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BOOK REVIEW

A Neoliberal Economics of Science

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SCIENCE-MART: Privatizing American Science. Philip Mirowski. viii + 454 pp. Harvard University Press, 2011. \$39.95.

Is academic science a public good that should be rationally planned and robustly supported by social resources? How one answers this question depends on several things: the connection one makes between science and economic development; whether one believes that scientific discovery, both pure and applied, is best accomplished through private markets or federal grants; and how effective one believes the government is at planning scientific research and translating discoveries into consumer products and industrial technology. These are the issues, not always explicitly stated, that underlie current science-policy debates about stem-cell research, gene patents, the value of the Bayh-Dole Act of 1980 and the future of the National Science Foundation. For many scientists, including me, the issues have personal meaning: My career began during the Sputnik era with a federal scholarship in high-energy physics and continued with a National Defense Education Act fellowship to study philosophy of science.

Philip Mirowski, professor of economics and of the history and philosophy of science at the University of Notre Dame, has written an important and intensely provocative book that explores fundamental questions about the political economy of science. *Science-Mart* challenges us to think more critically, more synthetically and more deeply about the growing commercialization of academic science by exploring the historical and ideological roots of that trend. His main argument is that “much of the modern commercialization of science and the commoditization of the university has followed a script promulgated by neoliberal thinkers.” To argue his case, Mirowski employs bibliometric studies of science as well as methods and scholarship from a variety of disciplines, including economic history, sociology, intellectual-property law and political economy.

The book begins by introducing the reader to a fictitious academic researcher named Viridiana Jones, who “feels strung out between the Scylla of Disneyfication of higher education and the Charybdis of Free EnronPrise in securing a patron, any patron, to support her inquiries in an era of impending financial doom.” Jones is trying to navigate her way through the miasma of commercial influence in academia (where the phrase “marketplace of ideas” is taken literally)

while protecting the integrity of her science. The main theses of the book are that the commercialization of science is the result of a planned, coordinated effort on the part of those associated with a neoliberal agenda and that this commercialization has weakened America's scientific hegemony.

The term *neoliberal*, which arises from the work of post–World War II economists such as Friedrich Hayek, Milton Friedman and others belonging to the “Chicago school” of economics and law, has little in common with what is usually thought of as liberalism. The important tenets of neoliberalism, Mirowski says, include such propositions as the following: “The Market” is a better processor of information than the state; “politics operates as if it were a market”; “corporations can do no wrong”; “competition always prevails”; the state should be “degovernmentalized” through “privatization of education, health, science and even portions of the military”; a good way to initiate privatization is to redefine property rights; “the nation-state should be subject to discipline and limitation through international initiatives”; “the Market . . . can always provide solutions to problems seemingly caused by markets in the first place”; “there is no such thing as a ‘public good’”; “freedom” means economic freedom within the Market. The book examines studies of the economics of science and discusses such topics as the U.S. government's effort to manage scientific research, the emergence of intellectual property as a *raison d'être* of university life, the outsourcing of science on the global stage, and the harms that have accrued to academic science from its commercial transmogrification.

Mirowski debunks the popular view that there is a linear, lockstep path leading from science and technology to economic growth, a claim that served as the mantra of those urging passage of the Bayh-Dole Act of 1980. The Act gave universities, businesses and nonprofits intellectual-property control of discoveries that resulted from federally funded research. In passing the legislation, Congress accepted the idea that American industrial progress was being hampered by the failure of discoveries to enter the marketplace. To allow wealth from discoveries to be realized, the Act turned the principle of capitalism on its head: “private risk yields private loss or gain” became “public risk yields public loss or private gain”—a form of “heads I win, tails you lose.”

Although many historians view the Bayh-Dole Act as a watershed in American science policy, one that closely linked universities with commercial interests, Mirowski maintains that the roots of academic commerce run deeper. “Bayh-Dole was neither the sole nor even the primary reason why science was becoming increasingly commercialized,” he maintains. “It was just one component in a whole range of roughly simultaneous ‘reforms’ being engineered into corporations, the government, and the universities—all calculated to instigate the marketplace of ideas throughout the entire culture.” The arguments Mirowski makes in support of this statement are by themselves sufficient to make this book stand out. But there is much more.

In his chapter on the intellectual-property explosion in academia, Mirowski uses the case of the transgenic Harvard Oncomouse to illustrate some of the consequences of commercialization. In the early 1980s, scientists at Harvard, funded in part by a National Institutes of Health grant and in part by DuPont, successfully implanted mammary tumor virus DNA into the genome of a mouse, which then showed a susceptibility to develop breast cancer. Transgenic mice engineered in this way were a useful tool for studying mammary oncogenesis. In the 1980s, the U.S. Patent

and Trademark Office expanded its criteria for awarding patents to include genetically modified organisms *sui generis*, as well as genes, plants, animals and all sorts of cell cultures. In the case of the Oncomouse, the Office awarded a patent that covered not just the Oncomouse but any tumorigenic, nonhuman mammal whose germ cells and somatic cells contained any oncogene sequence. The scope of the patent award sent shock waves through the academic community and the growing industry of lab-mouse production. The case was, Mirowski says, “one of the first attempts by a *university* to make serious money off of a research tool.” He could have also cited the patent on recombinant DNA techniques awarded to Stanford and the University of California in 1980.

The intellectual-property revolution had begun in academia. The currency of the trade was not the free and open exchange of materials, published articles and scientific methods, but the Material Transfer Agreement (MTA). Such agreements define how one university can use another’s intellectual property. In effect, universities do not honor any research exemptions, because all research potentially has commercial value. Scientists who wanted to acquire Oncomouse organisms to use in their own research were asked to sign an MTA that prohibited them from breeding and sharing descendant mice, a practice that had previously been allowed with other lines of purebred mice. Mirowski offers additional examples, some of them absurd, of the privatization of resources that were once shared—he tells the story of an art professor at SUNY-Buffalo who was sued by the American Type Culture Collection for violating an MTA when he incorporated some *Bacillus atrophaeus* into his artwork.

Gene patents are a special case of turning knowledge into a marketable entity. Myriad Genetics has a patent on the BRCA1 and BRCA2 genes that gives it the right to prevent clinicians from independently testing for the presence of mutations in those genes in women wanting to determine whether they are at higher risk of getting breast and ovarian cancer. In response to a suit led by the American Civil Liberties Union, which questioned whether isolated human genes and the comparison of their sequences are patentable, the U.S. Federal District Court of New York issued a summary judgment ruling on March 29, 2010, invalidating the patents on BRCA1 and BRCA2. The ruling stated that the patents were granted for a law of nature and were therefore improper. The case will be appealed, but the ruling is a major challenge to the privatization of scientific knowledge.

Much has been written about the commercial turn of American universities. In his 2003 book *Universities in the Marketplace: The Commercialization of Higher Education*, former Harvard President Derek Bok said that “What is new about today’s commercial practices is not their existence but their unprecedented size and scope.” Egregious conflicts of interest and the competing missions of university–business partnerships have been igniting debates over academic capitalism since the publication in 1918 of Thorstein Veblen’s book *The Higher Learning in America*, in which he discusses the dire consequences of modeling the governance of universities on business practices.

Mirowski writes eloquently about ghost authorship in the medical literature, silly patents and the decline of openness in science. However, he has little to say about the effects of academic commerce on the *quality* of the knowledge produced. In medicine, a growing body of work points to a “funding effect” arising from the for-profit sponsorship of research. There is a higher-

than-expected probability that research supported by for-profit entities will yield results consistent with the financial interests of those entities. And authors with financial conflicts of interest are more likely than authors without such conflicts to produce research outcomes that reflect the interests of the for-profit company with which they are connected. Mirowski's insight that society has largely treated conflicts of interest as a matter of individual responsibility rather than as a structural problem in the organization of science is supported by his analysis of the pharmaceutical industry. The proposed antidote of disclosure is inadequate: It doesn't eliminate conflicts of interest, address their structural roots or prevent them from adversely affecting the quality of science.

In the next-to-last chapter, "Has Science Been 'Harmed' by the Modern Commercial Regime?," Mirowski confronts that question head on and concludes that science has indeed been harmed—by "qualitative degradation in the character of the knowledge produced." Readers will have to decide for themselves how compelling his arguments are. It's true that the commercialization of universities has created an obsession with intellectual property and has produced impediments to the free flow of information. But indicators of scientific health are not easy to measure. Many universities (though not all) still assess candidates for tenure primarily by looking at whether they have published high-quality scholarship in prestigious journals—not at whether they have attracted commercial dollars. Until we get a better grasp on the effect that conflicts of interest and commercial partnerships are having on the quality of scientific results, many of us will, like Viridiana Jones, be unable to quite bring ourselves "to concede that the push to 'commercialize the university' has been one of the biggest Ponzi schemes this side of Bernie Madoff and Allen Stanford." Nevertheless, Mirowski has shown that a political economist can bring significant new insights to the discussion of academic marketphilia.

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