International organizations as teachers of norms: the United Nations Educational, Scientific, and Cutural Organization and science policy

Martha Finnemore

The structure of states is continually evolving. Since their establishment in Europe some five hundred years ago and particularly since World War I, states have grown in terms of both the variety of tasks they perform and the organizational apparatuses with which they perform these tasks.

The research outlined below investigates the causes underlying this process of state change in the case of one recently adopted set of state bureaucracies, those designed to coordinate scientific research. In the last fifty years science policymaking organizations have sprung up in virtually all developed countries and in most developing ones. Most explanations for the appearance of these new pieces of state machinery found in the political science or economics literatures describe this development as demand-driven, that is, some domestic group perceives a problem to which a science policy bureaucracy is the solution. Social groups such as producers of science (e.g., scientists) or consumers of science (e.g., technology-intensive businesses) may come to perceive that state coordination and direction of a growing science establishment are in their interest. State officials may come to perceive that the intimate relationship between science and security makes control of science in the national interest. Depending on the perspective adopted, one would predict different configurations of science bureaucracies serving different interests, but in all cases, the impetus for creating those organizations would be a demand by state or societal actors that the government should direct and control science.

This study quantitatively tests these demand-driven hypotheses by comparing a variety of indicators of state conditions that have been argued to prompt demand with the timing of adoption of science policy bureaucracies. The

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results provide little support for any of the demand-driven hypotheses. Consequently, an alternative explanation is investigated. Early in the diffusion of this bureaucratic innovation, several international organizations took up science policy as a cause and promoted it among member states. The article traces the process whereby one of these international organizations, the United Nations Educational, Scientific, and Cultural Organization (UNESCO), "taught" states the value and utility of science policy organizations.

I argue that the creation of this teaching mission, whereby UNESCO would supply the organizational innovation to states, was a reflection of a new norm elaborated within the international community.[1] This norm held that coordination and direction of science are necessary tasks of the modern state and that a science policy bureaucracy having certain well-specified characteristics was the appropriate means to fulfill those tasks. States created science bureaucracies, with UNESCO's help, to comply with the new norm about states' responsibility for science. Thus, the organizational innovation was supplied to states from outside, from an international organization, rather than being the product of any characteristics internal to or inherent in the state itself.

The article makes contributions to three different theoretical debates ongoing in the field. First, the findings outlined above lend support to constructivist or reflective theoretical approaches that treat states as social entities, shaped in part by international social action. State policies and structures in this case are influenced by changing intersubjective understandings about the appropriate role of the modern state.

However, in most cases the causes of those changed understandings lie not at the national level but at the systemic level: it is an international organization that persuades states to adopt these changes. Thus, a second contribution of this article is to demonstrate the role of international organizations as principals, rather than agents, in international politics.

Finally, the article raises questions about the nature and role of epistemic communities. While many of the UNESCO officials involved in this reorganization of international science had scientific credentials, their reasons for acting had more to do with their status as international bureaucrats than with their professional socialization or principled beliefs about science. This suggests that the "epistemic" aspect of groups may not always be their most important feature and that caution is warranted in ascribing causal status to specialized knowledge when explaining political behavior.

1. For purposes of this article a "norm" is defined as a rulelike prescription which is both clearly perceptible to a community of actors and which makes behavioral claims upon those actors. Although comments of McElroy were influential in formulating this definition, McElroy's own definition differs significantly from mine; see Robert McElroy, *Morality and American Foreign Policy: The Role of Moral Norms in International Affairs* (Princeton, N.J.: Princeton University Press, 1992).

The development of science policy

The relationship between states and science by no means begins with the establishment of formal state science policy bureaucracies.[2] National academies and royal societies of science, many of which enjoyed some amount of state sponsorship and whose members were in frequent contact with government officials, date back to the seventeenth century. Similarly, state-sponsored universities often housed scientists and their activities. However, state sponsorship of the sciences in this early period was understood to be analogous to state sponsorship of the arts; greatness and accomplishment in arts and sciences reflected state power rather than being a means to achieve power. Further, patronage of this kind usually entailed minimal direction and control. Academies and universities may (or may not) have benefited from state funding, but they were not part of the state apparatus and were left free to pursue their work with a minimum of state interference.

The modern concept of science policy differs on both these issues. It understands science as a means to national power and consequently seeks to bring science activity under the control of the state. Most often this has entailed the creation of a new piece of state apparatus dedicated explicitly to this task. The first effort to do this was made by the British in 1915 when they established the Department of Scientific and Industrial Research to wean British science and industry from continental, especially German, innovations, expertise, and technical equipment during World War I.[3] A few Commonwealth members mimicked the British lead and established similar organizations, but it was not until after World War II that science policy bureaucracies became widespread. Before 1955 only a handful of countries (fourteen) had such entities; by 1975 eighty-nine countries did. This research seeks to explain how and why the state interest in and use of science changed in this way.

2. The history of states' changing attitudes toward science obviously is much more complex than the overview presented here. For more on this subject, see Joseph Ben David, "The Scientific Role: The Conditions of Its Establishment in Europe," *Minerva* 4 (Autumn 1965), pp. 15–54; A. Hunter Dupre, *Science in the Federal Government: A History of Policies and Activities to 1940* (Cambridge, Mass.: Harvard University Press, 1957); Philip Gummett, *Scientists in Whitehall* (Manchester, England: Manchester University Press, 1980); Ros Herman, *The European Scientific Community* (Harlow, England: Longman Press, 1986); Eric Hutchinson, "Scientists as an Inferior Class: The Early Years of the DSIR," *Minerva* 8 (July 1970), pp. 396–411; Daniel Kevels, *The Physicists: The History of a Scientific Community in Modern America* (New York: Alfred A. Knopf, 1978); Frank Pfetsch, "Scientific Organization and Science Policy in Imperial Germany, 1871–1914: The Founding of the Imperial Institute of Physics and Technology," *Minerva* 8 (October 1970), pp. 557–80; Jarlath Royane, *Science in Government* (London: Edward Arnold, 1984); Ian Varcoe, "Scientists, Government, and Organized Research in Great Britain, 1914–1916: The Early History of the DSIR," *Minerva* 8 (April 1970), pp. 192–216; and Robert Wuthnow, "The World Economy and the Institutionalization of Science in Seventeenth Century Europe," in Albert Bergesen, ed., *Studies of the Modern World-System* (New York: Academic Press, 1980), pp. 57–76.

3. Peter Alter, *The Reluctant Patron: Science and the State in Britain, 1850–1920* (Oxford: Berg, 1987), pp. 201ff.

For purposes of this study I define science policy bureaucracies as organs of the state that have as their primary mission the tasks of coordinating, organizing, and planning scientific and technological activities at a national level. I exclude from my definition the following types of organizations: (1) nonstate organizations (such as scientists' professional societies); (2) organizations dealing with only one branch of science (such as the National Weather Service or medical and health organizations); (3) educational organizations whose primary mission is to train scientific and technical personnel rather than coordinate activities broadly; and (4) research organizations whose primary mission is to conduct research rather than to make policy. This definition is based on UNESCO's definition used in compiling its world directories of national science policymaking bodies and so ensures that the UNESCO activities chronicled below and my analysis concern the same phenomena.[4]

Demand-driven explanations for science policy organizations

Most explanations for the creation of new state bureaucracies trace the cause to some change in material conditions that reconfigures the interests of actors within the state. Functionalists might regard such an objective change to be sufficient as well as necessary for the new bureaucracy to appear. Others less sanguine about the efficacy of political systems in meeting all needs or fulfilling all functions would regard change in material conditions only as a necessary condition and look to the process by which demands are voiced and, once voiced, are realized for sufficient conditions. Even in this latter set of explanations, however, some material change must prompt the demand-making process.

Thus in most explanations there is some prerequisite condition associated with the creation of new state bureaucracies.[5] Three kinds of prerequisites have been argued to be relevant. The first are what I call *issue-specific* conditions. Here, it is the situation in the issue-area particularly relevant to the new

4. The first of these directories appeared during the 1960s. See United Nations Educational, Scientific, and Cultural Organization (UNESCO), *World Directory of National Science Policy-making Bodies,* 3 vols. (Paris: UNESCO, 1966–68). Volume 1 covered Europe and North America; volume 2, Asia and Oceania; and volume 3, Latin America. A second directory was published in 1984. See UNESCO, *World Directory of National Science Policy-making Bodies,* Science Policy Studies and Documents Series, vol. 59 (UNESCO: Paris, 1984). A second edition of this 1984 directory was published in 1990. See UNESCO, *World Directory of National Science Policy-making Bodies,* Science Policy Studies and Documents Series, vol. 71 (Paris: UNESCO, 1990). I have made several refinements to the UNESCO definitions. For further explanation, see the appendix.

5. I have borrowed the term "prerequisite" from Collier and Messick's analysis of the spread of social security across states. See David Collier and Richard Messick, "Prerequisites versus Diffusion: Testing Alternative Explanations of Social Security Adoption," *American Political Science Review* 69 (December 1975), pp. 1299–315.

organization that prompts its creation. Applied to science, this argument links the creation of a state science policymaking apparatus to the growth and strength of the domestic science community. An argument of just this type has been made by David Dickson to explain the origins of science policymaking in the United States.[6] In Dickson's view the growth of the domestic science establishment prompted the creation of a state science policy apparatus in two ways. On the one hand state actors saw a science policy bureaucracy as an opportunity to direct and control this new activity. On the other hand scientists saw such an organization as a potential conduit for state aid and coordination. This thesis would predict adoption of science policy organizations to be highly correlated with domestic levels of science activity, for example, with the number of scientists in the country and the amount of research and development (R&D) spending.

The next two types of conditions apply to consumers rather than producers of science. *Development or modernization* levels are argued to prompt the creation of science policy entities through the actions of the economic consumers of science, particularly industry. The idea here is that as a state's economy develops, it will become more technology-intensive and so require more scientific support. Economic actors therefore put pressure on the state to organize and supply this support; a new science policy organization is the result. In many mixed economies, these actors may be state economic actors; what is important for this analysis is that the purpose of demand-making is economic. According to this thesis, indicators of economic development, such as per capita gross domestic product (GDP), should predict the creation of a science policy organization.

Security conditions are argued to prompt the creation of science policy bureaucracies through the actions of military consumers of science. In the modern era of warfare, scientific prowess has been clearly linked to technological and hence to military success. Thus states perceiving threats to their power and/or security will be pushed to find new and more effective technologies to meet those threats. Militaries in these states will demand that the state organize and support the scientific establishment for reasons of national defense.

The timing of science bureaucracy creation in Britain (during World War I) and in the United States (immediately following World War II) has led a number of scholars to draw causal connections between security concerns and science policy. Sanford Lakoff, Jean-Jacques Salomon, and Harvey Sapolsky all point to these wars as well as to another perceived security threat—the launching of Sputnik—as the catalysts for government interest in harnessing science to achieve national objectives in the United States and Europe. Having organized science to meet security threats during wartime with apparent

6. David Dickson, *The New Politics of Science* (New York: Pantheon, 1984), pp. 25ff.

success, these wartime institutions were then redeployed by states to meet peacetime objectives.[7]

Robert Gilpin makes a more detailed and broader security argument based on his investigations of French science.[8] He argues that France's creation of science policy organizations was the direct result of a perceived threat to French influence and independence from a preponderance of U.S. power immediately following World War II. At one level, this threat was understood militarily and led the French to use their science community to upgrade their defense establishment, notably to establish a separate nuclear strike force. But threats to influence and security in the French view were not limited to the military sphere. The French were also concerned about loss of economic dominance. U.S. economic strength following World War II was viewed with trepidation, and direct U.S. investment in France was viewed as a form of imperialism by a foreign power. During that time the French spoke of a "technology gap" that they must bridge by harnessing French science in the service of French industry to protect French economic independence and integrity.[9]

Security understood in this sweeping way, as any threat to influence and independence, could operate in so many arenas that developing tidy objective indicators to test for its presence is probably impossible.[10] The narrower arguments about security threats understood in a military context are somewhat easier to uncover. If armed conflict or the threat of armed conflict is critical, indicators of perceived military threat, such as defense spending as a percentage of GNP, should be correlated with the creation of science policy organizations. States perceiving military threats should be among the first to adopt science policy; conversely, relatively secure states should be clustered among the late adopters.

Testing the demand-driven explanations

Each of these explanations posits a material condition that then sparks a demand for the state to adopt new tasks and to create new bureaucracies to carry out those tasks. While it would be impractical to investigate the actual

7. See the following chapters in Ina Spiegel-Rosing and Derek de Solla Price, eds., *Science, Technology and Society: A Cross-disciplinary Perspective* (London: Sage, 1977): Jean-Jacques Salomon, "Science Policy Studies and the Development of Science Policy," pp. 43–70; Sanford Lakoff, "Scientists, Technologists, and Political Power," pp. 355–92; and Harvey Sapolsky, "Science, Technology, and Military Policy," pp. 443–72.

8. Robert Gilpin, *France in the Age of the Scientific State* (Princeton, N.J.: Princeton University Press, 1968).

9. Ibid.

10. For example, in the French case, threats to influence and independence extended to cultural matters and led France to pursue a number of foreign policy initiatives aimed at preserving and extending French language and culture in other states.

demand-making process over a large number of countries having very different political systems, it is quite simple to check for the existence of conditions said to be prerequisite to those demands. The test reported here compiled and analyzed quantitative indicators of domestic conditions that might prompt creation of a science policy bureaucracy in a sample of forty-four countries chosen to be globally representative in terms of both geography and development levels. As suggested in the foregoing discussion, these were percentage of GDP spent on R&D; proportion of scientists and engineers in the population; per capita GDP; and percentage of gross national product (GNP) spent on defense. A complete description of the indicators used and the method of compiling them can be found in the appendix.

Testing a global sample of states raises issues about comparability among the units of analysis, particularly comparability of developing and industrialized states. Cameroon and the United States, for example, are so different on so many measures that one may question whether the units of analysis are sufficiently alike to make comparison appropriate and meaningful.

In this case, comparability of the units is ensured by the research questions being asked. The hypotheses being tested concern the behavior of states as a political and organizational form: What prompts states to adopt new tasks and construct new apparatuses to carry out those tasks? The hypotheses do not carry with them caveats about degrees of stateness, state capacity, or other potentially limiting characteristics. Instead they make arguments about the behavior of states qua states. Cameroon and the United States may be very different states, but they are both states nonetheless. In fact the article will suggest that what is going on in this case is a redefinition of the state as a political and organizational form; that is, a redefinition of what is necessary and appropriate behavior for a state.

Figures 1–4 show the distribution of values for each of the indicators of state conditions at the time science policy bureaucracies were created in the countries studied. A quick look at figures reveals that none of the patterns corresponds to the expected patterns described above. If any of these conditions were both necessary and sufficient, there would be a large cluster of adoptions on the histogram at that necessary and sufficient value. Instead, the adoptions appear to occur at a very wide range of values for all four of the variables. No single value of any variable appears likely as a necessary and sufficient condition for adoption.

In fact, countries adopted these science bureaucracies at wildly different levels of each of these domestic conditions. Some elaboration from the raw data will make the extremely wide range of variation in values even clearer:

(1) Countries created these bureaucracies when they had as few as nine scientists employed in R&D (e.g., Congo) or as many as half a million (e.g., the United States and the Soviet Union).

(2) R&D spending as a percentage of GDP ranged from 0.01 percent at the time of adoption (Bangladesh) to 1.5 percent (France).

(3) Per capita GDP in constant U.S. dollars ranged from a low of $118/year

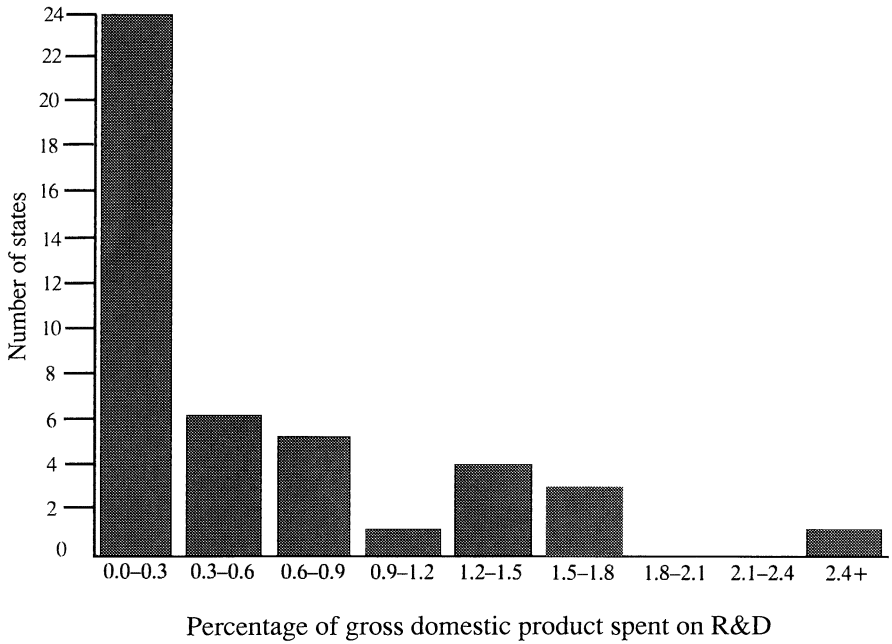

FIGURE 1. *Research and development (R&D) spending at the time of science policy adoption*

(Pakistan) to a high of more than $9,000/year (Denmark) at the time these bureaucracies were created.

(4) Defense spending as a percentage of GNP ranged from 0.7 percent (Mexico, Sri Lanka) to more than 10 percent at the time of adoption (France, Iraq, Jordan, and the Soviet Union).

The range of variation on the defense variable is more than a factor of ten; the range of variation on all of the other variables is a factor of one hundred or more. Ranges of variation this large do not readily suggest any causal connection between sufficient state conditions and the adoption of science bureaucracies.

Similarly, Figures 1–4 provide little support for the necessary condition hypothesis, that is, that there is some minimum threshold value of these variables that triggers demand for the bureaucracy. If such a value existed, we should see very few (or no) adoptions at the low end of the value range for one or more of these variables; all values would be spread across the upper end of the range at or above the necessary condition level.

Again, the far-flung distribution of values revealed in these figures and elaborated in the text above does not readily support this proposition. Rather than clustering at the upper end of the value ranges, there seems to be a concentration of values at the low end, particularly on the science variables. This is clearly not a bunching that would support the existence of a necessary

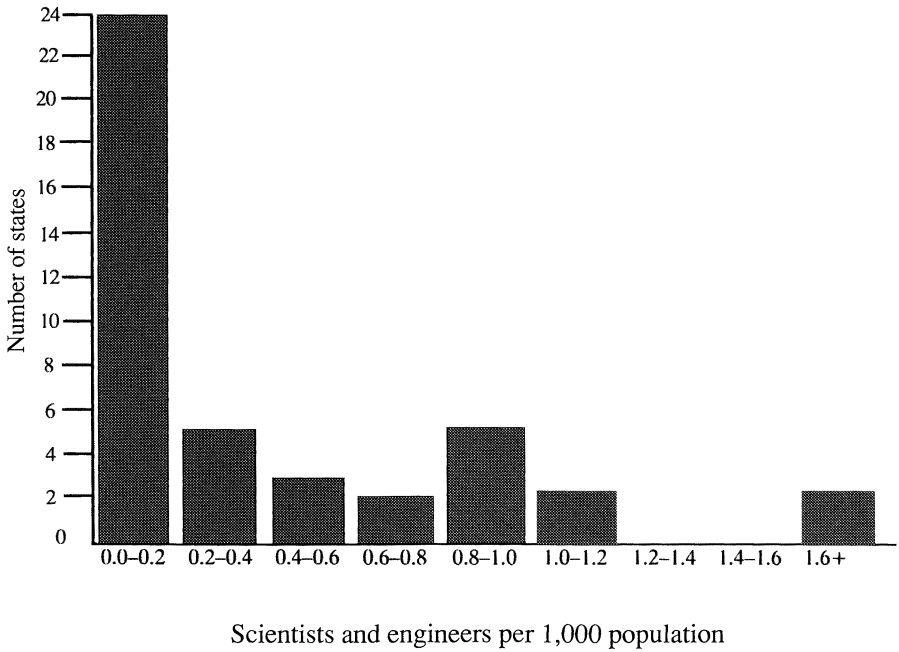

FIGURE 2. *Proportion of scientists and engineers in the population at the time of science policy adoption*

and sufficient condition, since the bunching in each case is accompanied by a large number of data points at the high end of each scale. Instead, it appears to be a strong negation of any necessary-but-not-sufficient-condition argument. If arriving at some minimum threshold level of these variables is supposed to trigger demand for a science policy bureaucracy, that threshold must be so low as to have very little explanatory power.

In fact a large number of small, poor, technologically unsophisticated, and militarily unthreatened countries created these bureaucracies in the 1950s and 1960s. It is this group that accounts for the clustering of data points at the low end of Figures 1–4. Guatemala, for example, created its Consejo Nacional de Investigacionnes Científicas y Técnicas in 1966 when it reported having only fourteen scientists employed in R&D jobs, spent only 0.01 percent of GDP on research, had a GDP per capita of $806, and, since it faced no serious military threats, spent only 1.07 percent of GNP on defense. Cameroon and the Congo were equally unlikely candidates for a science bureaucracy.[11]

11. The Congo created its Conseil National de la Recherche Scientifique in 1963 when it reported having only nine scientists engaged in R&D jobs and when spending on R&D was only 0.11 percent of GDP. Measured in U.S. dollars, GDP per capita was only $253 that year, and military spending accounted for only 2.04 percent of GNP. Cameroon created its Office National de la Recherche Scientifique et Technique in 1965 when it reported employing only eighty scientists in research jobs and spending only 0.16 percent of its GDP on research. Per capita GDP was $334 for that year, and the country spent only 2.3 percent of its GNP on defense.

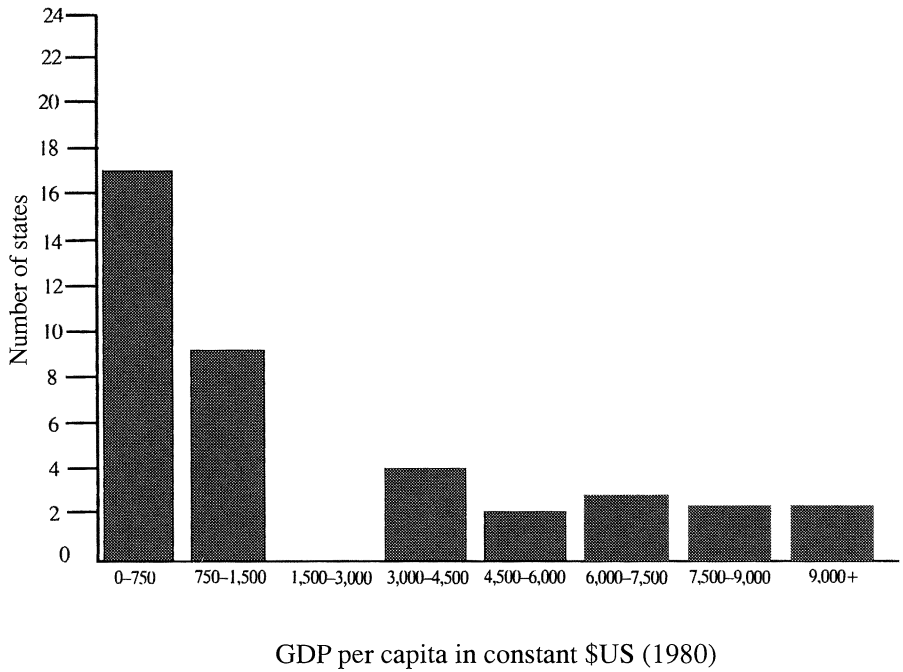

FIGURE 3. *Gross domestic product (GDP) per capita at the time of science policy adoption*

At the same time, the histograms do show that some countries create science bureaucracies at reasonably high levels of all the indicator variables. Significantly, the first instances of this science bureaucracy creation occur among this group, suggesting that demand-driven explanations may fit some of the earliest adopters of science policy. Britain, the first adopter, clearly created its Department of Science and Industrial Research in 1915 for security reasons to counter German advances in chemicals and machinery that were directly supporting the German war effort.[12] The establishment of the National Science Foundation in the United States in 1950 was explicitly related to concerns about military and industrial competitiveness and was strongly influenced by the creation of the atom bomb.[13] French science policymaking, as chronicled by

12. Alter, *The Reluctant Patron.* See also Roy McLeod and E. Kay Andrews, "The Origins of the D.S.I.R.: Reflections on Ideas and Men, 1915–1916," *Public Administration,* vol. 48, no. 1, 1970, pp. 23–48; and Ian Varcoe, "Scientists, Government, and Organized Research in Great Britain 1914–1916," pp. 192–216. The United Kingdom is not included in the quantitative analysis above because science data for that country for 1915 are unavailable.

13. Dickson, *The New Politics of Science.* See also J. Merton England, *A Patron for Pure Science: The National Science Foundation's Formative Years, 1945–1957* (Washington, D.C.: National Science Foundation, 1982); N. Dupree, *Science in the Federal Government;* Bruce Smith, *American Science Policy Since World War II* (Washington, D.C.: Brookings Institution, 1990); and U.S. Congress, House Committee on Science and Technology, Task Force on Science Policy, *A History of Science Policy in the United States, 1940–1985,* Science Policy Study Background Report, no. 1, 99th Congress, 2d sess., 1986, serial R.

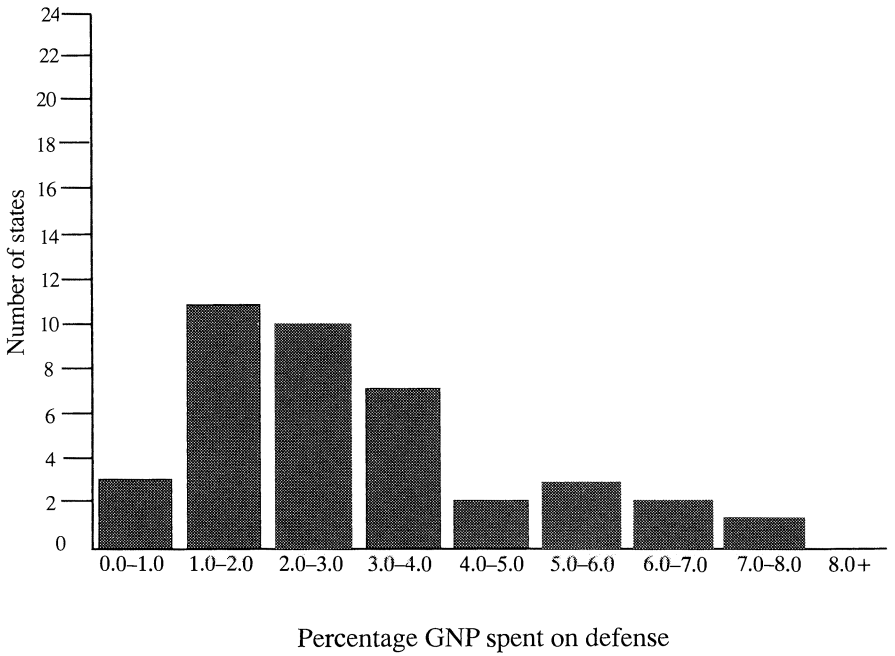

FIGURE 4. *Defense spending as a percentage of gross national product (GNP) at the time of science policy adoption*

Gilpin, seems also to have been prompted by security and competitiveness concerns, albeit of a more general nature since the French were concerned about a general loss of influence in the world, especially vis-à-vis the United States.[14]

But how do we explain the creation of science policy organizations in more than a hundred other states covering the extremes of science capacity, development levels, and military situations in the subsequent twenty years? Countries as dissimilar as Bulgaria, Czechoslovakia, El Salvador, the Federal Republic of Germany, Indonesia, Italy, Lebanon, Mali, Pakistan, and Sweden all created their first science policy bureaucracy during the peak adoption year of 1962.[15]

It will be argued below that these two phenomena, the apparent responsiveness to state conditions in a few early-adopting states followed by a pattern of adoption unrelated to state conditions, can be reconciled in the following way: science policy bureaucracies appeared as an innovation in the international system in response to clear domestic demands in a few prominent developed countries. The innovation was then picked up and popularized by an international organization, UNESCO, for reasons of its own and spread by that

14. Gilpin, *France in the Age of the Scientific State.*

15. "Peak adoption year" in this case means the single year in which the largest number of states created these science policy bureaucracies.

organization to other states in which the conditions that ordinarily would prompt such demands did not exist.

A supply-driven explanation

Since demand-side explanations for the creation of science policy organizations appear to be on weak ground for most states, the next logical question is, what if these bureaucratic innovations are not demanded inside the state but supplied from outside? In fact, most (roughly 70 percent) of these science policy organizations were created between 1955 and 1975.[16] Beginning in the early 1950s two international organizations, UNESCO and the Organization for Economic Cooperation and Development (OECD), began actively to promote this science policy innovation among their member states.[17] In this section I describe the promotion activities of one of these organizations, UNESCO, and present evidence that its activities were the impetus for widespread adoption of science policy. Such an explanation allows us to make sense of the data presented earlier since it is consistent with both (1) the low-end clustering on the histograms, indicating that many countries adopted these bureaucracies at very low levels of the indicator variables, and (2) the timing of adoption across states, specifically the rapid increase immediately after the international organizations begin to promote the science policy innovation.

Specifically, I will argue that from its inception UNESCO as an organization has had to address two constituencies—the states comprising its membership and the professional experts in its substantive areas of concern. As will be described below, the relationship between these two constituencies within the organization has changed over time. These shifts in turn have been responsible for changes in UNESCO's programs, particularly the rise of science policy as an area of concern.[18]

Origins of UNESCO's interest in science

As originally conceived, UNESCO was to be named the United Nations Educational and Cultural Organization. Science was understood to be part of culture. The notion that science was qualitatively different from other aspects

16. By extending the period by five years to include the years 1976–80, the percentage of adopting states rises to 84.4.

17. For more on the science policy promotion activities of the OECD see Martha Finnemore, "Science, the State, and International Society," Ph.D. diss., Stanford University, 1991, chap. 3.

18. The following account of UNESCO activities is based on research done at the library and archives of UNESCO's Paris headquarters. While these contain a wide variety of documents authored by national governments, it must be acknowledged that carrying out the research at the international organization's headquarters does run the risk of bias in favor of an international organization-driven explanation at the expense of a national one. A research design in which the science policy archives were consulted at a variety of national capitals in countries of different regions and development levels and facing different security situations would be superior. However, such a design was not feasible in this case.

of culture and therefore merited special recognition in the organization's mission and title had to be fought for by scientists and science promoters in government during the preliminary meetings and negotiations that took place in 1942–45. The fact that they succeeded in getting a piece of the new organization to serve their own interests was due in part to the organizational strength and coherence of the international science community and in part to their ability to influence world affairs, as had been demonstrated at Hiroshima.[19] The combination of these two convinced the president of the conference charged with establishing the new organization to support addition of the word "Scientific" to the title with the following remarks: "In these days, when we are all wondering, perhaps apprehensively, what the scientists will do to us next, it is important that they should be linked closely with the humanities and should feel that they have a responsibility to mankind for the result of their labours."[20]

UNESCO's early science programs and organizational structure

Giving science a titular role in the new interstate organization was a way of recognizing the importance of science to the state but did not, in those early years, entail state direction or control of scientific research. UNESCO's early science programs were designed to serve science and scientists rather than states. They aimed to increase the world sum of scientific knowledge and access to that knowledge without regard to national boundaries. The notion implicit in science policy, that science is a national resource to be developed by individual states, is very different from UNESCO's original notions of science as a transnational enterprise. Indeed, the principal rationale for internationalizing science and for bringing it under the auspices of the United Nations in the first place was to free it from the meddling of self-interested (and presumably self-aggrandizing) states.

Apart from the dangers of states exploiting scientific discoveries for military gain, state interference in science had long been understood to stifle scientific progress. Science was believed to proceed most efficiently and productively when left to scientists. Certainly this was the attitude of the League of Nations' International Institute for Intellectual Cooperation in the interwar period, and it continued to be the attitude of most scientists' professional organizations and of individual scientists active in international affairs.[21]

19. Details on the lobbying efforts of scientists for special recognition in the embryonic UNESCO can be found in James Sewell, *UNESCO and World Politics* (Princeton, N.J.: Princeton University Press, 1975).

20. Conference for the Establishment of UNESCO, "Opening Address by the President of the Conference, the Rt. Honorable Ellen Wilkinson, MP," *Conference for the Establishment of UNESCO, London, 1–16 November 1945* (Paris: UNESCO, 1946), p. 24.

21. Julian Huxley, the first executive director of UNESCO, and Joseph Needham, the first director of UNESCO's Natural Sciences Department, were instrumental in the founding of that organization and wrote extensively on their views of science as a transnational activity. See, for example, Julian Huxley, *Unesco: Its Purpose and Its Philosophy* (Washington, D.C.: Public Affairs

Early statements of UNESCO's purpose with regard to science reflect this view. At the first session of the General Conference in November 1946, the Subcommission of the General Conference for Natural Sciences summed up the aims of UNESCO's Department of Natural Sciences in the field of science as follows:

1. to establish a world-wide network of field science cooperation offices;
2. to support the scientific unions, add to their number and assist them in their work;[22]
3. to organize and operate an international clearing house for scientific information;
4. to support the work of the United Nations and its specialized services;
5. to inform the general public in all countries of the international implications of scientific discoveries;
6. to create new forms of international scientific cooperation (international observatories and laboratories, etc.).[23]

Science policy and promoting science capabilities of member states were not even mentioned.

Early UNESCO science programs conformed very much to these aims.[24] Science cooperation field offices were set up in Cairo, Nanking, New Delhi, and Rio de Janeiro to facilitate the movement of scientists and information around the globe.[25] Financial support was extended to nongovernmental organizations, particularly the International Council of Scientific Unions, as a means of promoting cooperation among scientists, and more of these unions were established.[26] Research institutes were established, such as the Institute of the Hylean Amazon, the Institute of the Arid Zone, and an International Computation Center, to bring scientists from different countries together to

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Press, 1947). Sir Henry Dale, who persuaded the establishing conference to accept science as a distinct part of the embryonic UNESCO and who had been part of the League of Nations' International Institute for Intellectual Cooperation, held similar views. See Sewell, *UNESCO and World Politics.*

22. "Scientific unions" are scientists' professional organizations, such as the International Astronomical Union and the International Geodesy and Geophysical Union. Their umbrella organization is the International Council of Scientific Unions.

23. This summary is from Marcel Florkin, "Ten Years of Science at UNESCO," *Impact of Science on Society* 7 (September 1956), pp. 123–24.

24. See, for example, "Activities of Unesco in the Natural Sciences During 1948," 14 February 1949, Natural Sciences (NS)/67, UNESCO Archives, Paris.

25. The Rio de Janeiro office was moved to Montevideo in 1949, and in 1951 the Nanking office was relocated to Djakarta in the wake of the Chinese revolution. In creating these field offices Joseph Needham (head of UNESCO's Natural Sciences Department) was realizing the International Science Cooperation Service he had proposed during the war. See Joseph Needham, "An International Science Cooperation Service," *Nature* 154 (25 November 1944), pp. 657–59. For original plans for the field offices, see "UNESCO Science Cooperation Offices," 12 June 1947 Nat Sci/28/1947, UNESCO Archives, Paris. For a brief history of early field office program see Florkin, "Ten Years of Science at UNESCO."

26. Specifically, UNESCO helped found the Union of International Engineering Associations and the Council of International Organizations of Medical Sciences. See Florkin, "Ten Years of Science at UNESCO."

work on problems of mutual interest. All of these activities provided services directly to scientists rather than states.

The early organizational structure of UNESCO also reflected this understanding of science and culture as transnational and often nongovernmental activities. While the General Conference was composed of equal member states, UNESCO's executive board was to be composed of eighteen individuals, elected by General Conference delegates for their distinction in the organization's substantive fields. Board members were to serve on behalf of the conference as a whole and not as representatives of their respective governments.[27]

Change

The principle of nongovernmentalism enshrined in the composition of UNESCO's executive board soon came under attack. While board members were to be elected as individuals, the original UNESCO constitution provided that no state could supply more than one of its nationals to the board. In practice this focused pressure on board members when their governments wanted to pursue particular policies through the organization. (James Sewell cites one high American official's description of the U.S. government bringing its board member back to Washington to "brief the hell out of [him] to try to get [him] to see things the State Department way."[28]) Accounts of UNESCO conference delegates from the period describe the decline of participation by scientists, scholars, educators, and writers and the increased presence of "government technicians" who viewed themselves as government spokespersons.[29]

In 1954 UNESCO members voted to amend the constitution and reorganize the executive board into a body of twenty-two governmental representatives. The shift toward a governmentalized secretariat was justified on several grounds. The reason cited most often was a financial one; since states were footing the bill for UNESCO's operations, the organization should serve states. In the words of one official who left the organization about that time, the shift was "the price for financial support." A cynical French delegate, Roger Seydoux, predicted that with this change "the Finance Ministries . . . would become masters of UNESCO and its programme."[30]

However, participants also understood the shift to be in keeping with a larger shift in the international climate from postwar Kantian transnationalism to

27. Note that this was a deliberate shift from the way in which the Conference of Allied Ministers of Education's executive bureau and UNESCO's preparatory commission executive committee were constituted. Both of these were composed of national representatives. See Sewell, *UNESCO and World Politics.*

28. As quoted in Sewell, *UNESCO and World Politics,* p. 169.

29. Ibid., pp. 168–69.

30. Both quotations are from ibid., p. 169.

cold war Hobbesian nationalism. The original nongovernmental structure was a reflection of 1940s beliefs (or at least hopes) that ideas were a unifying force in the world. Education, science, and culture could weave a web that would draw a divided world of nation-states together. If "wars begin in the minds of men," then the UNESCO solution follows logically, namely, that "it is in the minds of men that the defences of peace must be constructed."[31] Harry Truman voiced similar beliefs in his appeal to the 1945 United Nations founding conference in San Francisco to "set up an effective agency for consistent and thorough interchange of thought and ideas, for there lies the road to a better and more tolerant understanding among nations and among peoples."[32]

By the mid-1950s this view had been eclipsed. At best, ideas were irrelevant to the intense power struggle raging in the world; at worst, ideas were viewed as divisive and dangerous, in which case states could not afford to leave them to a collection of unaccountable individuals. As realpolitik replaced Kantian liberalism, states were reintegrated as major players in determining UNESCO policies.

Not surprisingly, the United States, then in the grip of anticommunist fervor, was the standard-bearer for this new attitude. UNESCO came to be viewed as a political instrument in the cold war; its purpose was to be a "Marshall Plan for ideas," which would block the expansion of "intolerant" communism. Failure to convert UNESCO wholeheartedly to its own foreign policy agenda led U.S. officials to erect organizational barriers to contain and control its influence. Chief among these was the International Organizations Employment Loyalty Board, established in early 1953 to oversee the employment of U.S. representatives to all United Nations agencies. Such screening ensured that American executive board members would be sympathetic to their government's views. This screening clearly flew in the face of the nongovernmental principles under which UNESCO was formed.

While the Americans succeeded in replacing intellectuals of dubious leanings with patriots and loyalists, they failed in their ultimate goal of making the organization a tool of U.S. foreign policy. Just as their governmentalist reforms were enacted in 1954, the Soviet Union and several of its Eastern bloc allies finally agreed to join UNESCO. Shortly thereafter came the influx of newly independent developing states with an agenda of their own, effectively blocking control by the United States or by any other great power.

The shift from nongovernmentalism to governmentalism represented a shift in the balance of power among UNESCO's two constituencies. As the international climate changed and optimism about the utility of transnational

31. Constitution of the United Nations Educational, Scientific, and Cultural Organization as reprinted in William Preston, Edward S. Herman, and Herbert I. Schiller, *Hope and Folly: The United States and UNESCO, 1945–1985* (Minneapolis: University of Minnesota Press, 1989), p. 315. The original phrase, "war begins in the minds of men," was coined by Clement Atlee. See ibid., p. 33.

32. Truman is quoted in Preston, Herman, and Schiller, *Hope and Folly,* p. 33.

activities declined, the champions of those activities—scientists, scholars, artists, and educators—lost ground. Their rhetoric about building bridges to all humankind became less and less appealing to UNESCO's member states, each of whom increasingly viewed the world as hostile and much of the rest of humanity with suspicion. Thus, during the cold war states reasserted themselves as UNESCO's chief constituents, and UNESCO officials reshaped their programs to accommodate them.

Effects of organizational change on science programs

UNESCO's science activities soon reflected the shift in worldview and the organization's rediscovered constituency of states. While international scientific projects begun previously had continued, UNESCO also became concerned with promoting science at the national level. UNESCO began to focus its attention on helping states to organize, direct, and expand their own domestic science establishments. Its preferred method of doing this was to help states to create a new state agency to take care of these tasks.

As a first step in this direction, UNESCO conducted a survey of the national research councils of member states in 1953.[33] The stated purpose was twofold. The first purpose was to collect reference material for anyone asking advice on how to set up a research council. The second purpose was to provide background material for the establishment within UNESCO of an advisory committee (the International Advisory Committee on Scientific Research) whose role would be to provide assistance to states seeking science policy advice.[34]

At this stage, UNESCO still viewed its role in science policy promotion as a relatively passive one; it waited for states to ask for advice and assistance. Following the 1954 reforms, the organization became more activist and science policy activities grew by leaps and bounds. In 1955, partly as an outgrowth of the 1953 survey, UNESCO convened a meeting of directors of national research centers in Milan at which thirty countries were represented.[35] The first agenda item for this meeting was discussion of "the role of national plans for the development of scientific research."[36] At the conference UNESCO staff members outlined the virtues of nationally directed science activity, discussed different models for such direction, and emphasized the role UNESCO could

33. The original survey analysis is contained in UNESCO Archives, document NS/107. Survey results were also published as "Reports and Documents: Survey of National Research Councils for Pure and Applied Science in the Member States of UNESCO," *Impact of Science on Society* 4 (Winter 1953), pp. 231–55.

34. "Reports and Documents," p. 231. See also Pierre Auger, "UNESCO and the Development of Research in the Field of Natural Sciences," *UNESCO Chronicle* 1 (July 1955), p. 5.

35. See UNESCO/NS/124, UNESCO Archives, Paris, for the final report of this meeting. See also Auger, "UNESCO and the Development of Research in the Field of Natural Sciences," p. 5.

36. *UNESCO Chronicle* 1 (July 1955), p. 26.

play in providing assistance to governments wishing to pursue the outlined objectives.[37]

By the late 1950s UNESCO had begun actively to assist countries in setting up science policy organizations: in 1957 when the Belgian government asked for help in setting up its National Science Policy Council, UNESCO sent the chief of its Science Policy Division to direct those activities.[38] UNESCO also provided assistance to the Lebanese government in creating a National Council for Scientific Research.[39]

These activities received a boost in 1960 when Pierre Auger, then acting as a special consultant to the United Nations as a whole,[40] issued a report recommending that national scientific policy be one of the "foremost preoccupations of governments":

> States should make it their business to ensure [that] interaction between the encouragement of scientific research, on the one hand, and economic and social progress, on the other, operates smoothly to the advantage of both. It is, at the same time, the duty of organizations in the United Nations family to assist States in this matter.[41]

Auger's detailed report, requested and approved by the larger United Nations, validated the science policy activities in which UNESCO had been engaged over the last five years and provided a basis for formalizing what had been an ad hoc collection of activities.[42] Beginning in 1960, UNESCO General Conference resolutions included instructions that the Director-General "collect, analyse and disseminate information concerning the organization of scientific research in Member States and the policies of Member States in this respect."[43] By 1963 the General Conference resolutions were more explicit. The Director-General was authorized to assist member states "in the establishment or improvement of science policy planning and research organization,

37. Several of the presented papers were later published in the journal *Impact of Science on Society.* Most relevant is Werner Moller's "National Research Councils and Science Policy," *Impact of Science on Society* 6 (September 1955), pp. 155–68. Moller was a member of the Department of Natural Sciences at UNESCO.

38. The Belgian National Science Policy Council was established in 1959. UNESCO Archives, NS/(Research Organization Unit)ROU/100, UNESCO Archives, Paris.

39. See NS/ROU/Lebanon (LEB) 1–23; and NS/ROU/100, UNESCO Archives, Paris.

40. Auger had been the second head of the Natural Sciences Department after Joseph Needham and had recently retired from the Secretariat.

41. Pierre Auger, *Current Trends in Scientific Research* (Paris: UNESCO, 1961), p. 220.

42. This report is routinely cited as the basis for UNESCO's science policy activities. See, for example, Y. de Hemptinne, "UNESCO's Role in the Organization of Scientific Research," *UNESCO Chronicle* 9 (July 1963), p. 245; and Alexi Matveyev opening speech to the meeting of the Coordinators of Science Policy Studies, Karlovy Vary, Czechoslovakia, June 1966. Matveyev was UNESCO's Assistant Director-General for Science. His speech is reprinted in *Principles and Problems of National Science Policies,* Science Policy Studies and Documents Series, vol. 5 (Paris: UNESCO, 1967), p. 12. Also see, "Survey of UNESCO's activities and achievements with regard to science policy," NS/ROU/100, UNESCO archives, Paris, p. 3.

43. UNESCO, General Conference, 11th sess., 1960, *Resolutions,* 2.1131 (Paris: UNESCO, 1960).

through sending advisory missions, conducting scientific and technological potential surveys, with particular regard to human resources and budgets, or organizing training seminars and, to this end, to participate in their activities in the field."[44] From this point on the goal of spreading and improving science policy organizations was firmly entrenched in UNESCO's official science program.

The new norm

What is interesting about UNESCO's program in terms of the questions raised in this article is that the language used is prescriptive not evaluative, and in this sense it is normative. UNESCO officials simply declared science policymaking to be necessary and good; there was no serious attempt to prove that that was so: "States *should* make it their business" to coordinate and direct science,[45] or, "The development of science policy should be the responsibility of an organization at the highest level of government in the country."[46] Also "the Science Policy Programme of UNESCO is formulated on the basis of *the principle* that the planning of science policy is indispensable" for the coordination and promotion of scientific research.[47] These assertions are not coupled with any evidence that such bureaucratic entities enhance science capabilities. This is surprising given that until only a few years earlier, conventional wisdom had held exactly the opposite—that government involvement stifled scientific creativity.

In addition the language is universal; it promotes these bureaucracies as good for all states and at all levels of scientific capability. This ignores an obvious potential strategy for many countries, particularly less developed countries (LDCs)—free-riding. Science, with its imperatives to disseminate results widely and immediately, has many properties of a collective good. The economic advantages of being a follower rather than a leader in technological innovation have been widely discussed in other contexts.

Thus, from a functional standpoint, it is not obvious why all states suddenly "needed" a science policy bureaucracy at that particular point in time. In fact, it appears that these events were not related to functional need in any strict sense. Rather, they constitute a redefinition of the norms and expectations of state roles with regard to science. Initially scientists sought to harness state resources to further their own scientific projects by claiming a piece of an interstate organization. To do so they had to proclaim science an appropriate

44. UNESCO, General Conference, 13th sess., 1964, *Resolutions,* 2.112(d) (Paris: UNESCO, 1964), p. 32.

45. Pierre Auger, *Current Trends in Scientific Research,* p. 220, emphasis added.

46. UNESCO, *Principles and Problems of Science Policy,* Science Policy Studies and Documents Series, vol. 5 (Paris: UNESCO, 1966), p. 87.

47. "The Proposed Science Policy Programme of UNESCO for 1967–68," NS/ROU/117, UNESCO Archives, Paris, p. 1, emphasis added.

concern of governments. The debate over the *S* in *UNESCO* and Wilkinson's comments in prompting it reveal the scientists' success in this. However, when scientists and the other epistemic communities lost control of UNESCO to the member states, the situation did not simply revert to the status quo ante.[48] The norm that science was now an appropriate concern of states remained firmly entrenched, but the relationship between science and states was redefined to reflect the new world climate and UNESCO's new dominant constituency. Rather than states *collectively* within an international organization promoting and directing science as a transnational enterprise, Natural Sciences Department officials in UNESCO now argued that states *individually* should take responsibility for promoting and directing science within their own borders. By proclaiming science policymaking to be an appropriate and necessary function of states qua states and by offering themselves as a source of knowledge about this new function, UNESCO science officials successfully redefined their role in a way that was neither irrelevant nor dangerous to their new clients.

The interest in and success of UNESCO's efforts is not unrelated to the fact that during this period large numbers of new states were being created, virtually all of which were LDCs. While it was developed countries such as the United States and the United Kingdom that initially had pushed for the reorganization of UNESCO's executive board to favor states for cold war-related reasons in the 1950s, UNESCO's reorientation toward states fit well with the climate of national self-determination in the 1960s. Among the large and growing membership of newly independent LDCs, the notion that states should and could promote and direct science, with all its economic and military applications, was popular. At the 1963 United Nations Conference on Science and Technology for the Benefit of Less Developed Areas, the agenda item on organizing and planning scientific and technological policies was reported to yield "one of the most fruitful discussions in the whole conference."[49] In addition to lauding science policy as an activity, conference delegates stressed the importance of building up in the developing countries indigenous programs of research. They argued that "just as no country could develop economically on imported goods, so none could develop intellectually on imported ideas alone."[50] For these states, science as a transnational activity spelled continued dependence. Science had to be a national pursuit to be normatively compatible

48. The term "epistemic community" refers to "a community of experts sharing a belief in a common set of cause-and-effect relationships as well as common values to which policies governing these relationships will be applied." See Peter Haas, "Do Regimes Matter? Epistemic Communities and Mediterranean Pollution Control," *International Organization* 43 (Summer 1989), pp. 377–403; the quotation is drawn from footnote 20, p. 384. Haas provides a more extensive discussion of this definition on page 3 of Peter Haas, "Introduction: Epistemic Communities and International Policy Coordination," *International Organization* 46 (Winter 1992), pp. 1–35.

49. United Nations, Secretariat, Economic and Social Council, 36th sess., *Report to the Secretary-General on the Results of the United Nations Conference on Science and Technology for the Benefit of Less Developed Areas,* 1963, E/3772, annexes, agenda item 15.

50. Ibid., section 181, p. 24.

with the nationalism of the newly created state and provide it with the means of resisting encroachments from outside.[51]

This national or statist conception is distinct from the understanding of science that prevailed in UNESCO's early years. States were now understood to be the primary purveyors of development and progress. Thus it was states, not scientists, who could best bring the fruits of science and technology to their citizens. Scientific knowledge could be translated into increased wealth and security or improved standards of living only if it was harnessed by states and integrated into their larger economic and military establishments. Scientific capacity or "scientific potential" was viewed as a national resource, not as a branch of some larger collectively held international resource.

The redefinition of science as a state concern did not necessarily have negative implications for the independence or productivity of the scientific community. In fact the establishment of national science bureaucracies very often had the effect of giving scientists more power at the national level and access to more resources. The argument here is not that states would now run and control scientists and science but that science would be organized nationally, for national benefit, rather than internationally, for overall benefit.

Spreading science policy

Teaching states to fulfill their new role quickly became UNESCO's principal science mission; by 1960 a special Research Organization Unit of the Natural Sciences Department had been established to deal with these tasks.[52] Efforts to establish and expand science policy organizations were undertaken on several fronts. First, following instructions from the executive board, UNESCO field offices organized a series of meetings to promote the idea of science policy and disseminate information about establishing the necessary policy machinery.[53] At the time these meetings took place (1959–60) in Latin America, the Middle East, and Southeast Asia very few of the attending countries had science bureaucracies. Only three of the eleven countries at the Latin American regional meeting did; only one of the Middle Eastern countries at the Cairo meeting had such a body.[54] In all three cases, these regional conferences were

51. This interpretation is compatible with the conclusions of Stephen D. Krasner in *Structural Conflict: The Third World Against Global Liberalism* (Berkeley: University of California Press, 1985).

52. The Research Organization Unit was subsequently renamed the Science Policy Division. For more on the early activities of the Research Organization Unit, see de Hemptinne, "UNESCO's Role in the Organization of Scientific Research," pp. 244–48.

53. "UNESCO Science Cooperation Offices," *UNESCO Chronicle* 7 (December 1961), pp. 433–435.

54. See Guy B. Grestford, "The Development of Science in South-east Asia," *Nature* 186 (11 June 1960), pp. 859–60; and B. A. Houssay, "Organization of Scientific Research in Latin America," *Nature* 188 (31 December 1960), pp. 1157–58. The three Latin American countries having science bureaucracies were Argentina, Brazil, and Mexico. Resolutions and declarations from this seminar are found in NS/ROU/36, UNESCO Archives, Paris. On the Middle East

only the first of what became a series of meetings on science policy, for once all states in the region had created the policy machinery, talks continued on how this machinery could be refined and improved.[55]

In addition, UNESCO undertook a series of studies on science policy issues.[56] Many of these works examined the science policy establishments of individual states and were designed to provide ideas and models to others seeking to establish and improve science policymaking in their own countries. Others examined general issues of science policymaking. Studies often were coupled with meetings of government science officials from member states.[57] Governmental participation in producing the recommendations of the studies ensured that these recommendations were reaching the desired audience.

Perhaps most interesting, UNESCO officials would, if requested, come into a country and provide on-site consulting services about how a science policy program might be established. By early 1966 UNESCO had science policy promotion programs of this kind either completed or under way in fifteen countries plus programs to revise existing state science policy bureaucracies along preferred UNESCO lines in several others.[58]

The preferred UNESCO form for a science bureaucracy had two key features. First, the entity making policy about science could not also *do* science; that is, it could not also be a research organization. The new science organization could not objectively assess national research priorities when it also had a vested interest in certain lines of research being done in its own laboratories. (The science policy body had to be liberated from any possible conflicts of interest.) Second, the science policy body was to have access to the highest levels of government. It was either to be a ministerial-level body or be located close to the seat of power, for example in the President's office. It was thought that it should not be subservient to any other ministry (for example, education or planning), since such an arrangement would seriously limit the organization's independence and prevent the nationwide coordination across all aspects of science that was required.

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conference, see UNESCO, *Structural and Operation Schemes of National Science Policy,* Science Policy Studies and Documents Series, vol. 6 (Paris: UNESCO, 1967); and "Science Planning, Development and Co-operation in the Countries of the Middle East and North Africa," *Nature* 189 (4 February 1961), pp. 362–63.

55. Results of some of the later meetings were subsequently published as part of the Science Policy Studies and Documents Series.

56. These were published in the (ongoing) book series UNESCO, *Science Policy and Documents Series* (UNESCO: Paris). The studies to which I refer here were published during the period 1965–90.

57. This was true for two of the volumes in particular. See UNESCO, *Principles and Problems of National Science Policies,* Science Policy and Documents Series, vol. 5, and UNESCO, *Structural and Operational Schemes of National Science Policy,* Science Policy and Documents Series, vol. 6 (UNESCO: Paris, 1966 and 1967, respectively).

58. Science policy establishment missions were complete or under way in Algeria, Congo (Leopoldville), Ethiopia, Guinea, Iran, Iraq, Kenya, Lebanon, Madagascar, Morocco, Senegal, Sudan, Tanzania, Venezuela, and Zambia. Science policy modification or reorganization programs were undertaken in Indonesia, Nepal, the Philippines, and the United Arab Republic, among others.

UNESCO consultants' insistence on these two features guided its science policy promotion efforts in member states. The organization's commitment to this particular form of the bureaucracy shows up consistently in its on-site "teaching" activities in member states. The following examples illustrate the ways in which UNESCO succeeded in persuading states to set up science bureaucracies and, more specifically, science bureaucracies of the kind UNESCO preferred.

Examples of UNESCO's promotion of science policy

Lebanon

One of the first places UNESCO officials undertook this kind of science policy consulting was in Lebanon. Because it was one of the first, the Lebanese case became a prototype for UNESCO consultants on later missions. A more detailed examination of the Lebanese case reveals the extent of UNESCO's influence on the construction of a science bureaucracy there. UNESCO officials did not just sit on the sidelines and make suggestions; the head of the UNESCO Natural Sciences Department actually drafted the enabling legislation for the new bureaucracy, while other members of the secretariat staff lobbied relevant Lebanese politicians to get it passed. In so doing they squelched a conflicting Lebanese proposal for the new bureaucracy which they considered inappropriate and inadequate.

The starting point for UNESCO's involvement in Lebanon was the December 1960 regional conference on science planning organized by the UNESCO Middle Eastern field office in Cairo. At that conference field office staff members presented reports on the organization of science in various countries of the region. The report on science and technology in Lebanon revealed that Lebanese research lacked any practical orientation and that coordination of research was almost nonexistent.[59] However, the report did not have precisely the intended effect. Rather than prompting the Lebanese government to begin organizing and coordinating scientific research, as the Cairo conference had recommended, it prompted the Lebanese Foreign Affairs Ministry to request UNESCO's help in setting up a scientific research *center,* to be part of the University of Lebanon, which could carry out (rather than coordinate) scientific research in Lebanon in an efficient and effective way.[60]

This request was channeled to Yvan de Hemptinne, then scientific secretary to the director of the Natural Sciences Department at UNESCO. After

59. Unless otherwise indicated, citations of letters and memoranda below are from UNESCO Secretariat Registry files, UNESCO Archives, Paris. Where documents were assigned file numbers, these are so noted. For a description of the report on Lebanese science and technology, see memorandum by Yvan de Hemptinne, scientific secretary to the director of the Department of Natural Sciences, to Malcolm S. Adiseshiah, UNESCO Assistant Director-General, May 1961, NS memo 50.085.

60. This proposal is described in a letter from Lebanese Director General of National Education Fouad Sawaya to UNESCO Assistant Director-General Adiseshiah, 23 May 1961.

reviewing the request, de Hemptinne responded that a country like Lebanon did not need more laboratories or research centers; instead it needed coordination of its existing research efforts. He proposed that rather than sending an expert to set up a research center, UNESCO should send an expert to set up a coordinative science policy body in Lebanon.[61] Negotiations over which project UNESCO would support, the center to carry out research or the science policy body to coordinate research, were eventually resolved when the Director-General of UNESCO, René Maheu, intervened with the President of Lebanon.[62] The new body was to be a national research council that would organize research and make policy about science rather than a research center that would do research.

On Maheu's instructions, de Hemptinne spent several weeks during the summer of 1961 in Lebanon drafting enabling legislation for this council.[63] Key features of de Hemptinne's proposal were: (1) that coordination of research in all scientific disciplines were to be centralized under the council and (2) that the council was under no circumstances to operate any type of laboratory or research facility itself. The next stage of UNESCO's work involved sending a second science policy expert, Charles Boschloos, to Lebanon to work with the Lebanese to refine and revise the proposed legislation drafted by de Hemptinne. By this time the Lebanese had formed a national scientific commission of their own whose purpose was to work with UNESCO specialists in designing the new council. In December, Boschloos and the Lebanese commission circulated their revised draft of the enabling legislation. It differed in several ways from de Hemptinne's draft, notably by weakening both of what de Hemptinne had considered to be the key provisions of the legislation—that all scientific disciplines were to be brought under council jurisdiction and that no direct involvement in research activities would be permitted.

De Hemptinne and other secretariat members were furious.[64] Boschloos's contract was terminated and elaborate negotiations were undertaken with the Lebanese National Scientific Commission to push the legislation back onto what secretariat members considered to be the right track. UNESCO submit-

61. Memorandum from de Hemptinne to Adiseshiah, May 1961, NS memo 50.085. De Hemptinne also proposed an elaborate three-tiered structure for this coordinative bureaucracy. These proposals were greatly simplified under pressure from F. Karam at the Bureau of Member States (BMS) and from the Director-General of UNESCO himself. See memorandum from F. Karam, BMS, to José Correa, director of BMS, 5 May 1961, BMS 80/memo 100; and memorandum from UNESCO Director-General René Maheu to M. V. Kovda, director of UNESCO Department of Natural Sciences, n.d. (possibly June or July 1961).

62. Memorandum from Maheu to Kovda, n.d. (possibly June or July 1961). The fact that the Director-General of UNESCO and the President of Lebanon both were involved in these negotiations indicates the importance attached to them by both parties. Maheu, in fact, goes on to say in the above-cited memo: "For many reasons, I attach the utmost importance to this project which, in my view, has great value as an example"; translation mine.

63. This proposed legislation comprises NS/ROU/7, 8 February 1962, UNESCO Archives, Paris.

64. See memorandum from F. Karam, BMS, to A. K. Kinany, chief, Unit of Arabic-speaking Countries, BMS, 15 December 1961; and letter from de Hemptinne to T.O.P. Lilliefelt, permanent resident, Technical Assistance Bureau, Beirut, 20 December 1961, NS 801/226(40).

ted formal comments to the commission on the revised draft, arguing for changes back to the original proposals on these important issues.[65] After several weeks of negotiation, de Hemptinne was permitted to compile a synthesis of the two existing drafts for consideration by the Lebanese Parliament.[66] In it de Hemptinne included strong statements about both of his chief concerns while making concessions to the commission's draft on issues of less consequence.

The synthesis proposal was submitted to the Lebanese Parliament in February 1962. Now the Parliament had two alternatives to consider: the Lebanese scientific commission's proposal and de Hemptinne's revised proposal. To promote his alternative, de Hemptinne traveled to Beirut that spring to answer questions and speak with members of Parliament about the new council proposals. He feared that the commission would produce some new counterproposal and derail his efforts. To offset this possibility he enlisted the help of the National Scientific Commission's new president, Joseph Najjar, to keep him informed of any new developments.[67] In the end, the lobbying efforts by Maheu, de Hemptinne, F. Karam, Malcolm Adiseshiah, and others at UNESCO paid off. On 28 August 1962 the Lebanese Parliament approved without discussion de Hemptinne's synthesis proposal for a National Scientific Research Council.[68]

UNESCO's activities in Lebanon did not stop with the creation of the council. Following passage of the enabling legislation, UNESCO immediately plunged into the task of helping the Lebanese set up the new bureaucracy and ensuring that that bureaucracy headed in the desired direction. Before the end of 1962, UNESCO was recruiting two "experts in the organization of scientific research" to go to Lebanon and draft operating regulations, budgets, and an organizational chart for the new Scientific Research Council.[69] UNESCO also

65. These comments are contained in "Commentaires de l'UNESCO sûr l'avant-projet de loi portant création d'un 'Conseil National de la Recherche Scientifique' redige en novembre 1961 pare la Commission Scientifique National du Liban," (Comments by UNESCO on the proposed legislation concerning the creation of a "National Council for Scientific Research" drafted in November 1961 by the National Scientific Commission of Lebanon), 8 February 1962, NS/ROU/9, UNESCO Archives, Paris.

66. "Avant-projet de loi portant création d'un conseil national de la recherche scientifique au Liban: Synthèse des avant projets de loi établis par M. Y. de Hemptinne, Chef du Groupe d'organisation de la recherche scientifique de l'UNESCO et par la Commission Scientifique Nationale du Liban" (Proposed legislation concerning the creation of a National Council for Scientific Research for Lebanon: synthesis of proposed legislation drawn up by M. Y. de Hemptinne, group leader of UNESCO's Research Organization Unit, and by the National Scientific Commission of Lebanon), 8 February 1962, NS/ROU/10, UNESCO Archives, Paris.

67. Letter from de Hemptinne to Joseph Najjar, National Scientific Commission President, 20 February 1962. De Hemptinne was then head of the new Research Organization Unit at UNESCO's Natural Sciences Department.

68. Letter from Chafic Moharram, technical counselor to the President of Lebanon, to de Hemptinne, 3 October 1962. De Hemptinne's enabling legislation specified that the council's budget was not to be less than 1 percent of the state's budget.

69. See, for example, B. K. Blount, "Report to the National Research Council of Lebanon," compiled 10 March–7 April 1964, Lebanon file, Secretariat Registry Files, UNESCO Archives, Paris. Blount was deputy director of the British Department of Scientific and Industrial Research and was a temporary consultant to UNESCO.

conducted external reviews of Lebanese science policymaking at frequent intervals over the next decade and offered suggestions for improvements.[70]

East Africa

Obviously UNESCO's experiences in promoting science policy bodies among its members differed from country to country. Records from one of UNESCO's large subsequent science policy campaigns in East Africa during 1967 and 1968 provides some insight into the range of experience encountered by UNESCO consultants.

First, UNESCO consultants did not always spoon-feed the structure of the new science policy bureaucracy to countries as they did in Lebanon. Sometimes the original draft of enabling legislation for the new bureaucracy came from some group within the country, often a Ministry of Education or a Ministry of Planning, and was then sent either to UNESCO's headquarters or to its regional office for comments and suggestions.[71] However as discussed earlier, UNESCO officials had some firm notions about what these science policy bureaucracies should look like and did not let opportunities to impose their views escape. Most often the drafts were returned not just with extensive comments but also with a visit by a UNESCO expert who would meet with relevant local officials about what UNESCO perceived as shortcomings of the country's plan and UNESCO's proposed remedies.

For example, in 1966 the Ethiopian government sent a draft of their order on the establishment of a national research council to UNESCO's regional office, which forwarded it along with suggested revisions to the Science Policy Division staff at UNESCO headquarters in Paris. Headquarters then sent one of their science policy experts out to Addis Ababa to attend meetings of the drafting committee for the research council order and to provide information regarding certain aspects of the proposed council's potential activities.[72] A similar course of events took place in Tanzania.[73]

Zambian officials on the other hand were making good progress toward

70. See, for example, P. Piganiol, "Organisation de la politique scientifique au Liban" (Organization of science policy in Lebanon), 1967–68; and M. Steyaert, "Liban: politique scientifique national et organisation des recherches oceanographiques" (Lebanon: national science policy and the organization of oceanographic research), 1968, Lebanon file, Secretariat Registry Files, UNESCO Archives, Paris.

71. It should be noted that even where enabling legislation originated in the countries themselves, UNESCO still provided some of the impetus for creating the new bureaucracy. Virtually all locally drafted enabling documents cite UNESCO regional science policy conferences (for example, the 1964 Lagos conference among African countries) as prompting local activity, and most follow conference recommendations to a large extent.

72. Memorandum from I. C. Koupalov-Yaropolk to A. Matveyev, 13 April 1967, science policy memo 541, Secretariat Registry Files, UNESCO Archives, Paris. Koupalov-Yaropolk was a UNESCO policy consultant and Matveyev, UNESCO Assistant Director-General. In particular, see confidential annex I, "Ethiopia."

73. Ibid., annex V, "Tanzania."

creating a national science policy board without UNESCO intervention when UNESCO staff officials discovered their activity. UNESCO consultants immediately inserted themselves into the process, offering advice and suggestions without any direct appeal from the Zambian government.[74]

The obstacles encountered by UNESCO officials in setting up these science bureaucracies also varied from country to country. In Ethiopia, UNESCO experts complained that creation of the research council was "not very popular" and that those working on the project "seem to be interested in safeguarding those rights and privileges of their institutions that might be delegated to the N.R.C. [National Research Council]. Hence they try to reduce the would-be powers of the N.R.C."[75] In Sudan, UNESCO officials had trouble finding enough qualified scientists to draft a proposal for the new science policy body, let alone staff it once it was created.[76] In Tanzania, UNESCO officials complained that a general apathy about the entire project prevailed.[77] In Kenya consultants complained of attempts to subordinate the science policy body to the Ministry of Economic Planning rather than making it part of the President's office and giving it direct access to the highest levels of government.[78]

One feature of all of UNESCO consultants' experience was the lack of familiarity with the notion of a science policy bureaucracy in member states, even in the highest government and science circles, and the "necessity" for UNESCO officials to spread the word. For example, in Ethiopia UNESCO consultants were astonished to find that they were the first people to present the idea of a national research council to the deans of the medical, engineering and building colleges at Haile Selassie I University, despite the fact that the vice-chairman of the committee drafting the enabling legislation for the council was the dean of the Faculty of Sciences at the university.[79]

Despite these difficulties, all of the above-mentioned East African states had installed science policy bureaucracies of a type in keeping with UNESCO's guidelines by 1970—within three years of the UNESCO consultants' initial visits.[80]

74. Ibid., annex VIII, "Zambia."

75. Ibid., confidential annex I, "Ethiopia."

76. Ibid., annex VII, "Sudan."

77. UNESCO consultant Koupalov-Yaropolk described the situation as follows: "The draft Constitution of the National Research Council has been lying for some 14 months in the Ministry of Agriculture. [This] indicates that there are few people really interested in the establishment of N.R.C. or that they do not have influence enough to push this matter forward." See ibid., annex V, "Tanzania."

78. See discussion of two key features of UNESCO's preferred form of a science policymaking body, above.

79. "Ethiopia," confidential annex I to science policy memo 541.

80. Kenya is the only exception, since it did not create its own national science policy bureaucracy until 1977. The Kenyan rationale for not creating such a bureaucracy earlier was that the nation could derive the necessary benefits from an existing East African regional science policy bureaucracy.

The relationship between demand and supply

When initially analyzing the data on creation of science policy organizations, I noted that for the earliest innovators in this area such as the United States and the United Kingdom, demand-driven explanations may be sufficient. UNESCO did not after all invent science policy. Rather, it picked up the notion from successful and powerful states and popularized it. Thus, while the first science policy organizations may have been created in response to domestic demand, subsequent adoptions were strongly influenced by systemic norms promoted by UNESCO.

This kind of systemic supply operation differs from simple imitation or mimetic explanations—the more common explanation for diffusion patterns in the organization theory literature—on two counts. First, mimesis is an unmediated process; it locates the impetus for imitative actions in the imitator. In this case mimesis would claim that each state, looking out at the world of states, decided it wanted a science bureaucracy like the ones created by these few prominent trendsetters. As the foregoing analysis makes clear, this is not what happened. Knowledge of these innovations and assertions of the value of these innovations were supplied to states by a third party, UNESCO.

Second, mimesis is a process, not a cause. It says nothing about why countries would choose to imitate one particular innovation and not others. I have argued that in this case the driving force behind adoption of this innovation is normative. Positive evidence for the effects of norms is always difficult to provide, which is one reason such explanations are often treated as residuals. Here I cite rhetorical shifts in discourse about the organization of science both within UNESCO and among member states that coincide with the behaviors described. This positive evidence, coupled with the failure of alternative explanations, provides a strong case for the role of norms.[81]

Conclusions and implications

The analysis offered here is suggestive in several ways. First and most obviously, it shows how forces external to states can shape choices about internal state structure. This in itself is noteworthy since, as was discussed earlier, the literature on state structure has little to say about international-level causes of state structural change.

81. In their analysis of the spread of municipal reforms across U.S. cities at the turn of the century, Tolbert and Zucker provide a similar explanation of a diffusion process. Their interpretation is as follows: "As an increasing number of organizations adopt a program or policy, it becomes progressively institutionalized, or widely understood to be a necessary component of rational organizational structure. The legitimacy of the procedures themselves serves as the impetus for the later adopters." See Pamela Tolbert and Lynne Zucker, "Institutional Sources of Change in the Formal Structure of Organizations: The Diffusion of Civil Service Reform, 1880–1935," *Administrative Science Quarterly* 28 (March 1983), p. 35.

In addition, the UNESCO story reveals a relationship between the international system and states that is not easily accommodated within traditional state-centric neorealist analysis. In neorealism, the force exercised by the international system on states is constraint; the system is passive or at best reactive. The system prevents states from pursuing certain policies that they may want to pursue, but the identification and definition of preferred policies come from states. In this case, the system-level actors were *pro*active; identification and definition of the policy options were supplied by an international-level actor, UNESCO.

Interest in international-level sources of state policy has been growing in recent years. The literatures on epistemic communities, ideas, and transnational relations all deal in one way or another with international sources of state policy in which system-level actors contribute to state policy debates in a positive rather than merely a negative and constraining way. Surprisingly little attention has been paid to international organizations in this research; the analysis here suggests that international organizations have an important role to play.

Third, the analysis presented here suggests that states are more socially responsive entities than is recognized by traditional international relations theory. State policies and structures are influenced by intersubjective systemic factors, specifically by norms promulgated within the international system. In this case, states were socialized by international organizations and an international community of experts—in this case scientists—to accept the promotion and direction of science as a necessary and appropriate role.[82] Before 1955 most states had no perception that a science policy bureaucracy was in their interest; it was not part of their utility function. Actions by UNESCO and examples of a few prominent developed states persuaded states that making science policy was an appropriate and necessary task of states, regardless of objective science, developmental, or security conditions. Thus, the empirical anomaly identified at the beginning of this research—that states have coordinative science bureaucracies regardless of whether they have any science to coordinate—is the result of a behavioral norm (that states should direct science) making similar claims on dissimilar state actors.

This finding is more compatible with constructivist or "reflective" theoretical approaches than it is with the more conventional approaches to international relations.[83] The fact that states adopt policies not as an outgrowth of their individual characteristics or conditions but in response to socially constructed norms and understandings held by the wider international community demon-

82. For an alternative perspective on socialization of states in which hegemons rather than international organizations are the socializing force, see G. John Ikenberry and Charles A. Kupchan, "Socialization and Hegemonic Power," *International Organization* 44 (Summer 1990), pp. 283–315.

83. Robert Keohane, "International Institutions: Two Approaches," *International Studies Quarterly* 32 (December 1988), pp. 379–96.

strates an embeddedness of states in an international social system that conventional approaches ignore.

In concrete terms, this research suggests at least three avenues for further research. First, it indicates a largely unexplored role for international organizations, namely, their role as an arena in which norms and convergent expectations about international behavior are developed. The regimes literature correlates norms and convergent expectations with regimes that often have affiliated international organizations, but it understands the norms and convergent expectations to produce the international organizations.[84] It does not focus on the reverse process documented here in which international organizations, once established, produce their own new convergent expectations and norms. Thus, the regimes literature has continued to treat international organizations as agents only; it also has had little to say about these organizations as principals and the active role played by these organizations in promoting new norms.

Second, this research builds on the growing literature on epistemic communities by showing how international communities of experts may use international organizations as a base from which to wield influence. However, this case does raise questions for epistemic communities scholars. While most of the people involved in UNESCO teaching activities had scientific credentials, their motivations for acting derived from their status as international bureaucrats rather than from professional norms in the science community or principled beliefs about science. In fact, these scientists were challenging existing norms in the science community, norms about state-science relations.

The case here suggests that specialized knowledge may not provide compelling principles for political action; those principles came from understandings about appropriate political organization that were developed in UNESCO. Further work on the conditions under which "epistemic" characteristics are determinative and the ways these interact with political and organizational variables might strengthen and clarify the epistemic communities framework.

Third, this research underscores the now widely recognized need for more theoretical work to address the increasingly well-documented feedback effects of social structures such as norms, shared expectations, and even international organizations on actors such as states.[85] Neorealist theory takes preferences as given and understands them to drive international interaction. To the extent

84. Stephen D. Krasner, ed., *International Regimes* (Ithaca, N.Y.: Cornell University Press, 1983).

85. Krasner, in the conclusion of *International Regimes,* raised this issue as did Keohane in his more recent address to the International Studies Association. Implications of the structure–actor relationship have been explored by Ashley and by Kratchowil and Ruggie, among others. See Krasner, *International Regimes;* Keohane, "International Institutions: Two Approaches"; Richard Ashley, "The Poverty of Neorealism," in Robert Keohane, ed., *Neorealism and Its Critics* (New York: Columbia University Press, 1986), pp. 255–300; and Friedrich Kratchowil and John Gerard Ruggie, "International Organization: A State of the Art on an Art of the State," *International Organization* 40 (Autumn 1986), pp. 753–75.

that preferences are shown to be the product rather than the producer of international interaction, a new theoretical apparatus to guide research in these areas is needed.

Appendix: data and sources

Science policy organizations

Definition. UNESCO has defined science policy organizations as organizations whose

> central policy making function [is] . . . national level . . . planning, organization, or co-ordination of scientific and technological activities. Organizations such as Ministries or Departments of Science and Technology, National Research Councils, and Academies of Science, as well as other bodies with similar overall responsibilities, have thus been included in the new UNESCO directory; bodies whose responsibilities are limited to specific sectors of the economy or particular fields of science and technology have, on the contrary, not been included.[86]

Two ambiguities arose in coding. The first concerns generalized state planning agencies whose responsibility is to plan all aspects of the economy. If these plans include science, do they qualify as science policymaking bodies? The 1984 directory is silent on this point, but the earlier 1960s directories specifically exclude entities with such general responsibilities.[87] I have done the same in requiring that science policy organizations have science as their central concern.

The second ambiguity concerns the status of national academies of science. For theoretical reasons made clear in the article, I am interested only in state organizations. However, not all academies are part of the state apparatus. (In the United States, for example, the National Academy of Sciences is a private professional society.) However, in many countries academies enjoy some amount of state support; in the former Soviet Union and Soviet-style states, academies are constituted in such a way as to make them difficult to distinguish from the state apparatus. In such cases, the active policymaking and advising role played by academies might very well be considered the first state science policymaking organization.

To determine whether or not academies should be counted as state science policy bureaucracies, I deferred to the UNESCO Science Policy Studies and Documents Series. These documents were authored by officials of the countries under study. If they presented their academy as their first science policy organization, as Cuba does, then it was coded as such. If they treated the academy as a forerunner of the "real" science policymaking apparatus, as the former Soviet Union did, then it was not coded as a science policy organization.

86. UNESCO, *World Directory of National Science Policy-making Bodies,* Science Policy Studies and Documents Series, vol. 59 (Paris: UNESCO, 1984); p. viii. See also the definitions in the earlier directories, listed in the textual notes above.

87. See UNESCO, *World Directory of National Science Policy-making Bodies,* 3 vols. (Paris: UNESCO, 1966–68).

Date of creation of initial science policy organizations. Data on creation dates were obtained from UNESCO's Science Policy Studies and Documents Series. Most items in that series are analyses of science policy activity in a region or UNESCO member country and usually include a brief history of science policy activity in member countries. Often countries have formed a series of science policymaking organizations as different governments reorganized their bureaucracies. Ambiguity about which of these might be the first science policymaking organization was resolved by deferring to the nationals of the country or region in question who had authored these studies. This is clearly preferable to coding that would have allowed UNESCO designation of the first organization that qualifies as a science policy body.

Science data

Data on the number of scientists and engineers involved in R&D and the amount of spending on R&D as a percentage of GDP in the year science policy organizations were created were obtained from the UNESCO *Statistical Yearbook*.[88] Not all countries collect science data in all years. Data collection by developing countries in particular is sporadic. Where figures were not available for the year of creation, the figure for the closest year available was used. In two cases (Chile and Tanzania), R&D spending figures were unavailable; thus the analysis of R&D as a percentage of GDP has been done for a sample of forty-two rather than forty-four countries.

The yearbooks contain extensive definitions of "scientist," "engineer," and "research and development" used in compiling their data. For purposes here it is worth noting that all of these figures, including R&D spending, are for both public and private sectors.

Development data

GDP per capita in constant 1980 U.S. dollars was used as a rough measure of development. These data were not available in constant dollars of the same base year for the relatively large span of years under study here; they were calculated based on data published by the International Monetary Fund (IMF).[89] Where necessary, conversions from one base year of U.S. dollars to 1980 dollars was made using producer price indexes found in the *Statistical Abstract of the United States*.[90] Populations figures were taken from the UNESCO *Statistical Yearbooks.* For countries not members of the IMF, figures for per capita GNP were substituted.[91]

88. UNESCO, *Statistical Yearbook* (Paris: UNESCO, various years).

89. International Monetary Fund (IMF), *International Financial Statistics Yearbook* (City of publication: IMF, various years).

90. U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States* (Washington, D.C.: U.S. Government Printing Office, 1992).

91. U.S. Arms Control and Disarmament Agency, *World Expenditures and Arms Trade, 1963–1973* (Washington, D.C.: U.S. Government Printing Office, 1975).

Security data

Defense spending as a percentage of GNP in the year of science policy creation was used as a measure of perceived security threat. These figures were obtained when available for the necessary years.[92] In cases where science policy organizations were created prior to 1963 (when the U.S. Arms Control Agency began collecting these data), the figures were obtained from national statistical abstracts.

Defense spending is only a rough measure of perceived security threat since there are a host of domestic reasons why states may spend on defense having to do with maintaining stability of governments. However, since these distortions generally increase rather than decrease defense spending, they should make us suspicious of false-positive findings rather than false-negative ones. Thus, if the data revealed a correlation between high defense spending and creation of science policy institutions, we would want to look more closely at our defense figures. The fact that even with these distortions states create science institutions at consistently low levels of defense spending supports rather than undermines my hypotheses.

92. U.S. Arms Control and Disarmament Agency, *World Military Expenditures and Arms Trade, 1963–1973* (Washington, D.C.: U.S. Government Printing Office, 1975).