however, there is little novelty in the discussion of what is needed and even less discussion on why it is needed.

This is a book by an author of great experience and distinction at the highest levels of academic life, with much involvement in academic and educational politics. Perhaps it is an attempt to draw conclusions for the future on the basis of his life-long extensive experience. In my view, a more anecdotal approach, rather than the formal approach, would have been more useful to the reader.

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The technology imperative, by Gregory Tassey, Cheltenham, Edward Elgar, 2007, 329 + xiv pp., £75, ISBN 978 1 84542 912 6

There is by now a long series of books by Americans warning Americans that their leading position in the world in general, and in the world economy in particular, is under threat. This parallels the long series of books by Europeans enjoining other Europeans to pay more attention to the superior arrangements of the Americans. The latter series can be described as generally market-friendly, and it has enjoyed rather a surge since the 'Reagan reforms', followed by the New Economy boom, offered a narrative of market-driven American resurgence. But on both sides of the Atlantic there have been contrary voices raised:

> Look at what the Americans do, not at what their textbooks say: for example, how could their free enterprise heroes have forged ahead in high technology industries if the Department of Defense and the National Institutes of Health had not paid huge sums of money for the basic and not-so-basic research on which the high technology was built?

Tassey is of this persuasion, and he goes on to warn (on p. 40) that, even more than in the past, 'the successful economy will be based on a "complementary-asset" growth model in that both the public and private sectors have essential and complementary roles'. 'The dynamic character of global markets … means that competition among national governments is also occurring.' He notes the vigorous policies of (among others) China and Singapore. As he argues in Chapter 2, the 'complementarity' is the greater because there is an increasing emphasis in the private sector on relatively short-term investment in innovation – shown by the much greater rise in industry-funded spending on development as opposed to applied and (above all) basic research (Figure 2.5).

What are governments competing on, then? On education, for one thing: and in Chapter 2, Tassey outlines the poor relative performance of the United States in primary, secondary and tertiary education – particularly with regard to science, technology and mathematics. In Chapter 3, he shows that it is also lagging in investment on IT infrastructure and thus in access to advanced broadband. In Chapter 4, he puts forward detailed arguments as to what the public sector needs to spend money on under the general label of 'technology'. The *science base* is generally understood to be a public responsibility, but Tassey argues that *infratechnologies* and *generic technologies* also demand heavy public investment – alongside private – and are getting too

little in the United States. Moreover, the public sector needs to give direction as well as spend money – the model being the Defence Advanced Research Projects Agency (DARPA), at least in the past – and is not doing so adequately on the civilian side.

In Chapter 10, Tassey reviews elements of STID policy, and finds two key elements of current policy wanting. The R&E (research and engineering) tax credit was, when introduced in 1981, relatively generous; by now, competing countries have caught up. Moreover, it is poorly structured: it was intended to shift the composition of industry-funded R&D towards higher-risk, longer-term research, which Tassey argues is impossible with such a credit – direct government funding should be used instead. Another key element of policy since the 1970s has been greater activity by universities, partly because of the incentive provided by the Bayh–Dole Act, which allows universities to own the intellectual property resulting from government-sponsored research. Tassey presents the disadvantages of the new role of universities. They operate individually, of course, and therefore 'they cannot provide the necessary management for the advancement of new technology platforms … the issuance of an exclusive licence [to a university] can inhibit the diffusion of breakthrough technologies …' (p. 299). 'In general, industry has shown increasing reluctance to fund breakthrough technology research at universities because of what are viewed as excessive IP ownership demands' (p. 300).

Tassey's overall argument is that the US government (and, the reader will infer, other governments) must spend much more on supporting and encouraging technological development, and do it in ways which are informed and guided by an understanding of the nature of the new technological paradigm. This book is highly persuasive and enlightening, and should be required reading for all interested in technology policy.

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