The Effortless Economy of Science? *By Philip Mirowski*. Durham: Duke University Press, 2004. 462 pp. Index, notes, bibliography, tables, figures. Cloth, $89.95; paper, $24.95. ISBN: cloth, 0-822-33310-4; paper, 0-822-33322-8.

Reviewed by Theodore M. Porter

There are many complaints that might be leveled against this book, some of them mentioned below. Counterbalancing them is one great virtue: Philip Mirowski asks and takes intelligent positions on big and important questions. The most important topic addressed in this book is the relation between modern science and its paymasters. In the United States, the military-industrial state, which funded most science in the cold-war era, has since the mid-1980s met its match in what I would call the "medical-pensioner state," and also, as Mirowski emphasizes most strongly, in neoliberal networks of corporate subcontracts and privatized research. Funding systems did not determine scientific models of the structure of DNA or measures of the solar emission of muons, but they certainly did help to shape the sense among scientists of what constituted the important research topics, the most promising methods, and even the most satisfactory forms of explanation.

Economic studies of science rarely consider such questions. Mirowski calls these efforts a "weapon of mass distraction, diverting attention from the causes and consequences of the vast contemporary reorganization of the scientific process," and also "a misleading caricature of an 'effortless economy of science'" (p. 11). By this last phrase, he refers to the supposition that science achieves disinterested or rational knowledge irrespective of the economic systems in which it is enmeshed, effortlessly and somehow by its very nature. One influential line of economic models of science posits a field of polarized particles, each tending to align with adjacent particles and each slightly biased in favor of the direction corresponding to truth, to show that career-minded scientists who follow fashions or fear to contradict their colleagues will nevertheless (all the more strongly, in fact) move toward a consensus corresponding to valid knowledge. Such a model seems to prove too much, since it contains no explicit assumptions

regarding the institutions of science, about prior states of knowledge, or about topics or methods of investigation. Meanwhile, as Mirowski shows, governments, corporations, and universities have expended immense effort in restructuring their relationships, reshaping career patterns, protecting intellectual property, and outsourcing laboratory work. Why all this bustle, unless something important is at stake? And why are most economists of science so obsessed with science in theory, as opposed to science in the world?

Mirowski has an alternative vision of the economics of science, and a more compelling one. It forms one important element in this book, which is in fact a collection of articles. While these all concern economics in relation to science, they are otherwise quite diverse. In some, Mirowski argues that philosophers or others have made use of economic arguments without recognizing the limitations or assumptions that any competent economist would know well. He undertakes to show that economics cannot provide what these writers want from it. In other articles, he uses economic tools in a more positive way, as for example when he deploys models of arbitrage to understand precision measurement as a collective process. Most of the second half of the book consists of studies in the history of econometrics or the history of mathematical economics, often containing valuable insights and usually exhibiting a jaded view of the economic discipline. I am not unsympathetic to the critique. Still, I detect a whiff of a conspiracy theory, involving economists of questionable probity forever papering over the flaws at the heart of their enterprise. Echoing his 1989 book *More Heat than Light*, Mirowski is particularly caustic regarding what he sees as the utter dependence of economic theory on nineteenth-century energy physics, and the incoherence of energy as analogous to the economists' utility. He hints also at a near conspiracy in the philosophy of science. Philip Kitcher, who used economic models to show the rationality of science, is a special object of Mirowski's opprobrium. Thomas Kuhn also figures in this story as a mediocre thinker who achieved fame because his theory of scientific revolutions provided a convenient "apologia for Big Science in the military modality" (p. 18).

If not quite paranoid, such interpretations are unacceptably monocausal and reductive. At other moments, Mirowski writes more sensitively, as in his sympathetic discussion of the physical chemist turned philosopher (and, sometimes, economist)

Michael Polanyi, who is presented as an interesting contrast to his friend and colleague at the London School of Economics, Friedrich Hayek. Always, however, there are gratuitously bitter asides, notes out of key to distract from the occasional well-turned phrase, aggressive self-positioning, and stylistic excesses, such as obscure and sometimes ill-fitting words, which make the reading intermittently painful. Are these flaws inseparable from the author's characteristic iconoclasm? Perhaps. But even after noting the problems, which are many, substantive as well as stylistic, we must recognize also that Mirowski is consistently original, sometimes brilliantly so. He is, moreover, at his best when writing within the constraints of space imposed by the article form. While the heterogeneity of the collection means that few will have professional need to read it from cover to cover, I found something valuable in almost every article. Mirowski has an impressive range. The most important aspect of this book, however, is its vision of a new economics of science, as laid out mainly in the first two (of five) sections. I will allow myself to hope that he might develop these insights systematically and concisely in his next book, and that he will attract able and articulate followers.

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