ON BELIEFS AND REGIMES:
JUSTIFICATION, CAUSAL KNOWLEDGE, AND MEASURES OF COMPLIANCE

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This essay links two strands of Robert O. Keohane's work. *After Hegemony* and his essays in *International Regimes* and *Cooperation Under Anarchy* relied on microeconomic reasoning to place the international institutions, norms, rules and procedures that we know as regimes at the center of the study of international relations. With Stephen Krasner, Robert Axelrod and others, Keohane defined the function of regimes as a corrective to political market failure, anticipating the rise of rational choice methods in the study of politics. *Ideas and Foreign Policy* relied on sociological and psychological reasoning to consider how principled and causal beliefs shape relations between countries. With Judith Goldstein, Keohane analyzed what would now be termed the construction and cumulation of knowledge in international relations, anticipating though not embracing the rise of postmodernist approaches to the study of politics. This essay relates the nature of principled and causal beliefs to the design of regimes, with emphasis on three themes.

The first section examines discusses interaction between principled beliefs and conflict within regimes, suggesting that acute international conflicts may be found on issues where differences over the principles used to legitimate policies are compounded by differences in causal beliefs that relate actions to expected outcomes..

The second section examines causal beliefs of varying complexity and perceived uncertainty, and discusses their relation to the selection of indicators of compliance with regimes. This section uses work by David Reiner on indicators suitable for legitimating lines of policy, for measuring progress on intervening states, and for assigning responsibility for actions.

The third section examines situations where conflict over causal beliefs and the existence of uncertainty preclude agreement on substance, and discusses dispute settlement procedures and arrangements governing the accumulation of knowledge. This section argues that current conflicts over the invocation of the precautionary principle in the presence of uncertainty may be managed through agreements to gather information to attack uncertainty.

Examples are drawn largely from the realm of international conflicts over domestic environmental, health and safety regulations with a brief discussion of international responses to weapons of mass destruction and Iraq.

PRINCIPLED BELIEFS AND CONFLICTS OVER JUSTIFICATION

Arcane domestic environmental, health and safety regulations have become common objects of economic diplomacy. There is intense debate within trade and environmental circles over the causes and consequences of regulatory diversity. Some view differences in regulations of *products* as bona fide responses to environment and health risks, while others see nontariff barriers to trade. Some see variation in regulations governing *production processes*, including air and water quality standards, as legitimate responses to national differences in environmental preferences, environmental conditions and wealth, while others see parochial efforts to attract investment and improve the competitive position of firms. The range of contemporary international conflicts over domestic product and process standards is striking[1]

Stripped of caveats and qualifications, conflicts over regulatory diversity are explained by a combination of the principled beliefs used to justify regulations and by the conventional product/process distinction. Conflicts over regulatory issues is most difficult to resolve in situations where disagreements over the *raison d'etre* of regulations are pronounced, with sharper conflicts over policies that shield individuals from the consequences of their own actions and that advance species and environmental rights than over regulations to correct for classic market failures such as externalities. In addition, conflicts over product regulations justified as risk-shielding measures may be compounded by differences in risk-perceptions within scientific communities and publics.

In Figure 1, rows are organized around the conventional product and process distinction, while the columns are organized by category of justification. Cases falling within the Risk Shielding and Species Rights columns and in the Product row are the most likely to be controversial. In addition to environmental, health and safety cases, nonenvironmental cases have been included as reference points.

As is commonly noted, cross-national differences in product-regulations are frequently associated with rents for import-competing producers and labor. Such rents can be explicitly demanded by these actors, or result as an unintended by-product of regulation. Exporters in other countries and consumers bear the costs of this rent-seeking and, depending on the market structure, are likely to complain to their governments. Governments may adopt these complaints and challenge the rent-

[1] International conflicts over domestic regulatory differences are not entirely a contemporary phenomenon. Within European city states, guilds set standards that defined acceptable training methods, specified acceptable production processes, and established benchmarks for product quality. Guild standards helped preserve local monopolies and retarded technological advance while assuring product quality. As trade among city states expanded and as technological change accelerated, conflict over traditional guild standards increased. In a particularly bitter 19th century case, the government of China devised a plan to protect domestic social stability and health by regulating handlers, dealers and consumers of opium. These purely domestic Chinese regulations literally drew fire from British commercial and financial interests that were harmed by the interruption of trade in opium. Though conflicts over domestic regulations are not new, the frequency of disputes appears to be rising.

providing foreign regulations. A trade dispute emerges. Cross-national diversity of process regulations, by contrast, are less likely to result in trade disputes because such regulations result in less diversion of trade, and because such regulations provide smaller or no rents to import-competing producers.

FIGURE 1: FORM AND JUSTIFICATION OF REGULATION

	……Primary Justification Offered for Regulation……		
	Externality/Commons	Risk Shielding/Info Asymmetry	Species & Ecological Rights
Product Regulations	CAFE Standard	Irradiated Food Ban	Tuna-Dolphin Embargo
	Auto Exhaust Standards	BGH Beef Ban	Shrimp-Turtle Embargo
	Fuel Formulation	GMO Content	Minke & Pilot Whale Meat Ban
	Fumigant Certification	BST Milk Ban	Rhino Horn Powder Ban
	CFC Trade Ban	Raw Milk Cheese Ban	Ivory Product Ban
	Design for Disassembly	Asbestos Products Ban	Forced Labor Product Ban
	Beer Bottle Laws	BSE Beef Ban	Child Labor Product Bans
	Salmon Heat Treatment	Dioxin Residue Standard	
	Energy CRT Standards	TCO EMF Certification for CRTs	
	Small Lobster Ban	Tobacco/Alcohol/Opium/Gambling	
Process Regulations	Dioxin Incineration	Workplace Exposures	Turtle Excluders
	Local Air Pollution	-Teratogens & Women	Dolphin Free Netting
	GMO Containment	-Pesticides & Agricultural Labor	Elephant Poaching
	Methyl Bromide Agriculture	-Ergonomics Standards	Cruelty Free Testing
	Water/Sewage Standards	-EMF Exposure Standards	Endangered Species Act
	Banking Capital Adequacy	Banking Capital Adequacy	Child Labor Convention
	Tanker Standards	GMO Cultivation	Prison & Slave Labor Convention
	CFC and circuit board washing		

GATT/WTO cases underlined

Product-regulations justified on the basis of risk-shielding tend to be associated with larger and more persistent cross-national variation in risk-perception by the wider public, and perhaps also with greater differences between public and scientific risk-perceptions. The causality underlying this relationship is not obvious. One possibility is that product-regulations justified as risk-shielding are associated with circumstances where environmental/consumer and rent-seeking groups, each for their own reasons, are interested in raising consumer fear. In countries where such often tacit coalitions emerge, the wider public will, due to strategically motivated campaigns to raise domestic fear, perceive greater risks than in countries where such a coalitions does not emerge.

Larger cross-national variation in risk perceptions of the wider public and greater differences between public and scientific risk-perceptions can reinforce or even increase cross-national regulatory diversity. But the degree of homogeneity of risk-perceptions in the scientific community may have complex effects. Dispute settlement procedures in existing trade regimes are ill-equipped to cope with cases where perceptions of the magnitude of risk by the wider public vary across countries, but scientists agree that the given risk to consumers is low. In this case, dispute settlement procedures will often produce legal solutions that do not politically solve the underlying conflicts. The trade dispute over bovine growth hormones is the strongest example of this kind. In cases where the heterogeneity of risk-perception by the scientific community is high, dispute settlement procedures are unlikely to result in clear-cut legal outcomes, or are not set into motion in the first place. In these cases trade conflicts will be less severe because countries are more likely to tolerate cross-national regulatory diversity.

The diversity of legitimating principles invoked to justify regulations appears to be increasing. Internationally, the European Union and the United States differ on antitrust doctrines, on reliance on the precautionary principle, and over the role of the state in shielding populations from environmental, health, and economic risks. Within the United States, neoconservatives, libertarians and liberals divide over precisely the same issues. Fundamental disagreements over regulatory principles appear to be widening, within and across nations. This is a key to understanding the connection between international and domestic controversies. International and domestic conflict over regulatory issues is most difficult to resolve in situations where disagreements over the legitimacy of justifications for regulations are pronounced, with sharper conflicts over regulations and policies to shield individuals from the consequences of their own actions and to advance species and environmental rights than over regulations to correct for classic market failures such as externalities. Many of the most striking areas of controversy are found where neo-liberal and deontological approaches to justification yield different policies.

1. Neo-Liberal Economic Justifications: Welfare Economics and Market Failure

Utilitarian economic justifications for regulation usually begin by identifying sources of economic market failure, then identify appropriate public regulations as corrections to private market failures. If private solutions to environmental or public health problems fail in the face of externalities, then state regulation of activities that generate externalities may be justified. If information asymmetries impede efficient responses to risks by private markets, then establishing public institutions to provide information is justified. If private markets for insurance against risks are vitiated by adverse selection problems and moral hazard, then regulation of activities generating risks may be warranted.[2]

A conventional welfare economics perspective would focus on the efficiency of market and regulatory approaches to the allocation of health and environmental risks. A classical welfare economics perspective may be used to justify differences in regulations across issues. Can markets respond to high uncertainty situations efficiently, for example through liability rules and insurance schemes? Which sort of liability regime and which sort of insurance would result in a level and form of risks that correspond best to the societal preferences, presuming that it might be economically inefficient to entirely eliminate such risks? Which are necessary and sufficient conditions for the insurability and marketability of highly uncertain environmental and health risks? From a welfare economics perspective, it is only when a market solution to a given risk problem is not feasible that government intervention in the sense of command and control approaches, such as environmental, health, and safety standards, product liability rules, or production regulations become important.

Economic justifications for regulations to take account of public externalities are relatively straightforward. The principle behind mandating standards on hazardous air pollution, requiring catalysts on cars, eliminating sulfur from gasoline, limiting incineration of PVC, barring discharge of untreated sewage, phasing out ozone depleting substances such as methyl bromide and CFCs are clear, even if the precise distribution of externalities associated with unregulated actions may be imperfectly understood.. The practical limitations of Coasian systems of exchange as means of internalizing externalities are well understood. Where

[2]Adverse selection means that an insurance attracts predominantly risky clients. Moral hazard means that those insured are more prone to engage in risky behavior than they would without insurance.

external costs associated with a private transaction are diffuse, bribes to internalize externalities are generally underprovided. In externalities cases, the invocation of market failure as a justification for regulation is typically relatively uncontroversial.

Economic justifications for regulations that shield individuals from risks associated with their own actions often rest on mixed appeals to non-economic values in combination with arguments on market failure. Governments bar individuals from assuming many risks. Governments have mandated the wearing of seat belts and motorcycle helmets, prohibited consumption of narcotics and alcohol, restricted gambling and tobacco, barred consumption of unpasteurized cheeses, banned meats produced with growth hormones and milk produced with BST, and prohibited foods containing genetically modified organisms. Such limitations on consumption run contrary to conventional economic assumptions on the sanctity of consumer sovereignty and voluntary consensual activity. Economic justifications for risk shielding tend to center on the content of informed consent. If narcotics and gambling are addictive, then true consent may be impossible. If information asymmetries preclude informed individual judgement without inordinate individual information gathering costs on pesticide residues, pasteurization of cheeses, or food additives, then rules restricting consumption may advanced welfare.

Regulations barring consumption may also rest on claims of the existence of secondary externalities, as distinct from shielding consumers from harms associated with their own actions per se. Bars on smoking are commonly justified in terms of the effects of second hand smoke on those not consenting. Other actions that may be injurious to an individual may have socially contingent effects external to the individual. If an individual were to destroy his or her health through consumption of drugs, alchohol or unpasteurized cheeses or by failing to wear a seatbelt or helmet, then the costs of medical treatment and other support may be borne by the state or the community rather than the individual.

Arguments framed in terms of economic welfare have also been offered for policies that protect individual species and general ecosystems. For example, private economic activity may result in extinction of an animal or plant or the loss of a habitat. The justification for regulation may be framed in terms of the economic value placed on a plant or animal based medicine undeveloped, on tourism unrealized, on fisheries depleted, and on other economic benefits not internalized by parties to market transactions. The international whaling convention was predicated on the assumption that unrestricted harvesting of whales would eradicate stocks of a commercially valuable species. Markets would not take into account potentially significant but as yet unspecified external economic costs associated with a loss in genetic diversity or ecosystems degradation.

2. Deontological Justifications for Risk Shielding and Environmental Preservation

Utilitarian economic justifications for risk shielding and species and ecosystem preservation are at times quite strained. Common arguments on welfare economics may obscure more direct, albeit more controversial, justifications for limiting individual choices on assuming risk and for restricting actions that would endanger species and ecosystems.

Consider other rationales for risk shielding. Social democratic values that would have the state assume a larger responsibility for health insurance and disability support also would have the state assume a larger responsibility for protecting collectively its citizens from risks. Conversely, libertarian values would have the state permit its citizens to make choices and live

with the good or bad consequences of their choices. Apart from broad differences in conceptions of the role of the state, justifications for risk shielding in the area of food may be framed more or less directly in terms of what may be fairly seen as a moral value ascribed to providing for pure versus adulterated foods and pharmaceuticals. From the ancient German beer laws through current concerns over GMOs and food irradiation, a moral and emotional dimension of justification runs strong through the regulation of food and drugs.

Deontological noneconomic justifications also play a substantial role in species and ecosystems preservation. Justifications for protection of endangered species in terms of environmental rights, environmental justice and respect for species diversity are at least as strong as economic arguments on the potential commercial value of genetic heterogeneity. Conflicts between Norwegians, Japanese and Americans over the harvesting and sale of whale meat rest not on the economics of commons preservation but rather on the widespread present view in the United States that the lives of whales are valued in and of themselves quite apart from considerations of maintaining commercial yields. The value that Americans place on sea turtles and dolphins does not reduce readily to commercial and economic efficiency. International variation in conditions and values used to justify crossnational variation in regulations also bears on the intensity of conflict.

C. Uncertainty, Risks, and Regulatory Conflict

Although utilitarian economic and deontological theories of regulation are often viewed as mutually exclusive, real conflicts embody at once political conflicts over particularistic economic interests, scientific debates over risks, technical debates over mitigation options, and moral debates over environmental and human rights. In this context, perceived uncertainty in scientific communities and among the wider public over the nature of environmental or health risks, and over the costs and benefits of regulatory options has several consequences. In practical terms, uncertainty may lead to more persistent regulatory variation across issues and countries. As a secondary effect, it may also complicate international conflicts over regulatory heterogeneity and its consequences for international trade and investment. In analytical terms, conventional material interest explanations may have to be supplemented by arguments about uncertainty to account for outcomes.

Under conditions of uncertainty, it can be difficult to differentiate between regulations that advance *bona fide* environmental and health ends and regulations that advance parochial national, sectoral or firm economic interests. The motivations of actors in these cases are often genuinely mixed, with calculations of economic interest and the careful shaping of regulations to yield economic advantage coexisting with debates over the science of health and environmental risks and over the technology of abatement.[3] Uncertainty may, for example, cloud understanding of how existing or proposed regulation affects the competitive position of firms. It is not clear at the outset how a specific regulation will ultimately affect the value of technologies, substitutes, and end products. In even the simplest of examples, with relatively unambiguous connections between regulations and environmental and health risks, fights over regulations often mix debates over risk assessment and characterization of economic interests.

[3]Uncertainty may also cloud firms' understandings of how a regulation will affect their competitive position. It is not clear at the outset how a regulation will ultimately affect the value of technologies, substitutes, and end products.

Debates over these issues in many contemporary risk shielding cases are foreshadowed by a 19th century case. In 1839, the government of China contended that the six point plan to discourage opium consumption devised by Emperor Tao Kuang and Commissioner Lin was designed to stem the rapid spread of opium use through China with benefits for Chinese health and morals. The British argued that Chinese expressions of concern over health and morality were mere covers for economic interest. The British questioned the validity of Chinese risk assessments, arguing that opium smoking was not particularly deleterious to health. The British asserted that opium restrictions were intended as trade barriers, noting that opium regulations were arbitrarily higher than measures governing other potential risks without trade implications such as drinking rice wine. Finally, the British observed that the plan would have reduced imports of opium via the British East India Company, thereby easing the drain of silver from China to Britain.[4]

Policy-makers face substantial and rising scientific uncertainty over environmental and health risks and the costs associated with mitigation of such risks. Scientists and engineers can contribute to better public policies by improving the quality of scientific and technical information used in decision making. In many situations, however, scientific uncertainty will remain a persistent feature of the problem, even when state-of-the-art knowledge is made available. Such uncertainty concerns the nature of environmental and health risks, uncertainty over the costs and benefits of technical means to mitigate or adapt to risks, and uncertainty over the efficacy of established and proposed policies. This problem is in part testimony to the success of first generation environmental and public health policies. As advanced industrial societies have reduced exposures to acutely toxic substances, attention shifted to lower dose exposures to biocumulative substances and to other problems characterized by longer time horizons, more complex interaction effects, and substantial uncertainty. Holding narrow economic self-interest constant, rising scientific uncertainty is likely to increase diversity of regulatory responses across nations. Evaluating risks and mitigation measures is intrinsically difficult and regulatory solutions are less determinant where potential effects are longer term and more complex. Whereas sensitivity to variations in domestic regulations and the need for effective means of managing trade-regulatory disputes has increased, uncertainty may have increased the difficulty of reaching clear conclusions on the legitimacy of regulatory differences.

Holding material interests and political power constant, the ways in which scientific information is fed into regulatory processes, and how this information is processed, absorbed and communicated by the principal stakeholders, accounts for at least some variation in regulatory outcomes. Major changes in environmental and consumer regulations may come about most readily when calculations of economic advantage complement calculations of environmental and health benefits. In fact, reductions in Chinese opium use would have yielded substantial economic and health benefits to China. Elevation of the EU's standards on volatile organic compounds would have provided health benefits and improved Volvo's competitive position. Limitations on the distribution of small lobsters within the United States would improve fisheries management and the competitive position of American lobsterers relative to their Canadian counterparts. Swiss taxes on heavy trucks crossing the Alps will please environmentalists by protecting the fragile environment in transit corridors and Swiss truckers alike. As the latter case

[4]See Hsin-pao Chang, Commisioner Lin and the Opium War, pp 93-95.

suggests, environmental, health and safety justifications for regulation may foster rent seeking by offering legitimating principles for regulation and by adding environmentalists to regulatory coalitions. Regulations that advance particularistic interests of existing producers and a general interest in effective management of environmental problems may also harm potential entrants and consumers.

Scientific uncertainty and associated processes of communication may influence regulatory outcomes in a variety of other ways as well. Greater uncertainty can change the patterns of influence among interest groups. Those who have more information than others and who play the "science and public policy" game better may gain in influence at the expense of other interest groups. The framing of issues, even the use of certain terminology, may influence which societal groups are mobilized for or against regulation. For example, describing food irradiation as 'ionization' instead of 'irradiation' in France may have reduced the resistance of consumer groups. Taking into account uncertainty may help us in accounting for outcomes that cut against Olsonian or Stiglerian propositions. Depending on the characteristics of countries' political systems and the characteristics of a regulatory issue some regulatory processes can result in enormous public attention. For example, massive public fear of health risks, such as the one created by mad cow disease in Europe or the 1999 dioxin scandal in Belgium, can override the interests of otherwise well-organized and powerful producers, particularly in political systems characterized by open access to regulatory processes. Highly publicized risks in particular tend to homogenize preferences and mobilize interests even among very large actor groups.

In summary, regulatory processes in the field of environment and consumer protection often involve greater uncertainty than traditional trade, investment, or public utilities issues on which conventional positive political economy explanations concentrate. Uncertainty complicates the explanation of regulatory processes and their outcomes. This insight has direct implications for the management of conflicts with international trade and investment, on which the second and third sections of this essay concentrate.

CAUSAL BELIEFS AND INDICATORS OF COMPLIANCE WITH REGIME*

A. Categories of Indicators
    1. Behavioral – define compliance in terms of concrete actions
    2. Intervening states or links – define compliance as observables on causal paths
    3. Ultimate objectives – define compliance in terms of consummatory values

B. Strengths and Weaknesses of Indicators

	Behavioral	Intervening	Consummatory
Strength	Assigning responsibility	Nominal measurability Ostensible objectivity	Legitimating arrangement
Weakness	Legitimating arrangement	Relevance to legitimacy and assigning responsibility	Assigning Responsibility

C. Goal Selection and Structure of Causal Beliefs

1. Equivalent if simple causal structures
   A => B => C

2. Not equivalent if complex and interactive causal structures
   A1 B1 C1
   A2 B2 C2
   A3 B3 CE

D. Domestic and International Examples
   1. Behavioral:
   Tax rate, catalyst, vaccinations, BSE testing, M & A
   2. Intervening:
   Fiscal balance, emissions, ambient air, infection rate, incidence of BSE, market share
   3. Consummatory:
   Standard of living, health, quality of life, innovation rate, prices

E. Potential Problems
   1. Selection Effects
   2. Interaction Effects
   3. Delegitimation
   4. Inability to measure with credibility
   5. Inability to assign responsibility
   6. Differences in selection of indicators across countries and regimes

*Ken Oye summary of David Reiner dissertation plus additional material

CAUSAL BELIEFS, UNCERTAINTY, AND DISPUTE MANAGEMENT

Disagreements over causal beliefs on the relationship between classes of actions and possible externalities and risks sit at the core of many trade disputes. WTO dispute settlement procedures often take the form of knowledge appraisal mechanisms that pass judgement on the plausibility of official causal beliefs that underpin regulations. This section examines WTO dispute settlement procedures and procedural requirements, including appeals for risk assessment, as means of managing tensions between domestic regulatory differences and an open stable trading system. Several findings emerge from this analysis.

(a) Established dispute settlement mechanisms and formal international standard setting are likely to lose effectiveness and legitimacy over time. Although de facto standards devised by networks of private actors have recently risen in significance, limits on this mode of harmonization are emerging and private harmonization is unlikely to fill gaps as de jure standards and formal international organization continue to decline.

(b) Uncertainty reduces the effectiveness of formal dispute resolution approaches predicated on the ability to differentiate between bona fide and illegitimate regulations. Appeals to scientific risk assessment as the sine qua non of dispute settlement will not work well in settling conflicts in many emerging issues where the precautionary principle is invoked and supported in a systematic manner.

(c) While conflicts over invocation of the precautionary principle in the presence of substantial uncertainty are building in intensity, a combination of Bayesian sequential updating strategies with commitments to modify regulations as information comes may ameliorate conflicts over precaution.

The Dispute Settlement Panels of the WTO have been important venues for international conflicts over the international repercussions of domestic environmental, health and safety regulations. . The content of principles to be applied by WTO panels derive from general principles of trade law. On the environmental and health based regulations at issue here, WTO Panels also turn to preexisting international agreements, such as the SPS agreement and CODEX rules.

This section suggests that although the performance of the WTO system in managing trade and environment cases to date has been good, the issues raised by GMO content and approval regulations will prove extremely particularly difficult to digest. This section begins by reviewing WTO panel decisions on environment, food, and trade cases to date, and concludes by comparing the properties of the GMO issue with these earlier issues.

A. Past WTO Cases on Environment, Food Safety and Trade

Conventional wisdom in environmental circles holds that the WTO has been all too willing to sacrifice domestic environmental regulations to defend an open global economic order. An initial examination of WTO panel findings would appear to support that conclusion. As Figure 2 suggests, WTO panels ruled against provisions of the US Clean Air Act and US rules protecting sea turtles and struck down EU, Australian, and Japanese environmental. With a single exception, the outcomes in these cases do not appear to favor domestic environmental regulation.

FIGURE 2: WTO PANEL FINDINGS

Regulation	Defendant	Outcome
Growth Hormone	EU	Struck down
Salmon Heat Treatment	Australia	Struck down
Fumigant Certification	Japan	Struck down
Shrimp-Sea Turtle Exclusion	US	Struck down
Gasoline Formulation	US	Struck down
Asbestos	France and US	Upheld

By contrast, there is widespread enthusiasm within trade circles over the application of WTO dispute procedures and standards in environment-trade conflicts. In his study of WTO rulings on the EU ban on meat produced using synthetic growth hormones, the Australian ban on imports of fruit and salmon from Canada, and Japanese fumigation testing requirements on imported fruit and nuts, David Victor argues that the WTO dispute settlement process, taken in conjunction with preexisting international standards, provide effective guidelines for evaluating tradeoffs between domestic regulations and free trade. He concludes that the SPS agreement has not been a straitjacket, but rather has "...allowed national diversity in SPS measures to thrive while also reducing barriers to trade." Richard Senti and others have arrived at the same conclusion, arguing that the WTO dispute settlement approach to managing conflict taken together with international standard setting may reconcile differences in domestic environmental preferences with requisites of free trade.

The reasoning behind these cases suggests that, at least to date, WTO Panel findings have been far more circumscribed than popular accounts suggest. With the exception of the bovine growth hormone case, each of these cases appears to have been decided in a manner that would allow for the ready defense of environmental objectives through less trade distorting means.

Growth Hormone: A WTO panel ruled against the EU ban on meat produced using synthetic growth hormones because the European measures: (1) did not conform to CODEX Commission standards; (2) were not based on risk assessment that exhibits "...a rational relationship between the measure and the risk assessment"; and (3) were arbitrarily higher than measures governing other potential risks, such as antimicrobial feed additives, hence were intended as a discriminatory barrier to trade. The WTO Appellate Body upheld the Panel ruling against the EU for failing to conduct a risk assessment to justify its standards. However, the Appellate Body overturned the Panel on the other two issues, offering more flexibility in the relationship between national and international standards; and holding that complainant had not provided sufficient evidence that the restrictions in this case had functioned as a discriminatory restriction on trade.

Salmon: A WTO panel ruled against Australian bans on fresh and frozen salmon imports to prevent the spread of fish borne diseases because the ban: (1) was not based on a risk assessment including identification of vectors, entry methods, and consequences; (2) were arbitrarily higher than measures governing other potential risks including bait fish and live ornamental fish without trade implications; (3) were not minimally trade restrictive, since beheading and eviscerating fresh and frozen fish would have been as effective as heat treatment. The WTO Appellate Body upheld the Panel ruling against Australia noting that the ban was not based on an assessment of risks and that the ban was a disguised restriction on trade.

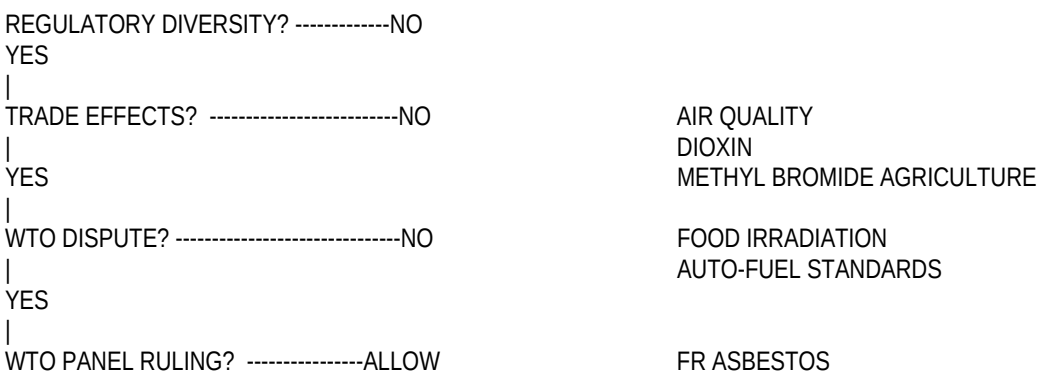
Fumigant Certification: A WTO panel ruled against Japanese requirements for full testing of the effectiveness of methyl bromide as a fumigant against moth eggs and larva on every new variety of fruits and nuts, finding that the testing requirement for every new variety: (1) was not based on risk assessment; (2) was more trade restrictive than necessary since testing standards could set on basis of sorption level rather than full retesting; and (3) were not transparent since the requirements were not published. The Appellate Body upheld the Panel ruling against Japan, noting that the retesting requirements were not based on risk assessment and were not transparent, while overturning the Panel finding that the retesting requirement was needlessly trade restrictive because the finding was based on evidence provided by the Panel and not parties to the case.

Fuel Formulation: A WTO panel ruled against the US for imposing penalties on Venezuelan gasoline that did not meet oxygenation standards under American law. The panel found that the US had established higher standards for gasoline of foreign than domestic origin, noting that the legislative history explicitly mentioned congressional intent to provide a modest favor for domestic producers. The WTO panel found that the penalty imposed by the US on Venezuela in this case was negligible, but that the differential standards were discriminatory. The WTO panel offered the US two methods of coming into compliance, by raising the domestic standard to meet the international standard or by lowering the international standard to meet the domestic standard.

Shrimp-Turtle: A WTO panel ruled against the US for banning some imports of shrimp harvested without benefit of sea turtle restriction devices. The WTO panel did not unconditionally strike down US reliance on import restrictions to address differences in how nations regulate fishing practices. The WTO panel did find that the US had set two different schedules for phasing in import bans linked to shrimping techniques, and in so doing had engaged in discrimination against countries faced with the tighter schedule for compliance and in favor of countries faced with the more relaxed schedule for compliance.

Asbestos: WTO panel considered a complaint by Canada against France and the United States challenging domestic regulations barring use of ceiling tiles and other products that use asbestos. The Canadian challenge on behalf of asbestos producers in Quebec contended that French and US regulations are not based on adequate scientific risk assessment. The core of the Canadian case rests on the claim that some varieties of asbestos are safe when used in ceiling tiles and other building materials, and that regulations that do not differentiate among varieties of asbestos are both arbitrary and needlessly trade restrictive. The WTO panel upheld French regulations.

FIGURE 3: REGULATORY DIVERSITY AND TRADE CONFLICT: SELECTION EFFECTS



|
DISALLOW
|
DEFENDANT RESPONSE? ---------ACCEPT
|
RESIST
EU GROWTH HORMONE

US GASOLINE FORMULATION
AU SALMON
JP FUMIGANT CERTIFIC
US SHRIMP SEA TURTLE

Of these cases, the EU growth hormone case has received by far the most attention. But it is important to note that it is has received attention because it is an exceptional case, marked by more intense conflict than the many other examples of regulatory diversity on environmental and food safety issues. The EU remained locked into trade restricting regulations despite verdicts by WTO panels declaring these regulations illegal. It stands out as the case where resistance continued beyond the WTO ruling and appeal. As Figure 3 suggests, all of the other cases treated were less contentious.

B. Present and Future Controversies on Environment, Food and Trade

Unfortunately, the issues raised by the BGH case are at the core of the GMO case now on the WTO docket, and several attributes of the GMO issue make it less digestible than the BGH case. The BGH decision was ultimately based on two points – the existence of an international standard under CODEX and the absence of anything resembling a scientific risk assessment to justify departures from that standard. Future panels will not be able to avoid ruling on the merits by basing decisions on this combination of factors.

Limited New Transnational Standards

While international standard setting has promise as a solution to environment-health-trade conflict, several potential problems may reduce the long term viability of this approach.[5]

First, voluntary transnational standard setting arrangements may be either stepping stones to deeper cooperation or may be stopping points that preempt other moves. On the one hand, voluntary standard setting under CODEX has been a stepping stone to deeper cooperation under the WTO SPS. On the other hand, Japanese and American businesses supported ISO environmental certification to preempt the spread of EMAS guidelines that were believed to favor European businesses.

Second, the content of voluntary transnational agreements may be strongly reflective of industry interests. If rent provision can be an important attribute of public regulations formed in open settings with a broader political base, more limited participation in closed international forums may tilt outcomes toward rent provision even more strongly. Participation by nonindustry participants including environmental nongovernmental organizations and labor is extremely rare in Codex, PIC, and ICHP.

[5] See David Victor, ibid; and Richard Senti in: Bernauer/Ruloff 1999. For more on voluntary standard setting, see Jan Sundgren, doctoral dissertation on ISO, MIT 1998.

Third, the Codex poster child may be less attractive than is commonly thought. It is an open question whether processes that worked well in producing voluntary standards that mattered little will work in producing binding standards that sit are the core of WTO SPS disputes. As the stakes have increased, contention and stalemate at the technical committee and commission levels may become far more common.

Uncertainty and Risk Assessment

Apart from these difficulties, uncertainty is likely to reduce the viability of appeals to risk assessment. Over the longer term, the WTO dispute settlement mechanism is likely to increasingly emphasize risk assessment as a technique for justifying stringent regulations. The first round cases were relatively easy to deal with in this regard, since in most instances no sophisticated risk assessment was conducted to defend trade restricting policies. What will happen as nations turn to risk assessment as a major element of regulatory decisionmaking processes is unclear. What will be the constraining requirements for "risk assessment"? The WTO Appellate Body has not yet established guidelines that might define adequate risk assessment. In the Japanese fumigant testing case, the Appellate Body simply declared "….whether there is a rational relationship between an SPS measure and the scientific evidence is to be determined on a case-by-case basis and will depend upon the particular circumstances of the case, including the characteristics of the measure at issue and the quality and quantity of the scientific evidence."[6] In the hands of skilled practioners of rent seeking, risk assessment may prove to be sufficiently elastic to accommodate a broad range of rent providing policies.

These problems are likely to be compounded by the substantial degree of scientific uncertainty associated with emerging domestic regulatory issues. Under conditions of limited uncertainty in the BGH, salmon, and fumigant cases, the WTO panels leaned against the free and easy invocation of the precautionary principle. In cases marked by higher degrees of uncertainty, including cases of GMOs and pesticide residues, it is not clear how acceptable levels of precaution should be established. In many emerging situations, uncertainty will remain a persistent feature of the problem even when state-of-the-art scientific and technical information is made available.

In those areas where the WTO has jurisdiction, the WTO approach to managing conflicts between trade and environment assumes that analysis of the science on environmental and health risks will differentiate clearly between bona fide and illegitimate regulations. With high levels of uncertainty associated with emerging environmental issues, simple risk assessment may not provide a basis for adjudication. In areas other than SPS, where jurisdiction is less clear and where guidelines for judgment are softer, quasi judicial procedures may not function well. Product restrictions are allowed under the GATT WTO legal definition if they do not discriminate against imports. With rare exceptions (such as prison labor; Article XX), GATT prohibits process bans. Hence, to reduce protectionism, GATT limited its definition of product restrictions to include only those concerning the nature of the product itself. The GATT has adopted an even more complicated distinction within PPM regulations: some are "product-related PPM" requirements, which affect the final characteristics of the product. Others are purely "non-product-related PPMs," which affect the

[6] Cited in David Victor, ibid, p 31.

production or processing of the product.[7] With the exception of SPS cases, the GATT WTO does not have an adequate legal basis for addressing the domestic regulatory problems that are precisely the issues that are so much in contention in regional and bilateral trading relations.

C. Managing Fights over Precaution: Sequential Updating and Adaptation

The real test of the WTO machinery will come with a new round of regulatory cases, where domestic and regional regulators craft their requirements with an eye to pro forma risk assessments and nominally nondiscriminatory methods and standards. Existing case law, as embodied in these panel decisions, cannot tell us how WTO Panels would rule on cases of bans or restrictions on products where there is no clear evidence of environmental, health or safety risk but where a plausible systematic case for restriction based on the precautionary principle could be made. The heart of the debate reduces to two positions.

The case for precaution is defended most systematically in the European Environment Agency report on *Late Lessons from Early Warnings: The Precautionary Principle 1896 to 2000.* This report offers twelve well documented cases where early but inconclusive warnings on environmental and health risks were ignored until after enduring harms were done. Studies on benzene, lead, PCBs, CFCs, MTBE, and other hazards focus on a combination of industrial resistance to regulation and scientific review processes weighted to filter false claims on causal links on risks. This creates a bias for generation of false negatives within the regulatory process, a bias that results in fatal delays in action. *Late Lessons from Early Warnings* suggests that the precautionary principle offers an offset against these biases. Regulators should act before conclusive proof exists but after there is reasonable evidence on the existence of harms because harms are often irreversible.

The case for proof before action has been made by analysts ranging from John Graham, Harvey Sapolsky and Marcia Angell. They cite cases where costly regulations addressed exaggerated or nonexistent risks. Their studies on alar, breast implants, saccharine, and food irradiation suggest that regulatory bureaucracies, the tort system, the media, and mass psychology of risk perception are weighted heavily to amplify fears of environmental and health risks. This creates a bias for generation of false positives within the regulatory process, a bias that often results in acceptance of costly regulations that lock into place. Insistence on proof before action offers an offset against these biases. Regulators should not act until after there is conclusive proof of harms, because regulatory actions are often irreversible.

The fight over precaution is intense because both parties are correct in their basic claims. The problems they identify coexist, but do not offset each other to produce evaluative neutrality, efficiency, or fairness.

[7]The product-process distinction can be contentious. In the Mexican tuna case, GATT ruled that "internal regulation of imported products cannot extend to the method of production of the products but must relate to the products themselves. . . Environmental concerns about the method of production (as opposed to the product itself) are excluded from consideration under Article III [national treatment], as are, for example, concerns about the treatment or human rights of workers."See Joel Trachtman "GATT Dispute Settlement Panel," American Journal of International Law, Vol.86 n.1, pp.142-151; and his "International Regulatory Competition, Externalization, and Jurisdiction," Harvard International Law Journal, Winter 1993 34:1.

- Up front uncertainty ensures that many regulatory choices with enduring consequences will be in error. The choice between precaution and proof before action is a choice between minimizing either Type I or Type II errors.
- Up front uncertainty ensures that it will be difficult to appraise the sincerity of those that invoke precaution and those that insist on proof before action. Because one cannot differentiate between sincere and insincere adversarial statements of priors on serious and irreversible risk, defense of precaution or insistence on proof before action.
- Backend irreversibility fuels up front fights. The prospect of irreversible harms and irreversible costly policies leads to exceptionally intense fights over policies up front. Near term battles over application of precaution are effectively battles with enduring consequences.

The combination of inevitable error, suspicion of motives, and enduring consequences of error does not portend well for disputes over precaution.

The fight over precaution is also fueled by the misconception that the EU favors precaution while the US favors proof before action. Although this is true for many current controversies, from EU acceptance of precaution on climate change policy, antibiotic use in animal feeds, estrogenic compounds, foods with GMO content, and cultivation of GM crops, on other issues the US accepts precaution while EU members insist on proof before action. Relative to the EU, the US federal government has favored precaution on cancer causing substances under the Delaney clause and on regulation of nitrogen oxides, while US states and locales have been leaders on the issue of second hand smoke. On security issues, including export controls on technologies and war against states of concern with possible chemical, biological or nuclear capabilities, the US explicitly invokes precaution. The fight between the US and the EU is not over the precautionary principle per se. The fight is over applications of the principle in cases with specific priors on risks and costs.

How can conflicts over invocation of precaution be mitigated? Initial regulatory choices may be constructively viewed as experiments that elicit information on risks, monitoring, mitigation options andside effects associated with regulation. Under conditions of uncertainty, initial regulatory choices will typically be wrong. The issue is how to use information from these experiments. Philosopher of science Carl Cranor has called for explicit attention to gathering "Precautionary Information," while ecologist Anne Myhr has recommended "Precautionary Motivated Science." In the literatures on integrated assessment, Lawrence McCray and James Foster of MIT, Warren Walker of Delft University of Technology, and Adnan Rahman, Jonathan Caves, Paul Davis, David Gompert and Richard Kugler of RAND urge greater attention to problems of adaptation. The spirit of this proposal is in line with their recommendations.

A Bayesian analytic frame may used to attack information problems that make conflict over precaution intense:
* uncertainty over the probability and magnitude of substantive risks of harms; and
* uncertainty over the sincerity of the motives of those invoking precaution
The emphasis in most of the environmental policy literature is on integrated assessment up front, and it is manifestly appropriate to make systematic use of the best available information on risks and mitigation methods to improve the quality of decision making. Conventional approaches reduce

uncertainty to estimates of probabilities of contingencies and estimates of values associated with contingencies, then postulate methods for identifying optimal initial policies given point estimates. By contrast, the sequential approaches stressed here cope with uncertainty by identifying strategies for eliciting information on underlying substantive phenomenon, by devising strategies to elicit information on the sincerity of statements by other actors, and by identifying and attacking impediments to the more effective utilization of information.

GMO Crops

Consider the conflict between the US and the EU over GM foods from an information harvesting perspective. Is information yielded by these divergent regulatory experiments being used to update US and EU priors on this issue?

The EU is running a program of monitoring without much experimentation. The EU set up a model program for identifying and analyzing the environmental effects of GM crops and the health effects of GM foods. The elements include careful validation and testing of detection methods, a model Preliminary Standard Action Protocol, a requirement for submission of samples to develop and validate tests, strict labeling requirements to warn of health concerns, and documentation requirements that will allow traceability of inputs and outputs in the event that problems develop. But with only 10,000 hectares of GM crops under cultivation and only one new GM approval in the past five years (BT-11 in May 2004), the extensive EU program of monitoring cannot yield much useful information.

The US is running a program of experimentation without monitoring. With over 40,000,000 hectares of GM crops under cultivation and over 56 products approved, the US is conducting an experiment on a grand scale. Yet the US has a weak program for monitoring effects, with limited validation of detection methods, no labels of content for health concerns, limited documentation with negligible tracing potential, and extremely limited means of monitoring compliance with what can only be described as lax regulations. With such limited monitoring, the likelihood of US early detection and analysis of health or environmental problems if they develop is small.

The mismatch here is obvious. The EU is acting on a prior of substantial risk to environment and health, with draconian limits and careful monitoring. The US is acting on a prior of negligible risk to environment and health, with lax limits and minimal monitoring. Starting from these priors, the US and EU cannot agree on what policies on certification make sense. But can the US and EU agree on a sequential updating strategy that may yield useful information on substantive environmental and health effects and on the sincerity of statements of belief? Specifically, could the EU and US agree to a program of transplanting EU monitoring methods within the US, and to modify EU and US policies on approval of products in light of information harvested by monitoring? An agreement on monitoring and contingent agreement on how to act on information produced may be more feasible than an up front agreement on substance.

Iraq WMD

In 2003, the intense disagreement over preventive war against Iraq between the Anglo-Americans and France, Germany and Russia presented many of the same issues. Given Iraq's history and the

absence of inspections in the period 1998-2002, it was reasonable for analysts offer a bad worst case with a wide range of uncertainty on the questions of possession of chemical and biological weapons and on nuclear weapons programs. Given uncertainty with reference to security risks posed by possession, the sincerity of US invocation of the precautionary principle and of French and German requests for proof before action were also matters of controversy. These suspicions were heighted by prior statements of the parties, particularly Bush administration declarations of intent to engage in war against Iraq and with French and German criticisms of such war.

The UN resolution establishing IAEA and UNMOVIC inspections may be viewed as an information harvesting strategy that yielded information on Iraq chemical, biological, and nuclear programs and on the sincerity of statements of belief by the governments of western nations and Iraq. In essence, the parties were able to agree on an inspections strategy that reduced zones of uncertainty over substance and sincerity. Based on inspections, IAEA Director El Baraidi reached the conclusion that there was no active nuclear program. Based on inspections, with a marked improvement in Iraqi cooperation in the days before the war, UNMOVIC Director Blix gradually narrowed the band of uncertainty and gradually tilted toward less severe worst cases and called for continuation of the inspections strategy.

Had the inspections yielded information on concealed stockpiles or had Iraq continued to obstruct, then inspections would have tested French, German and Russian statements of willingness to act on proof. In fact, with Iraq cooperating and with inspections suggesting that the worst case was wrong, the Bush administration issued a 48 hour ultimatum. The Bush administration's termination of inspections before UNMOVIC could further erode the case for war revealed that American invocation of precaution as a justification for war was insincere.

CONCLUSIONS

Substantial uncertainty over environmental and health risks contributes to the diversity of regulatory responses while precluding easy judgments on the legitimacy of regulatory differences. To explain conflicts over regulations, this essay examined jointly what is being regulated and how regulations are justified. It combines analysis of the conventional product-process distinction with analysis of principles invoked to legitimate regulations. These justifications include the need to correction market failures resulting from externalities, through the need to protect individuals from risks that they might voluntarily assume, to assertions of species and ecological rights. Several findings emerge from this analysis.

(a) Where product regulations are justified in terms of the need to shield individuals from voluntary risks or assertions of species rights, conflicts over regulatory differences are most intense. While conflicts can be found in all areas, the combination of controversy over legitimating principles and potential rent provision through protection cuts strongly against compromise.

(b) Where uncertainty over environment, health and safety risks is substantial, the normative justifications offered for regulations become more elastic. Uncertainty contributes to regulatory diversity, but appeals to uncertainty may ultimately mitigate conflict over regulatory differences.

Governments will differ in their priors on environmental, health and security risks and in their inclination or disinclination to invoke precaution. David Gee of the EU Environment Agency

notes that "… the absence of proof of harm is not proof of absence of harm" to argue for invocation of precautionary principle with respect to health effects of estrogenic compounds and GMO foods. Donald Rumsfeld of the US Department of Defense observed that "the absence of proof is not proof of absence" as he argued for war against Iraq to eliminate possible chemical and biological stockpiles and nuclear weapons programs. To expect agreement up front on the legitimacy of precaution in such cases is unrealistic. Our focus should not just be on how to incorporate information on science and technology into initial decisions, but also on how initial decisions might be revised in the face of new scientific and technical information elicited by regulatory experiments.

In practice, making use of new information is limited by the tendency of decisions to lock into place. Europe and the United States must both proceed with sensitivity to the manifest need for regulatory experimentation and flexibility, by fostering the adaptation of domestic regulations to make effective use of new information in a manner compatible with WTO moves to mitigate rent seeking through international rule of law. The central challenge in the period ahead is to manage the tension between improving the capacity of domestic regulators to make the best possible use of information gleaned by regulatory experiments and strengthening international mechanisms for minimizing trade distortions associated with differences in domestic regulations.