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The Economics of Science in Historical and Disciplinary Perspective^{*}

Esther-Mirjam Sent[†]

In the current climate characterized by scrutiny and control of science, it is not uncommon to encounter appeals to an “economics of science” that will serve to structure the inchoate impressions of the various constituencies involved, as well as to provide a basis for reasoned debate and guidance for public policy. This focused discussion piece sets out the historical and disciplinary foundation for that debate.

I. INTRODUCTION

The literature of an economics of science exists in a dismal no-(wo)man’s-land located somewhere between economics, history, philosophy, policy, sociology, and science. Perhaps it would have continued in this tenuous quasi-existence indefinitely, were it not for a series of trends that now seem to be encouraging the institution of a dedicated sub-field within the profession of economics. However, many of the economists who have proclaimed the existence of this new subfield have paid little attention to the alternative communities mentioned above; as they strive to think through the relevant problem settings and proposed solutions, they have built “models” of science generally unrecognizable to those outside of mainstream economics. The goal of this focused discussion piece is to provide the requisite materials for advancing the emerging field of economics of science by placing it in historical and disciplinary perspective.¹

II. HISTORICAL PERSPECTIVE

The impression that science is going through a new phase of reorganization and retrenchment is widespread and growing (Mirowski and Sent 2002; 2008;

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¹ My former colleague Philip Mirowski deserves much credit for these insights developed in our joint work (Mirowski and Sent 2002; 2008).

Sent 1999). This new phase is often referred to as the commercialization of science. Opinions about these developments vary widely. Some bewail the disappearance of an invisible college of truth-seekers and the emergence of feckless individual scientific entrepreneurs. Some celebrate the fact that scientists are finally operating with guidance from their ultimate patrons, the corporate pillars of the economy. And some conclude that commercialization has not drastically changed contemporary science. The approach I would like to take suggests that alternative forms of the funding of science have shaped the practice and organization of science throughout its history. More precisely, let me outline three regimes of the organization of science in the twentieth century.

The first regime, lasting from 1890 through World War II, was the “Captains of Erudition Regime,” which is so named in honor of Thorstein Veblen, who wrote one of the earliest descriptions of the research university as becoming subject to corporate organizational principles. More specifically, he saw University of Chicago President William Rainey Harper as a prime example of those “captains of erudition” who prostituted genuine scholarship in their drive for competitive standing in the academic world.² During the “Captains of Erudition Regime,” the success of large-scale corporate laboratories inspired the export of corporate protocols and funding structures to research universities by way of foundations. The second regime—the “Cold War Regime”—lasted from World War II until the 1980s. The structure of scientific funding was transformed during World War II and persisted in this novel economic format throughout the Cold War. It was during this regime that scientists came to be sponsored largely by the government and came to believe in the independence and isolation of the ivory tower. Finally, the “Globalized Privatization Regime” is the one in which we find ourselves at the present. It was triggered by the oil crisis, the subsequent economic slowdown, and events in the former Soviet Bloc. In other words, the changes we are experiencing during this regime are not just a response to budget cuts, but are attributable to a larger shift in the nexus of science management and funding.³ In short, the organization and management of scientific research has always been shaped by some form of economic structure. Thus the current wave of commercialization is neither entirely new, nor is it entirely the same.

One may argue that my narrative thus far takes science in the United States as its main focus, while ignoring developments in the rest of the world. However, illustrations of all three regimes can also be found outside of the United States. Let me offer just a few. For the “Captains of Erudition Regime,”

² Harper ran an autocratic administration that used questionable methods to extract ever-increasing funds from the University’s founder, John D. Rockefeller, to attract a most distinguished faculty to Chicago.

³ Looking into the future, we may very well witness the establishment of a new alliance among governments, corporations, universities, and international organizations within a “National Security Regime.”

I would like to point our attention to NatLab—the Philips Physics Laboratory in Eindhoven, the Netherlands, which was established in 1914 (Boersma 2002). Its founding director, Gilles Holst, created an academic environment through organizing lectures by top scientists and stimulating congress participation and academic publications by the laboratory’s own scientists, among other initiatives. In addition, NatLab significantly shaped the technical physics degree at the Technical University of Delft.⁴ For the “Cold War Regime” I would like to turn our attention to CERN, the European Organization for Nuclear Research, which is the world’s largest particle physics laboratory. It was created in 1954, at the height of the Cold War, in an effort to rebuild European physics to its former grandeur, to reverse the brain drain of the brightest and the best to the United States, and to continue and consolidate postwar European integration (Pestre and Krige 1992). CERN played an important role in the creation of the World Wide Web, which started as an effort to facilitate sharing information among researchers. Examples for the “Globalized Privatization Regime” include the Lisbon objectives aimed at making the European Union the most competitive and dynamic knowledge-based economy in the world, attempts at American-style reform of German universities, and wrenching experiments in privatization in Japan, where national universities are being transformed into independent administrative agencies that are forced to seek funding from companies and other outside sources.

The move towards the commercialization of science has not gone unnoticed by academics, as discussed in the next section.

III. DISCIPLINARY PERSPECTIVE

There are at least six groups concerned with what one might consider to be an economics of science, and yet there is little dialogue among these groups.

The first group of orthodox economists motivated by movements toward economic perspectives on traditionally non-economic issues, focus on the problem of “justifying” state or non-market funding of “science,” the difference between “pure” and “applied” science, or the economic incentives driving individual scientists (e.g. Wible 1998). However, the studies of orthodox economists have several weaknesses: they are largely silent about the influence of economic analyses on the content of science; their analysis is carried out at such a generic level that “science” becomes conflated with “knowledge” in general; and they have made almost no attempt to connect with any historically specific science or concrete institutional structures. Furthermore, one unfortunate repercussion of these works has been the impression on

⁴ Moreover, Holst served as a chairperson of two commissions that were instrumental in establishing the Technical University of Eindhoven. Upon retirement, he became a member of the Board of Advisors of Philips and a curator of the Technical University of Delft.

the part of philosophers, sociologists, and science studies scholars that the “presumptuous” and “ignorant” economists, after having colonized fields such as education, health and marriage, are now seeking to imperialize science as yet another area of expertise.

The second group of scholars, historians of science and technology, disparage the demarcation between “pure” and “applied” science by historicizing it and noting a recent shift in social support for scientific research (e.g. Guston and Kenniston 1994). However, beyond debunking conventional images of the “purity” of pure science, there is almost no theoretical analysis that comes out of this literature.

The third group, sociologists of science, inspired by trends toward analyzing the practice and culture of science, attempt to produce micro-studies of the social operations of science. Their stories about interests, credit and exchange look like the product of economic analysis (e.g. Callon 1998), but sociologists do not fully elaborate these market metaphors nor subject them to much scrutiny. Interestingly, despite their hesitation to explicitly endorse neoclassical economics, many sociologists implicitly use it in their analysis of the economic aspects of science.

The fourth group, philosophers of science, responding to tendencies toward anti-foundationalism, relativism and naturalism, seek to show that scientific truth may still emerge out of the research of self-interested scientists (e.g. Kitcher 1993). They use market models as a way to incorporate some “social” dimension. However, these explanations are not driven by the same questions or objectives as the explanations of economists, and typically sidestep problems associated with welfare economics and the assumption of instrumental rationality in economics.

The fifth group, science policy experts, analyze issues such as changes in financial support and organizational structure of science (e.g. OECD 2012). They resemble the orthodox economists, in that they do not want to be too committed to any specific economic model, but they differ in that they do want to pronounce on the relative efficiency of specific structures in specific sciences. However, these studies tend to lack historical depth and are driven more by the policy crises of the moment.

Finally, real working scientists are painfully aware that funding conditions affect the vitality of their science (e.g. Kevles 1978). At the same time, they are generally wary of any version of an economics of science. Furthermore, they tend to frown upon analyses of self-interested scientists.

IV. CONCLUSION

Surprisingly enough, the economics of science has not been approached in any systematic fashion. Perhaps worse, there has been little or no attempt to gauge the achievements and drawbacks of the economic approach to science

relative to those of other contemporary scholarly fields that have sought to describe and analyze the procedures and institutions of science, such as the science policy community, sociologists of science, and units for the history and philosophy of science. Repeated references to “social contracts” being renegotiated or abnegated have meant vastly different things to different groups: they range from arguments over the rate of return to public investments to Hobbesian politics to calls for greater accountability to the loss of credibility of scientists as political actors. Policy bodies have recently called for a “rationalization” of the budgeting process for science, without much attempt to define or explicate the theoretical underpinnings of such an endeavor. Measured evaluations of what have stood as vague metaphors for most concerned parties will assume more than academic significance at a time when economic models are increasingly used to justify various draconian options in the policy controversies that loom just over the horizon. Indeed, several scientists have already begun to bristle at the new language of efficiency and accountability, hurling recriminations back at the economists for attempting to throttle a scientific process that they do not understand, and which has delivered the goods in the past.

Under these circumstances, there is a distinct need for translators and synthesizers to move between these communities in order to suggest areas of common interests, to prevent the insensitive foisting of traditions and jargon of one field onto another, and to help policymakers evaluate the often conflicting scenarios that they receive from various groups. Accordingly, there is a need for a more synergetic approach to “science” and the “economy.” The time is ripe to encourage a more serious dialogue among economists, scientists, and historians, philosophers and sociologists of science in an atmosphere as free of mutual suspicion as possible. As one step in furthering this goal, this paper has given a historical and disciplinary background of the economics of science.

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