

## Book Reviews

Vernon W. Ruttan. *Is War Necessary for Economic Growth? Military Procurement and Technology Development*. New York: Oxford University Press, 2006. Pp. xi+219. \$45.00 (cloth).

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A provocative title such as *Is War Necessary for Economic Growth?* surely will help sell this book. Unfortunately, titles can mislead, and this one does. A more accurate title would have been: “Is Major War, or Threat Thereof, Necessary for the Continued Post–World War II Economic Growth of the United States of America?” The book’s author, Vernon W. Ruttan, Regents Professor Emeritus, Department of Applied Economics, University of Minnesota, carefully abstains from claiming insight beyond the confines of this narrow title, wherefore readers learn little about the broader questions of (military) technology, productivity, development, and growth.

The book examines the effect of military procurement on the eventual commercial development of general-purpose technologies. The author claims that such procurement has been “a major source of technology development across a broad spectrum of industries that account for an important share of U.S. industrial production” (vii). Packaged between an introduction and a conclusion, the book consists of six case studies: on interchangeable parts and the advent of mass production, military and commercial aircraft development, nuclear energy and electric power, the computer industry, the Internet, and the space industry.

It is not clear why the origin of other candidate general-purpose technologies—for example, the container “box” and sea transport, biochemistry and the pharmaceutical industry, or electronic microscopy and materials science—are not examined. If one wishes to examine why and how war might produce general-purpose technology, should one not set this against why and how peace might accomplish the same? Some of the chosen cases are puzzling: for instance, given its significant but not overwhelming share in the U.S. electricity market even today—20% in 2004 (<http://www.eia.doe.gov/fuelelectric.html>), and a much smaller share, namely, only 8% of overall U.S. energy consumption—

I am not clear in what sense nuclear energy is in fact a general-purpose technology.

The book's evidentiary standard is disappointingly low. All six case studies are underresearched and rely overly on weak secondary material, probably because the book is—by the author's own admission—essentially an afterthought to his much more thorough *Technology, Growth, and Development* (Ruttan 2001). For illustration, I take issue with just one claim, namely, the author's stark assertion that “nuclear power is the most clear-cut example discussed in this book of an important general-purpose technology that in the absence of military and defense-related procurement would not have been developed at all—it would not have been developed ‘anyway.’ It is exceedingly difficult to image that, without the threat of Germany's developing nuclear weapons during World War II, the U.S. government would have mobilized the scientific, technical, and financial resources devoted to the Manhattan Project. . . . Hahn and Strassmann's work would have been written up in the scientific literature and treated as a subject of mostly academic interest” (86).

Not only is Fritz Strassmann's name consistently misspelled throughout the book (I corrected the spelling in the just-quoted passage), but Lise Meitner is not mentioned at all and her crucial contribution thus ignored. (This is like omitting Rosalind Franklin's contribution to the discovery of DNA's double helix structure in 1953.) As director of the physics department of Otto Hahn's research institute, Meitner—the Jewish woman physicist—had been crucially involved in the radiochemistry experiments until, in July 1938, she made a narrow, harrowing escape from Germany. On the evening of December 19, 1938, Hahn posted certain experimental results that neither he nor Strassmann—both chemists—fully understood in a letter to Meitner who by now was in Sweden. “Perhaps you can suggest some fantastic explanation,” Hahn wrote. That she most certainly did, together with her nephew Otto Frisch who was visiting from Bohr's Copenhagen laboratory. The “fantastic explanation” was nuclear fission! That was on the morning of December 24, 1938. While Hahn and Strassmann readied a manuscript describing the results of the chemistry experiments for publication, Frisch, back in Copenhagen, told Bohr what Meitner thought about the experiments' physical interpretation. It hit Bohr like a brick: “Oh what idiots we have all been! Oh but this is wonderful! This is just as it must be!” Meitner was right. That was on January 3, 1939—the start of the war still 8 months off. (Quotes are from Rhodes [1988].)

The news shot around the scientific community—Sweden, Denmark, Holland, Great Britain, Germany, France, and—quite by accident—among the assorted Germans, Italians, and Hungarians (and Americans) in the United

States—even before they were “written up.” Physicists well realized the civilian, not simply the military, possibilities that the conversion of mass into energy by the square of the speed of light— $E = mc^2$ —entailed: enormous power. By January 1939, the coming conflagration may have been inevitable, and so may have been the Manhattan project, yet chemists and physicists had already secured the knowledge of splitting the atom and of generating power therefrom.

Military-induced demand then certainly played a role in the military’s harnessing of atomic power. Much of the associated expense, however, went toward the need to invent new detonation techniques and delivery devices rather than to the generation of a sustained chain reaction. Still, perhaps the military dollar did play the crucial role Ruttan assigns, but the categorical claim that the civilian emergence of nuclear energy simply would not have materialized at all save for the Manhattan project is just not made convincingly on the slight evidence presented.

I have similar qualms about each one of the other five cases (reviewed at length elsewhere; see Brauer 2007). Yet even if one grants Ruttan’s point that military funding and procurement were the key to the eventual commercial success of certain general-purpose technologies, the book tells us little about the economics involved. Just what makes spin-off possible and successful? Although there are frequent references about how civilians either brought critical ideas to the military or of how civilians harnessed such ideas from the military, the book is essentially silent on concepts such as network economies or the economics of open standards with which the question of successful technology transfer from the military to the civilian sector might have been explored. Even Alan Milward’s now 30-year-old chapter on “war, technology, and economic change” (Milward 1977) has a more nuanced discussion of the issues than the book under review offers.

Ruttan does not argue that creating spin-offs from the military sector is necessarily an “efficient way to advance commercial technology development” (162). That is not the question he pursues. Instead, he asks, Is major war, or threat thereof, necessary to create general-purpose technologies to advance future U.S. economic growth? His opinion is that “it may” (185), on no more argument than that he is doubtful that the U.S. private sector can mobilize the resources necessary to develop future general-purpose technologies. He also believes that the “U.S. [defense] industrial base is losing its capacity to respond” even if there were a massive publicly financed injection of resources (185). Further, even if the defense industrial base could respond, he still remains “skeptical” (185) that viable new general-purpose technologies could result. He raises the question, for example, of the general-purpose use of stealth aircraft technology (62). It is all argued as if the future United States were a case

study to fit Olson's (1982) thesis in *The Rise and Decline of Nations*. Once more, perhaps Ruttan is correct—it is just very hard to press as much of a conclusion as he does from the evidence presented.

The statement in the concluding chapter that “I have yet to identify a recent comprehensive analysis of the changing structure of the defense industrial base or of the policy implications for defense procurement” (176) is puzzling. The author does not specify what he means by “comprehensive analysis,” but the book's almost complete lack of reference to the now fairly well developed defense-economics literature—complete with its own journal (*Defence and Peace Economics*), professional association, annual conferences, at least one textbook, a three-volume reader, and two volumes in Elsevier's celebrated Handbook series (1995 and 2007)—suggests that he has not looked in the right place to inform himself. All in all, this is a disappointing book on a great topic.

#### References

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