems overdrawn, and the international rivalry hypothesis seems worth taking seriously.

Risk Assessment

It has long been observed that the US takes a more formal scientific and quantitative approach to risk assessment, while the European approach is more qualitative. The US Supreme Court's *Benzene* decision requiring OSHA to conduct a risk assessment before regulating,⁴⁴ and a 1983 guidebook from the National Academy of Sciences, spurred widespread adoption of scientific risk assessment as the basis for American risk regulation over the past two decades, while European regulation has remained more qualitative and informal.⁴⁵ Yet there are signs of convergence. In its February 2000 "Communication on the Precautionary Principle," the European Commission espoused scientific risk assessment as a predicate to any invocation of the precautionary principle.⁴⁶ And the European Court of Justice has held, in a case on mad cow disease (BSE) quite reminiscent of *Benzene*, that member state governments may not invoke precaution to regulate risks that the Commission has deemed insignificant.⁴⁷

On the other hand, in September 2002 the European Court of First Instance issued decisions in two cases that seem to cut against the need for a risk assessment prior to adopting a regulation, *Pfizer Animal Health SA v Council of the EU*⁴⁸ and *Alpharma Inc v Council of the EU*.⁴⁹ In these cases, the court held that certain antibiotics in animal feed could be banned without a full risk assessment, in the *Pfizer* case notwithstanding a recommendation against the ban by the official scientific committee, and in the *Alpharma* case without even consulting the scientific committee. The two decisions might be read as overriding the requirement of a risk assessment on the narrow ground that the bans were adopted before the European Commission published its February 2000 “Communication on the Precautionary Principle” (requiring a risk assessment as part of the precautionary principle). If so, then for regulations adopted after February 2000, the criterion of a risk assessment may still be binding. But the court in *Pfizer* also said:

“139. ... where there is scientific uncertainty as to the existence or extent of risks to human health, the Community institutions may, by reason of the precautionary principle, take protective measures without having to wait until the reality and seriousness of those risks become fully apparent. ... 142. Thus, in a situation in which the precautionary principle is applied, which by definition coincides with a situation in which there is scientific uncertainty, a risk assessment cannot be required to provide the Community institutions with conclusive scientific evidence of the reality of the risk and the seriousness of the potential adverse effects were that risk to become a reality. ... 143. [But] a preventive measure cannot properly be based on a purely hypothetical approach to the risk, founded on mere conjecture which has not been scientifically verified ... 144. Rather, it follows from the Community Courts' interpretation of the precautionary principle that a preventive measure may be taken only if the risk, although the reality and extent thereof have not been 'fully demonstrated by conclusive scientific evidence,' appears nevertheless to be adequately backed up by the scientific data available at the time when the measure was taken.”

These statements are confusing. To be sure, precaution must involve action under uncertainty. But since *all* decisions involve “situations in which there is scientific uncertainty,” the court seems to be saying in para. 142 that a risk assessment is *never* required. The court also seems to misunderstand what a risk assessment would do, presuming that it would provide “conclusive scientific evidence” which of course is never available. Then the court holds in para. 144 that without such “conclusive scientific evidence,” the finding of risk must be “adequately backed up” by the “available” scientific data. This new standard (if it can be called that) is highly ambiguous and may generate additional litigation over the colloquial terms “adequately,” “backed up” and “available,” and perhaps the question of whether preliminary indications of risk qualify as “scientific data.”

The court is plainly urging deference to the regulatory body’s choice of the level of acceptable risk, and to the regulator’s evaluation of the tradeoff between better information and delay – a deference that is familiar in US law. The European Court of First Instance also pointed out that the recommendations of the scientific committee are purely advisory and may be rejected by the Commission and the Council; that would usually be true under US law as well. But in the US, the courts would likely hold the agency accountable to provide a better explanation of why it set the standard where it did, and why it rejected the scientific committee’s advice – a more reasoned and fact-based explanation than just the recitation of the generic goal of “protecting public health.”

Near the end of its opinion in *Pfizer*, the court mentioned that such precautionary regulations adopted before “full” scientific evidence is available are

to be “provisional ... pending the availability of additional scientific evidence” (para. 387). Provisionality is also required by the European Commission’s “Communication on the Precautionary Principle.” But it remains unclear whose burden it will be to gather such additional information, and when the regulatory body could be required to revise the regulation in light of the additional information.

It is unclear whether appeals will be taken from the decisions in *Pfizer* and *Alpharma* to the European Court of Justice. The ECJ could reverse, along the lines of its decision in the BSE case noted above, and prior decisions holding that risk assessment and consultation of scientific committees are required.⁵⁰ Or it could limit the decisions to regulations adopted before the Feb. 2000 “Communication.” Or it could hold that the degree of evidence required before regulating depends, in European law as in American law, on the specific wording of the statute or directive that provides the legal basis for the regulation; in the antibiotics cases the directive broadly authorized regulation of any antibiotic posing a “danger.” Or the ECJ could give more teeth to the “provisional” character of the regulations, requiring research and reconsideration by some point in time.

Theofanis Christoforou’s chapter in this volume argues at some length that precaution is warranted because governmental risk assessment tends to understate risks (at least compared to public perceptions of risk). Even if this argument were correct, it would not imply that European risk policy is more precautionary. Both US and European policies respond strongly to public perceptions of risk

(notwithstanding greater use of formal risk assessment in the US).⁵¹ In any event, the bias Christoforou sees in risk assessment is only one piece of the full picture. Reasons that risk assessments may *understate* risks include: inattention to unforeseen risks, inattention to multiple simultaneous exposures, failure to identify thresholds above which critical damages occur, difficulty forecasting strategic risk actors such as terrorists and pathogens, and agency capture by the regulated industry. But reasons that risk assessments may *overstate* risks include: linear extrapolation of harm at low doses (yet low doses may actually be harmless or beneficial), conservative extrapolation from animals to humans, selection of most sensitive animal test species, assumption that harm at one organ can predict harm at other organs, conservative assumption of maximum individual exposure, excessive attention to new risks as opposed to older and more widespread risks, and the regulator's asymmetric incentive to avoid being blamed for allowing harm while not incurring blame for preventing what would not have been harmful. Taking these concerns together, it is not at all clear that risk assessments typically understate risks. It is more likely that risk assessments understate some risks and overstate others, leading to simultaneous paranoia about some risks and neglect of other risks. Moreover, in contrast to Christoforou's advocacy of deference to public perceptions, public perception of risk does not necessarily weight all risks more heavily than experts do: the public views some risks as more worrisome, and other risks as less worrisome, than experts do.⁵² Hence deference to public perceptions may affect the distribution of risk priorities but would not obviously increase overall risk protection. Meanwhile, public perceptions of risk may not

always be deserving of deference, because they may also be driven by prejudice (such as fear of unfamiliar technologies and races) that is not worthy of respect in a progressive society.⁵³

Risk Management: Standard Setting

When actual regulatory policy decisions are made, the trend is toward convergence. As noted, both the US and the European Commission have now adopted risk assessment and cost-benefit analysis as basic criteria for new regulations,⁵⁴ and European law adds the closely related principle of proportionality.⁵⁵ (Oddly, Theofanis Christoforou's chapter in this volume harshly critiques cost-benefit analysis, yet he nonetheless observes that it is frequently employed by European regulators to good ends; and the European Commission has expressly required cost-benefit analysis in its Communication on the Precautionary Principle.) To be sure, these criteria are not universally applied: for example, as noted above, some areas of US environmental law are exempt from cost considerations; and the European Commission has invested far less in the institutional capacity needed to review regulations on cost-benefit criteria than has the US executive branch. But the trend is toward convergence. Both systems also now involve substantial public participation in standard-setting.⁵⁶ Both have adopted major environmental legislation over the past two decades, as detailed above; the claim that Europe has done so while the US has retrenched since the 1980s is not accurate. David Vogel, who described the transatlantic posture as a

reversal of divergent approaches,⁵⁷ has more recently written of convergence in US and European regulatory approaches.⁵⁸ Similarly, Robert A. Kagan argues that, broadly speaking, the substantive environmental standards in the US and Europe are convergent.⁵⁹

To the extent that standard-setting does differ across the Atlantic, the US may more often employ formal cost-benefit analysis, but sometimes the cost-benefit shoe is on the other foot (or shore). For example, one recent study finds that the US legal regime for air pollution control is more strict and precautionary than the German regime, in part because US law requires standards to be set *without* considering cost, whereas it is the *German* approach that applies consideration of benefits and costs under the principle of proportionality.⁶⁰ Another study finds that European regulation is less susceptible to the problems of tunnel vision (excessive regulation of minor risks) and random agenda selection that have plagued US regulation.⁶¹

Moreover, it is not the case (as is often assumed) that cost-benefit analysis necessitates weaker regulation. Several of the examples of *greater* US precaution, including the phaseout of CFCs and the phaseout of lead in gasoline (both in the 1980s), were substantially motivated by cost-benefit analyses. Recently the US Office of Management and Budget has initiated a series of “prompt letters” that use cost-benefit analysis to identify and recommend promising new regulations that the agencies ought to consider adopting but have not yet -- using economics to spur smart regulation, not just to retard bad regulation.

Further, more precautionary regulation is not always a triumph over industry influence (agency capture). Nor is economic analysis a capitulation to industry. Sometimes industry itself seeks greater regulation for parochial gain, such as to impose costs on its trade rivals.⁶²

And, if the contention were true that the use of cost-benefit analysis had led to moderating (or strengthening) some regulations, whether in the US or in Europe, that would not necessarily be unwise -- indeed it might be quite sensible. (That is why the European Commission's "Communication" itself requires cost-benefit analysis as a predicate to precaution.) More precautionary policies are not always superior to policies chosen by cost-benefit balancing. Precaution may avoid the harms of inaction on false negatives (risks thought to be minor that turn out to be serious), but incur the harms of overreaction to false positives (risks thought to be serious that turn out to be minor). Both types of errors are harmful to society. The harms of ignoring false negatives include the health and environmental damages from the unrestricted risk. The harms of regulating false positives include high costs to consumers and workers, unemployment, lost innovations of helpful new products, restrictions on personal choices, and public cynicism about exaggerated risks (crying wolf). An extreme policy of zero risk would bring valuable activities to a halt; applied broadly it would be impossible. The goal is not zero false negatives, but the best balance of the two types of errors that we can achieve.

The argument that neglecting false negatives yields health damages, but that regulating false positives costs only money and therefore is worth tolerating

because health matters more than money,⁶³ is attractive but flawed. It is flawed because the premise that “regulating false positives costs only money” is incorrect. Even assuming no costs and inhibitions to innovation from precautionary policies, more precautionary policies can also yield increases rather than decreases in health and environmental risk. Precaution against a target risk can induce increases in other countervailing risks.⁶⁴ Hence even ignoring cost-benefit analysis, risk tradeoff analysis is important. To mention just a few of these examples of “risk-risk tradeoffs”: Airbags in cars may save adults but kill children. Banning asbestos may reduce cancers but increase highway fatalities because of inferior brake linings. Reducing ozone in smog may protect our lungs but put our skin at risk from increased ultraviolet radiation. The US FDA’s precautionary measures to safeguard the blood supply against mad cow disease (BSE) by banning blood from Europe may reduce the availability of blood in hospital emergency rooms. (No doubt Europe has not banned such blood precisely because of the countervailing risk.) Banning one pesticide (e.g. to protect food consumers from residues) may invite the use of a substitute pesticide (e.g. one that leaves less residue but that is more toxic to uninformed migrant workers). Banning all use of DDT (as opposed to banning just its use in agriculture) may increase the spread of malaria, killing millions. Banning chlorination of drinking water may foster deadly outbreaks of cholera and other microbial pathogens. Promoting fuel-efficient diesel engines to reduce greenhouse gas emissions may increase local particulate matter air pollution. The war on drugs may increase inner city violence. Police chases of fleeing suspects may kill

bystanders. Suppressing forest fires may worsen these fires when they occur. American or European precautionary policies may regressively burden poor countries: for example, wealthy country bans on genetically modified foods may perpetuate hunger in poor countries (a dilemma now facing Zambia and other famine-stricken African nations which are rejecting US offers of donated corn, apparently motivated in part by the fear that US corn might cross-pollinate Zambian corn, rendering future Zambian corn in violation of European restrictions on imports of genetically modified crops).

In short, the phenomenon of risk-risk tradeoffs is ubiquitous. Countervailing risks do not always warrant curtailing precautionary regulations, but ignoring countervailing risks in the pursuit of precaution would perversely lead to systematic increases in overall risk. Hence, even assuming zero financial costs of regulation, the ideal is not maximum precaution but an optimal precaution that takes into account the tradeoffs among multiple risks.⁶⁵ A "race to the top" in precautionary regulation would not be wise even if all one cared about were minimizing risks. The better goal is to minimize the sum of risks, and to seek "risk-superior" options that reduce multiple risks in concert.

Citing my work among others, Theofanis Christororou's chapter in this volume argues that weighing the countervailing risks of a risk reduction policy is "misconceived" and "dangerous." He gives three reasons for this view: that "voluntary exposure to risk by *some* must not enter into any type of balancing exercise against unintended, involuntary exposure to the same or other type of risks by *other* people. ... the fact that people face multiple sources of risk in our

society is not as such an argument in favor of an averaging or a balancing exercise”; that “the right to life and health is the most fundamental of all human rights, which implies that no restriction should in principle be placed on this right without proper consideration”; and that “considerations of health should take precedence over economic or commercial considerations.” The second two points are inapposite to risk-risk tradeoffs. Christoforou appears to conflate cost-benefit and risk-risk analyses, although they are distinct; risk-risk analysis, as noted above, does not weigh cost or money or economic considerations against health. Rather it weighs health against health. Regulations causing risk-risk tradeoffs do not pit the “right to life and health” against “restrictions” for other reasons; they pit some life and health interests against other life and health interests. Such a “right to life and health” could not be inviolate precisely because efforts to reduce target risks often incur countervailing risks. Christoforou’s first point is also confusing. Risk-risk analysis does not necessarily compare voluntary to involuntary risks, nor does it seek to favor one over the other. It considers all aspects of risk-risk tradeoffs, including qualitative attributes such as voluntariness.⁶⁶ Such a tradeoff might happen to be incurred by some policies, but other policies might have different effects. Some precautionary policies would themselves violate Christoforou’s rule by protecting some people from voluntary risks (e.g. food consumption choices they could avoid) while imposing involuntary risks on others (e.g. hunger in poor countries, or toxics exposures to uninformed migrant workers). None of Christoforou’s three points is actually an argument against risk-risk tradeoff

analysis. Without such analysis, precautionary policies could often increase overall risk, contradicting Christoforou's interest in safeguarding life and health.

Choice of Risks

The conceptual rhetoric of greater precaution in Europe, based largely on the visible examples of food safety and climate change, does not capture the full reality of actual regulatory policies. Nor does the convergence in standard-setting approaches. Disaggregating the overall convergence in regulatory criteria, one can see differences as to particular risks, but no simple divergence in whether Europe or the US is more precautionary than the other across the board. Nor has the EU in some broad sense "moved ahead" of the US in relative precaution in the 1990s. The picture is more complex.

Europe appears to be more precautionary than the US on some risks, such as GM foods, hormones in beef, climate change, toxic substances, phthalates, marine pollution, and guns. The US appears to be more precautionary than Europe on other risks, such as mad cow disease (BSE) (especially in blood donations), fine particulate matter air pollution (from electric power plants and from motor vehicles), nuclear power, teenage drinking, cigarette smoking, hazardous waste disposal, "right to know" information disclosure requirements, youth violence, and terrorism. In the past the US had also been more precautionary regarding new drug approval (e.g. forbidding drugs such as thalidomide which were licensed in Europe), the 1978 ban on CFCs in aerosol spray cans and the 1970s ban on supersonic transport to protect the stratospheric

ozone layer (both adopted years before Europe acted to phase out CFCs), and the phaseout of lead in gasoline (petrol) (adopted years earlier than in Europe), but Europe has now converged on most of those policies.⁶⁷

The picture that emerges is of precaution on both sides of the Atlantic, but regarding different risks. The length of these lists is not important; as discussed above, neither set of examples is a representative sample of the full arena and thus neither set “proves” a general characterization. Moreover, the point is not a contest to see who is “more precautionary than thou.” This broader set of examples merely indicates that neither the US nor the EU can easily claim to be the more precautionary actor across the board, today or in the past. Simple contrasts, such as that Americans are risk-takers while Europeans are risk-averse (then how to explain tighter US restrictions on particulate matter, smoking, and BSE in blood?), or that Americans are individualistic and anti-regulation while Europeans are collectivist and pro-regulation (then how to explain tighter US restrictions on smoking and teenage drinking?), are unsupported by the evidence of actual regulatory policies. The better view is that both legal systems are precautionary, but against different risks.

In one example from the list of divergent risk regulations above, the US and Europe are simultaneously precautionary about the same technology, but in opposite directions: the US tightly regulates diesel engines to reduce human exposure to fine particulate matter,⁶⁸ while Europe promotes diesel engines to reduce carbon dioxide emissions and global warming.⁶⁹ Both policies are precautionary, but against different (and countervailing) risks.

To note another example, the US has been highly precautionary about mad cow disease.⁷⁰ It banned the import of British beef in 1989, several years before the EU adopted such a ban. The EU has since lifted its ban--and sued France in the ECJ to force France to lift its ban⁷¹--while the US ban remains in place. (Meanwhile, Europe has adopted somewhat more stringent policies than the US regarding the kinds of protein matter that can be fed to cattle and sheep.) In addition, in 1999 the US FDA adopted a “precautionary measure” that prohibits blood banks from collecting blood from donors who have spent six months or more in the UK, which it since has tightened to exclude donors who have spent time anywhere in Europe. This regulation is especially precautionary given that there is no evidence of transmission of the disease via blood donations, and that the regulation is estimated to reduce the supply of blood in American hospitals by a substantial amount (roughly 3 to 8 percent), raising the specter of a serious countervailing risk. Europe has adopted no such restrictions on blood donations, though it has undertaken leukodepletion on the theory that the disease agent (the prion) is more likely to be carried by certain blood cells, and the UK has recently begun importing blood for young children. In short, the US has been more precautionary regarding a risk of much greater impact and public concern in Europe.

Consider a third example: terrorism. In September 2002, President Bush formally announced a new doctrine of American self-defense, promising that “America will act against such emerging threats before they are fully formed. ... The greater the threat, the greater is the risk of inaction — and the more

compelling the case for taking anticipatory action to defend ourselves, even if uncertainty remains as to the time and place of the enemy's attack."⁷² Similarly, in a speech at West Point in June 2002, he said: "If we wait for threats to fully materialize, we will have waited too long."⁷³ This US doctrine of preemptive self-defense against terrorism is, in effect, the precautionary principle applied to terrorism. In advocating precaution regarding the environment, European leaders – especially Greens – invoke the same logic that Mr. Bush has about terrorism: if we wait to confirm that the threat is real, it will be too late. The European Environment Agency advised in January 2002: "Forestalling disasters usually requires acting before there is strong proof of harm."⁷⁴ Said the EU's Environment Commissioner, Margot Wallstrom, in April 2002: "If you smell smoke, you don't wait until your house is burning down before you tackle the cause."⁷⁵ Likewise, nongovernmental advocates of the precautionary principle say: "Sometimes if we wait for proof it is too late. ... If we always wait for scientific certainty, people may suffer and die, and damage to the natural world may be irreversible."⁷⁶ These are almost verbatim the reasons given by the Bush administration for its preemptive anti-terrorism policy.

In response to the US call for precautionary action against uncertain threats of terrorism, German Foreign Minister (and Green Party member) Joschka Fischer, worried aloud on September 14, 2002 in remarks to the UN General Assembly: "To what consequences would military intervention lead? ... Are there new and definite findings and facts? Does the threat assessment justify taking a very high risk? ... we are full of deep skepticism regarding military

action ...”⁷⁷ Mr. Fischer’s call for more evidence of real risk before acting, and his concern about the potential adverse consequences of action, reflect the same objections that decision analysts make to calls for precautionary risk regulation.

Hence it is not that the EU endorses precaution and the US rejects precaution. The reality is that the US and Europe both endorse precaution, but regarding different risks; and each side criticizes precaution when applied to risks it discounts. Of course, one good reason for each side’s worries about the other side’s precautions is that, as noted above, there can be real countervailing risks to precaution, whether military or regulatory. Giving airline pilots guns to stop terrorists may lead to inflight accident, theft or misuse. Military action causes potentially devastating “collateral damage” (that is, civilian deaths), and also risks spurring reprisals (both by governments and by terrorists). European opposition to a precautionary war on terrorism is largely based on these kinds of concerns about countervailing risk.

The same complexity observed with regard to the selection of target risks can be seen from the vantage of concern about countervailing risks. After years of experience with precautionary risk regulations, the US has become somewhat more attentive to the prospect of the countervailing risks that may arise from efforts to reduce target risks.⁷⁸ Countervailing risk appears to be a lesser concern in Europe, at least in terms of the official literature.⁷⁹ But on another domain--the wars against terrorism, and against drugs--there is a parallel but opposite concern: the EU fears the countervailing risks of intervention, while the US presses ahead

notwithstanding (or perhaps neglecting) those risks.⁸⁰ This again illustrates the complex pattern of simultaneous precaution but concern about different risks.

What is interesting about this complex pattern is not whether one society is more environmentalist or risk-averse or morally upstanding than the other (as sometimes implied by claims of greater precaution), but why the societies choose to worry about different risks. Several hypotheses can be advanced to answer this question.⁸¹ The choice of which risks to regulate may derive from real differences in the seriousness of different risks in different places. Or it may arise from different cultures and risk perceptions (including heuristic reactions to recent crises).⁸² It may turn on differences in domestic political systems, such as separation of powers versus parliamentary systems, the role of third parties (including the Greens), the role of nongovernmental advocacy groups, and industry pressure and rent-seeking (including international trade protectionism and domestic trade rivalry). It may relate to different background legal systems, including the role of ex post tort law. It may spring from changing positions in global strategy.⁸³ But to fit the observed complex pattern, any or all of these explanations would have to predict heterogeneous policy choices in both the US and Europe, not a simple contrast between all US and all European policies. Identifying the probative explanatory variables driving the observed complex pattern of relative precaution is a prime question for further research.

Choice of Policy Instruments

In the past there had been some divergence between the US and Europe in the choice of policy instruments, but the future portends increasing convergence. Both the US and Europe have employed best available technology (BAT) approaches for many years. But the US had made increasing use of emissions trading (tradable permit) policies to deal with problems including lead in gasoline, CFCs, acid rain, land development, and water pollution, while Europe had not; and Europe had made greater use of emissions taxes (charges) than had the US.⁸⁴ Of late there appears to have been some convergence, especially as the EU has made greater use of emissions trading--in particular to control greenhouse gas emissions under the Kyoto Protocol.⁸⁵ But the US has not yet begun to make widespread use of emissions taxes.

It should be noted here that the use of “economic incentives” is not a move to favor “economic interests” over environmental interests. In fact, industry often resists the use of taxes or emissions trading because those instruments (unlike technology standards) force industry to pay for every residual unit of emissions (either as a tax levy or as the foregone earnings from not selling a permit). Nor is the advocacy of “market-based instruments” based on the premise that “the market” can solve all environmental problems; it is rather an effort to correct what are recognized to be market failures by adopting government policies that reconstitute incentives in environmentally desirable directions. Moreover, the choice of instruments, such as economic/market-based incentives, is distinct from the choice of the level of environmental protection to be achieved. One can employ economic incentives to achieve quite stringent, precautionary goals.

Information disclosure is an instrument that has been used more frequently in the US than in Europe.⁸⁶ In addition to the powerful "discovery" procedures in American civil litigation, the US has enacted several powerful information policies, including the 1966 Freedom of Information Act, the environmental impact statement (EIS) requirements of NEPA in 1969, the 1986 enactment of the national Toxics Release Inventory (TRI) and of California's Proposition 65, and the facility accident scenario requirements of Clean Air Act section 112r adopted in 1990. In turn, Europe has recently been moving to bolster its information disclosure policies through CEC Directive 1990/313/EEC on access to information from member states, the 1998 Aarhus Convention, Regulation (EC) 1049/2001 of 30 May 2001 on access to information from EU institutions, the new European Pollutant Emissions Registry created in 2000 to be operational by 2003, and the pending Draft Protocol on Pollutant Release and Transfer Registers to be finalized at the UN/ECE Ministerial Environmental Conference in Kiev in 2003.⁸⁷

Degree of Integration Across Hazards and Media

US environmental regulation is highly fragmented, with many different agencies implementing many different statutes to address different risks. Even within the EPA, there are separate fiefdoms for air, water, and waste.⁸⁸ This fragmentation contributes to cross-media and cross-pollutant shifts, frustrating effective regulation.⁸⁹ "Integrated pollution control" (IPC) is the effort to deal

with multiple risks more holistically, to ensure actual environmental improvement.⁹⁰ Since the early 1990s, the UK has made significant efforts to adopt integrated pollution control, especially in its 1990 and 1995 Environmental Protection Acts and its creation of an integrated pollution control agency.⁹¹ The UK approach has since been borrowed by other countries in Europe and by EU institutions.⁹²

Enforcement Mechanisms

The “style” of US and European regulation has long been said to diverge. The US regulatory system is seen as highly legalistic and adversarial, with a strong role for decentralized decisionmaking in courts (both in the review of regulation, and in the application of tort law).⁹³ US regulatory authority is more fragmented than European regulatory authority, with multiple agencies, courts, committees, and levels of government all having a hand in (and offering opportunities for public input into) policy development.⁹⁴ The European regulatory style is seen as more cooperative, hierarchical, and centralized.⁹⁵ Even when substantive standards are equivalent, the procedural approaches diverge significantly.⁹⁶ American adversarial legalism yields greater opportunities for formal public input and transparency, but also greater delay and antagonism; the European approach invites more negotiation of policy development between government and regulated businesses.⁹⁷

This difference in style reflect the longstanding American mistrust of concentrated power, in both government and business.⁹⁸ The US Constitution has few principles obligating government to act; it speaks of limited government powers and of individual rights to block the government. Mistrust of government power may itself be a reason for American reluctance to embrace the precautionary principle as a formal principle, while European legal culture may be more comfortable with principles of obligatory regulatory action.

The American reliance on courts, both to enforce regulations at the behest of citizen suits and to award compensation to tort victims, may also help explain the disagreement between US and European officials over adoption of an overarching precautionary principle. Knowing that the adversarial US legal system would enforce such a principle more vigorously than European law, US officials may resist agreeing to a principle that would seem more stringent in the US than elsewhere. And knowing that the US tort system is there to remedy injuries when they occur (and thereby deter future injuries), US officials may feel less need to adopt highly precautionary ex ante regulation. By contrast, European officials may worry less about vigorous and rigid enforcement of precaution, while they may feel they need it more because they lack as robust a tort system.

There are some signs of convergence regarding the style of enforcement. Europe is becoming more formal and legalistic, inviting greater participation by interest groups in policy formulation, in part as a consequence of the integration of European institutions and rise of power in Brussels.⁹⁹ European public trust in government and scientists has declined in the wake of several food safety crises,

including mad cow disease, thereby prompting greater demands for regulatory transparency and accountability.¹⁰⁰ Meanwhile, American regulation is becoming less adversarial and more cooperative through the use of regulatory negotiation, alternative compliance agreements, habitat conservation plans, and Dutch-style environmental covenants.¹⁰¹

Hierarchical Level of Government

There had been divergence between the US and Europe on the hierarchical or vertical level of government responsible for environmental regulation: US policy had moved toward a strong role for the federal government (though federal standards are often implemented by the states), while in Europe the competency of the European Commission to address environmental issues took time to establish, and the principle of subsidiarity still left most decisions in the hands of member state and provincial governments. But now there may be signs of some convergence, as the EU centralizes toward a stronger role for the Commission in Brussels and as the US decentralizes toward a greater role for the states.¹⁰²

Hybridization in Action

The foregoing analysis suggests that one cannot characterize the entirety of US and European environmental policies by either convergence or divergence; both are occurring, but differently in different strata of policy development and

implementation. A better model to depict current dynamics, as argued above, is hybridization: the exchange of legal concepts across systems.

Examples of such borrowing in environmental policy abound. From the US, Europe has borrowed approaches to emissions trading,¹⁰³ cost-benefit analysis and executive oversight of the regulatory system,¹⁰⁴ products liability¹⁰⁵ and the proposed liability directive, increasingly “federal” oversight of environmental policy,¹⁰⁶ information disclosure instruments including environmental impact assessment (EIA) and toxics release registries,¹⁰⁷ and other measures.

Meanwhile, from Europe, the US has borrowed the Dutch method of environmental covenants and related approaches to voluntary negotiated agreements,¹⁰⁸ and the concept of precaution itself (which originated as *vorsorgeprinzip* in German law, and was later adopted in the noted US case *Ethyl Corp.*).¹⁰⁹

These examples of hybridization correspond to the convergence observed in several policy strata, described above, including the criteria for standard setting, the choice of policy instruments, and the hierarchical level of authority. The policy strata in which divergence is observed, such as the choice of risks to regulate, the formality of risk assessment, and the style of enforcement, appear to have experienced less of this hybridizing exchange of legal concepts.

Additional examples of transatlantic borrowing are undoubtedly underway; for example, Europe may borrow American methods of judicial review and notice and comment rulemaking,¹¹⁰ and the US may borrow from European

experience with watershed management and with watershed management and with subsidiarity. Continuing transatlantic dialogue would also be desirable on the meaning, value, improvement, borrowing and reconciliation of decision making approaches, such as the precautionary principle, proportionality, and cost-benefit analysis. For example, it would be useful to compare US Executive Order 12866 on Regulatory Planning and Review with the European Commission's Communication on the Precautionary Principle, both on paper and in practice. There may be more room for agreement here than has so far been recognized. Climate change offers another potential arena for hybridization. Judged on cost-benefit criteria, the US should be more precautionary than its current posture (though not as precautionary as the Kyoto Protocol targets), while Europe should accept US proposals on robust use of market-based incentives and fully global participation.¹¹¹ This path would represent a better mixture of the US and European positions than either has advocated to date.

As discussed above, hybridization is not necessarily the same as convergence. Hybridization involves exchange, but it is more complex and dynamic than convergence or divergence. It can yield new offspring that diverge from both parents. And it may be difficult to discern when one is in the midst of its unfolding. Yet it offers both sides an opportunity to reduce acrimony, to study the complex reality, and to learn from each other. We are both observing and shaping the unfolding evolution of our regulatory policies; we can participate in the process of hybridization.

Further research is warranted on why hybridization occurs when and how it does. Why are some legal concepts borrowed and not others? How is this process stimulated or inhibited? How does it relate to convergence and divergence? Hybridization is probably spurred by several factors. The integrating world economy offers greater opportunities for exchange of ideas and counterpart experiences, and at the same time it puts pressure on national regulators to harmonize standards.¹¹² Transnational networks of environmental NGOs and policy entrepreneurs spread legal ideas,¹¹³ and multinational corporations spread environmental management practices to their foreign operations.¹¹⁴ Further, government officials, academics, nongovernmental actors, and businesses are all engaged in a process of learning by doing, in which successful innovations in one place can be imitated in other places (and failures can be avoided).

Conclusion

Claims that US and European environmental policies are converging or diverging miss the more complex -- and more interesting -- reality. Viewed across several strata of policy development and implementation, there are areas of divergence (such as the issue-framing rhetoric of precaution, the formality of risk assessment, the choice of particular risks to regulate, and the style of legal enforcement), and areas of convergence (such as the substantive criteria for standard setting, the choice of policy instruments, and the hierarchical level of authority). Viewed across the array of risks, both the US and Europe are

precautionary about many risks, but they differ primarily on which risks they select to worry about and regulate most. Neither Europe nor the US appears to be categorically more precautionary than the other across the board. Nor would it be desirable for the US and Europe to race to be ever more precautionary on all fronts, given the costs and countervailing risks of precautionary interventions. The reality is a complex pattern of diverse relative precaution across risks; the interesting question is why different societies are choosing different risks to worry about and regulate most. And the reality is a dynamic pattern of legal hybridization, with interactive exchange of legal concepts occurring continuously among the multiple nodes of these two vast legal system networks. These patterns indicate a process of mutual legal borrowing, from which we can learn a great deal, and to which we can contribute -- if we undertake our comparative analyses with seriousness and mutual respect.

¹ See Timothy Garton Ash, *Anti-Europeanism in America*, THE NEW YORK REVIEW OF BOOKS, February 13, 2003, available at <http://www.nybooks.com/articles/16059> .

² See the chapters by Theofanis Christoforou and Ludwig Kraemer in this volume; and the sources cited in endnotes 29-37 below.

³ See Oscar Wilde, *The Canterville Ghost*, COURT AND SOCIETY REVIEW, Feb. 23, 1887 (reprinted in THE SHORT STORIES OF OSCAR WILDE 123 (New York: Heritage Press, 1968)).

⁴ See e.g. Theofanis Christoforou's chapter in this volume, and David Vogel's work, cited below in endnote 37.

⁵ John C. Reitz, *How To Do Comparative Law*, 46 AMERICAN JOURNAL OF COMPARATIVE LAW 617-636 (1998).

⁶ See Ludwig Kramer's chapter in this volume.

⁷ See *Whitman v. American Trucking Associations (ATA)*, 531 U.S. 457 (2001).

⁸ Reitz (1998), *supra* note 5.

⁹ *Whitman v. ATA*, 531 U.S. 457 (2001).

¹⁰ Commission of the European Communities (CEC), *Communication from the Commission on the Precautionary Principle*, COM(2000)1, Brussels, February 2, 2000 (available at http://europa.eu.int/comm/dgs/health_consumer/library/pub/pub07_en.pdf).

¹¹ Peter H. Sand, *The Precautionary Principle: A European Perspective*, 6 HUMAN AND ECOLOGICAL RISK ASSESSMENT 445, 448 (2000).

¹² See NICHOLAS EMILIOU, THE PRINCIPLE OF PROPORTIONALITY IN EUROPEAN LAW (1996).

¹³ Henri Tajfel, *Experiments in Intergroup Discrimination*, 223 SCIENTIFIC AMERICAN 96-102 (November 1970); DONALD L. HOROWITZ, ETHNIC GROUPS IN CONFLICT 144-147 (2d ed., Berkeley: University of California Press, 2000).

¹⁴ See Konrad Zweigert & Hein Koetz, AN INTRODUCTION TO COMPARATIVE LAW 32 (Oxford Univ. Press, 3rd ed. 1998); Hiram E. Chodosh, *Comparing Comparisons: In Search of Methodology*, 84 IOWA LAW REVIEW 1025 (1999).

¹⁵ See GARY KING, ROBERT O. KEOHANE & SIDNEY VERBA, *DESIGNING SOCIAL INQUIRY* (1994).

¹⁶ David Kennedy, *New Approaches to Comparative Law: Comparativism and International Governance*, 1997 UTAH LAW REVIEW 545, 605.

¹⁷ Jonathan B. Wiener, *Precaution in a Multirisk World*, in *HUMAN AND ECOLOGICAL RISK ASSESSMENT: THEORY AND PRACTICE 1509-1531* (Dennis Paustenbach, ed., John Wiley & Sons, 2002).

¹⁸ ALAN WATSON, *LEGAL TRANSPLANTS: AN APPROACH TO COMPARATIVE LAW* (2d ed. 1993).

¹⁹ See John Bell, *Mechanisms for Cross-Fertilization of Administrative Law in Europe*, in *NEW DIRECTIONS IN EUROPEAN PUBLIC LAW 147* (Jack Beatson & Takis Tridimas, eds., Oxford: Hart Publishing, 1998) (describing cross-fertilization as a process of external stimulus and responsive adaptation, not necessarily involving full transplantation of a doctrine from one legal system into another).

²⁰ A.J. TOYNBEE, 12 *A STUDY OF HISTORY: RECONSIDERATIONS* 343 (1961).

²¹ Torsten Hägerstrand, *The Diffusion of Innovations*, 4 *INTERNATIONAL ENCYCLOPEDIA OF SOCIAL SCIENCES* 194 (1968).

²² RICHARD DAWKINS, *THE SELFISH GENE* (New York: Oxford University Press, 1976); ROBERT AUNGER, *THE ELECTRIC MEME: A NEW THEORY OF HOW WE THINK* (Free Press, 2002).

²³ M.L. ARNOLD, *NATURAL HYBRIDIZATION AND EVOLUTION* (Oxford: Oxford University Press, 1997); PETER R. GRANT, *ECOLOGY AND EVOLUTION OF DARWIN'S FINCHES* (Princeton, N.J.: Princeton University Press, 2d edition, 1999); Peter R. Grant & B. Rosemary Grant, *Hybridization in Bird Species*, 256 *SCIENCE* 193-197 (1992); Peter R. Grant & B. Rosemary Grant, *Speciation and Hybridization in Island Birds*, 350 *PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY OF LONDON* 765-772 (1996); DOLPH SCHLUTER, *THE ECOLOGY OF ADAPTIVE RADIATION* (Oxford: Oxford University Press, 2000).

²⁴ Hybridization therefore comports better (than do convergence or divergence) with models of the “disaggregated state” and transnational and transgovernmental networks for the exchange of policy ideas. See Robert O. Keohane & Joseph S. Nye, *Transgovernmental Relations and International Organizations*, 27 *WORLD POLITICS* 39, 43 (1974); Anne-Marie Slaughter, *The Real New World Order*, *FOREIGN AFFAIRS*, Sept.-Oct. 1997, at 183, 184.

²⁵ Mark Tushnet, *The Possibilities of Comparative Constitutional Law*, 108 YALE LAW JOURNAL 1225 (1999).

²⁶ Duke Center for Environmental Solutions, “The Reality of Precaution” project, information available at http://www.env.duke.edu/solutions/precaution_project.html .

²⁷ See Duke Center, *supra* note 26.

²⁸ Jonathan B. Wiener & Michael D. Rogers, *Comparing Precaution in the US and Europe*, 5 JOURNAL OF RISK RESEARCH 317-349 (2002).

²⁹ See Sonja Boehmer-Christiansen, *The Precautionary Principle in Germany – Enabling Government*, in INTERPRETING THE PRECAUTIONARY PRINCIPLE 33 (Tim O’Riordan & James Cameron eds., 1994); EUROPEAN ENVIRONMENT AGENCY (EEA), LATE LESSONS FROM EARLY WARNINGS: THE PRECAUTIONARY PRINCIPLE 1896-2000, Environmental Issue Report No. 22 (Luxembourg: Office for Official Publications of the European Communities, 2001); *Ethyl Corp. EPA*, 541 F.2d 1 (D.C. Cir. 1976); *TVA v. Hill*, 437 U.S. 153 (1978).

³⁰ John S. Applegate, *The Precautionary Preference: An American Perspective on the Precautionary Principle*, 6 HUMAN & ECOLOGICAL RISK ASSESSMENT 413 (2000).

³¹ TREATY OF AMSTERDAM AMENDING THE TREATY ON EUROPEAN UNION, THE TREATIES ESTABLISHING THE EUROPEAN COMMUNITIES AND CERTAIN RELATED ACTS, Oct. 2, 1997, Article 174, O.J. (C 340) (formerly Single European Act, Article 130R (1987), as amended by the Maastricht Treaty, 1993), 31 INTERNATIONAL LEGAL MATERIALS 247 (providing that EU environmental policy shall be “based on the precautionary principle”); see also CEC 2000, *supra* note 10 (elaborating on terms of Article 174).

³² EEA (2001), *supra* note 29.

³³ Suzanne Daley, *More and More, Europeans Find Fault with US: Wide Range of Events Viewed as Menacing*, NY TIMES, April 9, 2000, p.A1 (citing widespread European fear of the US as violent (e.g. guns, death penalty), profit-driven, heartless (lets poor go without medical insurance), imperialist (forcing its military, culture and products on others)); Donald McNeil, Jr., *Protests on New Genes and Seeds Grow More Passionate in Europe*, NY TIMES, March 14, 2000, pp.A1, A10 (quoting Pierre Lellouche, French Parliament environment committee, “The general sense here is that Americans eat garbage food, that they’re fat, that they don’t know to eat properly.”); Stephan-Gotz Richter, *The U.S. Consumer’s Friend*, NY TIMES, Sept. 21, 2000, p.A31 (lauding “the advantages of European intervention in everything from ... antitrust policy to food

safety” and charging that “the American government is inclined toward allowing industry to regulate itself”); David L. Levy & Peter Newell, *Oceans Apart? Business Responses to Global Environmental Issues in Europe and the United States*, ENVIRONMENT, November 2000, at 9, 10 (describing the “conventional wisdom” that “Europeans demonstrate their considerable concern about environmental issues” while “people in the United States are more individualistic, more concerned about their lifestyles than about the environment, and more ideologically averse to regulation.”); Willett Kempton & Paul P. Craig, *European Perspectives on Global Climate Change*, ENVIRONMENT, April 1993, at 16-20, 41-45 (arguing that Europeans are more concerned than are Americans about environmental impacts on future generations and on developing countries, and more likely to invoke caution regarding unforeseen risks; and that Americans are more concerned about the economic costs of regulation and more optimistic about future technological solutions to environmental problems).

³⁴ Steve Charnovitz, *The Supervision of Health and Biosafety Regulation by World Trade Rules*, 13 TULANE ENVTL. LAW JOURNAL 271, 295 n.181 (2000).

³⁵ Jorgen Henningsen, *The Seven Principles of European Environmental Policies*, in TOWARD A TRANSATLANTIC ENVIRONMENTAL POLICY 25-26 (Washington DC: The European Institute, 1992).

³⁶ RONALD BRICKMAN, SHEILA JASANOFF & THOMAS ILGEN, CONTROLLING CHEMICALS: THE POLITICS OF REGULATION IN EUROPE AND THE UNITED STATES (1985); SHEILA JASANOFF, RISK MANAGEMENT AND POLITICAL CULTURE (Russell Sage, 1986); DAVID VOGEL, NATIONAL STYLES OF REGULATION: ENVIRONMENTAL POLICY IN GREAT BRITAIN AND THE UNITED STATES (Ithaca and London: Cornell University Press, 1985).

³⁷ David Vogel, *Ships Passing in the Night: The Changing Politics of Risk Regulation in Europe and the United States*, Robert Schuman Centre for Advanced Studies, European University Institute, Working Paper 2001/16 (2001).

³⁸ Vogel (2001), supra note 37, at 1.

³⁹ Vogel (2001), supra note 37, at 31.

⁴⁰ Richter, supra note 33.

⁴¹ JOHN REDWOOD, STARS AND STRIFE: THE COMING CONFLICTS BETWEEN THE USA AND THE EUROPEAN UNION (2000).

⁴² Wiener & Rogers (2002), supra note 28.

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- ⁴³ Ivo Daalder, *Are the United States and Europe Heading for Divorce?* 77 INTERNATIONAL AFFAIRS 531-545 (2001); Robert Kagan, *Power & Weakness*, POLICY REVIEW No. 113 (June 2002), available at http://www.policyreview.org/JUN02/kagan_print.html .
- ⁴⁴ *Industrial Union Dept., AFL-CIO v. American Petroleum Institute*, 448 U.S. 607 (1980).
- ⁴⁵ JASANOFF (1986), supra note 36; Sheila Jasanoff, *Contingent Knowledge: Implications for Implementation and Compliance*, in EDITH BROWN WEISS & HAROLD JACOBSON (EDS.), *ENGAGING COUNTRIES: STRENGTHENING COMPLIANCE WITH INTERNATIONAL ENVIRONMENTAL ACCORDS* 63 (1998).
- ⁴⁶ CEC 2000, supra note 10.
- ⁴⁷ *Commission of the European Communities (CEC) v. French Republic*, European Court of Justice, Case C-1/00 (Failure of a Member State to fulfil its obligations - Refusal to end the ban on British beef and veal), decided 13 December 2001.
- ⁴⁸ *Pfizer Animal Health SA v Council of the EU*, Case T-13/99, 2002 WL 31337, European Court of First Instance, Sept. 11, 2002.
- ⁴⁹ *Alpharma Inc v Council of the EU*, Case T-70/99, 2002 WL 31338, European Court of First Instance, Sept. 11, 2002.
- ⁵⁰ See the *Angelopharm*, *Cassis de Dijon*, *German Beer* and *Danish Bottles* cases, cited in Theofanis Christoforou's chapter in this volume [draft p.21].
- ⁵¹ See STEPHEN G. BREYER, *BREAKING THE VICIOUS CIRCLE* (Cambridge: Harvard University Press, 1993); Cass R. Sunstein and Timor Kuran, *Availability Cascades and Risk Regulation*, 51 STANFORD LAW REVIEW 683-768 (1999).
- ⁵² See Breyer (1993), supra note 51; Jonathan Baert Wiener, *Risk in the Republic*, 8 DUKE ENV'T'L LAW & POLICY FORUM 1-21 (1997); JONATHAN BARON, *JUDGEMENT MISGUIDED* (1998); Ann Bostrom, *Risk Perception: "Experts" vs. "Lay People"*, 8 DUKE ENV'T'L L. & POLICY FORUM 101 (1997); HOWARD MARGOLIS, *DEALING WITH RISK* (1996).
- ⁵³ See Frank B. Cross, *The Subtle Vices Behind Environmental Values*, 8 DUKE ENV'T'L L. & POLICY FORUM 151 (1997).
- ⁵⁴ See CEC (2000), supra note 10; *Executive Order 12866: Regulatory Planning and Review*, 58 FEDERAL REGISTER 51735-51744 (signed September 30, 1993; published October 4, 1993).

⁵⁵ EMILIOU, *supra* note 12.

⁵⁶ David Vogel, *Risk Regulation in Europe and the United States*, 3 YEARBOOK OF EUROPEAN ENVIRONMENTAL LAW ____ (2002).

⁵⁷ Vogel (2001), *supra* note 37.

⁵⁸ Vogel (2002), *supra* note 56.

⁵⁹ ROBERT A. KAGAN & LEE AXELRAD, EDS., REGULATORY ENCOUNTERS 2-3, 376-77 (Berkeley: University of California Press, 2000). Robert A. Kagan, professor at the University of California at Berkeley, is not the same person as Robert Kagan, author of *Power and Weakness*, cited above in note 43.

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⁶⁴ JOHN D. GRAHAM & JONATHAN BAERT WIENER, RISK VS. RISK: TRADEOFFS IN PROTECTING HEALTH AND THE ENVIRONMENT (Cambridge: Harvard Univ. Press, 1995).

⁶⁵ Wiener (2002), *supra* note 17.

⁶⁶ See GRAHAM & WIENER (1995), *supra* note 64, chapter 1.

⁶⁷ Wiener & Rogers (2002), *supra* note 28; Jonathan B. Wiener, *Whose Precaution After All ?* 13 DUKE JOURNAL OF INTERNATIONAL AND COMPARATIVE LAW (forthcoming 2003); see also Duke Center, *supra* note 26.

⁶⁸ Katharine Q. Seelye, *Administration Approves Stiff Penalties for Diesel Engine Emissions, Angering Industry*, N.Y. TIMES, August 3, 2002, p.A9.

⁶⁹ Diesel Technology Forum, *Demand for Diesels: The European Experience* (July 2001), available at www.dieselforum.org

⁷⁰ Wiener & Rogers (2002), *supra* note 28.

⁷¹ CEC v. French Republic (2001), *supra* note 47.

⁷² THE NATIONAL SECURITY STRATEGY OF THE UNITED STATES OF AMERICA, September 17, 2002 (visited <http://www.whitehouse.gov/nsc/nss.html> September 22, 2002), Introduction & Part V.

⁷³ *Remarks by the President at 2002 Graduation Exercise of the United States Military Academy*, West Point, New York, June 1, 2002, available at <http://www.whitehouse.gov/news/releases/2002/06/20020601-3.html> (visited Sept. 22, 2002).

⁷⁴ EEA (2001), *supra* note 29, at section 1.2.

⁷⁵ Margot Wallstrom, *US and EU Environmental Policies: Converging or Diverging?* Speech to the European Institute, Washington DC, April 25, 2002.

⁷⁶ Science & Environmental Health Network, *Frequently Asked Questions*, at <http://www.sehn.org/ppfaqs.html>, visited 22 September 2002.

⁷⁷ Address by Joschka Fischer, Minister for Foreign Affairs of the Federal Republic of Germany, at the Fifty-seventh Session of the United Nations General Assembly, New York, 14 September 2002, available at <http://www.auswaertiges-amt.de/www/en/aussenpolitik/index.html>.

⁷⁸ GRAHAM & WIENER (1995), *supra* note 64; Wiener (2002), *supra* note 17.

⁷⁹ EEA (2001), *supra* note 29 (reviewing false negatives but neglecting to discuss any false positives).

⁸⁰ Kagan, *Power & Weakness* (2002), *supra* note 43.

⁸¹ For expanded discussion of these hypotheses, see Wiener & Rogers (2002), *supra* note 28.

⁸² ORTWIN RENN AND BERND ROHRMANN, EDS., *CROSS-CULTURAL RISK PERCEPTION: A SURVEY OF EMPIRICAL STUDIES* (Dordrecht: Kluwer Academic Publishers, 2000); MARY DOUGLAS & AARON WILDAVSKY, *RISK AND CULTURE : AN ESSAY ON THE SELECTION OF TECHNICAL AND ENVIRONMENTAL DANGERS* (Berkeley: University of California Press, 1982).

⁸³ Kagan, *Power & Weakness* (2002), supra note 43 (the US and Europe “disagree about what constitutes a threat . . . [they] differ most these days in their evaluation of what constitutes a tolerable versus an intolerable threat”).

⁸⁴ Jonathan Golub, *New Instruments for Environmental Policy in the EU: Introduction and Overview*, in *NEW INSTRUMENTS FOR ENVIRONMENTAL POLICY IN THE EU* 4-24 (Jonathan Golub, ed., London: Routledge, 1998); Jos Delbeke & Hans Bergman, *Environmental Taxes and Charges in the EU*, in Golub (ed.), supra, at 242-260; Richard B. Stewart, *Environmental Law in the United States and the European Community: Spillovers, Cooperation, Rivalry, Institutions*, 1992 UNIVERSITY OF CHICAGO LEGAL FORUM 41, 75-80.

⁸⁵ Commission of the European Communities (CEC), *Proposal for a Directive of the European Parliament and of the Council Establishing a Scheme for Greenhouse Gas Emission Allowance Trading Within the Community and Amending Council Directive 96/61/EC*, COM (2001) 581 final, Brussels, October 23, 2001.

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⁸⁸ Alfred Marcus, *EPA's Organizational Structure*, 54 LAW & CONTEMPORARY PROBLEMS 5 (1991).

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⁹⁰ Lakshman Guruswamy, *The Case for Integrated Pollution Control*, 54 LAW & CONTEMPORARY PROBLEMS 41 (1991); NIGEL HAIGH, & IRENE ERWIN, EDS., *INTEGRATED POLLUTION CONTROL* (1990).

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Neil Carter & Philip Lowe, *The Establishment of a Cross-Sector Environment Agency*, in UK ENVIRONMENTAL POLICY IN THE 1990s at 38 (T. Gray ed., 1995).

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⁹³ KAGAN & AXELRAD, REGULATORY ENCOUNTERS (2000), supra note 59.

⁹⁴ KAGAN & AXELRAD, REGULATORY ENCOUNTERS (2000), supra note 59, at 12-13.

⁹⁵ VOGEL (1985), supra note 36; JASANOFF (1986), supra note 36; KAGAN & AXELRAD, REGULATORY ENCOUNTERS (2000), supra note 59, at 11-13.

⁹⁶ KAGAN & AXELRAD, REGULATORY ENCOUNTERS (2000), supra note 59, at 3, 23. Cf. Donald L. Horowitz, *The Qu'ran and the Common Law: Islamic Law Reform and the Theory of Legal Change*, 42 AMERICAN JOURNAL OF COMPARATIVE LAW 543 (1994) (observing that procedural law is often slower to converge across countries than substantive law because practicing lawyers cling to the procedure they know).

⁹⁷ KAGAN & AXELRAD, REGULATORY ENCOUNTERS (2000), supra note 59, at 23, 404-05.

⁹⁸ KAGAN & AXELRAD, REGULATORY ENCOUNTERS (2000), supra note 59, at 10, 13; John C. Reitz, *Standing to Raise Constitutional Issues*, 50 AMERICAN JOURNAL OF COMPARATIVE LAW 437, 457 (2002); Richard B. Stewart, *A New Generation of Environmental Regulation?* 29 CAPITOL UNIVERSITY LAW REVIEW 21, 85-86 (2001).

⁹⁹ Vogel (2002), supra note 56; KAGAN & AXELRAD, REGULATORY ENCOUNTERS (2000), supra note 59, at 14-15.

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¹⁰² Breyer & Heyvaert, supra note 61.

¹⁰³ Golub, supra note 60; CEC 2001, supra note 85.

¹⁰⁴ CEC 2000, *supra* note 10.

¹⁰⁵ Mathias Reiman, *The End of Comparative Law as an Autonomous Subject*, 11 TULANE EUROPEAN & CIVIL LAW FORUM 49, 62 (1996).

¹⁰⁶ ECKARD REHBINDER & RICHARD B. STEWART, NTEGRATION THROUGH LAW: EUROPE AND THE AMERICAN FEDERAL EXPERIENCE: VOL. 2, ENVIRONMENTAL PROTECTION POLICY (Berlin and New York: Walter de Gruyter, 1985); Breyer & Heyvaert, *supra* note 61.

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¹⁰⁸ Golub, *supra* note 84; Stewart (2001), *supra* note 98.

¹⁰⁹ See Boehmer-Christiansen, *supra* note 29; Sand (2000), *supra* note 11; *Ethyl Corp. EPA*, 541 F.2d 1 (D.C. Cir. 1976).

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¹¹² KAGAN & AXELRAD, REGULATORY ENCOUNTERS (2000), *supra* note 59, at 2-3.

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