JLS Journal of Libertarian Studies
Volume 22 (2010): 103–25

The Neglected Costs of the Warfare State: An Austrian Tribute to Seymour Melman

Thomas E. Woods, Jr.

Libertarians often point to "What Is Seen and What Is Not Seen," a famous essay in which economist Frédéric Bastiat (1801–1850) makes perhaps the most important, if easily neglected, point in all of economics: to understand the economy properly we must consider not merely the immediate effects of a proposed government intervention on certain earmarked groups, but also its long-term effects on society as a whole.

The example from that essay that most people remember involves a boy who breaks a homeowner's window.Some people, Bastiat says, are inclined to think of the unfortunate incident as a concealed boon, for the money spent to repair the window will employ the glazier. That analysis is faulty, of course, because it confines itself only to *what is seen*—namely, the enrichment of the glazier. What is not seen is what the shopkeeper would have purchased with his money had he not needed to replace the window. Perhaps he might have bought a new pair of shoes. In that case, the shoemaker rather than the glazier would have been enriched. But since the repair to the window *is seen*, while the shoes that might have been purchased had there been to window to fix in the first place *are not seen*, careless observers neglect the foregone purchase of shoes and conclude that destruction can actually confer economic benefit, or stimulus. From the point of view of the shopkeeper himself, of course, the incident amounts to a total loss: whereas he might have had a window and a new pair of shoes, now he has only

Thomas E. Woods, Jr. is senior fellow in history at the Ludwig von Mises Institute.

a window. Less wealth exists, and society is worse off than it otherwise would have been.

What is often overlooked is the military example Bastiat uses in the essay. He discusses the demobilization of one hundred thousand soldiers from the French army—a prospect many entertain with dread, for what will these men do for a living? And what about the foregone stimulus to French businesses previously provided by the military's expenditures on wine, clothes, and weapons for these men? Of course, such critics are focusing once again only on what is seen. They fail to consider that the money that had previously been confiscated from the taxpayers in order to support the soldiers will now be available for other purposes, including expenditures on goods that these demobilized soldiers can devote themselves to producing. Likewise, the money the military once spent on wine, clothes, and weapons can now be spent on other things, so here again economic activity is none the worse for the soldiers' demobilization.

Perhaps no scholar has applied Bastiat's insights to military expenditures with more persistence and rigor than Seymour Melman (1917–2004). Melman was a professor of industrial engineering and operations research at Columbia University. In a scholarly career that yielded a great many books and articles, he focused much of his energy on the economics of the warfare and military-oriented state. In large part, Melman's work amounted to an extended analysis, in light of Bastiat's insight, of the costs, not only of modern American wars, but also of the defense establishment itself. "Industrial productivity," he wrote,

> the foundation of every nation's economic growth, is eroded by the relentlessly predatory effects of the military economy. . . . Traditional economic competence of every sort is being eroded by the state capitalist directorate that elevates inefficiency into a national purpose that disables the market system, that destroys the value of the currency, and that diminishes the decision power of all institutions other than its own. (Melman 1974, p. 11)

Although Melman was associated with the left, a fact that may account for libertarian neglect of his thought, his analysis of the warfare state is not only compatible with, but at times is absolutely identical to, the libertarian view, and deserves wider dissemination.

Throughout the Cold War, politicians and intellectuals left, right, and center could be heard warning of the catastrophic economic consequences of substantial reductions in military spending. The radical left in particular, as part of its critique of American state capitalism (which it sometimes conflated with pure *laissez-faire*, an altogether

different system), lent important support to that position. In their book *Monopoly Capital*, for example, Paul Baran and Paul Sweezy warned:

> If military spending were reduced once again to pre-Second World War proportions, the nation's economy would return to a state of profound depression, characterized by unemployment rates of 15 per cent and up, such as prevailed during the 1930s. (1966, p. 53)

This analysis was tainted by the fallacy Bastiat had refuted over a century earlier: pointing out the direct effects of discontinuing a particular spending stream, without considering the *indirect* effects–which included all those business ventures, jobs, and wealth creation that those funds would create when directed away from military use and toward the genuine service of the public as expressed in their voluntarily expressed spending patterns. Melman saw such thinkers' fallacy immediately: "By focusing on the size of the war-economy payroll and its locally stimulating effects on retail trade, real-estate values and the like, they render invisible the size and quality of *what has been forgone* for the wider society" (1986, p. 25).

Melman conceived of the true cost of the military establishment as including all the consumer goods, services, and technological discoveries that never came into existence because the resources to provide them were diverted into military production. He reminded his readers of the necessary antagonism that existed between production for the military and production for civilian use. Military production carried substantial but consistently overlooked opportunity costs, since of course a physical resource or a human being devoted to one purpose could not at the same time be devoted to another purpose. "Our able young men cannot, at once, be trainees for the Atomic Energy Commission and physicians in training; they cannot be teaching the young and also designing missile components," Melman wrote (1965, p. 11). With a quarter century having passed since the end of World War II, Melman considered the labor component of the defense sector as of 1970. In that year, 3 million people were employed by military industry on work directly linked to the Defense Department. Another million were employed directly by the Defense Department, primarily on military bases doing work ranging from research to base maintenance. Another 3.4 million people were in the uniformed armed forces (1971, p. 1). If these millions of people were involved in the production of goods and services oriented to consumer use, Americans would enjoy the fruits of all the additional productive energy that they would bring to the economy.

Judging a country's economic performance with reference to aggregates like Gross Domestic Product can be misleading, Melman observed, particularly when those quantitative measures conceal or

obscure qualitative problems.[1] Measurements of "economic growth" are meaningless if they do not differentiate between what he called productive growth and parasitic growth. Productive growth improves people's standard of living and/or contributes to future production, while parasitic growth merely depletes manpower and existing stocks of goods without accomplishing either of these ends (1965, p. 5). In Melman's view, productive growth involves both the production of consumer goods as well as the production of capital goods that increase the economy's capacity to produce consumer goods in the future. Both are aimed at satisfying human needs.

Beyond a certain limit, military spending constitutes the classic example of what Melman considered parasitic growth. Not himself a pacifist, Melman believed that since the nation's security demanded some kind of military establishment, military spending, up to a point, could be not only legitimate but also economically valuable. But astronomical military budgets, surpassing the military spending of the next dozen nations put together, and exceeding many times over the amount of destructive power needed to annihilate every enemy city, were clearly parasitic. Melman used the term "overkill" to describe that portion of the military budget that constituted this kind of excess, observing facetiously that it was not possible to annihilate the same city more than once, and that no development in military technology was likely to change that basic fact. By the 1960s the U.S. government, in its strategic aircraft and missiles alone, was capable of unleashing in explosive power the equivalent of six tons of TNT for every person on Earth. "Now that we have 6 tons of TNT per person in our strategic missiles and aircraft alone," Melman wondered, "have we become more secure than when we had only 1 ton of TNT per human being on earth?" (ibid., p 7). Such equipment neither served the well-being of consumers nor provided (as did capital goods) for greater production in the future. This spending was altogether wasted, for "whatever else you can do with a nuclear-powered submarine that is almost as long as two football fields, and capable of cruising underwater for weeks and at high speeds—you can't wear it, you can't live in it, you can't travel in it, and there's nothing you can produce with it" (Melman 1986). And in keeping with his principal theme, Melman recalled that "the labor and capital resources that were used to produce this stock of overkill material

[1]Murray N. Rothbard made a similar point when suggested that GNP be replaced by Private Product Remaining, which excludes government expenditures altogether and measures only the size of the private economy. Rothbard (1983, pp. 296–97).

could have been used to produce other goods and services for America" (1965, pp. 42-43).[2]

GDP calculations do not draw Melman's distinction between the parasitic and the productive. Military spending, like all government spending, is simply added—as if it were something positive—to the sum of all final goods and services sold in a given year. Parasitic growth is thus a component of a figure whose magnitude is supposed to indicate a country's economic well-being. For that reason alone, GDP can obscure as much as it reveals.

Likewise, measuring the defense budget as a percentage of GDP substantially understates its economic consequences. First, the official defense budget itself leaves out hundreds of billions of dollars appropriated to other departments that logically belong to the category of defense. (When interest payments on debt-financed defense and war-related expenditures are added in, the actual dollar amount of defense-related spending in recent years approaches *twice* the officially reported "defense budget" of the Department of Defense (Higgs 2004).) Second, Melman believed that a better measurement of the effect of military spending on the economy involved calculating the ratio of military

---

[2]Murray Weidenbaum made a similar point when he wrote that to convey the true costs of the military establishment in a meaningful way it was necessary to go beyond billions of dollars spent and consider also the

> thousands of men and women pulled away (voluntarily or otherwise) from civilian pursuits, millions of man-years of industrial effort, millions of barrels of oil pumped from the earth, and thousands of square yards of planet space filled with equipment and debris. In short, the real cost of military activities should be measured in human and natural resources and in the stocks of productive capital absorbed in producing, transporting, and maintaining weapons and other military equipment. It is in the sense of alternative opportunities lost that military spending should be considered—the numbers of people employed by the military, the goods and services it purchases from the private sector, the real estate it ties up, and the technology devoted to it. Not only do we lose the opportunity for civilian use of goods and services, but we also lose the potential economic growth that these resources might have brought about. (1974, pp. 28-29).

Arthur Burns, an economic adviser to President Dwight Eisenhower and Federal Reserve Chairman in the 1970s, concurred: "The real cost of the defense sector consists not only of the civilian goods and services that are currently foregone as its account; it includes also an element of growth that could have been achieved through larger capital investment in human and business capital" (quoted in Tirman 1984, p. 13).

spending to total, fixed-capital formation. In 1977, Melman calculated that for every $100 of producers' fixed capital formation, the U.S. military spent $46 (1983, p. 261).

The scale of the resources siphoned off from the civilian sector becomes more vivid in light of specific examples of military programs, equipment, and personnel. To train a single combat pilot, for instance, costs between $5 million and $7 million (Dunnigan 2003, p. 164). Over a period of two years, the average U.S. motorist uses about as much fuel as does a single F-16 training jet in less than an hour. The Abrams tank uses up 3.8 gallons of fuel in order to travel a single mile. Between 2 and 11 percent of the world's use of 14 important minerals, from copper to aluminum to zinc, is consumed by the military, as is about 6 percent of its consumption of petroleum (Biswas 2000, p. 306). The Pentagon's energy use in a single year could power all U.S. mass transit systems for nearly 14 years (Sidel 2000, p. 441).

Still other statistics illuminate the scope of the resources consumed by the military. "Since 1951," Melman noted, "the budget of the Department of Defense each year exceeds the net profits of all U.S. corporations. So, in finance capital terms, that means that the management of that budget controls the largest single block of finance capital resources" (1989). According to the U.S. Department of Defense, during the three decades from 1947 through 1987 it used (in 1982 dollars) $7.62 trillion in capital resources. In 1985, the Department of Commerce estimated the value of the nation's plant and equipment, and infrastructure, at just over $7.29 trillion. In other words, the amount spent over that period could have doubled the American capital stock or modernized and replaced its existing stock (1988, pp. 55-59).

That is a startling statistic, to be sure, but even this does not exhaust the consequences of the military state. The economic costs of these enormous military expenditures extend well beyond the dollar amounts spent on the materials, the machinery, the physical plant, and the manpower involved in weapons construction. Any portion of this money that might otherwise have been devoted to investment for civilian purposes would have brought returns *in excess* of the amount invested, since the machinery it purchased would have increased the country's productive capacity and thus, in perpetuity, its capability for future production (Melman 1986, p. 66). In 1970, as the Vietnam War raged, the marginal productivity of capital was estimated at between 20 and 25 percent, meaning that an additional dollar of capital investment would yield an additional 20 to 25 cents worth of additional production annually from that moment on. A further estimate suggests that one dollar of military spending displaces 29.2 cents of private investment.

Combining these statistics we arrive at the following calculation: an additional $1 billion in military spending tends to displace $292 million in private investment, which in turn means, in perpetuity, roughly $65 million less in annual production (Russett 1970, p. 144).

The dollar amount that the military establishment siphons from the civilian economy understates the true cost of military expenditure to society at large for the additional reason that the dollar value of the resources—human or material—diverted into defense manufacture is often lower than the value they would have had in the civilian economy. For example, men conscripted into the military would almost surely have had much higher-paying jobs, reflecting the value of their work to society, had they instead been able to carry on their lives without disruption. While in the military, their cost is reflected only in terms of government expenditures to feed and clothe them, along with the very modest cash payment they receive. To appreciate the full magnitude of the cost involved in having them participate in war would require taking into account the (surely much greater) value of the goods and services they would have produced back home (Weidenbaum 1974, pp. 29-30).[3]

An equally systematic, and just as frequently overlooked, additional cost of a large military establishment involves its damaging effects on the private sector, particularly among those firms and industries that supply it. Catering to the Pentagon, Melman argues, distorts a firm's business sense and makes it less mindful of controlling costs than it would be if its customers resided exclusively in the private sector. Since the Pentagon's funds come from involuntary taxation rather than through profits reaped by offering a useful good or service on a competitive market, it can afford to be less concerned with cost than would a private firm. Firms servicing Pentagon needs, according to Melman, "have become indifferent to cost and operate by methods that ordinarily escalate cost and therefore price" (1988, p. 57). They operate outside the market framework and the price system: the prices of the goods they produce are not deed by the voluntary buying and selling by property owners that comprise the market, but through a negotiation process with the Department of Defense in isolation from market exchange.

---

[3] A somewhat offsetting factor is that not all the resources consumed in the defense sector would have been available for use by the rest of society had they not been used by the defense sector. The food that goes to feed a soldier would have been necessary to feed him even in civilian life, and in that sense would not amount to a net subtraction from the existing stock of wealth. That person would have needed the food in either case.

Beginning in the 1960s, the Department of Defense required the military-oriented firms with which it did business to engage in "historical costing," a method by which past prices are employed in order to estimate future costs. Superficially plausible, this approach builds into the procurement process a bias in favor of ever-higher prices, since it does not scrutinize these past prices or the firm's previously incurred costs, or make provision for the possibility that work done in the future might be carried out at a lower cost than related work done in the past. This is not nit-picking: advancing technology has often made it possible to carry out important tasks at ever-lower costs, yet rising costs are a built-in assumption of the historical cost method (1986 pp. 28, 30). Moreover, if some piece of military equipment—a helicopter, plane, or tank, for example—winds up costing much more than initial estimates indicated, that inflated price then becomes the baseline for the cost estimates for new projects belonging to the same genus. This approach "allowed the managements to incorporate whatever methods, including inefficiencies, had been part of making product A, B and C into the historical trend of costs and prices used for justifying yet further cost and price increases for product D" (ibid., p. 31). The Pentagon, in turn, uses the resulting cost hikes to justify higher budget proposals submitted to Congress.

Cost-minimizing incentives that exist for civilian firms are often absent with the military-industry firm. The largest contracts are negotiated with a single supplier, and cost is not the major factor in the Pentagon's reckoning. Much more important is the Pentagon's confidence that the firm in question can actually deliver the product, interact successfully with the military community, and adapt to ongoing and sometimes quite frequent changes to the initial design. As for cost, even if the resulting military hardware exceeds the negotiated price by three or four times, the Pentagon will generally find a way to come up with the money (ibid., p. 34). Melman also found administrative overhead ratios in the defense industry to be double those for civilian firms, where such a crushing burden simply could not be absorbed. He concluded:

> From the personal accounts of "refugees" from military-industry firms, from former Pentagon staffers, from informants still engaged in military-industrial work, from the Pentagon's publications, and from data disclosed in Congressional hearings, I have found consistent evidence pointing to the inference that the primary, internal, economic dynamics of military industry are cost- and subsidy-maximization. (Ibid., p. 29)

These incentives also supply little reason to exert the intellectual and physical effort necessary not only to control costs but also to make

complex systems simpler and more user-friendly, as truly competitive firms and industries must try to do when catering to the public. "In one major enterprise," Melman reported,

> the product-development staffs engaged in contests for designing the most complex, Rube Goldberg-types of devices. Why bother putting brakes on such professional games as long as they can be labeled "research," charged to "cost growth" and billed to the Pentagon? (Ibid., p. 39)

The efforts of Boeing Vertol, Rohr, and Grumman to enter the field of mass transit are instructive. In each case, their products were simply too complex and unreliable (DeGrasse 1984, p. 85). Boeing Vertol's trolley cars, introduced on Boston's Green Line in the 1970s, broke down regularly, and have largely been replaced by cars built by Japan's Kinki Sharyo. Rohr Industries' subway cars, introduced in San Francisco's Bay Area Rapid Transit (BART) system and in the nation's capital, were enormously costly and for years suffered from chronic malfunctions. Grumman buses in New York City were so unreliable that the city ended up suing the company.

The once-vigorous American machine-tool industry may be the best example of the phenomenon Melman described.[4] From 1939 to 1947, machine-tool prices increased by only 39 percent at a time when the average hourly earnings of American industrial workers rose by 95 percent. Since machine tools increase an economy's productivity, making it possible to produce a greater quantity of output with a smaller input, the industry's conscientious cost-cutting had a disproportionately positive effect on the American industrial system as a whole.

Once highly competitive and committed to cost-cutting and innovation, the machine-tool industry suffered a sustained decline in the decades following World War II. Between 1971 and 1978, machine-tool prices rose 85 percent while U.S. industrial workers' average hourly earnings increased only 72 percent. The corresponding figures in Japan were 51 percent and 177 percent, respectively.

These problems can be accounted for at least in part by the American machine-tool industry's relationship with the defense department. "Since the Department of Defense has become the single largest customer for the machine-tool industry," Melman argued, "the industry is thereby made less sensitive to pressures from other customers for reducing the prices of its products" (1965, p. 53). That decreased pressure undoubtedly contributed to the negligible investment by the

[4]On the machine-tool industry, see Melman (1986).

machine-tool industry in modern production techniques of a kind used routinely in Europe. No longer under traditional market pressure to innovate and lower costs, the machine-tool industry saw a considerable drop in productivity.

What had typically happened prior to the 1960s was that the prices of machinery rose more slowly than did the wages of American industrial workers. (Machine-tool prices rose less rapidly than wages because productivity improvements occurred regularly within the machine-tool industry itself.) As a result, firms had an incentive to purchase more and better machinery to incorporate into their production processes (Melman 1986, pp. 81–82). The results for the American economy were all good: worker productivity increased, more wealth was produced, wages rose, and any labor displaced by machines could now produce other goods for which the necessary labor had not previously been available. When machine-tool prices began to outpace wages it suddenly made less economic sense for U.S. firms to invest in those tools. They would now be content to shift into additional labor at the current rate of productivity rather than invest in equipment that could have increased that rate.

In the short run, therefore, the American machine-tool industry's woes affected U.S. productivity at large. Firms were now much more likely simply to maintain their existing stock of machines rather than to purchase additional equipment or even to upgrade what they already possessed. Largely responsible for this unhappy situation was what Melman called "the collapse of cost-minimizing in the machine tool industry. And the falling rate of U.S. manufacturing productivity growth after 1965 was, in turn, strongly affected by the aging stock of production equipment" (1983, p. 6). That stock of production equipment was indeed aging, for by 1968 nearly two-thirds of all metalworking machinery in American factories was at least ten years old.

Why Americans couldn't immediately have switched to lower-cost imported machine tools involves the reluctance of machinery buyers to change their suppliers, and particularly to suppliers who are not close by. Not only do they prefer to deal with established firms with good reputations, but they also want to avoid unnecessary and costly downtime by patronizing suppliers who can perform repairs and supply spare parts on short notice. In the long run, American firms did indeed begin to shift into imported machine tools, and by 1967 the U.S. for the first time imported more machine tools than it exported.

The military-induced distortion of the American machine-tool industry and its correspondingly decreased global competitiveness is not confined to the perverse incentives created by the Pentagon's cost-maximization approach to procurement. Another factor is at work as

well: the more an industry caters to the Pentagon, the less it makes production decisions with the civilian economy in mind. Thus in the late 1950s the Air Force teamed up with the machine-tool industry to produce numerical-control machine-tool technology. The resulting technology was so costly that private metalworking firms could not even consider using it. The machine-tool firms involved in this research thereby placed themselves in a situation in which their only real customer was the aerospace industry. Some 20 years later, only two percent of all American machine tools belonged to the numerical-control line. It was Western European and Japanese firms that finally managed to produce numerical-control machine tools at affordable prices for smaller businesses.

In short, the distortion of business decisions and strategy that contributed to the decreasing competitiveness of the machine-tool industry is at work in thousands of American firms in rough proportion to their reliance on Defense Department contracts.

It may be objected that this "cost maximization" model is not inherent to the weapons procurement process, and that with the firm application of political pressure these abuses might at least be minimized. But political pressure *has* been brought to bear on the matter, and special blue-ribbon commissions were appointed in 1955, 1970, and 1986 to look into the procurement process and recommend reforms. In October 2000, Bill Clinton signed legislation "to set up a 12-member commission with the aim of recommending improvements to the sometimes troubled relationship between the federal government and the nation's aerospace and defense companies." So unsuccessful was each of these major commissions in bringing about reform that each time a new one was established the previous ones may as well never have occurred—the same abuses and the same proposed solutions were raised again and again (Higgs 2001, p. 292).[5]

Still another overlooked cost of the defense establishment is its distortion of the university system, where competition for military research grants has influenced the kind of scientific research done, the way certain disciplines are taught, and even, in some cases, the kind of students for whom slots in graduate departments are available. In the United States, the process transformed major portions of its top universities, practically rendering them adjuncts of the defense department (Melman 1970, pp. 97–106; Dumas 1984, pp. 129–32).

University administrations and academic departments typically welcomed the transformation, all too happy to enjoy the financial

[5] On the blue-ribbon commissions, see Kovacic (1990).

resources and institutional prestige that came with close cooperation with the federal government. By the end of 1956, the physics department at the Massachusetts Institute of Technology was declaring that "a healthy and vigorous research program . . . is the key item. . . . On this research program depends the quality of *everything else* that the physics staff undertakes." Research was thus given pride of place in the physics department, certainly much higher than the education of future physicists. This privileged place for research, over and against all other functions, came to characterize the rest of the institution as well (Geiger 1993, p. 63; emphasis added). That research, in turn, was typically military research. Carl Barus, a graduate student at MIT who worked in its Radiation Laboratory, later recalled:

> Professors teach what they know. They write textbooks about what they teach. What they know that's new comes mainly from their own research. It is hardly surprising, then, that military research in the university leads to military-centered undergraduate curricula. (Leslie 1992, p. 30)

A historian of MIT records that the new electrical engineering curriculum unveiled in the 1950s under chairman Gordon Brown reflected "a series of choices about what electrical engineering should be on a conceptual and thematic level, choices significantly influenced by the kinds of military-oriented problems their authors were considering at the time" (ibid., pp. 30–31).

MIT's Instrumentation Laboratory was dedicated in large part to military research, particularly the development of sophisticated weapons delivery systems. And just as most of the money for the Instrumentation Laboratory came from the military, so too did most of the students—the number of military officers, who at times outnumbered civilian students by as much as eight to one, was known to have limited the number of spots available to nonmilitary students. By 1965 the Laboratory had given birth to 27 spin-off companies, each of which did the bulk of its work for the Department of Defense. Toward the end of the decade a committee found that since the university had become so institutionally indebted to the military, there were "areas of graduate research which do not get support—they lack 'sex appeal'" (ibid., pp. 94, 99, 100).

Postwar aeronautics was particularly influenced by military funding, owing its "distinctive intellectual character and direction to the specific objectives of its military patrons," in the words of historian Stuart Leslie (ibid., p. 103). Stanford University's faltering program in aeronautical engineering received a massive shot in the arm from Lockheed, the prominent weapons firm, which needed research facilities and technical know-how in order to break into missile production in the 1950s. The

relationship remained close, with Lockheed employees teaching courses at Stanford and many of the university's graduates going on to work for Lockheed.

Some voices of warning about these military-university partnerships could be heard—though for the first two decades following the end of World War II they were relatively few and far between. Leslie writes of

> a growing awareness, even among those who had benefited most, that the price of that success might be higher than anyone had imagined—a pattern for engineering education set, organizationally and conceptually, by the requirements of the national security state. (Ibid., p. 43)

As early as the late 1950s the objection was being raised at MIT that the defense industry had skewed that institution's research priorities much too heavily in the direction of weapons development and technology and away from important civilian concerns. A professor from MIT's Fluid Mechanics Laboratory later recalled, "Almost all of our graduate students who didn't go into university teaching wound up in the missile and aircraft industries. We were churning out defense-oriented graduate students" (ibid., p. 239). Louis Smullin, who had worked on defense projects in MIT's labs, suggested in 1959 a shift toward some of the "major non-military engineering problems of the modern world." But his Lincoln Laboratory for civilian technology never attracted serious support, and twenty years later he was still objecting that "we are about at the limit of where it is practicable to make anything fancier in the way of weapons. . . . We don't really know what to do with our fancy, sophisticated engineers and scientists, in terms of the ordinary daily needs of people" (ibid., pp. 42–43)

In the postwar years Stanford followed a model for success similar to that of MIT. Professor Frederick Terman, who later became dean of engineering and provost, dreamed of rivaling MIT in electrical engineering as well as in other engineering and scientific fields. That dream came true, as the world of American higher education watched Stanford's meteoric rise from relative obscurity to one of the leading scientific institutions in the United States. But as it had with MIT, the success of Stanford came "at the cost of realigning its research and teaching programs toward the military priorities that had made such rapid growth possible in the first place" (ibid., p. 45). In 1946 Stanford's government contracts of all types totaled $127,599. Within ten years its Defense Department contracts alone had reached $4.5 million, and hit $13 million the decade after that (ibid.). At Stanford Terman's own specialty, electronics, bore the unmistakable imprint of military influence in the kinds of hardware prototypes produced, the laboratories and classrooms where future electronics engineers were educated, and the

theoretical research at the foundation of these defense projects (ibid., p. 46). "To a disturbing degree," argue two scholars of the subject, "today's [electronics] industry owes its present configurations to patterns of federal spending, corporate strategy and science-based innovation shaped by military assumptions and priorities" (Leslie and Kargon 1994, p. 218).

Warnings about military influence on academic departments proved prescient at Stanford as well. In 1957 Professor Karl Spangenberg wrote privately,

> We obviously need to operate carefully lest the research tail wag the academic dog in the electronics activity. . . . In particular, I feel we should avoid operating in such a way that we effectively have a group of Research Institutes which overshadow the EE [electrical engineering] department. (Leslie 1993, pp. 73–74)

(By the late 1960s it could safely be said that the research institutes and the EE department had become one and the same thing (ibid.). A Stanford laser scientist noted that "when the military supports everything, they're the people who come around with the problems, and so you think about those problems" (ibid., p. 181). Arthur von Hippel, a materials scientist at MIT, surveyed the university climate in 1958:

> What has happened to the old ivory tower! Telephones ring incessantly; visitors swarm in droves through the laboratories; meetings crowd meetings; an ocean of papers blots out the horizon; and the wise men, once quietly guided by the star of Bethlehem, now frantically count time by the star of Moscow. Yet this turmoil is of our own doing. Universities showed that research pays, and huge laboratories sprang up for profit; universities devised new weapons, and the countries bristle with laboratories for defense. What an outcome of a search for understanding of nature and for peace in our times. (Ibid., p. 211)

By the end of the 1960s campus radicals were calling for an end to military research at MIT—a radical demand indeed in light of the $119 million in military research contracts MIT had acquired for fiscal 1968. "By working almost solely for the military," they declared,

> M.I.T. has trained its students in military technology and thereby induced them to continue in [Department of Defense] work after graduation. In addition, by accepting military contracts, M.I.T. inculcates in its students a positive attitude concerning war research. (Ibid., p. 235)

In a common pattern, the majority of students remained aloof from the protests, perhaps none more so than one graduate student who told a reporter, "What I'm designing may one day be used to kill millions of people. I don't care. That's not my responsibility. I'm given an interest-

ing technological problem and I get enjoyment out of solving it" (ibid., p. 238). Even still, the protests led MIT to transform its Lincoln Laboratory and its Instrumentation Laboratory (renamed the Charles Stark Draper Laboratory) into quasi-independent institutions and to direct military research there.

The effects of massive military influence on the structure and organizing principles of so much of university life bring us once again to a consideration of opportunity costs. "The full costs of mortgaging the nation's high technology policy to the Pentagon can only be measured by the lost opportunities to have done things differently," writes Stuart Leslie. "No one now can go back to the beginning of the Cold War and follow those paths not taken. No one can assert with any confidence exactly where a science and technology driven by other assumptions and priorities would have taken us" (ibid., p. 256).

Again, whatever the size of the defense establishment *vis-à-vis* the economy as a whole, it can have a disproportionate effect on the country's economic well-being. In 1965, Melman pointed out that two-thirds of all technical researchers in the U.S. worked for the military; that fraction has fluctuated between one and two thirds since World War II (1965, p. 4). The result is "a short supply of comparable talent to serve civilian industry and civilian activities of every sort" (ibid., p. 7).

> [W]hen research and development is not properly done on behalf of civilian industry, results like poor product design or poor production methods can have disastrous effects on the economic position of the industry. When as little as one and a half percent of U.S. national product is diverted to military research it seems little enough, but that accounts for more than half of the national research and development effort and has left many U.S. civilian-products industries at a competitive disadvantage due to faltering product designs and insufficient improvement in industrial-production efficiency. (Melman 1986, p 64).

These opportunity costs are borne throughout the economy: "The people researching military-rocket motors are unavailable for developing efficient motors for civilian vehicles. The designers of naval vessels are unavailable for making an economically proficient merchant marine" (ibid., p. 80).[6] The same problems have beset the American fishing industry. There is, according to Melman,

> no American center, or institute, or set of firms now practicing design for, or construction of, modern fishing vessels. The technological talent that might be applied to this function has been substantially preempted by naval design and naval ship construction." (1965, p. 65)

[6]On the shipbuilding industry, see also Melman (1965, pp. 10, 61-64.)

Government jobs, whose funding source—taxation—is unavailable to private firms, carried substantially higher salaries than those in the private sector. ("The Pentagon," Melman once said, "is able to do what no other management in the country can do: It draws on the wealth of the whole society to do what it wants" [1989]). By the 1960s major companies complained of being unable to meet their hiring targets for new researchers. *The Wall Street Journal* warned in 1963:

> Top research men in industry reason this way: Frantic bidding, by space and military contractors, for scientists and engineers is creating a big shortage for industry. This scarcity, along with the skyrocketing salaries it is provoking, is bringing almost to a halt the hitherto rapid growth of company-supported research. This development hampers efforts to develop new products and processes for the civilian economy. (Melman 1965, p. 72)

"Government research programs serve as a brake on research in the private sector," said Du Pont Company vice president Samuel Lenher (ibid., p. 73).[7]

This was not just a case of special pleading on the part of private firms. A study in the *American Economic Review* argued that the growth of military and space R and D "has significantly retarded the growth of civilian R and D." The consensus among R and D directors, according to the study, was that

> the growth of defense R and D, by bidding up salaries and by taking the cream of the new science and engineering graduates, has tended

[7]Another factor is that military research can be more intellectually stimulating than civilian work. Writes Lester Thurow:

> Would the typical engineer rather work on designing a new missile with a laser guidance system or on designing a new toaster? To ask the question is to answer it. Military research and development are more interesting since they are usually closer to the frontiers of scientific knowledge and are not limited by economic considerations such as whether a product can be sold in the market. The military is willing to pay almost any premium to have a superior product. The civilian economy is not. As a result the most skilled technicians and scientists move into defense. But suppose you own a civilian computer firm in Boston and many of your best people leave to work in Boston's higher paying and more exciting aerospace firms. How do you compete with Japanese computer firms that will not be losing their most brilliant employees? The Japanese engineer might also like to work on missiles but he does not have the opportunity to do so." (Quoted in Tirman 1984, p. 20)

> to reduce significantly the quantity and quality of R and D undertaken in civilian-created laboratories. (Nelson 1963, p. 445)

All this amounts to a series of drains on and distortions of the economy that are all the worse for being overlooked and unappreciated:

> Our economists have tended to view the decline of a firm or an industry as part of an ordinary and recurring process of the decay and growth of the enterprise. The assumption has been that if a given management is not competent to meet the market demand for a product, another management will in due course recognize opportunity, move into the field, and serve the market anew. This natural process of economic correction has been substantially checkmated by the development of government-controlled industries and markets dominated by the military sphere of society. By offering superior salaries that could be absorbed by selling to Federal defense agencies, the military contractors, and their nonprofit adjuncts, have absorbed a massive proportion of the available technological talent. At the same time, capital has been attracted to the new rapid growth of defense and space industries. The result is that the normal process of correction of economic depletion has been rendered inoperative. (Melman 1965, pp. 68-69)

Such arguments occasionally managed to reach the general public. At a Senate committee meeting in 1962, Senator Hubert Humphrey wondered aloud,

> What is happening to our civilian economy as we plow more and more of our scientific personnel, our brains, into the military and into space and into atomic energy for military purposes? Where are we going to end up in this trade competition with these Belgians and these Dutch, who are clever, and the Germans who are very clever, who are spending more money for civilian aspects and will develop products cheaper, better, and more serviceable? (Ibid., p. 72)

The following year President John Kennedy acknowledged that the U.S. had "paid a price by sharply limiting the scarce scientific and engineering resources available to the civilian sectors of the American economy" (ibid., p. 103). More recently, Senator George McGovern noted in a speech on the Senate floor in August 1983 that

> we have distorted our economy in allocating such a high percentage of our highly trained manpower, research, and technology to weapons production at the expense of our other industry. Japan and our West European allies have all modernized their civilian industrial plants at much higher rates than the United States, largely because of our concentration on arms production. (Ibid., p. 299)

As a result, American industry was growing more costly and less efficient and competitive.

> American machine tool production was once the envy of the world, but today we have slipped to fourth or fifth rank among the nations. Our best scientific and technical competence is going into arms, not to the modernization of our civilian plant. . . . The concentration of capital and technical skill in arms production is a basic cause of our declining competitive ability. (Ibid., p. 300)

But these are clearly the exceptions, for hardly ever do these considerations receive serious consideration, or even a mention, in American politics today.

Now it may be objected, as a mitigating factor, that defense research at times has civilian uses, and that the research being done in the defense industry is therefore not altogether mislaid from the point of view of consumer welfare. In fact, though, the number and utility of such crossover applications, and whether they would not have occurred anyway in the absence of military research, is a matter of serious dispute.[8] In the middle of the Cold War, the Engineers' Joint Council concluded that such spillovers occurred only infrequently, and that "the military program must be recognized as utilizing a large fraction of the most talented individuals in research and development in the country and of denying to the civilian economy the services of these individuals" (1965, p. 93). Stephen Broadberry and Mark Harrison are skeptical of grandiose claims on behalf of military technology with civilian applications, speaking of "how difficult it is to show that any of these wider changes were actually the result of the war and would not have occurred anyway in its absence" (2005, p. 29). Herbert Holloman and Alan Harger, in a 1971 study, cited spinoff estimates ranging from five percent to as much as 33 percent (1971, p. 38). Melman himself was inclined toward the lower end of that range, having been given the estimate of 5 percent spillover from specialists in the Commerce Department (1986, p. 134).

Even on those occasions when a legitimate advance in civilian well-being can be shown to have derived from military research, such research is not thereby vindicated. Here, too, opportunity cost ought to be a central consideration. There is no non-arbitrary way to determine that funds diverted from civilian use to military research, whatever its value in civilian spinoff, yield greater social utility than the purposes to which people would have directed those funds themselves. When two

[8]John Tirman writes, "One cannot say with complete confidence that the military's impact on, say, the history of aviation has been positive, because we don't know what would have happened to aviation if the military had not played such a significant part" (Tirman 1986, p. xiii).

parties engage in a voluntary exchange, we know they are both better off in an *ex ante* sense, for they would not otherwise have taken part in the exchange. One party prefers what the other party has to what he himself has, and *vice versa*, and thus the exchange improves each party's well-being. But if a thief, after robbing his victim, gave that victim in a moment of remorse an item he (the thief) considered valuable, we cannot say the same thing. The thief is undoubtedly better off, but since the exchange in question did not take place voluntarily we must presume that the victim's well-being has been harmed rather than improved (otherwise, he would have entered into the exchange of his own free will). Much less can we say that something called "social utility" has been increased by this incident, since no matter how much happier we may think the thief is, and/or how satisfied the victim should be with the item the thief chose to give him, utility is necessarily subjective and incommensurable. In the absence of voluntary action on his part we have no way of determining what exchanges would yield an individual additional utility.[9]

Therefore, given that the necessary funds were seized from them by force, it is impossible to say with certainty, as those who trumpet military crossovers typically do, that people were truly better off by being deprived of their resources in order to contribute involuntarily to new technology. Consider the social resources that would have been necessary to bring about the production of the automobile in, say, 1800. The unspeakable sacrifice that would have been involved in order to mobilize that level of technological research at a time when the vast majority of the component parts, much less the technology and overall design, of the automobile had neither been discovered nor conceived of, would surely not have been compensated for by the premature introduction of that important invention. It would have come at a staggering cost that no people would voluntarily have borne. The same kinds of costs, albeit to a greater or lesser degree, are necessarily at work in any involuntarily supported technological research.

Along these lines, John Clark suggests that

> the artificial allocation of funds to this type of research could actually hamper economic progress. It concentrates on programs of special military concern, but the allotment of resources to particular segments of

[9]The essential text here is Murray N. Rothbard, "Toward a Reconstruction of Utility and Welfare Economics" (1956). For an excellent case against state-funded science, one of the great sacred cows of public expenditure, see Terence Kealey (1997); see also Tibor R. Machan, ed. (2002), and Joseph P. Martino (1992).

> the industrial system so as to support these specialized projects may unduly deprive other vital sectors (housing, local transportation, and so forth) of the capital assets essential for balanced economic growth. (1970, p. 23)

It is "not balanced growth nor advancement in speculative knowledge that the God of War seeds; it is merely the accelerated application of the already known for immediate purposes." (Ibid., p. 25)

Thus any military innovation with civilian applications may serve to mitigate the harm done to consumer welfare by the existence of a vast defense apparatus, but claims that such applications prove the merit of such an apparatus, or show that the apparatus is actually necessary to consumer welfare, are unfounded.[10] Melman, who was neither a libertarian nor an Austrian economist, did not advance this theoretical argument against spinoff claims, but it complements the concerns he expresses elsewhere about opportunity costs.

Now consider some of Melman's key arguments in summary. The military state, far from yielding economic benefits, carries the substantial opportunity cost of all the consumer and capital goods that never came into existence because the necessary resources were diverted to military production. Foregone production of capital goods, in turn, translates into less production in the future *in perpetuity*. The military state, since it possesses the privilege of taxation, can summon a fantastic level of resources—which, in turn, make it possible for government to attract a significant percentage, often even a majority, of the nation's scientific talent to military-related work. Fewer scientists are available for commercial research, and thus fewer advances are made in areas that might improve civilian well-being, and domestic productivity is reduced by the crowding out of private-sector research and development. In addition, private firms and industries catering to the Pentagon tend to adopt business practices that are unsuited to private-sector competitiveness.

None of these propositions is essentially leftist, and every one of them is compatible with libertarianism. For the most part, Melman's leftism came through instead in his policy recommendations. Instead of spending so much money on weapons systems, Melman would argue, "we" should spend it on a variety of government programs catering to the ordinary needs of civilian life. "We," of course, always meant the government, and "it" referred to the resources government expropriated from peaceful citizens. Naturally the concept of opportunity cost

[10]A recent book claiming that military research has a positive effect on economic growth, and that the diminution of such research would harm growth, is Vernon W. Ruttan (2006).

applies here as well, for money that is forcibly applied to the government's purposes is unavailable for any other. But Melman was not interested in taking opportunity-cost analysis quite so far.

Melman's normative conclusions, therefore, were altogether conventional and uninteresting, and far removed from libertarianism. But his positive analysis was anti-statist to the core, and provides us with an array of important and typically neglected costs of large military establishments.[11] His work is still appreciated and remembered by some on the left, but he is unfortunately all but unknown to libertarians. Much more needs to be written on the political economy of the warfare state from a libertarian point of view, and Seymour Melman's body of work can and should provide a useful entry point for a fruitful research program.

References

Austin, Jay E. and Carl E. Bruch. 2000. *The Environmental Consequences of War: Legal, Economic, and Scientific Perspectives*. Cambridge: Cambridge University Press.

Baran, Paul, and Paul Sweezy. 1966. *Monopoly Capital*. New York: Monthly Review Press.

Biswas, Asit K. 2000. "Scientific Assessment of the Long-Term Environmental Consequences of War." In *The Environmental Consequences of War: Legal, Economic, and Scientific Perspectives*. Eds. Jay E. Austin and Carl E. Bruch. Cambridge: Cambridge University Press.

Broadberry, Stephen, and Mark Harrison. 2005. "The Economics of World War I: An Overview." In *The Economics of World War I*. Eds. Stephen Broadberry and Mark Harrison. Cambridge: Cambridge University Press.

Holloman, J. Herbert, and Alan Harger. 1971. "America's Technological Dilemma." *Technology Review* (July-August).

Burns, Arthur. 1984. "The Defense-Economy Debate." In John Tirman, ed. *The Militarization of High Technology*. Cambridge, Mass.: Ballinger.

Clark, John J. 1970. "The New Economics of National Defense." In *The Economic Impact of the Cold War: Sources and Readings*. Ed. James L. Clayton. New York: Harcourt, Brace & World.

DeGrasse, Robert. 1986. "The Military and Semiconductors." In Tirman, ed., *The Militarization of High Technology*. Pensacola, Fla.: Ballinger Publishing.

DiFilippo, Anthony. 1986. *Military Spending and Industrial Decline: A Study of the American Machine Tool Industry*. New York: Greenwood Press.

[11]Melman's student Lloyd Dumas elaborated (from a more theoretical standpoint) on the problems Melman raises; see Dumas (1986).

Dumas, Lloyd J. 1986a. *The Overburdened Economy*. Berkeley, Calif.: University of California Press.

——.1986b. "University Research, Industrial Innovation, and the Pentagon." In Tirman, ed., *The Militarization of High Technology*. Pensacola, Fla.: Ballinger Publishing.

Dunnigan, James F. 2003. *How to Make War*. 4th ed. New York: HarperCollins.

Geiger, Roger L. 1993. *Research and Relevant Knowledge: American Research Universities Since World War II*. New York: Oxford University Press.

Higgs, Robert. 2001. "The Cold War Is Over, But U.S. Preparation for It Continues." *Independent Review* 6 (Fall): 292.

——. 2004. "The Defense Budget Is Bigger Than You Think." *San Francisco Chronicle*, January 18.

Holloman, J. Herbert and Alan Harger. 1971. "America's Technological Dilemma." *Technology Review* (July-August).

Kealey, Terence. 1997. *The Economic Laws of Scientific Research*. New York: Palgrave Macmillan.

Kovacic, William E. 1990. "Blue Ribbon Defense Commissions: The Acquisition of Major Weapon System." In *Arms, Politics, and the Economy: Historical and Contemporary Perspectives*. Ed. Robert Higgs. New York: Holmes & Meier.

Leslie, Stuart W. 1993. *The Cold War and American Science: The Military-Industrial-Academic Complex at MIT and Stanford*. New York: Columbia University Press.

Leslie, Stuart W,. and Robert H. Kargon, "Electronics and the Geography of Innovation in Post-war America." *History and Technology* 11, no. 2 (1994): 218.

Machan, Tibor R., ed. 2002. *Liberty and Research and Development: Science Funding in a Free Society*. Stanford, Calif.: Hoover Institution Press

Martino, Joseph P. 1992. *Science Funding: Politics and Porkbarrel*. New Brunswick, N.J.: Transaction.

Melman, Seymour. 1965. *Our Depleted Society*. New York: Dell.

——. 1971. "From Private to Pentagon Capitalism." In *The War Economy of the United States: Readings in Military Industry and Economy*. Ed. Seymour Melman. New York: St. Martin's Press.

——. 1986. "Consequences of a Permanent War Economy, and Strategies for Conversion to a Demilitarized Society." Lecture delivered at Oregon State University, October 13.

——. 1983. *Profits Without Production*. New York: Alfred A. Knopf.

——. 1989. "Where Will Engineers Work as the Cold War Winds Down?" Lecture delivered at Rensselaer Polytechnic Institute, April 27.

——. 1988. "Economic Consequences of the Arms Race: The Second-Rate Economy." *American Economic Review* 78 (May): 55–59.

——. 1970. Pentagon Capitalism: The Political Economy of War. New York: McGraw-Hill.

Nelson, Richard N. 1963. "The Impact of Arms Reduction on Research and Development." *American Economic Review* 53 (May): 445.

Rothbard, Murray N. 1956. "Toward a Reconstruction of Utility and Welfare Economics." In *On Freedom and Free Enterprise: Essays in Honor of Ludwig von Mises*. Ed. Mary Sennholz. Princeton, N.J.: D. Van Nostrand.

—. 1983. *America's Great Depression*. 4th ed. New York: Richardson & Snyder.

Russett, Bruce M. 1970. What Price Vigilance? The Burdens of National Defense. New Haven, Conn.: Yale University Press.

Ruttan, Vernon W. 2006. *Is War Necessary for Economic Growth? Military Procurement and Technology Development*. New York: Oxford University Press.

Sidel, Victor W. 2000. "The Impact of Military Preparedness and Militarism on War and the Environment." In Austin and Bruch, eds. *The Environmental Consequences of War: Legal, Economic, and Scientific Perspectives*. Cambridge: Cambridge University Press.

Tirman, John. 1986. "Conclusions and Countercurrents." In Tirman, ed. *The Militarization of High Technology*. Pensacola, Fla.: Ballinger Publishing.

Thurow, Lester. Quoted in Tirman, "The Defense-Economy Debate."

Weidenbaum, Murray L. 1974. *The Economics of Peacetime Defense*. New York: Praeger.