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Building an International Administrative Law of Expertise:
Law and Science in the International Regulation of Trade, Health, and the Environment

By

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University of California, Berkeley

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Abstract

Building an International Administrative Law of Expertise: Law and Science in the International Regulation of Trade, Health, and the Environment

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International agreements on issues related to human health and the environment often enlist notions of scientific principles or “science-based” decision making in order to constrain the realm of permissible causal argument within the an area of international law. As a result, parties to these agreements often wage conflicts over what is or is not “scientific,” and what kinds of decisions are or are not “based on” science – with important ramifications for the sovereign regulatory rights of the parties. This dissertation explores this process of contesting and constituting epistemic authority in international health and environmental law, and makes a modest attempt to suggest pathways to constructing more broadly legitimate international practices for validating knowledge claims for taking collective international action.

It does this through a detailed, mixed-method exploration of the practices employed by a number of critical international institutions to structure who is empowered to know, and to govern, in this relatively nascent international regulatory sphere. Through a mixture of negotiation observation, participant interviews, document review, and case law analysis, this dissertation tracks threads of cognitive and legal authority within and between science advisory bodies, domestic and international regulatory bodies, and domestic and international courts. By engaging with actual, as opposed to idealized sources of cognitive and legal authority in international affairs, it seeks to both illuminate the complexities of the relationship between science, sovereignty and the rule of law in global regulation, and to point the way to more broadly accepted practices of knowledge-making and law-making in global regulation.

I have approached this issue in three different ways: an in-depth analysis of the techniques used by two different international adjudicative bodies for evaluating scientific claims; a comparative examination of the expertise-related administrative law of the United States and European Community with an eye to the emergence of international norms; and a detailed examination of the birth of a global agency and the rise of its authoritative discourse of risk analysis. All three of these studies take interdisciplinary approaches to addressing these issues, supplementing legal analysis of key treaties and cases with important insights and analytical techniques from the field of science and technology studies (STS). Each chapter addresses distinct but interrelated issues, and makes a separate contribution to our understanding of the relationship between epistemic and regulatory authority in global governance.

Introduction

This dissertation explores the relationship between the constitution of legal and epistemic authority in the global regulation of human health and the environment. It asks the question: how do countries with different domestic practices for validating knowledge claims for public decision making come together to take collective action in these areas in ways that are seen as broadly legitimate to diverse national polities?

The ability to know authoritatively is of heightened importance in the international law of human health and the environment because polities around the world have come to expect that responses to these problems be justified in part through a process of scientific exploration and reason-giving. The epistemic authority of science has become a *sine qua non* of regulation in these areas, and scientific expertise has come to play a critical role in framing problems, designing responses, and evaluating outcomes to health and environmental problems of all stripes. Indeed, many of these problems, such as ozone deterioration and climate change, are essentially invisible to the lay citizen and have taken on political salience only through the framing and mediating language of science. As such, in many of these areas, the range of politically acceptable causal arguments is constrained in part by the proponent's ability to frame his or her arguments as "scientific."

In spite of the central role that scientific argument has come to play in regulating these arenas, the operation of scientific expertise in the process of health and environmental regulation has been far from unproblematic. As scholarship in the field of science and technology studies (STS) has long demonstrated, the constitution of epistemic authority – particularly in the context of regulation – is neither an apolitical nor an acontextual process. Knowledge that is fit for one regulatory purpose may not be fit for another, just as arguments that may be convincing to one polity may not persuade another. This context-specificity of knowledge claims presents a particular problem in the international sphere, where no overarching authority exists and countries with different understandings of how to validate knowledge claims must find ways to act and reason together, while still justifying their actions to their own citizenry. Given the centrality of scientific argument to many health and environmental regimes, the solutions to this problem will have considerable political and legal impact.

This dissertation explores the unique problems that arise when attempting to constitute epistemic authority in international health and environmental law, and makes a modest attempt to suggest pathways to constructing more broadly legitimate international practices for validating knowledge claims for taking collective international action. It does this through a detailed, mixed-method exploration of the practices employed by a number of critical international institutions to structure who is empowered to know, and to govern, in this relatively nascent international regulatory sphere. Through a mixture of negotiation observation, participant interviews, document review, and case law analysis, this dissertation tracks threads of cognitive and legal authority within and between science advisory bodies, domestic and international regulatory bodies, and domestic and international courts. By engaging with actual, as opposed to idealized sources of cognitive and legal authority in international affairs, it seeks to both illuminate the complexities of the relationship between science, sovereignty and the rule of law in global regulation, and to point the way to more broadly accepted practices of knowledge-making and law-making in global regulation.

The problem of constituting expert and regulatory authority in international health and environmental law has taken on increased importance in the last half century as three interrelated

strands of modernity have advanced across the globe. First, the international flow of people, goods, and risks have rapidly accelerated over this time period, giving rise to new conflicts between nations that employ different approaches to regulating risks. Much of my work takes place within the food safety regime complex and explores the ways that trade liberalization – an attempt to further accelerate international flows of goods – has reshaped the laws and institutions of international food safety.

Second, the rule of law has expanded into ever-larger spheres of health- and environment-related social and economic life, exerting authority over issues ranging from effluent control and water quality, to drug and chemical usage in veterinary and farming practices. This expansion has taken place on an international scale as well, as nations seek to enlist the predictability and reason-based legitimacy of law in order to facilitate the flow of goods and decrease the transaction costs of case-by-case negotiations. The “legalization” of international conflicts brings issues of regulatory legitimacy to the fore by compelling a larger role for case-by-case practices of persuasion and reason-giving, particularly when independent adjudicators are empowered to settle disputes.

Third, as technological innovation has accelerated, governments have increasingly sought to enlist the authority of science to underwrite their regulatory authority. However, as recent research in comparative regulation has shown, practices for utilizing scientific knowledge in domestic regulation have taken different forms in different nations. As this dissertation demonstrates, this patchwork of domestic knowledge-making approaches has important and as-yet underappreciated implications for the constitution of scientific authority in international law.

Together, this increased flow of goods, expansion of the rule of law, and rise of regulatory science has given rise to new international legal structures. These structures seek to both constitute a specific form of expert authority at the international level and simultaneously draw from this authority in order to resolve specific disputes. Understanding the social and legal process of constituting and mobilizing this authority is now central to understanding the dispensation of epistemic and legal authority in international health and environmental law, as well as to evaluating its legitimacy.

In the chapters that make up this dissertation, I help to elucidate the processes by which epistemic and regulatory authority are constituted in international law by describing the development of a nascent set of institutions and legal and pre-legal norms surrounding the deployment of knowledge claims in international regimes. I describe the ongoing efforts to structure practices of knowledge making in international law as giving rise to an emerging global administrative law of expertise. A global administrative law of expertise consists of the mechanisms, principles, practices and supporting social understandings that promote the legitimate validation and utilization of scientific claims in international law. In this dissertation I work to trace the development of this global administrative law of expertise in a manner that is institution specific – recognizing the distinct issues that are likely to arise in different legal regimes – but with an eye to more general phenomena that may transcend the fractured systems of international law.

I have approached this issue in three different ways: an in-depth analysis of the techniques used by two different international adjudicative bodies for evaluating scientific claims; a comparative examination of the expertise-related administrative law of the United States and European Community with an eye to the emergence of international norms; and a detailed examination of the birth of a global agency and the rise of its authoritative discourse of risk analysis. All three of these studies take interdisciplinary approaches to addressing these

issues, supplementing legal analysis of key treaties and cases with important insights and analytical techniques from the field of science and technology studies (STS). Each chapter addresses distinct but interrelated issues, and makes a separate contribution to our understanding of the relationship between epistemic and regulatory authority in global governance.

In the first chapter, “Filling in ‘Science’ in International Adjudication: Science and science-based reasoning in the WTO and ICJ,” I conduct a detailed analysis of the techniques utilized by the World Trade Organization’s Dispute Settlement Body and the International Court of Justice to give legal meaning to claims about science. International adjudicators in cases addressing specific conflicts about health and the environment often serve as *de facto* arbiters of who is entitled to know authoritatively in their respective regimes, and the ways in which this knowledge can be used to justify government actions. Coming to understand the techniques these adjudicators are using to draw lines bounding what is and is not scientific is thus critical for understanding the relationship between epistemic and regulatory authority in these areas of international law.

I examine the techniques utilized by these adjudicators by conducting a detailed analysis of a number of important health and environmental cases and unearthing the substantive assumptions and procedural requirements utilized by these courts to empower and disempower specific knowledge claims. After identifying these techniques, the chapter then asks an additional question: given the significant power held by international adjudicators to delimit the scientific from the unscientific in international law, what criteria and techniques might these adjudicators use in order to garner a broader base of positive legitimacy?

In answer to this question, I argue that there is danger in taking one judge or panel’s own understanding of what science is and how science works, and universalizing this understanding onto a variegated landscape of national practices for the use of science in public decision making. Instead, I propose a three-step framework for adjudicators to use when reasoning about science.

Under this framework, adjudicators would look first to the text of the relevant agreements between the parties. Where an agreement espouses particular agreements about legal epistemologies, or expressly delegates this task to a particular entity, the parties have consented to this understanding and the adjudicator should “fill in” science according to this agreement. Second, where the relevant epistemological basis for evaluating scientific claims is ambiguous, adjudicators should look to widely shared practices in domestic and regional reasoning about science in regulation. Where national views have converged on specific approaches to science-in-regulation, adjudicators should fill in science with these convergent understandings, absent compelling reasons why the specific international context in issue calls for something different (issues of international convergence in practices for using science in health and environmental regulation are taken up in more detail in Chapter 2). Third, where the text is ambiguous and no broadly shared norms exist, international adjudicators should conceptualize their role as contributing to the progressive development of legal rules by, in part, catalyzing the development of norms of regulatory science. To this end, I argue that the most important thing that international adjudicators can do in order to aid in this project of progressive legal development is to clearly articulate their reasoning when filling in science.

Examining the practices of the WTO and ICJ in this light, I conclude that in contrast to the WTO, which has grappled openly and extensively with its science-based reasoning, the ICJ has done a poor job at acting as a catalyst by eliding its science-based reasoning. Finally, I explore the possibility for cross-regime norm-building and inter-regime learning, but set out a

number of likely barriers to an extensive project of cross-regime harmonization of science-validation practices.

Overall, this chapter offers a detailed look at the empirical reality of practices for validating science in international law, and sets out a project for improving the positive legitimacy of these practices.

In Chapter 2 I work to further flesh out the framework I develop in Chapter 1. This chapter, titled “Norms of Regulatory Science: A Role for Comparative Empirical Analysis in Building a Bottom-Up Approach to Science in International Law?” begins the empirical legwork that would be necessary to take a comparative norm-building approach to building broadly legitimate approaches to evaluating scientific claims in international law. It begins by reestablishing the need for additional resources for international adjudicators to draw from when interpreting science-based provisions in international law. In order to do this it demonstrates the ambiguity in science-related treaty provisions, and describes the problems that may arise from adjudicators resolving this ambiguity in an *ad hoc* or unguided manner. In order to move beyond this *ad hoc* approach, the chapter makes the case that a comparative-convergence approach to building norms of scientific validation in international law is likely to provide significant legitimacy benefits.

The chapter grapples with the relationship between regulatory science and sovereign authority, drawing from comparative STS research that has demonstrated the diverse approaches that different sovereigns have taken to validating knowledge claims for use in public decision making. While remaining attentive to the differences between international and domestic law, the chapter argues that identifying broadly shared “groundnorms” – commonalities between domestic approaches to validating scientific claims in regulatory law – is likely to provide international adjudicators with a useful resource to draw from when interpreting scientific arguments in international conflicts.

Although a broad multi-national study of the expertise-related law of all nations of the world would be the paragon with respect to advancing this comparative framework, this study offers a first step in this direction by comparing the administrative rulemaking of two regular players in international conflicts about health and the environment whose approaches are often held out as contrasting: the United States and the European Community. This analysis focuses on the legal rules in these two systems relating to transparency and participation in regulatory science, and identifies both commonalities and differences between the two. Given the limited scope of the study and the differences between domestic and international legal systems, the chapter’s conclusions are necessarily cautious. However, the potential groundnorms identified through this international comparison my nonetheless help to guide future research, and to begin to provide a source of broadly legitimate guidance for future international adjudicators faced with conflicting claims about science and expertise.

Chapter 3 moves beyond the international judiciary to examine the constitution of epistemic and regulatory authority in a newly empowered global agency: the Codex Alimentarius Commission (Codex). The Codex is an international standard-setting body for food safety that was transformed by its 1994 recognition by the World Trade Organization’s Agreement on Sanitary and Phytosanitary Measures (SPS Agreement). Chapter 3 tells the story of this transformation from a coproductionist perspective. It demonstrates that instead of simply identifying in the Codex an existing source of international scientific authority to legitimate the WTO’s heightened power to review domestic food safety regulations, the SPS negotiations and

the trading regime had to produce the very science-based agency it had identified as its foundation.

A substantially similar version of this chapter, titled “Science and Power in Global Food Regulation: The Rise of the Codex Alimentarius” was published as a co-authored article with David Winickoff. In this chapter, my field work, including negotiation observation, interviews with negotiators, science advisors, and secretariat staff, and document research in the United Nations Food and Agriculture Organization library in Rome allowed us to provide a nuanced analysis of the impact that the Codex’s newfound regulatory authority had on the knowledge-making and regulatory practices of this newly-important player in the international trading regime. We demonstrate that this new authority necessitated newly formalized strategies of purification and boundary work within the organization, and describe how these practices emerged and evolved over time.

First, we describe the Codex’s process of building an authoritative framework for risk analysis that is touted as scientifically rigorous, while simultaneously embodying particular value choices regarding health, the environment, and the dispensation of regulatory power. We show that the formalization of this “science based” framework did not predate the WTO and was instead a direct result of the SPS Agreement’s rationalization and harmonization goals.

Second, we demonstrate the unsettling and subsequent stabilization of the Codex decision-making procedures. While previously, decisions at the Codex were made by consensus with disagreeing parties simply abstaining, we illustrate that the post-SPS Codex saw the rise of voting as a practice for setting controversial standards. After a period of debate about changing the rulemaking procedure at the Codex, the organization moved to retrench the consensus norm instead of formally adopting a proposed supermajority requirement. We argue that the overtly political act of voting served to undermine the appearance of a neutral science-based standard setting organization, causing the organization to seek to recapture its prior consensus-based decision making norm, even when parties would in fact have disagreed had it come to a vote. A similar frolic into voting was not seen in the science advisory bodies to the Codex, due to stronger norms of purification in those bodies.

Finally, we demonstrate how the influx of regulatory power unsettled Codex expert committees’ ability to know authoritatively, leading to new procedures to shore up their epistemic authority. Codex expert committees, responding to concerns that they were dominated by Western scientists, began to adopt procedures to ensure a degree of geographic representation on the committees. Whereas overt attempts to “balance” expert committees based on region of origin might be seen to undermine the scientific authority of such bodies, our research revealed the emergence of two distinct discourses at the Codex at this time that allowed this practice to support, rather than undercut the epistemic legitimacy of the expert committees. First, a discourse of credibility building was used to justify the influx of non-Western scientists, framing the balance not as correcting potential bias, but simply avoiding the perception of bias. Second, a discourse of capacity building allowed members to frame the involvement of non-Western scientists as educational to these scientists themselves, and contributing to an ethos of science-based regulation back in their home countries.

Altogether, these shifts in Codex procedure demonstrate the simultaneous emergence and mutual reliance of epistemic and regulatory authority in this new global agency, as the coproductionist idiom would suggest. Just as the WTO addressed problems of legitimacy in the legal/economic order by identifying a common trust in scientific rigor and a source of

international expertise, so too did the Codex address difficult questions regarding the role of science in regulatory process through the legitimation it received from the WTO.

Each of these chapters push the STS-law literature forward, as described in detail in each individual chapter. The first two chapters bring important STS insights into a field that has often underappreciated the context-specificity of scientific authority. These chapters provide important empirical analysis of the judicial treatment of scientific claims in the US, EC, WTO DSB, and ICJ that help to elucidate the particular dynamics involved with constituting scientific authority in these bodies. More importantly, these chapters seek to reframe the relationship between sovereignty and scientific authority by providing a framework that fully appreciates the polity-specific nature of knowledge-validation processes. This work contributes to the limited body of STS work that addresses the problem of constituting expert authority in international organizations. It does so by focusing on adjudicators and the role that they can play in identifying and codifying widely shared understandings about the validity of scientific claims. In the context of the WTO, this work helps to develop a standard of review for the DSB that is deferential to domestic regulatory choices, but also capable of identifying opportunistic regulation obscured by purportedly scientific justification.

The final chapter provides an important case study of the coproduction phenomenon, conducting a detailed tracing of the simultaneous emergence of particular understandings of science and social ordering. Although coproduction processes will be institution-specific, this chapter demonstrated a number of distinct processes that emerged by virtue of the Codex's role as an international, as opposed to domestic regulatory body, thus helping to advance the emerging field of global administrative law as well.

Taken together, this dissertation provides an empirically informed and politically grounded understanding of the role of expertise in international law. It emphasizes the context-specificity of practices for validating knowledge claims, and draws out some of the unique phenomena that arise in particular international forums. Across all three chapters, it illustrates that when a given institution is legally empowered with the authority to determine what is and is not scientific in international health and environmental law, that institution will develop its own particular knowledge politics and attendant legitimacy challenges. The nature of these internal politics and external challenges vary across institutions. The fact that this dissertation examines both adjudicative bodies and an international "agency" allows for some limited comparison across these two types of bodies (although the limited number of institutions studied should lead to caution about any attempts to generalize there from).

In the Codex, the institution's newfound power led to pressures to purify or attempt to scientize its decision making, and a simultaneous pressure to render decision making more broadly representative of perspectives from its diverse members. The institution responded to the pressure for scientization by attempting to standardize the institution's decision making procedures through formalizing a framework for risk analysis. This framework served to limit the place for case-by-case politics in the standard-setting process. However, the overarching technocratic framework it imposed carried with it its own politics and rules of participation, leading to challenges to the institution's legitimacy as a representative body. In order to address these challenges to its representative legitimacy, the organization enlisted narratives of credibility building and capacity building in order to allow for broader participation in its science-based regulatory process.

By contrast, the WTO DSB lacks the institutional flexibility of the Codex. It cannot renegotiate decision making procedures or actively enlist the participation of underrepresented

nations to shore up the legitimacy of its knowledge-making practices. The DSB is constrained by its requirement to settle the dispute before it, with the arguments (scientific and otherwise) presented to it. Nevertheless, the DSB has also faced pressures to render decisions that are both scientifically sound in the eyes of members, while simultaneously not overreaching by universalizing a single monolithic view of science. The DSB has responded to these pressures by enlisting postures of deference, as opposed to representation. The DSB has looked searchingly at the evidence presented by parties in order to determine whether it was sufficiently scientific to serve as the basis for the regulations at issue. However, instead of constructing a broader and more representative procedure for determining what is and is not scientific, as the Codex has, it has developed a deferential test for evaluating these claims. The DSB's "qualified and respected" test serves many of the same functions as the Codex's moves to representation and consensus, while being mindful of its own limited institutional competencies. It conjures up a sense of scientific rigor because of its insistence on the qualification of the scientists involved, but it seeks to avoid overreaching by tracing a web of respect out to its outer reaches before determining that a given source is not acceptable.

Both the Codex and the DSB illustrate institution-specific processes of coproduction in the international arena. The different rules and procedures developed to delineate science in these two institutions accompanies the different roles that these institutions play in generating social order. The Codex, as a representative international body, has developed a more broadly inclusive and international science. By contrast, the DSB, as an adjudicator of specific disputes has developed a science that allows it to press on the claims of particular nations, while simultaneously appearing deferential to the multitude of different perspectives on how to validate knowledge claims for public decision making. In both of these stories of coproduction, the institution has produced its science in the shadow of sovereignty. Sovereigns have created these institutions and assented to be bound by the science-based judgments therein. In order to maintain this ability to bind member states, these institutions must continue to produce a type of science that is seen as broadly legitimate across nations. This dissertation shows how these bodies accomplish this, and suggests mechanisms that may allow them to effectively do so into the future.

Chapter 1

Filling in “Science” in International Adjudication: Science and science-based reasoning in the WTO and ICJ

Is climate change occurring? What will happen if I eat beef that has been fattened with oestradiol 17 β ? Does Thalidomide cause birth defects? We count on our governments to know a plethora of things in order to act on our behalf. Crucially, however, not every democratically elected government comes to know things in the same ways. As important research in the field of science and technology studies (STS) has demonstrated, science for public regulation means different things in different places.¹ The diversity of ways that nations validate knowledge claims for public decision making gives rise to an underappreciated challenge for international adjudicators: when nations with diverse ways of grappling with science in decision making agree that the resolution of disputes will be based on science, how should international adjudicators separate the scientific from the non-scientific?

International agreements on issues related to human health and the environment often enlist notions of scientific principles or “science-based” decision making in order to constrain the types of causal arguments that parties can make within the regime. For example, if a treaty provides that food import restrictions must be “based on scientific principles,” then food import restrictions based on religious views or highly questionable science may be suspect under that treaty.² As a result, parties often wage conflicts under these agreements over what is or is not “scientific,”³ and what kinds of decisions are or are not “based on” science. In agreements with legalized dispute settlement mechanisms, decisions about what is and is not sufficiently scientific necessarily fall to dispute settlement panels.⁴

At first glance the requirement that decisions be based on science might appear to significantly constrain dispute settlement panels to a narrow range of options, leaving them with very little discretion to entertain alternative arguments. However, as I describe in Part I, these requirements are actually highly ambiguous. Due to the differences in the ways that societies around the world organize procedures for testing and deploying the knowledge claims that they

¹ See SHEILA JASANOFF, *DESIGNS ON NATURE: SCIENCE AND DEMOCRACY IN EUROPE AND THE UNITED STATES* (2005).

² For example, India has prohibited the import of bull semen from Canada on the basis of concerns about bovine spongiform encephalopathy (more commonly known as BSE or mad cow disease). See G/SPS/GEN/204/Rev.9/Add.2 paras. 376-78. In spite of the sacred status of cows in the Hindu faith, as scientific evidence has mounted that BSE is not transferrable by semen, it has grown harder and harder for India to justify its ban under WTO law. See *id.*

³ Thomas Gieryn has defined the term “boundary work” as “the attribution of selected characteristics to the institution of science...for the purposes of constructing a social boundary that distinguishes some intellectual activity as non-science.” THOMAS GIERYN, *BOUNDARIES OF SCIENCE*, 405 (1985)

⁴ This is clearly the case when the court engages in its own *de novo* review of the scientific evidence. However, it is important to note that it is also true when the court takes more deferential postures. Even in these instances, the court’s position is rooted in some kind of underlying understandings or heuristics about what science is or how science works. If the court simply reviews procedure of domestic decision-making, it must have certain procedures that it is looking for that it deems necessary for science-based decision making. If the court delegates the decision to an international institution (*de facto* or *de jure*), it has identified this institution as one that has a type of legitimacy that allows it to speak for science.

use for making collective choices,⁵ it is clear that the constraining effect of “science-based” reasoning requirements is largely determined by the way that these dispute settlement panels operationalize these requirements.⁶

In practice, international adjudicators resolve these ambiguities by “filling in” science: mobilizing assumptions about what science is or how science works in order to give legal effect to “science-based” reasoning requirements. This practice of “filling in” involves both the heuristics that courts deploy when weighing scientific evidence, and the procedural requirements that courts impose on parties purporting to make scientific claims.

The fact that international adjudicators cannot simply draw from universal practices, but must instead fill in science in the face of a collection of non-uniform practices employed by different sovereigns raises the two key questions that this chapter sets out to answer. First, given this diversity of domestic practices, how can international adjudicatory bodies fill in science in a way that is most likely to generate broadly accepted outcomes? Second, how have international adjudicators filled in science in practice, and to what extent have they been attentive to the challenges posed by the context-specificity of science-for-regulation?

The answers to these questions suggest a reconceptualization of the way that scholars and practitioners should think about science in international law. If, as argued in Part I, the legitimacy of science in public decision making is rooted in nation-specific procedures and practices for validating scientific knowledge, then building legitimate mechanisms for the use of science in international law should proceed not from deducing ideal procedures from imagined universal qualities of science, but from a process of convergence and norm building. Such norm development may help to build toward more consistent and legitimate use of science in international law in a way that takes into account the diversity of domestic practices and thus avoids the risk of inappropriately universalizing one nation’s (or one judge’s) view of science onto a variegated landscape of national practices for the use of science in public decision making.

In light of this politically grounded view of science-based regulation, Part I.C lays out a three-step framework for international adjudicators to use when reasoning about science. This framework takes seriously the diversity of domestic practices for validating scientific claims by acknowledging the ambiguity in terms like “science based” regulation and suggesting a structured approach for addressing this ambiguity. Instead of filling in science with the individual judge’s ad hoc view of how scientific claims should be validated, this framework seeks to bolster the legitimacy of these decisions by harnessing the legitimating forces of consent, convergence, and catalysis. First, it suggests that where nations have consented to a particular regulatory epistemology through treaty text or other subsequent legally binding agreement, adjudicators should give effect to that agreement. Second, where widely shared domestic practices have emerged through convergence, international adjudicators should draw from those practices unless there is a compelling reason why the international context requires a different result. Third, where there is no express agreement and no widely shared practice,

⁵ See SHEILA JASANOFF, *DESIGNS ON NATURE: SCIENCE AND DEMOCRACY IN EUROPE AND THE UNITED STATES* (2005).

⁶ In other words, because methods for dealing with claims about science vary significantly from country to country, the requirement that decisions be based on science is actually highly ambiguous. The way that the court resolves this ambiguity is dependent on the attributes that the court ascribes to science.

adjudicators should seek to settle disputes in such a way as to catalyze further reasoned debate and discussion about appropriate practices for validating scientific claims in international law.

After developing this framework, Part II conducts a fine-grained analysis of the science-related reasoning of the WTO DSB and the ICJ with the purpose of both identifying the assumptions and procedures that these bodies have used to fill in science, and exploring the extent to which these bodies have acted in accordance with the three-part framework. It is important to understand what these bodies are actually doing to fill in science in highly technical disputes. These practices have important impacts on litigants who are or may be considering bringing a dispute before these bodies, as well as on the legitimacy of these adjudicatory bodies in settling science-based disputes.⁷

After identifying the specific substantive assumptions and procedural requirements that these adjudicatory bodies have used to fill in science in their disputes, Part III examines and explains the differences between the approaches of these two bodies and argues that these adjudicatory bodies can increase the legitimacy of their decisions by positioning themselves in the progressive development of international norms of regulatory science. In order to serve this role, it is critical that international adjudicators clearly explain the reasoning of their science-related conclusions, so as to allow for meaningful analysis and critique of the techniques that these adjudicators have used to evaluate scientific claims. By so doing, these adjudicators can serve as focal points for debate among academics, politicians, and future litigants, aiding in the progressive development of international law in this area. My analysis in this area attempts to remain neutral on espousing any particular substantive assumptions or procedural requirements about science, and focuses instead on the behavior of courts as catalysts of norms – facilitating and enriching international dialogue about scientific reasoning. It finds that while the WTO has generally done an excellent job in this area by clearly articulating its reasoning and progressively building a jurisprudence of science-based dispute resolution, the ICJ has largely failed to serve as a catalyst of norm development and a source of useful law.

I. SCIENCE IN PUBLIC DECISION MAKING: CIVIC EPISTEMOLOGIES AND INTERNATIONAL LAW

The rapid pace of scientific and technological advance since the industrial revolution has driven extraordinary advances in standards of living and sizeable economic growth.⁸ Slower to develop, but now nearly as commonplace is the sentiment that these technological advances have

⁷ See, e.g., *Pulp Mills on the River Uruguay (Arg. v. Uru.)*, ¶28 (Apr. 20, 2010) (dissenting opinion of judges Al-Khasawneh and Simma) (lamenting that the Court missed “a golden opportunity to demonstrate to the international community its ability, and preparedness, to approach scientifically complex disputes in a state-of-the-art manner”).

⁸ Of course, the costs and benefits of these advances have not been evenly distributed. Just as wealth has concentrated in parts of the world and driven resource extraction and environmental damage in others, see, e.g., U. Thara Srinivasan et. al., *The Debt of Nations and the Distribution of Ecological Impacts from Human Activities*, 105 PROC. NAT’L ACAD. SCI. U.S. 1768 (2008), so too has the globalization of science created centers of science, where data from around the world is collected, processed, and made into knowledge. See BRUNO LATOUR, *SCIENCE IN ACTION*, 215-58 (1987) (describing “centers of calculation” where accumulated knowledge accumulates and is rendered “combinable” with other accumulated knowledge), See also Bruno Latour, *Drawing Things Together*, in REPRESENTATION IN SCIENTIFIC PRACTICE, 19, 59 (Michael Lynch & Steve Woolgar eds. 1990) (further discussing centers of calculation).

also produced significant risks.⁹ Substances like asbestos, thalidomide, and DDT persist in the public consciousness not as life-improving technological breakthroughs but as emblems of scientific progress gone awry. Similarly our lexicon has swelled with metonyms for the same phenomenon, often without requiring further explanation: Love Canal, Bhopal, Chernobyl (now Fukushima?), Valdez (now Deepwater Horizon?).

As public awareness and concern has grown about the safety of food, drugs, consumer goods, and the environment, citizens have come to expect an increased governmental role in understanding, managing, and distributing these risks.¹⁰ Governments across the globe have responded to these demands by generating a host of laws, regulations and institutions designed to address these risks. Given the significant benefits that have flowed from scientific and technological advances, the solutions put forth from this expansion of social regulation have not necessarily taken the form of broad and potentially economically disastrous bans on potentially harmful substances or activities.¹¹ As a result, these new agencies were tasked with undertaking ever more predictive analyses of the risks and benefits of regulation in order to set these standards and justify them to the onlooking public.¹² Given the significant economic and environmental impact of these regulations, this practice of standard setting quickly became a site of fierce conflict.

In order to make these governance decisions and justify them before their polities (and in some cases judiciaries), lawmakers and regulatory agencies have consistently sought to draw upon the legitimacy and perceived neutrality of science. In the face of high-stakes decisions and

⁹ See ULRICH BECK, *THE RISK SOCIETY: TOWARDS A NEW MODERNITY* (1992); ULRICH BECK, *WORLD RISK SOCIETY* (1999).

¹⁰ See Beck, *supra* note 26 (Risk Society) at 19-50. The rise of the environmental movement in the last half century is illustrative of these new demands on government. The relatively newer environmental justice movement has arguably taken on board the permanence of some of the risks attendant to modern technologies and has focused less on the removal of risks and more on the distribution of risks. See e.g., Sheila Foster, *Justice from the Ground Up: Distributive Inequities, Grassroots Resistance, and the Transformative Politics of the Environmental Justice Movement*, 86 CAL. L. REV. 775 (1998); Rachel Morello-Frosch et. al., *Environmental Justice and Southern California's "Riskscape": The Distribution of Air Toxics Exposure and Health Risks among Diverse Communities*, 36 URB. AFF. REV. 4 (2001).

¹¹ Many laws that did articulate a zero risk or zero pollution standard quickly revealed that the costs associated with meeting such a goal would not be politically palatable. For example, in the United States the "Delaney Clause" amendment to the Food Drug and Cosmetics Act of 1938 barred Food and Drug Administration approval of food additives or food colorings that are "found to induce cancer when ingested by man or animal." 21 U.S.C. § 348(c)(3)(A). As more and more substances have been shown to cause cancer when laboratory animals are exposed to very large doses, and technologies have advanced to be able to detect very small amounts of a substance, the world of substances that would be banned by a literal reading of the Delaney Clause swelled. Frank Cross, *The Consequences of Consensus: Dangerous Compromises of the Food Quality Protection Act*, 75 WASH. U. L. Q. 1155 (1997). As a result, Congress passed the Food Quality Protection Act in 1996, removing pesticide residues on food from the reach of the Clause. See 21 U.S.C. § 346a(b)(2)(A) (1997). See also Charles Blank, *The Delaney Clause: Technical Naivete and Scientific Advocacy in the Formulation of Public Health Policies*, 62 CAL. L. REV. 1084 (1974); Margaret Gilhooley, *Plain Meaning, Absurd Results and the Legislative Purpose: The Interpretation of the Delaney Clause*, 40 ADMIN. L. REV. 267 (1988). Similarly, the 1972 Clean Water Act established the goal of zero discharge of pollutants into the nation's waterways by 1985. 33 U.S.C. § 1251(a)(1). Not only has this goal not been attained, but it is clear that an EPA rulemaking attempting to strictly achieve this goal, even 25 years later, would be dead on arrival.

¹² See SHEILA JASANOFF, *THE FIFTH BRANCH: SCIENCE ADVISERS AS POLICYMAKERS*, 3 (1990).

complex technoscientific phenomena, however, making “science based” decisions has not proven as easy as drawing facts from a universally accepted compendium of scientific knowledge.¹³ Instead, conflicts about the veracity of scientific claims have increasingly gone hand-in-hand with political and regulatory decisions.¹⁴ The “knowledge politics” attendant to science-related decision making has become a central feature of the modern regulatory state.¹⁵

This regulatory knowledge politics takes on additional complexity in the international sphere, where diverse nations must act and reason together. Scholars in the fields of science and technology studies (STS) and international law have begun to give attention to this phenomenon, improving our understanding of the relationship between epistemic and regulatory authority, as described in the next two subsections. However, as I argue in the final subsection of this Part, these two bodies of literature have yet to fully appreciate and address the difficult questions at the border of sovereignty and epistemic authority in international law.

A. Civic Epistemologies, Boundary Work, and the Legitimacy of Domestic Risk Governance

As the epistemic aspect of public decision making has moved to the foreground in environmental and health regulation, an interdisciplinary group of science and technology studies (STS) scholars has emerged to explore the processes by which facts are made in scientific, political, and legal discourse.¹⁶ Drawing from the sociology and philosophy of science, and generally applying highly empirical methods,¹⁷ this body of scholars has made significant progress in coming to understand why specific actors come to accept certain assertions as true, and how the politics of knowledge-making interacts with broader regulatory politics. Developing legal theories about science-in-law without attention to how science is actually utilized in practice risks importing the author’s (or judge’s) own, often idealized, views of science. In light of this, before examining the substantive assumptions and procedural requirements that the WTO and ICJ have used to “fill in” science, it is useful to introduce a number of central insights and

¹³ See SHEILA JASANOFF, *SCIENCE AT THE BAR*, 209 (1995) (“[T]extbook science – the body of knowledge that is already in the public domain, having passed through science’s critical filters – is rarely enough to satisfy the law’s need for contextualized knowledge.”).

¹⁴ See, e.g. *Am. Petroleum Inst. v. Costle*, 665 F.2d 1167, 1185 (D.C. Cir. 1981) (examining whether there was scientific support for the finding that adverse health effects occur at ozone levels of 0.15 to 0.25 parts per million); Brief of Petitioners at 6, 19-29, *Coalition for Responsible Regulation v. EPA*, No. 09-1322 (D.C. Cir. Oct. 17, 2011) (challenging the science underlying the EPA’s finding that climate change “may reasonably be anticipated to endanger public health or welfare”).

¹⁵ See generally YARON EZRAHI, *THE DESCENT OF ICHARUS: SCIENCE AND THE TRANSFORMATION OF CONTEMPORARY DEMOCRACY*, Harvard Univ. Press (1990) at 281 (“[T]ruth, ‘facts,’ and ‘knowledge’ are appreciated by democratic political performers mostly for their rhetorical value in strategies and in rituals of legitimation than for their instrumental value in improving substantive performance.”).

¹⁶ See generally *THE SCIENCE STUDIES READER* (Mario Biagioli, ed., 1999); *THE HANDBOOK OF SCIENCE AND TECHNOLOGY STUDIES* (Edward Hackett et. al., eds., 3d ed. 2008). The STS literature is not limited to studies of science in policy making. Although the literature has a multitude of theoretical roots, many of its most prominent early works focus on the practices of scientists themselves, with little attention to the interplay with government. See, e.g. ROBERT MERTON, *THE NORMATIVE STRUCTURE OF SCIENCE* (1942); BRUNO LATOUR AND STEVE WOOLGAR, *LABORATORY LIFE: THE SOCIAL CONSTRUCTION OF SCIENTIFIC FACTS* (1979); Latour, *supra* note 8.

¹⁷ That is, studying actual social actors in the process of knowledge production and validation.

terms from the STS literature: the contingency of knowledge, boundary work, and civic epistemologies. A working understanding of these central STS concepts will help to better identify and evaluate the often unexamined and unnoticed reasoning that adjudicators undertake in order to construct the science upon which they base their decisions.¹⁸

Contingency of knowledge. One of the central achievements of the STS literature has been to demonstrate the contingency of scientific knowledge. The contingency of knowledge is the rather uncontroversial proposition that the set of things that a given individual believes to be true at a given time has been shaped by social and historical forces; that is, their status as true is contingent not just upon the physical world itself, but upon the social processes through which individuals come to regard claims as true. Science is often imagined to remove this contingency from knowledge. However, scholars in STS have consistently demonstrated that scientific facts operate with a degree of contingency as well. This insight, most famously advanced by philosopher of science Thomas Kuhn, highlights that social and historical forces shape ways that we understand the physical world.¹⁹ This insight is highly relevant to understanding public decision making in science-related fields because laws and regulations are based not upon absolute truths about the material world, but on what lawmakers and regulators believe to be true at the time of regulation. As such, attention to the processes by which claims become understood to be true in specific communities is important to understanding lawmaking and regulation in different times and places.

STS researches studying social practices in laboratories,²⁰ field research sites,²¹ science advisory bodies,²² courtrooms,²³ public health controversies,²⁴ international institutions,²⁵ and

¹⁸ See ORAN PEREZ, *ECOLOGICAL SENSITIVITY AND GLOBAL LEGAL PLURALISM: RETHINKING THE TRADE AND ENVIRONMENT CONFLICT*, 127 (2004) (noting that judicial deference to science is actually deference to science “in its legally reconstructed image”).

¹⁹ See THOMAS KUHN, *THE STRUCTURE OF SCIENTIFIC REVOLUTIONS* (1962).

²⁰ See, e.g. Latour and Woolgar, *supra* note 16 at 105 (tracing the production of a single scientific fact as it is “freed from the circumstances of its production” and becomes widely accepted scientific knowledge); Latour, *supra* note 8. See also STEVEN SHAPIN AND SIMON SCHAFFER, *LEVIATHAN AND THE AIR PUMP: HOBBS, BOYLE, AND THE EXPERIMENTAL LIFE*, 55-65 (1985) (describing the conventions of replication and witnessing in the early experimental method).

²¹ See, e.g. Michel Callon, *Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St. Brieuc Bay*, in *POWER, ACTION AND BELIEF: A NEW SOCIOLOGY OF KNOWLEDGE?* (John Law ed. 1986) (describing the network of human and non-human actors that a scientist must manipulate in order to render him or herself an authoritative “obligatory passage point” for the production of new knowledge); Bruno Latour, *PANDORA'S HOPE: ESSAYS ON THE REALITY OF SCIENCE STUDIES*, 24-79 (1999) (describing the procedures used by forest researchers to “reduce” physically gathered artifacts to numerical representations, and then to “amplify” these representations to make them representative of a larger set of phenomena and thereby render them more universal).

²² See, e.g., Jasanoff, *supra* note 12; STEPHEN HILGARTNER, *SCIENCE ON STAGE: EXPERT ADVICE AS PUBLIC DRAMA* (2000).

²³ See, e.g., SHEILA JASANOFF, *SCIENCE AT THE BAR* (1995).

²⁴ See, e.g., Brian Wynne, *Misunderstood Misunderstandings: Social Identities and Public Uptake of Science*, in *MISUNDERSTANDING SCIENCE? PUBLIC RECONSTRUCTION OF SCIENCE AND TECHNOLOGY*, 19 (Alan Irwin and Brian Wynne, eds. 1996) (describing interactions between sheep farmers and radiation experts in the production of knowledge about the impacts of the fallout from Chernobyl); Steven Epstein, *The Construction of Lay Expertise: AIDS Activism and the Forging of Credibility in the Reform of Clinical*

other sites have shed significant light on the reasons why individuals come to treat particular factual claims as true, and the techniques used by individuals and institutions in order to position themselves as providers of authoritative knowledge. Critically, these scholars have demonstrated that science and scientific credibility are not artifacts or phenomena that simply exist in the world without the work of specific social actors. Facts must be produced by specific individuals, observers and skeptics must be persuaded by the practices of these individuals, and trust and credibility must be maintained against an onslaught of skepticism and doubt. In short, facts have a history – a process by which they become understood to be true.²⁶

Research in this area has focused on the behavior of scientists in the process of research, highlighting the ways that practices such as structured observation, repetition, and peer review may operate to make certain knowledge claims so widely accepted that they are taken for granted as true and no longer meaningfully challenged.²⁷ But of course, just as facts are built up by social practices over time, so too may they become subject to attack and succumb to a breakdown of the consensus that once supported them. This process by which facts are made and unmade over time is particularly relevant in the world of high-stakes, politically-relevant factual disagreements where purportedly scientific claims are often subject to relentless attack.²⁸

Conflicts about the truth of particular claims are often framed as battles surrounding whether or not a certain claim or process is or is not scientific. As a result, the processes by which some claims come to be labeled as scientific while others are dismissed as non-scientific have been of central importance to STS scholars.

“Boundary work” and demarking science from non-science. There has been broad interest within the STS literature in a subject that is usually referred to as the boundary problem. This term refers to the social practices that contribute to creation of a boundary between certain claims, which are labeled as scientific, and other claims which are not. In his important work on the subject of marking a boundary between science and non-science, Thomas Gieryn explores a number of canonical solutions to this boundary problem.²⁹ Most of these solutions are essentialist, in that they maintain that a boundary between science and non-science exists

Trials, 408 SCI. TECH. & HUM. VALUES 408 (1995) (describing the role of AIDS treatment activists in changing the epistemic practices of biomedical research).

²⁵ See, e.g. Michael Goldman, *The Birth of a Discipline: Producing Authoritative Green Knowledge*, *World Bank Style*, 2 ETHNOGRAPHY 191 (2001); Clark Miller, *Hybrid Management: Boundary Organizations, Science Policy, and Environmental Governance in the Climate Regime*, 26 SCI. TECH. & HUM. VALUES 478 (2001).

²⁶ The fact that the material world is not strictly determinative of our understandings of it is not to suggest that a real physical world does not exist, or that the content of that world is determined by our understanding of it. Airplanes would not fall from the sky if people stopped believing in the relevant laws of physics, as overstated critiques of STS approaches would seem to imply.

²⁷ Bruno Latour refers to this as “black boxing” facts; there comes a point where it is no longer necessary to open the box each time a claim is asserted. Latour, *supra* note 8 at 2-3. See also Callon, *supra* note 21; Latour, *supra* note 21. A somewhat similar, but more familiar formulation would be to suggest that such facts are a part of the current paradigm of a science at a given time. See THOMAS KUHN, *THE STRUCTURE OF SCIENTIFIC REVOLUTIONS* (1962).

²⁸ See, e.g., DAVID COLLINGRIDGE AND COLIN REEVE, *SCIENCE SPEAKS TO POWER*, St. Martin’s Press, New York (1986).

²⁹ See Thomas Gieryn, *Boundaries of Science*, in *HANDBOOK OF SCIENCE AND TECHNOLOGY STUDIES*, 393 (Jasanoff et. al. eds. 1995).

objectively and can be demarcated by some universal set of criteria. Gieryn gives the examples of Karl Popper's falsifiability,³⁰ Robert Merton's social norms of science,³¹ and Thomas Kuhn's paradigmatic consensus.³² All of these widely cited theories supply criteria from philosophy, sociology, and history respectively that can be used to argue that some claims are scientific, while others are unscientific, pseudoscientific, or pre-scientific.

For Gieryn, however, these theories are unsatisfactory for describing the actual practice of scientists and consumers of science. Gieryn argues that science is not defined by a distinctive "methodology, institution, history or [consequence of science]"³³ Instead, defining the boundaries of science is effectively an empirical question. In place of deducing universal objective criteria, Gieryn argues that to understand how the boundary is actually drawn in real situations and conflicts attention must shift to "representations of scientific practice and knowledge in situations where answers to the question, 'What is science?' move from tacit assumption to explicit articulation."³⁴ The task of demarcating science from non-science is thus best achieved by studying episodes of what Gieryn calls "boundary work": "the attribution of selected characteristics to the institution of science (i.e. to its practitioners, methods, stock of knowledge, values and work organization) for the purpose of constructing a social boundary that distinguishes some intellectual activity as non-science."³⁵

Episodes of boundary work are best understood as contests about who can claim the cognitive authority of science. Under this conception, science is "a kind of spatial 'marker' for cognitive authority, empty until its insides get filled and its borders drawn amidst context-bound negotiations over who and what is 'scientific.'"³⁶ In short, if our goal is to understand how

³⁰ Popper's familiar philosophy of science posits falsifiability as the primary criterion for demarcating scientific inquiry. Popper's philosophy addresses the problem of induction by which evidence may amass in favor of a given claim, but no matter how many observations accrue, the next one could always in principle yield a refutation. For Popper, science advances toward truth, but never achieves certainty. What is required for the advancement of science is bold conjecture that can then be subject to critique and disproof. Claims that are not "falsifiable," as defined by Popper, are relegated to the realm of non-science. See, e.g. KARL POPPER, *THE LOGIC OF SCIENTIFIC DISCOVERY*, 40 (1959). This position has been criticized on the basis that falsification is not as straightforward and easily defined or accomplished as Popper claims, particularly with regard to the reproducibility of falsifying empirical evidence. See HARRY COLLINS, *CHANGING ORDER: REPLICATION AND INDUCTION IN SCIENTIFIC PRACTICE*, 2 (1985).

³¹ Robert Merton famously posited four social norms of scientific inquiry: universalism, communism, disinterestedness, and organized skepticism. Robert Merton, *The Normative Structure of Science*, in *THE SOCIOLOGY OF SCIENCE: THEORETICAL AND EMPIRICAL INVESTIGATIONS* (1973). For Merton, knowledge produced by individuals who followed these social norms led to the extension of certified knowledge, and served to excise matters of political influence, and unjustified beliefs from the realm of the scientific.

³² See Gieryn, *supra* note 29. In Thomas Kuhn's *Structure of Scientific Revolutions*, Kuhn distinguishes "mature" and "normal" science from pre-science and "sort of" science by describing the existence of paradigms in normal science – widely agreed background assumptions about the way the world works and the appropriate methods for framing and suggesting new problems and methods for arriving at solutions. THOMAS KUHN, *THE STRUCTURE OF SCIENTIFIC REVOLUTIONS* (1962).

³³ Gieryn, *supra* note 29 at 405.

³⁴ *Id.*

³⁵ *Id.* (quoting Thomas Gieryn, *Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists*, 48 *AM. SOC. REV.* 781 (1983)).

³⁶ *Id.*

particular claims come to be understood as scientific, then is it important to observe actual social actors negotiating and posturing to claim this authority.³⁷

If science is understood as an empirically observable social category, filled in by episodes of boundary work, then it becomes important to probe what types of boundary drawing strategies are successful in different contexts. Given the high stakes of much legal and regulatory decision making in areas of health and the environment, this area has seen frequent and high-profile debates about the scientific status of factual claims.³⁸ It has also received significant attention from STS scholars.

Regulatory science and civic epistemologies. Scientists are not, of course, the only social actors that engage in boundary work. Both regulators and judges often rely on boundary drawing techniques in order to bolster the legitimacy of their regulations or decisions. Science in these settings, however, takes on somewhat of a different character.

“Regulatory science” – science conducted or evaluated for the purpose of taking or not taking some governmental action, is characterized by a number of differences from “pure” research science.³⁹ First, regulators need to make policy decisions in the short term in situations where simply waiting for more clarity and consensus to develop may not be practical. Second, regulatory decision making often involves deeply intertwined value judgments and factual determinations that make boundary drawing exercises particularly difficult. Third, the economic interests at stake are often great, leading to particularly fierce challenges to any factual claims that could harm these interests.⁴⁰ Fourth, and most crucially, regulatory decisions bind an onlooking polity and must consistently demonstrate their legitimacy in the eyes of this polity.

Regardless of these challenges to making regulatory decisions in the face of contested factual claims, regulators rely heavily on the authority of science to legitimate their decisions.⁴¹ Indeed, this dependence on scientific legitimacy to undergird public decision making can be understood as one of the central features of the modern regulatory state.⁴²

³⁷ It is important to stress again that this technique is designed to understand how particular claims and practices come to be viewed as scientific and authoritative. It is agnostic on the actual correspondence of these claims to an objective reality. It may be that claims demarcated by the above-described essentialist theories are the most useful for certain purposes, or because these theories have been widely accepted and internalized, that social actors actually behave in a way that grants scientific authority only to claims that fulfill Popper’s, Merton’s, or Kuhn’s demarcational criteria. This empirical question, however, requires empirical inquiry to evaluate.

³⁸ Consider, e.g., health debates about cigarette smoke, pesticide use, and the effects of breathing the air in lower Manhattan after the September 11, 2001 terrorist attacks. Consider also environmental debates about climate change, the stratospheric ozone layer, and hydraulic fracturing.

³⁹ Most of these differences are differences of degree, not of kind.

⁴⁰ “Inconvenient” truth claims, as it were. See *AN INCONVENIENT TRUTH* (Lawrence Bender Productions 2006). In particularly high-stakes situations, it is unclear whether even the most esteemed group of experts can muster the authority to settle a regulatory science dispute on scientific grounds. See Collingridge and Reeve, *supra* note 28; Jasanoff, *supra* note 12 at 234.

⁴¹ Some have argued inappropriately so. See, e.g. Wendy Wagner, *The Science Charade in Toxic Risk Regulation*, 95 COLUM. L. REV. 1613 (1995) (arguing that regulatory agencies often mask policy decisions as outcomes of a scientific analysis).

⁴² See Ezrahi, *supra* note 15.

However, it is crucial to realize that the way that governments make and deploy knowledge claims in order to justify their decisions to their publics is not uniform across the globe. STS scholarship attentive to practices of boundary drawing in regulatory settings has documented a diversity of institutionalized practices by which members of different societies test and deploy the knowledge claims that are used as a basis for making collective choices.⁴³ In her pathbreaking work on the subject, Sheila Jasanoff conducted a comparative study of the science and politics of biotechnology regulation in the United States, Britain, Germany, and the EU.⁴⁴ This work's most important contribution was a textured account of the different ways that democratic polities acquire communal knowledge for the purposes of taking collective action. Terming these different aspects of national political culture "civic epistemologies," Jasanoff explores six different dimensions along which these practices differ in different societies: the dominant participatory styles of public knowledge making, the methods of ensuring accountability, the practices of public demonstration, the preferred registers of objectivity, the accepted bases of expertise, and the visibility of expert bodies.⁴⁵ Jasanoff's analysis demonstrates that different nations hold different perspectives on what counts as legitimate knowledge and how that knowledge should be produced and used in legal and policy contexts.

Crucially, after chronicling these differences, Jasanoff does not condemn them or paint them as an inappropriate politicization of an acontextual ideal of science. Instead, she recognizes that attention to these differences in political culture is necessary in order to justify and explain science-related policy choices to governments' diverse national polities.⁴⁶ Jasanoff's work illustrates that there is not one single, universal or ideal model for the use of science in public decision making. Instead, different political and legal systems have spawned different practices for producing policy- and law-relevant knowledge, alongside polities who have come to expect these practices and view them as legitimate.⁴⁷ It follows that practices for legitimating

⁴³ See, e.g., Sheila Jasanoff, *Acceptable Evidence in a Pluralistic Society*, in *ACCEPTABLE EVIDENCE: SCIENCE AND VALUES IN RISK MANAGEMENT* 29 (Mayo and Hollander, eds. 1991) (comparing the role of experts in public decision making in Britain and the United States); Jasanoff, *supra* note 1; Clark Miller, *Civic Epistemologies: Constituting Knowledge and Order in Political Communities*, 2 *SOC. COMPASS* 1896 (2008) (exploring how knowledge is made in political communities); Shobita Parthasarathy, *Whose knowledge? What values? The comparative politics of patenting life forms in the United States and Europe*, 44 *POL'Y SCI* 267 (2011) (describing the different "expertise barriers" to participation in the technically complicated policy domain of life form patenting in the US and Europe).

⁴⁴ Jasanoff, *supra* note 1.

⁴⁵ *Id.* at 259.

⁴⁶ For example, Jasanoff elsewhere notes that "[w]ell entrenched habits of skepticism in American politics . . . have been linked to a recurrent, utopian search for neutral approaches to conflict resolution, framed by objective, quantitative decisionmaking techniques, such as vulnerability assessment, risk assessment and cost-benefit analysis." Sheila Jasanoff, *Ordering Knowledge, Ordering Society*, in SHEILA JASANOFF (ed.), *STATES OF KNOWLEDGE: THE CO-PRODUCTION OF SCIENCE AND SOCIAL ORDER*, 13, 34 (2004).

⁴⁷ More generally, the fact that different institutions have developed different ways of knowing that in turn help to constitute the institution is a central insight of the body of work on the "coproduction" of science and social orders (such as the law). See, e.g., Ezrahi, *supra* note 15; Sheila Jasanoff, *The Idiom of Coproduction*, in SHEILA JASANOFF (ed.), *STATES OF KNOWLEDGE: THE CO-PRODUCTION OF SCIENCE AND SOCIAL ORDER*, 1 (2004); Charis Thompson, *Co-producing CITES and the African Elephant*, in SHEILA JASANOFF (ed.), *STATES OF KNOWLEDGE: THE CO-PRODUCTION OF SCIENCE AND SOCIAL ORDER*, 67 (2004); David Winickoff and Douglas Bushey, *Science and Power in Global Food Regulation: The Rise of the Codex Alimentarius*, 35 *SCI. TECH. & HUM. VALUES* 356 (2010).

knowledge claims in public decision making cannot simply be cut and pasted across places and scales without raising potentially significant legitimacy challenges. As I will argue, the context-specific nature of scientific knowledge legitimation has important implications for international law. Lawmakers, regulators and scholars who ignore these differences in pursuit of a universal approach to mobilizing knowledge claims in public decision making risk unwittingly imposing their own parochial understandings of the process onto political systems that have grown up with different systems of public justification.⁴⁸ In order to orient my discussion of the challenges that the civic epistemology thesis raises for our understanding of science in international law, it is necessary to first examine the key strands in the existing scholarship on science in international affairs.

B. Science in International Affairs

As scientific evidence has been asked to play an increasingly central role in international health and environmental regimes, a body of scholarship has developed to help understand the role of science in these regimes, and to probe the legitimacy of different techniques for mobilizing science in international affairs. Attention to the issue of building more legitimate practices for making and validating knowledge in international affairs has focused largely on science advisory bodies, negotiating bodies, and standard-setting organizations.⁴⁹ Scholars examining these non-adjudicative contexts have looked to questions of process and institutional design in science advisory bodies,⁵⁰ the role of scientific advice in intergovernmental negotiation

⁴⁸ Indeed, it is not uncommon for scholars to ignore these differences and conclude that any difference in science-based regulation is simply veiled protectionism. *See, e.g.*, THOMAS BERNAUER, *GENES, TRADE, AND REGULATION: THE SEEDS OF CONFLICT IN FOOD BIOTECHNOLOGY*, Princeton Univ. Press (2003). These arguments tend to over-universalize science and simultaneously overestimate its ability to level divergent moral and political principles. For an excellent criticism of this perspective, *see* Vern Walker, *The Myth of Science as a 'Neutral Arbiter' for Triggering Precautions*, 26 B.C. INT'L & COMP. L. REV. 197 (2003). *See also* David Winickoff et. al. *Adjudicating the GM Food Wars: Science, Risk, and Democracy in World Trade Law*, 30 YALE J. OF INT'L L. 82 (2005); Jacqueline Peel, *Risk Regulation under the WTO SPS Agreement: Science as an International Normative Yardstick?* Jean Monnet Working Paper, New York Univ. (2004). This is not to suggest that veiled protectionism does not exist; it is only to point out that some differences in regulatory choices reflect legitimate differences between nations with respect to the process of legitimating scientific claims in public decision-making.

⁴⁹ *See, e.g.* Karen Litfin, *Ozone Discourses: Science and Politics in Global Environmental Cooperation* (1994); David Jukes, *The Role of Science in International Food Standards*, 11 FOOD CONTROL 181 (2000); Clark Miller, *Hybrid Management: Boundary Organizations, Science Policy, and Environmental Governance in the Climate Regime*, 26 SCI. TECH. AND HUM. VALUES 478 (2001); Rolf Lidskog & Goran Sundqvist, *The Role of Science in Environmental Regimes: The Case of LRTAP*, 8 EURO. J. INT'L RELATIONS 77 (2002); Clark Miller, *Climate Science and the Making of a Global Political Order*, in STATES OF KNOWLEDGE: THE CO-PRODUCTION OF SCIENCE AND SOCIAL ORDER, 46 (Sheila Jasanoff, ed. 2004); Marybeth Long Martello, *Expert Advice and Desertification Policy: Past Experience and Current Challenges*, 4 GLO. ENV'T'L POLS. 85 (2004); ALEX FARRELL & JILL JAGER, ASSESSMENTS OF REGIONAL AND GLOBAL ENVIRONMENTAL RISKS: DESIGNING PROCESSES FOR THE EFFECTIVE USE OF SCIENCE IN DECISIONMAKING (eds. 2006); RONALD MITCHELL ET. AL., GLOBAL ENVIRONMENTAL ASSESSMENTS: INFORMATION AND INFLUENCE (2006); Ann Keller *Credibility and Relevance in Environmental Policy: Measuring Strategies and Performance among Science Assessment Organizations*, 20 J. PUB. ADMIN. RESEARCH & THEORY 357 (2010).

⁵⁰ *See, e.g.*, Keller, *supra* note 49; Farrell & Jager, *supra* note 49; Mitchell et. al., *supra* note 49; Paul Edwards & Stephen Schneider, *Self-Governance and Peer Review in Science-for-Policy: The Case of the IPCC Second*

processes,⁵¹ and the role of expert advice in international standard-setting.⁵² Clark Miller has been an important thinker in this area; his work on building authoritative knowledge in “international knowledge institutions” has been useful in highlighting the power inherent in global knowledge-making and subjecting it to democratic critique.⁵³ In this work, Miller explored the normalizing effect of a class of international organizations designed specifically to produce and validate knowledge in global politics. For Miller, these institutions represent a “proto-democratic” experiment in structuring global knowledge-making processes in an inclusive manner so as to garner a broad base of legitimacy from diverse global publics. He posits that these institutions signal the existence of a struggle to deploy scientific knowledge and expertise as the basis of a global civic epistemology and argues that we should be attentive to the manner in which these institutions conduct this important political work.⁵⁴

While Miller’s work focuses on the role of advisory bodies and other non-adjudicatory international bodies in building practices for validating knowledge claims in international affairs, my work focuses on the role that the judiciary may play in helping to build these practices.⁵⁵ The existing literature on the use of science in international adjudication has focused largely on the use of science in decision making, and less on the more fundamental definitional and boundary-drawing issues that I focus on here. Moreover, the vast majority of the literature in this area has focused on one particular adjudicatory body: the WTO DSB.

This focus on the WTO DSB is not surprising. The WTO has a strong dispute settlement system with the authority to settle disputes in areas where free trade values conflict with domestic regulations designed to protect “human, animal, or plant life or health.”⁵⁶ Because issues relating to human, animal and plant life and health are often scientifically complex and unsettled, the DSB at times finds itself faced with reams of complex technical argument in the

Assessment Report, 219 in CHANGING THE ATMOSPHERE: EXPERT KNOWLEDGE AND ENVIRONMENTAL GOVERNANCE (Clark Miller & Paul Edwards, eds 2001).

⁵¹ See, e.g., PETER HAAS, SAVING THE MEDITERRANEAN: THE POLITICS OF INTERNATIONAL ENVIRONMENTAL COOPERATION (1990); Litfin, *supra* note 49; Miller, *supra* note 49; Lidskog & Sundqvist, *supra* note 49; Martello, *supra* note 49.

⁵² See, e.g. Jukes, *supra* note 49; Michael Livermore, *Authority and Legitimacy in Global Governance: Deliberation, Institutional Differentiation, and the Codex Alimentarius*, 81 N.Y.U. L. REV. 766 (2006); Winickoff & Bushey, *supra* note 47. See also Michael Goldman, *Imperial Science, Imperial Nature: Environmental Knowledge for the World (Bank)*, 55 in EARTHLY POLITICS: LOCAL AND GLOBAL IN ENVIRONMENTAL GOVERNANCE (Sheila Jasanoff & Marybeth Long Martello, eds. 2004).

⁵³ See Clark Miller, *Democratization, International Knowledge Institutions, and Global Governance*, 20 GOVERNANCE 325, 328 (2007) (arguing that these international knowledge institutions contribute to the epistemic ordering of world affairs by, *inter alia*, fixing rules for deploying evidence in global policy debates).

⁵⁴ *Id.* at 350.

⁵⁵ Even though Miller’s work does not reach adjudicatory bodies in international law, it is easy to see within the framework I have laid out above how the work of international knowledge institutions may feed into international adjudication. For instance, where treaties delegate epistemic authority to specific international institutions, such as the Codex Alimentarius Commission, adjudicators may legitimately use the work of these institutions to fill in science in adjudicatory contexts in step one. Moreover, where international knowledge institutions reach agreement about certain norms of regulatory science, these norms may diffuse to domestic legal systems and support the finding of broadly shared norms across domestic systems that adjudicators may use to fill in science in step two of my framework.

⁵⁶ See GATT Art. XX(b); Agreement on the Application of Sanitary and Phytosanitary Measures, Art. 2.1.

course of settling these disputes. Moreover, the SPS Agreement explicitly reserves a place for “science” in settling these disputes by requiring members’ regulations to be “based on scientific principles and . . . not maintained without sufficient scientific evidence.”⁵⁷

The centrality of science in the agreements themselves and subsequently in a number of contentious disputes has generated a body of literature debating the appropriate and legitimate use of science in WTO dispute settlement. At its core, this literature consists of a debate about the tension between the preservation of member states’ cultural autonomy and domestic regulatory processes, and the regime’s goal of advancing nondiscrimination by avoiding veiled protectionism. As it has become clear that a simple reference to “science” in the text would not by itself strike the needed balance, scholars have proposed more detailed and specific ways to strike this balance. These scholars generally agree that absolute deference to member regulations would render the agreement meaningless,⁵⁸ and that the WTO heavy-handedly leveling domestic regulatory diversity by imposing its own view of science would result in a crisis of legitimacy for the organization.⁵⁹ Where they don’t agree is exactly how to balance in the middle.

David Wirth was among the earliest commentators in this area, expressing concern as early as 1994 that panels scrutinizing domestic regulatory decisions would act in a heavy-handed manner, requiring a high degree of correlation between the “scientific support and the regulatory measure chosen.”⁶⁰ As a result, Wirth recommended that panels adopt a “highly deferential” stance toward domestic regulators.⁶¹

Wirth is not alone among commentators in his concern that WTO review of domestic regulations could take the form of a problematically strict application of one particular scientific view, raising problems of democratic legitimacy and cultural autonomy.⁶² Authors raising this concern often point to diverse regulatory cultures in different members, and emphasize the sovereign right of these members to regulate as they see fit, evaluating and responding to risks in ways that take into account the particular cultural values of their polity. Vern Walker has argued

⁵⁷ Art. 2.2. Art 2.2 also provides an exception for situations in which scientific evidence is insufficient. *See also* Art. 5.7. The SPS Agreement also requires that measures be based on a risk assessment, and require that such risk assessments take into account “available scientific evidence.” *Id.* Arts. 5.1, 5.2.

⁵⁸ *See, e.g.* Vern Walker, *Keeping the WTO from becoming the “World Trans-science Organization”: Scientific Uncertainty, Science Policy, and Fact Finding in the Growth Hormones Dispute*, 31 CORNELL INT’L L.J. 251, 280 (1998) (arguing that a WTO panel that defers to any member who cries “science” would render the SPS Agreement ineffective); Winickoff et. al., *supra* note 48 at 109-110 (same).

⁵⁹ *See, e.g.* Walker, *supra* note 58 (arguing that the WTO must avoid becoming the “World Trans-Science Organization” – a global meta-regulator); Joanne Scott, *On Kith and Kine (and Crustaceans): Trade and Environment in the EU and WTO*, in *THE EU, THE WTO, AND THE NAFTA: TOWARDS A COMMON LAW OF INTERNATIONAL TRADE?* (J.H.H. Weiler, ed.), 125 (2000).

⁶⁰ David Wirth, *The Role of Science in the Uruguay Round and NAFTA Trade Disciplines*, 27 Cornell Int’l L.J. 817 (1994).

⁶¹ *Id.*

⁶² *See, e.g.* Vern Walker, *Keeping the WTO from becoming the “World Trans-science Organization”: Scientific Uncertainty, Science Policy, and Fact Finding in the Growth Hormones Dispute*, 31 CORNELL INT’L L.J. 251 (1998); Scott, *supra* note 59; Theofanis Christoforou, *Settlement of Science-Based Trade Disputes in the WTO: A Critical Review of the Developing Case Law in the Face of Scientific Uncertainty*, 8 N.Y.U. ENVTL. L.J. 622, 629-32 (2000); Vern Walker, *The Myth of Science as a “Neutral Arbiter” for Triggering Precautions*, 26 BC INT’L & COMP. L. REV. 197 (2003); Jacqueline Peel, *Risk Regulation under the WTO SPS Agreement: Science as an International Normative Yardstick?* Jean Monnet Working Paper, New York Univ. (2004); JACQUELINE PEEL, *SCIENCE AND RISK REGULATION IN INTERNATIONAL LAW*, 260-62 (2010).

that if the WTO is to avoid becoming what he calls the “World Trans-Science Organization” – a sort of global regulator, it must adopt a position of deference to the different national science policies of its members.⁶³

David Winickoff, along with a group of STS scholars, have also argued along these lines.⁶⁴ Winickoff et al., writing in the context of the transatlantic conflict over genetically modified food, emphasized that risk assessment science is not universal. They argued that in the process of reviewing national regulations to determine if they are veiled trade barriers, it is important to involve the public, especially on issues with low certainty with respect to the knowledge base to be relied upon, and low consensus as to the framing of the scientific issues and the values to be protected through public policy. To this end, Winickoff et. al. proposed that dispute settlement panels should not function as adjudicatory bodies reviewing the substantive scientific details underlying the parties' risk assessments, but should rather adopt a stance similar to that of an administrative tribunal reviewing the adequacy of executive decision-making.⁶⁵ In so doing WTO review would increase transparency in domestic rulemaking, serving as a discipline on potential veiled protectionism.

Christophe Bonneuil and Les Levidow have recently challenged this conclusion.⁶⁶ Although they share the concerns raised by Winickoff et. al. about regulatory pluralism and a narrow view of science normalizing from above, they argue that the panel's largely procedural review in the *EC-Biotech* case resulted in an obfuscation of the substantive judgments actually made by the panel. Because the substantive judgments were hidden in what appeared to be a mundane procedural review, Bonneuil and Levidow argued that “[t]he decision-makers' engagement with scientific aspects therefore becomes less explicit and less accountable.”⁶⁷

Other commentators have been more sanguine about the role science before the DSB. Robert Howse has argued that the science-based requirements in the SPS Agreement do not represent a usurpation of context-specific democratic control, but instead serve to enhance the

⁶³ Vern Walker, *Keeping the WTO from becoming the “World Trans-science Organization”: Scientific Uncertainty, Science Policy, and Fact Finding in the Growth Hormones Dispute*, 31 CORNELL INT'L L.J. 251, 254-55, 271 (1998).

⁶⁴ David Winickoff et al., *Adjudicating the GM Food Wars: Science, Risk, and Democracy in World Trade Law*, 30 YALE J. OF INT'L L. 82 (2005)

⁶⁵ *Id.* at 108-111 (suggesting adopting a role akin to U.S. “hard look” review). *See also* Andrew Guzman, *Food Fears: Health and Safety at the WTO*, 45 VA. J. INT'L L. 1 (2004) (arguing for a purely procedural review). Elizabeth Fisher has made a similar argument, framing different cultures of risk regulation as embodying different types of “administrative constitutionalism” - different conceptions for how to bring about legitimate administration. *See* ELIZABETH FISHER, *RISK REGULATION AND ADMINISTRATIVE CONSTITUTIONALISM* (2007).

⁶⁶ Christophe Bonneuil & Les Levidow, *How Does the World Trade Organization Know?: The Mobilization and Staging of Scientific Expertise in the GMO Trade Dispute*, 42 SOC. STUDS. SCI. 75, 97 (2012).

⁶⁷ *Id.* Gregory Shaffer, however, highlights some benefits of a proceduralist review, suggesting that in the same case that Bonneuil and Levidow described, the review served to provide input to other institutional processes in which debates will continue to play out – pushing WTO members to take into account the impact their decisions have on others, justify their decisions, and facilitate exchanges between governments internationally and between governments and their constituencies nationally. Gregory Shaffer, *A Structural Theory of WTO Dispute Settlement: Why Institutional Choice Lies at the Center of the GMO Case*, 41 N.Y.U. J. INT'L L. & POLS. 1, 76-77 (2008).

quality of rational democratic deliberation about risk and its control.⁶⁸ Others see science as a useful tool for adding “rigor and discipline” to the agreement, and are apparently less concerned about the potential impact on domestic regulatory autonomy.⁶⁹ Jeffery Atik has even argued that the science-based requirements in the WTO agreements represent a “substantial restoration of rulemaking authority to national institutions,” reasoning that the agreement explicitly reserves regulatory autonomy to states, and that in technically complex and contested areas the requirement that regulations have a scientific basis (as opposed to the “best” scientific basis) will allow states to be able to defend a wide range of regulatory practices.⁷⁰

A number of scholars have usefully suggested looking beyond the adjudicatory context itself for tools to aid the DSB in evaluating scientific claims.⁷¹ Joanne Scott and Jacqueline Peel have pointed to a potential role for the SPS Committee, a political body within the WTO in which representatives of member states meet to “carry out the functions necessary to implement the provisions of [the] Agreement.”⁷² The Committee operates as a quasi-legislative body and is capable of offering clarifying interpretations of the SPS Agreement.⁷³ The SPS Committee allows for a degree of deliberation and reflexivity that the contentious dispute settlement system does not.⁷⁴ However, as Peel notes, the Committee has yet to exercise its norm elaboration function in respect to the scientific evidence or risk assessment requirements of the SPS Agreement.⁷⁵ She suggests that were it to do so, it may aid in the evolution of SPS rules in a way that would enhance their flexibility.⁷⁶

Although this chapter does not focus exclusively on the WTO, it does contribute to this literature in three key ways. First, it provides a detailed look at the specific techniques utilized by the Panel and AB to operationalize the science-related requirements in the SPS Agreement. This

⁶⁸ Robert Howse, *Democracy, Science, and Free Trade: Risk Regulation on Trial at the World Trade Organization*, 98 MICH. L. REV. 2329, 2330 (2000), *See also* Fisher, *supra* note 65 (describing a “deliberative-constitutive” paradigm of administrative constitutionalism in which the process of debate builds more robust and legitimate regulation).

⁶⁹ *See* Warren Maruyama, *A New Pillar of the WTO: Sound Science*, 32 INT’L L. 651, 676 (1998); Steve Charnovitz, *Improving the Agreement on Sanitary and Phytosanitary Standards*, in *TRADE, ENVIRONMENT, AND THE MILLENNIUM* 171, 185 (Gary Sampson & W. Bradnee Chambers eds., 1999). *See also* Fisher, *supra* note 65 (describing a “rational-instrumental” paradigm of administrative constitutionalism in which science more unproblematically serves as a tool to effectuate regulatory goals).

⁷⁰ Jeffery Atik, *Science and International Regulatory Convergence*, 17 NW J. INT’L L. & BUS. 736, 739 (1996).

⁷¹ Gregory Shaffer has framed dispute settlement as a comparative institutional question, highlighting that by allocating authority between states, markets, international organizations and the court itself, the dispute settlement process requires heightened attention to the comparative institutional competencies of all of these entities, not just the court itself. Shaffer, *supra* note 67 at 2-7.

⁷² SPS Agreement, Art. 12.1.

⁷³ Peel, *supra* note 62 at 189. Although, as Peel notes, these interpretations have only a “soft law” effect. *Id.* (citing JOANNE SCOTT, *THE WTO AGREEMENT ON SANITARY AND PHYTOSANITARY MEASURES: A COMMENTARY*, 72 (2007)).

⁷⁴ *See* JOANNE SCOTT, *THE WTO AGREEMENT ON SANITARY AND PHYTOSANITARY MEASURES: A COMMENTARY*, 70 (2007).

⁷⁵ Peel, *supra* note 62, at 189.

⁷⁶ *Id.* at 189-90. Although, Peel and Scott both note that in practice the SPS Committee has often followed the DSB instead of leading it in this area. *Id.* at 190; Scott, *supra* note 74 at 72-74.

analysis is robust and developed in light of important social science insights in the STS literature. Second, it provides a timely look at the most recent case law – specifically the *Hormones II* case – which represents an important, and thus far underappreciated movement in SPS jurisprudence. Third, it suggests a path of norm-building in processes of science validation, not as a panacea, but as a process that could usefully augment many of the deferential approaches already put forward in the literature. It can do this by firming up a set of lowest common denominator practices in a way that would serve to further restrict the ability of nations to opportunistically depart from genuinely held beliefs about science, while at the same time minimizing the risk of heavy-handed imposition of a narrowly held set of beliefs.

Beyond filling these holes in the WTO literature, this chapter also contributes to the literature on science in international adjudication more broadly. As described in more detail in the next section, it does this by grappling with the civic epistemology thesis and developing a novel framework for the evaluation of scientific argument in international adjudication. It also fills a need for more in-depth empirical analysis of the science-based reasoning of adjudicatory bodies, and addresses the dearth of comparative or cross-regime analysis in this area.

In spite of the significant attention that scholars have paid to the WTO, very few scholars have looked comparatively or more generally at the issue of scientific validation as a distinct area of study in international law.⁷⁷ There may be a number of reasons for this lack of attention. First, science plays a different role in different regimes and issue areas. As insights from the literature on networked governance suggest, international law is fragmented into separate issue areas.⁷⁸ In light of this fragmentation, different types of issues may settle upon different norms surrounding the role of science in decision making. As such, comparison across these various issue areas may present difficulties with generating generalizable results.⁷⁹

Second, in less adjudicatory areas of international law, it may often be difficult to tell exactly why a given international body has taken the action that it has. Although norms of transparency may lead to explanation and justification of decisions in some areas, in others, the doors may close to all but the most powerful players for behind-the-scenes horse-trading at critical moments. Third, the volume of conflicts that have arisen and been thoroughly worked out in adjudicatory bodies is low. Starting slowly with the Trail Smelter decision,⁸⁰ and accelerating only recently with the advent of the WTO, the total number of technically mediated decisions in international adjudication remains low.

In spite of these problems with cross-regime comparison, there is value in such a comparison. Although science may play a different role in different regimes and issue areas, there are certainly commonalities. While it is important not to overemphasize these commonalities in the name of a procrustean universalism, there may be value in cross-fertilization of practices and principles across regimes.⁸¹ Indeed, international law itself evolves

⁷⁷ But see JACQUELINE PEEL, *SCIENCE AND RISK REGULATION IN INTERNATIONAL LAW*, 192-220 (2010).

⁷⁸ See, e.g. International Law Commission, *Fragmentation of International Law: Difficulties arising from the diversification and expansion of international law*, Analytical Guide (available at: http://untreaty.un.org/ilc/guide/1_9.htm).

⁷⁹ See *infra* Part III for a discussion of some of these differences.

⁸⁰ Trail Smelter Arbitral Decision (US v. Can.) (1941) 35 AM. J. INT'L L. 684.

⁸¹ For example, as discussed below, a dissent in the ICJ's *Pulp Mills* decision pointed to the WTO as having developed a superior method for evaluating scientific claims.

through the emergence of new principles which slowly come to serve as sources of authority in other areas of international law.

Further, although not all areas of international law are replete with explanations and justifications for science-related decisions, a study that limits itself to adjudications can take advantage of the strongly entrenched legal norm that adjudicators nearly always provide some set of explanations or justifications to accompany their decisions. Finally, the last few years have produced at least two important cases in this area. In light of these cases, it is reasonable to assert that the WTO's approach to the role of science in food safety conflicts is coming into sharper focus. The ICJ's jurisprudence on this matter is at an earlier stage of development. Although the long-awaited *Pulp Mills* case was decided in 2010, the decision was distinctly sparse in articulating its reasoning in technical areas. Notably, two judges dissented precisely because of this failure on the part of the majority to address the technical issues in the case with a sufficient degree of nuance. As a result, the time is ripe for a cross-regime comparison of these two adjudicatory systems.

C. A New Framework for Evaluating Science in International Adjudication

Although the literature has recognized many of the complications that arise in mobilizing science in international law, it has generally not taken the civic epistemology thesis sufficiently seriously. In this section I draw out the specific challenges that the civic epistemology thesis raises for using science in international adjudication, and address these challenges by proposing a new three-part framework for adjudicators to use when evaluating scientific arguments in international adjudication.

The civic epistemology thesis raises at least two non-obvious points about the use of science in international adjudications. First, it raises the issue of what is meant when different countries, each with a different model for using science in public decision making, come together and agree that solutions to their disputes should be based on science?⁸² The existence of variegated civic epistemologies reveals that what at first might seem like clear and unambiguous agreement on the epistemic basis for collective action is actually highly ambiguous. Science in these agreements is as Gieryn says, a marker, empty until its insides are filled and its borders drawn by negotiations over who and what is "scientific." Of course, this is familiar territory for international lawyers. Parties, unable or uninterested in specifying more detailed agreements regularly leave vague and ambiguous language in treaties. The civic epistemology thesis forces us to address the fact that that agreements about "science" likely fall into this category as well.

Second, and critically, the diversity of civic epistemologies demonstrate that there is not one single model for certifying knowledge for use in public decision making that can be deduced from presumed universal qualities of science or science-in-regulation.⁸³ As a result, when

⁸² See, e.g., The Montreal Protocol on Substances that Deplete the Ozone Layer, chapeau ("measures taken to protect the ozone layer from depletion should be based on relevant scientific knowledge"); United Nations Framework Convention on Climate Change, chapeau ("steps required to understand and address climate change will be environmentally, socially and economically most effective if they are based on relevant scientific, technical and economic considerations..."); WTO Agreement on the Application of Sanitary and Phytosanitary Measures, 2.2 ("Members shall ensure that any sanitary or phytosanitary measure is . . . based on scientific principles and is not maintained without sufficient scientific evidence").

⁸³ That is to say that in addition to the term being ambiguous, we cannot look to science itself to provide a single or "right" way to fill it in.

international adjudicators “fill in” science by making substantive assumptions about how science works and adopting procedural mechanisms for legitimating scientific claims, they must be understood to be selecting between different possible and likely contested interpretations, each with a potentially different degree of legitimacy in the eyes of different publics around the world; they are not adopting techniques that are aperspectively right or wrong.⁸⁴ These important boundary-drawing decisions that adjudicators must make in scientific and technical disputes are often elided by the mistaken belief that there is one universal or correct manner for validating science in public decision making. In essence, adjudicators filling in science should be understood to be making law by determining what assumptions and procedures will be used to separate science from non-science, not simply finding facts in a universal encyclopedia.

This insight raises two important questions, one empirical and one normative. Empirically, the question is: what decisions are international adjudicators actually making when faced with different claims about how knowledge claims should be tested and validated? If we are to understand the operation of science in international adjudication, we must attempt to elucidate the boundary-drawing techniques employed by these adjudicators as they fill in science in their decisions. In practice, these boundary drawing techniques take the form of substantive assumptions about what science is or can do, and procedural requirements that adjudicators put in place to structure the treatment of scientific evidence before the court. The bulk of this chapter is dedicated to answering this question by providing a detailed analysis of the boundary drawing techniques utilized by the adjudicators in the recent case law of the WTO DSB and the ICJ.

The normative question is: what impact does the civic epistemology thesis have on what international adjudicators should be doing when they evaluate scientific claims? The role of the adjudicator looks different in a world where universal properties of regulatory science can unproblematically span different cultures than it does in a world where the legitimacy of regulatory science arises in part *through* these different political cultures. Where regulatory science is universal, proper techniques for bounding science need only be drawn deductively from these universal properties. The adjudicators need only get it right by applying the correct assumptions and procedures to bound science. However, in a world where the legitimacy of specific techniques for validating regulatory science varies between legal systems and no single correct approach exists, an adjudicator’s task is more complicated. In this world, techniques for validating knowledge claims will not be strictly right or wrong, but only more or less broadly accepted. We can no longer assume that acceptability to diverse publics will be based on correspondence to universally accepted criteria. Instead, we must look to build techniques that will garner legitimacy from a wide range of nations with a diverse set of practices for validating knowledge claims.

A technique for generating practices that garner broad legitimacy must be attentive to the institutional constraints of courts. While nations may come together and design institutions to generate scientific advice or science-based standards in ways that explicitly address many of the concerns that arise when using science in international affairs,⁸⁵ adjudicators are not so-

⁸⁴ Of course, the fact that different techniques exist for validating scientific claims does not mean that specific scientific conclusions cannot be evaluated as being right or wrong within these different frameworks.

⁸⁵ For example, the Intergovernmental Panel on Climate Change, or the Codex Alimentarius Commission. See generally Clark Miller, *Democratization, International Knowledge Institutions, and Global Governance*, 20 GOVERNANCE 325 (2007); ALEX FARRELL & J. JAGER, ASSESSMENTS OF REGIONAL AND GLOBAL ENVIRONMENTAL RISKS: DESIGNING PROCESSES FOR THE EFFECTIVE USE OF SCIENCE IN DECISIONMAKING (eds. 2006); W.C. CLARK ET AL., LEARNING TO MANAGE GLOBAL ENVIRONMENTAL RISKS: A

positioned. Adjudicators are often left to settle disputes with limited textual guidance from treaties, and are faced with conflicting scientific claims put forward by the different parties, coupled with supporting claims for how specific techniques for bounding science support their position (and arguments for why the other party's factual claims should be drawn outside of the boundary of science). In these situations, as my analysis below reinforces, adjudicators often treat regulatory science as a matter of simply getting it right, drawing from their own understanding of how science works to evaluate the competing claims, or developing procedures for soliciting the advice of experts to aid them in drawing these boundaries. This *ad hoc* approach is sub-optimal. It fails to appreciate the political groundedness of varying techniques for validating science in public decision making, and risks inappropriately universalizing the particular judge's understandings of regulatory science.

In place of this *ad hoc* approach, I propose a three step framework for addressing the boundary problem in regulatory science that is designed to be more attentive to the context-specificity of different techniques for validating policy-relevant knowledge claims. Under this framework, adjudicators should look first to the text of the relevant agreements between the parties. This step is no different from the current approach. Where an agreement espouses particular agreements about legal epistemologies, or expressly delegates this task to a particular entity, the parties have consented to this understanding and the adjudicator should "fill in" science according to this agreement. This textual agreement may be broad and offer little guidance, for example, the WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement), discussed in detail below, provides that "Members shall ensure that any sanitary or phytosanitary measure is . . . based on scientific principles and is not maintained without sufficient scientific evidence."⁸⁶ This bare text provides little beyond the empty space of "science" to set the bounds of acceptable evidence. Other text, particularly text which delegates epistemic authority, may provide much more specific guidance. For example, the SPS Agreement elsewhere provides that "Members shall ensure that their sanitary or phytosanitary measures are based on an assessment, as appropriate to the circumstances, of the risks to human, animal or plant life or health, taking into account risk assessment techniques developed by the relevant international organizations."⁸⁷ This text expressly empowers a set of relevant international organizations to define risk assessment techniques.⁸⁸

Second, where the relevant epistemological basis for evaluating scientific claims is ambiguous, adjudicators should look to widely shared practices in domestic and regional reasoning about science in regulation. Where national views have converged on specific approaches to science-in-regulation, adjudicators should fill in science with these convergent understandings, absent compelling reasons why the specific international context in issue calls

COMPARATIVE HISTORY OF SOCIAL RESPONSES TO CLIMATE CHANGE, OZONE DEPLETION, AND ACID RAIN (eds. 2001); Ann Keller *Credibility and Relevance in Environmental Policy: Measuring Strategies and Performance among Science Assessment Organizations*, 20 J. PUB. ADMIN. RESEARCH & THEORY 357 (2010).

⁸⁶ Article 2.2.

⁸⁷ Article 5.1.

⁸⁸ Here, the Codex Alimentarius Commission, International Office of Epizootics, and International Plant Protection Convention. Annex A(3). The Codex Alimentarius Commission, for example, has completed its production of risk assessment guidelines. As such, the WTO dispute settlement body must take these guidelines into account when evaluating challenged risk assessments.

for something different. This argument, although the second step in the framework, is not addressed in detail in this chapter, because it will be fleshed out in more detail in Chapter 2.

Third, and the primary normative focus of this chapter, is the situation where the text is ambiguous and no broadly shared norms exist. In these situations adjudicators are left to “fill in” science on their own, crafting substantive assumptions and procedural requirements to test knowledge claims and separate science from non-science. Given that most treaty text relating to science is of limited detail, and shared norms are unlikely to exist on many issues, this is likely to be a common situation. How then are adjudicators, with limited guidance and faced with conflicting arguments about how to bound science, to select between alternatives in such a way as to build legitimacy and broadly held faith in their competence as neutral adjudicators?⁸⁹ It is not the purpose of this chapter to espouse a particular correct or best-suited substantive vision of where to draw the boundaries of science. Rather, my purpose is to remain neutral on this point and instead explore techniques that adjudicators can utilize to build broadly legitimate boundaries. To this end, my primary argument is that international adjudicators should conceptualize their role as contributing to the progressive development of legal rules by, in part, catalyzing the development of norms of regulatory science.

Such progressive legal development is important because there is a lot at stake in the way that international regimes handle conflicts about science-based decision making. Issues of free trade, environmental degradation, and food safety all regularly turn on interpretations of science in international regimes.

While most developed legal systems have worked out internal mechanisms for evaluating scientific claims in adjudicatory contexts,⁹⁰ international adjudicatory bodies generally have much less precedent to draw from, less-well-established norms for warranting scientific claims in policymaking contexts, and a wider array of party positions on the appropriate role of science in decision making.⁹¹ What is more, international law develops in part through the slow accretion

⁸⁹ This broadly shared faith in the neutrality and competence of adjudicators is a primary component of the rule of law, and a central reason why international actors would seek to legalize an otherwise ungoverned area of international relations.

⁹⁰ For example, in the U.S., there is Daubert review, hard look review, and Chevron deference, as well as well-regarded independent expert bodies like the National Academies of Science that can lend institutional credibility to certain claims.

⁹¹ See Jasanoff, *supra* note 5; Clark Miller, *Challenges in the Application of Science to Global Affairs: Contingency, Trust, and Moral Order*, in *CHANGING THE ATMOSPHERE: EXPERT KNOWLEDGE AND ENVIRONMENTAL GOVERNANCE*, 266 (2001) (“Although problems of contingency, trust, and moral order are, in principle, intrinsic to all science-based policy enterprises, they have ceased to pose fundamental threats to political legitimacy in industrial countries. Government officials, scientists, and citizens in most Western nations - even when they disagree on the details of scientific interpretation - are able to draw on culturally specific systems of rhetoric and practice for warranting scientific knowledge in policy contexts, for securing the trustworthiness and credibility of institutions that use science, and for rendering the uses of political power consistent with norms of legitimate governance, such as transparency, openness, and public participation.”). Critically, this does not necessarily mean that international science advisory organizations in general will perform poorly in comparison to domestic bodies. Indeed, when nations explicitly agree on approaches to dealing with scientific evidence and design organizations that possess legitimating procedural and structural qualities, some international organizations are capable of achieving a broader sense of legitimacy and an ability to speak for “science” in international affairs. See, e.g. Ann Keller, *Credibility and Relevance in Environmental Policy: Measuring Strategies and Performance among Science Assessment Organizations*, 20 *J. PUB. ADMIN. RESEARCH & THEORY* 357 (2010) (evaluating the organizational strategies, credibility and relevance of the US National Research Council, National Acid Precipitation

and ossification of international norms and principles that shape processes of reasoning both within individual regimes, and across regimes. Although the issues raised parallel many familiar domestic issues,⁹² the international context adds at least three additional complications. First, the lack of a well-developed parallel to administrative law makes questions of institutional delegation more difficult.⁹³ Second, it may be more difficult for parties to reach common ground due to more fundamental disagreement about the appropriate role of science in decision making stemming from different domestic norms of reasoning and justification.⁹⁴ Third, international adjudicators face heightened legitimacy issues, due to their greater distance from democratic accountability.⁹⁵

Additionally, on a more critical level, judicial decisions about technical issues may affect the balance of power within an international regime. For example, systemic delegation of technical decision making to international expert bodies may have the effect of displacing important political/value decisions to expert groups that are often dominated by developed country representatives.⁹⁶ These distinct issues that arise in the context of international adjudications surrounding science-based decision making raise concerns about generalizing too broadly from the insights of domestic studies, and underscore the importance of empirical study of specific international regimes.⁹⁷

The most important thing that international adjudicators can do in order to aid in this project of progressive legal development is to clearly articulate their reasoning when filling in science. Where international adjudicators explain their reasoning when coming to conclusions

Assessment Program, and Intergovernmental Panel on Climate Change and concluding that the IPCC achieves a degree of credibility comparable to the NRC, and greater than the NAPAP); Winickoff and Bushey, *supra* note 47 at 375 (discussing how negotiated procedural changes within the Codex Alimentarius Commission may “harness the necessary sense of transparency, representation, and accountability . . . to enable them to do their political work”). Courts, however, are differently situated. The procedures of international courts are often underspecified with respect to addressing scientific evidence, as the analysis below shows. Moreover, international adjudicators often need to settle factual disputes with little guidance from treaty text and must address arguments based on conflicting interpretations of scientific evidence in a relatively short timeframe. Absent an expert institution that is explicitly tasked with resolving scientific disputes within a regime, the findings of international adjudicators may lack the legitimating force of knowledge produced out of science advisory bodies with expressly agreed procedures to harness “transparency, representation, and accountability.” See Winickoff and Bushey, *supra* note 47. This is not to suggest that adjudicators cannot work to adopt procedures that harness some of these qualities, as the analysis below will show.

⁹² e.g. administrative law contexts, judicial interpretation of environmental and human health statutes, and even things as basic as common law tort cases with contested arguments about causation.

⁹³ *But see*, Benedict Kingsbury et. al., *The Emergence of Global Administrative Law*, 68 LAW & CONTEMP. PROBS. 15 (2005). See also Gregory Shaffer, *A Structural Theory of WTO Dispute Settlement: Why Institutional Choice Lies at the Center of the GMO Case*, 41 N.Y.U. J. INT’L L. & POL 1 (2008).

⁹⁴ See Jasanoff, *supra* note 5 (describing variation in the “institutionalized practices by which members of a given society test and deploy knowledge claims used as a basis for making collective choices.”); Miller, *supra* note 91.

⁹⁵ See, e.g. Daniel Esty, *The World Trade Organization’s Legitimacy Crisis*, 1 WORLD TRADE REV. 7 (2002).

⁹⁶ See Winickoff & Bushey, *supra* note 47 (suggesting that by importing appropriate procedural checks into these bodies they may indeed be made into the appropriate type of hybrid expert/democratic institution to be making these decisions).

⁹⁷ However, see Chapter 2, arguing that there is a role for comparative domestic analysis in building international norms for using science in decision making.

about scientific controversies, they create decisions that can serve as a focal point for future political and academic debate. Joanne Scott and Susan Sturm have demonstrated that beyond simply conceiving of the judiciary as norm elaborators and enforcers, courts can play an important role in catalyzing the formation and solidification of norms.⁹⁸ According to this conception of the judicial role, "the judicial function is to prompt – and create occasions for – normatively motivated inquiry and remediation by relevant non-judicial actors in response to signals of problematic conditions or practices."⁹⁹ Judges who work to serve this role will cultivate greater legitimacy, and long-term efficacy of an international adjudicatory body because they act less as ultimate arbiters, imposing their own view of the correct outcome on the parties, and more as entities that facilitate effective problem solving by additional non-judicial stakeholders.¹⁰⁰

Critically, in order to act as effective catalysts, judges must clearly explain their reasoning in coming to conclusions. An opaque decision that simply declares matters of fact as if they require no explanation fails to effectively catalyze normative development. Although such decisions may settle the dispute at issue, they are of limited use in future decisions, and of limited utility in advancing the progressive development of law in this area. As a result, after evaluating the empirics of what adjudicators in the WTO DSB and ICJ are actually doing to fill in science in international disputes, I then examine the degree to which these adjudicators are acting as useful catalysts, spurring further discussion and debate and potentially building toward broadly shared agreements about how to bound science in international disputes.

II. FILLING IN SCIENCE IN INTERNATIONAL ADJUDICATORY BODIES

In this section I turn my attention to the most recent, and as yet underanalyzed, rulings of two prominent international adjudicatory bodies: the WTO and the ICJ. In recent years both have heard important cases involving conflicting scientific claims in which the adjudicators have had to separate science from non-science. In late 2008 the WTO Appellate Body released its report in the second round of the protracted dispute between the US and EU over trade in beef treated with certain growth-promoting hormones.¹⁰¹ More recently, in mid-2010 the ICJ decided its *Pulp Mills* case, involving the environmental impacts of a pulp mill on the River Uruguay on the border of Uruguay and Argentina. Both cases turned on highly technical issues and involved the protracted presentation of expert argument to the adjudicators. By paying close attention to the persuasive resources mobilized by the courts in deciding these cases, and the ideas about science that motivate the key holdings, this analysis reveals the substantive assumptions and procedural techniques that international courts¹⁰² are using to fill in science in international legal disputes.

⁹⁸ See Joanne Scott & Susan Sturm, *Courts as Catalysts: Re-Thinking the Judicial Role in New Governance*, 13 COLUM. J. EUR. L. 565 (2007).

⁹⁹ *Id.* at 571.

¹⁰⁰ *Id.* at 575.

¹⁰¹ Appellate Body Report, *United States – Continued Suspension of Obligations in the EC – Hormones Dispute*, ¶8, WT/DS320/AB/R (Oct. 16, 2008).

¹⁰² Although the WTO dispute settlement body panels and Appellate Body are not technically “courts,” this dissertation employs that term for the sake of simplicity.

In order to conduct this analysis this section focuses in on specific points of ambiguity in these treaties and disputes, and explores the resources utilized by the courts to fill in these ambiguities. While the word “science” is perhaps the most important example of an ambiguous term, the interpretation of which requires significant extra-textual input on the part of the courts, key process questions are also frequently left underspecified by the establishing treaty. Of particular interest are instances where courts draw from general principles of law to create judge-made procedures guiding the treatment and interpretation of scientific evidence.

The analysis in this section is also attentive to the quality of the reason-giving and justification by the adjudicators themselves. As described above, even absent a formal rule of *stare decisis*, the decisions of international adjudicatory bodies can play a significant role in stirring debate, serving as a focal point for nations and scholars to praise or criticize in future discussions of what ought to be. When an adjudicatory body clearly explains its reasoning, it serves a purpose that extends beyond its utility in settling the dispute in front of it. It helps move the debate, improving international deliberation and pointing the path to possible points of convergence in the future.

In addition to elucidating many of the substantive assumptions and procedural requirements used by these bodies to fill in science, my analysis reveals that the differences between the WTO and the ICJ in their approaches to these questions are great. The WTO is developing a jurisprudence dedicated to the settlement of science-related disputes in the area of food safety. The Appellate Body has wrestled with these questions and detailed its reasoning in its reports in such a way that it can be, and has been, the source of significant discussion and debate. Regardless of whether one believes that the WTO’s cases have come out the right way, the Appellate Body has done a very good job at justifying and explaining its decisions and has thus served as a testing ground for possible emerging norms and principles for justifying scientific claims in international law.

The ICJ, by contrast, has failed in this task. By opaquely choosing between conflicting claims without justifying or explaining the bases of its scientific reasoning, the ICJ’s recent jurisprudence gives very few clues about how science-based disputes will be treated before the Court, and provides almost no raw materials for debating if and how the Court could improve its decision making. Given that one of the primary reasons for pursuing an international-law-based approach in an area of foreign affairs is the predictability provided by a rules- and reason-based method of settling disputes, the ICJ’s jurisprudence in this area has given little reason to seek legal resolution of international science-based disputes before the ICJ.

1. The World Trade Organization

The WTO’s dispute settlement process is among the most important features of the international trade regime. By allowing members to seek independent and quasi-binding resolution of disputes under the core WTO agreements, the dispute settlement system went a long way toward “legalizing” the trade regime. The Dispute Settlement Understanding (DSU) is the central text laying out the procedures by which disputes between parties are settled under the WTO. The DSU establishes a Dispute Settlement Body (DSB) to administer the rules and procedures governing the settlement of disputes, and defines its powers and procedures.¹⁰³

¹⁰³ Understanding on Rules and Procedures Governing Settlement of Disputes, Marrakesh Agreement Establishing the World Trade Organization, Annex 2, art. 13.1, 1869 U.N.T.S. 401, 33 I.L.M. 1226 (1994) [hereinafter DSU], Art. 2.1.

In the event of a conflict that parties are not able to settle through consultation, the DSB shall, at the request of a complaining party, establish a three-member panel to hear the dispute.¹⁰⁴ Panels are composed of “well-qualified governmental and/or non-governmental individuals” from member countries that are not parties to the dispute.¹⁰⁵ The Secretariat proposes nominations for a panel, to which a party may object for a “compelling reason[.]”¹⁰⁶ If there is no agreement on the panel composition after 20 days, the Director General, at the request of one of the parties, determines the composition of the panel.¹⁰⁷ A panel is charged with, *inter alia*, making “an objective assessment of the matter before it, including an objective assessment of the facts of the case and applicability of and conformity with the relevant covered agreements.”¹⁰⁸ Panels may seek information or technical advice from any individual or body which it deems appropriate.¹⁰⁹

Upon the issuance of a panel report, a party may appeal the decision to a standing Appellate Body.¹¹⁰ The Appellate Body (AB) is composed of seven persons, three of whom serve on any one case.¹¹¹ AB members are appointed by the DSB to a four year term with the possibility of two total terms. AB review is limited to issues of law covered in the panel report and legal interpretations developed by the panel.¹¹² Although AB reports and unappealed panel reports must be adopted by the DSU, this procedure is essentially automatic, as only a consensus of all members could reject these decisions.¹¹³

Although the DSB has seen hundreds of disputes since its inception in 1995, those disputes that have turned heavily on scientific questions have most often, and most recently arisen under one particular agreement: the Agreement on the Application of Sanitary and Phytosanitary Measures (“SPS Agreement”).¹¹⁴ The SPS Agreement deals with health- and safety-related trade practices and is designed in part to help prevent member countries from

¹⁰⁴ See DSU Art. 6. Panels may have five members at the request of the parties. DSU Art. 8.5.

¹⁰⁵ DSU Arts. 5.1, 5.3. A panelist may be a citizen of a party to the dispute with the consent of all parties to the dispute. DSU Art. 5.3.

¹⁰⁶ DSU Art. 8.6.

¹⁰⁷ Although parties are not to object to panel members without compelling reasons, such objections have become the norm, leaving the director general with the *de facto* authority to appoint panels in most cases. Sikina Jinnah, *Overlap Management in the World Trade Organization: Secretariat Influence on Trade-Environment Politics*, 10 GLOBAL ENVTL. POLS. 54, 72 (2010).

¹⁰⁸ DSU Art. 11.

¹⁰⁹ DSU Art. 13.1.

¹¹⁰ DSU Art. 16.4.

¹¹¹ DSU Art. 17.1. AB members should be “persons of recognized authority, with demonstrated expertise in law, international trade and the subject matter of the covered agreements generally.” DSU Art. 17.3.

¹¹² DSU Art. 17.6.

¹¹³ See DSU Art. 17.14. This consensus would have to include all parties to the dispute as well.

¹¹⁴ Article XX of the GATT and the Agreement on Technical Barriers to Trade (TBT Agreement) have also given rise to a number of somewhat technical disputes. See, e.g. *European Communities – Measures affecting asbestos and asbestos-containing products* WT/DS135/AB/R (2001). Although a detailed analysis of the more limited jurisprudence under these agreements would help to illustrate how the DSB has filled in science in these disputes, the reasoning in relevant areas under these agreements has largely tracked and/or been reflected in the more numerous, detailed, and recent jurisprudence under the SPS Agreement.

using health and safety standards as veiled attempts to exclude foreign goods and therefore protect their own domestic suppliers.

Because this analysis focuses on science-related reasoning within areas of textual ambiguity, a brief overview of the text of the SPS Agreement is important in order to understand the disputes. The SPS Agreement is a Multilateral Trade Agreement under the WTO that addresses the trade effects that may arise from members' regulation of food safety and controls on the spread or introduction of pests and diseases. The Agreement seeks to guide the development of these measures in order to minimize their negative effects on trade.¹¹⁵ The primary motivating concern is that, although WTO members may not establish purely protectionary tariffs or import restrictions in order to benefit domestic producers, health and safety standards may be manipulated to serve as *de facto* import restrictions. The Agreement seeks to ensure that members do not erect sanitary or phytosanitary standards as a veiled attempt to protect domestic industry.

In order to ferret out potentially protectionist measures, the Agreement places a number of restrictions on members' SPS measures. A number of these restrictions seek to draw on scientific evidence and principles to constrain members' choice of measures. Specifically, Article 2.2 requires that members ensure that any SPS measures are "based on scientific principles and not maintained without sufficient scientific evidence," except in situations where such evidence is insufficient. In those cases, Article 5.7 provides that a member may provisionally adopt SPS measures on the basis of available pertinent information. Article 5.1 requires that SPS measures be based on a risk assessment, and Article 5.2 specifies that such risk assessments must, *inter alia*, "take into account available scientific evidence."

Taken together, these provisions appear to envision science playing an important role in disciplining potentially protectionist measures.¹¹⁶ Notably, the risk assessment requirement also limits a member's acceptable options. However, it is important to understand that these two, though related, are distinct. Not all the cases that have arisen under the SPS Agreement have turned on conflicts about the science underlying a challenged health or safety measure. Although most SPS cases have addressed the sufficiency of a risk assessment supporting a given measure, the Appellate Body recently noted that there are two aspects of WTO panels' scrutiny of a risk assessment: "scrutiny of the underlying scientific basis and scrutiny of the reasoning of the risk assessor based upon such underlying science."¹¹⁷ Of all the cases that have arisen under the SPS Agreement, three have turned significantly on the "underlying scientific basis" of a risk assessment: *EC – Measures Concerning Meat and Meat Products (Hormones I)*, *EC – Measures Affecting the Approval and Marketing of Biotech Products (EC-Biotech)*, and *United States –*

¹¹⁵ *Id.* at chapeau.

¹¹⁶ On the role of science in the SPS Agreement, *see generally*, Peel, *supra* note 48; Howse, *supra* note 68; Walker, *supra* note 63; Winickoff et. al., *supra* note 48.

¹¹⁷ Appellate Body Report, *Australia – Measures Affecting the Importation of Apples from New Zealand*, ¶215 WT/DS367/AB/R (Nov. 29, 2010). For example, in the *Hormones* cases, discussed below, the issue turns on the underlying science: what impact specific substances are likely to have on the people who ingest them. In many of the invasive species cases, *see, e.g., Japan – Measures Affecting the Importation of Apples* WT/DS245/AB/R (Nov. 26, 2003), the fundamental disagreement is not about the impact of a given pest on the crops of a given importer country, it is about the sufficiency of the risk assessment and management decisions that control the likelihood of an unintentional importation of a crop-destroying pest. Although there may be some disagreement about the scope of such crop damage, it is the risk assessment itself that is typically the focus of these disputes.

Continued Suspension of Obligations in the EC – Hormones Dispute (Hormones II). While much has been written of the first two of these disputes¹¹⁸, the *Hormones II* decision came and went without much fanfare, escaping the notice of many scholars.¹¹⁹ The analysis in this section partially cures this oversight by offering the most detailed reading to-date of the panel and AB’s evaluation of the scientific claims of the parties.

The *Hormones II* decision cannot be read in isolation. Because the *Hormones II* decision builds on and extends the framework laid out by the AB in *Hormones I*, drawing from a closely related body of facts, it is important to read the two cases together. As a result, this section begins with a detailed analysis of the *Hormones I* decision, going beyond the existing commentary on this case by providing a finer grained analysis of the specific substantive assumptions and procedural techniques that the Panel and Appellate Body use to fill in science in the process of settling the dispute.¹²⁰ It then moves to the *Hormones II* dispute, exploring in detail how this case builds on *Hormones I*, and further reveals the resources that the DSB draws upon to evaluate scientific claims. This analysis does not provide a comprehensive description of each legal issue in these cases, but instead highlights the key places where the AB interpreted ambiguous science-related obligations and identifies the resources that the AB used to fill in these ambiguities. The section then concludes with a summary and analysis of the central principles of scientific validation that the DSB has used to fill in science in the two *Hormones* disputes.

a. *Hormones I*

In the EC-Hormones dispute (hereinafter, *Hormones I*), the United States and Canada requested the formation of a dispute settlement panel to address an European Communities (EC) Council Directive that prohibited the import of animals or meat that had been administered any of six hormones for growth promotion purposes.¹²¹ The U.S. and Canada, significant exporters of beef, allowed the use of these hormones in domestic beef production and brought the complaint in order to protect their interest in the export of beef products to Europe. The U.S. and Canada claimed, *inter alia*, that the EC standards were not based on a risk assessment under Article 5.1,

¹¹⁸ See, e.g. Robert Howse, Democracy, Science, and Free Trade: Risk Regulation on Trial at the World Trade Organization, 98 MICH. L. REV. 2329 (2000); Joanne Scott, *On Klth and Kine (and Crustaceans): Trade and Environment in the EU and WTO*, in THE EU, THE WTO, AND THE NAFTA: TOWARDS A COMMON LAW OF INTERNATIONAL TRADE? (J.H.H. Weiler, ed.), 125 (2000); Theofanis Christoforou, *Settlement of Science-Based Trade Disputes in the WTO: A Critical Review of the Developing Case Law in the Face of Scientific Uncertainty*, 8 N.Y.U. ENVTL. L.J. 622, 629-32 (2000); Walker, *supra* note 58; David Winickoff et. al. *Adjudicating the GM Food Wars: Science, Risk, and Democracy in World Trade Law*, 30 YALE J. OF INT’L L. 82 (2005); Gregory Shaffer, *A Structural Theory of WTO Dispute Settlement: Why Institutional Choice Lies at the Center of the GMO Case*, 41 N.Y.U. J. INT’L L. & POLS. 1 (2008); Bonneuil, Christophe & Les Levidow, *How Does the World Trade Organization Know? The mobilization and staging of scientific expertise in the GMO trade dispute*, 42 SOC. STUD. SCI. 75 (2012)

¹¹⁹ But see JACQUELINE PEEL, SCIENCE AND RISK REGULATION IN INTERNATIONAL LAW, 192-220 (2010).

¹²⁰ For another excellent and detailed reading of this case, See Walker, *supra* note 58. See also Peel, *supra* note 119.

¹²¹ See Panel Report, *EC – Measures Concerning Meat and Meat Products (Hormones)*, WT/DS26/R/USA, WT/DS48/R/CAN (Aug. 18, 1997). The Panel and Appellate Body both heard the Canada and U.S. complaints at the same time. Although each body issued separate reports for the two complainants, the reports at each stage are sufficiently similar to each other that they will be cited together as “*Hormones I*,” with pincites to the U.S. reports.

not “based on scientific principles” under Article 2.2, and were being maintained “without sufficient scientific evidence” under Article 2.2.

The case was highly technical, turning in part on the definition of “scientific principles” and the “sufficien[cy]” of scientific evidence.¹²² As a result, the Panel and AB were forced to wrestle extensively with a number of substantive and procedural questions relating to the use of science in decision making.

Much of the debate about the nature of scientific inquiry involved questions about the EC provisions’ compliance with the Article 2.2 requirement that sanitary or phytosanitary measures be “based on scientific principles and not maintained without sufficient scientific evidence,” except in the case of explicitly provisional measures.¹²³ Given the ambiguity within the term “science,” and the different ways that different nations validate and utilize scientific evidence in public decision making, as described above, we should not be surprised to see the parties disagreeing over the meaning of the terms “scientific principles” and “sufficient scientific evidence” and to see the court wrestling with these different positions.

Before turning to the detailed analysis of the substantive assumptions and procedural techniques that the DSB used to fill in these terms, it is useful to highlight one particular exchange in order to illustrate the ambiguity in the terms “scientific principles” and “sufficient scientific evidence,” and the depth of possible disagreement between nations over how these terms should be interpreted. In this particular exchange, the members disagreed not just about whether or not the bases for the EC’s measures conformed with “scientific principles” but they explicitly argued about the definition of “science” itself. Rarely is an attempt to conduct boundary work so explicit. The United States argued for a narrow and objective definition of “scientific,” and laid out a set of “universal[.]” properties that the Panel could check for.¹²⁴ The EC disagreed, calling the U.S. version of science a “caricature” of the scientific method, and arguing instead that there are many theories of science and the scientific method.¹²⁵

This philosophical exchange, while not central to the resolution of the dispute, highlights both the ambiguity within treaty provisions that call upon science to settle disputes, and the role that international adjudicatory bodies must play in filling in that ambiguity if they are to settle disputes. To the extent that international adjudicatory bodies can fill in this ambiguity with

¹²² A host of other important issues arose in this dispute, including the appropriate standard of review, the burden of proof, and the role of the precautionary principle. These issues have been addressed extensively by the literature and are outside the scope of this chapter.

¹²³ The debate is actually somewhat more complicated, relying on Articles 3.3, 5.1 and 5.2 as well. These articles provide that a Member may introduce a standard that is more strict than the relevant international standard if there is, *inter alia*, a scientific justification, and the standard complies with the risk assessment provisions laid out in Article 5 (Article 3.3). Article 5.2, in addition to requiring that risk assessments “take into account available scientific evidence,” spells out a number of additional requirements for risk assessments. The specific details of the interplay between these provisions is less important for the purposes of this chapter than the details of the Panel and AB’s reasoning about what constitutes science.

¹²⁴ *See id.* at 4.24 (stating that the U.S. believes that “‘scientific principles’ at a minimum [incorporates] the scientific method, which represent[s] those principles and processes universally regarded as necessary for scientific investigation, in particular procedures for: (i) the observation of phenomena in nature or under controlled conditions; (ii) the systematic classification of empirical data; (iii) the measurement of empirical quantities and for calculating probable errors and significant deviations; (iv) forming a hypothesis; (v) analysing experimental results using logic and mathematics; and (vi) many other related techniques and processes”).

¹²⁵ *Id.* at 4.25.

broadly legitimate general principles for the use of science in government decision making, they will have made a significant contribution to respecting sovereign differences in the use of science in public decision making, while constraining attempts to avoid international commitments by exploiting or manipulating scientific argumentation. *Hormones I* marks the WTO Dispute Settlement Body's first significant opportunity to make such a contribution.

The central structure of the Panel's inquiry into the core scientific concepts at play in the dispute was as follows. First, the Panel decided which of the documents the EC submitted in support of its standard were "scientific."¹²⁶ Once it had eliminated certain "non-scientific" submissions, the Panel evaluated the central findings of each submission, and compared them to the scientific conclusions reflected in the EC measures in dispute.¹²⁷ The Panel then evaluated whether these conclusions conformed to the conclusions of the scientific studies.¹²⁸ Concluding that they did not conform, the Panel then considered and rejected a number of additional arguments put forward by the EC about the scope of risks to be considered, and notably, the inherent limits of science.¹²⁹

Procedurally, the Panel was remarkably untethered by constraints in either the SPS Agreement, or the Dispute Settlement Understanding (DSU).¹³⁰ The Panel was free to form an Expert Review Group, pursuant to Article 13.2 of the DSU, which would be governed by a set of procedures laid out in an Appendix to the DSU.¹³¹ However, the Panel was also free to simply seek information from experts on an individual basis, as it deemed appropriate.¹³² This is ultimately what the Panel decided to do. Following consultation with the parties, the Panel appointed six experts to aid it in its evaluation of the scientific and technical aspects of the dispute.¹³³ The procedures by which the Panel selected and interacted with the appointed experts, although it involved the input of the parties, was almost entirely of judicial origin.¹³⁴ The Panel's procedures and the AB's use of due process norms to evaluate these procedures on appeal illustrates that a central part of the AB's filling in of science in this dispute involves assumptions about when scientists may be said to be interested in the outcome of the dispute and how to formulate notions of fairness for the participation and exclusion of potentially interested experts.

Both substantively and procedurally, *Hormones I* marks the first time the WTO DSB was forced to grapple with many of these issues. As a result, the *Hormones I* court had limited precedent to cite to and thus engaged in significant lawmaking throughout the course of the decision. The decision now stands as an important early case in SPS jurisprudence.

¹²⁶ Panel Report, *Hormones I*, at 8.109.

¹²⁷ *Id.* at 8.118-8.136

¹²⁸ *Id.* at 8.137-8.138.

¹²⁹ *See id.* at 8.139.

¹³⁰ The DSU lays out the procedures for resolving trade disputes within the WTO.

¹³¹ *See id.* at 6.1-6.5; DSU art. 13.2, and Appendix 4.

¹³² *See* DSU arts. 13.1, 13.2.

¹³³ *See* Panel Report, *Hormones I*, at 6.5-6.10.

¹³⁴ For a detailed description of the process that the Panel used to select its experts, see Joost Pauwelyn, *The Use of Experts in WTO Dispute Settlement*, 51 INT'L & COMP. L.Q. 325 (2002). These procedures became even more central to the dispute in *Hormones II*.

Delineating “Science”: Substantive Issues

In this section I examine the substantive assumptions that the *Hormones I* Panel and AB used in order to evaluate the parties’ competing claims, and complete its own boundary work – separating science from non-science. At various points in the dispute, the Panel and AB heard arguments about the nature of scientific inquiry and made substantive determinations about which claims were scientific and which were not. Specifically, the Panel and AB evaluated: 1) what types of documents count as scientific, 2) whether scientific sources in this area must be quantified, and 3) what degree of certitude is available via scientific inquiry. The remainder of this section examines each of these boundary drawing acts in turn and attempts to discern, where possible, what resources the DSB drew from in order to construct each boundary.

“Non-scientific” Reports

The most clear and fundamental piece of substantive boundary work performed by the Panel was its delineation of scientific from non-scientific sources put forward by the EC. In an attempt to demonstrate that it had based its standards on a risk assessment and that this risk assessment was based on scientific evidence, the EC submitted a series of reports and articles that it contended supported its standard.¹³⁵ The Panel, considering some of these documents to be scientific, proceeded to evaluate their contents.¹³⁶ However, before doing so it excluded a number of sources noting that “we consider that the non-scientific reports and opinions of the European Parliament and the EC Economic and Social Committee, which *evaluate* the scientific and other reports submitted to them, are not part of the *risk assessment* process” and thus not a sufficient basis for the EC standard.¹³⁷

It is unclear what basis the Panel used to determine that the excluded reports are “non-scientific.” If evaluating existing reports as opposed to conducting its own original research is the criterion, then it is unclear why other reports evaluating the science, such as the JECFA report, were included as scientific. Indeed, the EC challenged the Panel’s exclusion of some of these reports before the Appellate Body.¹³⁸ The AB took up the challenge only in passing, apparently declining to consider one of the challenged reports because “none of the original studies and evidence put before the Committee of Inquiry was submitted to the Panel.”¹³⁹ However, the implied requirement that a source will not be considered unless the original studies and evidence that supported the source are also before the committee does not appear to be a criterion that the Panel and AB consistently apply. Elsewhere in the report, responding to a request from the EC to include the original studies and other data on which the 1998 JECFA Report based its recommendations, the Panel wrote that “we did not consider it necessary to request the studies and data on which the 1988 JECFA Report is based since it was our

¹³⁵ See *id.* at 8.108.

¹³⁶ See *id.* at 8.118-8.134.

¹³⁷ See *id.* at 8.109 (emphasis in original).

¹³⁸ See Appellate Body Report, EC Measures Concerning Meat and Meat Products, WT/DS26/AB/R, WT/DS48/AB/R, 27 (1998) [hereinafter “*Hormones I* Appellate Body Report”].

¹³⁹ See *id.* at 207.

understanding that both parties involved in this dispute participated in the elaboration of this report.”¹⁴⁰

This preliminary effort at boundary-drawing on the part of the Panel and AB is not a model of clarity. The rationale for excluding these reports appears to either be an unsupported assertion that they are “non-scientific” or an unclear or inconsistently applied rule about reports that evaluate pre-existing scientific studies. Either way, the Panel has failed to articulate a generalizable principle underlying its decision.¹⁴¹ As a result, it is difficult to evaluate what the Panel used in this instance in order to fill in its understanding of what is and is not scientific.

Achievable Level of Certainty

The Panel’s reasoning on another substantive determination of how science works was much clearer. With respect to the level of certainty attainable by scientific inquiry, the EC argued that none of the studies referred to as part of a risk assessment “proves beyond doubt or concludes in an unqualified manner that the presence of residues of the hormones in dispute in meat or meat products present *no risk whatsoever*.”¹⁴² The EC seems to suggest that absolute proof is an attainable goal and that a Member may take protective measures based on the lack of absolute certainty. The United States, by contrast, argued that “science can never prove beyond doubt that there is no risk,” and that it “cannot eliminate the possibility that a potential risk may be found in the future.”¹⁴³

The Panel appeared to agree with the United States. Although its holding was based in part on the burden of proof,¹⁴⁴ the Panel went on to support its holding by noting that “according to scientists advising the Panel, science can never provide a certainty.”¹⁴⁵ This “residual risk,” therefore was a consequence of the inherent limitations of science and could not be assessed, as required by the Agreement.¹⁴⁶ The Panel here reasons from the substantive limits of science, making a determination about the nature of science, and then applying that characterization of the scientific enterprise to bar certain claims made by the EC.¹⁴⁷ In order to support its

¹⁴⁰ See Panel Report, *Hormones I*, at 8.11. The JECFA report was regularly cited by the Panel and explicitly fell within the realm of documents that the Panel considered to be “scientific.” See *id.* at 8.108. The stated rationale for not requesting the underlying documents – that both parties participated in the elaboration of the JECFA report is particularly odd, given that the Panel explained earlier in its report that “[t]he JECFA is composed of independent scientists who serve in their individual capacities as experts, not as representatives of their governments or organizations.” See *id.* at 2.14.

¹⁴¹ It is not my contention that the Panel or AB was wrong in excluding these reports. They may well have had a good reason for doing so. Indeed, at least one of the Panel’s experts appears to have taken the position that these reports, particularly the “Pimenta Report” were not scientific. The point, instead, is that whatever the Panel’s decision, it should give clear reasons.

¹⁴² Panel Report, *Hormones I*, at 8.149 (emphasis in original). See also *id.* at 4.45.

¹⁴³ *Id.* at 8.150.

¹⁴⁴ See *id.* at 8.151 (“the European Communities has . . . the burden of proving the existence of a risk assessment It is not, in this dispute, for the United States to prove that there is *no risk*.”).

¹⁴⁵ See *id.* at 8.152. The panel cited a number of the experts advising the panel. See, e.g. *id.* at 6.92 (“scientifically it would be impossible to ever test to a certainty.”).

¹⁴⁶ See *id.* at 8.149, 8.153.

¹⁴⁷ This widely recognized limitation of science is rooted in Hume’s problem of induction, and has been more recently emphasized in the philosophy of science of Karl Popper. See, e.g. KARL POPPER, IN SEARCH OF A

conclusion about the lack of absolute certainty in science, the Panel here relied in part on the experts advising the Panel.

The AB agreed with the Panel's substantive assessment of the nature of science and certainty, writing that "uncertainty . . . theoretically always remains since science can never provide absolute certainty that a given substance will not ever have adverse health effects."¹⁴⁸ This characterization of science is a clear example of the DSB filling in the space of science with substantive assertions about the way science works, with the result of excluding certain claims as inappropriate to ask of science.

Quantitative versus Qualitative Analysis

If the delineation of scientific from non-scientific sources was the Panel's clearest exercise of boundary work, the AB's primary exercise in defining science came when evaluating the acceptability of utilizing non-quantitative analyses in risk assessments. The Panel adopted a narrow view of risk assessment, characterizing it as a "scientific process aimed at establishing the scientific basis for the sanitary measure a Member intends to take."¹⁴⁹ The AB, in evaluating the Panel's characterization of risk assessment, played on the ambiguities in the Panel's use of the word "scientific." The AB wrote that "[t]o the extent that the Panel [used the word "scientific"] to refer to a process characterized by systematic, disciplined and objective enquiry and analysis, that is, a mode of studying and sorting out facts and opinions, the Panel's statement is unexceptionable."¹⁵⁰ Here, the AB includes a footnote citing a variety of dictionary definitions for the words "scientific" and "science." "However," the AB writes, "to the extent that the Panel purports to exclude from the scope of a risk assessment . . . all matters not susceptible of quantitative analysis by the empirical or experimental laboratory methods commonly associated with the physical sciences, we believe that the Panel is in error."¹⁵¹

It is important not to overstate the AB's position on this matter. The reasoning is largely based on interpretation of the SPS Agreement, which calls for Members to take into account available scientific evidence in their risk assessments, but also provides that Members should consider other non-scientific matters as well.¹⁵² However, the logic of the AB appears to concede that "scientific" could reasonably be understood to mean anything from "any methodological activity, discipline, or study," and "knowledge attained through study or practice" – two of the dictionary definitions it cited – to "quantitative analysis by the empirical or experimental laboratory methods."¹⁵³ Given that standards must be "based on scientific evidence," this would appear to leave open a broad, capacious reading of the treaty, and a much more narrow,

BETTER WORLD: LECTURES AND ESSAYS FROM THIRTY YEARS, 4 (1996) (arguing that scientific knowledge "consists in the search for truth", but that it "is not the search for certainty All human knowledge is fallible and therefore uncertain.").

¹⁴⁸ See Appellate Body Report, *Hormones I*, at 186.

¹⁴⁹ See *id.* at 8.107.

¹⁵⁰ See Appellate Body Report, *Hormones I*, at 187.

¹⁵¹ *Id.*

¹⁵² See SPS Agreement art. 5.2 ("In the assessment of risks, Members shall take into account available scientific evidence; relevant processes and production methods; relevant inspection, sampling and testing methods; prevalence of specific diseases or pests; existence of pest- or disease-free areas; relevant ecological and environmental conditions; and quarantine or other treatment.").

¹⁵³ See Appellate Body Report, *Hormones I*, at 187.

quantitative-physical-science-based reading. In other words, the ambiguity within the word “science” itself gives the AB a large amount of discretion in interpreting the science-based provisions of the Agreement.

The AB’s approach to this question might seem to suggest that, even though there are a multitude of dictionary definitions of science, the AB is taking the type of approach to delineating science that the United States has urged. That is, by seeking a dictionary definition of science to delineate science from non-science, the AB is looking to define and require submissions to conform to objectively definable universal qualities of science. However, in the central holding of the case the AB ultimately rested its holding not upon any particular definition of science – dictionary-based or otherwise. Instead, the AB made a social turn, delineating “science” not based on a particular philosophy or methodology, but on the respect of one’s colleagues.¹⁵⁴ The AB held that “governments may act in good faith on the basis of what, at a given time, may be a divergent opinion coming from *qualified and respected sources*.”¹⁵⁵ In short, a Panel’s task is not to evaluate for itself the merits of any purportedly scientific claims; instead, a Panel should attempt to evaluate if a given source is respected and qualified to speak to the issue at hand.

This central holding, further elaborated in *Hormones II*, suggests two things. First, it suggests that although the EC may have lost the battle – the AB held that their measures were not based on a proper risk assessment – it may have won the war. The standard elaborated by the AB, requiring analysis of whether or not a given source is qualified and respected, would seem to be consistent with the EC’s position that science is multifarious and diverse. Thus, although the EC was unable to locate a qualified and respected source on which to base its standards this time, the AB was unwilling to begin to create a substantive, universal definition of science that might serve as mold for the evaluation of future scientific claims. Second, it highlights the importance of the procedural issues that will guide future panels in determining whether a given source is qualified and respected. These determinations will no doubt be expert-mediated, making the procedures for selecting and consulting with experts assume a new centrality in future cases. As a result, the DSB must fill in science, not just with substantive findings about what science is and is not, but with procedural rules for how Panels should make this determination. Although these procedural aspects of evaluating scientific claims play a critical role in the *Hormones II* dispute, the initial signs of some of these principles of “scientific due process” began to emerge in the *Hormones I* dispute.

Due Process of Expertise: Procedural Issues

Just as the Panel and AB wrestled with a number of key substantive questions in the process of evaluating the parties’ scientific claims, they also decided a number of key procedural questions surrounding the admissibility of certain types of evidence, and the selection and consultation procedures for non-party experts. In general, these key questions were not specifically addressed in the text of the relevant treaties. Instead, the Panel and AB drew from

¹⁵⁴ Of course, there is a certain circularity to this approach. If, to determine whether a source is scientific, the panel must ascertain whether it is respected in the scientific community, the panel must first identify individuals who are in the “scientific community” in order to solicit their opinions. Evidently, the AB believes it will be easier to make this determination than for panels to weigh the substantive characteristics of “science” themselves. As discussed below, this gives a heightened importance to procedural issues, such as the selection of experts to advise the panel.

¹⁵⁵ *See id.* at 194 (emphasis added).

general principles of law, including notions of due process and “natural justice,” to fashion key procedural practices for evaluating conflicting scientific claims. Specifically, these procedural decisions included 1) the relevance of new evidence, uncovered subsequent to the setting of the standard, and 2) procedures for the selection of non-party experts to advise the panel, including conflict of interest issues.

“Based on” a Risk Assessment: The admissibility of post-hoc science

While the bulk of the procedural issues in the case surrounded the appointment and consultation of experts to advise the panel, one additional procedural challenge about the admissibility of evidence was raised by the EC on appeal. In evaluating the Article 5.1 requirement that SPS measures be “based on” a risk assessment, the Panel determined that this requirement had both substantive and procedural components.¹⁵⁶ Substantively, the Panel evaluated the scientific evidence submitted by the EC and compared it to the scientific conclusions underlying the measures at issue.¹⁵⁷ Procedurally, the Panel determined that not only must the scientific evidence submitted conform with those underlying the measure, but the party must demonstrate that it “actually took into account” this science – i.e. it must not have been considered in an attempt to construct a *post hoc* rationale for the measure at issue.¹⁵⁸ On this basis, the Panel effectively excluded from consideration any “new evidence” that the EC submitted.¹⁵⁹

The AB rejected the Panel’s interpretation, finding that it was an error of law to read a procedural requirement into Article 5.1.¹⁶⁰ It is important to note that the AB’s reasoning in overturning the Panel’s ruling on this issue was largely based on differing interpretations of the words “based on” in Article 5.1. Although the Panel’s interpretation was overturned, its reading was not unreasonable. Setting aside the textual argument about whether “based on” can be read to require that a party “actually took into account” the evidence, the requirement put in place by the Panel has some basis in the manner in which some countries treat the relationship between scientific evidence and regulation-setting in domestic administrative law. For example, it is a central facet of U.S. administrative law that when evaluating the decision of an agency, the decision be evaluated based on the record before the agency at the time, and the reasoning it actually employed.¹⁶¹ It appears that the Panel chose to interpret the textual ambiguity in line with this administrative law norm. The fact that the AB overturned this requirement suggests that the “record rule” of U.S. administrative review will not be read into the ambiguities surrounding the use of science in SPS litigation before the DSB. .

¹⁵⁶ Panel Report, *Hormones I*, at 8.112.

¹⁵⁷ See *id.* at 8.117. The substantive portion of this analysis was analyzed in the previous subsection.

¹⁵⁸ See *id.* at 8.113.

¹⁵⁹ See *id.* at 8.115.

¹⁶⁰ Appellate Body Report, *Hormones I*, at 189. Although my treatment of the different holdings of the Panel and AB on this point is brief as I am only attempting to distill out a limited point about how the DSB has filled in textual ambiguity in its examination of scientific evidence, a number of scholars have treated the Panel and AB’s readings of “based on” in much more detail. See, e.g. Walker, *supra* note 58; JACQUELINE PEEL, SCIENCE AND RISK REGULATION IN INTERNATIONAL LAW, 195-98 (2010).

¹⁶¹ See, e.g. *Citizens to Preserve Overton Park v. Volpe*, 401 U.S. 402 (1971). A number of scholars have analogized between DSB review under the SPS Agreement and domestic administrative review of agency decision-making. See, e.g. Walker, *supra* note 58; Winickoff et. al., *supra* note 48.

Expert Advice: Selecting experts and interpreting expert advice

Aside from the just-discussed holding on the role of new evidence, most of the procedural conflict in *Hormones I* surrounded the Panel's procedures for soliciting and interpreting expert advice. The DSU contains a number of provisions to guide Panels' fact finding, but ultimately Panels have wide latitude in the techniques that they choose to implement. Article 13 of the DSU provides that "[e]ach panel shall have the right to seek information and technical advice from any individual or body which it deems appropriate."¹⁶² Moreover, "[p]anel[s] may seek information from any relevant source and may consult experts to obtain their opinion on certain aspects of the matter."¹⁶³ However, Article 13.2 provides that "[w]ith respect to a factual issue concerning a scientific or other technical matter raised by a party to a dispute, a panel may request an advisory report in writing from an expert review group."¹⁶⁴ If a Panel elects to form such an expert review group, the rules for the establishment and procedures of such a group are given in an appendix to the DSU.¹⁶⁵ Finally Article 11.2 of the SPS Agreement provides that "[i]n a dispute under this Agreement involving scientific or technical issues, a panel should seek advice from experts chosen by the panel in consultation with the parties to the dispute."

The upshot of this framework is that panels *may* elect to form an expert review group with procedural constraints given in the DSU. However, if they elect not to they nonetheless have wide discretion to seek information from "any individual or body which it deems appropriate."¹⁶⁶ In *Hormones I*, the EC proposed that the panel seek expert advice in the form of an expert review group.¹⁶⁷ The Panel declined to do this and instead decided to seek advice from individual experts.¹⁶⁸ This decision left the Panel in uncharted territory. Having avoided the procedural constraints associated with an expert review group, the only clear constraint imposed on the Panel from the relevant treaty text was the requirement to seek advice from experts "chosen by the panel in consultation with the parties to the dispute."¹⁶⁹ In the face of substantial textual ambiguity, the Panel was free to effectively make up a critical process for soliciting scientific advice from whole cloth.¹⁷⁰

The Panel requested a list of potential names from the secretariats of the Codex Alimentarius Commission (Codex) and the International Agency for Research on Cancer

¹⁶² DSU Art. 13.

¹⁶³ *Id.* at 13.2.

¹⁶⁴ *Id.*

¹⁶⁵ *Id.* See also *id.* at Appendix 4.

¹⁶⁶ *Id.* at 13.1.

¹⁶⁷ Appellate Body Report, *Hormones I*, at 37.

¹⁶⁸ Panel Report, *Hormones I*, at 6.5.

¹⁶⁹ SPS Agreement, art. 11.2.

¹⁷⁰ For the leading piece discussing this process, see Theofanis Christoforou, *Settlement of Science-Based Trade Disputes in the WTO: A Critical Review of the Developing Case Law in the Face of Scientific Uncertainty*, 8 N.Y.U. Envtl. L.J. 622, 629-32 (2000) (describing the process of expert selection in the *Hormones I* dispute).

(IARC), two international organizations with expertise in the relevant areas.¹⁷¹ The parties were allowed to comment on the potential experts, and were invited to nominate one expert each, not necessarily from the lists.¹⁷² In the end, the Panel selected one expert nominated by each party, and three additional experts from the lists provided by the international organizations.¹⁷³ In consultation with the parties, the Panel composed questions which were submitted to the experts for written replies.¹⁷⁴ These replies were distributed to the parties to the dispute, and an oral hearing was held in which the parties, the Panel and the experts further discussed the issues raised in the questions.¹⁷⁵

The EC objected to the expert selection process on a number of grounds. First, they argued that because the EC's case involved criticizing the standards set by the Codex, it was inappropriate for the Panel to appoint experts from the Codex, who might be biased in favor of maintaining their organization's standards.¹⁷⁶ Second, they argued that one of the experts was a national of a party and had ties to industry. Finally, the EC argued that the panel failed to make an objective assessment of the facts by disregarding or distorting certain evidence.

Regarding the conflict of interest claim related to the Codex experts, the EC sought to draw on general principles of law by referring the AB to a case before the European Court of Human Rights which held that it was a violation of the accused's right to a fair hearing for the same person whose report was used as evidence against the accused to serve as an expert to advise the court.¹⁷⁷ The EC argued by analogy that appointing a Codex expert in this case would be inconsistent with the Panel's obligation to make a fair assessment of the matter.¹⁷⁸ The AB does not explicitly address this ground for appeal in its report, although it appears to have implicitly rejected it.¹⁷⁹

Similarly, the AB rejected the EC's second conflict of interest claim with almost as little analysis. The AB noted that the Panel appeared to have met its obligation to consult with the parties in its selection of the experts.¹⁸⁰ Beyond that, "there is no legal obstacle" to the Panel applying *ad hoc* rules that allow for nationals from the parties to the dispute. The AB's reasoning on these two points is rather opaque. However, the limited reasoning presented by the AB suggests that in the face of this ambiguity, it chose to employ something akin to the maxim that "that which is not prohibited is permitted." Given that capacious text, the AB appeared unwilling to impose additional procedural requirements.

¹⁷¹ Panel Report, *Hormones I*, at 6.6.

¹⁷² *Id.* at 6.7.

¹⁷³ *Id.* See also Christoforou, *Settlement of Science-Based Trade Disputes*, at 629-32.

¹⁷⁴ Panel Report, *Hormones I*, at 6.8.

¹⁷⁵ *Id.* at 6.9.

¹⁷⁶ Appellate Body Report, *Hormones I*, at 37; Christoforou, *supra* note 173 at 630.

¹⁷⁷ See *Bönish v. Austria*, 92 Eur. Ct. H.R. (ser. A) at 14-16 (1985); Christoforou, *supra* note 173 at 630-31, n. 30.

¹⁷⁸ See Christoforou, *supra* note 173 at 630-31, n. 30.

¹⁷⁹ See Appellate Body Report, *Hormones I*, at 149 ("We conclude . . . that in its selection and use of experts, the Panel has not acted inconsistently with Articles 11, 13.2 and Appendix 4 of the DSU and Article 11.2 of the *SPS Agreement*"); Christoforou, *supra* note 173 at 630-31, n. 30.

¹⁸⁰ Appellate Body Report, *Hormones I*, at 148.

The AB spent more time addressing the EC's claim that the Panel failed to make an objective assessment of the facts. Article 11 of the DSU provides that "a panel should make an objective assessment of the matter before it, including an objective assessment of the facts of the case and the applicability of and conformity with the relevant covered agreements." The AB interpreted this requirement to mean that the Panel has an obligation to consider the evidence presented to it, and to make factual findings on the basis of that evidence.¹⁸¹ The standard articulated by the AB, however, was particularly deferential to the Panel. In order to find that the Panel failed to make an objective assessment of the matter, the AB effectively required "not simply an error of judgment in the appreciation of evidence, but rather an egregious error that calls into question the good faith of a panel."¹⁸² The AB wrote that "[a] claim that a panel disregarded or distorted the evidence submitted to it is . . . a claim that the panel, to a greater or lesser degree, denied the party submitting the evidence fundamental fairness, or what in many jurisdictions is known as due process of law or natural justice."¹⁸³

In evaluating the EC's claims, then, the AB effectively used the highly ambiguous requirement to make an "objective assessment of the facts" as a stand-in for a set of due process principles relating to the evaluation of scientific evidence.¹⁸⁴ The AB analyzed a collection of misinterpretations and potential oversights which the EC claimed the Panel had made, and determined that each of them did not rise to the level of deliberate disregard of evidence, or gross negligence amounting to bad faith as claimed by the EC. With respect to the Panel's citation of some expert statements but not others, which the EC claims ignored important information, the AB held that "it is generally within the discretion of the Panel to decide which evidence it chooses to utilize in making findings."¹⁸⁵ With respect to a clear misinterpretation of one of the experts' attribution of a small risk to one of the hormones at issue, the AB again held that this misinterpretation did not amount to a deliberate disregard of evidence or gross negligence amounting to bad faith.¹⁸⁶ The AB also rejected additional claims that the Panel created an artificial distinction between specific and general information on the hormones so that it could ignore the general information, and misquoted the experts in ways that changed the meaning of their statements.¹⁸⁷

In short, although the AB read in a set of due process rights to the Panel's procedures for evaluating scientific evidence, the Panel's neglecting to cite potentially relevant expert opinions, and misunderstanding and misquoting other expert input does not necessarily violate these due process rights.

On the whole *Hormones I*, the DSB's first attempt to create procedures for evaluating scientific evidence in order to fill out the vague treaty text, paints the picture of a relatively

¹⁸¹ *Id.* at 133.

¹⁸² *Id.*

¹⁸³ *Id.*

¹⁸⁴ Effectively, the AB deferred to the factual findings of the panel, except where it found that these findings were in violation of due process rights. Although this would seem to simply articulate a deferential standard of review, the bounds of these due process limits to deference are important to understand as they were subsequently pushed to their limits in *Hormones II*.

¹⁸⁵ *Id.* at 135.

¹⁸⁶ *Id.* at 138.

¹⁸⁷ *Id.* at 141, 144.

unconstrained Panel. In that case, the AB appears to fill in the procedural aspects of evaluating scientific evidence by leaving the panel free to invent procedures for appointing experts with what appears to be very few constraints, and free to partake in a fact finding strategy that selectively addresses some expert claims to the exclusion of others. Although the AB suggests that some type of due process or “natural justice” principles may discipline these procedures somewhat, the bar is high and a collection of non-willful, and non-egregious mistakes on the part of the Panel does not reach that bar. Exactly how high that bar is would remain unclear until 10 years later when the *Hormones II* decision raised many of the same procedural challenges on slightly different facts and led to very different results.

b. Hormones II

Following the *Hormones I* decision the issue of trade in hormone treated beef between the US and EU continued to fester. This section will begin by briefly laying out the progression of events that led from the conclusion of the *Hormones I* dispute to the filing of the *Hormones II* dispute. It will then provide a detailed analysis of the ideas that both the Panel and the AB drew from in order to fill in science in this dispute. This analysis demonstrates that the *Hormones II* dispute represents a movement by the AB as the body has learned to deal with the complexity of expert-mediated adjudication in international law. This evolving jurisprudence, thus far underappreciated in the literature, reveals itself primarily through the fleshing out of a sociologically-informed technique for identifying legitimate sources of science, and an accompanying increase in attention to process concerns for the selection of experts.

Although the *Hormones II* dispute had a different procedural posture and raised a number of new questions about the application of the DSU in the post-suspension stage of a dispute (that is, after the DSU authorized the United States and Canada to suspend concessions to the EC based on the *Hormones I* decision), the subject matter of the dispute had much in common with *Hormones I*. In *Hormones II*, the EC complained that although it had removed the provisions that were found to be inconsistent with the SPS Agreement in *Hormones I*, the United States and Canada continued to apply their countervailing tariffs to EC goods.¹⁸⁸

Following the *Hormones I* decision, the Scientific Committee on Veterinary Measures relating to Public Health (SCVPH), an expert committee established under EC legislation, conducted a new risk assessment of the six hormones. The EC then adopted Directive 2003/74/EC in 2003, allegedly based on this new risk assessment.¹⁸⁹ This Directive, “taking into account the results of the risk assessment and all other available pertinent information,” maintained a permanent prohibition of meat containing oestradiol 17 β , and provisionally prohibited the other five hormones “while the Community seeks more complete scientific information....”

The EC claimed that this Directive fulfilled its obligations under the *Hormones I* dispute; beef treated with oestradiol 17 β was banned “based on” the SCVPH risk assessment, in line with Article 5.1, and the other five hormones were provisionally banned in line with Article 5.7’s allowances for provisional standards when scientific evidence is insufficient. In light of these

¹⁸⁸ On the basis of the findings of the *Hormones I* dispute, the United States and Canada suspended concessions to the EC equivalent to an amount of, respectively, 116.8 million U.S. Dollars and 11.3 million Canadian Dollars. Appellate Body Report, *United States – Continued Suspension of Obligations in the EC – Hormones Dispute*, ¶8, WT/DS320/AB/R (Oct. 16, 2008) [hereinafter “Hormones II”].

¹⁸⁹ See *id.* at ¶12.

newly justified bans, and the United States and Canada's continued suspension of concessions against the EC, the EC requested the establishment of a Panel to halt the suspension.¹⁹⁰

As with *Hormones I*, much of the dispute was highly technical, with the parties disagreeing strongly about the scientific evidence surrounding the safety of these hormones. The Panel evaluated the evidence of the carcinogenicity of oestradiol 17 β to evaluate whether it supported the EC's ban, and then explored the state of the science for the five other hormones, in order to evaluate the EC's claim that scientific evidence was insufficient to allow for the conduct of a risk assessment for these hormones. While the Panel and AB dealt with a number of substantive claims about the nature of science and scientific change, the most important issue in *Hormones II* was procedural, relating to the due process rights of the parties with respect to the Panel's consultation with experts.

Delineating "Science": Substantive Issues

In this section I examine the substantive assumptions that the *Hormones II* Panel and AB used in order to characterize "science" and "non-science" and in turn validate and invalidate various arguments. Again, in order to demonstrate the breadth of different approaches to science in regulatory policy that the DSB had to address, it is illustrative to note that in *Hormones II* the parties again clashed not just about their interpretation of the evidence, but about the very definition of science. For example, in its Appellee's Statement, the United States wrote:

the EC makes the rather remarkable claim that "Science is essentially about measuring past fact and hypothesising about the future, including postulating about future risk." The EC provides no support for this theory, nor could it. This statement completely mischaracterizes science and does not even acknowledge the scientific method. "Science is best defined as a careful, disciplined, logical search for knowledge about any and all aspects of the universe, obtained by examination of the best available evidence and always subject to correction and improvement upon discovery of better evidence." The scientific method is central to science and is about rigorously testing a hypothesis using experimentation rather than "measuring past fact" or "hypothesizing about the future." This statement, in which the EC reveals its fundamental misunderstanding of science, could explain much about the EC's approach in this dispute.¹⁹¹

Rarely is an attempt at boundary work so explicit. The United States is working very hard in this quotation to establish a boundary between science and non-science that is defined by a particular method, practiced by scientists. The U.S. depiction of science is reminiscent of both Popper's falsifiability, and Merton's "organized skepticism."¹⁹² It is not simply about measuring and hypothesizing but about rigorous testing and a constant assailing of claims. Attempts at disproof,

¹⁹⁰ *Id.*

¹⁹¹ Appellee's Statement, United States *Hormones II* at ¶74 (footnote omitted). The quoted material in the U.S. submission is from a now dead link to a University of California, Riverside physics professor's website (http://phyun5.ucr.edu/~wudka/Physics7/Notes_www/node5.html). The quote defining science comes originally from James Randi, the well-known magician and debunker of paranormal phenomena. Randi's original quote ends: "What's left is magic. And it doesn't work."

¹⁹² See Popper, *supra* note 30; Merton, *supra* note 31.

and evaluation to put certain claims outside the realm of accepted knowledge, are central to the United States' characterization of science.

In its evaluation of the scientific issues at play in the dispute, however, the AB does not explicitly engage with this debate about abstract qualities of scientific inquiry. Instead, the AB utilizes two distinctly social concepts in order to effectuate its boundary work. First, it applies, and further refines its “qualified and respected source” test for the acceptability of scientific evidence to serve as a basis for a risk assessment.¹⁹³ Second, it relies on a version of the Kuhnian concept of paradigm shifts in science to describe scientific change and help determine when previously sufficient evidence may become insufficient.

Criteria for Acceptability of Scientific Evidence

The first of these instances of boundary drawing on the part of the AB arose in the context of its review of the EC's permanent ban of oestradiol 17 β under Article 5.1. Article 5.1 provides that a member's sanitary and phytosanitary measures must be “based on an assessment, as appropriate to the circumstances, of the risks to human, animal or plant life or health.” This requirement is a specific application of Article 2.2 which, as discussed in *Hormones I*, requires that measures be “based on scientific principles and . . . not maintained without sufficient scientific evidence, except as provided for in [Article 5.7].”¹⁹⁴ When a measure is challenged under Article 5.1 a panel must review the risk assessment upon which the member's measure is based in order to determine whether the risk assessment is appropriate. Due to the delicate balance between sovereign regulatory authority and the Agreement's goals of encouraging harmonization and avoiding veiled protectionism, the AB has found that a member need not base its measures on mainstream scientific opinions, but may properly base an SPS measure on divergent or minority views.¹⁹⁵

Of course, in order to allow members to base their measures on divergent or minority views, the AB must have some way to separate minority scientific positions from non-science. In order to do this, the AB fleshed out its finding in *Hormones I* that a member may base its measures on an opinion coming from a “qualified and respected source.”¹⁹⁶ In doing so, the AB gave detailed instructions for future panels.¹⁹⁷ Specifically, the AB in *Hormones II* wrote that when reviewing the consistency of an SPS measure with Article 5.1, a panel must first identify the scientific basis upon which the SPS measure was adopted.¹⁹⁸ Having identified this basis, the panel must then verify that the scientific basis comes from a respected and qualified source.¹⁹⁹ The AB explained “[a]lthough the scientific basis need not represent the majority view within the scientific community, it must nevertheless have the necessary scientific and methodological rigour to be considered reputable science.”²⁰⁰ Further, the AB noted that “while the correctness

¹⁹³ See Appellate Body Report, *Hormones II* at ¶591.

¹⁹⁴ See Appellate Body Report, *Hormones I* at ¶180.

¹⁹⁵ See *id.* at ¶194.

¹⁹⁶ See *supra* note 155.

¹⁹⁷ See also, Peel, *supra* note 62 at 215-20.

¹⁹⁸ Appellate Body Report, *Hormones II* at ¶591.

¹⁹⁹ *Id.*

²⁰⁰ *Id.*

of the views need not have been accepted by the broader scientific community, the views must be considered to be legitimate science according to the standards of the relevant scientific community.”²⁰¹

The above standard of review marks the AB’s clearest attempt to-date to describe how panels should draw the boundary between science and non science in SPS disputes. In order to justify a standard under this review procedure, a member must be able to identify the scientific basis for its measure and convince a panel that this basis comes from a source that, even if not in the mainstream of scientific opinion, is “qualified and respected” and considered to be legitimate according to the standards of the relevant scientific community. In other words, instead of attempting to delineate science from non-science based on substantive characteristics of science, the panel should instead look within the network of scientists working within this field, and attempt to trace a web of “respect” that the AB imagines to bound the community of relevant knowledge-holders.²⁰²

Interestingly, the AB’s instructions for boundary drawing have less in common with the iconic descriptions of science given by Popper, Kuhn, and Merton,²⁰³ than they do with STS theorists who focus on science as a profession and an exercise in network-building.²⁰⁴ These theorists focus on the practices that scientists employ in order to garner trust and respect, and position themselves as authoritative holders of knowledge. For these “actor-network” theorists, science is made and delineated by scientists’ attempts to build networks connecting their objects of study, consumers of knowledge, sources of funding, and other relevant actors. To the extent

²⁰¹ *Id.*

²⁰² This approach shares some qualities with the approach to evaluating the admissibility of expert testimony in US courts under the rule of *Daubert v. Merrell Dow Pharms.*, 509 U.S. 579 (1993). The *Daubert* court moved away from the test of *Frye v. United States*, 293 F. 1013 (D.C. Cir, 1923) in which scientific evidence is inadmissible unless the technique is “generally accepted” by the relevant scientific community. Instead, the US Supreme Court laid out a non-exhaustive list of factors to consider in order to evaluate the admissibility of scientific evidence. This list includes degree of acceptance in the scientific community as one factor to consider, but is clear that a reliability assessment “does not require, although it does permit, explicit identification of a relevant scientific community and an express determination of a particular degree of acceptance within the community.” *Daubert*, 293 F. at 584 (quoting *United States v. Downing*, 753 F. 2d, 1224, 1238 (3d. Cir, 1985)). The AB’s fleshing out of the “qualified and respected” standard parallels in part the US Supreme Court’s move away from the *Frye* standard, effectively empowering minority viewpoints. However, the two standards are different in a number of important respects. For example, while the DSB’s test requires evaluating the degree of qualification and respect afforded to the source of the evidence, the *Daubert* standard is clear that evaluating the degree of acceptance in the scientific community is “not require[d].” *See id.* More importantly, the *Daubert* court went beyond the DSB’s social web of respect tracing test and laid out a number of additional specific factors that it took to be indicative of reliable scientific knowledge: whether there is a known or potential error rate and the existence and maintenance of standards controlling the technique’s operation, whether the theory has been subjected to peer review or publication, and whether it can be, or has been tested. *See id.* at 593-4. As such, although the two have some important similarities, they also have a number of critical differences. *See generally* Sheila Jasanoff, *Law’s Knowledge: Science for Justice in Legal Settings*, 95 AM. J. PUB. HEALTH S49 (2005) (describing and critiquing the *Daubert* standard).

²⁰³ *See supra* notes 30-32.

²⁰⁴ *See, e.g.* Callon, *supra* note 21; Latour, *supra* note 8; Marilyn Strathern, *Cutting the Network*, 2 J. ROYAL ANTHROPOLOGICAL INST. 517 (1996). I am not suggesting that the AB read or drew from these sources, only that, when faced with the need to draw a practical boundary, the AB’s strategy bears greater similarity to these approaches than other more objective criteria for conducting boundary work.

that an individual can establish herself as an “obligatory passage point,” that is, an individual whose claims must be addressed by anyone else proffering a claim in a given area, then that person has succeeded in building a sufficiently robust network to lay a claim to speak for science. The AB’s requirement that panels attempt to evaluate the “respect” of a given source within the relevant scientific community is, essentially, a requirement that future panels trace the network within a given community of scientists and attempt to determine where it ends.

This respect network, of course, does not mean that we should not expect to see evidence of the lasting impact of Popper, Kuhn, Merton, and other important scientific theorists in parties’ arguments and the DSB’s reasoning. This is because tracing a network of respect is essentially a hermeneutic exercise. In tracing a network, panels must attempt to understand the beliefs of actors in the scientific community and the meaning they ascribe to particular events and actions. It may be that scientists within the relevant community do not respect research which they do not understand to be falsifiable or to adhere to a set of Merton-like social norms. If this turns out to be the case within a given community then Popper or Merton’s boundary drawing criteria may still have a very real impact in panels’ future attempt to delineate science from non-science.

It is important to note that the AB’s essentially sociological boundary of science was indeed colored at parts by a degree of essentialist or substantive guidance about the qualities of science that panels should look for.²⁰⁵ Although the goal of panels is to determine whether a given source is qualified and respected, the AB appears to presuppose that qualified and respected sources will have “the necessary scientific and methodological rigour to be considered reputable science.”²⁰⁶ In other words, the AB understands “methodological rigour” to be one of the qualities that will determine whether a source is qualified and respected. This loosely-defined bounding concept appears to be somewhat of a nod to the U.S. perspective that a particular rigorous methodological approach is what delineates science from non-science. However, this limited substantive guidance is quite broad and does not appear to stand alone as a separate requirement.²⁰⁷ It instead falls within a panel’s task of determining qualification and respect. As a result, the primary guidance that the AB gives should be understood to be an exercise in looking to the social practices of scientists themselves.

Panels are not to embark on this exercise of network-tracing alone. Specifically, the AB notes that panels may seek the assistance of experts in order to identify the scientific basis of the challenged SPS measure and to determine whether this scientific basis comes from a qualified and respected source.²⁰⁸ As panels in SPS cases have generally appointed independent experts to aid the panel’s analysis of scientific evidence, this suggests that the makeup of these expert advisory groups are likely to take on an added importance, as this small number of experts is likely to be the panel’s primary window into the network of respect that bounds admissible science. Indeed, as will be discussed in detail below, the central points of contention in the *Hormones II* appeal were the procedures and protections in place in the Panel’s appointment and consultation with independent experts.

²⁰⁵ As with the *Daubert* standard. See *supra*, note 202.

²⁰⁶ Appellate Body Report, *Hormones II*, at ¶591.

²⁰⁷ This is evidenced by the fact that the AB clarifies what it means in the next sentence, writing “In other words . . . the views must be considered to be legitimate science according to the standard of the relevant scientific community.” See *id.*

²⁰⁸ *Id.* at ¶592.

Changes in Scientific Knowledge

The second way in which the AB substantively engaged in the act of characterizing and bounding science came with its description of scientific change in its analysis of Article 5.7. Article 5.7 provides that “in cases where relevant scientific evidence is insufficient, a Member may provisionally adopt sanitary or phytosanitary measures on the basis of available pertinent information. . . .” In the *Hormones II* dispute, the EC provisionally banned the import of meat from cattle treated with the five remaining hormones that were at issue in *Hormones I*.²⁰⁹ The provisional ban was based on the findings of the new studies and SCVPH opinion that the current state of knowledge did not allow a sufficient assessment of the risks.

In evaluating the EC’s claims, the Panel gave significant weight to the fact that risk assessments for the five substances had been previously carried out by international organizations. The JECFA had conducted risk assessments for all five of the hormones, and the Codex, an intergovernmental food safety body, had adopted standards for four of them, based on the JECFA assessments.²¹⁰ The Panel concluded that the existence of these standards and assessments “suggests that evidence has been at one point sufficient” to carry out a risk assessment.²¹¹

After having determined that scientific evidence was at one point sufficient, the question for the Panel became when and how scientific evidence that was previously deemed to be sufficient could become insufficient.²¹² The Panel placed the burden on the EC to produce evidence of some “sufficient change” in the scientific knowledge so that what was once sufficient to perform an adequate risk assessment had become insufficient.²¹³ The Panel was careful to note that not any change in the scientific knowledge would render previously sufficient scientific knowledge insufficient. Where existing standards established that there was once sufficient scientific evidence to conduct an appropriate risk assessment, “there must be a *critical*

²⁰⁹ Oestradiol 17 β was banned permanently and was dealt with under Article 5.1 as previously discussed. The other five provisionally banned hormones were testosterone, progesterone, trenbolone acetate, zeranol, and MGA.

²¹⁰ On the JECFA and the Codex and their relationship to the SPS Agreement, see Winickoff and Bushey, *supra* note 47.

²¹¹ See Appellate Body Report, *Hormones II*, at ¶649. For the four hormones that had Codex standards, the Panel made the even stronger finding that the existence of international standards meant “that there was sufficient evidence for JECFA to undertake appropriate risk assessments.” Panel Report, *Hormones II*, at ¶7.644.

²¹² Panel Report, *Hormones II*, at ¶7.620. The issue of when scientific evidence is sufficient or insufficient is wider than this, covering not just the issues of scientific change discussed here, but broader issues of how to define sufficiency. A detailed analysis of this issue is beyond the scope of this chapter, but in short, the AB explained that “the relevant scientific evidence will be considered ‘insufficient’ for purposes of Article 5.7 ‘if the body of available scientific evidence does not allow, in quantitative or qualitative terms, the performance of an adequate assessment of risks as required under Article 5.1 and as defined in Annex A to the *SPS Agreement*.’” Appellate Body Report, *Hormones II*, at ¶674 (quoting Appellate Body Report, *Japan – Apples*, ¶179.). The AB further clarified that this determination is also made by the “qualified and respected” test, described above: *Id.* at ¶677 (“Where there is, among other opinions, a qualified and respected scientific view that puts into question the relationship between the relevant scientific evidence and the conclusions in relation to risk, thereby not permitting the performance of a sufficiently objective assessment of risk on the basis of the existing scientific evidence, then a Member may adopt provisional measures under Article 5.7 on the basis of that qualified and respected view.”). See also Peel, *supra* note 62 at 232-39.

²¹³ *Id.* at ¶7.625.

mass of new evidence and/or information that calls into question the fundamental precepts of previous knowledge and evidence so as to make relevant, previously sufficient, evidence now insufficient.”²¹⁴ For the Panel, it would appear that the act of performing a risk assessment stabilizes the state of the science, which then requires a significant showing of new evidence to call this previous finding into question.

The EC challenged the Panel’s “critical mass” requirement on appeal, arguing that it imposed an excessively high qualitative and quantitative threshold.²¹⁵ The AB, in evaluating the Panel’s holding, made reference to various properties of the scientific endeavor in order to justify its eventual rejection of the “critical mass” standard. First, the AB wrote that it was “the nature of scientific inquiry” that it is always possible to conduct more research or obtain additional information.²¹⁶ As a result, the AB wrote, the possibility of conducting further research or analyzing additional information should not, in itself, mean that relevant scientific evidence is insufficient.²¹⁷ This holding parallels the AB’s findings regarding the impossibility of certitude and the insufficiency of “residual risk” to serve as a basis for measures under Article 5.1.²¹⁸

Second, the AB wrote, “science continuously evolves.”²¹⁹ In order to understand this evolution, the AB noted that it may be useful to think of the degree of scientific change as a spectrum.²²⁰ At one end of the spectrum is the incremental advance of science. At the other end lie “the more radical scientific changes that lead to a *paradigm shift*.”²²¹ The radical changes that bring about paradigm shifts are “not frequent.”²²²

The Panel’s critical mass requirement, the AB wrote, could be read as requiring new scientific evidence to lead to a paradigm shift.²²³ This, according to the AB, is too inflexible an approach.²²⁴ Instead, AB wrote that Members should be able to take a provisional measure on the basis of new evidence from a qualified and respected source that calls into question the relationship between the pre-existing body of scientific evidence and the conclusions regarding the risks.²²⁵

²¹⁴ *Id.* at ¶7.648 (emphasis in original).

²¹⁵ Appellate Body Report, *Hormones II*, at ¶699.

²¹⁶ *Id.* at ¶702.

²¹⁷ *Id.*

²¹⁸ See *supra* notes 142-148 and accompanying text.

²¹⁹ *Id.* at ¶703.

²²⁰ *Id.*

²²¹ *Id.* (emphasis added).

²²² *Id.*

²²³ *Id.* at ¶705. The AB also noted that the Panel’s explanation that in order to amount to a critical mass, new evidence must be “at the origin of a change in the understanding of a scientific issue,” also connotes a paradigm shift. *Id.* at ¶707.

²²⁴ *Id.*

²²⁵ *Id.* at ¶703.

In order to evaluate the Panel's critical mass requirement, the AB called upon the notion of a paradigm shift – the central element of Thomas Kuhn's description of scientific change.²²⁶ It appears that the AB's understanding of Kuhn's theory, a widely read and cited work in science studies,²²⁷ shaped its understanding and reading of the Panel's standard. The fact that the AB referenced paradigm shifts in a matter of fact way, without even citing Kuhn's work, suggests that the AB believes that this understanding of how science works is so widely understood and taken for granted that it need not introduce or explain the concept.²²⁸

It is important to note, however, that the AB's use of Kuhn's language for describing scientific change is not part of its holding in its interpretation of Article 5.7 the way that its "qualified and respected" requirement is part of its holding in its interpretation of Article 5.1. However, the central role that Kuhn's theories play in the AB's reasoning and justification of its holding suggest that these theories of science may be an important resource that the DSB is using to fill in science.

Due Process of Expertise: Procedural Issues

More important than any substantive evaluation of scientific evidence in the *Hormones II* dispute were the Panel's procedures for the selection of and consultation with independent experts. As in *Hormones I*, the Panel had the option to form an Expert Review Group, but instead decided to consult experts on an individual basis.²²⁹ Although the Panel consulted with the parties in the process of selecting these experts, it was unable to arrive at a list of experts that either party did not object to.²³⁰

As a result of this lack of agreement, the Panel formulated its own selection criteria. The Panel chose to exclude experts with close links to governmental authorities involved with regulating the hormones at issue, as well as those with close links to pharmaceutical companies or who engaged in public advocacy activities.²³¹ However, the Panel chose not to exclude *a priori* experts who had participated in the JECFA's risk assessments of the hormones at issue, reasoning that this would deprive the Panel of important expertise related to both the substantive

²²⁶ See Kuhn, *supra* note 32. It is of note that neither party mentioned the concept of a paradigm shift in its appellate submission or oral statement, This understanding of science appears to have come not from the parties, but from the AB itself.

²²⁷ As of January 2012, Google scholar shows more than fifty thousand works citing this book.

²²⁸ The use of Kuhn's language without referring to his actual work may also suggest that the AB is referring not to Kuhn's work directly, but instead to what Kuhn's work has come to mean in more popularized, non-academic circles. Indeed, it seems unlikely that the AB would read the Panel's "critical mass" requirement as requiring something akin to a full-fledged Kuhnian paradigm shift – e.g., the shift from the miasma to the germ theory of disease. See generally María Suárez & Walewska Lemoine, *From Internalism to Externalism: A study of academic resistance to new scientific findings*, 24 HIST. SCI. 383 (1986). The AB's use of Kuhn's terminology more likely indicates a sensitivity to the idea that scientific knowledge evolves over time and at times may undergo radical changes in its basic understanding of how natural processes occur. It may or may not also take on board aspects of Kuhn's description of the social dynamics that accompany his paradigm shifts. As a result, some caution should be exercised in inferring that the AB is using Kuhn's theories *per se* to fill in science.

²²⁹ Appellate Body Report, *Hormones II*, at ¶416.

²³⁰ In fact, out of the 35 experts that responded to the Panel's solicitation, only one was not objected to by one party or the other. *Id.* at ¶418.

²³¹ *Id.* at ¶419.

issues in the dispute, and the contents of the JECFA assessments.²³² The Panel also declined to exclude *a priori* experts who were current or past governmental employees unless a potential conflict of interest could reasonably be assumed from their official functions.²³³ Applying these selection criteria, the Panel chose six experts, two of whom had participated in the drafting and adoption of the JECFA reports for a number of the hormones at issue.²³⁴

The EC challenged the Panel's selection of experts who had participated in the adoption and drafting of the JECFA reports.²³⁵ Specifically, the EC argued that because the JECFA report is criticized by the EC Directive at issue in the dispute, co-authors of that report "cannot be considered to be independent and impartial" because they would be asked to review and criticize their own reports.²³⁶ The EC raised these complaints at the interim review stage before the Panel. The Panel responded that it was "puzzled" by the EC's claim that scientists that worked with JECFA could be deemed to be biased in evaluating the EC's claims and would be assumed to defend JECFA's work. The Panel reasoned that peer review is a central part of the scientific enterprise and that experts are used to considering and peer reviewing studies that go beyond or possibly contradict what they have published.²³⁷ Because of the nature of peer review, the Panel reasoned, these experts would "not likely feel any need to defend their own previous work results in the light of new, convincing evidence or techniques that put such previous work into doubt."²³⁸

The Panel may be understood to have filled in science with the idea that the Mertonian norms of disinterestedness and organized skepticism are fundamental aspects of science and that scientists as individuals are therefore particularly gifted in their ability to distance themselves from their own personal views.²³⁹

Following the Panel's rejection of its argument, the EC raised the issue on appeal. As in *Hormones I*, the expert selection challenge was rooted in due process considerations. Although the SPS Agreement and the DSU make no mention of due process, the AB, drawing from general principles of law, wrote that "the protection of due process is an essential feature of a rules-based system of adjudication."²⁴⁰ Noting that scientific experts "can have a significant bearing on a

²³² *Id.*

²³³ *Id.*

²³⁴ *Id.* at ¶420.

²³⁵ *Id.* at ¶426.

²³⁶ *Id.*

²³⁷ *Id.* at ¶¶421-22.

²³⁸ Panel Report, *Hormones II*, at ¶6.63.

²³⁹ This view of scientists tends to conflict with views of science that understand it as a socially embedded process. See, e.g. Donna Haraway, *Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective*, in SIMIANS, CYBORGS, AND WOMEN: THE REINVENTION OF NATURE (1991); Helga Nowotny et. al., *The Co-Evolution of Society and Science*, in RE-THINKING SCIENCE: KNOWLEDGE AND THE PUBLIC IN AN AGE OF UNCERTAINTY, 30-49 (2001). Additionally, the Panel's understanding may conflict somewhat with a Kuhnian understanding in which an outdated paradigm may linger long after it has begun to show signs of instability because senior scientists are unwilling to abandon the perspective that they have built so much of their understanding (and careers) upon. For Kuhn, paradigms shift not because senior scientists are persuaded of a new way, but because opponents to the new paradigm eventually die and leave the field open for others to shape.

²⁴⁰ Appellate Body Report, *Hormones II*, at ¶433.

panel's consideration of the evidence . . . especially in cases like this one involving highly complex scientific issues," the AB found that the protection of due process must apply to a panel's consultations with experts.²⁴¹ Specifically, the AB found that the important due process guarantees of fairness and impartiality in the decision-making process would not be respected where the decision-makers appoint and consult experts who are not independent or impartial.²⁴²

While conflict of interest requirements for experts are quite common in international science advisory bodies,²⁴³ these conflict of interest policies tend to focus on financial conflicts of interest, with much more limited attention to other potential conflicts. The claim that an expert would be conflicted by his previous participation in a separate risk assessment was novel in international adjudication.

The AB noted that the JECFA assessments for the hormones at issue "lie at the centre of the dispute."²⁴⁴ Various criticisms of the JECFA reports were pivotal to the EC's claims for all six hormones. In these circumstances, the AB wrote, the panel should have "closely scrutinized any institutional links the experts may have had with JECFA and objectively determined whether those links were likely to affect or give rise to justifiable doubts as to the experts' independence or impartiality."²⁴⁵ The two experts who had participated in the JECFA assessments were not just participants but had served as Chairman, Vice-Chairman, and Joint Rapporteur at various points in time. As such, the AB noted, they would be expected to have played a significant role in the JECFA discussions.²⁴⁶

In evaluating whether or not these two experts were conflicted, the AB rejected the Panel's reasoning about the nature of science and peer review being such that scientists are unproblematically able to review work that conflicts with their own. By contrast to the Panel's position, the AB wrote that it would expect a person who is regarded as an expert to "hold views, and even very strong views, on his or her particular areas of expertise."²⁴⁷ A person placed in a situation where they are asked to evaluate work that conflicts with their own will have a "natural inclination" to compare the assessments, and to "favour or defend" their own approach.²⁴⁸ As a result, the AB held, the appointment and consultations with these two experts compromised the adjudicative independence and impartiality of the Panel and violated the due process rights of the EC.²⁴⁹

The AB's holding may raise practical difficulties for future panels. The *Hormones II* panel noted that it had a limited pool of experts to draw from, and that excluding scientists who had participated in the JECFA process would significantly limit the supply of qualified experts to

²⁴¹ *Id.* at ¶436.

²⁴² *Id.*

²⁴³ See e.g., Decisions Taken with Respect to the Review of IPCC Processes and Procedures: Conflict of Interest Policy, Intergovernmental Panel on Climate Change, 34th Session, 18-19 November 2011, Kampala, Uganda.

²⁴⁴ Appellate Body Report, *Hormones II*, at ¶458.

²⁴⁵ *Id.*

²⁴⁶ *Id.* at ¶460.

²⁴⁷ *Id.* at ¶459.

²⁴⁸ *Id.* at ¶469.

²⁴⁹ *Id.* at ¶¶481-82.

advise the panel.²⁵⁰ The AB recognized these practical difficulties, but noted that “the practical difficulties that a panel may encounter in selecting experts cannot displace the need to ensure that the consultations with the experts respect the parties’ due process rights.”²⁵¹

The fact that the AB, while recognizing the practical difficulties wrought by its decision, and without a strong textual basis for extending due process rights in this way, nonetheless went forward and invalidated many of the Panel’s findings on these grounds is striking. The AB’s due process holding demonstrates that, when left to generate expert consultation procedures with minimal textual guidance, the AB believes that it is important to fill in science with some sort of due process norms to constrain the sources of information that the Panel is allowed to consider. Although the bounds of these due process norms were unclear following *Hormones I*, the AB gave them much more texture in *Hormones II* by specifying social/psychological assumptions about how scientists are likely to behave in the face of a potential conflict. The AB’s broad conflict of interest holding, imputing conflicts not just to financial conflicts, but to conflicts with one’s own prior work is perhaps the most striking procedural creation that the AB generated in order to fill in science in the *Hormones II* dispute.

c. Filling in Science in the WTO

The above in-depth analysis of the *Hormones I* and *Hormones II* disputes reveal a number of principles of scientific validation that the AB appears to have drawn from in order to fill in the “science-based” requirements of the SPS Agreement. Substantively, it appears well-settled that science cannot provide absolute certitude, and that therefore, lack of certainty shall not, in itself, be sufficient to justify action or inaction. Moreover, it appears that although there is significant ambiguity within the word “science,” the term should not be read narrowly to include only “quantitative analysis by the empirical or experimental laboratory methods commonly associated with the physical sciences.”²⁵²

The AB has also begun to develop a jurisprudence that provides for particular methods for separating scientific claims from non-scientific ones. Its “qualified and respected” test appears to take on board what is likely the limited competency that panels have with evaluating scientific claims on their face, and instead tasks panels with tracing webs of respect within the relevant scientific community. Moreover, change in the relevant science is understood within the framework of shifting paradigms.

Procedurally, conflict of interest issues are critical, implicating fundamental due process protections. Conflicts are understood broadly, covering not just financial conflicts, but also requests for a given expert to review or criticize work that he or she participated in producing. Although panels have broad discretion in the fact finding process, and may disregard or even misrepresent evidence without giving rise to a sufficiently egregious violation of a party’s due process rights, issues dealing with the appointment and consultations with experts appear to be central to the AB’s understanding of impartial adjudication.

The AB was not always perfect at explaining its reasoning. For example, the reasons for its exclusion of certain reports as “non-scientific” in the *Hormones I* dispute were not supported by sufficient justification. On the whole, however, the body has articulated its reasoning with a laudable degree of clarity. It stated its substantive assumptions about how science works, and

²⁵⁰ See *id.* at ¶419. See also Panel Report, *Hormones II*, at ¶7.87.

²⁵¹ See *id.* at ¶480.

²⁵² See Appellate Body Report, *Hormones I*, at 187.

laid out and justified a procedure for future panels to follow. Such clear reason-giving facilitates the disagreement, debates, and consensus-building that will allow for the slow accretion of more widely accepted and legitimate principles for legitimating and delimiting scientific claims in international law.

2. *The International Court of Justice*

Although the history of the ICJ is much longer than that of the WTO, it has less frequently had the occasion to consider cases that turn on points of scientific or technical disagreement. This is not surprising, due to both the jurisdictional limitations of the ICJ, and the fact that it was not formed, as the DSB was, with a view to enlisting science to settle disputes.²⁵³ Arguably, the ICJ's first opportunity to dig deeply into a technical conflict and develop procedures for doing this came in the relatively recent case *Pulp Mills on the River Uruguay*.²⁵⁴ This section explores the ways that the ICJ filled in science in the *Pulp Mills* case. The first subsection gives an overview of the case, and walks through the ways that the court addressed the scientific issues raised in the case. The second subsection evaluates the Court's treatment of these issues, criticizing both the Court's failure to explain its reasoning and its decision not to employ even the most minimal procedural devices for testing and evaluating the validity of scientific claims.

a. *Pulp Mills*

The *Pulp Mills* case, decided in April 2010, arose when Argentina instituted proceedings against Uruguay relating to pollution in the River Uruguay, which serves as the border between the two countries. Argentina alleged breaches in the water quality aspects of the Statute of the River Uruguay, a 1975 treaty between the two nations [hereinafter, 1975 Statute].²⁵⁵ Specifically, Argentina claimed that two pulp mills on the Uruguayan side of the river were polluting the river, and that Uruguay's domestic regulation of these mills did not regulate the effluent from these mills in line with the requirements of the treaty.²⁵⁶

²⁵³ The limits of comparing the WTO and the ICJ are discussed in more detail *supra* Part III. On the central role that science was imagined to have in settling disputes in the WTO, particularly SPS disputes, see David Wirth, *The Role of Science in the Uruguay Round and NAFTA Trade Disciplines*, 27 CORNELL INT'L L.J. 817 (1994); Vern Walker, *The Myth of Science as a 'Neutral Arbiter' for Triggering Precautions*, 26 B.C. INT'L & COMP. L. REV. 197 (2003); Jacqueline Peel, *Risk Regulation under the WTO SPS Agreement: Science as an International Normative Yardstick?* Jean Monnet Working Paper, New York Univ. (2004).

²⁵⁴ *Pulp Mills on the River Uruguay (Arg. v. Uru.)*, Judgment (Apr. 20, 2010) [hereinafter *Pulp Mills*]. Note that although the parties in the Gabčíkovo-Nagymaros dam case presented a large volume of technical argument, the court's ruling largely avoided any need to address the technical aspects of the case. See *Case Concerning the Gabčíkovo-Nagymaros Project (Hun. v. Slo)*, Judgment (Sept. 25, 1997); CAROLINE FOSTER, *SCIENCE AND THE PRECAUTIONARY PRINCIPLE IN INTERNATIONAL COURTS AND TRIBUNALS*, 37-41, 85-86 (2011).

²⁵⁵ *Id.* at ¶1. For broader overview of the case than I give here, see Daniel Kazhdan, *Precautionary Pulp: Pulp Mills and the Evolving Dispute between International Tribunals over the Reach of the Precautionary Principle*, 38 ECOL. L. QUARTERLY 527, 541-45 (2011); Cymie Payne, *Pulp Mills on the River Uruguay*, 105 AM. J. INT'L L. 94 (2011).

²⁵⁶ Specifically, Argentina claimed that Uruguay violated the treaty's requirements to: contribute to the "optimum and rational utilization of the river," *Pulp Mills* at ¶170 (quoting Article 1), "ensure that the management of the soil and woodland [does not] impair the regime of the river or the quality of its waters," *id.* at ¶178

For the purposes of examining the court’s evaluation of scientific evidence, the most relevant part of the case involves Argentina’s claim that Uruguay violated the 1975 Statute’s requirement that parties undertake to “protect and preserve the aquatic environment and, in particular, to prevent its pollution by prescribing appropriate rules and [adopting appropriate] measures in accordance with applicable international agreements.”²⁵⁷ A central part of the court’s evaluation of this issue was a pollutant-by-pollutant analysis of the impact of the discharges on the quality of the waters of the river.²⁵⁸ In its analysis of this issue, the court evaluated “a vast amount of factual and scientific material” submitted by the two parties.²⁵⁹

As a preliminary matter, the court attempted to lay out its approach to the role of expert evidence in the case. After pointing out that the Parties disagree on the authority and reliability of many of the studies and reports submitted to the court, the court lamented that many of the experts that appeared before the court appeared as Parties and not as expert witnesses, precluding what could have been useful opportunities for these experts to answer questions posed by the other party, as well as the court.²⁶⁰ In spite of questions raised about the “independence” of these experts, however, the court “d[id] not find it necessary in order to adjudicate the present case to enter into a general discussion on the relative merits, reliability and authority” of the work of these experts.²⁶¹ Instead, the court wrote that:

[D]espite the volume and complexity of the factual information submitted to it, it is the responsibility of the Court, after having given careful consideration to all the evidence placed before it by the Parties, to determine which facts must be considered relevant, assess their probative value, and to draw conclusions from them as appropriate.²⁶²

“Thus,” the court wrote, “the Court will make its own determination of the facts, on the basis of the evidence presented to it.”²⁶³

Applying this approach to its analysis of the impact of the discharges of different pollutants on the water quality of the river, the court noted that although it had before it interpretations of the data provided by experts appointed by the parties, “the Court will

(quoting Article 35), “co-ordinate . . . measures to avoid any change in the ecological balance,” *id.* at ¶183 (quoting Article 36), and “protect and preserve the aquatic environment” by “prevent[ing] pollution,” *id.* at ¶190 (quoting Article 41).

²⁵⁷ *Id.* at ¶190 (quoting Article 41). Other important aspects of the case not treated in this chapter include the court’s interpretation of the precautionary principle, *see* Kazhdan, *supra* note 255, and the requirement that parties conduct an environmental impact statement, *see* Cymie Payne, *Environmental Impact Assessment as a Duty under International Law: The International Court of Justice Judgment on Pulp Mills on the River Uruguay*, 3 EUR. J. OF RISK REGULATION 317 (2010).

²⁵⁸ *Pulp Mills* at ¶¶229-59.

²⁵⁹ *Id.* at ¶229.

²⁶⁰ *Id.* at ¶166-67.

²⁶¹ *Id.* at ¶ 168.

²⁶² *Id.*

²⁶³ *Id.*

principally weigh and evaluate the data, rather than the conflicting interpretations given to it by the Parties or the experts.”²⁶⁴

As will be discussed in more detail below, it is unclear exactly how the court weighed or evaluated the data or what reasoning it used to resolve situations with competing factual claims. The court’s general technique for presenting a technical disagreement and resolving it was to lay out the arguments made by each party, and then simply state a conclusion. For example, on the issue of whether the mills caused an algal bloom in February 2009, the court summarized Argentina’s argument in two sentences, stating that Argentina claims that effluent products were present in the bloom, and that Argentina presented satellite images showing the concentration of chlorophyll in the water.²⁶⁵ Next, the court turned to Uruguay’s argument, summarizing it in two sentences as well. Uruguay claimed that the bloom and chlorophyll concentrations were not caused by the mill, but were most likely caused by an increase in sewage from a festival upriver, and that the data submitted by Argentina actually prove that the mill did not add to the concentration of phosphorus in the river.²⁶⁶ Having laid out these two positions, the court simply writes “[i]t has not . . . been established to the satisfaction of the Court that the algal bloom . . . was caused by the nutrient discharges from the . . . mill.”²⁶⁷

Similarly, in evaluating the impact of emissions of phenolic substances, the court wrote that Argentina claimed that the mill’s emissions resulted in violations of the relevant standard for phenolic substances, and that before the mill opened, data did not show that the standard was exceeded.²⁶⁸ Uruguay argued that the standard had been exceeded regularly in the past and that therefore present violations could not be attributed to the mill.²⁶⁹ After summarizing data submitted by Uruguay tending to show past violations, the court noted that Argentina disagreed with this interpretation, and claimed that the standard has not previously been exceeded, and that the concentrations had increased by three to twenty times.²⁷⁰ In addressing this conflict, the court did not indicate why it found one account to be more persuasive than another. It simply wrote: “Based on the record, and the data presented by the Parties, the Court concludes that there is insufficient evidence to attribute the alleged increase in the level of concentrations of phenolic substances in the river to the operation of the . . . mill.”²⁷¹

After dispensing with Argentina’s claims with respect to dissolved oxygen, phosphorus, phenolic substances, nonylphenols, dioxins, and furans, the court concluded that there was “no conclusive evidence” on the record that the discharges of effluent from the mill had deleterious effects or caused harm to living resources or to the quality of the water or the ecological balance of the river.²⁷² As a result, even though Uruguay was found to have breached a number of

²⁶⁴ *Id.* at ¶236.

²⁶⁵ *Id.* at ¶ 248.

²⁶⁶ *Id.* at ¶ 249.

²⁶⁷ *Id.* at ¶ 250.

²⁶⁸ *Id.* at ¶ 251.

²⁶⁹ *Id.*

²⁷⁰ *Id.* at ¶¶ 251-53.

²⁷¹ *Id.* at ¶ 254.

²⁷² *Id.* at ¶ 265.

procedural obligations under the 1975 Statute, the court rejected Argentina’s request that the mill be dismantled, and denied Argentina’s claim for compensation.²⁷³

b. “A Missed Opportunity”

In the *Pulp Mills* case, the ICJ appears to have filled in science with its own opinions about how the evidence presented to it should be interpreted. If the court made any substantive assumptions about what science is or how science works (which it almost certainly did), these assumptions are rendered invisible by the court’s failure to explain its reasoning. Procedurally, the court’s bare assessment of the data failed to enlist even the most limited processes for testing and evaluating knowledge claims. As a result, the ICJ missed both an opportunity to engage with the scientific arguments in the controversy in a useful and transparent way, and a chance to explain its reasoning in evaluating scientific evidence in a way that could catalyze the progressive development of superior reasoning in the future.

The first of these two points was made pointedly in the Joint Dissenting Opinion of Judges Al-Khasawneh and Simma.²⁷⁴ In their dissenting opinion, judges Al-Khasawneh and Simma take the majority to task for utilizing a “deficient method of scientific fact finding,” and “miss[ing] a golden opportunity to demonstrate [the court’s] ability to approach scientifically complex disputes in a state-of-the-art manner.”²⁷⁵ The dissenting judges questioned the competence of judges to adequately assess and weigh complex scientific evidence,²⁷⁶ and wrote that the court should have utilized different procedures for evaluating the scientific arguments put forth by the parties. Specifically, the dissenting judges wrote that the court, instead of simply lamenting that the parties elected to present their scientific arguments through party experts, could have taken the initiative itself to arrange for the attendance of experts to give evidence in the proceedings.²⁷⁷ Better still, according to the dissent, the court could have appointed its own experts to give an opinion on the technical issues at hand.²⁷⁸ Article 50 of the Statute of the ICJ provides that “[t]he Court may, at any time, entrust any individual, body, bureau, commission, or other organization that it may select, with the task of carrying out an enquiry or giving an expert opinion.” The Rules of the ICJ further provide that parties shall have the opportunity to comment

²⁷³ *Id.* at ¶¶ 275-76.

²⁷⁴ *Id.* at ¶¶ 2-17 (dissenting opinion of judges Al-Khasawneh and Simma).

²⁷⁵ *Id.* at 1.

²⁷⁶ The dissent listed a number of issues in the case that it believed were beyond the capability of judges to understand:

To refer to only a few instances pertinent for our case, a court of justice cannot assess, without the assistance of experts, claims as to whether two or three-dimensional modelling is the best or even appropriate practice in evaluating the hydrodynamics of a river, or what role an Acoustic Doppler Current Profiler can play in such an evaluation. Nor is the Court, indeed any court save a specialized one, well-placed, without expert assistance, to consider the effects of the breakdown of nonylphenoethoxylates, the binding of sediments to phosphorus, the possible chain of causation which can lead to an algal bloom, or the implications of various substances for the health of various organisms which exist in the River Uruguay.

Id. at ¶ 4 (dissenting opinion of judges Al-Khasawneh and Simma).

²⁷⁷ *Id.* at ¶ 7 (dissenting opinion of judges Al-Khasawneh and Simma) (referring to Article 62 of the Rules of the ICJ: “The Court may, if necessary, arrange for the attendance of a witness or expert to give evidence in the proceedings”).

²⁷⁸ *Id.* at ¶ 8 (dissenting opinion of judges Al-Khasawneh and Simma).

on any expert opinion commissioned by the court.²⁷⁹ Because in a scientific case, “the insights to make sound legal decisions necessarily emanate from experts consulted by the Court,” the dissent concluded that the court should have consulted with experts.²⁸⁰

Although the act of consulting with experts was important for the dissent, not just any consultations with experts would suffice. To the extent that members of the court consulted with “experts fantômes” – undisclosed experts consulted without public knowledge or even knowledge of the parties – this was also problematic for the dissent.²⁸¹ Adopting such a practice, the dissent wrote, would deprive the court of the advantages of “transparency, openness, procedural fairness, and the ability for the Parties to comment upon or otherwise assist the Court in understanding the evidence before it.”²⁸² Because the court could have applied these procedures, but elected not to, the dissent characterized the case as a “missed opportunity” to deal with scientific evidence in a state-of-the-art manner.

The dissent was correct in its criticism of the majority. Without the opportunity to cross-examine expert claims or to appoint court experts to give opinions, the court left behind both of the major procedural innovations that legal systems have developed to assist non-expert judges in evaluating highly technical information. In the U.S. and other common law nations, cross examination is understood to be the primary manner in which facts are tested. The adversarial system is imagined to test knowledge claims before the court and sort the trustworthy from the questionable.²⁸³ In inquisitorial systems, by contrast, the court is much more actively involved in fact-finding. In these systems, it is not uncommon for a judge to be able to appoint a technical expert, or panel of experts, to be able to assist him or her with the more technical aspects of the case. In such systems, the legitimacy of the judge’s opinion on technical matters is underwritten not by an ability to cross examine, but from neutrality and competence of the judge and appointed experts. By refusing to take on board either of these two potentially legitimating procedures to test contested knowledge claims, the *Pulp Mills* majority hung its claim to competence on the bare assertion that “it is the responsibility of the Court . . . to determine which facts must be considered relevant, assess their probative value, and to draw conclusions from them as appropriate.”²⁸⁴ Given the court’s stubborn refusal to acknowledge its own institutional shortcomings, it is unclear that this responsibility is well-placed.²⁸⁵

In addition to missing the opportunity to utilize legitimizing procedures for testing and evaluating expert claims, the *Pulp Mills* majority missed a second and equally important opportunity that the dissent did not discuss: the opportunity to articulate its reasoning in coming to its conclusions. The court’s decision to fill in science with only its own *ipse dixit* claim to

²⁷⁹ ICJ Rule 50.

²⁸⁰ See *Pulp Mills* at ¶ 12 (dissenting opinion of judges Al-Khasawneh and Simma). The dissent even referred to the practices of the WTO as having contributed significantly to the development of best practices for evaluating technical evidence. *Id.* at ¶ 16 (dissenting opinion of judges Al-Khasawneh and Simma).

²⁸¹ See *id.* at ¶ 14 (dissenting opinion of judges Al-Khasawneh and Simma).

²⁸² *Id.*

²⁸³ See, e.g. SHEILA JASANOFF, *SCIENCE AT THE BAR: SCIENCE AND TECHNOLOGY IN AMERICAN LAW* (1995).

²⁸⁴ *Pulp Mills* at ¶ 168.

²⁸⁵ For an excellent discussion of comparative institutional competence in the context of a highly technical dispute in the WTO, see Gregory Shaffer, *A Structural Theory of WTO Dispute Settlement: Why Institutional Choice Lies at the Center of the GMO Case*, 41 N.Y.U. J. INT’L L. & POL 1 (2008).

cognitive authority fails to provide the onlooking public with any reason to believe that the court got it right. Moreover, although the ICJ is not bound by the rule of *stare decisis*, a reasoned decision is a useful resource for future adjudicators that are faced with similar issues. The *Pulp Mills* majority could have provided such a resource by better explaining its reasoning and articulating the principles it applied to conclude that Uruguay's arguments were more persuasive than Argentina's. Where the court's logic failed to persuade commentators, this would provide a service as well, providing grist for scholars and future judges to criticize and improve on what was done. Providing these materials is especially important in a legal system that has rarely dealt with highly scientific and technical issues. In just fifteen years, the WTO DSB has spurred a wealth of commentary and discussion on the appropriate mechanisms for evaluating conflicting scientific claims in that body.²⁸⁶ It is difficult to imagine the *Pulp Mills* decision serving such a useful catalyzing role.²⁸⁷

In sum, substantively, it is difficult to discern the resources that the *Pulp Mills* court drew from in order to validate and evaluate competing scientific claims. Procedurally, the *Pulp Mills* court refrained from adopting any procedures to structure the flow of scientific evidence to the court, or to aid the court in evaluating this evidence. In the process of so-doing, the *Pulp Mills* court missed a potentially valuable opportunity to help catalyze norm formation in this area by offering an opaque decision, bereft of any clues as to how the court came to its conclusions about contested factual claims.

III. VALIDATING SCIENCE: ADJUDICATORY PRACTICE AND THE POSSIBILITY FOR NORMATIVE DEVELOPMENT

In this section I draw from the analysis in Part II to compare the approaches of the WTO and ICJ. If, as I argue, the area of scientific validation in international adjudication is one that is ripe for norm building, then cross-regime dialogue and identification of best practices across regimes may be a helpful part of the norm development process. Moreover, a number of critical differences between the two institutions may help to illuminate some more fundamental limits to inter-regime norm building and allow us to understand the extent to which practices for validating knowledge claims in international adjudication are likely to remain fragmented across different regimes. This section consists of two parts. In the first, I examine the significant differences between the two bodies and explore possible sources for these differences, and the limits to cross-regime harmonization. In the second, I turn to the normative question of legitimacy-building and explore the differences in the two bodies with respect to their potential for norm catalysis.

²⁸⁶ Moreover, this commentary is not simply talk in an academic echo chamber. The Panel in the WTO's *EC – Biotech* case accepted a number of *amicus curiae* briefs including one from a group of STS scholars. See *EC Measures Affecting the Approval and Marketing of Biotech Products*, WT/DS291R Sept. 29, 2006 at 7.10. Although the Panel claimed not to have taken the amicus briefs into account, the Panel read the briefs, and they were argued about by both parties. The Winickoff et. al. article cited *supra* note 48 is a version of this amicus brief.

²⁸⁷ On the role of courts as catalysts for the formation and articulation of norms, see Joanne Scott & Susan Sturm, *Courts as Catalysts: Re-Thinking the Judicial Role in New Governance*, 13 COLUM. J. EUR. L. 565 (2007).

A. Approaches to Evaluating Scientific Argument

In this subsection I review the differences between the approaches the WTO and ICJ have taken to evaluating the validity of scientific argument. I begin by drawing from the analysis in Part II to review the significant differences between the way the two institutions have treated scientific argument. Then, I discuss possible reasons for these differences, looking to the different purposes of the two institutions, and the different posture of the two cases with respect to the party defending its own domestic regulation. This discussion is not designed to be a systematic comparison of the two in order to determine why, empirically, the two approaches differ. Rather, the purpose is to demonstrate that although some inter-regime learning and norm-development may be appropriate, there are limits to any such project of normalization.

As the analysis in Part II has demonstrated, there are significant differences between the ways that the WTO DSB and ICJ have filled in science in international adjudication. Substantively, the WTO jurisprudence on validating scientific claims has begun to construct specific boundaries of science, placing certain types of claims and methods on either side of this boundary. For example, the AB has held that absolute certainty is not attainable by scientific methods, drawing claims to such a level of certainty outside the boundaries of science. By contrast, the AB has drawn certain techniques within the boundaries of science, holding that “science” contains not only the quantitative analysis commonly associated with the physical sciences, but a broader set of qualitative methods as well. Moreover, when evaluating specific claims, the AB has instructed panels to fill in science with a dynamic and social understanding of the knowledge making process: drawing the boundaries of science based on a web of respect, and according validity to claims supported by any “qualified and respected source.” The AB also expects science to change over time, in both incremental ways, and with occasional paradigm shifts. The ICJ, by contrast, has not crafted substantive boundaries for science in its jurisprudence, and has instead simply announced which arguments it found most persuasive.

Procedurally, the contrast is just as striking. The WTO has focused on the process of expert consultation, apparently understanding this process to be so central to the administration of justice that it has called upon notions of due process to provide protections to the parties that were not provided for in the treaty itself. This due process of expertise has developed to encompass particular understandings of what motivates scientists, looking beyond simple financial conflicts to examine country of origin, and attachment to prior intellectual commitments. These due process norms were so central to the AB’s understanding of neutrality that the AB effectively threw out the *Hormones II* panel’s findings based on its nonconformity with these norms. The ICJ, by contrast, was much less proactive in crafting its procedures for the presentation of scientific information. In the situation in which all of the scientific evidence before the court had come from counsel, the *Pulp Mills* court stated that it “would have found it more useful” for the experts who appeared before the court as counsel to have appeared as expert witnesses.²⁸⁸ However, the court nonetheless proceeded on this basis, declining to formally appoint its own experts and instead apparently conferring with “experts fantômes.”

The procedural approaches of the two bodies were so different that were the WTO AB to evaluate, hypothetically, the ICJ’s decision in the manner of its review of a WTO panel decision, it would almost certainly have to conclude that the ICJ committed the same type of violation of due process of expertise that it held was committed by the *Hormones II* Panel. Consulting with

²⁸⁸ *Pulp Mills* at ¶167.

“experts fantômes” – as the dissent charged – would not be seen as an influx of useful and neutral knowledge into the adjudication. Instead, this opaque exercise of influence on the reasoning of the majority would almost certainly conflict with the due process of expertise rules that the WTO AB purported to draw from general principles of law.

Why then do we see such a significant difference between the approaches of the two bodies? One answer that must be rejected is that the treaties constituting the adjudicatory bodies themselves provide significant constraints. As discussed in Part II, although both the WTO Dispute Settlement Understanding and the Statute of the ICJ offer some guidance for the courts’ treatment of experts, neither could be said to discuss legal epistemologies in any meaningful way, or to significantly constrain the courts’ abilities to appoint and consult with experts. Both bodies had significant discretion to craft their own substantive and procedural treatments of science and only one has developed a significant substantive structure and a set of due process requirements.

A more likely reason stems from the courts’ relationship with the treaty they were interpreting in these two cases. In the *Hormones* disputes, the DSB was interpreting the SPS Agreement – a core WTO agreement that assigned a central role to science in ferreting out veiled protectionism. As a core agreement, the DSB was likely to have to interpret the SPS Agreement repeatedly over the lifespan of the WTO, and thus could be understood to provide a degree of consistency and predictability by laying out its interpretation of the agreement in some detail – including its treatment of scientific argument. The ICJ, by contrast, was likely reading the treaty in the *Pulp Mills* case in a one-off manner. Although that bilateral treaty also provided a role to science in settling disputes, it is less clear that it would pay off for the ICJ to put in the work to develop detailed rules regarding science and expertise. However, as the dissent pointed out, although the ICJ is unlikely to interpret this particular treaty again, it could nonetheless have benefited from projecting a degree of competence with scientific argumentation.

Another potentially important reason to expect differences is the different postures in which the respective treaties placed the defending parties. The SPS Agreement is clear that domestic regulation is preserved as a sovereign act.²⁸⁹ Although the act of regulating is disciplined somewhat by the SPS Agreement where regulations impact international trade, it is clear that unless the treaty provides otherwise, “[m]embers have the right to take [SPS] measures necessary for the protection of human, animal or plant life or health.”²⁹⁰ In the *Hormones* decisions, the challenged act was a sovereign act of domestic regulation, allegedly protecting its own citizens on its own soil. This is the very core of sovereign authority. By contrast, in *Pulp Mills*, the river marks a border between the two nations, and the treaty places a burden on each nation to regulate its activities so as to avoid harm to the other country. Here, the country bringing the case sought to regulate activity on foreign soil that it alleged was impacting its citizens. Although the treaty, and international law generally, establishes a principle of responsibility for trans-boundary harm caused by actions within a foreign country,²⁹¹ it is less clear in these

²⁸⁹ See SPS Agreement, Article 2.1 (“Members have the right to take sanitary and phytosanitary measures necessary for the protection of human, animal or plant life or health, provided that such measures are not inconsistent with the provisions of this Agreement.”). See also Annex A(5) (defining “appropriate level of sanitary or phytosanitary protection” as “The level of protection deemed appropriate by the Member establishing a sanitary or phytosanitary measure to protect human, animal or plant life or health within its territory”).

²⁹⁰ Article 2.1.

²⁹¹ See *Trail Smelter Arbitral Decision* (US v. Can.) (1941) 35 AM. J. INT’L L. 684.

situations whether the same degree of deference to domestic health-related regulation – and science validation practices – is appropriate.

The purpose of pointing out this difference is not to weigh in on how deference should be afforded in these two cases or to enter into a protracted discussion on precaution and the appropriate burden of proof in international law.²⁹² Rather the purpose is simply to point out that approaches to validating scientific claims in one international forum may not be appropriate in others. The WTO's "qualified and respected" test, which allows domestic regulation to be based on the opinion of anyone within a web of respect could not easily be ported over and applied in the *Pulp Mills* case. The fact that the SPS Agreement explicitly preserves nations' sovereign right to regulate differently from other countries in order to protect their own publics allows different understandings of science to coexist in SPS regulation, and different countries to rely on different, potentially conflicting interpretations of the scientific evidence.²⁹³ The qualified and respected test is a technique for filling in science capaciously that builds in a high degree of deference to the sovereign regulator. By contrast, in the *Pulp Mills* case it is not immediately clear which party, if either, deserves deference to its own interpretation of the evidence.²⁹⁴ Does Argentina deserve deference in a precautionary mode because it has alleged potentially irreversible environmental harm, or does Uruguay deserve deference because it is regulating activity on its own soil? The treaty and the posture of the case provide no obvious basis for deference to one party or the other's practices for validating science.

These points have been argued elsewhere, and are not the focus of my argument. They are highlighted here only to demonstrate the limits of cross-regime norm building. While some techniques for filling in science may conceivably span different regimes in a way that is not impacted by the particular posture of the case at issue – perhaps the unavailability of absolute proof through scientific methods – others will be specifically designed to fill in the conception of science that is necessary to do the legal work required by the treaty at issue.²⁹⁵ In light of these limits to normalization, we should be cautious about pushing the project of norm building too far in this area. Although some qualities of scientific validation may be so widely accepted so as to span regimes, we should nonetheless expect different international regimes to develop different

²⁹² See CAROLINE FOSTER, SCIENCE AND THE PRECAUTIONARY PRINCIPLE IN INTERNATIONAL COURTS AND TRIBUNALS (2011). On the precautionary principle in general, see Holly Doremus, *Precaution, Science and Learning While Doing*, 82 WASH. L. REV. 547 (2007).

²⁹³ See Walker, *supra* note 58 (arguing that the DSB under the SPS Agreement should defer to nations' specific science policies).

²⁹⁴ See Daniel Kazhdan, *Precautionary Pulp: Pulp Mills and the Evolving Dispute between International Tribunals over the Reach of the Precautionary Principle*, 38 ECOL. L. QUARTERLY 527, 541-45 (2011) (examining the application of the precautionary principle in the *Pulp Mills* case).

²⁹⁵ This is an example of what is known as "coproduction" in the STS literature. See *supra* note 47. The idiom of coproduction suggests that particular ways of knowing emerge in tandem with particular social orders. These ways of knowing and their concomitant social orderings underwrite each other's existence. In the SPS treaty, for example, the treaty calls upon "science" to do a particular type of legal work. This particular brand of science did not preexist, as the analysis in Part II demonstrates – it was filled in over time by the DSB. This particular regime-specific view of science was coproduced alongside the social/legal ordering it is used to impose. The two are in a sense inseparable and inexorably tied to the institution of the SPS Agreement.

regulatory epistemologies in order to address the qualities of the specific legal problems they face.²⁹⁶

One important question for the future of normative development in the area of scientific validation is the extent to which due-process norms of the type developed in the WTO are regime-specific or are of such a fundamental character that they begin to become more universally included in the fundamental requirements of justice for processes of expert consultation. The *Pulp Mills* dissent appeared to suggest that it was willing to expand due process norms in a way that may point toward future convergence. The dissent wrote that concerns for transparency, openness, procedural fairness, and the ability of parties to comment upon or otherwise assist the Court in understanding the evidence before it are not concerns based purely on abstract principle, but on the “good administration of justice.”²⁹⁷ The dissent wrote “[t]ransparency and procedural fairness are important because they require the Court to assume its overall duty for facilitating the production of evidence and to reach the best representation of the essential facts in the case, in order best to resolve a dispute.”²⁹⁸ These comments are reminiscent of the way that the WTO read a set of due process requirements into a treaty that was silent on the matter, and may point a way toward suffusing international adjudication generally with a set of due process norms in the area of evaluating expert evidence. Although this view was unable to garner a majority of the court, it suggests that there is at least some interest within the Court for building toward more universal due process norms for expert consultation.

B. Norm Catalysis

In this subsection I briefly compare the approaches of the two institutions with respect to the utility of their decisions in playing a catalyzing role in international law. This analysis looks beyond the impact of the decisions on the disputes themselves and instead examines the extent to which the decisions provide a useful resource to future adjudicators, or non-judicial actors seeking to resolve science-related disputes.

Looking at the performance of the WTO and the ICJ, the answer to the question of whether either body has produced a useful resource for possible future norm building must be that the WTO has indeed provided such a resource, while the ICJ has not. Whether or not one agrees with the substance of the AB’s conclusions, there is little room to argue that it has generally been sufficiently clear about its reasoning that it can be coherently critiqued. Indeed, such criticism and discussion has formed a cottage industry of international legal scholars who have continually subjected the AB’s reasoning to critical scrutiny.²⁹⁹ Such constant attention and

²⁹⁶ I have elsewhere used the term regulatory epistemology to refer to “embedded ways of knowing, standards of proof and credibility within regulatory cultures at different scales of governance.” Winickoff & Bushey, *supra* note 47. This term differs from “civic epistemologies” because of the lack of an obvious global culture to make such an epistemology a “civic” one.

²⁹⁷ *Pulp Mills* at ¶14.

²⁹⁸ *Id.*

²⁹⁹ See *supra* Part I.3; Walker, *supra* note 46; Winickoff et. al., *supra* note 46; Robert Howse, Democracy, Science, and Free Trade: Risk Regulation on Trial at the World Trade Organization, 98 MICH. L. REV. 2329 (2000); Joanne Scott, *On Kith and Kine (and Crustaceans): Trade and Environment in the EU and WTO*, in THE EU, THE WTO, AND THE NAFTA: TOWARDS A COMMON LAW OF INTERNATIONAL TRADE? (J.H.H. Weiler, ed.), 125 (2000).

constructive criticism can only aid in the development of law, both within the WTO and otherwise.

This criticism has even found its way back into the DSB. The Panel in the WTO's *EC – Biotech* case accepted a number of *amicus curiae* briefs including one from a group of STS scholars.³⁰⁰ These commentators were able to draw from transparently reasoned cases in the past in order to lay out specific recommendations for rethinking the review of science under the SPS Agreement. This flow of ideas between the courts and the academy is an important aspect of the progressive development of the law in this area and has been facilitated by the DSB's continued willingness to grapple with the difficult questions of epistemic validity in international adjudication.

The WTO DSB's close attention to these issues has drawn the attention of judges in other international institutions as well, potentially shaping the law outside the WTO through the persuasive force of carefully reasoned argument. The *Pulp Mills* dissent, described in Part II.B, referred specifically to the WTO in taking the majority to task for missing an opportunity to treat scientific argument in a state of the art manner. The *Pulp Mills* dissent, in criticizing the majority for declining to consult with outside experts, wrote that “[i]t is perhaps the World Trade Organization . . . which has contributed to the development of a best practice of readily consulting outside sources in order better to evaluate the evidence submitted to it.”³⁰¹ It is clear from both the level of detail of the reasoning, and the outside attention it has garnered, that the WTO's jurisprudence on the issue of validating scientific claims has become an important resource in spurring deliberation beyond the institution itself, potentially driving future norm formation.

By contrast, The ICJ's *Pulp Mills* decision is so opaque that it is difficult to know where to begin a discussion about how it could improve. Any meaningful comment on the evaluation of scientific evidence in ICJ would require some knowledge as to how that evidence was actually treated by the majority. Such information was not forthcoming. Although the dissent offers a number of important points and suggestions along these lines, the majority misses what could have been an important opportunity to both draw from and engage in the progressive development of a set of norms in this area.

Although opaque decisions may seem to shield the court from criticism by limiting post-facto commentators' ability to pick apart the court's reasoning and cast doubt on its scientific conclusions, such decisions in fact fail to provide a basis of broadly understood legitimacy for at least two reasons. First, by providing no reasoned pathway from the evidence presented to the court's conclusions, the court gives no affirmative reason for future readers to believe it should be trusted. In short, the court fails to establish any claim to competence. Second, even if the court did competently deal with the scientific issues at hand, an opaque decision provides no manner for commentators and future jurists to utilize the courts' reasoning, potentially building upon it and improving it in future decisions.

Given the early stage of development in this area, the relative lack of textual guidance in treaties that refer to capacious concepts like “science,” and the lack of uniformity in domestic practices in this area, international adjudicators have relatively few techniques at their disposal to

³⁰⁰ See *EC Measures Affecting the Approval and Marketing of Biotech Products*, WT/DS291R (Sept. 29, 2006) at 7.10. The Winickoff et. al. article, cited supra, note 48 is an expansion of this amicus brief.

³⁰¹ *Pulp Mills* at ¶16 (dissenting opinion of Judges Al-Khasawneh and Simma) (citing, *inter alia*, the *Hormones* disputes).

shore up the legitimacy of their decisions regarding the validation of scientific information. As such, international adjudicators, and international law generally would be well served by detailed and transparent explanations of courts' reasoning in this area. International adjudicative bodies stand to play an important role in the process of norm formation, if they would only provide the raw materials that such deliberation would require. In this respect, the ICJ has much to learn from the WTO.

IV. CONCLUSION

The purpose of this exposition has not been to analyze whether the WTO and the ICJ came to the "right" outcomes. Instead, the purpose of this analysis has been threefold. First and most importantly, it has identified the assumptions and procedures that the WTO DSB and ICJ have used to operationalize science in international disputes. In this respect it has provided a detailed analysis of the techniques these bodies have used to give meaning to "science" in their respective jurisprudences. It is hoped that the insights here might help guide potential practitioners and scholars of international law.

Second, it has utilized cross-regime comparison to suggest the utility of cross-regime learning and norm building. This same analysis, however, also serves to highlight the limits to such a project of cross-regime convergence, due to the institutional differences between international adjudicatory organizations.

Third, it has attempted to look, with a longer timeframe in mind, at the role international courts may be able to play in rendering science-based reasoning in cross-national disputes more legitimate over time. To this end, it has focused on the role of courts as catalysts of norm formation in an area that has not traditionally been understood to be ripe for normative development – the validation of scientific claims. Although this analysis is of import to scholars attempting to understand the development of practices for the validation of scientific argument in international adjudication, it is of particular importance for adjudicators seeking to project competence and neutrality to an international audience.

I am not the first to note that science does not unproblematically span cultures.³⁰² Where my analysis has pushed into new territory is by arguing that even though a universal regulatory science cannot be derived from properties of science itself, adjudicators may be able to build an approximation of such culture-spanning epistemic rules by recognizing the political groundedness of regulatory science and building widely legitimate norms of regulatory science in much the same way that norms are built in other areas of international law.

As such, this chapter is part of a larger project to reconceptualize the way we think about scientific argument in international adjudication; one that takes seriously the diversity of

³⁰² See, e.g. Jacqueline Peel, *Risk Regulation under the WTO SPS Agreement: Science as an International Normative Yardstick?* Jean Monnet Working Paper, New York Univ. (2004); Vern Walker, *The Myth of Science as a 'Neutral Arbiter' for Triggering Precautions*, 26 BC INT'L & COMP. L. REV. 197 (2003); Jeffery Atik, *Science and International Regulatory Convergence*, 17 NW J. INT'L L. & BUS. 736 (1996); Joanne Scott, *On Klth and Kine (and Crustaceans): Trade and Environment in the EU and WTO*, in THE EU, THE WTO, AND THE NAFTA: TOWARDS A COMMON LAW OF INTERNATIONAL TRADE? (J.H.H. Weiler, ed.), 125 (2000); David Winickoff et. al. *Adjudicating the GM Food Wars: Science, Risk, and Democracy in World Trade Law*, 30 YALE J. OF INT'L L. 82 (2005); Clark Miller, *Challenges in the Application of Science to Global Affairs: Contingency, Trust, and Moral Order*, in CHANGING THE ATMOSPHERE: EXPERT KNOWLEDGE AND ENVIRONMENTAL GOVERNANCE, 266 (2001).

domestic practices for validating scientific claims, and seeks to build legitimate practices for evaluating these claims in ways that do not unduly privilege one particular civic epistemology or one particular judge's view of science. It has focused on the role of courts, providing both a detailed look at the current state of affairs in international science-related adjudication and a limited recommendation for a way courts can contribute to the progressive development of norms in this area.

Although at an early stage, this cautious approach to norm-building will allow international adjudicators to harness a greater degree of legitimacy in their science-related reasoning. By recognizing the diverse array of practices for using and legitimating knowledge claims for public decision making instead of drawing from imagined universals, and reasoning about this issue in a clear and transparent way instead of relying on an opaque *ipse dixit*, international adjudicators have the potential to begin a conversation that could lead to a significant and beneficial process of convergence. Such a conversation cannot be had when critical players remain silent.

Chapter 2

Norms of Regulatory Science: A Role for Comparative Empirical Analysis in Building a Bottom-Up Approach to Science in International Law?

As the acceleration of international flows of goods, people, and technology continues to drive new social and environmental risks,³⁰³ international adjudicatory bodies will be faced with an increasing number of disputes involving complex scientific and technical claims.³⁰⁴ In order to address the rising tide of technical conflict in international adjudication, practitioners and scholars of international law must begin to be more attentive to the tools available for building consistent and legitimate practices for dealing with conflicts about science. An *ad hoc* and undertheorized approach of treating scientific evidence in the same way as other evidentiary conflicts simply will not do.³⁰⁵ This chapter seeks to address this coming challenge for international law by exploring the emergence of what I call a global administrative law of expertise.³⁰⁶ A global administrative law of expertise consists of the mechanisms, principles, practices and supporting social understandings that promote the legitimate validation and utilization of scientific claims in international law.

As with questions of expertise in domestic administrative law, a global administrative law of expertise addresses questions regarding standards of transparency and participation in the production and use of expert knowledge, along with requirements for reason-giving in regulatory bodies and procedures for oversight and review of the use of scientific claims in public decision making. In this chapter I suggest that although a number of emergent phenomena arise when evaluating scientific claims at the international level that do not arise in the same manner at the domestic level,³⁰⁷ the issue of evaluating scientific claims made before international adjudicatory bodies is not *sui generis*.³⁰⁸ Instead, it can and should be informed by the practice of domestic and regional courts in a process of norm building. Such an approach avoids essentializing arguments about the role of science in decision making and is consistent with the diversity of

³⁰³ See ULRICK BECK, *WORLD RISK SOCIETY* (1999).

³⁰⁴ *Pulp Mills on the River Uruguay* (Arg. v. Uru.), ¶ 9 (Apr. 20, 2010) (dissenting opinion of judges Al-Khasawneh and Simma) (observing that international disputes with complex scientific or technical aspects will become all the more common as the world will be faced with more environmental or other challenges) [hereinafter *Pulp Mills*]. The rate cases with these issues coming before international adjudicatory bodies has increased sharply in the last decade. See, e.g. *EC-Biotech* (2006), *EC-Continued Suspension of Obligations in the EC-Hormones Dispute* (2008), *Pulp Mills* (2010).

³⁰⁵ See Chapter 1 (criticizing the ICJ's approach to evaluating scientific evidence in the 2010 *Pulp Mills* case); *Pulp Mills* at ¶¶ 2, 12 (dissenting opinion of judges Al-Khasawneh and Simma) (same).

³⁰⁶ See generally Benedict Kingsbury et. al., *The Emergence of Global Administrative Law*, 68 L. & CONTEMP. PROBS. 15, 17 (2005) (defining global administrative law as “comprising the mechanisms, principles, practices, and supporting social understandings that promote or otherwise affect the accountability of global administrative bodies, in particular by ensuring they meet adequate standards of transparency, participation, reasoned decision, and legality, and by providing effective review of the rules and decisions they make”).

³⁰⁷ See Clark Miller, *Challenges in the Application of Science to Global Affairs: Contingency, Trust, and Moral Order* in CLARK MILLER AND PAUL EDWARDS (eds.) *CHANGING THE ATMOSPHERE: EXPERT KNOWLEDGE AND ENVIRONMENTAL GOVERNANCE*, 266, (2001).

³⁰⁸ I have elsewhere examined the substantive reasoning and procedural techniques utilized by international adjudicatory bodies in the process of evaluating competing expert claims. See Chapter 1.

approaches that exist for validating and using science in the world's myriad legal and political cultures.

Enlisting the aid of science to underwrite the legitimacy of government decision making is one of the central features of modern democratic societies.³⁰⁹ As political decision makers are held accountable for their choices by attentive and observing publics, the broadly recognized epistemic authority of science has become an indispensable resource for justifying government actions.³¹⁰ Critically, however, practices for validating scientific claims for use in public decision making are not universal.³¹¹ Instead, governments rely on the authority of specific institutions and practices in order to meet the cultural expectations of their polities about how knowledge should be made authoritative.³¹² For example, in the United States, technical decision making operates against the backdrop of a highly adversarial legal system that demands visible and transparent expert bodies, stocked with highly credentialed individuals.³¹³ Truth, in this system, emerges from aggressive testing in a competitive forum.³¹⁴ Germany, by contrast, is marked by a

³⁰⁹ YARON EZRAHI, *THE DESCENT OF ICHARUS: SCIENCE AND THE TRANSFORMATION OF CONTEMPORARY DEMOCRACY*, Harvard Univ. Press (1990). See also THEODORE PORTER, *TRUST IN NUMBERS: THE PURSUIT OF OBJECTIVITY IN SCIENCE AND PUBLIC LIFE*, 8 (1995).

³¹⁰ Processes of public reason-giving and transparency are central to the legitimacy of the modern democratic state. See Loren King, *Deliberation, Legitimacy, and Multilateral Democracy*, 16 *GOVERNANCE* 23, 24 (2003) (“A part of exercising legitimate democratic authority is the public act of justification to those over whom authoritative decisions are binding.”); Jerry Mashaw, *Reasoned Administration: The European Union, the United States, and the Project of Democratic Governance*, 76 *GEO. WASH. L. REV.* 99, 101 (2007) (demonstrating that reason-giving is a prominent part of both the American and European administrative states, and arguing that its most fundamental function is “the creation of authentic democratic governance”). See also AMY GUTMANN AND DENNIS THOMPSON, *DEMOCRACY AND DISAGREEMENT*, 95 (1996) (“publicity is one of the purifying elements of politics”) (quoting Woodrow Wilson). Regulating agencies in the United States are required to “articulate a satisfactory explanation for [their] action[s], including a ‘rational connection between the facts found and the choice made.’” *Motor Veh. Mfrs. Ass’n v. State Farm Ins.*, 463 U.S. 29 (1983) (quoting *Burlington Truck Lines, Inc. v. United States*, 371 U.S. 156, 168 (1962)). Scientific support for agency decisions is a necessary part of this exercise in public justification. See, e.g. *United States v. Nova Scotia Food Prods. Corp.*, 568 F.2d 240, 252 (2d Cir. 1977) (holding that when the basis for a proposed rule is a scientific decision, the scientific material which is believed to support the rule should be available for public notice and comment); *Portland Cement Ass’n v. Ruckelshaus*, 486 F.2d 375, 393 (D.C. Cir. 1973) (“It is not consonant with the purpose of a rulemaking proceeding to promulgate rules on the basis of inadequate data, or on data that, [in] critical degree, is known only to the agency.”). Some commentators, however, have observed that an over-reliance on science can be counterproductive to regulatory decision making. See Wendy Wagner, *Congress, Science, and Environmental Policy*, 1999 *U. ILL. L. REV.* 181; Daniel Sarewitz, *How Science Makes Environmental Controversies Worse*, 7 *ENVTL. SCI. & POL.* 385 (2004).

³¹¹ SHEILA JASANOFF, *DESIGNS ON NATURE: SCIENCE AND DEMOCRACY IN EUROPE AND THE UNITED STATES*, Princeton Univ. Press (2005). See further discussion, *infra*, note 43. See also Clark Miller, *Democratization, International Knowledge Institutions, and Global Governance*, 20 *GOVERNANCE* 325 (2007); Sheila Jasanoff, *Acceptable Evidence in a Pluralistic Society*, in *ACCEPTABLE EVIDENCE: SCIENCE AND VALUES IN RISK MANAGEMENT* 29 (Mayo and Hollander, eds. 1991) (comparing the role of experts in public decision making in Britain and the United States).

³¹² See Jasanoff, *supra* note 311, at 249.

³¹³ *Id.* at 267-9.

³¹⁴ *Id.* at 262.

stronger role for public deliberative rationality.³¹⁵ In the German public sphere, expert committees are balanced according to a tacit understanding of the interests and positions considered essential to fact-finding and deliberation on a given issue.³¹⁶ Public trust in this system is rooted more in collective reasoning between representatives of authoritative institutions than it is in the spotlight of public inquiry or the merit of distinguished credentials.³¹⁷

As different governments and political cultures have evolved around the globe, shared domestic understandings of how to legitimize scientific claims in policy-making contexts have become crucial aspects of national political cultures. These “civic epistemologies” allow domestic policy makers to secure the trustworthiness and credibility of specific institutions and help to render the uses of political power consistent with nation-specific norms of legitimate governance.³¹⁸

At the international level, however, no such broadly shared cultural understandings exist (yet).³¹⁹ Given the sizeable differences in the methods deployed for validating scientific claims by public officials in Germany and the United States – two industrialized Western democracies – this is hardly surprising.³²⁰ As a result, it has proven difficult to call upon shared cross-national sources of legitimate expertise for use in international law and policy. Even where international agreement does exist about the legitimacy of certain institutions or the truth of certain factual claims, in the absence of a law or widely recognized principle or norm undergirding this legitimacy, there is a strong incentive to opportunistically abandon one’s views of science for the purpose of justifying politically unpopular positions.³²¹

This chapter explores one way that broadly shared commitments about the legitimacy of particular practices for using science in public decision making may be concretized and rendered

³¹⁵ *Id.* at 264.

³¹⁶ *Id.* at 262.

³¹⁷ *Id.* at 269 (“it is as if, having constituted expert groups as perfect microcosms of relevant rationality, German politics sees no particular reason for a further layer of transparency, allowing irrelevant outsiders to look in.”). In Britain, by contrast, the same study demonstrated that public knowledge tended to be legitimated more through individual experts, whose demonstrated long-term commitment to the public good engendered a high degree of public trust. *Id.* at 268 (“It is as if the expert’s function [in Britain] is to discern the public’s needs and to define the public good as much as it is to provide appropriate technical knowledge and skills for resolving the matter at hand.”). See also ELIZABETH FISHER, RISK REGULATION AND ADMINISTRATIVE CONSTITUTIONALISM (2007) (describing different practices for risk regulations as different models of administrative constitutionalism and comparing a “rational-instrumental” model with a “deliberative-constitutive” model).

³¹⁸ See Jasanoff, *supra* note 311; Miller, *supra* note 311.

³¹⁹ Clark Miller, *Challenges in the Application of Science to Global Affairs: Contingency, Trust, and Moral Order* in CLARK MILLER AND PAUL EDWARDS (eds.) CHANGING THE ATMOSPHERE: EXPERT KNOWLEDGE AND ENVIRONMENTAL GOVERNANCE, 266 (2001).

³²⁰ The development of such mechanisms is important to international law as a means to constrain the disingenuous reliance on assertions of scientific uncertainty to justify self-serving positions. See Miller, *supra* note 311 at 350-51 (“[t]oday, in global society, the practice of powerful actors justifying their decisions through ritualistic reference to matters of fact is ubiquitous and pervasive.”).

³²¹ For example, it may be easier to argue that climate change does not exist than to argue that it does exist, we are contributing to it, and we don’t care enough about its (distributional) impacts to take the steps necessary to curb its impacts. If the factual argument can be made, it is likely more politically palatable than the normative one. In the face of scientific uncertainty, of course, the choice is not quite so binary.

more “binding” in international law. In so doing, these explicitly recognized norms may act as an important constraint on nations’ ability to opportunistically abandon their view of the science in the face of political convenience.³²² This is dangerous territory for international law. As international legal systems work to limit and structure the methods by which scientific facts are included or excluded from consideration they risk forming procedures that silence the legitimate differences between states, thus undermining its own legitimacy. International legal regimes must tread lightly here. As a result, I propose a novel way to contribute to the process of developing science-based decision making procedures in international law: norm building through comparative analysis.³²³

The central point is that broadly shared international understandings on this point cannot be deduced from asserted universal properties of science or even science-policy interactions. Instead, the legitimacy of practices for validating scientific claims is context- and institution-specific. In domestic contexts, the political legitimacy of science-backed claims is rooted in nation-specific institutionalized practices for validating such claims. As relatively less developed international courts grapple with developing practices appropriate to their own particular purpose and positionality with respect to global publics, they need not work from a blank slate. To the extent that there exist broadly-shared commonalities across governmental practices, these practices should be understood to represent groundnorms – broadly shared expectations held by global publics for the legitimate validation of knowledge claims in governance processes. Although there may be reasons to deviate from these groundnorms due to emergent issues that arise in the international context,³²⁴ there are nonetheless likely to be significant legitimacy benefits to international courts from identifying and drawing from these groundnorms when formulating procedures for validating knowledge claims in international adjudication.³²⁵ As a result, this chapter argues that international adjudicators should begin to conceptualize the process of validating scientific claims in a partially inductive rather than a purely deductive manner. That is, attention to political convergence and a concomitant program or norm building

³²² In this sense, my goal can be understood in part as enhancing deliberation through enshrining or developing norms of justification for science-related decisions. Although process constraints requiring reason giving and justification in domestic administrative law are commonplace, *see supra note 2*, the possibility of enhancing international relations and international law with enhanced deliberative strategies has only recently drawn the attention of scholars. *See, e.g.,* Thomas Risse, “Let’s Argue!”: *Communicative Action in World Politics*, 54 INT’L ORG. 1 (2000); Thomas Gehring & Eva Ruffing, *When Arguments Prevail Over Power: The CITES Procedure for the Listing of Endangered Species*, 8 GLOBAL ENVTL. POLS. 123 (2008). *See also* Robert Howse, *Democracy, Science, and Free Trade: Risk Regulation on Trial at the World Trade Organization*, 98 MICH. L. REV. 2329, 2330 (2000) (arguing that the science-based requirements in the SPS Agreement serve to enhance the quality of rational democratic deliberation about risk and its control).

³²³ Of course, norm building is not novel in itself. International law evolves in part through a process of norm building between nations. What is novel is the application of this approach to practices for validating science – an area that has often been seen as not appropriate for this approach because it has wrongly been assumed that practices for validating scientific claims were universal and unrelated to specific political/legal contexts.

³²⁴ For example, a number of international science advisory and standard setting bodies have developed procedures to ensure a degree of geographic representation among their experts to involve experts from different parts of the world. *See, e.g.,* Winickoff & Bushey, *supra note 47*.

³²⁵ These benefits are likely to be heightened when these courts are tasked with reviewing domestic regulatory decisions.

are likely to generate more broadly legitimate practices than *a priori* or universal assumptions about science in policy making.

In light of this insight, this study performs a comparative analysis of the US and EU administrative law of expertise in order to identify possible groundnorms for validating scientific claims. The US and EU are two developed legal systems that are often held out as taking very different approaches to using science in public decision making.³²⁶ These differences are highlighted (perhaps artificially), by public and protracted trade disputes surrounding hormone-treated beef and genetically modified foods.³²⁷ As a result, comparing these divergent systems can be expected to highlight both key differences in the types of concerns that arise in the administrative law of expertise, and the types of shared principles that may grow to become broadly shared norms.

The chapter proceeds as follows. Part I addresses the benefits of developing a global administrative law of expertise by highlighting the indeterminacy of treaty text addressing science-based decision making, and describing a number of problems with proceeding in an unguided, *ad hoc* manner. Part II explains why a comparative empirical approach may be a fruitful resource for developing such global norms. It introduces social science research demonstrating the diversity of ways in which national political cultures make and deploy knowledge claims in public decision making, and argues that international regulators and adjudicators must be attentive to these domestic differences. Part III introduces the expertise-related administrative law of the United States and European Union, focusing in particular on rules relating to transparency and participation. Part IV compares the two, identifying points of commonality and discussing their potential role in building a global administrative law of expertise. Part V concludes.

I. THE BENEFITS OF A GLOBAL ADMINISTRATIVE LAW OF EXPERTISE

In this section I explain the benefits that are likely to arise from developing a global administrative law of expertise. I first show that international adjudicators have been called upon to examine an increasing number of technical and scientific conflicts in recent years, and that they are often forced to do so with little to no guidance from treaty text. Given this lack of guidance, I argue that these adjudicators are left to either take an *ad hoc* approach, or to draw from general principles of law and the practice of other national and international courts. I then lay out the disadvantages of taking an *ad hoc* approach, and the benefits of building a global administrative law of expertise, concluding that as different adjudicators begin to thoughtfully examine the practices of other jurisdictions as they craft their own practices, a beneficial global administrative law of expertise may begin to emerge.

³²⁶ See, e.g. Jasanoff, *supra* note 311; Jacqueline Peel, *Risk Regulation under the WTO SPS Agreement: Science as an International Normative Yardstick?* Jean Monnet Working Paper, New York Univ. (2004); Shobita Parthasarathy, *Whose knowledge? What values? The comparative politics of patenting life forms in the United States and Europe*, 44 POL'Y SCI (2011); Joseph Murphy et. al. *Regulatory Standards for Environmental Risks: Understanding the US-European Union Conflict over Genetically Modified Crops*, 36 SOC. STUDS. SCI. 113 (2006).

³²⁷ See *EC-Hormones* (1998), *EC-Biotech* (2006), *EC-Continued Suspension of Obligations in the EC-Hormones Dispute* (2008)

The last century has seen unprecedented technological development and a rapid acceleration in international flows of people, goods, pollution and information. This accelerating current of exchange and technological change has brought with it a host of transboundary problems, from air and water pollution transport, to climate change, to ensuring the safety of imported food. In response to these problems the international community has produced a wide array of environment- and health-related agreements. Within these agreements the idea that responses to environmental and health risks should be based on scientific evidence is virtually uniform.³²⁸ However, in spite of the prevalence of requirements that decisions be “based on science,” treaty texts are generally very sparse in explaining what this means or how it should look.

Where a regime provides for dispute settlement, the treaty that constitutes the adjudicatory body may contain some guidance for substantive or procedural techniques for evaluating scientific claims, such as laying out standards of review or procedures for expert consultations.³²⁹ However, the treaties constituting international adjudicatory bodies are generally extremely general in this area, giving little to no meaningful guidance on these issues.³³⁰ In the face of this limited guidance, adjudicatory bodies have often treated these terms as if their meanings were self-evident, universal, or otherwise unproblematic. For example, in the 1997 *EC-Hormones* dispute the WTO Appellate Body utilized a set of dictionary definitions of “scientific” and “science” in order to evaluate the Panel’s understanding of the risk assessment process.³³¹

Although courts may treat the definition of terms like “science,” “scientific evidence,” and “scientific principles” as unproblematic and universal, the terms are in fact highly ambiguous with meanings varying from discipline to discipline and from country to country. As I will lay out in more detail in the Part II, “science” in regulatory contexts refers to a social institution whose relationship to public decision making varies over time, place, and issue area.³³² This diversity of practice should be understood as evidence that the meanings of these

³²⁸ See, e.g., The Montreal Protocol on Substances that Deplete the Ozone Layer (“measures taken to protect the ozone layer from depletion should be based on relevant scientific knowledge”), the United Nations Framework Convention on Climate Change (“steps required to understand and address climate change will be environmentally, socially and economically most effective if they are based on relevant scientific, technical and economic considerations...”), The WTO Agreement on the Application of Sanitary and Phytosanitary Measures (“Members shall ensure that any sanitary or phytosanitary measure is...based on scientific principles and is not maintained without sufficient scientific evidence,” except in cases where such evidence is insufficient).

³²⁹ See, e.g. The WTO Dispute Settlement Understanding, Arts. 11, 13 (providing that panels must make an “objective assessment of the facts” and that panels “may seek information from any relevant source and may consult experts to obtain their opinion on certain aspects of the matter”).

³³⁰ See *id.*

³³¹ Appellate Body Report, *Hormones I*, at 187. For a detailed examination of the practices that these international adjudicatory bodies use when evaluating scientific claims, see Chapter 1.

³³² In the modern regulatory state, this relationship is often governed though an administrative law of expertise. These laws vary between jurisdictions in ways that reflect the varying “civic epistemologies” across jurisdictions – that is, practices for validating knowledge claims that are understood as legitimate by a given polity. In the domestic context this relationship is enacted through a body of statutes and judicial decisions regulating administrative actors, and setting forth the rules for challenging these actions.

terms are not universal or self-evident, and are thus not amenable to resolution through dictionary definitions or deduction from purported universal properties of science.

Given this ambiguity, courts evaluating science-related arguments are left with a choice. They can either draw from their own understanding of how science, regulation, and judicial review ought to be structured and invent procedures and principles for evaluating scientific evidence out of whole cloth, or they can realize that evaluating scientific evidence for use in public decision making is not a *sui generis* problem and inform their approach with the principles and procedures adopted by the courts and legislatures of other jurisdictions.³³³

There are a number of problems with taking an *ad hoc* approach. First, taking an *ad hoc* approach may lead to inconsistency and unpredictability. One of the central benefits of building an international legal regime instead of seeking a negotiated political resolution to conflicts stems from the rule of law values of avoiding arbitrary or unpredictable outcomes.³³⁴ When the resolution of scientific controversies rest with the intuitions of a set of judges about how to evaluate scientific evidence, the process may become wildly unpredictable. Second, to the extent that repeated engagement with evaluating scientific evidence provide opportunities for learning and critique from the legal academy, leading to better procedures in the future, courts that take an *ad hoc* approach forego these benefits.³³⁵ Finally, drawing from existing procedures may yield benefits in the form of increased legitimacy of decisions and buy-in from affected parties. Where a court, in evaluating scientific evidence, has drawn from the accepted domestic practices of parties to the conflict, the broadly shared practices of nations, or the accepted practices of other international bodies, this may help to legitimate a decision against a given party.³³⁶ Where broadly shared groundnorms exist, practices that, without justification, deviate from those that global publics have come to expect may raise legitimacy problems.³³⁷ Given the legitimacy and “democratic deficit” critiques that have increasingly been lodged against “unaccountable”

³³³ It is important to note the limited options available to international courts. International science advisory bodies and international standard setting bodies are generally entities explicitly negotiated with an eye to constituting a body that is suited to addressing the legitimacy concerns that are likely to arise in the specific international area in which they operate (which is not to say that they all do so successfully). Courts, by contrast, do not have recourse to the types of negotiated, credibility-enhancing structures and procedures that bodies like the IPCC have. See Ann Keller, *Credibility and Relevance in Environmental Policy: Measuring Strategies and Performance among Science Assessment Organizations*, 20 J. PUB. ADMIN. RES. & THEORY 357 (2010). See also Winickoff & Bushey *supra* note 47.

³³⁴ Richard Fallon has usefully described the rule of law ideal, writing: “Perfectly realized, the Rule of Law would be rule (i) in accordance with the originally intended and understood meaning of the directives of legitimate, democratically-accountable lawmaking authorities, (ii) cast in the form of intelligible rules binding on citizens, governmental officials, and judges alike, (iii) as identified and elucidated in an interpretive process guided by publicly accessible norms and characterized by reason-giving, and (iv) consistent with legitimate public purposes and sound, shared principles of political morality.” Richard Fallon, “*The Rule of Law*” as a Concept in Constitutional Discourse, 97 COLUM. L. REV. 1, 38 (1997). On the rule of law in international affairs, see generally JOHN MURPHY, *THE UNITED STATES AND THE RULE OF LAW IN INTERNATIONAL AFFAIRS* (2004).

³³⁵ See Chapter 1 (leveling such a criticism at the ICJ’s *Pulp Mills* decision).

³³⁶ This discussion of legitimacy will be taken up in more detail *supra* Part II in my discussion of why a comparative approach may be beneficial.

³³⁷ Of course, there may be legitimate reasons to deviate from these practices in particular circumstances. See *infra* Part IV.

international institutions,³³⁸ opportunities to seize on more broadly legitimate and acceptable behavior should not be passed up lightly.

As a result of these reasons, international adjudicators looking to craft broadly legitimate practices for evaluating scientific claims should not interpret scientific evidence as though they were islands, addressing *sui generis* problems that are entirely unique to a particular case, or their particular institution.³³⁹ While some problems certainly are unique to particular institutions, international adjudicators are likely to benefit from participating in process of slowly accreting a global administrative law of expertise – drawing from past practices, and acting as an exemplar for future courts that might find themselves faced with similar issues.

II. DEVELOPING A GLOBAL ADMINISTRATIVE LAW OF EXPERTISE: CIVIC EPISTEMOLOGIES AND COMPARATIVE ANALYSIS

In this section I describe in more detail the nature and importance of polity-specific practices for validating knowledge claims for the purpose of public decision making, and explore the implications for international legal theory. I begin by laying out some of the most important social scientific findings describing these “civic epistemologies” and their role in domestic policy making. Concluding that these practices are fundamental to securing the legitimacy of knowledge claims to specific populations, I then explore what this diversity of perspectives means for the use of science in international law. Importantly, instead of concluding that the contingency of these practices means that cautious harmonization through the accretion of a global administrative law of expertise is inappropriate or impossible, I argue that careful attention to national differences and similarities may lead to growing consensus on the legitimate use of science in international law. After recognizing the possibility of such convergence, I argue that increased attention to expertise-related global administrative law issues would be beneficial and that attention to emerging norms and principles of scientific validation may be help to speed this formation. I conclude by orienting my arguments in the existing literature and identifying specific contributions that this chapter makes to ongoing discussions in a number of areas of international law.

A. Civic Epistemologies and the Legitimacy of Domestic Risk Governance

The rapid pace of scientific and technological advance since the industrial revolution has driven extraordinary advances in standards of living and sizeable economic growth.³⁴⁰ Slower to

³³⁸ See, e.g. Daniel Esty, *The World Trade Organization's Legitimacy Crisis*, 1 WORLD TRADE REV. 1 (2002); KATI KULOVESI, *THE WTO DISPUTE SETTLEMENT SYSTEM: CHALLENGES OF THE ENVIRONMENT, LEGITIMACY, AND FRAGMENTATION* (2011).

³³⁹ Of course, absolute uniformity is not desirable either. There are legitimate reasons to take different approaches in different cases and different institutions.

³⁴⁰ Of course, the costs and benefits of these advances have not been evenly distributed. Just as wealth has concentrated in parts of the world and driven resource extraction and environmental damage in others, see, e.g., U. Thara Srinivasan et. al., *The Debt of Nations and the Distribution of Ecological Impacts from Human Activities*, 105 PROC. NAT'L ACAD. SCI. U.S. 1768 (2008), so too has the globalization of science created centers of science, where data from around the world is collected, processed, and made into knowledge. See BRUNO LATOUR, *SCIENCE IN ACTION*, 215-58 (1987) (describing “centers of calculation”

develop, but now nearly as commonplace is the sentiment that these technological advances have also produced significant risks.³⁴¹ Substances like asbestos, thalidomide, and DDT persist in the public consciousness not as life-improving technological breakthroughs but as emblems of scientific progress gone awry. Similarly our lexicon has swelled with metonyms for the same phenomenon, often without requiring further explanation: Love Canal, Bhopal, Chernobyl (now Fukushima?), Valdez (now Deepwater Horizon?).

As public awareness and concern has grown about the safety of food, drugs, consumer goods, and the environment, citizens have come to expect an increased governmental role in understanding, managing, and distributing these risks.³⁴² Governments across the globe have responded to these demands by generating a host of laws, regulations and institutions designed to address these risks. Given the significant benefits that have flowed from scientific and technological advances, the solutions put forth from this expansion of social regulation have not necessarily take the form of broad and potentially economically disastrous bans on potentially harmful substances or activities.³⁴³ As a result, these new agencies were tasked with undertaking ever more predictive analyses of the risks and benefits of regulation in order to set these standards and justify them to the onlooking public.³⁴⁴ Given the significant economic and environmental impact of these regulations, this practice of standard setting quickly became a site of fierce conflict.

where accumulated knowledge accumulates and is rendered “combinable” with other accumulated knowledge), *See also* Bruno Latour, *Drawing Things Together*, in REPRESENTATION IN SCIENTIFIC PRACTICE, 19, 59 (Michael Lynch & Steve Woolgar eds. 1990) (further discussing centers of calculation).

³⁴¹ *See* ULRICH BECK, *THE RISK SOCIETY: TOWARDS A NEW MODERNITY* (1992); ULRICH BECK, *WORLD RISK SOCIETY* (1999).

³⁴² *See* Beck, *supra* note 26 (Risk Society) at 19-50. The rise of the environmental movement in the last half century is illustrative of these new demands on government. The relatively newer environmental justice movement has arguably taken on board the permanence of some of the risks attendant to modern technologies and has focused less on the removal of risks and more on the distribution of risks *See e.g.*, Sheila Foster, *Justice from the Ground Up: Distributive Inequities, Grassroots Resistance, and the Transformative Politics of the Environmental Justice Movement*, 86 CAL. L. REV. 775 (1998); Rachel Morello-Frosch et. al., *Environmental Justice and Southern California’s “Riskscape”: The Distribution of Air Toxics Exposure and Health Risks among Diverse Communities*, 36 URB. AFF. REV. 4 (2001).

³⁴³ Many laws that did articulate a zero risk or zero pollution standard quickly revealed that the costs associated with meeting such a goal would not be politically palatable. For example, in the United States the “Delaney Clause” amendment to the Food Drug and Cosmetics Act of 1938 barred Food and Drug Administration approval of food additives or food colorings that are “found to induce cancer when ingested by man or animal.” 21 U.S.C. § 348(c)(3)(A). As more and more substances have been shown to cause cancer when laboratory animals are exposed to very large doses, and technologies have advanced to be able to detect very small amounts of a substance, the world of substances that would be banned by a literal reading of the Delaney Clause swelled. Frank Cross, *The Consequences of Consensus: Dangerous Compromises of the Food Quality Protection Act*, 75 WASH. U. L. Q. 1155 (1997). As a result, Congress passed the Food Quality Protection Act in 1996, removing pesticide residues on food from the reach of the Clause. *See* 21 U.S.C. § 346a(b)(2)(A) (1997). *See also* Charles Blank, *The Delaney Clause: Technical Naivete and Scientific Advocacy in the Formulation of Public Health Policies*, 62 CAL. L. REV. 1084 (1974); Margaret Gilhooley, *Plain Meaning, Absurd Results and the Legislative Purpose: The Interpretation of the Delaney Clause*, 40 ADMIN. L. REV. 267 (1988). Similarly, the 1972 Clean Water Act established the goal of zero discharge of pollutants into the nation’s waterways by 1985. 33 U.S.C. § 1251(a)(1). Not only has this goal not been attained, but it is clear that an EPA rulemaking attempting to strictly achieve this goal, even 25 years later, would be dead on arrival.

³⁴⁴ *See* SHEILA JASANOFF, *THE FIFTH BRANCH: SCIENCE ADVISERS AS POLICYMAKERS*, 3 (1990).

In order to make these governance decisions and justify them before their polities (and in some cases judiciaries), lawmakers and regulatory agencies have consistently sought to draw upon the legitimacy and perceived neutrality of science. In the face of high-stakes decisions and complex technoscientific phenomena, however, making “science based” decisions has not proven as easy as drawing facts from a universally accepted compendium of scientific knowledge.³⁴⁵ Instead, conflicts about the veracity of scientific claims have increasingly gone hand-in-hand with political and regulatory decisions.³⁴⁶ The “knowledge politics” attendant to science-related decision making has become a central feature of the modern regulatory state.³⁴⁷

As the epistemic aspect of public decision making has moved to the foreground in environmental and health regulation, an interdisciplinary group of science and technology studies (STS) scholars has emerged to explore the processes by which facts are made in scientific, political, and legal discourse.³⁴⁸ Drawing from the sociology and philosophy of science, and generally applying highly empirical methods,³⁴⁹ this body of scholars has made significant progress in coming to understand why specific actors come to accept certain assertions as true, and how the politics of knowledge-making interacts with broader regulatory politics. Developing legal theories about science-in-law without attention to how science is actually utilized in practice risks importing the author’s (or judge’s) own, often idealized, views of science. In light of this, before embarking on a comparative study of the administrative law of expertise in the US and EU, it is useful to introduce two central insights and terms from the STS literature: the contingency of knowledge, and civic epistemologies. A working understanding of these central STS insights will help to better understand and identify the types of institutions and strategies that typically come into play in the use of science in public decision making.

Contingency of knowledge. Perhaps the central insight that the STS literature has provided relates to the contingency of knowledge. The contingency of knowledge is the rather uncontroversial proposition that the set of things that a given individual believes to be true at a given time has been shaped by social and historical forces; that is, their status as true is

³⁴⁵ See SHEILA JASANOFF, SCIENCE AT THE BAR, 209 (1995) (“[T]extbook science – the body of knowledge that is already in the public domain, having passed through science’s critical filters – is rarely enough to satisfy the law’s need for contextualized knowledge.”).

³⁴⁶ See, e.g. *Am. Petroleum Inst. v. Costle*, 665 F.2d 1167, 1185 (D.C. Cir. 1981) (examining whether there was scientific support for the finding that adverse health effects occur at ozone levels of 0.15 to 0.25 parts per million); Brief of Petitioners at 6, 19-29, *Coalition for Responsible Regulation v. EPA*, No. 09-1322 (D.C. Cir. Oct. 17, 2011) (challenging the science underlying the EPA’s finding that climate change “may reasonable be anticipated to endanger public health or welfare”).

³⁴⁷ See generally Ezrahi, *supra* note 309 at 281 (“[T]ruth, ‘facts,’ and ‘knowledge’ are appreciated by democratic political performers mostly for their rhetorical value in strategies and in rituals of legitimation than for their instrumental value in improving substantive performance.”).

³⁴⁸ See generally THE SCIENCE STUDIES READER (Mario Biagioli, ed., 1999); THE HANDBOOK OF SCIENCE AND TECHNOLOGY STUDIES (Edward Hackett et. al., eds., 3d ed. 2008). The STS literature is not limited to studies of science in policy making. Although the literature has a multitude of theoretical roots, many of its most prominent early works focus on the practices of scientists themselves, with little attention to the interplay with government. See, e.g. ROBERT MERTON, THE NORMATIVE STRUCTURE OF SCIENCE (1942); BRUNO LATOUR AND STEVE WOOLGAR, LABORATORY LIFE: THE SOCIAL CONSTRUCTION OF SCIENTIFIC FACTS (1979); Latour, *supra* note 8.

³⁴⁹ That is, studying actual social actors in the process of knowledge production and validation.

contingent not just upon the physical world itself, but upon the social processes through which individuals come to regard claims as true. Science is often imagined to remove this contingency from knowledge. However, scholars in STS have consistently demonstrated that scientific facts operate with a degree of contingency as well. This insight, most famously advanced by philosopher of science Thomas Kuhn, highlights that social and historical forces shape ways that we understand the physical world.³⁵⁰ This insight is highly relevant to understanding public decision making in science-related fields because laws and regulations are based not upon absolute truths about the material world, but on what lawmakers and regulators believe to be true at the time of regulation. As such, attention to the processes by which claims become understood to be true in specific communities is important to understanding lawmaking and regulation in different times and places.

STS researchers studying social practices in laboratories,³⁵¹ field research sites,³⁵² science advisory bodies,³⁵³ courtrooms,³⁵⁴ public health controversies,³⁵⁵ international institutions,³⁵⁶ and other sites have shed significant light on the reasons why individuals come to treat particular factual claims as true, and the techniques used by individuals and institutions in order to position themselves as providers of authoritative knowledge. Critically, science and scientific credibility are not artifacts or phenomena that simply exist in the world without the work of specific social actors. Facts must be produced by specific individuals, observers and skeptics must be persuaded by the practices of these individuals, and trust and credibility must be maintained against an

³⁵⁰ See THOMAS KUHN, *THE STRUCTURE OF SCIENTIFIC REVOLUTIONS* (1962).

³⁵¹ See, e.g. Latour and Woolgar, *supra* note 16 at 105 (tracing the production of a single scientific fact as it is “freed from the circumstances of its production” and becomes widely accepted scientific knowledge); Latour, *supra* note 8. See also STEVEN SHAPIN AND SIMON SCHAFFER, *LEVIATHAN AND THE AIR PUMP: HOBBS, BOYLE, AND THE EXPERIMENTAL LIFE*, 55-65 (1985) (describing the conventions of replication and witnessing in the early experimental method).

³⁵² See, e.g. Michel Callon, *Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St. Brieuc Bay*, in *POWER, ACTION AND BELIEF: A NEW SOCIOLOGY OF KNOWLEDGE?* (John Law ed. 1986) (describing the network of human and non-human actors that a scientist must manipulate in order to render him or herself an authoritative “obligatory passage point” for the production of new knowledge); Bruno Latour, *PANDORA'S HOPE: ESSAYS ON THE REALITY OF SCIENCE STUDIES*, 24-79 (1999) (describing the procedures used by forest researchers to “reduce” physically gathered artifacts to numerical representations, and then to “amplify” these representations to make them representative of a larger set of phenomena and thereby render them more universal).

³⁵³ See, e.g., Jasanoff, *supra* note **Error! Bookmark not defined.**; STEPHEN HILGARTNER, *SCIENCE ON STAGE: EXPERT ADVICE AS PUBLIC DRAMA* (2000).

³⁵⁴ See, e.g., SHEILA JASANOFF, *SCIENCE AT THE BAR* (1995).

³⁵⁵ See, e.g., Brian Wynne, *Misunderstood Misunderstandings: Social Identities and Public Uptake of Science*, in *MISUNDERSTANDING SCIENCE? PUBLIC RECONSTRUCTION OF SCIENCE AND TECHNOLOGY*, 19 (Alan Irwin and Brian Wynne, eds. 1996) (describing interactions between sheep farmers and radiation experts in the production of knowledge about the impacts of the fallout from Chernobyl); Steven Epstein, *The Construction of Lay Expertise: AIDS Activism and the Forging of Credibility in the Reform of Clinical Trials*, 408 *SCI. TECH. & HUM. VALUES* 408 (1995) (describing the role of AIDS treatment activists in changing the epistemic practices of biomedical research).

³⁵⁶ See, e.g. Michael Goldman, *The Birth of a Discipline: Producing Authoritative Green Knowledge*, *World Bank Style*, 2 *ETHNOGRAPHY* 191 (2001); Clark Miller, *Hybrid Management: Boundary Organizations, Science Policy, and Environmental Governance in the Climate Regime*, 26 *SCI. TECH. & HUM. VALUES* 478 (2001).

onslaught of skepticism and doubt. In short, facts have a history – a process by which they became understood to be true.³⁵⁷

Research in this area has focused on the behavior of scientists in the process of research, highlighting the ways that practices such as structured observation, repetition, and peer review may operate to make certain knowledge claims so widely accepted that they are taken for granted as true and no longer meaningfully challenged.³⁵⁸ But of course, just as facts are built up by social practices over time, so too may they become subject to attack and succumb to a breakdown of the consensus that once supported them. This dynamic is particularly relevant in the world of high-stakes, politically-relevant factual disagreements where purportedly scientific claims are often subject to relentless attack.³⁵⁹

Conflicts about the truth of particular claims are often framed as battles surrounding whether or not a certain claim or process is or is not scientific. Such conflicts are worked out through debate and other social interactions the qualities of science. Techniques of exclusion or inclusion from the realm of science are often referred to as “boundary work”: “the attribution of selected characteristics to the institution of science (i.e. to its practitioners, methods, stock of knowledge, values and work organization) for the purpose of constructing a social boundary that distinguishes some intellectual activity as non-science.”³⁶⁰ Attentiveness to the boundary-drawing rhetoric of different social actors may be indicative of the types of characteristics that are likely to have epistemic legitimacy in the eyes of the speaker or her audience. As a result, the processes by which some claims come to be labeled as scientific while others are dismissed as non-scientific have been of central importance to STS scholars.

Regulatory science and civic epistemologies. Scientists are not, of course, the only social actors that engage in boundary work. Both regulators and judges often rely on boundary drawing techniques in order to bolster the legitimacy of their regulations or decisions. Science in these settings, however, takes on somewhat of a different character.

“Regulatory science” – science conducted or evaluated for the purpose of taking or not taking some governmental action, is characterized by a number of differences from “pure” research science.³⁶¹ First, regulators need to make policy decisions in the short term in situations

³⁵⁷ This is not, of course to say that airplanes would fall from the sky if people stopped believing in the relevant laws of physics, as overstated critiques of STS approaches would seem to imply.

³⁵⁸ Bruno Latour refers to this as “black boxing” facts; there comes a point where it is no longer necessary to open the box each time a claim is asserted. Latour, *supra* note 8 at 2-3. *See also* Callon, *supra* note 21; Latour, *supra* note 21. A somewhat similar, but more familiar formulation would be to suggest that such facts are a part of the current paradigm of a science at a given time. *See* THOMAS KUHN, *THE STRUCTURE OF SCIENTIFIC REVOLUTIONS* (1962).

³⁵⁹ *See, e.g.* DAVID COLLINGRIDGE AND COLIN REEVE, *SCIENCE SPEAKS TO POWER*, St. Martin’s Press, New York (1986).

³⁶⁰ Such conflicts are often referred to as “boundary work”: “the attribution of selected characteristics to the institution of science (i.e. to its practitioners, methods, stock of knowledge, values and work organization) for the purpose of constructing a social boundary that distinguishes some intellectual activity as non-science.” Thomas Gieryn, *Boundaries of Science*, in *HANDBOOK OF SCIENCE AND TECHNOLOGY STUDIES*, 393 (Jasanoff et. al. eds. 1995) (quoting Thomas Gieryn, *Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists*, 48 *AM. SOC. REV.* 781 (1983)).

³⁶¹ Most of these differences are differences of degree, not of kind.

where simply waiting for more clarity and consensus to develop may not be practical. Second, regulatory decision making often involves deeply intertwined value judgments and factual determinations that make boundary drawing exercises particularly difficult. Third, the economic interests at stake are often great, leading to particularly fierce challenges to any factual claims that could harm these interests.³⁶² Fourth, and most crucially, regulatory decisions bind an onlooking polity and must consistently demonstrate their legitimacy in the eyes of this polity.³⁶³

Regardless of these challenges to making regulatory decisions in the face of contested factual claims, regulators rely heavily on the authority of science to legitimate their decisions.³⁶⁴ Indeed, this dependence on scientific legitimacy to undergird public decision making can be understood as one of the central features of the modern regulatory state.³⁶⁵

However, it is crucial to realize that the way that governments make and deploy knowledge claims in order to justify their decisions to their publics is not uniform across the globe. STS scholarship attentive to practices of boundary drawing in regulatory settings has documented a diversity of institutionalized practices by which members of different societies test and deploy the knowledge claims that are used as a basis for making collective choices.³⁶⁶ In her pathbreaking work on the subject, Sheila Jasanoff conducted a comparative study of the science and politics of biotechnology regulation in the United States, Britain, Germany, and the EU.³⁶⁷ This work's most important contribution was a textured account of the different ways that democratic polities acquire communal knowledge for the purposes of taking collective action. Terming these different aspects of national political culture "civic epistemologies," Jasanoff explores six different dimensions along which these practices differ in different societies: the dominant participatory styles of public knowledge making, the methods of ensuring accountability, the practices of public demonstration, the preferred registers of objectivity, the

³⁶² "Inconvenient" truth claims, as it were. See AN INCONVENIENT TRUTH (Lawrence Bender Productions 2006). In particularly high-stakes situations, it is unclear whether even the most esteemed group of experts can muster the authority to settle a regulatory science dispute on scientific grounds. See Collingridge and Reeve, *supra* note 28; Jasanoff, *supra* note **Error! Bookmark not defined.** at 234.

³⁶³ Sheila Jasanoff usefully introduces the concept of "public science" to refer broadly to a broader class of science that includes regulatory science. She describes public science as including policy-relevant knowledge in the broadest sense: "science that underwrites specific regulatory decisions, science offered as legal evidence, science that clarifies the causes and impacts of phenomena that are salient to society, and science that self-consciously advances broad social goals, such as environmental sustainability." Sheila Jasanoff, *Transparency in Public Science: Purposes, Reasons, Limits*, 68 L. CONTEMP. PROBS. 21, 24 (2006).

³⁶⁴ Some have argued inappropriately so. See, e.g. Wendy Wagner, *The Science Charade in Toxic Risk Regulation*, 95 COLUM. L. REV. 1613 (1995) (arguing that regulating agencies often mask policy decisions as outcomes of a scientific analysis).

³⁶⁵ See Ezrahi, *supra* note 309.

³⁶⁶ See, e.g., Sheila Jasanoff, *Acceptable Evidence in a Pluralistic Society*, in ACCEPTABLE EVIDENCE: SCIENCE AND VALUES IN RISK MANAGEMENT 29 (Mayo and Hollander, eds. 1991) (comparing the role of experts in public decision making in Britain and the United States); Jasanoff, *supra* note 311; Clark Miller, *Civic Epistemologies: Constituting Knowledge and Order in Political Communities*, 2 SOC. COMPASS 1896 (2008) (exploring how knowledge is made in political communities); Shobita Parthasarathy, *Whose knowledge? What values? The comparative politics of patenting life forms in the United States and Europe*, 44 POL'Y SCI (forthcoming 2011) (describing the different "expertise barriers" to participation in the technically complicated policy domain of life form patenting).

³⁶⁷ Jasanoff, *supra* note 311.

accepted bases of expertise, and the visibility of expert bodies.³⁶⁸ Jasanoff's analysis demonstrates that different nations hold different perspectives on what counts as legitimate knowledge and how that knowledge should be produced and used in legal and policy contexts.

Crucially, after chronicling these differences, Jasanoff does not condemn them or paint them as an inappropriate politicization of an acontextual ideal of science. Instead, she recognizes that attention to these differences in political culture is necessary in order to justify and explain science-related policy choices to governments' diverse national polities.³⁶⁹ Jasanoff's work illustrates that there is not one single, universal or ideal model for the use of science in public decision making. Instead, different political and legal systems have spawned different practices for producing policy- and law-relevant knowledge, alongside polities who have come to expect these practices and view them as legitimate.³⁷⁰ It follows that practices for legitimating knowledge claims in public decision making cannot simply be cut and pasted across places and scales without raising potentially significant legitimacy challenges. Lawmakers, regulators and scholars who ignore these differences in pursuit of a universal approach to mobilizing knowledge claims in public decision making risk unwittingly imposing their own parochial understandings of the process onto political systems that have grown up with different systems of public justification.³⁷¹

In the regulatory context, these civic epistemologies find their expression in part though a subset of each jurisdiction's administrative law. This administrative law of expertise addresses,

³⁶⁸ *Id.* at 259.

³⁶⁹ For example, Jasanoff notes that “[w]ell entrenched habits of skepticism in American politics . . . have been linked to a recurrent, utopian search for neutral approaches to conflict resolution, framed by objective, quantitative decisionmaking techniques, such as vulnerability assessment, risk assessment and cost-benefit analysis.” Sheila Jasanoff, *Ordering Knowledge, Ordering Society*, in SHEILA JASANOFF (ed.), *STATES OF KNOWLEDGE: THE CO-PRODUCTION OF SCIENCE AND SOCIAL ORDER*, 13, 34 (2004).

³⁷⁰ More generally, the fact that different institutions have developed different ways of knowing that in turn help to constitute the institution is a central insight of the body of work on the “coproduction” of science and social orders (such as the law). *See, e.g.*, Ezrahi, *supra* note 309; Sheila Jasanoff, *The Idiom of Coproduction*, in SHEILA JASANOFF (ed.), *STATES OF KNOWLEDGE: THE CO-PRODUCTION OF SCIENCE AND SOCIAL ORDER*, 1 (2004); Charis Thompson, *Co-producing CITES and the African Elephant*, in SHEILA JASANOFF (ed.), *STATES OF KNOWLEDGE: THE CO-PRODUCTION OF SCIENCE AND SOCIAL ORDER*, 67 (2004); David Winickoff and Douglas Bushey, *Science and Power in Global Food Regulation: The Rise of the Codex Alimentarius*, 35 *SCI. TECH. & HUM. VALUES* 356 (2010).

³⁷¹ Indeed, it is not uncommon for scholars to ignore these differences and conclude that any difference in science-based regulation is simply veiled protectionism. *See, e.g.*, THOMAS BERNAUER, *GENES, TRADE, AND REGULATION: THE SEEDS OF CONFLICT IN FOOD BIOTECHNOLOGY*, Princeton Univ. Press (2003). These arguments tend to over-universalize science and simultaneously overestimate its ability to level divergent moral and political principles. For an excellent criticism of this perspective, *see* Vern Walker, *The Myth of Science as a 'Neutral Arbiter' for Triggering Precautions*, 26 *B.C. INT'L & COMP. L. REV.* 197 (2003). *See also* David Winickoff et. al. *Adjudicating the GM Food Wars: Science, Risk, and Democracy in World Trade Law*, 30 *YALE J. OF INT'L L.* 82 (2005); Jacqueline Peel, *Risk Regulation under the WTO SPS Agreement: Science as an International Normative Yardstick?* Jean Monnet Working Paper, New York Univ. (2004). This is not to suggest that veiled protectionism does not exist; it is only to point out that some differences in regulatory choices reflect legitimate differences between nations with respect to the process of legitimating scientific claims in public decision-making.

inter alia, participation and the relative roles of experts and democratically elected representatives³⁷² and rules of transparency and open communication in scientific matters.³⁷³

B. Civic Epistemologies in International Law

The point of departure for this piece is to ask what the existence of these different national practices for validating knowledge claims means for international law. If national differences in science policy are, at least in part, based on legitimate differences between civic epistemologies and therefore on national political cultures, how should we expect to see the resolution of international disagreements with a strong relation to scientific knowledge claims?³⁷⁴ This insight has not been sufficiently appreciated by political science and legal scholars in their work on the role of science in international affairs. There are, of course, notable exceptions.

Clark Miller has examined the role of a class of international organizations in building broadly legitimate knowledge making procedures.³⁷⁵ Miller's work is attentive to the complex science-sovereignty issues raised by the diversity of national practices for validating knowledge claims in public decision making. Motivated, as I am, by a desire to honor these legitimate differences and simultaneously constrain the opportunistic fabrication of scientific disagreement for political gain, Miller looks to the "proto-democratic" role of a set of "international knowledge institutions" in structuring global knowledge-making processes in an inclusive manner so as to garner a broad base of legitimacy from diverse global publics.³⁷⁶ While Miller has made important contributions in this area, his work has focused on political intergovernmental processes, and has not explored the role of international adjudicatory bodies in building and recognizing widely accepted practices for validating scientific claims in international law.

A number of legal scholars have begun to look at some of the complex issues raised by drawing on the legitimacy of science to help settle international adjudicatory conflicts – mostly at the WTO.³⁷⁷ While some of these scholars have either not recognized the issues raised by diverse domestic practices for validating scientific claims, or not seen them as problematic,³⁷⁸

³⁷² See, e.g., Jody Freeman & Adrian Vermeule, *Massachusetts v. EPA: From Politics to Expertise*, 2007 SUP. CT. REV. 51 (describing the US Supreme Court's *Massachusetts v. EPA* case as "expertise forcing").

³⁷³ See, e.g. Holly Doremus, *Using Science in a Political World: The Importance of Transparency in Natural Resource Regulation*, in WENDY WAGNER & RENA STEINZOR (eds.), *RESCUING SCIENCE FROM POLITICS: REGULATION AND THE DISTORTION OF SCIENTIFIC RESEARCH* (2006) (calling on courts to require clear explanations of agency reasoning in highly technical disputes); Sheila Jasanoff, *Transparency in Public Science: Purposes, Reasons, Limits*, 68 L. CONTEMP. PROBS. 21 (2006) (exploring transparency issues in scientific matters in US law).

³⁷⁴ For example, environmental issues, such as climate change, biodiversity and desertification, and health issues, such as food and drug safety and nanotechnology regulation.

³⁷⁵ Miller, *supra* note 53.

³⁷⁶ See *id.* at 350.

³⁷⁷ For a more complete overview of this literature, see Chapter 1.

³⁷⁸ See, e.g., Warren Maruyama, *A New Pillar of the WTO: Sound Science*, 32 INT'L L. 651, 676 (1998); Steve Charnovitz, *Improving the Agreement on Sanitary and Phytosanitary Standards*, in *TRADE, ENVIRONMENT, AND THE MILLENNIUM* 171, 185 (Gary Sampson & W. Bradnee Chambers eds., 1999).

scholars who have been attentive to these variegated domestic practices have often emphasized the role of deference to these national practices in ensuring legitimate global governance. For example, Jeffrey Atik, in exploring the role of science in regulatory convergence in the WTO, has observed that scientific practices are variegated and likely to give rise to multiple regulatory approaches.³⁷⁹ As a result, he predicted that the WTO and NAFTA requirements affirming regulatory autonomy to states but requiring that such regulations be based on science would actually represent a substantial restoration of rulemaking authority to national institutions.³⁸⁰ Vern Walker has similarly observed the diversity of domestic approaches to health and safety regulation, and argued persuasively that unless the WTO wishes to become a global-meta regulator – a role that would likely tax its legitimacy to a breaking point – the Organization should adopt a deferential position with respect to members’ different science policies.³⁸¹

David Winickoff and a group of STS scholars have also wrestled with the tension created by diverse domestic approaches to scientific validation and risk regulation.³⁸² Highlighting the importance of public involvement in regulating areas with high degrees of uncertainty and significant disagreement on the values that should drive regulation, Winickoff et. al. proposed that WTO dispute settlement panels adopt a stance similar to that of an administrative tribunal reviewing the adequacy of executive decision-making.³⁸³ This procedural review is designed to be deferential to domestic choices regarding substantive scientific decisions, but to generate a degree of accountability by ensuring a degree of transparency and public participation in the regulatory process.³⁸⁴

The above scholars have recognized that broadly legitimate international governance of scientifically complex issues requires respect for the diversity of domestic approaches to validating knowledge claims. Each have argued for the importance of deference to these approaches. Of course, deference alone raises its own problems.³⁸⁵ Judicial deference to any party that claims to have based its conclusions on science is not a solution, as parties could make ritualistic and unsupported reference to purported scientific fact in order to back up nearly any position they choose to put forward.³⁸⁶ As a result, striking a balance between deference and some level of review of domestic decisions is critical to developing legitimate methods for validating scientific claims in international law.³⁸⁷ This chapter contributes to this literature by

³⁷⁹ Atik, *supra* note 70 at 739.

³⁸⁰ *Id.*

³⁸¹ Walker, *supra* note 58 at 254-55, 271.

³⁸² *See* Winickoff et. al., *supra* note 48.

³⁸³ *Id.* at 108-111 (suggesting adopting a role akin to U.S. “hard look” review). *See also* Andrew Guzman, *Food Fears: Health and Safety at the WTO*, 45 VA. J. INT’L L. 1 (2004) (arguing for a purely procedural review).

³⁸⁴ *Id.* at 110.

³⁸⁵ These scholars have noted this as well. *See* Walker, *supra* note 58 at 280 (noting that WTO panels deferring to any member that cries “science” would “render the SPS Agreement ineffective as a trade agreement,” and potentially “perversely encourage global fragmentation in science by encouraging trade protectionist interests to co-opt the academy.”); Winickoff et al. at 109-110 (making the same point).

³⁸⁶ *See* Miller, *supra* note 53.

³⁸⁷ The degree of deference and the precise balance to strike will vary between international legal regimes, and even between cases with different postures. *See* Chapter 1, Part III. Different commentators have proposed different ways to strike this balance in different regimes. Vern Walker has proposed techniques to structure

offering a new tool – and supporting empirical analysis – to help strike this balance and prevent abuse of judicial deference to domestic scientific claims: norm building through comparative analysis. The major contribution of this chapter, and the central insight that should be drawn from this work in STS is that international adjudicators should not think about processes and structures for science in policymaking from a strictly deductive perspective. That is, judicial deduction of universal or global mechanisms to utilize science in international decision making from *a priori* qualities of the scientific process is apt to universalize one potentially parochial view of science in public decision making. This deductive process is likely to marginalize other views and approaches in a way that, absent further analysis or explanation, is likely to raise legitimacy problems.³⁸⁸ . Instead, the process could be bolstered by application of an inductive approach that is attentive to the practices that evolve in particular countries and the commonalities that may develop across countries over time. As commonalities emerge, broadly legitimate practices and principles for science in policy making may then slowly build through convergence.³⁸⁹

The benefits of this approach are easy to see in the WTO context. For example, the Winickoff et. al. proposal for process review takes important steps toward striking a serviceable balance between deference and review by using US “hard look” review as a model for judicial review of domestic scientific claims. These authors may well be right that the particular values advanced by this type of review will be seen as broadly legitimate by global publics. However, this chapter can be understood to improve on this type of review by beginning to pave the way to a similar review inspired by, and drawing legitimacy from, not just US administrative law values, but from a broader base of national approaches. That is, while a process review based on the relatively deferential US administrative review procedures is likely to be an improvement over ad hoc approaches, a similar review based on broadly shared groundnorms is likely to be a further step toward broad acceptance.³⁹⁰

To this end then, this paper seeks to explore the status of particular ideas about legitimating science for use in public decision making. It aims to identify commonalities in the way that different nations address the legitimacy of scientific claims in making collective decisions, with the hopes of identifying emerging broad groundnorms that could grow into a global administrative law of expertise.

I am intentionally cautious about the scope of my claims regarding norm development. I am not making the claim that any particular science policy principle exists as binding customary

factfinding in the WTO to help strike this balance, *see* Walker, *supra* note 58, while Winickoff et. al. have proposed the procedural review discussed immediately above.

³⁸⁸ Of course, where different conflicting approaches exist, a judge may not help but to pick one approach at the expense of others. Here, attention to the different approaches and a conscious choice supported by an act of reason-giving is likely to be seen as more transparent and legitimate than ignoring or naturalizing the decision. *See* Chapter 1.

³⁸⁹ This is not to suggest that convergence is necessary or that agreement on matters of fact is necessary or sufficient for agreement on matters of policy. *See, e.g.* KAREN LITFIN, *OZONE DISCOURSES* (1994) (criticizing the idea that scientific consensus leads inexorably to political consensus).

³⁹⁰ These groundnorms may well have much in common with US approaches. *See* Richard Stewart, *U.S. Administrative Law: A Model for Global Administrative Law?*, 68 L. & CONTEMPORARY. PROBS. 63 (2005). However, further empirical analysis would be required in order to establish this.

international law.³⁹¹ I am instead making the much more limited claim that common principles may be emerging across countries and across regimes in a way that suggests broad commonalities in the way that nations treat the role of science in policy making. Attention to emerging norms and principles is nonetheless important as commentators in the socio-empirical pluralist school of international law have pointed out. Authors in this area have emphasized the critical role of broadly held, but uncodified normative commitments in law-generating communities.³⁹² The fact that a particular norm has yet to be enacted into a treaty, or that states do not conform with it out of a sense of legal obligation (*opinio juris*) does not render it unworthy of study, as such norms may become law eventually, provide critical background understandings within which existing legal commitments are interpreted, or serve as *de facto* persuasive authority because to derogate from it would be to betray a widely held international principle.³⁹³ Ignoring such emerging norms is thus ill-advised for those seeking to study, or participate in lawmaking surrounding technically complex international issues.

Furthermore, it is important to note that I am not advocating a strong program of harmonization of international science policy practices. As Jasanoff and others have shown, it is indeed appropriate for different nations to have different contingent practices for deploying those knowledge claims which are used as a basis for making collective choices.³⁹⁴ These differences are rooted in a wide variety of legitimate cultural and political differences, including: levels of trust in expert bodies,³⁹⁵ beliefs about the role of public participation and populism in technical decision making,³⁹⁶ beliefs about the capacity of the public and political decision makers to apprehend technical issues,³⁹⁷ beliefs about how to practice decision making in the face of

³⁹¹ Customary international law “results from a general and consistent practice of states followed by them from a sense of legal obligation.” RESTATEMENT (THIRD) OF THE FOREIGN RELATIONS LAW OF THE U.S. §102 (1987). It seems unlikely at this point that states’ science policy decisions are enacted with the requisite sense of legal obligation (*opinio juris*).

³⁹² For example, Paul Berman explains that “international law scholars . . . increasingly recognize that we inhabit a world of multiple normative communities, some of which impose their norms through officially sanctioned coercive force and formal legal process, but many of which do not. These norms have varying degrees of impact, of course, but it has become clear that ignoring such normative assertions altogether as somehow not ‘law’ is not a useful strategy.” Paul Berman, *A Pluralist Approach to International Law*, 32 YALE J. OF INT’L L. 301, 302 (2007).

³⁹³ See generally, ABRAM CHAYES & ANTONIA CHAYES, *THE NEW SOVEREIGNTY: COMPLIANCE WITH INTERNATIONAL REGULATORY AGREEMENTS* (1995).

³⁹⁴ See Jasanoff, *supra* note 311. See also Miller, *supra* note **Error! Bookmark not defined.**

³⁹⁵ See, e.g., THEODORE PORTER, *TRUST IN NUMBERS: THE PURSUIT OF OBJECTIVITY IN SCIENCE AND PUBLIC LIFE* (1995).

³⁹⁶ There is a swelling literature on techniques of public participation in expert deliberations on science and technology issues. See, e.g. Silvio Funtowicz and Jerome Ravetz, *Science for the Post-Normal Age*, 25 FUTURES 739 (1993) (proposing involvement of an “extended peer community” in situations with large amounts of scientific uncertainty and/or high decisional stakes); Anders Blok, *Experts on Public Trial: on Democratizing Expertise Through a Danish Consensus Conference*, 16 PUB. UNDERSTANDING OF SCI. 163 (2007) (examining citizen deliberation on technoscientific developments through “consensus conferences”); Gene Rowe and Lynn Frewer, *Public Participation Methods: A Framework for Evaluation*, 25 SCI., TECH., & HUM. VALUES 3 (2000) (evaluating different proposals for public participation in public decisions about science and technology).

³⁹⁷ See, e.g. Brian Wynne, *Misunderstood Misunderstandings: Social Identities and Public Uptake of Science*, in MISUNDERSTANDING SCIENCE? PUBLIC RECONSTRUCTION OF SCIENCE AND TECHNOLOGY, 19 (Alan Irwin

scientific uncertainty,³⁹⁸ and beliefs about transparency in expert deliberation.³⁹⁹ To the extent that these differences exist between states, it may strain the domestic legitimacy of international agreements to enforce a single Procrustian vision of science policy across diverse states.⁴⁰⁰ However, when such commonalities exist, and are not widely recognized, it presents an opportunity for states to opportunistically depart from such nascent principles in their own self interest, and effectively stymie discussions about other closely related political – and typically distributional – issues.

As a result, the purpose of this paper is to conduct a comparative analysis of the administrative law of expertise in the US and EU, and to point in the direction of any noticeable commonalities and possible emerging principles. In the short term, these principles may only be persuasive, notable for their breadth of acceptance and difficult to deviate from for those nations that are deeply committed to them. In the longer term, however, it may point in the direction of more binding legal principles.

This tension between respect for a diversity of legitimate positions and a desire to identify and avoid opportunistic behavior is perhaps most familiar in consumer preference and food safety arguments in food trade rules under the WTO.⁴⁰¹ Mindful of the arguments that that agreement went too far in the direction of harmonization,⁴⁰² this preliminary investigation of the potential to build a global administrative law of expertise is intentionally conservative in the scope of its claims, and goes no further than suggesting that emerging commonalities have some persuasive authority in their own right, and are worthy of further attention from both scholars and practitioners of international law.

C. Motivation and Broader Contribution

and Brian Wynne, eds. 1996) (problematizing traditional notions of public understanding of science in the context of lay-expert interactions); Scott Brewer, *Scientific Expert Testimony and Intellectual Due Process*, 107 YALE L.J. 1535 (1998) (questioning the capacity of judges and juries to apprehend complicated scientific issues).

³⁹⁸ Most notably, the protracted debate surrounding the precautionary principle. *See supra*, notes **Error!**

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³⁹⁹ *See, e.g.*, Hilgartner, *supra* note 22.

⁴⁰⁰ Some scholars have criticized the WTO for exactly this. *See, e.g.*, Walker, *supra* note **Error! Bookmark not defined.**; Winickoff et. al., *supra* note 48; Joanne Scott, *On Kith and Kine (and Crustaceans): Trade and Environment in EU and WTO*, in THE EU, THE WTO, AND THE NAFTA: TOWARDS A COMMON LAW OF INTERNATIONAL TRADE 125, 157 (J.H.H. Weiler ed., 2000).

⁴⁰¹ *See, e.g.*, Vern Walker, *Keeping the WTO from becoming the “World Trans-science Organization”: Scientific Uncertainty, Science Policy, and Fact Finding in the Growth Hormones Dispute*, 31 Cornell Int’l L.J. 251 (1998); Joanne Scott, *On Kith and Kine (and Crustaceans): Trade and Environment in the EU and WTO*, in The EU, the WTO, and the NAFTA: Towards a Common Law of International Trade? (J.H.H. Weiler, ed.), 125 (2000); Theofanis Christoforou, *Settlement of Science-Based Trade Disputes in the WTO: A Critical Review of the Developing Case Law in the Face of Scientific Uncertainty*, 8 N.Y.U. Envtl. L.J. 622, 629-32 (2000); Vern Walker, *The Myth of Science as a “Neutral Arbiter” for Triggering Precautions*, 26 BC Int’l & Comp. L. Rev. 197 (2003); Jacqueline Peel, *Risk Regulation under the WTO SPS Agreement: Science as an International Normative Yardstick?* Jean Monnet Working Paper, New York Univ. (2004); Jacqueline Peel, *Science and Risk Regulation in International Law*, 260-62 (2010).

⁴⁰² *See, e.g.* Scott *supra* note 400 at 157.

In performing this analysis, this chapter has both a practical goal and a theoretical goal. Practically, it seeks to provide a tool to constrain opportunistic reliance on scientific disagreement in order to avoid or impoverish political debate.⁴⁰³ This is not to trivialize genuine scientific disagreement, or even to suggest that scientific disagreement and disagreement about matters of policy *can* always be wholly separated; it is instead to recognize that constructive debate about sensitive political issues may be prematurely foreclosed when disagreements are framed as technical or scientific.⁴⁰⁴ There is therefore an incentive for parties taking unpopular or difficult-to-justify value positions to rationalize their positions with reference to scientific uncertainty, or unsupported statements of fact.⁴⁰⁵ This paper seeks to provide a tool to help constrain the opportunistic use of such argumentation by suggesting a mechanism to slowly harmonize, where appropriate, states' positions on the use of science in policy making.

Theoretically, this paper seeks to help initiate a conversation between the empirical-constructivist elements of contemporary STS, and the similar socio-empirical strands of contemporary legal studies. STS scholars have made important strides in the last quarter century to help understand the social and cultural mechanisms employed by scientists and policy makers in order to secure the broad public acceptance of their claims.⁴⁰⁶ Over the same period, pluralist law and society scholars have turned their attention to the social processes by which law and other normative commitments come into being.⁴⁰⁷ These scholars have drawn attention to other non-law types of social conventions and emphasized their centrality to a robust understanding of modern law by either serving as precursors to "black letter" law, or by acting with such a binding moral or social force as to operate as *de facto* law. These bodies of thought should be in natural conversation with one another, as they describe how science underwrites the legitimacy of law

⁴⁰³ A well-known domestic analog comes from the debates about the health effects of tobacco use. As scientific consensus solidified about the health effects of tobacco use, tobacco companies fended off public policy action by relying on increasingly fringe scientific positions. By either relying on dubious studies framed as scientific, or insisting on absolute certitude of the facts before addressing the pressing policy issues, regulatory interventions were stymied for decades. *See generally* See Robert Freudenburg et. al., *Scientific Certainty Argumentation Methods (SCAMs): Science and the Politics of Doubt*, 78 SOC. INQUIRY 2 (2008) (describing and criticizing arguments that insist on scientific certainty before taking action).

⁴⁰⁴ *See, e.g.*, Wagner, *supra* note 63 (pointing out that agreement about scientific matters can also be used to foreclose political debate). *See also* ANN KELLER, SCIENCE IN ENVIRONMENTAL POLICY: THE POLITICS OF OBJECTIVE ADVICE, 28 (2009) (discussing the work that claims to objectivity can do in closing off political debate).

⁴⁰⁵ *See* Clark Miller, *Democratization, International Knowledge Institutions, and Global Governance*, 20 GOVERNANCE 325, 350-51 (2007) ("[t]oday, in global society, the practice of powerful actors justifying their decisions through ritualistic reference to matters of fact is ubiquitous and pervasive."). It is well established that politically controversial topics generate controversy about scientific methods and findings much more so than more uncontroversial topics about which there is broad normative agreement. *See e.g.*, DAVID COLLINGRIDGE AND COLIN REEVE, SCIENCE SPEAKS TO POWER (1986); Daniel Sarewitz, *How Science Makes Environmental Controversies Worse*, 7 ENVTL. SCI. & POL 385 (2004).

⁴⁰⁶ *See, e.g.*, Michel Callon, *Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St. Brieuc Bay*, in POWER, ACTION AND BELIEF: A NEW SOCIOLOGY OF KNOWLEDGE? 196 (John Law ed., 1986); Latour *supra* note 8. John Carson, *Army Alpha, Army Brass, and the Search for Army Intelligence*, 84 ISIS 278 (1993).

⁴⁰⁷ *See, e.g.*, Robert Cover, *Folktales of Justice: Tales of Jurisdiction*, 14 CAP. U. L. REV. 179, 181 (1985) (arguing that "all collective behavior entailing systematic understandings of our commitments to future worlds" can lay equal claim to the word "law").

and law underwrites the legitimacy of science.⁴⁰⁸ In practice however, much legal work in this area, even when recognizing the contingency of particular social conventions and normative commitments, has tended to wash the contingency out of discussions of science, instead imagining a universal practice that transcends politics.⁴⁰⁹ Strengthening the conversation between these two fields can be expected to yield a better understanding of how the contingency of science impacts international law, and vice versa.

To facilitate this conversation, I have worked hard to clearly explain a number of core STS concepts. Although STS scholarship has made significant contributions to understanding the actual practices of scientists and science-based regulation, the field has often run into difficulty communicating to a broader audience. This is largely because its tendency to stress the contingency of scientific findings is often read as opening into a relativism in which it is difficult to weigh competing truth claims – a function that law often requires. By emphasizing the social and political contingency in knowledge production practices, but demonstrating why the breadth of its impacts is bounded by deeply held legal and socio-political norms, I hope to highlight the importance of some of the central findings of the STS community, but do so in a way that emphasizes its practical utility for addressing some of the world’s most pressing sociotechnical risks.

This chapter is also an important contribution to the emerging field of global administrative law.⁴¹⁰ Global administrative law was initially defined by Benedict Kingsbury, Nico Krisch, and Richard Stewart as “the mechanisms, principles, practices, and supporting social understandings that promote or otherwise affect the accountability of global administrative bodies, in particular by ensuring they meet adequate standards of transparency, participation, reasoned decision, and legality, and by providing effective review of the rules and decisions they make.”⁴¹¹ As this article demonstrates, references to science are not a substitute for the standards of transparency, participation, reasoned decision, and legality that these scholars are concerned with.⁴¹² Highly technical international problems will not be solved by treating science as a black box from which facts emerge to undergird the legitimacy of international regulatory decisions. Instead, scholars and practitioners of international law must be attentive to the “mechanisms, principles, practices, and supporting social understandings” that establish the legitimacy of the factual claims made by specific actors in international law.⁴¹³ While the global administrative law literature has been attentive to these legitimacy concerns in areas spanning a wide diversity

⁴⁰⁸ See SHEILA JASANOFF (ed.), *STATES OF KNOWLEDGE: THE CO-PRODUCTION OF SCIENCE AND SOCIAL ORDER* (2004).

⁴⁰⁹ See Rebecca Bratspies, *Rethinking Decisionmaking in International Environmental Law: A Process-Oriented Inquiry into Sustainable Development*, 32 *YALE J. OF INT’L L.* 363, 377 (2007) (criticizing early work in the New Haven School as clinging to the hope that a sufficient amount of information could render decisions value-free).

⁴¹⁰ See, e.g., Benedict Kingsbury et. al., *The Emergence of Global Administrative Law*, 68 *L. & CONTEMP. PROBS.* 15 (2005). Daniel Esty, *Good Governance at the Supranational Scale: Globalizing Administrative Law*, 115 *YALE L.J.* 1490 (2006).

⁴¹¹ Kingsbury, *supra* note 410, at 17.

⁴¹² See Jacqueline Peel, *Risk Regulation Under the WTO SPS Agreement: Science as an International Normative Yardstick?*, Jean Monnet Working Paper 02/04 (2004).

⁴¹³ See Kingsbury, *supra* note 410 at 17.

of legal areas and issues,⁴¹⁴ my analysis below demonstrates that conflicts about scientific claims raise a set of unique issues that have yet to be addressed in this literature.⁴¹⁵ Just as domestic administrative law is full of important questions surrounding the review of the technical assertions which support national policy decisions, and questions of deference to specific expert institutions, so too must global administrative law face its own questions about science, policy and institutional deference.⁴¹⁶ This chapter contributes to this discussion by both pushing the discussion about principles of global administrative law into new territory by exploring the administrative law of expertise, and by exploring the role of comparative analysis in the formation of these new international legal principles.

III. ADMINISTRATIVE LAW OF EXPERTISE: THE US AND EU

In this section I introduce and detail the administrative law of expertise of US and EU. The discussion is intentionally general, eschewing a focus on any particular substantive issue area. The exploration of each entity's administrative law of expertise begins with a broad overview of the administrative structure and process of regulatory development generally. The focus then shifts to expertise-specific issues, exploring in turn issues relating to participation and the relative roles of experts and democratically elected representatives, and rules of transparency and open communication in scientific matters.⁴¹⁷ In each area, the analysis begins with the legislative framework for agency action, and then moves to an analysis of the way that these legal frameworks have taken shape in practice through judicial interpretation over time.

⁴¹⁴ See, e.g. Farahat, Anuscheh, *Regulating Minority Issues through Standard-Setting and Mediation: The Case of the High Commissioner on National Minorities*, in *THE EXERCISE OF PUBLIC AUTHORITY BY INTERNATIONAL INSTITUTIONS*, Beiträge zum ausländischen öffentlichen Recht und Völkerrecht 210 (Armin von Bogdandy et al., eds., 2010) (national minority issues); Less, Steven, *International Administration of Holocaust Compensation: The International Commission on Holocaust Era Insurance Claims (ICHEIC)*, in *The Exercise of Public Authority by International Institutions*, Beiträge zum ausländischen öffentlichen Recht und Völkerrecht 210 (Armin von Bogdandy et al., eds., 2010) (holocaust compensation); van Aaken, Anne and Richard Chambers, *Accountability and Independence of International Election Observers*, 6 *International Organizations Law Review* 541 (2009) (election observation); Hunter, David, and Nathalie Bernasconi-Osterwalder, *Democratizing Multilateral Development Banks*, in "New Public:" *The Globalization of Public Participation* (Environmental Law Institute ed., 2002) (World Bank finance governance).

⁴¹⁵ But see Michael Livermore, *Authority and Legitimacy in Global Governance: Deliberation, Institutional Differentiation, and the Codex Alimentarius*, 81 *N.Y.U. L. REV.* 766 (2006).

⁴¹⁶ See, e.g. Gregory Schaffer, *A Structural Theory of WTO Dispute Settlement: Why Institutional Choice Lies at the Center of the GMO Case*, 41 *N.Y.U. J. INT'L L. & POL.* 1 (2008); Winickoff and Bushey, *supra* note **Error! Bookmark not defined.**

⁴¹⁷ While some of the issues explored may not be expertise-specific *per se* – for example the duty to give reasons for administrative decisions – these broader administrative norms often exhibit particular and distinct dynamics in expertise-related areas.

A. US Administrative Law of Expertise

1. General Overview

Administrative law in the US federal government is a complex and multifaceted subject, spanning areas of rulemaking, agency adjudication, and enforcement. For the purposes of this exploration of the administrative law norms for using science in public decision making, the most critical area in US administrative law is the process of informal rulemaking under the Administrative Procedure Act (APA).⁴¹⁸ The APA lays out the procedures that agencies must observe for formulating any agency statements designed to implement, interpret, or prescribe law or policy.⁴¹⁹ This occurs most commonly when the US Congress has passed a law empowering an agency to promulgate rules with greater specificity than the usually general terms of the legislation.

The APA lays out a series of procedural steps that agencies must engage in when undertaking informal – commonly referred to as “notice and comment” – rulemaking. First, the agency must generate and publish a notice of proposed rulemaking, giving the details of any planned public proceedings, referencing the legal authority drawn upon to issue the rule, and describing the proposed rule.⁴²⁰ Following the publication of the notice, the agency must give the interested public a chance to comment on the proposed rule with any data, views or arguments they might submit.⁴²¹ The agency must then consider these comments, and generate a final rule, including a concise statement of the basis and purpose of the rule.⁴²²

Following the issuance of a final rule, the rule may be (and often is) challenged in court. The APA also provides guidance to courts on how to conduct such reviews. The APA provides that a person suffering legal wrong due to an agency action or who is adversely affected or aggrieved by such an action is entitled to judicial review of that action.⁴²³ In conducting that

⁴¹⁸ See 5 USC §553. As a general matter, when Congress delegates authority to agencies, the agency may elect to effectuate Congress’s intent through rulemaking or adjudication, unless Congress has specified one approach or the other. See *SEC v. Chenery Corp.*, 332 U.S. 194 (1947). For our purposes, rulemaking is more important than agency adjudication. This is primarily because rulemaking represents an articulation of rules of general applicability by agencies, and judicial review of these rules is both common and detailed. Moreover, the posture of such judicial review, with the judiciary reviewing agency regulation is the closest analog to the posture of most science-related international adjudication, in which one nation is challenging the domestic regulation of another nation, and the validity of those domestic regulations is the matter at issue. Within rulemaking, agencies may select either formal or informal rulemaking, unless the statute specifies that formal rulemaking must be used. See 5 USC §§553, 556, and 557. Since *Fla. E. Coast Ry. v. United States*, 410 U.S. 224 (1973) (holding that a statute must specify that rulemaking must be made by a hearing “on the record” in order to make formal rulemaking a necessity), nearly all rulemaking has been informal rulemaking. See Vanessa Burrows & Todd Garvey, Cong. Research Serv., A Brief Overview of Rulemaking and Judicial Review, Summary (2011) (“The APA details the rarely used procedures for formal rules as well as the requirements for informal rulemaking, under which the vast majority of agency rules are issued.”),

⁴¹⁹ See *id.*, 5 USC §551(4), (5).

⁴²⁰ 5 USC §553(b).

⁴²¹ 5 USC §553(c).

⁴²² *Id.*

⁴²³ 5 USC §702.

review, “[t]he reviewing court shall . . . hold unlawful and set aside agency action, findings, and conclusions found to be . . . arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law.”⁴²⁴

Particularly since the rise of the environmental movement in the 1970s, US agencies have promulgated an extraordinary number of rules, many of which have required significant scientific and technical input. As these rules have been generated, put through the notice and comment, and subsequently challenged, a sub-body of administrative law dealing with the use of scientific and technical information in rulemaking has emerged. The following sections trace the contours of this American administrative law of expertise.

2. Transparency

The US notice and comment rulemaking procedure under §553 of the APA serves a number of important transparency goals in expert-mediated regulation. This subsection discusses two of the most important transparency-related impacts of the APA. First, under §553(b)(3) the agency’s notice of proposed rulemaking must contain either the contents of the proposed rule, or a description of the subjects and issues involved.⁴²⁵ Courts have interpreted this provision to require that an agency disclose the data it has used in a rulemaking and construct a publically available docket with everything the agency has considered.⁴²⁶ Second, under §553(c), after receiving comments on the proposed rule, an agency must incorporate in the final rule a “concise general statement of their basis and purpose.”⁴²⁷ These statements have become less and less concise over time as courts have interpreted this provision to require that agencies articulate reasons for their decisions and respond to meaningful comments they have received.

It is important to note that transparency in administrative decision making has some overlap with participation. Rendering decision making more transparent may serve to allow interested parties to inform themselves and then participate in the process both before and after a final decision has been made. Before a final decision, transparent processes may allow interested parties to submit comments or otherwise lobby the decision makers in order to affect the final rule. After a final decision, transparent decision making procedures may affect interested parties’ ability to participate by either challenging the decision in court, or bringing political pressure to bear on the administration to change its policies or procedures in specific ways. This subsection will address requirements that agencies make their data and reasoning process visible to interested onlookers. Although this may facilitate participation by interested parties,⁴²⁸ a discussion of how those parties may participate once they have this information will be withheld for the subsequent subsection on participation.

⁴²⁴ 5 USC §706(2)(A).

⁴²⁵ See 5 USC §553(b)(3).

⁴²⁶ See *Portland Cement Association v. Ruckelshaus*, 486 F.2d 375, 392-93 (D.C. Cir. 1973).

⁴²⁷ 5 USC §553(c).

⁴²⁸ Importantly, regardless of whether interested and observing parties actually get involved, the simple act of being watched may itself impact agency procedures. See generally MICHEL FOUCAULT, *DISCIPLINE AND PUNISH: THE BIRTH OF THE PRISON* (1979).

a. Input Transparency

The first way that the US administrative law of expertise addresses transparency is through the “notice” aspect of notice and comment rulemaking.⁴²⁹ Although the text of the APA simply requires that an agency give notice of “either the terms or substance of the proposed rule or a description of the subjects and issues involved,” courts have generally read this requirement broadly to include a requirement that technical data or studies on which the agency relied be included along with the notice of proposed rulemaking.⁴³⁰

In *Portland Cement Association v. Ruckelshaus* cement manufacturers sought review of the EPA’s new stationary source standards for new or modified Portland cement plants under the Clean Air Act.⁴³¹ In addition to a number of substantive challenges, the petitioners challenged the final standards on the grounds that EPA failed to make available sufficient details about data and methodology used in certain tests conducted by the agency that were subsequently relied upon in the final rulemaking.⁴³² Although the agency released a background document that disclosed some information about the tests, the document did not identify the location or methodology used for certain critical tests.⁴³³ EPA later released the results of these tests in a supplemental statement a number of months after issuing the final rule.⁴³⁴ Petitioners then moved to remand the final rule to the agency in order to allow it to take into account any comments on the supplemental statement.⁴³⁵ The US Court of Appeals for the District of Columbia (“DC Circuit”) granted petitioners’ request, noting that “[o]bviously a prerequisite to the ability to make meaningful comment is to know the basis upon which the rule is proposed.”⁴³⁶ The court found that the public’s inability to obtain test results and procedures which formed a partial basis for rule adopted constituted a “critical defect” in the decision making process, and wrote that “It is not consonant with the purpose of a rule-making proceeding to promulgate rules on the basis of inadequate data, or on data that, [to a] critical degree, is known only to the agency.”⁴³⁷

Portland Cement is useful for illustrating the important role of what I will call “input transparency” in the US administrative law of expertise. Although courts will generally adopt a deferential stance in reviewing the substantive decisions of agency experts, courts’ process or “hard look” review will hold agencies to heightened standards of transparency, requiring full disclosure of the input to the agency’s decision making process. The technical aspects of the decision do not insulate the agency from its requirements to lay bare the basis for its decision. Indeed, it may heighten it.

⁴²⁹ See 5 USC §553(b).

⁴³⁰ See 5 USC §553(b)(3).

⁴³¹ 486 F.2d 375 (D.C. Cir. 1973). Note that “Portland” cement is a common type of cement.

⁴³² *Id.* at 392.

⁴³³ *Id.*

⁴³⁴ *Id.* at 392-93.

⁴³⁵ *Id.* at 393.

⁴³⁶ *Id.*

⁴³⁷ *Id.* at 392-93. *Portland Cement* also raises important participation principles regarding an agency’s responsibility to respond to comments. This will be discussed further *infra* section III(A)(3).

Since its genesis in the 1970s, this input transparency requirement has been repeatedly applied in scientifically or technologically complex cases.⁴³⁸ More recently, in *American Radio Relay League v. FCC* the FCC redacted portions of a number of staff-prepared scientific studies that it relied upon in a rulemaking regulating the use of the radio spectrum.⁴³⁹ The rulemaking was challenged on procedural grounds due to the failure to include the relevant studies in the rulemaking docket. Citing the *Portland Cement* line of cases the court remanded the rule, requiring that the agency release the unredacted studies for notice and comment.⁴⁴⁰ The court wrote:

By requiring [that] the "most critical factual material" used by the agency be subjected to informed comment, the APA provides a procedural device to ensure that agency regulations are tested through exposure to public comment, to afford affected parties an opportunity to present comment and evidence to support their positions, and thereby to enhance the quality of judicial review.⁴⁴¹

Here again, a behind the scenes "trust us, we're experts" approach to agency expertise is rejected. In the US administrative law of expertise, the technical basis of expert-mediated administrative decision making must be aired to the public. As will be discussed below, this transparency is understood to facilitate participation by both the public, and the judiciary in administrative decision making.

b. Output Transparency

The second way that the US administrative law of expertise implicates transparency interests is through the APA's requirement that agencies provide some form of justification for their decisions. Section 553(c) of the APA requires agencies to provide a "concise general statement of their basis and purpose."⁴⁴² In technical areas, courts have construed this provision

⁴³⁸ See, e.g., *United States v. Nova Scotia Food Prods. Corp.*, 568 F.2d 240 (2d. Cir. 1977) ("When the basis for a proposed rule is a scientific decision, the scientific material which is believed to support the rule should be exposed to the view of interested parties for their comment."); *Conn. Light & Power Co. v. Nuclear Regulatory Comm'n*, 673 F.2d 525, 530 (D.C. Cir. 1982) ("[i]n order to allow for useful criticism, it is especially important for the agency to identify and make available technical studies and data that it has employed in reaching the decisions to propose particular rules."); *Chamber of Commerce v. SEC*, 443 F.3d 890, 899 (D.C. Cir. 2006) ("[a]mong the information that must be revealed for public evaluation are the 'technical studies and data' upon which the agency relies [in its rulemaking].") (citation omitted). See also *Nat'l Asso. of Pharmaceutical Mfrs. v. HHS*, 586 F. Supp. 740, 754-56 (S.D.N.Y. 1984) (noting that although "[r]egulations based on technical scientific data . . . require a more detailed explanation of the agency's conclusions than less technical regulations," the agency need not swell the docket with thousands of inspection reports that were mostly publically available anyway).

⁴³⁹ 524 F.3d 227, 236-40 (D.C. Cir. 2008).

⁴⁴⁰ *Id.* at 237, 240.

⁴⁴¹ *Id.* at 236 (quoting *Chamber of Commerce v. SEC (Chamber of Commerce II)*, 443 F.3d 890, 900 (D.C. Cir. 2006) (quoting *Ass'n of Data Processing Serv. Orgs., Inc. v. Bd. of Governors of the Fed. Reserve Sys.*, 240 U.S. App. D.C. 301, 745 F.2d 677, 684 (D.C. Cir. 1984))).

⁴⁴² 5 USC §553(c).

to require a rather detailed description of the reasoning that the agency applied – including the scientific data and conclusions drawn there from – in order to come to its ultimate decision.

The precise contours of what US courts will require from agencies in a statement of basis and purpose accompanying a technical regulation are not uniform. In the leading Supreme Court decision laying out the standard for the judicial review of agency rulemaking, the Court required, *inter alia*, that agencies must “articulate a satisfactory explanation for its action, including a rational connection between the facts found and the choice made.”⁴⁴³ What precisely this exercise of reason-giving should look like in the case of technical rulemaking has been the subject of evolving jurisprudence.

In *Chemical Manufacturers Association v. EPA*, the EPA was empowered by the Toxic Substances Control Act (TSCA) to require testing of certain chemicals if a chemical substance or mixture “enters or may reasonably be anticipated to enter the environment in substantial quantities” or “there is or may be significant or substantial human exposure to such substance or mixture.”⁴⁴⁴ In a rulemaking proceeding, EPA concluded that the chemical cumene met the statutory requirements and sought to require testing. An industry group for the chemicals industry challenged this finding and sought to have the rule set aside. Specifically, petitioners claimed that EPA failed to articulate an administrative standard for determining whether a quantity of a chemical is “substantial.”⁴⁴⁵ The EPA provided only a brief discussion of its methodology, concluding that it would make a “case-by-case” determination, but neglecting to provide any further details as to what would inform its case-by-case decisions.⁴⁴⁶ The Fifth Circuit Court of Appeals remanded the rule back to the EPA to articulate standards for determining when substantial quantities of cumene enter the environment or substantial exposure occurs.⁴⁴⁷ The court wrote:

Here, we are unable to conclude from the final rule itself, or from the administrative record, or prior EPA decisions, on what basis or in light of what criteria the EPA concluded either that the quantities of cumene found to enter the environment from the facilities in question were "substantial" or that the human exposure potentially resulting therefrom was "substantial."⁴⁴⁸

The agency’s decision may well have been proper, but its failure to explain itself led to a remand.

The rule at issue in *Chemical Manufacturers* was certainly a hybrid decision of science and policy. There is no purely technical answer to how much cumene is “substantial.” However, the *Chemical Manufacturers* court makes clear that agency decisions do not get a free pass on the duty to justify simply because they raise complicated technical issues. Other US courts have agreed, to varying degrees.

⁴⁴³ *Motor Veh. Mfrs. Ass’n v. State Farm Ins.*, 463 U.S. 29, 43 (1983) (quoting *Burlington Truck Lines, Inc. v. United States*, 371 U.S. 156, 168 (1962)) (internal quotations omitted).

⁴⁴⁴ *Chemical Mfrs. Ass’n v. EPA*, 899 F.2d 344, 347 (5th Cir. 1990) (quoting 15 U.S.C. §2603(a)(1)(B)).

⁴⁴⁵ *Id.* at 357.

⁴⁴⁶ *Id.* at 358.

⁴⁴⁷ *Id.* at 360.

⁴⁴⁸ *Id.* at 359.

United States v. Nova Scotia Food Products Corp. involved an FDA regulation laying out fish processing requirements.⁴⁴⁹ Nova Scotia claimed that following the rules would make their product commercially unfeasible. As a part of its challenge, Nova Scotia challenged the concise general statement of basis and purpose as inadequate for failing to explain the agency’s reasoning.⁴⁵⁰ The agency laid out broadly applicable rules, in spite of evidence that different types of fish would be impacted in different ways. The Second Circuit found that this was indeed problematic, writing that “the burden was upon the agency to articulate rationally why the rule should apply to a large and diverse class, with the same . . . parameters made applicable to *all* species.”⁴⁵¹ The court went on to explain that “[w]hat we are entitled to . . . is a careful identification by the Secretary, when his proposed standards are challenged, of the reasons why he chooses to follow one course rather than another.”⁴⁵² “By the same token,” the court continued, “when the Secretary is obliged to make policy judgments where no factual certainties exist or where facts alone do not provide the answer, he should so state and go on to identify the considerations he found to be persuasive.”⁴⁵³

This decision highlights an important aspect of transparency in the administrative law of expertise: clear delineations between scientific and political decisions. Hiding policy judgments in the language of apolitical or technical decisions fails to provide the type of output transparency that the *Chemical Manufacturers* and *Nova Scotia* courts require. It is important, however, not to overstate the vigor with which American courts will enforce such a duty to justify. Although the requirement for a statement of basis and purpose exists in the APA, and has been interpreted to require both a transparent exposition of the agency’s scientific findings and a clear distinction between its scientific findings and its policy judgments, a remand for such a violation is relatively rare, particularly after the US Supreme Court’s decision in *Vermont Yankee*, forbidding courts from adding additional procedural requirements beyond those required in the APA.⁴⁵⁴ There is a strong contingent of environmental and administrative law scholars in the US who believe that courts have not gone far enough in ensuring that agencies provide transparency in scientific reasoning.⁴⁵⁵ Regardless, for the purposes of this analysis, it is

⁴⁴⁹ *Nova Scotia*, *supra* note 310. The posture of the case was unusual, as it was not commenced as a challenge to the rule, but when the government sought an injunction against Nova Scotia Food Products Corp. for failing to comply with the regulation, six years after the issuance of the rule. *Id.* at 242-45.

⁴⁵⁰ The challenge also related to the agency’s failure to respond to meaningful comments, an issue that will be discussed in the subsection on participation, *infra*.

⁴⁵¹ *Id.* at 252.

⁴⁵² *Id.* at 253 (quoting *Industrial Union Dep’t, AFL-CIO v. Hodgson*, 499 F.2d 467, 475 (1974)).

⁴⁵³ *Id.* (quoting *Industrial Union Dep’t, AFL-CIO v. Hodgson*, 499 F.2d 467, 475 (1974)). See also *Evt’l Def. Fund, Inc. v. EPA*, 465 F.2d 528, 540-41 (D.C. Cir. 1972) (“We cannot discharge our role adequately unless we hold EPA to a high standard of articulation.”).

⁴⁵⁴ See *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council*, 435 U.S. 519 (1978). This issue is discussed in more detail *infra* note **Error! Bookmark not defined.**

⁴⁵⁵ These scholars argue that the practice of disguising policy judgments in technical language remains a problem in U.S. administrative law, and have called for more aggressive judicial review in order to hold agencies to this standard of disclosure. See, e.g. Wagner, *supra* note 41; Doremus, *supra* note 373; Sara Clark, Taking a Hard Look at Agency Science: Can Courts Ever Succeed?, 36 CALIF L. REV. 317 (2009). But see Sheila Jasanoff, *Transparency in Public Science: Purposes, Reasons, Limits*, 69 L. & CONTEMP. PROBS. 21 (2006)

important to note that in technically complex areas a description laying out the scientific or technical bases for agency decisions must be elaborated. Moreover, there exists at least a limited requirement for this description to identify political versus scientific judgments.⁴⁵⁶

3. Participation and the Role of Experts

In US administrative law, expert participation in administrative rulemaking occurs during the formulation of proposed rules in ways that are specific to the structure of the agency formulating the rule.⁴⁵⁷ After a proposed rule is formulated, “the agency shall give interested persons an opportunity to participate in the rule making through submission of written data, views, or arguments.”⁴⁵⁸ Following public comment, the agency issues the final rule, responding to the comments received.

As discussed in the previous subsection, the notice and comment process effectively requires an interim airing of the agency’s understanding of the relevant science and its application to the regulated issue area. One of the primary reasons this is required is so that agencies make the data and information upon which they relied publically available in order to facilitate meaningful participation.⁴⁵⁹ This is a central participatory aspect of the US administrative law of expertise with an important impact on the role of both lay and expert knowledge. While some authors have suggested that the participatory requirements of US

(arguing that in the face of too much transparency it may be too easy to pick apart or “deconstruct” agency science).

⁴⁵⁶ While US courts have not been exceedingly aggressive in ensuring that agencies do not hide political judgments in scientific reasoning, they have been more willing to enforce legislative mandates that particular decisions be based on science by imposing a heightened duty of reason-giving when agency decisions run contrary to the recommendations of science advisory bodies. For example, in *Am. Farm Bureau Fed’n v. EPA*, 559 F.3d 512 (DC Cir. 2009), the DC Circuit remanded EPA’s primary fine particular matter air quality standard, in part because the agency failed to explain its rejection of the recommendation of the Clean Air Scientific Advisory Committee. Similarly, in *Earth Island Inst. v. Hogarth*, 484 F.3d 1123 (9th Cir. 2007), the 9th Circuit vacated the Secretary of Commerce’s finding of no adverse impact of purse-seine fishing’s effect on dolphins in part because the agency’s scientific judgment was improperly influenced by foreign policy concerns. While these cases are notable in demonstrating both the US legislature’s willingness to assign a heightened role to science advisors in particular regulatory decisions, and the courts’ willingness to enforce these requirements in areas where courts are generally deferential to regulators, the fact that these cases turned so critically on statute-specific legislative text requiring such a heightened duty of reason giving, *see, e.g.* 42 U.S.C. §7607(d)(3) (requiring the EPA’s statements of basis and purpose under the Clean Air Act to provide an explanation of differences between the agency’s proposal and the recommendations of the relevant science advisory body), makes it difficult to discern whether this requirement has risen to a general requirement in US administrative law. Continued attention to this issue in future cases is warranted.

⁴⁵⁷ *See* Jasanoff, *supra* note 12 at 33-36 (briefly describing the Congressionally mandated science advisory committees of the Environmental Protection Agency, Food and Drug Administration, Occupational Safety and Health Administration, and Consumer Product Safety Commission).

⁴⁵⁸ 5 U.S.C. § 553(c).

⁴⁵⁹ *See United States v. Nova Scotia Food Prods. Corp.*, 568 F.2d 240, 251 (2d Cir. 1977); *Conn. Light & Power Co. v. Nuclear Reg. Com.*, 673 F.2d. 525, 530, *cert. denied*, 459 U.S. 835 (1982) (“The purpose of the comment period is to allow interested members of the public to communicate information, concerns, and criticisms to the agency during the rule-making process. If the notice of proposed rule-making fails to provide an accurate picture of the reasoning that has led the agency to the proposed rule, interested parties will not be able to comment meaningfully upon the agency’s proposals.”).

administrative law are in tension with requirements that regulations be legitimated using expertise,⁴⁶⁰ this misconceives the role of public comment in the American administrative law of expertise. Because the commenting public consists not simply of members of the lay populace, but also includes a bevy of sophisticated interest groups with their own affiliated experts, the notice and comment process is not just a place for airing policy disagreements; it is a significant onramp for both lay and conventional expertise into the rulemaking process,⁴⁶¹ and the central structure shaping participation in the American administrative law of expertise.

While US courts will exercise a high degree of discretion to agencies in reviewing their substantive decisions, these courts are generally more aggressive in enforcing the central procedural requirements that structure notice and comment rulemaking. An opportunity to comment on a proposed rule is central in this regard. For example, in *Natural Resources Defense Counsel v. EPA*, the First Circuit Court of Appeals heard a challenge to EPA standards for the disposal of high level radioactive waste pursuant to the Nuclear Waste Policy Act.⁴⁶² In that case, the petitioners claimed that the notice of proposed rulemaking failed to provide sufficient notice that the agency was considering promulgating groundwater protection requirements.⁴⁶³ When the agency promulgated a final rule that included such regulations, the petitioners challenged the procedural basis of the rule for failing to allow a sufficient opportunity to comment on this issue. Although the EPA argued that its more general notice that it was considering individual protection requirements was sufficient, the court disagreed. While acknowledging that working with such technically complex issues is difficult, the court wrote that “we believe that in this case, where the issues are so complex, the Agency must be careful to give full and adequate public notice.”⁴⁶⁴ Because the court “normally gives deference to the Agency’s substantive conclusions in complex regulatory matters,” the court stated, “we will insist that the required procedures be strictly complied with.”⁴⁶⁵ As a result, the court remanded the regulation for a second round of notice and comment.⁴⁶⁶

The result in *NRDC v. EPA* is not unusual.⁴⁶⁷ American administrative law strictly requires an opportunity to comment on proposed rules that may impact members of the public. The requirement that interested parties be able to comment on a proposed rule, particularly if it is

⁴⁶⁰ See Catherine Donnelly, *Participation and Expertise: Judicial Attitudes in Comparative Perspective*, in *COMPARATIVE ADMINISTRATIVE LAW*, 357, 371 (Susan Rose-Ackerman & Peter Lindseth, eds.) (2010)

⁴⁶¹ See, e.g. Changes to the final 2011 Cross-State Air Pollution Rule responding to technical comments about the efficiency of certain combustion processes.

⁴⁶² *Natural Res. Def. Council v. EPA*, 824 F.2d 1258 (1st Cir. 1987).

⁴⁶³ *Id.* at 1282.

⁴⁶⁴ *Id.* at 1286.

⁴⁶⁵ *Id.*

⁴⁶⁶ *Id.*

⁴⁶⁷ See also *Portland Cement*, 486 F.2d at 392-93 (remanding a rule because agency release of certain test results after the comment window closed did not provide interested parties with a sufficient opportunity to comment); *Shell Oil Co. v. EPA*, 950 F.2d 741, 752 (D.C. Cir. 1991) (“Because the EPA has not provided adequate notice and opportunity for comment, we conclude that the . . . rules must be set aside and remanded to the EPA.”); *Buckeye Power, Inc. v. EPA*, 481 F.2d 162, 170-73 (6th Cir. 1973) (vacating the approval of a State Implementation Plan under the Clean Air Act for failure to provide an opportunity to comment).

technologically complex, is a key aspect of the US administrative law of expertise, and one which courts police closely.

The participatory impact of the notice and comment procedure is further amplified by the requirement that agencies respond to significant comments they receive during the process.⁴⁶⁸ Although the agency is free to not incorporate changes suggested by commenters, the reasoning requirement forces the agency to engage with the input, scientific and otherwise. This requirement makes the notice and comment input more meaningful, and paves the way for judicial review of challenges that an agency improperly interpreted scientific evidence.⁴⁶⁹ The agency is not required to respond to every point raised by every comment. Generally, the agency need only enable the court to “see what major issues of policy were ventilated by the informal proceedings and why the agency reacted to them as it did.”⁴⁷⁰

However, the requirement to respond to comments does have some teeth in US administrative law. In *American Mining Congress v. EPA* petitioner processing companies challenged EPA’s relisting of six materials as “hazardous” under the Resource Conservation Recovery Act.⁴⁷¹ After acknowledging that “the Administrator may apply his expertise to draw conclusions from suspected, but not completely substantiated, relationships between facts, from trends among facts, from theoretical projections from imperfect data, from probative preliminary data not yet certifiable as ‘fact,’ and the like,”⁴⁷² the court nonetheless remanded EPA’s rule for five of the six materials for failing to respond to petitioners’ comments.⁴⁷³ For these five materials, the DC Circuit found that, in the face of “significant challenges” by the petitioners, the EPA offered only “summary comments” and dated reports that failed to respond with sufficient clarity to the comments.⁴⁷⁴ The court wrote that the agency’s failure to respond to petitioners’ specific challenges in the record were fatal, because “the points raised in the comments were sufficiently central that agency silence . . . demonstrate[s] the rulemaking to be arbitrary and capricious.”⁴⁷⁵

⁴⁶⁸ See *Motor Vehicle Mfrs. Ass’n of the U.S. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 42-44 (1983).

⁴⁶⁹ See, e.g. *Coalition for Responsible Investment v. EPA*, Docket No. 09-1322 (challenging the climate change science behind EPA’s finding that greenhouse gases endanger public health and welfare).

⁴⁷⁰ *Auto. Parts & Accessories Asso. v. Boyd*, 407 F.2d 330, 338 (D.C. Cir. 1968). See also *Thompson v. Clark*, 741 F.2d 401, 408 (D.C.Cir. 1984) (noting that the notice and comment provision of the APA “has never been interpreted to require [an] agency to respond to every comment, or to analyse [sic] every issue or alternative raised by comments, no matter how insubstantial”) (citation omitted); *ACLU v. FCC*, 823 F.2d 1554, 1581 (D.C. Cir. 1987) (emphasis omitted) (quoting *Home Box Office, Inc. v. FCC*, 567 F.2d 9, 35 n.58 (1977)), cert. denied, 485 U.S. 959, 108 S. Ct. 1220, 99 L. Ed. 2d 421 (1988) (noting that the agency need respond only to those “comments which, if true, . . . would require a change in an agency’s proposed rule”).

⁴⁷¹ *Am. Mining Cong. v. EPA*, 907 F.2d 1179 (D.C. Cir. 1990).

⁴⁷² *Id.* at 1187 (citing *Ethyl Corp. v. EPA*, 541 F.2d 1, 28 (D.C.Cir.) (en banc), cert. denied, 426 U.S. 941 (1976)).

⁴⁷³ *Id.* at 1190.

⁴⁷⁴ *Id.* at 1191.

⁴⁷⁵ *Id.* (quoting *Natural Res. Def. Council v. EPA*, 859 F.2d 156, 188 (D.C. Cir. 1988)) (alteration and omission in original).

The *American Mining* court is not an outlier in American administrative law.⁴⁷⁶ In the American administrative law of expertise, participation is understood to be made meaningful by requiring the agency not just to receive comments, but to respond to them. The requirement that agencies respond to comments received in rulemaking is a key aspect of the rules governing participation in the US administrative law of expertise.

Moreover, the process plays an important role in *constraining* participation later. By requiring judicial review based solely on the docket, the doors are open to anyone who wants to participate during the allotted window, but latecomers, or individuals purporting to come forward with new scientific evidence after the close of the comment window are excluded. The US administrative law of expertise should thus be understood to seek to balance participation rights and administrability concerns.

Finally, US courts, when interpreting a statute that appears to require a scientific determination, may intervene in agency decision making in order to ensure that the decision being made is a scientific one and not a political one. Jody Freeman and Adrian Vermeule have argued that the US Supreme Court in *Massachusetts v. EPA* engaged in what they called “expertise forcing.”⁴⁷⁷ In that case, the majority faulted the EPA for failing to provide a “reasoned justification for declining to form a scientific judgment,” writing that “[i]f the scientific uncertainty is so profound that it precludes EPA from making a reasoned judgment as to whether greenhouse gases contribute to global warming, EPA must say so.”⁴⁷⁸ Not only did the Court require EPA to make a decision about whether EPA believed that greenhouse gases endanger public health and welfare, they effectively required that this judgment be a scientific one, dictating the relative participation of experts and non-experts in this particular agency action.⁴⁷⁹ Although some of the details of this case turn on the text of the Clean Air Act, the fact that US courts will step in and enforce the type of actors within the agency that should participate in regulation is an important aspect of the American administrative law of expertise.

B. EC Administrative Law of Expertise

1. General Overview

EC administrative law is a somewhat more complex institution than American administrative law due to the much more significant role for member states in the multi-level, or quasi-federal structure of the EC. Although states in the US play some role in American

⁴⁷⁶ See also *National Tire Dealers & Retreaders Asso. v. Brinegar*, 491 F.2d 31, 37-38 (D.C. Cir. 1974) (remanding the National Highway Traffic Safety Administration’s rule because they agency’s “mere assertions” that the proposed tire labeling rule was economically feasible were not a sufficient response to the “considerable comment” in the record to the contrary); *Natural Res. Def. Council v. EPA*, 859 F.2d 156, 188 (D.C. Cir. 1988) (referring to the requirement that agencies respond to comments submitted on proposed rules as a “fundamental tenet of administrative law”).

⁴⁷⁷ Freeman & Vermeule, *supra* note 33722.

⁴⁷⁸ *Massachusetts v. EPA*, 549 U.S. 497, 534 (2007)

⁴⁷⁹ See also *supra* note 456 (discussing US courts’ willingness to impose a heightened burden of reason-giving in situations where the ultimate decision departed from the recommendation of a science advisory body.

administrative law,⁴⁸⁰ the more centralized nature of US federalism means that American administrative law is itself much more centralized than EC administrative law. Although some provisions in EC administrative law regulate EC institutions, it is much more common for Community law to apply to Member States, which then have the duty of implementing the Community-wide provisions within their own domestic legal systems.

The primary institutions of the EC are the European Council, the Council of the EU, the European Parliament, the European Commission, and the Court of Justice of the European Union. The European Council consists of the President of the European Council, the President of the European Commission, and a collection of the head of state or heads of government of each Member State. The European Parliament and the Council of the EU are effectively the legislative bodies. These bodies operate in an essentially bicameral manner. The Council of the EU consists of national ministers from each member state, with different constellations of ministers sitting depending on the issue area discussed.⁴⁸¹ The European Parliament consists of members who are directly elected by EU citizens based on proportional representation.

For the purposes of EU administrative law, the European Commission (“Commission”) and the Court of Justice of the EU (CJEU) are the two most important bodies. The Commission can be thought of as sharing the executive power with the European Council. While the Council consists of leaders of states and addresses the bulk of the foreign policy matters of the EU, the Commission consists of 27 commissioners, one from each state, and each one in charge of a different issue area.⁴⁸² The Commission is in charge of drafting legislation, which must subsequently be approved by the Council of the EU and the Parliament. The Commission also has enforcement powers. If a treaty or law is not being upheld, the Commission may take a member state or other institution to the ECJ. Finally, in much the same way as in US administrative law, the Commission may also be assigned implementation powers by an EU treaty or other law. These delegated powers may include the ability to establish rules for the implementation of legislation.

The CJEU is the judicial body of the EU. It consists of three different courts, the European Court of Justice (ECJ), the General Court (formally the Court of First Instance), and the Civil Service Tribunal. Cases brought before the General Court can be appealed to the ECJ – the highest court in the EU – on points of law.⁴⁸³ The CJEU can review the legality of the acts of EU institutions, and ensure that member states comply with their treaty obligations. The CJEU may also interpret EU law at the request of national courts.

The primary non-treaty legal instruments in EU law are regulations, directives, and decisions. Regulations are directly applicable enactments that bind member states and/or individuals and do not require implementation at the national level. Directives are binding on the Member States to which they are addressed, and require implementation by national legislation to achieve the results required by the directive. Decisions are generally more narrowly applicable

⁴⁸⁰ See for example the “cooperative federalism” structure of the Clean Air Act wherein the EPA sets air quality standards and the states must develop State Implementation Plans to meet these standards. *See* 42 U.S.C. §7410.

⁴⁸¹ For example, when environmental issues are being discussed, a relevant minister charged with responsibility in this area attends from each Member State.

⁴⁸² For example, Competition, Mobility and Transport, and Environment.

⁴⁸³ Article 256, Treaty on the Functioning of the European Union.

requirements on individuals or Member States requiring specific acts, such as the recovery of subsidies that have been found to be contrary to the common market.⁴⁸⁴

The EU administrative law of expertise has developed as regulations, directives and decisions have been developed by the legislative organs of the EU. These laws have then been either enforced before the CJEU by the Commission or challenged by interested Member States or other parties. The EU institutions have a much shorter history than the American legal system and hear significantly fewer cases. As a result, the law has not developed in as many different circumstances and situations as US administrative law. Nevertheless, a number of important CJEU decisions have addressed issues relating to the use of science and expertise in policymaking and begin to mark the outline of an EU administrative law of expertise.

2. Transparency

a. Input Transparency

Input transparency in the EC administrative law of expertise does not appear to have a firm legislative base. Instead, a requirement for a type of input transparency has slowly grown from various soft law principles within the Community. However, in 2002 the Court of First Instance solidified some of this soft law preference for input transparency into a more firm requirement.

In *Pfizer Animal Health SA v. Council*, the court sought to lay out principles for when scientific advice has sufficient indicia of reliability to feed into the policy making process. Drawing from the preamble to a previous decision, and the Commission's Communications on the Precautionary Principle and on Consumer Health and Food Safety – not a binding document – the court concluded that “scientific advice on matters relating to consumer health must . . . be based on the principles of excellence, independence, and transparency.”⁴⁸⁵ The court then used these indicia to distinguish a valid independent scientific body from a political body. In establishing that the Standing Committee was not fit to give scientific advice, the court wrote that even if the Standing Committee's work met with the principle of “excellence” of scientific advice, “it would not, failing publication, meet the requirement that scientific evidence should be transparent.”⁴⁸⁶

This language notwithstanding, it is unlikely that the *Pfizer* court has laid out a per se rule that scientific advice cannot be considered by the Commission unless it is published. Rather, it seems that transparency of scientific information coming into the Commission is important to the legitimacy of Community regulation, and that absent publication or some other mode of transparency, the Commission is not free to consider such input as scientific advice.

Although EC administrative law is somewhat later to develop than US law, and there are few cases on this principle at present, the fact that the court created a firm requirement on its own volition out of a number of soft law documents speaks to the court's sense that some type of

⁴⁸⁴ See Rob Widdershoven, *European Administrative Law*, in ADMINISTRATIVE LAW OF THE EUROPEAN UNION, ITS MEMBER STATES, AND THE UNITED STATES: A COMPARATIVE ANALYSIS (René Seerden & Frits Stroink, eds.), 259, 271 (2002).

⁴⁸⁵ *Id.* at ¶159.

⁴⁸⁶ *Id.* at ¶287. The Standing Committee is a body consisting of representatives from EC member states and the Commission to help ensure cooperation between member states and the commission in the sphere of feedingstuffs. *Id.* at ¶281-82.

input transparency requirement is important in building a legitimate administrative law of expertise.

b. Output Transparency

Beyond the EC's burgeoning input transparency requirement, the EC administrative law of expertise also has an important requirement for a type of output transparency. A broad duty to state reasons applies to all law adopted by the EC bodies. Article 252 of the Treaty Establishing the European Community provides that: "Regulations, directives and decisions adopted jointly by the European Parliament and the Council, and such acts adopted by the Council or the Commission, shall state the reasons on which they are based and shall refer to any proposals or opinions which were required to be obtained pursuant to this Treaty." This requirement has been held to apply to scientific reasoning as well, requiring the Commission to justify its scientific conclusions.

For example, in the *Pfizer* case the court held that not only did the Commission have a duty to give its reasons for its decision, but when the Commission reached different conclusions from its scientific advisory committee, its duty to give reasons was heightened. In that case, Pfizer, a producer of antibiotics, challenged an EC regulation banning the use of four different antibiotics in animal feed. The antibiotics were used as growth promoters, but their ban was based on a concern that antibiotic resistance could develop in a way that could transfer to humans, making future medical treatment more difficult.⁴⁸⁷ The Commission consulted with the Scientific Committee for Animal Nutrition (SCAN), but ultimately made a decision that ran contrary to the opinion that SCAN had given in its report.⁴⁸⁸ The court wrote that "[t]o the extent to which the Community institution opts to disregard the [scientific] opinion, it must provide specific reasons for its findings by comparison with those made in the opinion and its statement of reasons must explain why it is disregarding the latter."⁴⁸⁹ Moreover, the court required that the statements of reasons must be of a scientific level at least commensurate with that of the opinion in question.⁴⁹⁰

This duty to give reasons is important in both facilitating legal challenges, and legitimating Community actions to the onlooking public. This second role is arguably of heightened importance in the EC where an added layer of separation between Community decisions and the electorate is likely to give rise to more difficult practices of trust-building between the citizenry and Community-level transnational expert bodies.⁴⁹¹

3. Participation and the Role of Experts

European administrative law does not provide for the type of broad public input that is provided for in US notice and comment rulemaking. Nonetheless, participation is an important

⁴⁸⁷ *Pfizer* [2002] ECR II-3305,

⁴⁸⁸ Consultation is a process that is initiated by a written request from the Commission staff, triggering a formal procedure for producing a scientific opinion. *Id.* at ¶274.

⁴⁸⁹ *Id.* at ¶199.

⁴⁹⁰ *Id.*

⁴⁹¹ See Miller, *supra* note 307.

part of administrative activity in the EC.⁴⁹² However, EC administrative law is particularly attentive to when expert and/or political participation are or are not appropriate. For example, EC administrative law sets threshold criteria for organizations that the Commission will consult with, requiring such organizations to have the qualities of independence and transparency.⁴⁹³ The General Court has gone so far as to distinguish between political influence and expertise, holding that a political committee cannot supply sufficiently independent scientific advice to consult with the Commission.⁴⁹⁴

This screening role in the participatory process in the EC is very attentive to concerns that experts may step in and make the political decisions appropriately left to political actors.⁴⁹⁵ This may reflect the unease many Europeans have about a “democratic deficit” in EU governance.⁴⁹⁶

However, when issues are legitimately technical EU courts have also shown a willingness to intervene to ensure the participation of appropriate experts. In *Angelopharm GmbH v. Freie Hansestadt Hamburg* a cosmetics manufacturer challenged the addition of a key ingredient in one of its hair-loss prevention products to a list of substances that are forbidden for use in cosmetic products.⁴⁹⁷ Angelopharm brought a procedural challenge alleging that the directive at issue required consultation with a scientific committee before an item could be added to the list.⁴⁹⁸ Turning to the text of the directive, the court found that there was ambiguity in the text – particularly in light of what appeared to be different meanings in the different language versions of the directive.⁴⁹⁹ In order to resolve the ambiguity, the court looked to the role that the scientific committee was to play in the process of amending the list.⁵⁰⁰ Looking to the preambular text of a number of directives regarding cosmetic products, the court concluded that EC rules governing such products are “founded on scientific and technical assessments” that must themselves be based on the latest international research. The court then concluded that because of the central role of science, the Commission could not, unaided, carry out the required complex assessment.⁵⁰¹ The Scientific Committee on Cosmetology, on the other hand, was established in order to provide the Commission with the assistance necessary to examine these complex scientific and technical problems. The court wrote: “[s]ince the purpose of consulting the Scientific Committee is to ensure that the measures adopted at Community level are

⁴⁹² See Commission of the European Union, *European Governance – A White Paper* (2001) (including participation in decision making as a principle of European governance).

⁴⁹³ See Commission of the European Union, *Commission Communication Towards a Reinforced Culture of Consultation and Dialogue – General Principles and Minimum Standards for Consultation of Interested Parties by the Commission* (2002); Donnelly, *supra* note 460.

⁴⁹⁴ See Case T-70/99 *Alpharma Inc. v Council* [2002] ECR II-3495, ¶ 236; Donnelly, *supra* note 460 at 365.

⁴⁹⁵ See Commission White Paper, *supra* note 492 (expressing some consternation about “who is actually deciding – experts or those with political authority”).

⁴⁹⁶ Donnelly, *supra* note 460 at 363. See also MARIA LEE, *EU ENVIRONMENTAL LAW: CHALLENGES, CHANGE AND DECISION-MAKING* (2005).

⁴⁹⁷ Case C-212/91 *Angelopharm GmbH v. Freie Hansestadt Hamburg* [1994] ECR I-171, ¶ 1.

⁴⁹⁸ *Id.* at ¶¶ 19-20.

⁴⁹⁹ *Id.* at ¶ 26.

⁵⁰⁰ *Id.* at ¶ 30.

⁵⁰¹ *Id.* at ¶ 32.

necessary and adapted to the objective, pursued by the Cosmetics Directive, of protecting human health, consultation of the Committee must be *mandatory* in all cases.”

In *Angelopharm*, The ECJ was not afraid to step in and require that experts play a role in the regulatory process, even in the face of ambiguity, and where it required butting heads with the regulating agency.⁵⁰² In *Technische Universität München v. Hauptzollamt München-Mitte*, the court took this approach a step further, going so far as to scrutinize the qualifications of proposed experts to ensure that the proper expertise was being deployed.⁵⁰³ In that case, the Court interpreted EC regulation regarding the tariff-free import of scientific materials.⁵⁰⁴ Under the regulation, scientific instruments may be imported free of customs duties as long as instruments of equivalent scientific value were not being manufactured in the Community.⁵⁰⁵ In the case of a disagreement regarding whether a specific item fits the requirements, a “group of experts” composed of representatives of all member states meets to decide.⁵⁰⁶ In analyzing a challenge to the decision of a particular “group of experts,” the Court wrote that such a body should be “impartial” and have access to the necessary technical expertise.⁵⁰⁷ Where, as here, the “group of experts” consisted of members of the Ministries of Finance or Trade and Industry, the court wrote that such a group may be unduly sensitive to the interests of manufacturers in their respective countries, and not sufficiently motivated by independent technical advice.⁵⁰⁸ As a result, the court declared the decision invalid, writing that it was not satisfied that the decision was “based on the objective findings of an independent group of persons possessing the necessary technical expertise.”⁵⁰⁹

While the Court has thus worked, in the face of textual ambiguity, to secure expert participation in situations where it appeared that such participation would be important to effectuating the goals of the legal provisions at issue, the Court has also been careful to cabin expert participation in other areas. In the *Pfizer* case, introduced above, the Commission consulted with the Scientific Committee for Animal Nutrition (SCAN) in the process of adopting the regulation banning the use of certain antibiotics in animal feed. SCAN produced an opinion in which it ultimately concluded that use of the antibiotics did not constitute a real immediate risk to public health.⁵¹⁰ Nevertheless, the Commission asserted that there was sufficient scientific information to conclude that a risk to human health did exist, and the Council relied on this in

⁵⁰² See also, *Pfizer* at ¶270 (“it is only in exceptional circumstances and where there are adequate guarantees of scientific objectivity that the Community institutions may, when . . . they are required to assess particularly complex facts of a technical or scientific nature, adopt a preventive measure withdrawing authorization from an additive without obtaining an opinion from the scientific committee set up for that purpose at Community level on the relevant scientific material.”).

⁵⁰³ Case C-269/90 *Technische Universität München v. Hauptzollamt München-Mitte* [1991] ECR I-5469, ¶¶34-39; Donnelly, *supra* note 107 at 365.

⁵⁰⁴ *Id.* at ¶2.

⁵⁰⁵ *Id.*

⁵⁰⁶ See Regulation 2784/79 Art. 7(5).

⁵⁰⁷ *Technische Universität München*, at ¶34.

⁵⁰⁸ *Id.*

⁵⁰⁹ *Id.* at ¶39.

⁵¹⁰ *Pfizer* [2002] ECR II-3305, ¶193.

making its decision.⁵¹¹ The Commission claimed to have used the science in the SCAN report to form its conclusions, but its view of those conclusions simply differed from that of the scientific committee. Pfizer claimed that this was inappropriate and that the Commission was not free to disregard SCAN's conclusions.⁵¹²

The court disagreed. Emphasizing that SCAN was an advisory body, the court wrote that the role played by a committee of experts in a procedure designed to produce a decision is restricted to answering the questions which are asked of it, and providing reasoned analysis of the relevant facts.⁵¹³ Explicitly addressing the role of expertise in public decision making, the court wrote that “[w]hilst the Commission’s exercise of public authority is rendered legitimate . . . by the European Parliament’s political control, the members of SCAN, although they have scientific legitimacy have neither democratic legitimacy nor political responsibilities.”⁵¹⁴ Scientific legitimacy, the court wrote, “is not a sufficient basis for the exercise of public authority.”⁵¹⁵

These cases demonstrate that in the EC administrative law of expertise the court plays a strong role in policing where experts will and will not participate. In *Angelopharm* and *Technische Universität München*, the court stepped in to ensure that experts were participating in decisions that required expert input. In *Pfizer*, the courts played the opposite role, making sure that expert participation did not encroach upon political decisions that were properly reserved for democratically elected decision makers.⁵¹⁶

IV. COMPARISON AND THE EMERGENCE OF A GLOBAL ADMINISTRATIVE LAW OF EXPERTISE?

This section takes up a comparison of the administrative law of expertise of the US and EC laid out in the prior section. Although there are important differences between the two systems, with one system developing case law in areas that the other has yet to seriously consider, a number of broad similarities are apparent. In both systems, some type of input transparency requirement is in place, regulating the public-availability of information that the decision maker considered. Both systems similarly impose a burden of reason giving that, far from being set aside in the face of complex decisions, may actually be heightened by it. Finally, both systems are marked with a judiciary that is willing to insert itself in the face of ambiguous text and require the participation of experts in certain aspects of technical decision making. The details and ramifications of these similarities are explored in the next two subsections, followed by a discussion of the relevance of domestic practice for the formation of international law.

⁵¹¹ *Id.*

⁵¹² *Id.* at ¶187.

⁵¹³ *Id.* at ¶197.

⁵¹⁴ *Id.* at ¶201.

⁵¹⁵ *Id.*

⁵¹⁶ *See generally* Wagner, *supra* note 41.

A. Transparency

Both the US and EC administrative laws of expertise rely on some sort of requirement that input to administrative decision making be made publically available. The requirement, however, takes a different form in the two systems. In the US, the *Portland Cement* line of cases place an affirmative duty on US agencies to provide, in the docket, all of the information it has considered in its decision making process. In the EC by contrast, the input transparency requirement takes the form of a negative requirement, prohibiting the Commission from considering purported scientific advice that is not itself transparent.

On their face, the two requirements are arguably motivated by somewhat different concerns. The US requirement that all information considered by the regulator be made available to the public is understood to be a “prerequisite to the ability to make meaningful comment,”⁵¹⁷ as well as a guarantee that regulations not be promulgated with “inadequate data, or on data that, [to a] critical degree, is known only to the agency.”⁵¹⁸ Moreover, the US input transparency requirement is understood to “enhance the quality of judicial review.”⁵¹⁹ The EC requirement, by contrast, is framed as a requirement to screen the type of information that the regulator may consider – in essence a type of quality control on the input to the regulatory process.⁵²⁰ Much of this difference may be explained by the differences in the participation expectations between the broadly pluralist US notice and comment system and the somewhat more corporatist EC system, as will be discussed in the next subsection. From a transparency perspective, the end effect of both of these requirements is similar: information that has not been made available to the public may not be used to support regulatory decisions.

Interestingly, both of these requirements have only a loose basis in legislative text. Recall that the APA only requires notice of “either the terms or substance of the proposed rule or a description of the subjects and issues involved.” 5 USC §553(b)(3). This text does not on its face require a point-by-point disclosure of all of the information that the agency considered in its decision making. Judge Brett Kavanaugh of the DC Circuit authored a dissent in *American Radio* pointing this out and arguing that the *Portland Cement* line of cases stands on shaky legal foundation.⁵²¹ In his dissent, Judge Kavanaugh wrote that the *Portland Cement* disclosure requirement cannot be found in the text of the APA, and that given the United States Supreme Court’s requirement that the judiciary not create additional requirements for agency decision making under the APA,⁵²² *Portland Cement*’s disclosure requirement should no longer be good law.⁵²³

Similarly, in the EC the *Pfizer* court, lacking any hard law requirements that scientific input to the Commission meet specific requirements, looked to soft law documents to construct a rule that scientific advice to Commission decision making be based on the principles of excellence, independence, and transparency. The court then applied this newly fashioned

⁵¹⁷ 486 F.2d 375, 393 (D.C. Cir. 1973).

⁵¹⁸ *Id.* at 392-93.

⁵¹⁹ 524 F.3d 227, 236-40 (D.C. Cir. 2008).

⁵²⁰ See *Pfizer* [2002] ECR II-3305 at ¶¶159, 287.

⁵²¹ *American Radio*, 524 F.3d at 245-47 (Kavanaugh, dissenting).

⁵²² See *Vermont Yankee Nuclear Power Corp. v. Natural Res. Def. Council, Inc.*, 435 U.S. 519 (1978).

⁵²³ *American Radio*, 524 F.3d at 245-47 (Kavanaugh, dissenting).

requirement to exclude input from a body that it considered to be too political to offer scientific input.

The fact that courts in both legal systems have read in such a requirement absent a firm textual basis has mixed connotations for considering the relevance of this principle to an international administrative law of expertise. To the extent that the “input transparency” requirement did not stem from the legislature, it lacks the democratic legitimacy that accompanies enactments of popularly elected representatives. However, the fact that, absent the requirement’s presence in the text, the judiciary in both systems felt it was necessary to create it in order to effectuate the goals of (often imprecise) legislative enactments, may suggest that input transparency is a process or general principle that has proved to be a practical necessity in public technical decision making. In order to bolster the legitimacy of what might otherwise be challenged as smoky back-room decision making, the judiciary in both the US and EC have taken the somewhat extraordinary step of reading this requirement into the law.⁵²⁴ In neither instance has the legislature stepped in to modify this judicial practice. As a result, although in neither system does the input transparency requirement have the direct force of popular legislative enactment, it has emerged as an important, and perhaps necessary component of each legal system’s administrative law of expertise.

Both the US and EC legal systems also have a general legislatively-imposed requirement that administrative decision makers give reasons for their decisions. These broadly-phrased requirements – requiring a “concise general statement of [a rule’s] basis and purpose” and that EC enactments “state the reasons on which they are based” – have been interpreted in both legal systems to take on a particular, and perhaps heightened significance in the case of scientific and technical decisions. In *Nova Scotia*, the US Second Circuit Court of Appeals wrote that “when the Secretary is obliged to make policy judgments where no factual certainties exist or where facts alone do not provide the answer, he should so state and go on to identify the considerations he found to be persuasive.”⁵²⁵ Similarly, in *Pfizer* the Court of First Instance held that if the Commission was going to disregard the opinion of its science advisory committee, “it must provide specific reasons for its findings by comparison with those made in the opinion and its statement of reasons must explain why it is disregarding the latter.”⁵²⁶

As discussed briefly above, this requirement is not firmly entrenched in US administrative law and a number of scholars have called for its strengthening.⁵²⁷ However, the existence of this norm of justification in both legal systems may serve the important goal of preventing administrative decision makers from hiding the true basis of their decisions, and thus facilitating their being held to account.⁵²⁸ Although the general rule is firmly entrenched by

⁵²⁴ This practice could alternatively – or additionally – be understood as an institutional power grab on the part of the judiciary. By subjecting the agency to a heightened duty to disclose, it also makes agency action more susceptible to judicial review.

⁵²⁵ *Nova Scotia*, 568 F.2d at 252 (quoting *Industrial Union Dep’t, AFL-CIO v. Hodgson*, 499 F.2d 467, 475 (1974)).

⁵²⁶ *Pfizer* [2002] ECR II-3305 at ¶199. Some US courts have enforced similar requirements where explicitly required by the legislature. See *supra* note 456.

⁵²⁷ See *supra* note 455.

⁵²⁸ See *American Radio* 524 F.3d at 237-37 (noting that enforcing the APA’s notice and comment requirements prevents an agency from “play[ing] hide the peanut with technical information, hiding or disguising the information that it employs.”) (quoting *Conn. Light & Power Co. v. Nuclear Regulatory Comm’n*, 673 F.2d

legislation in both systems, the heightened requirements in the area of scientific decision making are on less solid footing. Nonetheless, the requirement certainly does not apply with lesser force to technical decision making in either system, making some sort of output transparency an important aspect of the administrative law of expertise in both legal systems.

It may also bear noting that neither legal system imposes strong requirements for a sort of process transparency – that is, actual access to agency deliberations in coming to its conclusions. It may be that too much access here could render administrative decisions too susceptible to challenge, as challengers could too easily deconstruct agency decisions by asking why the agency may have changed its mind at various points throughout the process.⁵²⁹

B. Participation

The rules of participation in science-related public decision making differ more significantly between the two systems than the rules related to transparency. In the US, the broad pluralist requirement for public participation in the rulemaking process does not have a parallel in the EC. This may be more of a function of the intergovernmental quasi-federalist nature of the EC. With citizen participation in their domestic governments, and governments able to weigh in and participate more in the regulatory process, the need for broad public input may be lessened. Moreover, the EC threshold requirements for consulting only with independent and transparent organizations may prevent the participation of some input that could enter in the US system. Again though, such interests are likely to be able to be brought to bear through national representatives, suggesting that the difference may not be so stark.

Both systems do see a role for both lay and public participation in scientific and technical decision making. However, it is somewhat unclear what this would look like transposed to the international level. Is participation by nations sufficient, based on the understanding that they take into account the interests of their citizens – an issue that arises in the EC? This may be unsatisfactory, as it may problematically limit the availability of different scientific viewpoints to an international adjudicator. Broader participation rights for the interested public may be a candidate for an emerging global administrative law of expertise. Indeed, the WTO has recently responded to such pressure by beginning to accept *amicus curiae* briefs.⁵³⁰

There may also be practical difficulties to expanding participation rights in international contexts. With a potentially significant number of comments (in the form of input to global standard setters, such as the Codex Alimentarius Commission or Clean Development Mechanism Executive Board, or *amicus curiae* briefs to the WTO DSB), it may simply not be practical to open the floodgates. Recall that in the US domestic context, participation rights are curtailed after the close of the comment period, largely for administrability concerns. If participation rights are to be meaningfully expanded in the international administrative space, practical administrability interests will similarly need to be balanced against the benefits that would come from broader participatory rights.

Finally, both legal systems appear willing to engage in some type of “expertise forcing” – ensuring that certain types of decisions are either made by experts or with expert input. In

525, 530-31 (D.C. Cir. 1982)). *See also*, Doremus, *supra* note 373 (arguing that a lack of transparency in agency science-based decisions encourages agencies to hide political decisions in technical language).

⁵²⁹ *See* Jasanoff, *supra* note 12; Hilgartner, *supra* note 22; Jasanoff, *supra* note 363.

⁵³⁰ *See* Winickoff et. al., *supra* note 48.

Massachusetts v. EPA the US Supreme Court faulted the EPA for failing to provide a “reasoned justification for declining to form a scientific judgment.”⁵³¹ Similarly, in *Angelopharm* the CJEU required consultation with experts in technical decision making, and in *Technische Universität München*, the court even went so far as to ensure that proper experts sat on an expert body.

The question of expertise forcing may have particularly strong implications in international organizations such as the WTO whose treaty text contains specific requirements that classes of decisions be science-based and made on the basis of scientific evidence. Indeed the very presence of such requirements in the treaty text are plainly understandable as attempts to conduct expertise forcing in that forum. While such text has been oft maligned for limiting the authority of democratically elected representatives to pass the laws they see fit,⁵³² this analysis has demonstrated that some degree of judicial expertise-forcing is not per se problematic in either US or EC administrative law. The fact that expertise forcing is acceptable, in some form in both the US and EC is likely due in part to the existence of politically acceptable mechanisms for testing and validating knowledge claims in these systems.⁵³³ As a result, the validity of expertise-forcing at the international level should also be understood to be contingent on building mechanisms that will be seen as broadly legitimate in these forums. As this chapter has argued, international adjudicators may be able to bolster the legitimacy of their decision making by both learning from, and exercising deference to these different domestic practices.⁵³⁴

Making decisions “based on” science does not mean that scientists are authoritative technocrats in either administrative law system. It need not mean that internationally as well if international adjudicators are attentive to shared norms in the administrative law of expertise between member nations.

C. Domestic and Regional Practice and International Law

The fact of domestic or supranational legal similarity is, of course, not sufficient to generate obligations under international law. Nor, it should be noted, will practices of governments that are deemed legitimate by their own polities necessarily conjure up the same sense of legitimacy when practiced by global institutions.⁵³⁵ Different institutional arrangements and the greater distance between individual citizens and international institutions may lead to different requirements in terms of transparency and participation. However, although domestic practice does not necessarily ripen into international law and is not a perfect analog for international practice, neither is domestic practice irrelevant to the formation of international law. This subsection discusses the relevance of the above comparative analysis of US and EU administrative law of expertise to the formation of a global administrative law of expertise.

As an initial matter, this chapter is not so cavalier as to make the positive claim that a developed global administrative law of expertise has come into being, or the normative claim

⁵³¹ See also *Am. Farm Bureau Fed'n v. EPA*, *supra* note 456.

⁵³² See, e.g. Scott, *supra* note 400.

⁵³³ See Jasanoff, *supra* note 1.

⁵³⁴ See generally Walker, *supra* note **Error! Bookmark not defined.**

⁵³⁵ See generally Miller, *supra* note 307; OSCAR SCHACHTER, INTERNATIONAL LAW IN THEORY AND PRACTICE, 178 (1982) (listing, in addition to the requirements that general principles of law be general and recognized, that they be “appropriate” for international application in order to become part of international law).

that similarities identified through comparative analysis should be plucked from their domestic and regional legal contexts and reproduced without reflection in international adjudicative systems. However, there are important lessons to be drawn from this comparison.

As a positive matter, international adjudicatory bodies often do look to domestic practices as gap fillers when operating in areas of ambiguity. Although such practice may not conform *de jure* to the sources of law laid out in, for example, the statute of the ICJ,⁵³⁶ it certainly has a strong *de facto* impact. This is precisely the legal vacuum that much of global administrative law operates within. For example, in the *Shrimp Turtle* dispute before the WTO the Appellate Body (AB) addressed a challenge to the differential impact of US turtle protection requirements for shrimping vessels. Alongside an array of other issues, the AB, in holding the US law to not be in conformity with the agreement, noted that the US had not provided any of the States whose exports of shrimp had been banned by US domestic regulation, the basic guarantees of administrative procedures, such as the procedure to be heard.⁵³⁷ The AB had no textual basis for its imposition of these basic guarantees of administrative procedures, it simply read this broadly shared requirement of domestic administrative law into the law. The emergence of such general principles of administrative law out of systems of domestic administrative law illustrates that broadly shared domestic administrative law principles may develop into international principles for administrative legitimacy.

Similarly, in the WTO dispute *Continued Suspension of Obligations in the EC-Hormones Dispute*,⁵³⁸ the WTO AB was faced with a challenge from the EC that the body of experts that the Dispute Settlement Panel had relied upon in making many of its factual findings was biased because two of the experts on that panel had served on an expert committee whose conclusions were specifically challenged by the EC. Absent any specific treaty-based requirements describing Panel consultation with experts, the AB looked to broadly shared due process principles in order to lay out a due process of expertise within the WTO.⁵³⁹ The AB wrote that “the protection of due process is an essential feature of a rules-based system of adjudication.”⁵⁴⁰ Noting that scientific experts “can have a significant bearing on a panel’s consideration of the

⁵³⁶ See Article 38, Statute of the International Court of Justice (laying out the sources of law the court shall apply).

⁵³⁷ See Juli Ponce Solé, *EU Law, Global Law and the Right to Good Administration*, in GLOBAL ADMINISTRATIVE LAW AND EU ADMINISTRATIVE LAW: RELATIONSHIPS, LEGAL ISSUES, AND COMPARISON, 133, 141 (2011).

⁵³⁸ WT/DS320/AB/R (Oct. 16, 2008) [hereinafter “Hormones II”].

⁵³⁹ See Chapter 1. Conflict of interest requirements are common features in many domestic legal systems. See, e.g., Sven Timmerbeil, *The Role of Expert Witnesses in German and U.S. Civil Litigation*, 9 ANNUAL SURVEY OF INT’L & COMP. L. 163, 173-74 (describing conflict of interest rules for disqualifying non-neutral experts in German civil litigation). Note that given the adversarial nature of the US legal system and the infrequent use of court-appointed experts, the conflict of interest rules for experts in US law take a somewhat different form. Although these rules focus predominantly on experts having sensitive information from past interactions with the opposing party, US courts have developed an “inherent power to disqualify experts on the basis of the expert’s past relationship with an adversary in the litigation.” *Am. Empire Serv. Lines v. Care Ctrs.*, 484 F.Supp. 2d 855, 857 (N.D. Ill. 2007). This inherent power of US courts to disqualify experts is not limited to these situations and instead extends to more general notions of fairness in the presentation of expert evidence. See, e.g., *Id.* (holding that in spite of a proposed expert having no confidential information about the opposing party, allowing one party to retain an expert for the benefit of a second party in a prior action, and use her later to the second party’s detriment in a second related action “undermines public confidence in the integrity and fairness of the judicial process.”).

⁵⁴⁰ Appellate Body Report, *Hormones II*, at ¶433.

evidence . . . especially in cases like this one involving highly complex scientific issues,” the AB found that the protection of due process must apply to a panel’s consultations with experts.⁵⁴¹ Finding that due process principles of fairness and impartiality were not respected in this case, the AB overturned the Panel’s decisions that drew from the advice of these experts. The AB’s willingness to use broadly shared due process principles to motivate its decision making in technical decisions demonstrated the practical importance of being attentive to broadly shared principles in diverse legal systems. These principles will continue to serve as gap fillers – providing a menu of potentially legitimate principles for international adjudicators to draw from when faced with decisions that are underdetermined by the text of the treaty itself. Given the relevance of domestic practice to the *de facto* practice of international adjudication, there are likely to be significant benefits to a more systemic examination of the commonalities of such practice in specific areas of law.

Moreover, shared domestic practice may be indicative of the types of practice that are likely to garner broad legitimacy in international law. Although there may be reasons for differences on the international scale (and, indeed between different fragmented international legal systems), broadly shared domestic practice is likely to provide a strong normative compass. The issue of the desirability of utilizing broadly shared domestic administrative law practices for building a global administrative law of expertise can be thought of as having two components. The first is related to the variety of civic epistemologies that come together when nations come together to address problems internationally. The mere points of disagreement between these different national and regional political cultures and their respective sources of domestic legitimacy may make it difficult to come to shared understandings of an appropriate administrative law of expertise. This is the problem this chapter was designed to address. If broadly shared commitments about the use of expertise in domestic administrative law can be identified, international solutions drawing from these broadly shared commitments may be able to garner a broader and more robust sense of legitimacy.

The second, more problematic issue in evaluating the desirability of utilizing broadly shared domestic administrative law practices in international law is that there may be emergent qualities of the use of science in international public decision making that make principles that are appropriate in domestic and regional systems inappropriate internationally.⁵⁴² Such differences may include the accountability gap between citizens of the various countries of the world and international institutions,⁵⁴³ and the lack of broadly trusted institutions whose claims to making authoritative knowledge are widely recognized. In practice, these problems have been addressed in two separate ways: deference to domestic findings, and the formation of international science advisory bodies. These methods, while useful in building broadly legitimate practices for evaluating knowledge claims in international law, are not sufficient.

The argument for deference is well illustrated in the WTO context where Vern Walker has called for the WTO to take a deferential stance to different nations’ science-based regulations, because of the different “science policies” of the various member nations.⁵⁴⁴ Walker’s argument goes beyond an argument for deference to the varying risk preferences of

⁵⁴¹ *Id.* at ¶436.

⁵⁴² *See* Miller, *supra* note 307.

⁵⁴³ *See, e.g.* Esty, *supra* note 338.

⁵⁴⁴ *See* Walker, *supra* note **Error! Bookmark not defined.** *See* also discussion surrounding *supra* note 379.

different polities and instead implicates the different policies that guide domestic risk assessment techniques. For Walker, the emergent issues that arise internationally at the WTO are best addressed through deference to various national approaches.⁵⁴⁵ While the argument for greater deference helps to ensure that legitimate domestic differences will not be washed out and trusted domestic institutions will maintain their authoritative role in domestic regulation, an argument from pure deference makes it difficult for international agreements to have any teeth at all.⁵⁴⁶ As such, while there is an important role for deference in international science-related adjudication, it is not a panacea. The danger that such deference will be manipulated for self-serving and protectionist outcomes is significant. The process of building a global administrative law of expertise can help to prevent undue deference by setting a lowest common denominator of agreed, broadly legitimate practice, and thus serve to restrict opportunistic abandonment of a nation's own scientific principles in pursuit of its own self interest.

Beyond deference, the second way that the emergent qualities of using science in international institutions are commonly addressed is through building broadly legitimate international institutions that are able to speak authoritatively about scientific issues. These "international knowledge institutions" have been an important site for negotiating global regulatory processes and, arguably, building a global civic epistemology.⁵⁴⁷ There is a robust literature examining the effectiveness of these international advisory bodies and the techniques they use in order to garner broad trust and legitimacy.⁵⁴⁸ In these bodies as well, techniques that are successful in domestic contexts may need to be altered or augmented in order to garner sufficient legitimacy for international usage.⁵⁴⁹ However, the practices of these international institutions have often drawn heavily from the experience of their domestic analogues. For example, the Intergovernmental Panel on Climate Change recently reorganized its conflict of interest policy, drawing significantly from the practices of the United States National Academy of Science.⁵⁵⁰

International knowledge institutions need not be the only site for building practices for validating knowledge claims for use in international public decision making. There is a role for the judiciary as well. Indeed, such a role is unavoidable so long as international adjudicators are

⁵⁴⁵ See also, Winickoff et. al., *supra* note 47 (arguing that the WTO should adopt a deferential, procedural standard of review when reviewing domestic regulations under the SPS Agreement).

⁵⁴⁶ In response to this point, Walker discusses the importance of harmonizing domestic science policies. *Id.* at 276.

⁵⁴⁷ See Miller, *supra* note 311.

⁵⁴⁸ See, e.g., Winickoff and Bushey, *supra* note **Error! Bookmark not defined.**; Ann Keller, *Credibility and Relevance in Environmental Policy: Measuring Strategies and Performance among Science Assessment Organizations*, 20 J. PUB. ADMIN RES. & THEORY 357 (2010); Alexander Farrell & Terry Keating, *Dissent and Trust in Multilateral Assessments: Comparing LRTAP and OTAG*, in ASSESSMENTS OF REGIONAL AND GLOBAL ENVIRONMENTAL RISKS: DESIGNING PROCESSES FOR THE EFFECTIVE USE OF SCIENCE IN DECISIONMAKING, 64 (2006); Frank Bierman, *Institutions for scientific advice: Global environmental assessments and their influence in developing countries*, 8 GLOBAL GOV. 195 (2002); William C. Clark et. al. (eds.) LEARNING TO MANAGE GLOBAL ENVIRONMENTAL RISKS: A COMPARATIVE HISTORY OF SOCIAL RESPONSES TO CLIMATE CHANGE, OZONE DEPLETION, AND ACID RAIN (2001), Miller, *supra* note 311.

⁵⁴⁹ See Winickoff and Bushey, *supra* note **Error! Bookmark not defined.** (discussing the role of geographic representation in the Codex Alimentarius Commission); Keller, *supra* note 548 (comparing the credibility and relevance of two US domestic science advisory bodies to the IPCC).

⁵⁵⁰ See InterAcademy Council, CLIMATE CHANGE ASSESSMENTS: REVIEW OF THE PROCESS AND PROCEDURES OF THE IPCC (2010). I participated personally in this design and negotiation process.

forced to settle technical disputes in areas where no third party institution has been delegated authority by treaty to make technical decisions within the regime. With their requirement to state clearly reasoned bases for their decisions, their capacity to catalyze norm formation, and their power to settle actual disputes, international adjudicatory bodies serve an important role in resolving science-related policy disagreements between nations.⁵⁵¹ Although, as with international knowledge institutions, there are certain to be aspects of international practice that are not appropriate to inform through domestic analog, international adjudicatory bodies should nonetheless be attentive to broadly shared domestic practices by looking to such practices to help form a global administrative law of expertise to fill the often under-specified text of their treaties. While these adjudicatory bodies must exercise caution not to push too fast and force harmonization, they are missing an important opportunity if they fail to recognize where normative convergence has already occurred, and draw their gap-filling administrative law of expertise from this body of shared normative commitments. Continued scholarly attention to the comparative administrative law of expertise across a broader range of nations and issue areas should help to guide these international adjudicators in crafting a broadly legitimate global administrative law of expertise.

V. CONCLUSION

This chapter has compared the administrative law of expertise of the US and EC with an eye to identifying particular commonalities that may blossom into a future global administrative law of expertise.⁵⁵² These potential groundnorms may come to have an important impact on the behavior of both international adjudicators, and global standard setters. Importantly, these norms are not candidates for future international administrative law norms based purely on the essential and universal qualities of science. Instead, they demonstrate that although nation-specific procedures for using science in decision making do exist, there are areas of convergence in the way that these processes are treated across domestic (and intergovernmental) administrative law systems. Requirements for some form of input and output transparency may represent a level below which purportedly scientific advice may not be considered, by global standard setters, or international courts. Requirements of output transparency and reason giving may legitimately be imposed on domestic and international bodies alike, serving as the basis for casting such decisions out upon review. Finally, although the line is murky and context-specific, there may be a role in international law for adjudicators to police, via a process review, the respective roles of scientific experts and democratically elected representatives. The fact that this line is drawn differently in different legal systems and issue areas, however, suggests that a particularly deferential standard is likely appropriate in this area when reviewing national decisions.

Further work in this area is needed – both to bring other nations into the comparative analysis, and to flesh out the broadly shared principles and the reasons for difference. Caution must be exercised in this project however. The goal is not to draw upon natural law concepts and

⁵⁵¹ See e.g., Chapter 1; Winickoff et. al., *supra* note 47; Walker, *supra* note 58.

⁵⁵² At the very least, it has demonstrated shared practices that are likely to be viewed legitimate by two important players in international relations.

simply substitute the universal nature of science for the divine basis of law.⁵⁵³ Instead, the point is that although knowledge may be contingent, public science may find a politically legitimate seat within the administrative law of democratically accountable governments. Attention to these civic epistemologies, and their legal enactment through an administrative law of expertise may be a path to international convergence that avoids the problematic universalizing move of simply assuming that science has meaning without context.

These proto-norms are not designed to immediately transform the international administrative law of expertise (if such a thing can be said to exist at this point). In the short term, they may serve as a useful constraint on nations seeking to deviate from their established domestic practices for legitimating science in public decision-making – for example, by arguing about the science of climate change or the health impacts of a particular chemical using purportedly scientific evidence that fails to meet widely shared expectations of transparency or participation. In the longer term, however, as such principles become identified, discussed and refined, these norms may grow into much more specific and binding forces, guiding the development of future domestic and international regulation from the ground up.

⁵⁵³ Although, arguably, this project shares some parallels with John Finnis's approach to identifying natural rights by a broad survey of the legal systems of the world. *See* JOHN FINNIS, *NATURAL LAW AND NATURAL RIGHTS* (1980).

Chapter 3

Science and Power in Global Food Regulation: The Rise of the Codex Alimentarius

Increasing global interdependence in such fields as trade, security, development, and environment has given rise to a new layer of transnational regulation and administration. As a result, new bodies of law and international institutions have emerged with varying degrees of authority to constrain and compel the regulatory actions of nation states.⁵⁵⁴ Scholars in law and international relations have begun to develop sustained interest in this emergent global administrative sector, and the powerful role of knowledge therein.⁵⁵⁵ Nevertheless, it has been scholars in science and technology studies who have identified the special importance of the *epistemic* within these international institutions. This work has connected the development of global knowledge-making, the politics of expertise, and standardized forms of reasoning with themes of legitimation and the distribution of power.⁵⁵⁶ Nevertheless, there continues to be relatively little work within science studies examining the processes by which expert authority and legal authority work simultaneously to bring global knowledge regimes into being.

Some of the most interesting and important, but least studied, developments in this regard are emerging out of the international trading regime and its associated regulatory bodies. Established by the Food and Agricultural Organization (FAO) and the World Health Organization (WHO) in 1963, the Codex Alimentarius Commission (Codex) is an international body based in Rome that promulgates standards, guidelines, and codes of practice in the realm of food safety. The power of the Codex in standardizing the regulation of health, trade, and environment changed radically in 1994 when the World Trade Organization (WTO) elevated its legal status within the global trading regime: under the new Sanitary and Phytosanitary (SPS) Agreement, WTO member states can sue other members for maintaining food and environmental safety standards that are stricter than Codex standards. Legally, this makes the Codex an authoritative international agency for “food additives, veterinary drug and pesticide residues, contaminants, methods of analysis and sampling, and codes and guidelines of hygienic

⁵⁵⁴ Kingsbury, Benedict, Nico Krisch, and Richard B. Steward. 2005. The Emergence of Global Administrative Law. *Law and Contemporary Problems* 68 (15):15-61

⁵⁵⁵ See e.g. Haas, Peter. 1989. Do Regimes Matter? Epistemic Communities and Mediterranean Pollution Control. *International Organization* 43 (4):377-404. See also Esty, Daniel. 2002. The World Trade Organization's Legitimacy Crisis. *World Trade Review* 1 (1):7-22.

⁵⁵⁶ See e.g. Miller, Clark A. 2007. Democratization, International Knowledge Institutions, and Global Governance. *Governance* 20 (2):325-357. See Jasanoff, Sheila, and Marybeth Long Martello, eds. 2004. *Earthly Politics: Local and global in environmental governance*. Cambridge, MA: MIT Press. See also Featherstone, Mike, and Couze Venn. 2006. Problematizing Global Knowledge and the New Encyclopaedia Project: An Introduction. *Theory Culture Society* 23 (2-3):1-20.

practice.”⁵⁵⁷ In the process, the Codex has become an important exemplar of a global administrative system that is enlarging its reach and power.

The political stakes of attending to the developmental process of the Codex, an example of what Featherstone and Venn call a “circuit of global knowledge” and what Miller calls an “international knowledge institution,” are high: in the upcoming years, different players will struggle in this forum to normalize particular norms for food safety and trade, and standardize particular regulatory rationalities regarding the risk of food, food systems, and food technologies.⁵⁵⁸ More generally, a better understanding of the interplay of global knowledge institutions and emergent regulatory regimes could help produce more effective and acceptable global governance in crucial domains such as environment and health.

Primary documents produced by the WTO, the Codex itself, and its scientific advisory committees illustrate that particular interactions of political and expert authority have been instrumental in shaping the developmental trajectory of the Codex during and after its uptake into WTO law. First, the emergence of a global food safety regime has relied on a process of mutual legitimation across organizations and their differing sources of authority. Requiring a solution to the difficult political problem of how to promote regulatory convergence, the WTO relied critically on the notion of science and the Codex’s expert authority. Conversely, the Codex’s invocation of the WTO’s legal power proved crucial in producing an authoritative framework for risk analysis. Second, in the Codex’s struggles to stabilize decision-making procedures in the wake of its transformation, we see institutional attempts to negotiate a difficult dilemma: how to fortify an identity as a technocratic rather than political organization, even as its newfound power calls for new forms of political legitimation. Taken together, the case illustrates the importance of attending to the iterative construction of legal and epistemic authority in understanding the constitution of global regulatory regimes.

Coproduction of the Global Food Safety Regime

In the last 15 years, the Codex Alimentarius Commission (Codex) transitioned from a middling and largely invisible international body to a powerful global regulatory agency with an authoritative discourse: “risk analysis.” In order to help explore why and how this occurred, it is useful to draw upon what STS scholars have called “the coproductionist idiom.” Practices and norms that actors in the world tend to organize under the two discrete headings of science and politics often interact closely to produce hybrid regimes of knowledge and power.⁵⁵⁹ The administrative agency at the state level has been one place that STS scholars have turned a coproductionist eye, demonstrating how boundary work, standardization, and discourse formation in those agencies powerfully order our world.⁵⁶⁰ Work in this idiom has also been

⁵⁵⁷ SPS Agreement, Annex A(3)(a).

⁵⁵⁸ See Featherstone, Mike, and Couze Venn. 2006. Problematizing Global Knowledge and the New Encyclopaedia Project: An Introduction. *Theory Culture Society* 23 (2-3):1-20. See Miller, Clark A. 2007. Democratization, International Knowledge Institutions, and Global Governance. *Governance* 20 (2):325-357.

⁵⁵⁹ Jasanoff, Sheila, Ordering knowledge, ordering society. In *States of Knowledge: The Coproduction of Science and Social Order*, edited by S. Jasanoff. London: Routledge (2004).

⁵⁶⁰ See Hajer, Maarten. 1995. *The Politics of Environmental Discourse: Ecological Modernization and the Policy Process*. Oxford: Oxford University Press. See Jasanoff, Sheila, The Fifth Branch: Science Advisers as Policymakers, 3 (1990). See Porter, Theodore, Trust in Numbers: The Pursuit of Objectivity in Science and

useful for describing and explaining the shape of knowledge-based institutions in global governance.⁵⁶¹ Attending to processes of coproduction is critical for understanding the constitution of the new global administrative space produced by the WTO, and the Codex in particular: indeed, this lens reveals crucial dynamics in the emergence of the Codex and its formalized regime of risk analysis.

Birth of a Global Agency

The SPS Agreement has been described as one of the most ambitious achievements of the Uruguay Round of trade negotiations that created the WTO, in part because of its goals of rationalizing food safety regulation across its member states.⁵⁶² While the primary purpose of the General Agreement on Tariffs and Trade (GATT) is to prevent discriminatory trade practices, negotiators in the domain of food safety aimed at a further substantive goal of rationalizing and harmonizing food standards across nations.⁵⁶³ Producing convergent standards through harmonization and rationalization was seen as an important way of promoting the freer exchange of food across borders, while still acknowledging the necessity of state-based food safety regulation. Achieving these ambitious goals would require identifying broadly acceptable sources of epistemic authority in the domain of food safety.

The final text of the SPS Agreement reveals how science itself became the primary ideological resource for producing an agreement aiming to rationalize regulation at the global level.⁵⁶⁴ As the most important example, Article 2 contains the “Basic Rights and Obligations” of the treaty, and requires Members to ensure that any sanitary and phytosanitary measure “is based on scientific principles and is not maintained without sufficient scientific evidence.”⁵⁶⁵ Relying on the authority of science to discipline food safety regulation also took pressure off lawyers and delegates, by appealing to a supposedly neutral arbiter to do the work of harmonization.⁵⁶⁶ This move also transferred the political and epistemic difficulties of delineating substantive science-based standards into other regulatory fora.

Seeking acceptable means of harmonizing standards across WTO member states, SPS negotiators looked around the world for existing international food standards.⁵⁶⁷ They found the

Public Life, 8 (1995). *See also* Carson, John, *Army Alpha, Army Brass, and the Search for Army Intelligence*, 84 *Isis* 278 (1993).

⁵⁶¹ *See e.g.* Fogel, Cathleen, *The Local, the Global, and the Kyoto Protocol*. In *Earthly Politics: Local and global in environmental governance*, edited by S. Jasanoff and M. L. Martello. Cambridge, MA: MIT Press (2004). *See also* Miller, Clark, *Climate Science and the Making of a Global Political Order*, in *States of Knowledge: The co-production of science and social order*, 46 (Sheila Jasanoff, ed. 2004).

⁵⁶² *See* Charnovitz, Steve, *Improving the Agreement on Sanitary and Phytosanitary Standards*, in *Trade, Environment, and the Millennium* 171, 185 (Gary Sampson & W. Bradnee Chambers eds., 1999).

⁵⁶³ *See e.g.* Weiler, J.H.H., *The EU, the WTO and the NAFTA: Towards a Common Law of International Trade*. Oxford: Oxford University Press. (ed. 2000).

⁵⁶⁴ *See* Walker, Vern, *The Myth of Science as a ‘Neutral Arbiter’ for Triggering Precautions*, 26 *B.C. Int’l & Comp. L. Rev.* 197 (2003). *See also* Wirth, David, *The Role of Science in the Uruguay Round and NAFTA Trade Disciplines*, 27 *Cornell Int’l L.J.* 817 (1994).

⁵⁶⁵ SPS 2.2.

⁵⁶⁶ *See* Walker 2003 *supra* note 564.

⁵⁶⁷ Interview with members of the SPS Secretariat, Geneva Switzerland, 2006-7.

Codex Alimentarius Commission, a little known bureau of the FAO and WHO that had been producing voluntary food safety standards on residues, pesticide use, etc., since the 1960s. Accordingly, within the SPS Agreement, the Codex was designated one of three “relevant international organizations” around whose standards the signatories would attempt to harmonize.⁵⁶⁸ The guidelines and recommendations of Codex, if adopted by nations, would “be deemed to be necessary to protect human, animal, or plant life or health, and presumed to be consistent with the relevant provisions of this Agreement and of GATT 1994.”⁵⁶⁹ Reading these provisions together, in order to satisfy the core science-based obligations, WTO members would have to either adopt existing international health and safety standards, or justify deviant measures with risk assessment and “sufficient scientific evidence.”⁵⁷⁰

This negotiating history and text evinces a strong commitment to a technocratic paradigm of global regulation in tension with the regulatory sovereignty of nation states. Indeed, it has been asserted that the GATT-WTO system may represent the “the high water mark of the twentieth-century commitment to technocratic decisionmaking” and a “belief in a governance model centered on bureaucratic rationality.”⁵⁷¹ The SPS Agreement stands as perhaps the most extreme example: the very legitimacy of the SPS regime now relied on particular conceptions of science as a foundation for rational and convergent regulation, with “risk assessment” as the powerful and objective discourse through which disputes could in theory be settled fairly and rationally. This effort to rationalize food safety regulation presents a clear challenge to the principles of state sovereignty in a sphere of “social regulation.” Where political legitimacy may be undermined, a legitimacy based upon technocratic rationality and the universal claims of science is implicitly offered in its place.⁵⁷²

Just how and why negotiators across the trading community came to agree on the “science-based” SPS text is not a trivial question, especially since individual European states had been resisting the introduction of American food products containing hormones based mostly on consumer concerns. Achieving agreement on these provisions was no small feat, as sovereign member states were clearly risking the loss of regulatory discretion to the dictates of a newly constituted global regulatory rationality. The U.S. was pushing science as a means of trumping consumer-driven bans on beef and milk hormones in European states. Certainly, the fact that Europe was being represented by the European Commission (E.C.)—an entity that was engaged in its own difficult project of harmonizing “social regulation” across EU Member States⁵⁷³ had

⁵⁶⁸ SPS 3.4 The others are enumerated as the International Office of Epizootics and Secretariat of the International Plant Protection Convention. (SPS, Annex A(3)).

⁵⁶⁹ SPS 3.2.

⁵⁷⁰ SPS 3.3, Article 5.

⁵⁷¹ See Esty, Daniel, *The World Trade Organization’s Legitimacy Crisis*, 1 *World Trade Rev.* 7 (2002).

⁵⁷² As a positive term, legitimacy of an institution describes a social fact—the actual acceptance of the authority by its subjects. (Esty 2002) In a normative sense, the concept of institutional legitimacy is usually founded either upon a notion of just political process (e.g., elections for political representatives or deliberation), and/or a conception of rationality and technocratic efficacy. (Livermore 2006) Technocratic legitimacy in a positive sense usually rests on the social authority of science, and in a normative sense on the expected benefits of basing policy on technical knowledge. Here we are talking about political and technocratic legitimacy in the normative sense.

⁵⁷³ See Joerges, Christian, *Scientific Expertise in Social Regulation and the European Court of Justice: Legal Frameworks for Denationalized Governance Structures*. In *Integrating Scientific Expertise into Regulatory*

something to do with its willingness to embrace scientific universalism and risk analysis as a harmonizing force within the SPS Agreement. Given the alignment of interests across the U.S. and the E.C., rationalization through risk assessment was a plausible enough ideological concept around which to forge agreement.⁵⁷⁴ The SPS negotiators were able to find a mutually acceptable solution to the difficult problems of regulatory harmonization by identifying a universalist framework of epistemic warrant, namely science, and enrolling an international regulatory body supposedly devoted to it.⁵⁷⁵

The central coproductionist point is this: far from simply enrolling and empowering an existing expert organization, the WTO's legal and executive power was instrumental in producing one. In short, the Codex had to become the agency that the WTO said it would be relying on. Prior to the Uruguay trading round, and the discussions of an SPS Agreement with a significant role for the Codex, Codex had been an international body with fairly low visibility.⁵⁷⁶ As its increase in power became imminent, the Codex began acting with an invigorated mandate and sense of itself as a science-based organization. It would now have executive and judicial power at the global level to mechanize what were previously "voluntary" standards.

As it became clear by 1991 that Codex would play a significant role in the trade regime,⁵⁷⁷ a movement emerged to clarify, unify and standardize risk analysis practices across the Codex. In order to play its role within the SPS regime as an authoritative regulatory institution, major Codex actors agreed that it would have to formalize its science-based account of food safety regulation.⁵⁷⁸ A patchwork of different risk analysis processes had come to operate in different areas of Codex regulation before the conclusion of the Uruguay Round.⁵⁷⁹ These processes utilized different practices that had emerged during the unique historical trajectories of the assorted expert advisory committees and Codex subcommittees. Moves to standardize these procedures were motivated directly by the anticipated outcome of the Uruguay

Decision-making, edited by C. Joerges, K.-H. Ladeur and E. Vos. Baden: Nomos Verlagsgesellschaft (1997).

⁵⁷⁴ SPS interviews.

⁵⁷⁵ Of course, this belief in the pragmatic ability of "sound science" to settle disputes on contested regulatory questions was naïve, as the ample STS work on regulation might have predicted; and these same "science-based" provisions have been litigated strenuously over the first decade of the agreement. (Winickoff et al. 2005).

⁵⁷⁶ See Hüller, Thorsten and Maier, Leonhard, Fixing the Codex? Global Food-Safety Governance Under Review. In *Constitutionalism, Multilevel Trade Governance, and Social Regulation*, edited by C. Joerges and E. U. Petersmann. Oxford: Hart Publishing (2006). See also Salter, Liora, *Mandated Science: Science and Scientists in the Making of Standards*. Dordrecht: Kluwer (1988).

⁵⁷⁷ See Victor, David, The Sanitary and Phytosanitary Agreement of the World Trade Organization: An assessment after five years. *New York University Journal of International Law and Policy* 32:865-937 (1999). See also CAC 1991. *Report of the Nineteenth Session of the Joint FAO/WHO Codex Alimentarius Commission Codex Alimentarius Commission ALINORM 91/40*. Rome.

⁵⁷⁸ See *Ibid.*

⁵⁷⁹ See Hathaway, S. C., *Risk assessment procedures used by the Codex Alimentarius Commission and its subsidiary and advisory bodies*. *Food Control* 4 (4):189-201 (1993). See Joint FAO/WHO Expert Consultation 1995. *Application of Risk Analysis to Food Standards Issues* WHO WHO/FNU/FOS/95.3. Geneva. See also Jukes, David, *The Role of Science in International Food Standards*, 11 *Food Control* 181 (2000).

round: there was a general recognition that the Codex standard-setting process needed to be more routinized, science-based and transparent.⁵⁸⁰

As previous commentators have shown, this move to shore up Codex science crystallized amidst controversies over growth-promoting hormones in beef cattle and recombinant Bovine Somatotropin (BST).⁵⁸¹ In 1991, a Codex vote to reject adoption of standards on four meat hormones⁵⁸² catalyzed an aggressive response from the United States.⁵⁸³ Following this vote, the delegation of the United States prepared a paper discussing the “Implications [of the vote] for the Codex Committee on Residues of Veterinary Drugs in Foods” Explicitly reimagining the relationship between expert knowledge and regulation within the Codex, the paper proposed that “[T]he Commission should examine the process by which draft standards recommended by a Codex Committee that are based on thorough scientific assessments by JECFA are evaluated. Unless new scientific information is presented by a delegation which calls into question the validity of the draft standard. . . the Commission should adopt the standard.”⁵⁸⁴

The US policy paper specified how Codex might make good on its pre-existing promise to review “all Codex standards as to their current relevance and sound scientific basis, with a view to facilitating international trade.”⁵⁸⁵ But the U.S. position paper stands out as the first explicit attempt to specify a new regulatory epistemology within the Codex system, as a response both to the Uruguay round negotiations and the specific hormone controversies.⁵⁸⁶ By framing their concerns as implications for the Veterinary Drugs Committee, the U.S. delegation implicates the committee itself in a problem that is both legal and epistemological. They argue that a new set of rules, and a new understanding of how science and regulation interact must be formulated.

As the debate about the role of science in food regulation was playing out in the context of the Uruguay round and bovine “production aids,” it began to merge with discussions about general methodology, especially the development of more formalized procedures for risk analysis. The increased prominence of risk-speak within the Codex was no accident. The Codex

⁵⁸⁰ See e.g. FAO/WHO 1991. *Report of the FAO/WHO Conference on Food Standards, Chemicals in Food and Food Trade (in cooperation with GATT)* FAO, WHO, GATT ALICOM 91/22. Rome. See e.g. McNally, H. 1991. FAO/WHO Conference on Food Standards, Chemicals in Food and Food Trade. *Food, Nutrition, and Agriculture* 1 (2/3):48-53. See also Jukes, David, *The Role of Science in International Food Standards*, 11 *Food Control* 181 (2000). See e.g. CAC 1991. *Report of the Nineteenth Session of the Joint FAO/WHO Codex Alimentarius Commission* Codex Alimentarius Commission ALINORM 91/40. Rome.

⁵⁸¹ See Jukes, David, *The Role of Science in International Food Standards*, 11 *Food Control* 181 (2000).

⁵⁸² See CAC 1991. *Report of the Nineteenth Session of the Joint FAO/WHO Codex Alimentarius Commission* Codex Alimentarius Commission ALINORM 91/40. Rome.

⁵⁸³ Standards for these four hormones, along with one other, were passed by vote in 1995 and then played a central role in the 1997 WTO Beef Hormones dispute.

⁵⁸⁴ See CCEXEC 1992. *Report of the Thirty-Ninth Session of the Executive Committee of the Codex Alimentarius Commission* Joint FAO/WHO Food Standards Programme ALINORM 93/3. Geneva.

⁵⁸⁵ See FAO/WHO 1991. *Report of the FAO/WHO Conference on Food Standards, Chemicals in Food and Food Trade (in cooperation with GATT)* FAO, WHO, GATT ALICOM 91/22. Rome.

⁵⁸⁶ We define “regulatory epistemology” to be the tacit and explicit rules, norms and practices for the management of knowledge and uncertainty, and the deployment of expertise and evidence, in regulatory decision-making. Derivative of the broader concept of “civic epistemology” (Jasanoff 2005), regulatory epistemology points to embedded ways of knowing, standards of proof and credibility within regulatory cultures at different scales of governance.

Executive Committee, when considering the abovementioned US proposal wrote that “The draft GATT/Uruguay Round Sanitary and Phytosanitary decision, which invoked the concepts of risk assessment, equivalency and transparency, was considered to be very relevant in terms of making scientific determinations.”⁵⁸⁷ After the issue was forwarded to the Codex Committee on General Principles⁵⁸⁸ and back, the Executive Committee began to explicitly review the “implications of the Uruguay Round Agreements for Codex.”⁵⁸⁹ This review concluded, *inter alia*, that “scientific analysis and advice, together with risk analysis, should form the basis of the development of standards” and that “a consistent approach to risk management in the specification of Codex Standards...be developed and documented.” Although risk analysis is not a new concept within the Codex, throughout the 1990s, we consistently see the invocation of the trade negotiations to push along a process of standardizing risk analysis, thus codifying a new account of how “politics” will mix with “science.”

Perhaps the most important event in the codification of this new relationship was the 1995 *Joint FAO/WHO Expert Consultation on the Application of Risk Analysis to Food Standards Issues* (hereafter *Risk Analysis Consultation*). By March 1995, it was clear that participants in the Codex recognized how its new status in WTO law had transformed it from a voluntary standard-setting *organization* to a global *agency*. At that point, Codex convened the *Risk Analysis Consultation*, which recognized the moment as “a landmark in the development of international food safety evaluation” because of the adoption of a science-based approach. The report of this consultation explains how:

For the first time, an international trade agreement, the SPS Agreement, explicitly recognizes that for establishment of rational harmonized regulations and standards for food in international trade a rigorous scientific process is required. Consequently, for food, CAC [the Codex Alimentarius Commission] is required to provide the scientific framework on which adherence to the SPS Agreement will be based.⁵⁹⁰

What is so interesting here is that the Codex had not developed a formalized “scientific framework” for food regulation prior to this “landmark” moment. In fact, the consultation recommended “several changes in Codex practices to foster a harmonized approach within Codex, consistent with science-based risk assessment.” In other words, it was only the prompt of the SPS Agreement, aided perhaps by the U.S. delegation’s positions on beef and milk hormones, that the Codex saw it necessary to make its own recommendations more consistently “science-based.” The WTO created the necessary political conditions to require Codex to

⁵⁸⁷ See CAC 1992, *Report of the Thirty-Ninth Session of the Executive Committee of the Codex Alimentarius Commission* Joint FAO/WHO Food Standards Programme ALINORM 93/3. Geneva.

⁵⁸⁸ See CCGP 1992, *Report of the Tenth Session of the Codex Committee on General Principles* ALINORM 93/33. Paris and CCGP 1994, *Report of the Eleventh Session of the Codex Committee on General Principles* ALINORM 95/33. Paris.

⁵⁸⁹ See CAC 1994, *Report of the Forty-First Session of the Executive Committee of the Codex Alimentarius Commission* Joint FAO/WHO Food Standards Programme ALINORM 95/3. Rome.

⁵⁹⁰ See Joint FAO/WHO Expert Consultation 1995, *Application of Risk Analysis to Food Standards Issues* WHO WHO/FNU/FOS/95.3. Geneva.

develop a “rigorous scientific process” that would form the basis of the rationalized harmonized system the SPS negotiators sought to produce.

It is precisely the trading regime’s power, with its new legislation and new binding adjudication system, and the delegation of that authority that enables the Codex to define the parameters of sound science for regulation. The organization highlighted and even celebrated the fact that “the SPS Agreement provides a mechanism for the collective adoption of Codex standards.”⁵⁹¹ Just as the WTO addressed problems of legitimacy in the legal/economic order by identifying a common trust in scientific rigor and existing international expertise, so too the Codex addressed difficult questions regarding the role of science in regulatory process through legitimation received from the WTO. In order to come into being, the SPS negotiators and the trading regime helped produce the very science-based agency it relied on.

The New Risk Analysis Regime

The precise form that the new risk regime took deserves close tracking, for it helped establish a regulatory epistemology with truly global scope and authority. As we will see, the sustenance of the Codex’s newly vested authority necessitated newly formalized strategies of purification and boundary work⁵⁹² as it began to define its organizing discourse of risk analysis. By institutionalizing these boundary-drawing rules, contingent positions on the science-policy relationship became stabilized and embedded, facilitating the more rapid formation of standards, but marginalizing concerns that do not fit neatly into the new framework.

The process for *Codex-wide Development and Application of Risk Analysis Principles and Guidelines* began in 1997 as an attempt to draft uniform standardized principles for risk analysis for application both within the Codex and by member countries. As agreement proved difficult on such broad principles, the process split into a process to draft principles for application within the Codex, and a separate process to draft principles for application by member countries. The *Working Principles for Risk Analysis for Application in the Framework of the Codex Alimentarius* [hereinafter *Codex Risk Principles*]⁵⁹³ were adopted in 2003, while the *Working Principles for Risk Analysis for Application by Governments* [hereinafter *Government Risk Principles*] were finally completed in 2007.⁵⁹⁴

In both sets of principles, risk analysis is broken up into three “distinct but closely linked” components: risk assessment, risk management, and risk communication. Risk assessment is defined as a scientifically based process of moving from hazard identification to risk characterization. Risk management, on the other hand is the process of weighing policy alternatives and selecting the appropriate prevention and control options. Risk communication involves both communication between risk assessors and risk managers, and communication

⁵⁹¹ Ibid.

⁵⁹² See Jasanoff, Sheila, *The Fifth Branch: Science Advisers as Policymakers*, 3 (1990). See also Gieryn, Thomas, *Cultural Boundaries of Science: Credibility on the Line*. Chicago: University of Chicago Press (1999).

⁵⁹³ See Joint FAO/WHO Food Standards Programme 2006. *Codex Alimentarius Commission Procedural Manual - Sixteenth Edition* Codex Alimentarius Commission. pp. 103-109.

⁵⁹⁴ See CAC 2007. *Report of the Thirtieth Session of the Joint FAO/WHO Codex Alimentarius Commission* Joint FAO/WHO Food Standards Program ALINORM 07/30/REP. Rome. On the negotiating history of the principles, see (Gerstetter and Maier 2005).

with other outside parties.⁵⁹⁵ The relationship between risk assessors and risk managers should be functionally separate, “in order to ensure the scientific integrity of the risk assessment....” However, it is recognized that the relationship between the two should be interactive, even iterative. The most salient example of this relationship is the inclusion of a section on “risk assessment policy” in both documents. Risk assessment policy is defined as “[d]ocumented guidelines on the choice of options and associated judgements for their application at appropriate decision points in the risk assessment such that the scientific integrity of the process is maintained.”

The fact that the Codex has called for an interactive, iterative process demonstrates some understanding of arguments put forward by social scientists of risk over the last two decades, who have noted the problems of exaggerating the separation of technical and political phases in risk analysis.⁵⁹⁶ As a descriptive matter, risk analysis is necessarily a hybrid process. As a matter of democratic governance, it should perhaps be recognized as such. Global institutions using risk analysis as a central discourse of regulation will necessarily be boundary organizations involved in hybrid management.⁵⁹⁷ Giving deference to “scientific integrity” divorced from the necessarily surrounding values and norms should be seen as a power move, the results of which should not be taken for granted, but instead opened up and analyzed to discover which interests are being served by this move. The inclusion of risk assessment *policy* in the framework is likewise a significant advance. Its inclusion acknowledges the value judgments that scientists must frequently make in the conduct of risk assessments, and that these judgments should be guided by risk managers and not made in an *ad hoc* way by risk assessors.

Even so, it must be kept in mind that the institutionally embedded discourse of risk, and the boundary drawing implied by assessment/management separation continue to do political work when they have faded into the background. Risk discourse implicitly empowers some people as experts while marginalizing others as inarticulate or irrelevant.⁵⁹⁸ Two groups who regularly find it difficult to express their interests in risk discourse are developing countries and consumers: developing countries due to the lack of access to measurement equipment and other technologies of quantification,⁵⁹⁹ and consumers due to difficulties framing cultural, religious, and other concerns not strictly related to safety.⁶⁰⁰

The SPS Agreement together with newly entrenched framework at Codex has also marginalized talk of the precautionary principle, arguably because of the difficulty of

⁵⁹⁵ See CCGP 2007. *Report of the Twenty-Fourth Session of the Codex Committee on General Principles* 07/30/33. Paris.

⁵⁹⁶ See Winickoff, David et. al. *Adjudicating the GM Food Wars: Science, Risk, and Democracy in World Trade Law*, 30 *Yale J. of Int'l L.* 82 (2005) pp. 93-106

⁵⁹⁷ See e.g. Miller, Clark, *Hybrid Management: Boundary Organizations, Science Policy, and Environmental Governance in the Climate Regime*, 26 *Sci. Tech. & Hum. Values* 478 (2001).

⁵⁹⁸ See Jasanoff, Sheila, *Songlines of Risk*. *Environmental Values* 8:135-152 (1999).

⁵⁹⁹ See e.g. CAC 2007. *Report of the Thirtieth Session of the Joint FAO/WHO Codex Alimentarius Commission* Joint FAO/WHO Food Standards Program ALINORM 07/30/REP. Rome, at 194.

⁶⁰⁰ See Bureau, Jean-Christophe and Marette, Stephan, *Accounting for Consumers' Preferences in International Trade Rules*. Paper read at *Incorporating Science, Economics, and Sociology in Developing Sanitary and Phytosanitary Standards in International Trade*, at Irvine, California (2000).

standardizing precautionary approaches.⁶⁰¹ For instance, the Principles and Guidelines for Microbiological Risk Management, mired in debate for a decade with the use of the term precaution as one of the major sticking points, was finally adopted at the 2007 session of the Codex, with no mention of the term.⁶⁰²

The trajectory of the debate surrounding the 1995 general decision of the Commission entitled *Statements of Principle Concerning the Role of Science in the Codex Decision-Making Process and the Extent to which Other Factors Are Taken Into Account* also corroborates this trend. This decision states that “food standards...shall be based on the principle of sound scientific analysis and evidence...,” but that the “Codex Alimentarius will have regard, where appropriate, to other legitimate factors relevant for the health protection of consumers and for the protection of fair practices in food trade.”⁶⁰³ The “other legitimate factors” (OLF) language emerged against the backdrop of the beef and milk hormones controversies, from the insistence by certain delegations, led by a number of European countries, that issues beyond science – particularly environmental impacts, economic feasibility, and ethical concerns – be considered relevant to food safety.⁶⁰⁴ Although the inclusion of consideration for OLFs modifies the science-policy relationship imagined in the 1991 US working paper, its relegation to “other” status suggests that the model is one in which science is the starting place from which deviations must be justified.

In practice, the lack of a formal definition or enumeration of OLFs has sparked numerous controversies surrounding the term. In spite of a 2001 decision offering “criteria for the consideration of [OLFs],”⁶⁰⁵ the lack of agreement on whether specific factors, most notably consumer concerns, constitute OLFs has led to prolonged debate about if and how these concerns should be addressed in Codex standard-making.⁶⁰⁶

In the last half decade the debate surrounding OLFs has begun to fade as risk standardization has advanced. One member of the Codex Secretariat observed that debates involving OLFs had become less common since the late 1990s because that language was from the old paradigm where the well-structured, step-wise risk analysis approach had not yet gained a firm base within the Codex system; now, such factors are frequently subsumed within risk

⁶⁰¹ See Post, Diahanna L., The Precautionary Principle and Risk Assessment in International Food Safety: How the World Trade Organization Influences Standards. *Risk Analysis* 26 (5):1259-1273 (2006).

⁶⁰² See CCFH 2006. *Report of the Thirty-Eighth Session of the Codex Committee on Food Hygiene* Joint FAO/WHO Food Standards Programme ALINORM 07/30/13. Houston. See also CAC 2007. *Report of the Thirtieth Session of the Joint FAO/WHO Codex Alimentarius Commission* Joint FAO/WHO Food Standards Program ALINORM 07/30/REP. Rome. A 1999 draft of these Principles and Guidelines gave a working definition of the precautionary principle, and included as Principle 7 “In case where scientific knowledge on the risks is insufficient, risk management decisions may be adopted on an interim basis as part of a precautionary approach.”

⁶⁰³ See Joint FAO/WHO Food Standards Programme 2006. *Codex Alimentarius Commission Procedural Manual - Sixteenth Edition* Codex Alimentarius Commission.

⁶⁰⁴ The EC called upon this language in the EC Beef Hormones Panel case, claiming that “Members which had different views about other considerations (e.g. health concerns of consumers) could abstain from accepting the relevant standards.” (4.86)

⁶⁰⁵ See CAC 2001. *Report of the Twenty-Fourth Session of the Joint FAO/WHO Codex Alimentarius Commission* Codex Alimentarius Commission ALINORM 01/41. Geneva. Appendix III.

⁶⁰⁶ David Jukes has traced the evolution of the OLF debate in the context of the beef and milk hormones dispute.

analyses.⁶⁰⁷ In fact, the dominant risk discourse may marginalize concerns underlying the OLF debates, and are at the heart of the major food-related trade conflicts of the last decade, including hormones and genetically modified foods.⁶⁰⁸ Consumers within a country may wish to take a more precautionary approach to legislating a given health concern. People may hold different views of what public health risks are acceptable with the possibility of what economic rewards. The differences in these views across nations may lead to differing calls for further international harmonization or greater national sovereignty in defining domestic food safety regulations. As the WTO has facilitated the advance of a standardized discourse of risk within the Codex, it has become more and more difficult to voice precautionary and locality-specific concerns.

The foregoing analysis suggests that far from taking up a pre-existing regime of science-based food regulation, the WTO actually brought one into being. Discursive choices often form a critical element in institutional efforts to shore up new structures of scientific authority.⁶⁰⁹ The Codex case corroborates this insight. With the WTO's help, risk analysis has become the very grammar of Codex decision-making and of the emergent global regulatory regime for food. Though parties may differ in their positions about what should be included in a risk analysis, the idea that standards must be based on a risk analysis is unquestioned.⁶¹⁰

Stabilization of Codex Decision-Making Procedures

As others have noted, the new role of Codex in the trading regime transformed the ethos of the Codex from more of a “gentleman’s club,” to more of an explicitly politicized organization.⁶¹¹ Less noted, however, have been Codex efforts to negotiate a difficult dilemma wrought by these changes: how to stabilize its primary identity as a technocratic rather than political organization, even as its enhanced legislative power heightened its political visibility. In its struggles to rediscover procedural normality and to implement geographical representation on expert committees, we see the Codex staking its claim as a bona fide global agency through the development of hybrid procedures and practices mixing technocratic and democratic elements. Yet, we see continuous self-positioning as a scientific organization amidst the increasingly difficult political work it must accomplish.

The Codex Alimentarius Commission, whose membership currently stands at 174 nations, is open to all Member Nations and Associate Members of FAO and/or WHO, and always has been. All nations are entitled to send one representative with an attendant delegation to the annual commission-wide meetings. The commission elects a chair and three vice-chairs, and each of the seven Codex geographic regions elect their own coordinator and regional

⁶⁰⁷ Interview at Codex Secretariat, Rome. July 2007.

⁶⁰⁸ See Jukes, David, *The Role of Science in International Food Standards*, 11 Food Control 181 (2000).

⁶⁰⁹ See Porter, Theodore, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life*, 8 (1995). See Jasanoff, Sheila, *Ordering Knowledge, Ordering Society*, in Sheila Jasanoff (ed.), *States of Knowledge: the Co-production of Science and Social Order*, 13, 34 (2004). See e.g. Veggeland, Frode, and Svein Ole Borgen, *Changing the Codex: The role of international institutions* Norwegian Agricultural Economics Research Institute 2002-16. Oslo (2002).

⁶¹⁰ See e.g. CAC 2007. *Report of the Thirtieth Session of the Joint FAO/WHO Codex Alimentarius Commission* Joint FAO/WHO Food Standards Program ALINORM 07/30/REP. Rome. At 162.

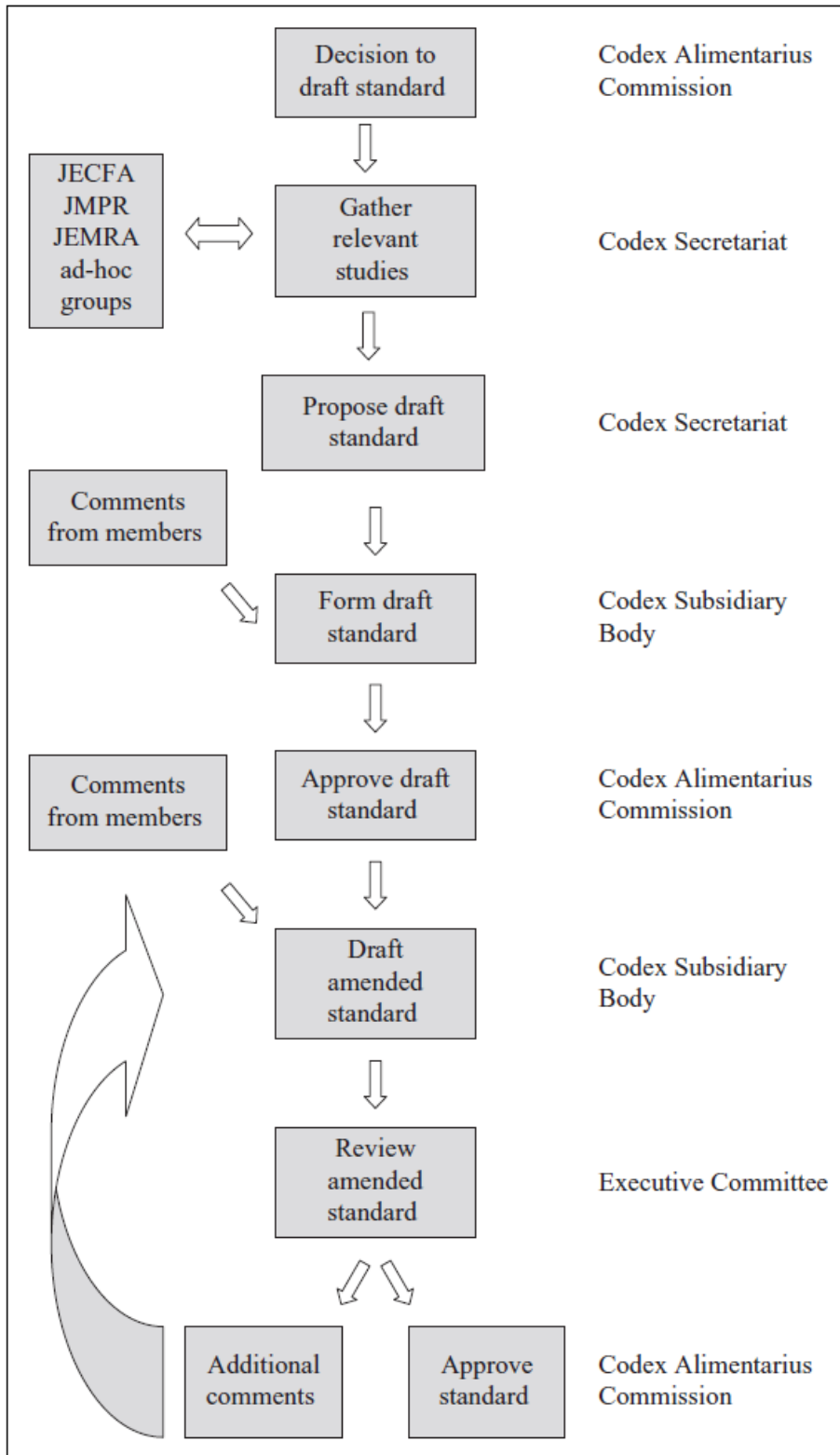
⁶¹¹ See e.g. Veggeland, Frode, and Svein Ole Borgen, *Changing the Codex: The role of international institutions* Norwegian Agricultural Economics Research Institute 2002-16. Oslo (2002).

representative to the Executive Board. These fourteen regional representatives, plus the chairs and vice-chairs make up the Executive Board. In addition, other subsidiary bodies, called committees focus on specific subjects or commodities and do the work of drafting or finalizing standards for submission to the Commission as a whole. General Subject Committees perform “horizontal” work that applies across the board to all commodity standards. The Codex Committee on General Principles (CCGP), Codex Committee on Food Additives (CCFA), and Codex Committee on Residues of Veterinary Drugs in Foods (CCRVDF) are examples of General Subject Committees. Commodity Committees perform the “vertical” work of developing standards for specific foods. For example, the Codex Committee on Fats and Oils, and the Codex Committee on Milk and Milk Products are Commodity Committees.⁶¹²

A number of standing and ad-hoc expert committees, coordinated by the FAO and WHO, support the work of the Codex. The most important of these committees are the Joint FAO/WHO Expert Committee on Food Additives (JECFA), the Joint FAO/WHO Meetings on Pesticide Residues (JMPR), and the Joint FAO/WHO Meetings on Microbiological Risk Assessment (JEMRA). While not officially part of the Codex, the activities of these committees are coordinated by the FAO and WHO so as to be able to advise the Codex as needed. The process for drafting and approving a new Codex standard is shown in Figure 1.

⁶¹² See Joint FAO/WHO Food Standards Programme 2006. *Codex Alimentarius Commission Procedural Manual - Sixteenth Edition* Codex Alimentarius Commission.

Figure 1: The Codex Standard-Setting Process



The WTO-wrought Disruption in Codex Procedure

The formal decision rule within the Codex is ‘one country, one vote,’ and a majority of attending members can set standards and make changes to the organization’s procedural structure.⁶¹³ Indeed, the use of voting indicates how the Codex has been, from the beginning, a hybrid space of politics and technocratic expertise with explicit mandates to consider science and economic impacts as it develops standards.⁶¹⁴ Nevertheless, prior to the enactment of the SPS Agreement, consensus in decision-making both within the Codex and its scientific advisory committees has been a strong customary norm. Nations did not always agree about the standards that were being debated. Nevertheless, the non-binding nature of the regulations created no incentive for nations to block them by disagreeing. Nations disagreeing with a standard frequently abstained from voting, allowing the standard to be passed, and then simply refrained from implementing it domestically.

The passage of the SPS agreement changed decision-making practices starting in the 1990s, as outcomes there took on new legal import within the trading regime. Where decision by consensus previously reigned, bursts of voting occurred in 1995 and again in 1997 for a number of meat hormones, a standard for natural mineral waters, and guidelines for food import and export inspection certification systems. (see figure 2) In the immediately post-SPS Codex, it seemed, abstention was no longer a sensible behavior for a dissenting nation. A 2002 FAO-and-WHO-sponsored evaluation of the Codex traced these changes to the trading regime, stating that “[w]hereas in the past member governments of Codex were under no obligation to use Codex standards for domestic consumer protection or health, since the WTO SPS agreement of 1994, Codex has had legal status . . . [and this] has inevitably made compromise more difficult.”⁶¹⁵

This newfound legal status not only made compromise more difficult, it brought previously enacted standards into question: would standards enacted before the Codex’s uptake into WTO law provide the legal default standard, and would such standards be enforced even when the challenged country voted against the standard? These issues emerged explicitly within WTO litigation. In *EC Beef Hormones*, the first case brought under the SPS Agreement, the EC argued before Panel that:

the Codex and the SPS Agreement did not interact properly, because a member of Codex, which had different views about other considerations (e.g. health concerns of consumers) and in good faith abstained from blocking the adoption of a Codex standard knowing in advance that in doing so it would not be required to follow the standard whose adoption it did not block, would later find itself to have an obligation to follow under the SPS Agreement.

⁶¹³See Joint FAO/WHO Food Standards Programme 2006. *Codex Alimentarius Commission Procedural Manual - Sixteenth Edition* Codex Alimentarius Commission.

⁶¹⁴See Salter, Liora, *Mandated Science: Science and Scientists in the Making of Standards*. Dordrecht: Kluwer (1988).

⁶¹⁵See Traill, Bruce, Bedouin, Rachel, Gourlie, Katharine, Husch, Jerri, Lustre, Alicia, Cravitoto, Alejandro, du Bois, Irina, Buckle, Ken, Scala Gelli, Dilma, Henson, Spencer, Hoda, Anwarul, Xiumei, Liu, McCrea, Diane, Oniang'o, Ruth, and Wachsmuth, Kaye 2002. *Report of the Evaluation of the Codex Alimentarius and Other FAO and WHO Food Standards Work* FAO/WHO.

In fact, the WTO Panel, as well as its Appellate Body, held that abstentions and even dissenting votes did not excuse a country from needing to justify its departure from an existing Codex standard.

The mid-1990s votes, and the *Beef Hormones* ruling, led to a questioning of the procedural rules within the Codex. In the 1999 Codex meeting “[t]he Delegation of India, supported by China, Malaysia and other delegations expressed the view that, when decisions could not be reached by consensus and voting was required, a two-third majority should be introduced, in view of the importance of Codex texts as a reference in international trade.”⁶¹⁶ The 2002 Codex evaluation also supported this strategy, noting that “the occasional use of simple majority voting of delegates present to adopt standards has led to some of the most controversial Codex decisions, given the narrow margins by which standards were passed.”⁶¹⁷ This is no doubt a reference to the 1995 Codex standards for five of the six hormones in the EC-Hormones case, which passed 33-29 with 7 countries abstaining.⁶¹⁸ However, as we will see, the institution has avoided formal reform, and has instead moved to shore up consensus procedures.

Stabilizing Consensus

After passage of the SPS, and the rise in frequency of voting, a number of scholars predicted that voting would play an increasingly important role in the newly “politicized” organization.⁶¹⁹ However, the data supports no such conclusion: rather, there was a blip of voting around 1995, and then a retrenchment back to consensus outcomes.⁶²⁰ (see figure 2)

Figure 2: Voting in the Codex Alimentarius Commission

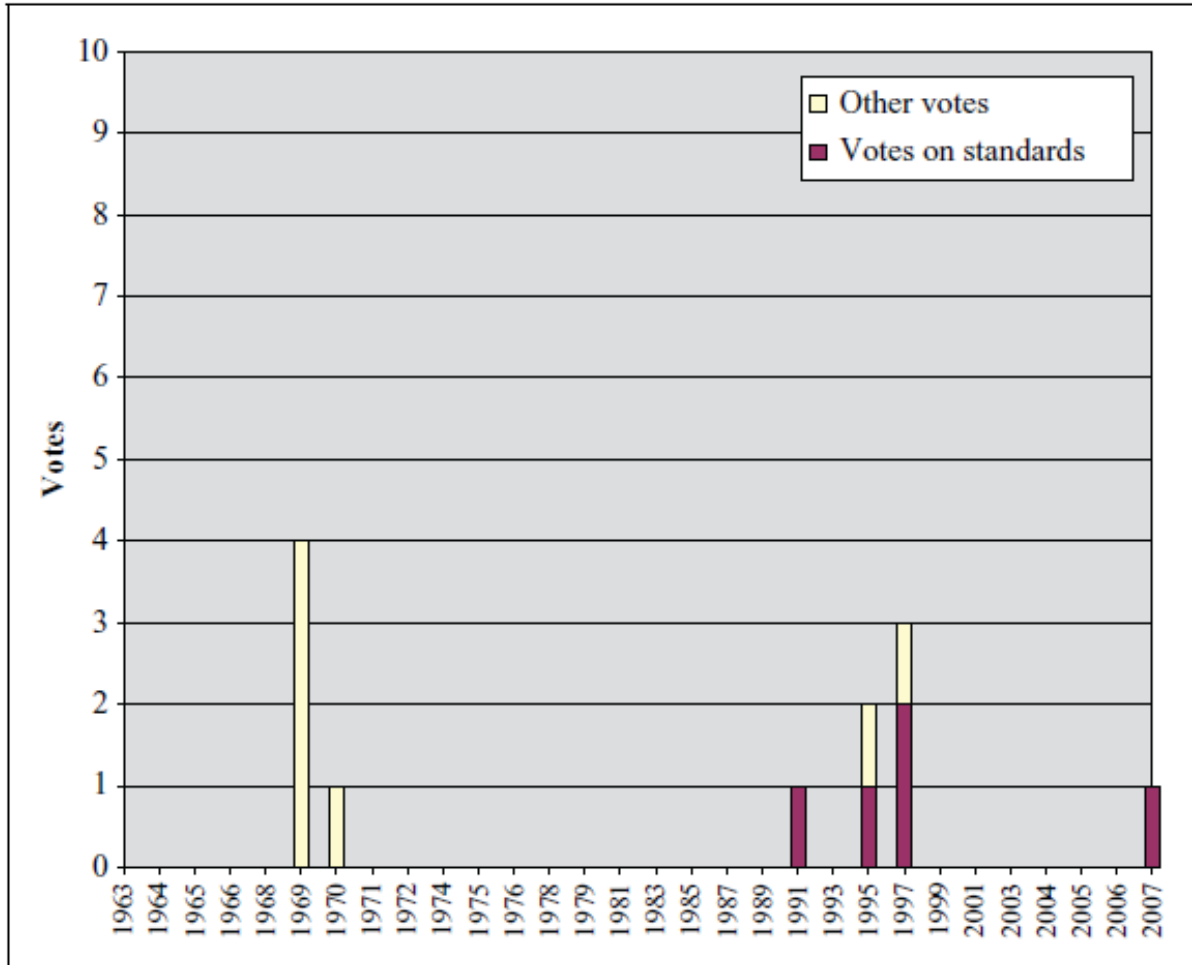
⁶¹⁶ See CAC 1999. *Report of the Twenty-Third Session of the Joint FAO/WHO Codex Alimentarius Commission* Codex Alimentarius Commission ALINORM 99/37. Rome. See para. 61.

⁶¹⁷ See Traill, Bruce, Bedouin, Rachel, Gourlie, Katharine, Husch, Jerri, Lustre, Alicia, Cravitoto, Alejandro, du Bois, Irina, Buckle, Ken, Scala Gelli, Dilma, Henson, Spencer, Hoda, Anwarul, Xiumei, Liu, McCrea, Diane, Oniang'o, Ruth, and Wachsmuth, Kaye 2002. *Report of the Evaluation of the Codex Alimentarius and Other FAO and WHO Food Standards Work* FAO/WHO.

⁶¹⁸ See WTO 1997. *EC Measures Concerning Meat and Meat Products (Hormones) - Complaint by the United States: Report of the Panel* WTO WT/DS26/R/USA.

⁶¹⁹ See e.g. Motaal, Doaa, Abdel, *The "Multilateral Scientific Consensus" and the World Trade Organization*, *Journal of World Trade* 38 (5):855-876 (2004). See also e.g. Stewart, Terence P., and Johanson, David S., *The SPS Agreement of the World Trade Organization and International Organizations: The Roles of the Codex Alimentarius Commission, the International Plant Protection Convention, and the International Office of Epizootics*. *Syracuse Journal of International Law and Commerce* 26:27-54. (1998).

⁶²⁰ These data were compiled from the reports of the Commission. They exclude votes to modify the procedural manual, as these changes must be done via voting.



The first reason for this pattern concerns the ruling of the 1997 *Beef Hormones* panel. From the perspective of WTO dispute settlement, a country gains nothing legally by logging dissent on a particular Codex standard, thus reducing the incentive of countries to call for a vote. However, a more important factor in this return to consensus is that the Codex has actively mobilized efforts to prevent votes from occurring. In 1997, following a particularly contentious vote on the milk hormone BST, the Commission tasked its Committee on General Principles with improving procedures to obtain consensus.⁶²¹ This process led in 1999 to a decision to amend the Codex Rules of Procedure by adding rule X.2: “The Commission shall make every effort to reach agreement on the adoption or amendment of standards by consensus. Decisions to adopt or amend standards may be taken by voting only if such efforts to reach consensus have failed.”⁶²² Years of additional discussion led to the 2003 general decision entitled *Measures to*

⁶²¹See CAC 1997. *Report of the Twenty-Second Session of the Joint FAO/WHO Codex Alimentarius Commission* Codex Alimentarius Commission ALINORM 97/37. Geneva. See para. 125. See also Jukes, David, *The Role of Science in International Food Standards*, 11 Food Control 181 (2000).

⁶²²See CAC 1999. *Report of the Twenty-Third Session of the Joint FAO/WHO Codex Alimentarius Commission* Codex Alimentarius Commission ALINORM 99/37. Rome.

*Facilitate Consensus.*⁶²³ This decision, now part of the procedural manual, recommends *inter alia* “[r]efraining from submitting proposals...where the scientific basis is not well established on current data and, where necessary, carry out further studies in order to clarify controversial issues;” and that “matters should not be passed on to the Commission until such time as consensus has been achieved at the technical level” This decision highlights the Codex’s attempt to mobilize adherence to the norm of consensus, and demonstrates that a “technical consensus” is understood to be central to attempts to arrive at a political consensus.⁶²⁴

Though the concept of consensus clearly does legitimizing political work on its own, the idea that Codex standards flow easily and unproblematically from scientific knowledge is useful for both the Codex and the WTO. The instrumentality of the Codex is perceived to depend on its ability to produce convergence towards credible and authoritative standards that are “scientifically sound.” Convergence validates the trust given to it by the trading regime, and reinforces its theory of food regulation as a technocratic practice, guided by universal reason.

Thus, the work to re-establish consensus decision-making goes hand-in-glove with its post-WTO self-presentation as, above all, a *scientific* organization. The 2006 Third Edition of *Understanding the Codex Alimentarius*, an explanatory document targeted to the public, states that the “carefully crafted Statutes and Rules of Procedure ensure that [the Codex] pursues its clearly defined objectives in a disciplined, dispassionate, and scientific way” and that “Codex standards are considered scientifically justified and are accepted as the benchmarks against which national measures and regulations are evaluated.”⁶²⁵ Achieving consensus serves to demarcate the Codex as an expert agency, which in turn helps legitimate its newfound regulatory power. In this sense, the organization’s systematic attempts to arrive at consensus and avoid voting can best be understood as boundary work.

The recent and anomalous vote on Emmental Cheese labelling in 2007 illustrates the weight put on consensus in the current Codex. This vote, the first on a standard in a decade, occurred when Switzerland refused a proposal by the Chair to simply note its opposition to the proposed standard, and instead refused to allow the standard to go forward by consensus. According to the Codex procedures, in such a situation, the dissenting party must make a counterproposal. If this counterproposal is seconded, a vote ensues between the original proposal of the Chair and the counterproposal. After Switzerland made its counterproposal to send the proposed standard back to the relevant subcommittee for further discussion, a tense few minutes ensued, during which it did not seem that any party was going to second the counterproposal. Finally, the delegation of Jamaica seconded the proposal, sending the issue to a vote.⁶²⁶ Remarkably, in spite of delegations’ reluctance to second the issue, bringing about a vote, once it was decided that there would be a vote, 23 members, or ¼ of the voting countries voted along with Switzerland. This highlights the fact that even when standards pass by

⁶²³See CAC 2003. *Report of the Twenty-Sixth Session of the Joint FAO/WHO Codex Alimentarius Commission* Codex Alimentarius Commission ALINORM 03/41. Rome.

⁶²⁴ That these attempts to avoid voting are now taken quite seriously is illustrated by the fact that the draft residue limit for BST has been held at the final stage of the process since 1997, so as to avoid bringing it before the committee, where it would inevitably result in a vote.

⁶²⁵See FAO/WHO 2006b. *Understanding the Codex Alimentarius* FAO/WHO W9114/E. Rome.

⁶²⁶ This material is based on one of the author’s in-person observations in 2007.

consensus, there are likely to be many members who would vote against it if a vote were to occur, but who elect not to in order to maintain the norm of consensus.⁶²⁷

The vote was widely regarded as a black eye on the meeting. When the lights on the results screen began to light up, delegates brought out their cameras and began to take pictures of the screen – not to see who had voted how, that information was to be available to all in the report of the meeting, but because this was a rare and noteworthy event. After the fact, many delegates expressed their displeasure that the vote had occurred, calling it a “negotiating failure.” More than one delegate referred to what they thought would be the coming political fallout in this and other fora resulting from the vote.

Voting and Consensus in Science Advisory Bodies

Beyond the Codex itself, a reassessment of the role of voting and consensus has also been felt in the bodies that provide it scientific advice.⁶²⁸ These bodies produce the reports that the Secretariat gathers at the request of the Codex subcommittees (see Figure 1). The reports combine exposure-pathway and intake data with health and toxicological data in order to provide the expected health effects from different levels of exposure to the substance in question. This process frequently involves evaluating a set of previous studies of the substance and summarizing these findings for the committee. With much agreeing evidence, this process may not be particularly controversial. When the evidence is mixed, the advisory body is in a more difficult position. Disagreement among scientists on these committees has generally been dealt with by simply reporting the disagreement. However, in the wake of the *Beef Hormones* case, explicit procedures for *resolving* as opposed to reporting this type of disagreement began to be suggested.

Regardless of what decision is made, each assessment that comes out of an advisory body represents an agreement on the part of the scientists writing the report. In the event of disagreement between these scientists, the Joint FAO/WHO Workshop on the Provision of Scientific Advice to Codex and Member Countries (2004) suggests that “[v]oting could be used where consensus cannot be reached. Meetings should strive for consensus wherever possible, but where consensus cannot be achieved, this should be documented.” This type of disagreement is inappropriate to represent with error bars and certainty intervals. If a single finding must emerge from such disagreement, it must instead be settled by interpersonal decision-making procedures. This type of “science by committee” is increasingly common in global scientific bodies (e.g. the IPCC assessment reports).⁶²⁹ Requiring different degrees of majority or consensus among members of scientific groups in order to offer the institution’s approval to certain findings introduces an important element of *democratic process* to what is ostensibly

⁶²⁷ See Hüller, Thorsten and Maier, Leonhard, Fixing the Codex? Global Food-Safety Governance Under Review. In *Constitutionalism, Multilevel Trade Governance, and Social Regulation*, edited by C. Joerges and E. U. Petersmann. Oxford: Hart Publishing (2006).

⁶²⁸ As described above, the three standing bodies are the JECFA, JMPR and JEMRA.

⁶²⁹ See e.g. IPCC 2007a. *Fourth Assessment Report: Working Group I Report "The Physical Science Basis"* IPCC Geneva. See also IPCC 2007b. *Fourth Assessment Report: Working Group II Report "Impacts, Adaptation and Vulnerability"* IPCC Geneva. See 2007c. *Fourth Assessment Report: Working Group III Report "Mitigation of Climate Change"* IPCC Geneva.

legitimated as an expert activity.⁶³⁰ This suggested push toward formal voting procedures on expert bodies is an illustration of how changes in global trade law engender accompanying changes in the practice of international science advising. Formalizing and legalizing the Codex in the wake of the SPS agreement has led to a similar move to further formalize the Codex advisory bodies.

Perhaps more interesting has been the science advisory bodies' push back against this suggestion. As far as we can determine, no formal votes have taken place in the Codex expert bodies. At the 65th meeting of the JECFA, a safety evaluation of flavoring agents took place. During this evaluation an irresolvable difference of expert opinion occurred, and after much failed attempt to reach consensus, the chair asked for a show of hands of who was not in agreement. The minority opinion of two scientists was recorded in the report. When asked about this event, a member of the JECFA secretariat was very insistent on the fact that this had not been a vote, and that the JECFA was not a voting body. "You cannot vote in science, you can only disagree."⁶³¹ Within the ethos of the Codex advising bodies, voting undercuts a scientific mandate and authority.

Representation on Expert Committees

The procedures to determine the content of the reports that Codex committees use to draft standards obviously heightens the importance of expert committee composition. Who is being chosen and how become critical questions. With international science advisors explicitly acting in a more authoritative capacity, one might expect to find new calls for representation emerging on these advisory panels. Issues of representation on scientific committees *have* become more salient in the Codex than ever before, but it is crucial to understand how these issues are playing out in ways different than those noted in various domestic science advising contexts.

The major Codex science advisory bodies are joint expert committees of the FAO and WHO.⁶³² As such, appointments are made by both organizations, based on their respective rules for expert committees.⁶³³ Experts are selected by the Directors General of the FAO and WHO from standing expert panels within their respective organizations. Membership on these panels is also determined by the Directors General, with oversight from the executive board of their respective organizations. The procedure for the selection of JECFA experts, given in the FAO JECFA procedural guidelines, states that a balance between scientific expertise and other experience (particularly regulatory) is essential.⁶³⁴

The FAO and WHO maintain a roster of experts, from which individuals are drawn to serve on expert consultations. To be placed on a roster, an interested individual must submit an

⁶³⁰ See Guston, David H., On Consensus and Voting in Science: From Asilomar to the National Toxicology Program. In *The New Political Sociology of Science: Institutions, Networks, and Power*, edited by S. Frickel and K. Moore. Madison, Wisconsin: University of Wisconsin Press (2006).

⁶³¹ Personal interview – July, 2007

⁶³² The JECFA, JMPR, and JEMRA are the standing expert panels. Other ad-hoc panels are also joint FAO/WHO entities.

⁶³³ For the FAO, these rules are given in Article VI of the FAO constitution: (FAO 2001). For the WHO, these rules are given in the "Regulations for Expert Advisory Panels and Committees" – section 31 in (WHO 2004).

⁶³⁴ See FAO 2003. *FAO Procedural Guidelines for the Joint FAO/WHO Expert Committee on Food Additives: Procedures for Food Additives and Food Contaminants* FAO Rome.

application in response to a current call for applications for experts on a given issue. The FAO and WHO cover the costs of experts' attendance at the JECFA meetings, but no payment is provided. While case-specific politics enter into play in the selection of relevant experts, this process is opaque. But the substantial time and resources required to gather the relevant studies and draft summaries of them is not a compensated activity. Thus, although experts theoretically serve "in their own personal right - not as government representatives or as spokespeople for organizations,"⁶³⁵ they may only be able to afford to serve if they can work without pay for some time, or if their employer funds or sponsors their work.

Especially important here is the requirement for a certain level of scientific expertise and experience. Some scholars have noted that this requirement may serve to preclude participation from developing country scientists, leading to advisory bodies that are filled largely with experts from the developed world.⁶³⁶ In 2001 the Codex called for "a review of the status and procedures of the expert bodies in order to improve the quality, quantity, and timeliness of scientific advice."⁶³⁷ This call led to a Joint FAO/WHO Consultative Process on the Provision of Scientific Advice – a multi-year process involving circulating papers in an e-forum, meetings/workshops, and the generation of reports containing recommendations that were regularly presented to and evaluated by the Codex. The question of developing country participation in expert committees became a strong theme in this process. Ultimately, a more focused "Meeting on Enhancing Developing Country Participation in Scientific Advice Activities" was convened in December 2005. The final recommendations of the consultative process, brought before the 2007 Codex Committee meeting included *inclusiveness* as a core principle. In addition to inclusiveness of minority scientific opinion and a diverse set of skills, the report recommends that in the selection of participants, "in addition to their expertise, due consideration should be given to geographical and socioeconomic balance, but not to the extent that it compromises scientific integrity. Particular emphasis should be placed on improving the participation of developing countries. Where participation is limited by a skill or knowledge gap, appropriate capacity building activities should be undertaken."⁶³⁸

The emerging discourse about representation across north and south on expert science committees creates an obvious tension, however, with the Codex's concern with emphasizing scientific credentials as the key criterion of committee membership.⁶³⁹ The authority of advisory committees in the U.S. policy system, for instance, derives in part from their ability to claim the

⁶³⁵ See FAO/WHO 2006b. *Understanding the Codex Alimentarius* FAO/WHO W9114/E. Rome.

⁶³⁶ See Boutrif, Ezzeddine, The new role of Codex Alimentarius in the context of WTO/SPS agreement. *Food Control* 14 (2):81-88 (2003). See also Post, Diahanna, *Food Fights: Who Shapes International Food Safety Standards and Who Uses Them?* PhD, Political Science, UC Berkeley, Berkeley (2005).

⁶³⁷ See CAC 2001. *Report of the Twenty-Fourth Session of the Joint FAO/WHO Codex Alimentarius Commission* Codex Alimentarius Commission ALINORM 01/41. Geneva.

⁶³⁸ See FAO/WHO 2007. *FAO/WHO Framework for the Provision of Scientific Advice on Food Safety and Nutrition* FAO/WHO Rome and Geneva.

⁶³⁹ Codex explains in its public material that "those selected must be pre-eminent in their speciality, have the highest respect of their scientific peers, and be impartial and indisputably objective in their judgement." (FAO/WHO 2006b) The issue of equity in representation across North and South is highly reminiscent of discussions within other global knowledge institutions, most obviously the IPCC. (see e.g., Biermann 2002)

label ‘science’ rather than ‘politics.’⁶⁴⁰ The implication that it matters *who* is doing the science challenges the politically useful construct of disinterested science. From the perspective of science studies scholarship, calls for greater geographic representation on the FAO/WHO advisory committees would tend to undermine the ability of science advisory committees at the Codex to engage in this boundary work.

Perhaps for this reason, official Codex discourse framed the geographical representation in ways that would preserve the demarcation of advisory committees as a pure, scientific space. First, the goal of representation is presented as *credibility building*, rather than correcting science slanted to the interests of the North. The guiding discussion piece for developing country participation portion of the e-forum of the Consultative Process on the Provision of Scientific Advice states that smaller proportion of experts from developing countries “contributes to the perception that the advice provided could be biased.”⁶⁴¹ The fact that the report seems to worry about only about the “perception” is telling: they don’t actually worry about a departure from sound science due to a northern bias. Their worry is more political and pragmatic, and deals with gaining trust in the expertise of such committees. Given the complex post-colonial politics at the international level, the framers of the consultation appreciate how the *epistemic* authority of the “sound science” conception may be insufficient to establish political legitimacy among developing countries, whose trust may require more than the authority of expertise.

In addition to credibility building, the need to reconcile representation with “scientific integrity” gives rise to a second framing: geographical representation as *capacity building*. When the benefits of greater participation are discussed in official reports and recommendations, they are largely given as benefits leading to a superior “enabling environment” at home for new science and new science-based standards. For example, the report on the aforementioned meeting for Enhancing Developing Country Participation in FAO/WHO Science Advice Activities recommends that a “practical booklet should be prepared by FAO/WHO and distributed that describes the importance of scientific advice as a tool towards increasing awareness of various member government agencies, organizations and institutes.”⁶⁴² Any reference to representation of developing countries on the committee is relegated to discussions about data availability in which insufficient data from developing countries may lead to their not being represented in the scientific findings.

These framings of the representation issue highlight an important difference between international science advising and that of domestic agencies. By shifting to talk of capacity building, a scripted and off-the-shelf discourse within the modern international bureaucracy, the FAO/WHO advisory bodies try to accomplish what U.S. advisory committees were not able to do: call for ideological and political “balance” within advisory committees without undermining their epistemic authority. Because this body can argue that developing country participation brings scientific influence to national policymaking (an argument that does not make sense for political balance in the domestic setting) potentially conflicting parties are able to call for the same thing: greater participation. Thus, discourses of representation and sound science are made

⁶⁴⁰ See Jasanoff, Sheila, *The Fifth Branch: Science Advisers as Policymakers*, 3 (1990).

⁶⁴¹ See Gonzalez, Roberto, *FAO/WHO Electronic Forum on the provision of scientific advice to Codex Alimentarius and member countries: Enhancing the role of developing countries in developing scientific advice* FAO/WHO (2003).

⁶⁴² See FAO/WHO 2006a. *Enhancing Developing Country Participation in FAO/WHO Scientific Advice Activities: Report of a Joint FAO/WHO Meeting* FAO Rome.

to converge rather than conflict, achieving the reconstruction of science advisory committees as hybrid zones of science and political negotiation.

Conclusion

The emergence of the global food safety regime relied on a process of mutual legitimation across organizations and their differing sources of authority. The World Trade Organization invoked sound science and the Codex as a pre-existing source of expertise that embodied it. But far from simply enrolling and empowering an existing expert organization, the WTO was instrumental in producing one. Further, through a process of coproduction of both epistemic and legal authority, both the WTO and the Codex have given rise to an authoritative discourse of regulation and an attendant regulatory epistemology. The resulting standardized risk analysis within the Codex is a direct result of the ambitious goals set by SPS negotiators to rationalize and harmonize the regulation of consumer and environmental risk in the trading regime. Furthermore, the near-ubiquitous demand to base Codex standards on scientific risk analysis renders the regulation of food legible to a set of policymakers who seek to impose universally applicable standards in the interest of economic efficiency. These of course are not incorrect goals as such. But as scholarship by Scott⁶⁴³ and others has shown, large-scale rationalization projects may try to do too much: systems of standards may be in harmony with each other but discordant with the political reality within member states. Hence, it is critical to remain attentive to the ways particular accounts of science-for-regulation become naturalized. It is precisely this sort of attention that has helped produce a risk analysis framework that is far less rigid than first proposed.

We have also traced a narrative of knowledge regime stabilization, namely how the accretion of power at the Codex ushered in a phase of unsettlement around its working procedures, and its science advice. Validating the Codex's newly vested authority necessitated new strategies of boundary work as it organized risk analysis into technical and policy phases, and as it worked to re-establish procedures that seemed in accord with a technocratic ethos. Accordingly, the Codex has actively tried to re-establish consensus within its standard-setting procedures and avoid decision-forcing procedures in its science advice. Finally by framing calls for developing country participation in expert bodies as capacity building, Codex could retain its image as a technocratic rather than a political agency, productive of scientific convergence rather than disunity.

Like Latour's skeptic,⁶⁴⁴ if we go looking for the source of scientific legitimacy, we find that it is not readily localizable. It is spread out across a network of actors, tools, and institutions. The WTO locates it within the Codex, the Codex looks to its expert advisory bodies, and the expert advisory bodies in turn look to the contingently defined scientific community. What we see is a process of nesting delegations of epistemic authority. At each step, the parent institution derives political legitimacy from a "nest" of experts, while the experts derive political authority from their parent institutions. As the work of these bodies takes on increasing power in the sphere of health and environment, expert consensus becomes harder to achieve, and so purer expert bodies are needed.

⁶⁴³ See Scott, James C., *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. Edited by J. C. Scott, *Yale Agrarian Studies Series*. New Haven: Yale University Press (1988).

⁶⁴⁴ See Latour, Bruno, *Science in Action*, 215-58 (1987).

The move, however, towards democratic elements with Codex expert process signals the fact that such delegations have their pragmatic limits. Perhaps these new procedures harness the necessary sense of transparency, representation, and accountability within these hybrid bodies to enable them to do their political work. Considering both the power and the hybrid nature of Codex functions and activities, the embrace of democratic elements should not be dismissed as inappropriate or out of place. To the contrary, they signal the critical importance of attending to the politics within international knowledge institutions. We have in part been showing that these politics are taking on a particular character in global fora, where geopolitical divides are stark, where trade interests are strong, and where acceptable forms of science-for-regulation must somehow be negotiated.

As the political importance of the Codex has increased, these rules of procedure have come to the fore, becoming new sites of conflict in a struggle to define the rules for legitimate knowledge production within the WTO legal framework. These developments signify that Codex *has* achieved a sort of explicit status as a global governmental agency, a place of both politics and expertise that must balance efficiency with the other substantive values of the polity.

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