

precisely those characteristics that it has in common with research and development in the free enterprise economy. Research and development in the American economy is uncoordinated. There is no central planning or direction. There is a great deal of duplication, rivalry, and of course, viewed with the aid of hindsight, apparent waste. And yet the American economy is, in most industrial and technological areas, the most progressive and advanced in the world — certainly more progressive in those areas than the economies of countries that place much greater emphasis upon central planning and less upon competition.

We would not argue that all is perfect with research and development in the American competitive economy. There are persuasive reasons for believing that, from the point of view of national economic growth, the American economy spends too little in total on research and development and that, like the military it spends relatively too much at the quick-payoff, prototype end of the spectrum and too little at the basic and applied research end.¹⁶

Nor would we argue that the government could simply copy aspects of the competitive economy even if these were perfect in their own environment. There are at least two fundamental differences. In the economy the consumers are king; there are millions of them for firms to satisfy — with varied wants and in all sorts of circumstances. But military research and development has a much narrower purpose — the promotion of national security. And while national security is exceedingly complex, the government has a special capability as well as a special responsibility to define its objectives and means. This demands a kind and degree of planning and control that would serve no function in the private economy. And there is a second difference, which is of even greater practical importance. In the competitive economy, firms risk their own money; they therefore police themselves. In military research and development contractors risk public money, and some fairly effective controls against malfeasance, carelessness, and irresponsibility are needed and demanded — even at the cost of some efficiency.

Nevertheless, despite the imperfections of the competitive market solution and despite the differences in circumstances, the government could learn a great deal from observing how the private economy manages research and development. The private economy does, in effect, recognize the essential characteristic of research and development — uncertainty

¹⁶ The most important reason for such underemphasis on basic research is the difficulty the private competitive firm has in latching onto property rights in the results of R and D. Patents provide partial and undependable protection in most areas. The obstacles to reaping the reward from one's own discoveries are greater the further removed the discoveries are from immediate practical application. (See Kenneth J. Arrow, "Economic Welfare and the Allocation of Resources for Invention," The RAND Corporation, P-1856, December 15, 1959.)