

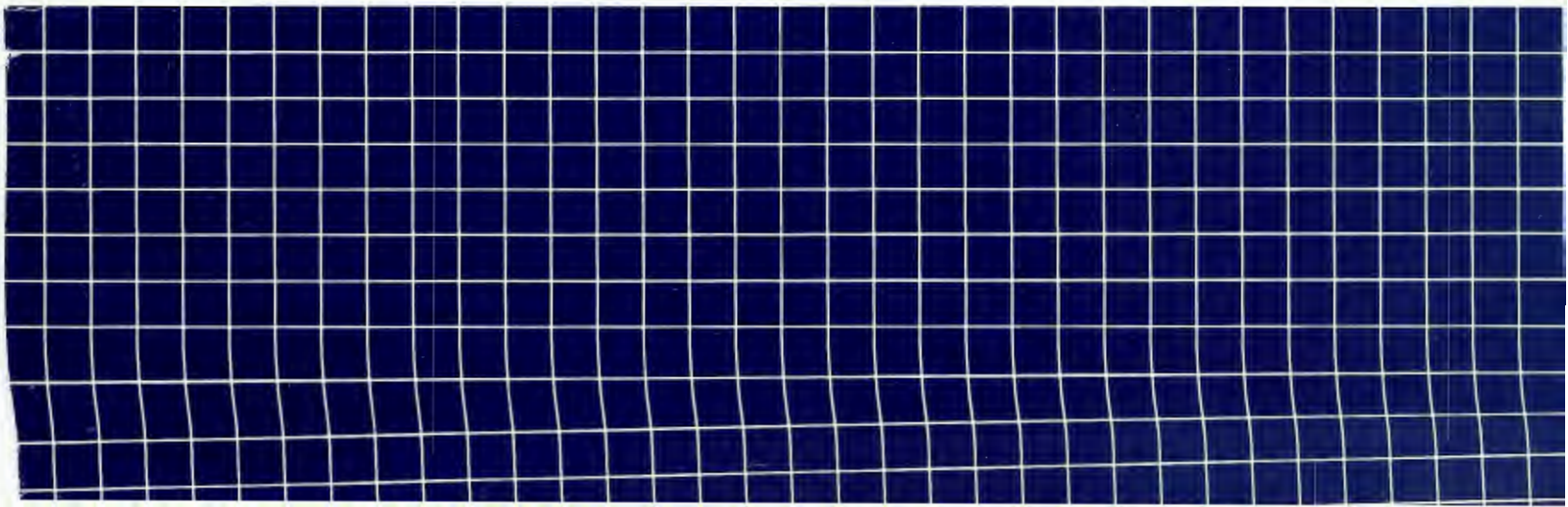
Deterrence in Decay: The Future of the U.S. Defense Industrial Base



**The Final Report of the CSIS
Defense Industrial Base Project**



**The Center for Strategic & International Studies
Washington, D.C.**



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Executive Summary

The U.S. defense industrial base faces significant challenges, and little is being done to address them. If present trends persist, the once-mighty arsenal of democracy could become little more than an electronic laboratory, perhaps even incapable of manufacturing the matériel required for deterrence or for protecting U.S. national interests around the globe. Inefficiency, a decline in capability, steady erosion of global competitiveness, and increasing vulnerability to a disruption of supplies present serious challenges to the national security of the United States.

The U.S. defense acquisition system is grossly inefficient. The single greatest cause of this inefficiency is unrealistic defense programming and budgeting. Cautious observers estimate that about 25 percent of the cost of research, development, and procurement of military products is wasted as a result of unnecessary oversight, auditing, and regulations; program instability and poor estimates; excessive performance requirements; and overspecification of product and process in defense acquisition. This is an inefficiency premium—the price paid by the United States in its regulation of the defense business. Increasingly, the taxpayers are becoming impatient with such inefficiency in defense.

U.S. firms are becoming increasingly unwilling to do business with the Department of Defense (DOD). In the 1980s, there was a fundamental restructuring of producers out of the defense business. In 1982, there were more than 138,000 firms that provided manufactured goods to DOD. In 1987, there were fewer than 40,000. Some of the 80,000 went out of business, including about 20,000 small businesses. Most of the 80,000 firms, however, simply quit doing business with DOD and opted for other customers. This is remarkable because at the same time that 80,000 firms stopped doing business with DOD, the defense procurement budget grew from \$54.9 billion to \$87.0 billion in constant fiscal year (FY) 1989 dollars. Defense business is not being pursued by profit-seekers. In fact, some firms that are dependent on defense business for survival are engaged in behavior, such as predatory pricing, that would be illegal or

suicidal in other sectors. In the sometimes perverse world of defense contracting, such behavior is often the only way to survive.

In comparison with other industrial sectors, defense is not a highly profitable business. Return on sales (ROS) in defense overall has been about the same as in commercial manufacturing, falling from 4.9 percent in 1980 to 3.8 percent in 1986. Many defense sectors posted precipitous declines during that time. Return on fixed assets (ROA) was higher in defense manufacturing (44.7 percent) than in commercial manufacturing (11.3 percent) in 1986, but those apparently favorable ratings mask some troubling trends.

Defense is one sector in which the firm does not own all its production facilities. Many are owned by the government. Much of the capital equipment that defense companies do own is quite old and has been depreciated well beyond zero present value. Thus, the book value of the assets held by defense firms is artificially low. ROA is thus not a good measure of profitability in the defense business. Even if used as an indicator, ROA in defense sectors declined by more than 4 percentage points from 1980 to 1986, including huge drops in small arms, aircraft, and shipbuilding.

The drop in profitability in the defense industrial base is reflected in the investment climate surrounding the military manufacturing sector. In U.S. manufacturing as a whole, the ratio of capital spending to value of goods shipped was 3.8 percent in 1980 and 4.3 percent in 1985. The performance of the defense industrial base was worse, actually falling from 3.9 percent in 1980 to 3.6 percent in 1985 while capacity and productivity in defense sectors were no better than in manufacturing overall.

One of the most important national security aspects of industrial performance is import penetration into the domestic defense industry. Total import penetration grew between 1980 and 1986 in 104 of 122 defense sectors for which data are available. Certain critical components are available only from foreign suppliers whose reliability in time of emergency is questionable.

The statistics on import penetration and foreign source dependence in the defense industry are good news only if the United States is acquiring the best foreign technology or benefiting from the low costs of reliable allies. There is little evidence that this is the case, however. Foreign penetration of

the U.S. defense industrial base may drain the U.S. technological lead. Both U.S. economic competitors and military adversaries have targeted the U.S. lead in these areas.

Present U.S. policies toward the defense industrial base do not address these problems because they are largely ineffective. The effective policies that do exist are haphazardly applied and underfunded. Some policies are in jeopardy of falling prey to other defense priorities as defense outlays decline.

There are some proposals for remedying the problems of the defense industrial base. Many call for rebuilding the productive capability of World War II, but this would cost trillions. Other plans would simply let the market play itself out, but that might result in the loss of even more of the defense industrial base as the economy shifts more toward services. As former Under Secretary of Defense for Acquisition Robert Costello said, "You can't fight a war with pizza parlors." Increasingly, lawmakers are calling for mandatory "buy American" provisions in the interest of national security. Certainly the United States cannot require U.S. defense firms to compete on unequal terms with foreign enterprises that are unfairly subsidized by their governments, and protectionism can sometimes be an effective, temporary tool to ensure fairness and reciprocity. Protectionism alone, however, cannot enhance national security.

If the United States is to arrest the erosion of its defense industrial base as a matter of national security priority, then fundamental policy changes are needed. Given the budget environment of the 1990s, those policies must incur little or no cost. The challenge before the Bush administration and the 101st Congress is to adopt policies that are based on thinking and working "smarter not richer." This must be reflected in three basic areas: more productive oversight of defense industries in peacetime to reduce costs; more rational planning, programming, and budgeting in the context of U.S. national security strategy; and selective incentives for firms in industries that are particularly disadvantaged in globally competitive defense markets or for industries in which it is especially vital to have a domestic production base.

In many respects, the problems of the U.S. defense industrial base are leadership issues. The national security decision-making process must recognize this issue of leadership and reorganize the policy structure to reflect this understanding.

The Congress must streamline its procedures regarding defense industrial base oversight and budgeting. Too much law and policy are made based on parochial or bureaucratic interests using anecdotal or incomplete data. Management at all levels lacks the information-processing system needed just to understand the nature and extent of the problems of the U.S. defense industrial base.

If the United States fails to reform its approach to the defense industrial base in these fundamental ways, unconstrained market or political forces will prevail. In place of the arsenal of democracy, the United States may find it has only the best pizza parlors in the world.

I

Issues of the U.S. Defense Industrial Base

The U.S. defense industrial base faces significant challenges, and little action is being taken to address them. If present trends continue, the once-mighty arsenal of democracy could become little more than an electronic laboratory. Perhaps the United States will even be incapable of manufacturing the matériel required to deter and protect its interests around the globe. This trend must be reversed, and only the federal government can accomplish this reversal. This report analyzes the nature and causes of this decline and prescribes an agenda for preserving the U.S. defense industrial base within the constraints of the world economy for the foreseeable future.

This study measures the magnitude of the U.S. defense industrial base problem. It shows that inefficiency, declining capability, a steady erosion of global competitiveness, and increasing vulnerability to supply disruption in this vital part of the U.S. economy are factors that seriously challenge U.S. national security. Several policy recommendations are aimed at remedying the problems that were found.

The erosion of the U.S. defense industrial base is evident from the rush of commercial firms away from the defense business. In the 1980s, there was a fundamental restructuring of producers away from the defense business. Ironically, this occurred during a time of a record defense budget buildup that in other markets would have attracted a legion of entrepreneurial and growth-hungry commercial enterprises. This exodus also occurred at a time when government policy was deliberately attempting to increase competition in defense markets as a

means of keeping costs down. Because manipulation of these market mechanisms failed, a major part of this report is devoted to explaining why the defense industry did not respond to those measures.

Many other defense industry observers have reported on the increased reliance of the U.S. defense industry on foreign suppliers. This study found no evidence that they are wrong. Indeed, it documents an across-the-board penetration by foreign suppliers and contractors of all U.S. manufacturing industrial sectors related to defense. This penetration is caused by an increasingly integrated global economy abetted by foreign competitors whose industrial policies target dual-use sectors, and this situation cannot be reversed by shortsighted U.S. policies that seek to protect rusting domestic manufacturers from unfair foreign competition on national security grounds.

Although the national security aspects of the declining U.S. defense industrial base are indeed a real threat to the preservation of U.S. national well-being, institutions, and way of life, protectionism alone cannot preserve national security. Some form of protection, however, may be the only policy tool available, in the last resort, that gives the United States a response to foreign industrial policy practices. Protectionism works best as part of a comprehensive trade policy, however. In national security policy, protectionism can be especially helpful in a comprehensive strategy for preserving the health of the defense industrial base.

The participants in the Center for Strategic and International Studies (CSIS) defense industrial base project have been concerned about these issues for many years. These concerns are not new nor is this report the only one to address them. Indeed, the DOD itself has long recognized that the defense industrial base faces difficulties, beginning with its 1980 Defense Science Board (DSB) summer study report and continuing to its more recent reports—another DSB study in 1988 and a study from the under secretary of defense for acquisition, *Bolstering Defense Industrial Competitiveness*. Those studies and several others released in 1988 have generally identified the sources of the problem. This report does not aim to replicate those studies; instead, it concentrates on documenting more accurately the magnitude of the erosion in very specific, quantitative analyses and proposing an affordable, politically viable, and comprehensive set of policy options to deal with those problems.

Past studies have identified a number of causes for the decline of the U.S. defense industrial base. Although not all studies agree on the principal causal factors, they do agree that the reasons for the poor health of the defense industrial base are complex. In general, there are a number of sources of defense industrial base erosion, including problems with industry itself, education, labor, and government. Although no single factor is completely responsible for the defense industry's malady, present attempts to deal with the problems of the defense industrial base ignore the singular most important factor—namely, that the global environment and the U.S. national security context within which the defense industrial base must perform have changed dramatically in the past several decades.

In the course of this project, many of these issues were not reexamined because they were adequately addressed in other studies. Instead, this research effort has concentrated on a comprehensive measurement of the extent of the defense industry's erosion, something that has heretofore been addressed in an anecdotal or piecemeal fashion. The result was a new understanding of the problems of the defense industrial base. The view of the defense industrial base captured here and described in section II of this report reveals a very different picture from that presented in most current research.

In fact, the structure of the U.S. defense industrial base is such that even if the United States could solve all the problems previously identified, the problems of the defense industrial base would not be solved.

In general, this study concurs with the findings of the 1988 DSB study and with the DOD report, *Bolstering Defense Industrial Competitiveness*, that many of the problems of the U.S. defense industrial base are subsumed within larger industrial problems the United States faces as it responds to the problems of maintaining competitiveness in an increasingly integrated global economy. If U.S. industry were made more competitive in general, then the defense industrial base would likewise become more competitive, but the defense budget alone cannot be the engine for a national competitiveness policy. Nor should the DOD have a broad mandate to command economic, industrial, and trade policy in the interest of national security. The national security implications of the country's competitiveness problems require that defense considerations

maintain a strong influence in economic, industrial, and trade policy-making. The Defense Department has a strong interest in maintaining the economic health of manufacturing sectors that, without DOD business or special incentives, could not meet the demands of peacetime deterrence or war-fighting production.

Extensive efforts in this study were devoted to analyzing the policy solutions that could be applied to those problems. A set of policy solutions is detailed in section III and consists of a threefold approach including:

- more productive oversight of the U.S. defense industry;
- more rational defense planning, programming, and budgeting; and
- low-cost investment incentives to preserve the defense industrial base.

These measures must be applied discriminately according to the sector, market circumstances, and national security needs. The worst possible solution would be to apply a single approach across all sectors, ignoring the impact of the policy for varying conditions in different sectors.

Unfortunately, most other current proposals, and even some legislation, call for precisely that kind of uniformity of approach. Some studies, for example, have called for the expenditure of hundreds of billions of dollars to restore the manufacturing capacity of critical defense industries for national security reasons despite the lack of a natural market for peacetime defense programs or for civilian applications to support such industries. This approach, if applied to all potential defense requirements, would be too costly and could be strategically destabilizing.

Some would mandate that defense goods be purchased only from domestic firms in the interest of preserving national security. This approach is shortsighted in view of the increasingly integrated global economy within which the United States must live. Surely the United States must respond to unfair trade practices by foreign competitors—especially to the practices of allies who benefit from U.S. contributions to their own security—in defense as in other sectors. There are many appropriate mechanisms—such as the General Agreement on Tariffs and Trade (GATT)—and in U.S. law for applying such responses. “Buy American” provisions may contribute both to trade and national security interests, but the circumstances

under which they do are limited and rare. Some argue for a more hands-off approach, one that would allow the market itself to decide what the industrial base should be. This view presumes that government is an imperfect intervenor in the free market, which only distorts natural market forces, delaying the inevitable or, worse, exacerbating existing problems and creating new ones. This report does not take a view so pessimistic about government's role nor is it optimistic that free markets are the norm among high technology industries around the world.

As the United States moves toward the dawn of the twenty-first century, it needs to develop a new understanding of the nature of the U.S. defense industrial base and of the opportunities that arise. This report presents such an understanding and proposes a set of actions to keep the United States in a position of leadership in the world.

The Defense Industrial Base and Deterrence

According to official U.S. defense policy and integrated national security strategy, national security ultimately rests on U.S. and technological robustness. This has long been a tenet of national security strategy, and, in principle, this report agrees. Such a pronouncement is far too broad in scope to form the basis for defense industrial base policy, however. To link U.S. national security directly to the health of the economy is to imply that any measures taken to strengthen the domestic economy are inherently in the national security interest.

Clearly, such a concept of national security is too broad to be useful. The purpose of strategy is to specify a means of applying limited resources to the achievement of basic goals in the national interest—that is, the preservation of freedom and democratic institutions. A more narrow definition of the defense industrial base will make public policy formulation more realistic.

Mobilization and Deterrence

The U.S. defense industrial base is linked to U.S. national security strategy, but not so broadly as to lead to unfocused policies. The capabilities of the U.S. defense industrial base are

an asset or a liability to U.S. national security strategy only insofar as they contribute to or detract from the doctrine of that strategy. This means that the performance of the defense industrial base should be judged according to its contribution to the strategic doctrine of deterrence, which is the foundation of U.S. national security strategy. This doctrine includes maintaining a large, ready strategic nuclear force to strike at the Soviet Union; forward-deployed, qualitatively superior conventional forces and theater nuclear forces; a deployable strategic reserve to reinforce U.S. forward commitments and those of U.S. allies; and the ability to preserve the qualitative superiority of U.S. weaponry over the long term.

Moreover, the defense industrial base should not be judged in terms of whether it is capable of winning World War II over again or whether it could meet the requirements of every conceivable conflict in which the United States might find itself engaged during the 21st century. Given limited resources, the United States does not maintain forces for every contingency because the nation could not afford the garrison state that would be required. Likewise, the United States cannot maintain a mobilization economy to be ready for all types of wars. The country must make choices about allocating scarce resources to the industrial base component of the deterrent strategy, and those choices must be based on a rational analysis of the risks involved and the proportion of the national wealth the United States is willing to pay to hedge against those risks.

Too many current analyses and policy prescriptions for the defense industrial base assume that the base must be capable of rapidly converting to become the arsenal of democracy. Contrary to such popular conceptions, industrial mobilization is not currently a component of U.S. national security strategy. In President Ronald Reagan's 1988 national security strategy report to Congress, mobilization is described only briefly as a supporting capability for deterrence and the flexible response strategy. In the defense secretary's FY 1989 report to Congress, published at virtually the same time as the *National Security Strategy Report*, industrial mobilization is nowhere mentioned. Close analysis of DOD programs and budgets testifies to a lack of emphasis or concern about the contribution of mobilization readiness to defense and deterrence.

Mobilization readiness is simply not a component of U.S. strategy that is held in the same regard as the doctrines of

forward deployment and flexible response. The United States abandoned principal reliance on mobilization for deterrence during the Truman administration with the promulgation of National Security Council Decision Document No. 68 (NSC 68) in April 1950. For nearly 40 years following that decision, the principal U.S. deterrent has been the operational readiness of a sufficient strategic nuclear force to place the Soviet Union at risk and a sufficient forward-deployed, qualitatively superior, combat-ready conventional force to provide a robust defensive capability to keep the nuclear threshold high. The objective of U.S. strategy is to avoid altogether the necessity of incurring the costs that would be required to maintain a production capacity that could be mobilized to a scale of that achieved during World War II.

It is incorrectly assumed by many that the arsenal of democracy brought to bear in winning World War II was an instance of rapid mobilization of domestic industry for wartime production. According to this perception, the resiliency and robustness of U.S. industry resulted in a rapid conversion of production to build 296,000 aircraft; 1,201 major naval vessels; 64,546 landing craft; 86,333 tanks; and 41.585 billion rounds of small arms ammunition between July 1, 1940 and July 31, 1945. In fact, however, those great feats of industrial prowess were achieved only after a 44-month industrial mobilization program that continued for 25 months during the war before the last defense production facility was constructed.

In other twentieth century wars, both before and after World War II, no such buildup occurred. The United States deployed its Allied Expeditionary Force (AEF) to Europe in World War I equipped with European-made weapons. Production for the Korean War was built out of World War II facilities that had continued to operate or could be rapidly reopened because the previous war had ended only a short time before. Production for the Vietnam War was never mobilized; a steadily growing flow of defense dollars permitted a market response to the increased defense demands of that conflict.

Mobilization is a short-range problem motivated by large-scale combat, either pending or actually under way. If deterrence fails and the United States finds itself facing the Soviet Union in a major confrontation, it has been declared that the United States might not mobilize its national industrial base; rather, the fight with the Soviets could be conducted at the strategic nuclear level, even to the extent—under the doctrine of flexible

response—that the United States reserves the right to use nuclear weapons first. In fact, to construct a vast mobilization capacity for the U.S. defense industrial base would undermine the credibility of the strategic nuclear deterrent. Viewed in this perspective, *rapid* industrial mobilization has never occurred in the United States in the twentieth century, and it is not a component of the United States' deterrent strategy now. It should not be a concern that the United States is not prepared for rapid total industrial mobilization today.

Assessing the Defense Industrial Base

The U.S. defense industrial base is defined as the aggregate ability to provide the manufacturing, production, technology, research, development, and resources necessary to produce the matériel for the common defense of the United States. This definition captures the essence of the defense industrial base as it *is* rather than as one might *wish* it to be. The definition also presumes that there is a market mechanism at work that results from the interaction of government policy, defense budget demand, and corporate decision making. This market mechanism produces the U.S. defense industrial base.

This definition of the defense industrial base presumes that *any* firm that provides—or potentially could provide—goods for the national defense (whether it is commercially owned and operated, whether it is completely or partially government-owned or operated, or whether it is domestic or foreign-based) is part of the U.S. defense industrial base. This definition also limits the analysis here to the production of goods and omits consideration of firms that provide services to the national defense effort, although there is obviously much overlap between the two.

As a matter of policy choice, what is observed in the analysis of the defense industrial base may not be what is desired in regard to government control over critical defense production capacity or the amount of foreign intrusion into critical industrial sectors. The definition itself, however, does not presuppose any particular mix of type or source of ownership. These guidelines permit an objective observation of the structure of the defense industrial base that, in turn, permits the

setting of a rational policy objective to change that structure in the desired direction.

The U.S. defense industrial base must contribute to deterrence strategy in three fundamental ways: peacetime efficiency, technological competitiveness, and crisis flexibility. These theoretical contributions to deterrence became the criteria in this report for assessing the health of the U.S. defense industrial base. These contributions became the basis upon which this study judged the current performance of the defense industrial base and recommended policy solutions for the future.

First, U.S. strategy presumes that peace will be the normal state of U.S. relations and that peace will be sustained by demonstrated readiness and willingness to fight to protect national interests. The primary vehicle that demonstrates this intent is the set of programs administered by the Department of Defense that man, equip, maintain, train, and operate U.S. forces around the globe. The defense industrial base must respond to the demands of these programs with cost-effective, reliable, and capable systems. These demands shift over time both in the magnitude of the demand, as expressed in the changing defense budget top line, and in the emphases of programs as expressed in the allocation of resources to such defense functions as force structure, manpower, readiness, procurement, and research and development (R&D). The defense industrial base must provide the goods required by the defense budget in an efficient manner.

Second, the defense industrial base must provide U.S. forces with technologically superior matériel. Maintaining a technological advantage over potential adversaries, particularly the Soviet Union, has been an explicit part of U.S. national security strategy since the end of World War II. Because it would be prohibitive in cost and alien to the U.S. democratic culture, the United States cannot match the number of Soviet deployed forces in peacetime. Recognizing the danger to U.S. national security from the massive Soviet military machine, the United States has opted to respond to quantity with quality. This requires that the United States maintain a significant margin of superiority over the Soviet Union in its ability to develop high performance, high quality, and cost-effective products and processes so that the United States does not have to match the Soviets soldier-for-soldier or gun-for-gun. Unquestionably, it is in the U.S. defense industrial base that this lead is developed and

maintained, although critical dual-use technologies are increasingly coming from commercial sector spin-offs.

Finally, because deterrence may not always preserve the peace and because there is the risk that low-level threats may bring the United States into conflict, the defense industrial base must retain some flexibility to convert from peacetime R&D and production to the production and development required for anticipated forms of future conflict. If post-World War II history is a guide, then the defense industry must be capable of short-term surge, long-term expansion, and postwar recovery. The surge requirement was demonstrated in the 1973 Arab-Israeli War when U.S. war reserve stocks in tanks and antitank guided missiles, for example, in a very short time were so severely depleted that weapons in the hands of U.S. active forces were taken and given to the Israelis to prevent the utter defeat of a valued U.S. ally. The Vietnam War required U.S. industry to develop gradually a production capacity for many combat items not stocked in sufficient quantity in peacetime, such as small arms and artillery ammunition.

Achieving these three criteria is problematic because efforts designed to achieve one goal may be counterproductive in preserving another. For example, if the United States spends large sums of defense budget dollars to build excess production capacity for anticipated surge requirements, it would be building an inherent economic inefficiency into the peacetime production of the military goods. Unit costs for peacetime requirements would carry an exorbitant premium to amortize the investment in the excess—but idle—capacity set aside for anticipated surge production. Indeed, the failure to recognize such fundamental trade-offs and to devote adequate resources and analysis to these issues have led to disarray in current defense industrial base policy.

Current Legislation, Policies, and Programs

Present U.S. policies that affect the defense industrial base are uncoordinated, incoherent, and ill-conceived. Some aspects of present policy reflect special interest patchwork solutions that attack only select aspects of the problem and generally waste defense dollars or make little real contribution. The effective

policies that do exist are haphazardly applied and underfunded. Some are in jeopardy of falling prey to other defense priorities in the present period of declining defense outlays. Other programs, which have a net negative effect on the health of the defense industrial base, have been legislated and appropriated beyond their apparent utility for national security purposes. They can only be characterized as politically motivated.

Legislation governing the defense industrial base consists essentially of the Defense Production Act of 1950 as amended and relevant provisions of the annual Defense Authorization Act. These laws come under conflicting jurisdictions in the Congress, with the annual defense authorizations coming under both the House and Senate Armed Services Committees and the Defense Production Act under the House and Senate Banking Committees. The fundamental problem of current defense industrial base legislation is that these two laws do not aim to preserve the base in concert with the demands of the twenty-first century. Moreover, the appropriations committees too frequently become the locus for policy matters (e.g., the Berry amendment to the annual defense appropriation acts.)

The Defense Production Act was passed in 1950 "to establish a system of priorities and allocations for materials and facilities, authorize the requisitioning thereof, provide financial assistance for expansion of productive capacity and supply, provide for price and wage stabilization, provide for the settlement of labor disputes, strengthen controls over credit, and by these measures facilitate the production of goods and services necessary for the national security, and for other purposes." It has been amended through the years, most recently in 1986 when the act was extended through 1989. Its fundamental purpose is to provide the mobilization capability that would be needed for large-scale general war, and it provides for the authority to assign priorities to government contracts and to allocate materials and facilities for the national defense. It also has provisions for voluntary participation by industry in mobilization preparedness and for the reassignment of executives to national production planning in an emergency. The Department of Commerce has statutory responsibility for the administration of the provisions of the Defense Production Act, and that authority has been delegated by executive order to the Federal Emergency Management Agency.

There is nothing intrinsically adverse about the intent or the

specific provisions of the Defense Production Act. It is prudent to plan even for an unlikely event if the risks of not planning are high and the costs of planning are not prohibitive. The problem with the act is that it has become more than legislated authority to prepare for a general mobilization. It has become, in the view of some, a vehicle for attempting to restructure the domestic manufacturing economy or to protect individual industries against unfair foreign competition. Several amendments proposed in 1988 and 1989 are no more than thinly veiled protectionism. Because legislative jurisdiction for the act lies outside of the armed services committees and because executive authority lies with the Commerce Department, those individuals who are charged with the primary responsibility for the oversight and execution of U.S. national security strategy are not able to have much influence in the initial formulation of policies and legislation affecting the defense industrial base.

The difficulty with this mechanism is that maintaining the health of the U.S. defense industrial base is a vital component of national security strategy, as well as an important component of economic, commercial, and trade policies. Economic, industrial, and trade policies certainly affect national security policy, and much interaction takes place among them. In considering the requirements of deterrence, however, defense acquisition policies should not be used as a device to enhance other industrial policies any more than defense policy itself should be a primary economic policy instrument in the first place.

The other principal legislative authority governing the defense industrial base lies in certain provisions of the annual Defense Authorization Act. In FY 1989, for example, the act included a chapter (148) that dealt specifically with defense industrial base policy. Chapter 148 of the FY 1989 DOD Authorization Act detailed a number of provisions, several of which are summarized here.

First, the act called on the secretary of defense to provide centralized guidance, analysis, and planning for the defense industrial base and for the under secretary for acquisition to answer to the secretary of defense in this regard. Second, the act requires the secretary of defense to review acquisition policies with a view toward their impact on the defense industrial base. It establishes a Defense Industrial Base Office in the DOD and requires the secretary to identify 20 critical

technologies that demand concentrated effort to maintain the U.S. technological lead against potential adversaries. The act also imposes "buy American" provisions on certain valves and machine tools, and it restricts the application of cooperative development programs. It provides for a Commerce Department role for negotiations and renegotiations with allies on Memorandums of Understanding on defense research, development, and production. It calls for the development of a U.S. policy on offsets in defense trade and for negotiations with allies on offsets. Finally, the act designates the costs to U.S. defense firms of promoting their products for export as an allowable expense in submitting cost and pricing data under defense contracts.

The Defense Production Act focused broadly on the mobilization aspects of the defense industrial base, whereas the provisions of the current defense authorization act focus narrowly on the peacetime efficiency aspects of the defense industrial base. Again, the act does not take a position about the defense industrial base that is rooted in U.S. national security policy. Rather, it reflects an admixture of concern for trade issues and acquisition practices, which are the focus of other defense, trade, and economic policies. Although the defense industry should not be granted blanket exemption from trade, commercial industry, economic, or other domestic and social policy legislation aimed specifically at preserving and fostering growth, the defense industrial base must be firmly rooted and logically based on existing national security strategy, not upon other considerations or outdated strategies. In this regard, an especially commendable provision of the FY 1989 Defense Authorization Act is the requirement of identifying 20 critical long-term defense technologies, a provision with which the Department of Defense has eagerly sought to comply.

U.S. policy on the defense industrial base is formulated and executed primarily by the DOD in coordination with other departments and agencies and overseen by appropriate committees and subcommittees of Congress. The most recent statement of the policy objectives toward the U.S. defense industrial base is in the 1988 report, *Bolstering Defense Industrial Competitiveness*. This report identified six strategic thrusts for addressing the fundamental causes of the United States' industrial competitiveness problems:

- forging the right relations with industry,
- improving the acquisition system,
- establishing strategic defense industrial plans that support U.S. strategic military plans,
- developing manufacturing capabilities concurrent with the development of weapon systems,
- laying the foundation for the technical skill base required for the defense needs of the future, and
- ensuring that industrial base issues important to U.S. defense benefit from a full spectrum of potential policy remedies, when appropriate.

This list of policy initiatives is commendable for its breadth of scope and its reach. It emphasizes the need for competitiveness and efficiency, however, as if the only requirement for national security is a financially healthy commercial U.S. industrial base. Again, the lack of connection to a strategy of deterrence means that the policy direction of *Bolstering Defense Industrial Competitiveness*, although otherwise commendable in its intent, would not necessarily result in a defense industrial base that met the study's three criteria for an effective component of deterrence. Moreover, the specific policy actions that these strategic thrusts would require would be far beyond the scope of the DOD to implement by itself.

The examination of current defense industrial base programs conducted here lead one to conclude that regardless of legislative direction and intent, and in spite of Defense Department desire, current programs for the defense industrial base are completely ineffective in meeting the requirements of deterrence. The U.S. defense industrial base is eroding, and the Defense Department is ineffective in producing significant change.

The Defense Department's FY 1990 defense industrial base programs are described in the *Defense Secretary's Annual Report to Congress*, published in February 1989. The report mentioned the creation of a new deputy under secretary, a Manufacturing Strategy Committee, and a Strategic Planning Task Force to deal with many of the issues of the defense industrial base. These changes were promising, but came far too late in the Reagan administration to have lasting effects and may well have lost their potential in the extended transition to the Bush administration's Defense Department.

There is little substance in the remainder of the defense

industrial base programs. "Production Base Analyses" are annual studies conducted by the armed services or the joint logistics agencies or staffs to examine problems of production in implementing operational contingency plans. (The air force spent only \$2.9 million in FY 1988 on this program. No service has a complete set of analyses on the ability of the defense industry to supply its needs for future conflict situations.) The North American Defense Industrial Base Organization is made up of two very small staffs—most of whom are principally responsible for other industrial issues—in the U.S. Department of Defense and the Canadian Defence Ministry, and the organization has a small budget of a \$300,000 to hold an annual conference. The "total quality management strategy" is a conceptual approach to managing excellence in defense acquisition, but the understanding and application of the concepts are broad and controversial. The Value Engineering Program rarely achieves priority attention either in DOD or in industry, although some productivity improvements have been noted.

The remaining programs allocate some resources to the improvement of the defense industrial base. The Defense Industrial Network (DINET) is a small pilot program to develop an integrated industrial base information management system for assessing the adequacy of the U.S. production base to meet DOD requirements in peacetime and emergency situations. To establish the pilot project, \$1.3 million was spent in FY 1988, and the DOD estimates that it would require \$29 million to develop a fully operational system. Yet the DINET program is unfunded in the DOD FY 1990 budget. In contrast, the government asked for \$34.1 million in FY 1990 for information systems for space applications alone in the National Aeronautics and Space Administration (NASA) budget.

The DOD Industrial Modernization Incentives Program (IMIP) is designed to promote contractor investment for improved industrial productivity and competitiveness by sharing a portion of the savings resulting from the increased efficiency. It provides incentives to industry to make investments that enhance productivity, improve product quality and reliability, and reduce the total cost of ownership of weapon systems through implementation of new or improved manufacturing technology. It is meant to overcome disincentives that pervade acquisition and inhibit investments in productivity improvements through the modernization of process technology. Currently only

the air force actively participates in IMIP, and it had 85 projects in FY 1988.

The DOD established the Manufacturing Technology Program (MANTECH) in the late 1950s in response to a growing need for advanced production processes. MANTECH's primary goal is to improve the productivity and responsiveness of the defense industrial base by engaging in initiatives that will develop advanced manufacturing technology. This, in turn, will permit DOD and its contractors to produce matériel more efficiently by using fewer resources during production. Under MANTECH projects, the department invests in the development of advanced manufacturing technology, while contractors are expected to invest in the capital equipment necessary to implement that technology. MANTECH investment by the government has averaged \$191 million annually (in constant FY 1989 dollars) during the 1980s, with a low in FY 1986 of \$140.8 million and a high in FY 1982 of \$259.1 million. The air force has been a leader in funding MANTECH projects and has been rewarded by the Office of the Secretary of Defense (OSD) with a \$25 million cut in FY 1990 allocations. Considering that returns on IMIP and MANTECH investments have sometimes been on the order of 3 to 1, these figures are remarkably low.

In contrast to the DINET, IMIP, and MANTECH programs, which are managed by the DOD for across-the-board application in the defense industrial base, the machine tool domestic action plan is narrowly directed at a specific industry. More than \$6.4 million was spent in FY 1988 by the DOD to implement aspects of the president's December 1986 machine tool domestic action plan, promulgated by President Reagan in response to a trade case, ranging from channeling seed money from DOD to the National Research Council for the National Center for Manufacturing Sciences to providing funding to the automated manufacturing research facility at the National Bureau of Standards. Although these efforts are important for the health of the domestic machine tool industry, they are more directly related to the goals of the agencies above and only indirectly related to the national defense from a long-term perspective. It is unclear whether this was the optimum means of preserving the defense industrial base or whether DOD could more directly apply those resources to national defense through its own production, R&D, or through existing IMIP and MANTECH programs.

Title III of the Defense Production Act, in providing for the

expansion of industrial capacity and supply, gives the president the authority to utilize purchase guarantees, loan guarantees, and grants to provide incentives to defense-related industries to prepare for the needs of rapid mobilization. The FY 1987-1989 budgets authorized by Congress provided \$150 million for such projects, but in FY 1988 only \$27.5 million was appropriated for that purpose.

The only other program related to the defense industrial base is the government's partnership in establishing the Semiconductor Manufacturing Technology Institute (SEMATECH) with DOD as the lead agency for the government providing some \$500 million to be matched by investments from a consortium of industrial participants. SEMATECH was organized in 1988 and has just begun to take shape. It is aimed at the technological competitiveness of a critical dual-use industry that underpins a host of others—such as computers, communications, and aerospace—and that serves both deterrence and commercial goals. Such an effort could not have gone forward without government and industrial cooperation.

In sum, the programs directed toward providing incentives to increase efficiency, competitiveness, and responsiveness of the U.S. defense industrial base in its role in deterrence spent less than \$200 million in FY 1988 out of \$112.0 billion in total acquisition outlays. Restoration of the defense industrial base will be sluggish at such a low rate of investment in productivity improvement (0.18 percent). And defense contractors cannot make up for the shortfall in investment. The present incentive structure requires firms to focus their independent R&D almost exclusively on products, with little regard to process technology. This trend will worsen as defense firms continue to be required to devote greater shares of their independent spending on administrative costs rather than on R&D.

Clearly, the present approach toward the defense industrial base is in disarray. Legislative oversight is diffuse and not focused on the industrial base role of deterring U.S. adversaries. Defense Department policy, although recently reviewed, is still directed more toward increasing peacetime efficiency and toward using DOD budget leverage to create a national industrial policy. Furthermore, defense industrial base programs are minuscule compared to the nature of the task that lies before them. The conflicting interests brought to bear in the political and bureaucratic milieu have little relation to the strategic

requirements of the U.S. defense industrial base. No one seems to be in charge of fixing this situation, however, and perhaps no one can. Later in this report, recommendations aimed at reversing the conditions that have been discovered are set forth. First, however, the condition of the U.S. defense industrial base is described.

II

Capabilities of the U.S. Defense Industrial Base

An industrial organization approach was used in this study to explain the economics of the U.S. defense industrial base. This approach to economics focuses on the way in which the economy's productive outputs meet the demands of society. It presumes that outputs and demands are brought into conformity through some organizing mechanism—in the case of the United States, the competitive market—and that the nature and impact of imperfections in the organizing structure are explained by this mechanism. The approach holds that the performance of an economy, in relation to valued goals, is related to the organizing structure that the society constructs for economic life.

In the U.S. market economy, the basic conditions of supply and demand establish the parameters in which an industrial market must operate. These conditions of supply and demand are generally accepted by society, but if they are controlled or inordinately influenced by one segment of the economy, that segment may be tempted to engage in noncompetitive behavior. The industrial organization approach also presumes that there are differences in market structures depending on factors such as the number of buyers and sellers, product differentiation, entry and exit barriers, cost structures, and the degree of integration or diversification among firms.

As a market's structure varies, the behavior of firms engaged in enterprise within that market also varies, ultimately aiming to maximize profits. Such variations can be observed in plant investment, innovation, advertising, product strategy, and pricing behavior. The performance of a market is then judged by

measuring it against societal values.

In the United States, the free market is seen as the optimum mechanism for allocating scarce resources. A completely unfettered market is not allowed to operate, however, because the economy does not necessarily provide all the goods and services in the proper mix and distribution desired by society. In general, the goal is to have a maximum range of freedom of choice for the individual although not at the expense of certain collective goods or minority rights that the market would not otherwise support.

The popular conception of the defense industrial base is not of a competitive market; rather, it is seen as a highly concentrated military-industrial complex. It is not an exaggeration to argue that most U.S. citizens believe that the defense industrial base is a tightly knit group of executive branch, legislative branch, and industry officials who control most of what goes on in the defense business—a classical “Iron Triangle.” According to this popular notion, the ills of the defense industry—inefficiency and high costs that prevail in defense acquisition—are a result of the inordinate market power held by a few very large defense firms, perhaps abetted by the Defense Department, the sole customer. The process is said to be expedited by a few legislators in key defense authorization and appropriations positions and by the impact in legislative constituencies of the defense budget as a whole. Legislators are often said to favor efficiency as long as it is not at the expense of jobs and business in their own states and districts.

A popular remedy for this situation is to attempt to restore the market mechanism under the yoke of heavy government regulation. Recent policy has mandated extensive use of competition in contracting, across-the-board examination and regulation of internal corporate cost and pricing data, overwhelming oversight and auditing of defense contract preparation and execution, and other measures aimed at making the defense market more competitive. The expectation, of course, is that more competition will bring greater efficiency, lower costs, and better product performance. Furthermore, in the process of trying to make the defense market less monopolistic and more competitive, waste, fraud, and abuse are expected to be uncovered and rooted out.

The difficulty with this approach is that it presumes that the purely competitive market model is the structure that will best

meet society's goals for the defense industrial base. In fact, other industrial sector organizational patterns may be superior. As pointed out in section I of this report, the criteria against which to judge the performance of the defense industrial base is the extent to which it contributes to and sustains U.S. deterrence strategy. Achieving the best value for the lowest cost makes sense only if "value" is defined according to the three criteria established for the defense industrial base: peacetime efficiency, technological competitiveness, and surge or mobilization flexibility. The optimum mix of these criteria may not be achieved by a purely competitive market.

Moreover, this approach presumes that the DOD has significant leverage across all sectors of the defense economy because it is almost always the only customer for the goods it procures. This is also true even for common items such as hammers, coffee pots, and toilet seats because the military frequently requires higher performance standards for such items, which must be capable of withstanding temperature extremes and combat rigors the military is frequently exposed to.

According to the Iron Triangle notion, the defense industrial base lies somewhere between a monopoly, in which a single firm controls the market, and an oligopoly, in which a few firms control the market. If public policy could somehow drive the defense industrial complex toward a purely competitive market, in which no single firm or group of firms had the power to dominate the price of goods produced, then the public interest would be better served. The industrial organization approach to economics, however, casts a very different light on this popular notion.

Market structure theory suggests that buyer power is at least as important in understanding market performance as is the power of the supplier. Both buyers and sellers can be numerous, few, or concentrated. The more numerous the buyers of a given product or of a particular sector, the more competitive those buyers will be in seeking suppliers and in seeking greater value from suppliers. In situations in which there is only one customer, the buyer has immense leverage over the producers, and the buyer can also conceivably negate the competitive environment of numerous suppliers. A single-buyer-dominant market can be as noncompetitive as a single supplier market.

Economists have developed a taxonomy of market structure types based on the mix of the number of buyers and sellers. Truly competitive markets are those populated by many buyers

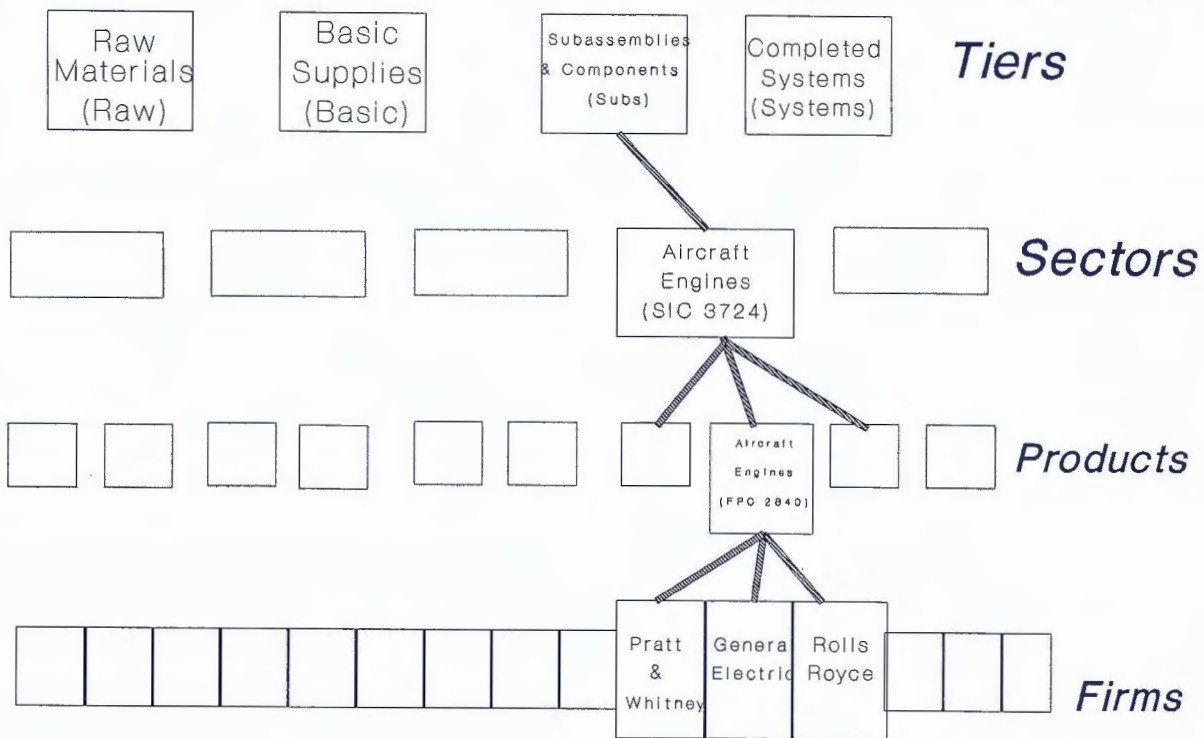
Figure 1
Theoretical Market Structures

		<i>Buyers</i>		
		<u>One</u>	<u>Few</u>	<u>Many</u>
<i>Sellers</i>	<u>One</u>	<i>Bilateral Monopony</i>		<i>Monopony</i>
	<u>Few</u>		<i>Bilateral Oligopoly</i>	<i>Oligopoly</i>
	<u>Many</u>	<i>Pure Monopony</i>		<i>Pure Competition</i>

and many sellers. The condition wherein a single seller provides products to a single buyer is known as a bilateral monopoly. A market in which many buyers are dominated by a single supplier is a monopoly, and a market consisting of a single buyer and many suppliers is a monopsony. Between these four polar market forms are various kinds of oligopolies, with differing combinations of a few buyers and a few sellers. (See figure 1.)

The implication of this approach is that the economic structure is a condition, not a criterion. That is, in assessing the health of the defense industrial base, it is important first to take an objective view of how the market really is structured, before attempting to modify that structure. There will also be costs involved in any such restructuring that should be evaluated before any change is attempted. It is possible for different sectors of the defense industrial base to have quite different buyer-seller structures.

Figure 2
Data Base Structure



The conduct of firms in a particular sector will be driven by the structure of the sector as well as by the behavioral preferences of the firms. Of course, any firm must act to maximize profit in the first place. That is, firms will act upon their own assessment of the basic conditions and market structure. This does not always lead to a purely competitive market, which is characterized by profit-maximizing behavior. For example, because the buyer also has leverage, a supplier who has the power of monopoly in an industrial sector may not necessarily receive excessive or monopoly profits. The buyer may insist on lower rates of profit, and the seller may have no alternative but to accept the buyer's offer or leave the market entirely. In some cases, competition will not drive down cost as it would in a purely competitive market. That is, there are sectors in which competition is not maximized but the sectors have, nevertheless, reached a point at which the barriers to new firms entering the market are sufficiently high that potential new entrants are deterred from

breaking in. Examples of such anomalies can be found throughout the defense industrial base.

The Data Base

In an effort to understand more fully the condition of the U.S. defense industrial base, the CSIS project compiled an extensive data base on the structure and performance of the defense industry. Measures of structure included the number of firms by sector, the defense share of industry purchases (a measure of DOD buyer power), and a four-firm concentration ratio (the sector market share of the top four firms in the sector and a measure of where the sector falls in the taxonomy in figure 1). In measuring market performance, data was aggregated on import penetration, profit margin, investment ratio, capacity, and productivity.

The data were organized in a vertical structure that reflects the hierarchical nature of the U.S. defense industrial base. At the lowest level is data on individual firms that participate in defense contracting for matériel. The next highest level of analysis is data on individual products purchased by the Defense Department. At this level, data were collected for all firms that supply products to the DOD. The next level of aggregation is sectoral data. Data on products are grouped by sector as defined by the U.S. Department of Commerce standard industrial classification (SIC) system. Finally, these sectors were grouped into tiers according to the type of defense output produced. (See figure 2.)

The data were collected from a variety of sources. Information on individual firms was collected by field research at participating companies and from publicly available historical records. No attempt was made to survey every firm in the defense industrial base, nor do the examples cited in this report reflect a statistical representation of the entire defense industrial base. Instead, case studies are provided of the more general phenomena discovered from an analysis of the aggregate information.

Product-specific data were provided by the Office of the Under Secretary of Defense for Acquisition in the DOD. These data were extracted from the department's historical data tapes that have recorded millions of contract actions over the past

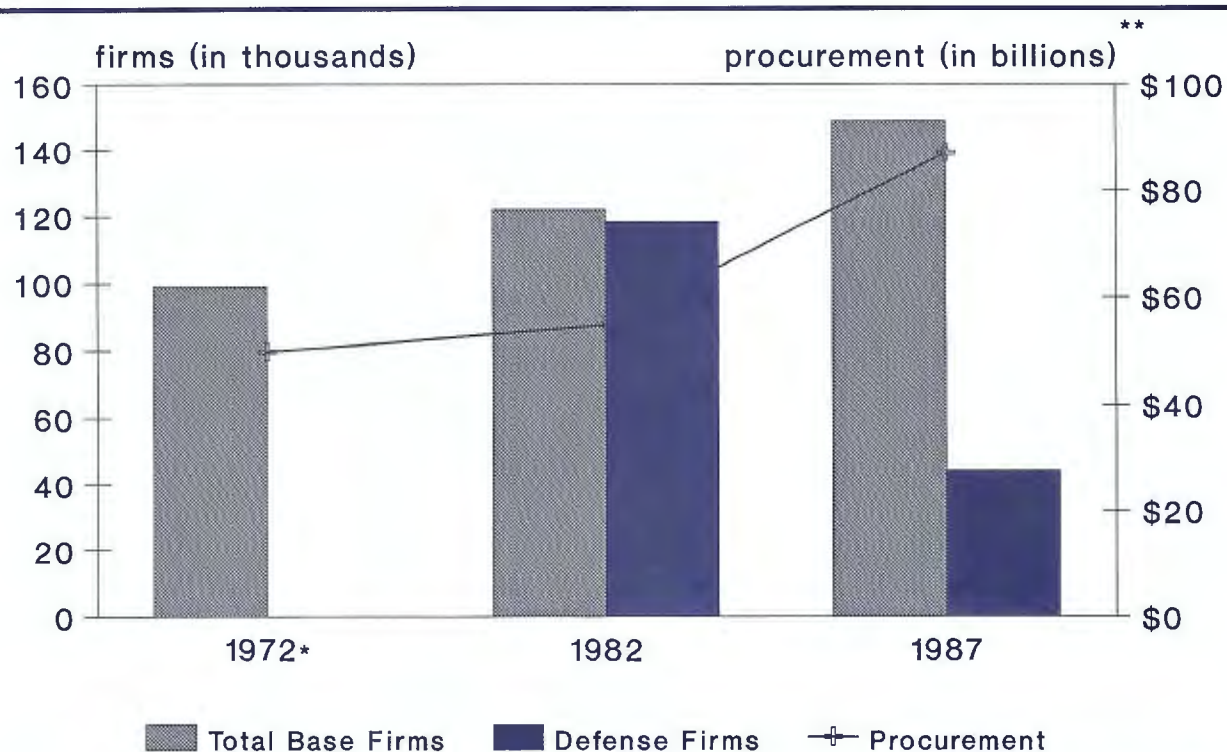
decade. Much of this information has not been publicly available until now, and it has yielded some surprising findings and conclusions about the defense industrial base. A few of those findings were so startling that they were later independently verified by a major analysis firm in the Washington, D.C. area. No significant discrepancy with the results was found.

Sectoral data were collected from two principal sources. First, data were collected from a compilation by the Logistics Management Institute (LMI) under contract to the Department of Defense in the conduct of the DOD Defense Industrial Base Initiative in 1988. These data have subsequently been examined by the General Accounting Office, which concluded that the LMI methodology was sound. The second source of sectoral data—1982 Census of Manufacturers—was collected by the Commerce Department's Bureau of the Census. These data are collected by the Census Bureau quinquennially; regrettably, the department would not release its 1987 Census of Manufacturers data in time to include it in this study.

In an attempt to gain further insight into the U.S. defense industrial base, sectoral data were grouped into four "tiers" of production. Because some manufacturing output is used as input in the manufacture of other finished products, the sectors were divided into four groups, or tiers, based on the type of products. The "Raw Materials" tier consists of those sectors that convert raw resources into useful materials. One example of a sector included in this tier is that of "Drawing and Insulating of Nonferrous Wire," SIC Code 3357. Included in this category are firms that manufacture fiber optic cable and nonferrous aircraft wire. The "Basic Supplies" tier comprises those sectors that produce materials, hardware, and other common supply items. "Electric Lamps," SIC 3641, is one example of a sector in this tier that uses inputs from sector 3357 in the "Raw Materials" tier.

The third tier is the "Components and Subassemblies" level. This grouping consists of more complex end items, which are manufactured separately but may be a part of a total system. To continue the hierarchical example, "Aircraft Engines," SIC 3724, is considered to be in the "Components and Subassemblies" sector. Finally, the "Completed Weapons System" tier comprises those sectors in which weapons are manufactured for final delivery to the DOD. The "Aircraft," (SIC 3721) sector is included in this tier, as well as ships, tanks, and missiles, among others.

Figure 3
Structure of the Defense Industrial Base, 1972–1987

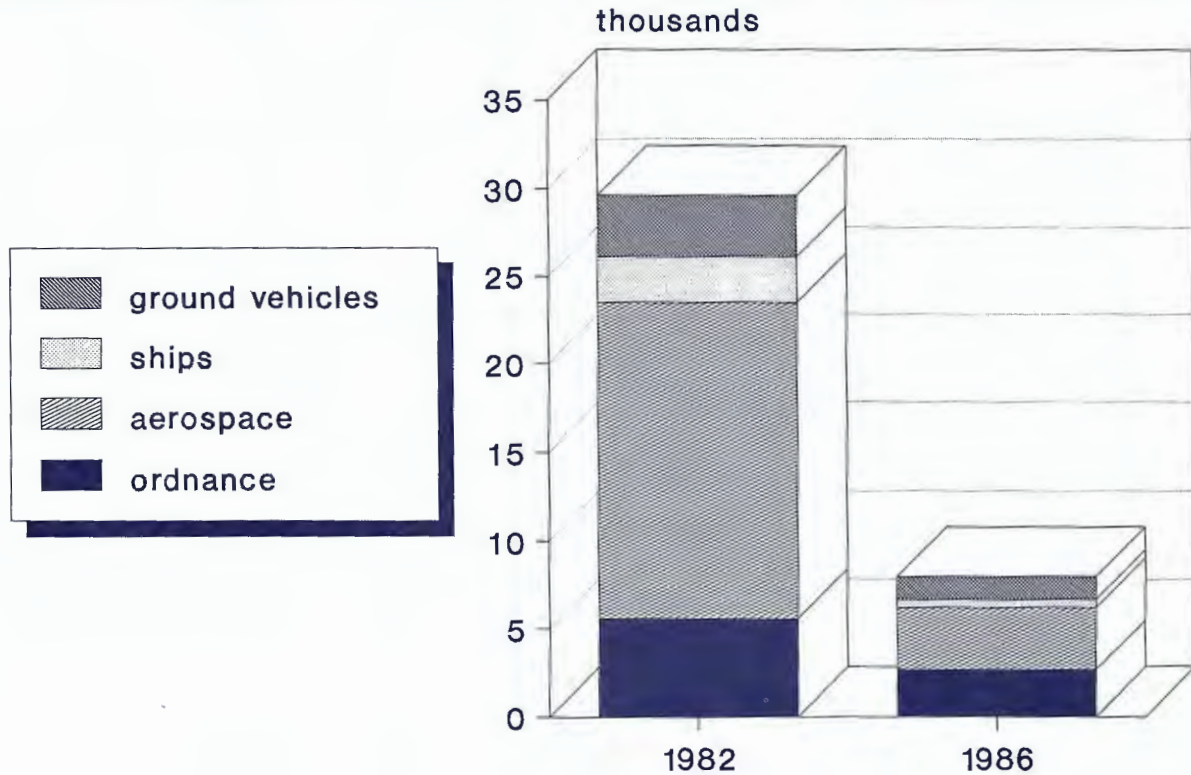


Source: Bureau of the Census, 1982 *Census of Manufacturers* (Washington, D.C.: Bureau of the Census, 1986); Defense Logistics Agency, *DoD Contract Database* (Washington, D.C.: Defense Logistics Agency, 1988).

Because of the large amount of data available and the inability to absorb it all, this study deliberately narrowed its field of examination. The DOD engages in contracts with more than a quarter of a million firms annually for thousands of goods and services across all defense sectors. The Census Bureau compiles its data in thousands of sectors. The defense industrial base clearly is not represented in all of these categories so the data base need not be as extensive. It is limited first to products, not services, because this study is concerned with the industrial or manufacturing base. Second, only product data from procurement accounts were studied because these reflect the manufacturing base as it now exists.

Finally, the study was concerned with only those sectors of the manufacturing base deemed important to national security. It used the analysis conducted by LMI for the DOD during the Defense Industrial Base Initiative Study to select the 215 critical defense sectors that accounted for 95 percent of all DOD purchases from the manufacturing sector. Thus, the range of data has been

Figure 4
Defense Suppliers by Product Type—Weapons



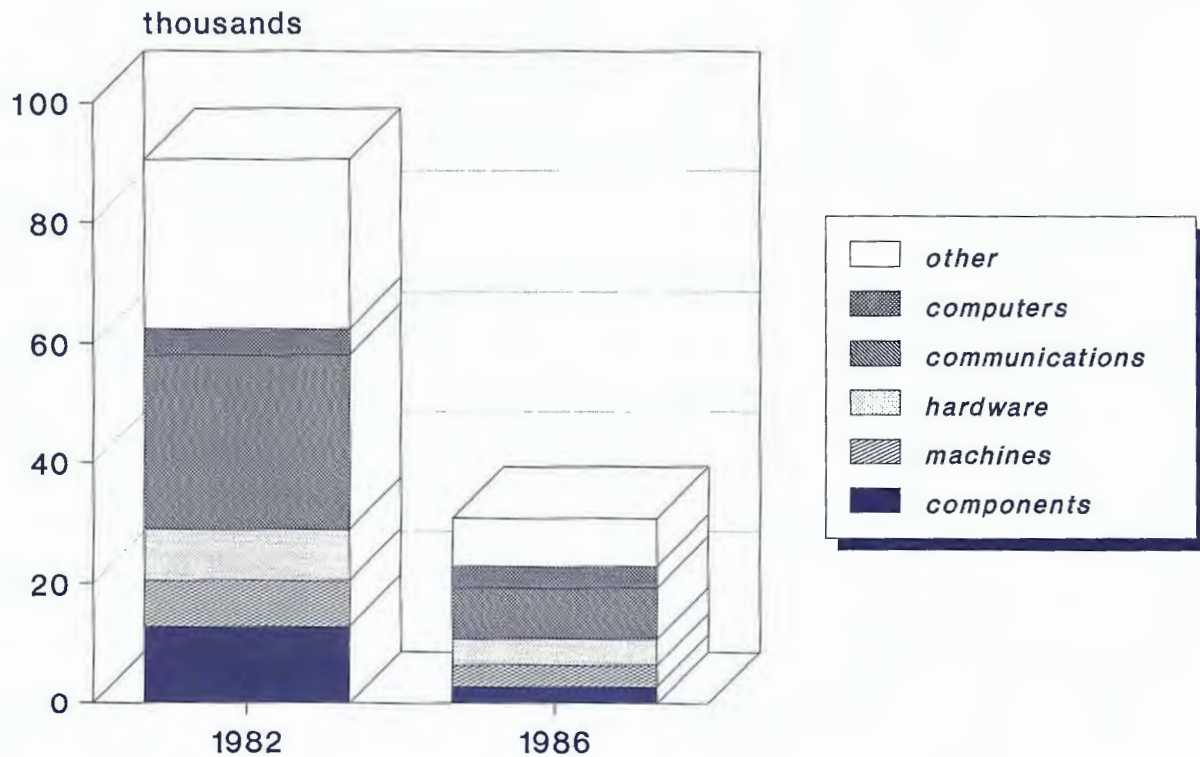
Source: Defense Logistics Agency, DoD Contract Database DD Form 350 (Washington, D.C.: Defense Logistics Agency, 1988).

from the manufacturing sector. Thus, the range of data has been limited to a usable size that captures the components of the U.S. manufacturing base that make up the defense industrial base. The picture that emerges from these data is striking.

Structure

The most striking aspect of the defense industrial base is that it has shrunk dramatically in the 1980s. In 1982, there were 118,489 firms that provided goods to the DOD in the relevant defense sectors. In 1987, only 38,007 firms in those sectors provided goods to DOD. (See figure 3.) This shrinkage is more remarkable in view of the total U.S. manufacturing sector and the defense budget at the same time. The number of firms in

Figure 5
Defense Suppliers by Product Type—Support

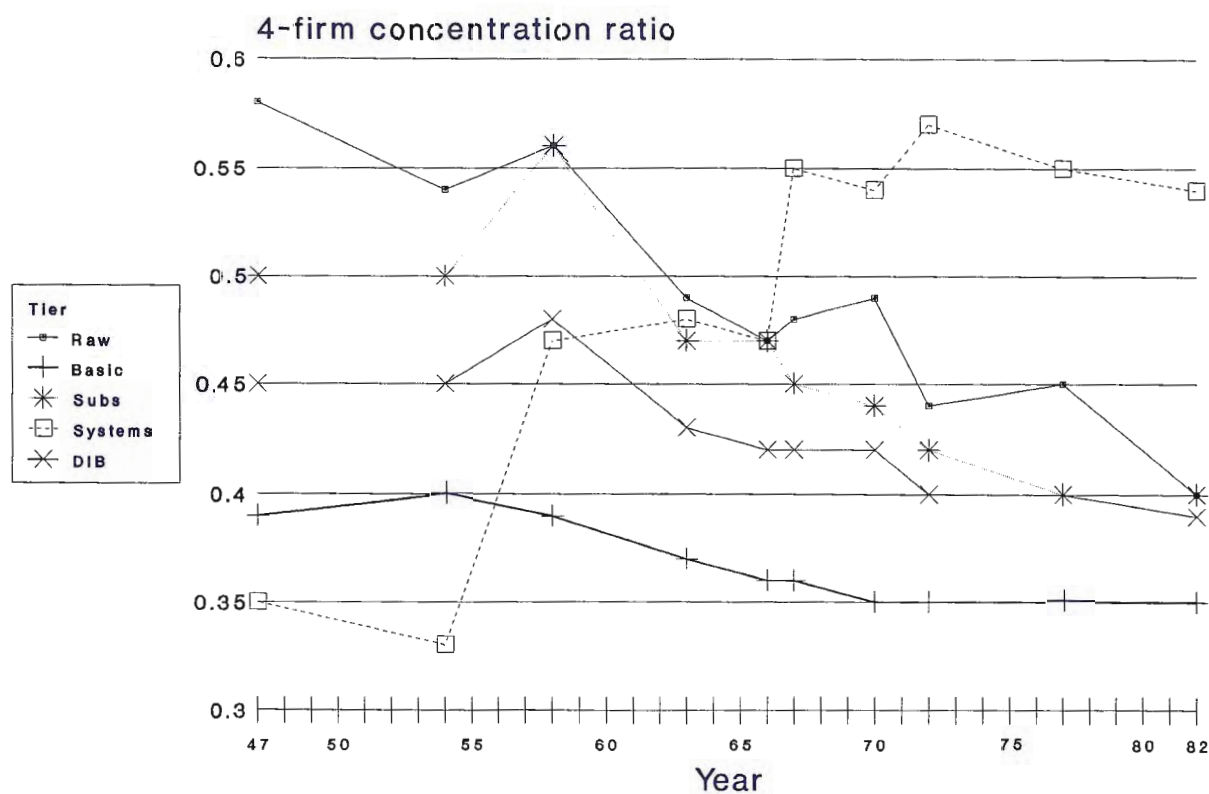


Source: Defense Logistics Agency, DoD Contract Database DD Form 350 (Washington, DC.: Defense Logistics Agency, 1988).

those sectors providing goods to all buyers, not just the DOD, went from 98,659 in 1972 to 122,965 in 1982, and it is projected to have increased to more than 150,000 in 1987.

The decline in the number of firms providing manufactured goods to DOD occurred at a time when the defense procurement budget increased from \$43.271 billion in 1982 to \$80.744 billion in 1987 (from \$54.850 billion to \$87.046 billion—or a 58.7 percent increase—in constant FY 1989 dollars). In constant FY 1989 dollars, DOD procurement increased nearly 10 percent annually between 1982 and 1987. The number of firms providing goods for those procurement dollars, however, declined by more than 67 percent during the same time frame. The fact that the number of firms in those same sectors

Figure 6
Concentration Ratios for the Defense Industrial Base

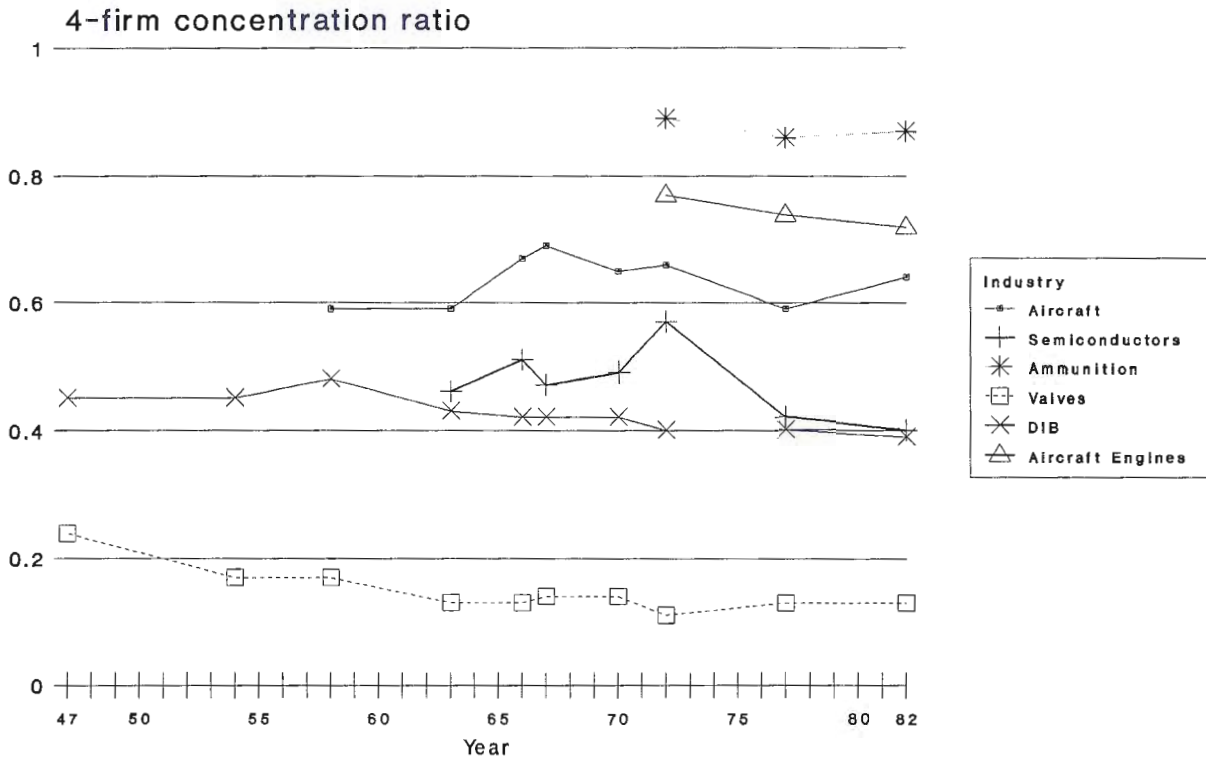


Source: Bureau of the Census, 1982 *Census of Manufacturers* (Washington, DC.: Bureau of the Census, 1986).

increased overall by about 22 percent means that firms in critical defense sectors are leaving or avoiding the defense business in favor of more profitable endeavors elsewhere.

At the product-specific level, the trend is even more dramatic. (See figures 4 and 5.) Because so many of the products purchased by the Department of Defense have no civilian counterpart or have performance specifications that make them unsuitable for civilian use, many firms that manufacture similar products for both the military and civilian sectors often maintain separate production facilities for each. The movement away from the defense business that is evident

Figure 7
Concentration Ratios for Selected Defense Sectors



Source: Bureau of the Census, 1982 *Census of Manufacturers* (Washington, DC: Bureau of the Census, 1986).

at the industry sector level appears as a stampede at the product-specific level. Out of 566 product groups for which data were collected, only 90 registered no change or a slight increase in the number of firms doing business with the DOD between 1982 and 1987. More than 80,000 suppliers stopped providing products to the Defense Department during the same time period.

Some products no longer have more than one domestic provider, including nuclear projectiles, depth charge components, parachute recovery systems, some specialized marine vessels, tanks, several types of machinery, rope, nonmetallic pipe, piezoelectric crystals, and various textile and clothing products. More than 280 product groups lost producers in those four years—more producers than those continuing to do business with the DOD—indicating an ominous trend for the near future. The shakeout in some sectors was massive. More than 4,000 firms left the airframe structural components business; more than 600 firms left the antifriction bearings business; 890 of 1,310 no longer sell nonpowered

valves to the DOD; and 668 of 834 establishments stopped supplying navigational instruments. In some cases, national security was placed in jeopardy by small individual production facilities closing down, as was the case with the shut down in 1988 of the Avtex fiber production plant—the sole source of certain materials for missiles and rockets.

The long-term trend in market concentration is that these critical defense sectors are remarkably stable. (See figures 6 and 7.) The average four-firm concentration ratio has hovered around 0.40, although it has perceptibly declined since a post-World War II high of 0.48 in 1958. This aggregate stability, however, masks some significant changes in sectoral concentration for different tiers. Although the raw materials, basic supplies, and components and subassemblies tiers have either remained stable or have become more competitive since 1947, the completed systems tier has become dramatically more concentrated in the post-World War II era. From its low in 1947 of a four-firm concentration ratio of 0.35, this tier has rapidly become more concentrated, with the latest data showing a four-firm concentration ratio of 0.54 for 1982. Although data for 1987 are regrettably unavailable, it is clear that firms involved in making ships, planes, and tanks for DOD are facing less competition than those making the materials, hardware, and components that go into those end items.

In fact, there is wider variation among defense sectors in their buyer-seller structure than is revealed by these aggregate measures. There is a wide range of market structure types in the defense sectors, and there are at least some examples of every theoretical structure type from highly competitive to bilateral monopoly in the defense sectors. DOD buying power is as varied as the market concentration in these sectors. In terms of defense purchases (as a share of total purchases) from industrial sectors, the DOD consumes a weighted average of only 12.7 percent of the production of these sectors, ranging from a high (approaching monopsony) in the ammunition sector of 84.5 percent to a low (nearly purely competitive) in the "X-ray Apparatus and Tubes Sector" of 0.1 percent. In sectoral concentration, defense industries averaged 0.39 (39 percent of the value of shipments from all firms in these sectors came from the top four firms in the sector). The range in concentration ratios among defense sectors, however, varied from 0.99 (virtual monopoly) in the primary lead sector to a low (approaching

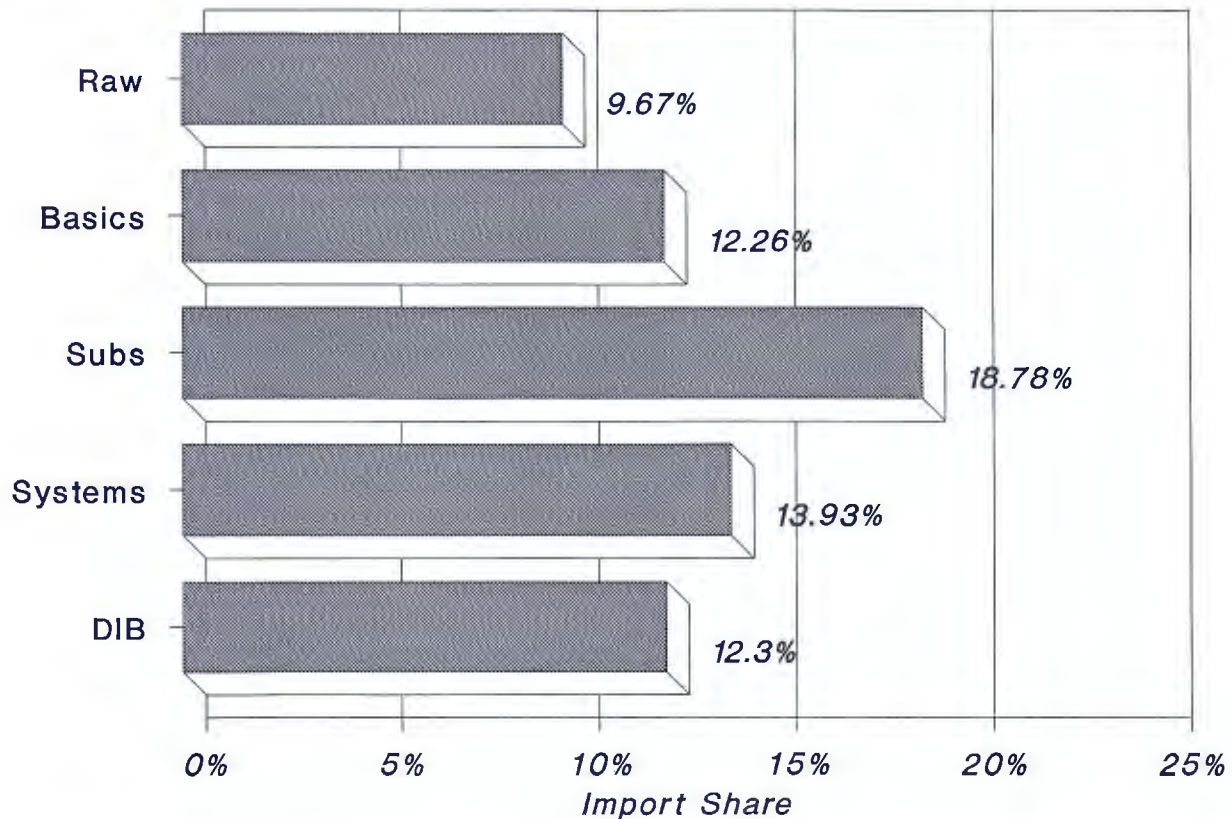
pure competition) of 0.03 in the special metalworking machinery sector. Overall, the defense industrial base is no more concentrated than the aggregate U.S. manufacturing base.

Performance

One of the most important measures of industrial performance, from the perspective of U.S. national security interests, is the import penetration of critical domestic defense industrial sectors. Foreign suppliers not only take business away from domestic firms but also can create undesirable foreign dependencies that, during peacetime, could sap the technological competitiveness of U.S. weaponry and that, during wartime, could disrupt the flow of matériel to U.S. or allied forces in combat. Nevertheless, the world is becoming increasingly integrated economically, and it would be impossible to eliminate all foreign dependencies. Moreover, the emphasis in defense contracting on seeking the lowest priced products often pushes the DOD to procure from overseas firms that sometimes offer products below the price offered by U.S. firms. Many observers argue that these lower prices—based on lower cost structures of foreign suppliers—are generated in part by unfair foreign government subsidization of exporting defense or critical dual-use businesses.

The statistics on import penetration and foreign source dependence in the defense industry are good news only if the United States is acquiring the best of foreign technology or lower costs from reliable allies. There is little evidence to indicate that this is the case, however. It is feared that foreign penetration of U.S. defense industrial base sectors may drain the U.S. technological lead in critical defense areas. Both the economic competitors and military adversaries of the United States have targeted the U.S. lead in these areas. Surge and mobilization flexibility are inherently degraded as import penetration increases. Although the globalization of the industrial base means that the United States cannot achieve compete autarky in all defense sectors and products, it must carefully evaluate the dependencies that exist and establish industrial preparedness plans or modify acquisition strategies accordingly.

Figure 8
Import Penetration, 1986



Source: Logistics Management Institute, "Identifying Industrial Base Deficiencies" (Bethesda, Md.: Logistics Management Institute, 1987).

The import share of all U.S. manufacturing consumption was about 8.1 percent in 1980 and 14.3 percent in 1986, an increase of 6.2 percentage points. (See figure 8.) In the defense industrial base, the increase was about 4 percentage points— from 8.3 percent in 1980 to 12.3 percent in 1986. The greatest import penetration in the defense industrial base is in the components and subassemblies tier, with nearly 19 percent of domestic consumption coming from foreign sources in 1986.

Although the defense industrial base performed no worse in the aggregate than the overall U.S. manufacturing base, significant import growth occurred at the sectoral and product levels, posing challenges to national security. In 1980, and again in 1986, 52 critical defense sectors had import penetration greater than U.S. manufacturing as a whole. The sectors in which foreign penetration increased the most in the 1980s were machine tools,

with cutting tools rising 18.8 points, industrial machinery rising 28.3 points, and office machinery growing by the greatest amount, 47.4 percentage points. Only 18 critical defense sectors showed a decline in imports, and the declines were generally small.

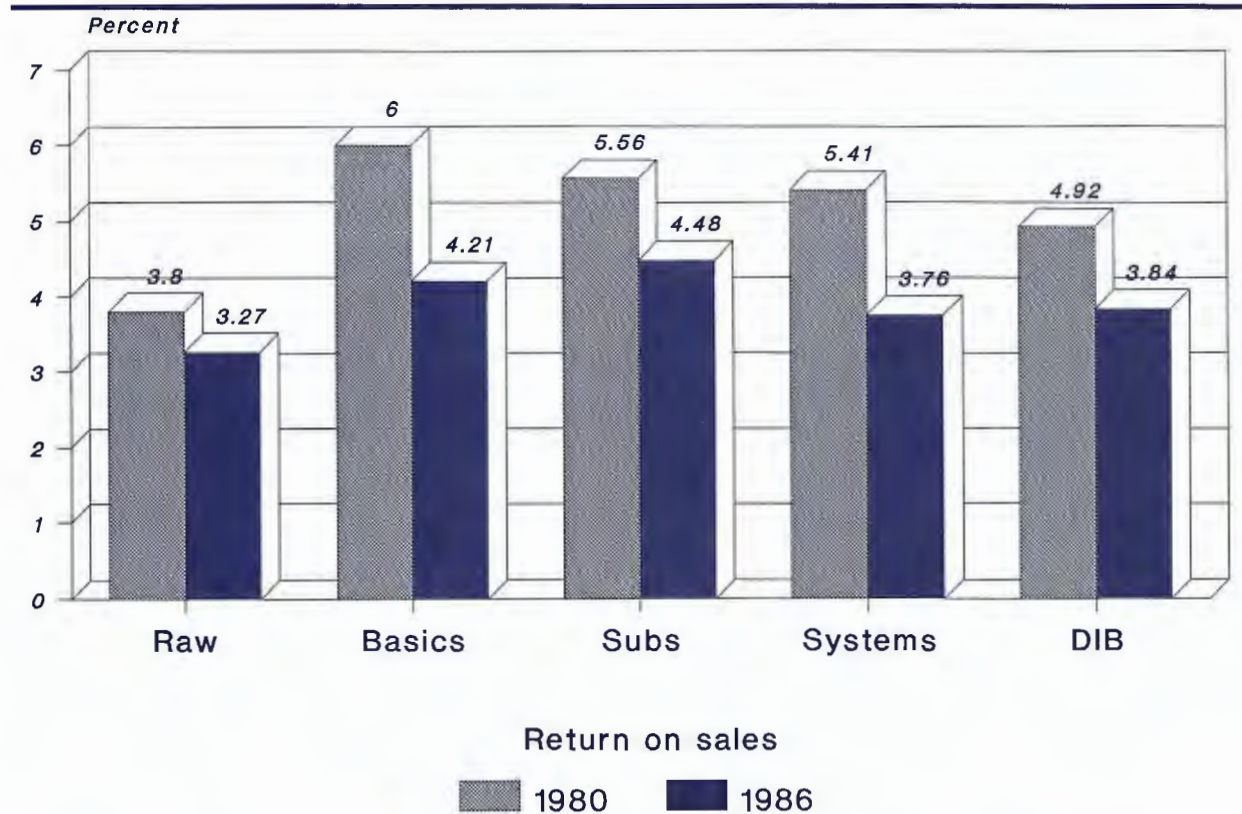
In total, import penetration was observed to have grown between 1980 and 1986 in 104 of 122 critical defense sectors for which data are available. With imports growing in at least 48 percent of the 215 relevant sectors comprising the U.S. defense industrial base, there is ample reason for concern. The United States loses flexibility to respond to emerging contingencies or to mobilize for war to the extent the industrial base—upon which the United States depends for surge or mobilization—is in foreign hands and thus beyond U.S. control under the Defense Production Act.

Beyond the aggregate levels of import penetration, there is another aspect of foreign dependency that affects U.S. national security. The practical result of dependence on foreign sources for critical defense products is that in time of crisis the United States may not be able to overcome shortages or bottlenecks in supplies of critical items. The United States could not support a war on the scale of the Vietnam conflict without a major mobilization effort to rebuild domestic production capability. Even to supply U.S. allies with critical weapon systems, the United States would have to surge production at plants that are not prepared to increase production rapidly.

The precise dimensions of the surge and mobilization problem were beyond the scope of this study. A number of other recent studies and exercises were examined that have attempted to address the problem, however. A 1986 DOD exercise, for example, identified 18 critical items that could not be produced at required levels for a certain operational contingency of low-level conflict, even given an 18-month mobilization period of three shifts operating around the clock, with no constraints on funding or skilled production staff. The critical showstoppers were key parts, machine tools, raw materials, and test equipment that came from foreign suppliers that possibly would not be available in time of crisis.

Also under consideration in this study was an unclassified Industrial Preparedness Plan for a major subsystem of a primary military weapon system that would be used on the front lines during wartime. This plan identifies, in addition to key foreign-supplied parts and equipment, other critical bottlenecks to surge

Figure 9
Profitability, 1980 & 1986



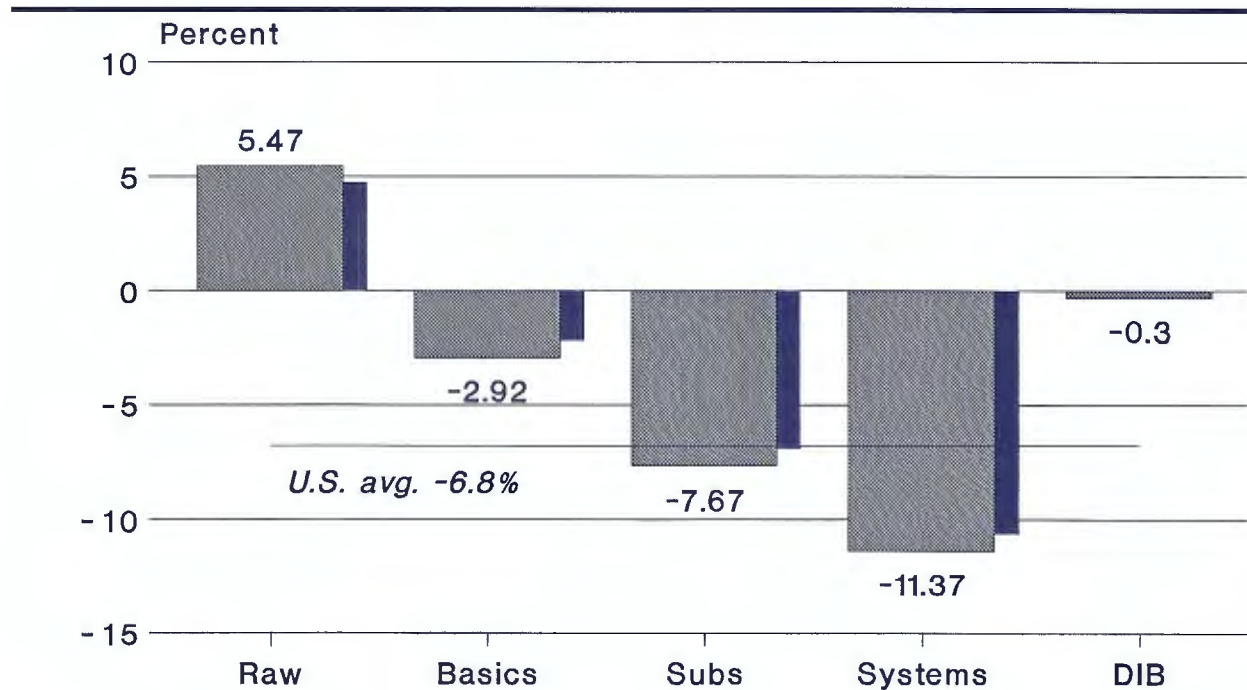
Source: Logistics Management Institute, "Identifying Industrial Base Deficiencies" (Bethesda, Md.: Logistics Management Institute, 1987).

production as well, including lack of skilled staff and plant space. It is estimated that it would cost more than \$25 million to build new facilities and train new people in the labor force to meet the Industrial Preparedness Plan requirements.

The data show not only that the U.S. defense industrial base faces problems of import penetration and dependency on foreign suppliers for critical matériel, but also that the economic efficiency of the defense industrial base is eroding. An examination of the data on the financial health of the defense industrial base revealed much to be concerned about.

The basic measure of the health of a firm is its bottom line. To the extent a firm is profitable, it can raise new capital to reinvest in its productive capacity or in R&D for future productivity and new products. The importance of profitability to the U.S. defense industrial base is not that particular defense

Figure 10
Return on Assets, 1980–1986 (percentage change)



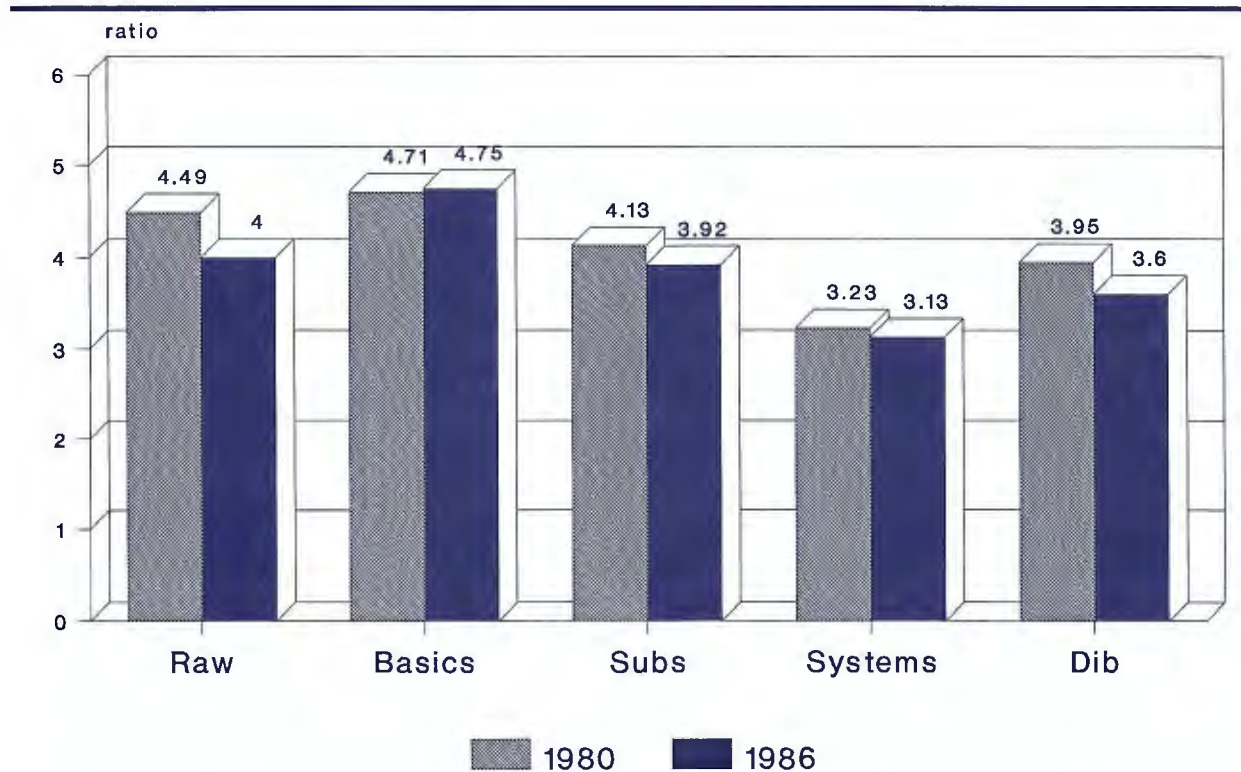
Note: return on assets = after-tax profit/present value of facilities capital

Source: Logistics Management Institute, "Identifying Industrial Base Deficiencies" (Bethesda, Md.: Logistics Management Institute, 1987).

firms perform well, but that the overall performance of the sectors critical to defense creates a climate that will foster productivity growth—for peacetime efficiency—and R&D for maintaining the U.S. technological lead over potential adversaries. In measuring profitability of the defense industrial base, data from return on sales, return on assets, and investment ratios were examined.

Profit margins, in terms of return on sales, were about the same in the defense sectors during the 1980s as in manufacturing as a whole. (See figure 9.) The defense industrial base sectoral average was 4.9 percent in 1980 and 3.8 percent in 1986, while the U.S. manufacturing sector earned 4.9 percent in 1980 and 3.7 percent in 1986. In 1986, the highest profit margin was observed in the aircraft engines and engine parts sector, and the lowest was the aircraft industry, which showed a sectoral average net loss on sales in 1986 of 3.1 percent.

Figure 11
Investment Ratios, 1980 & 1986

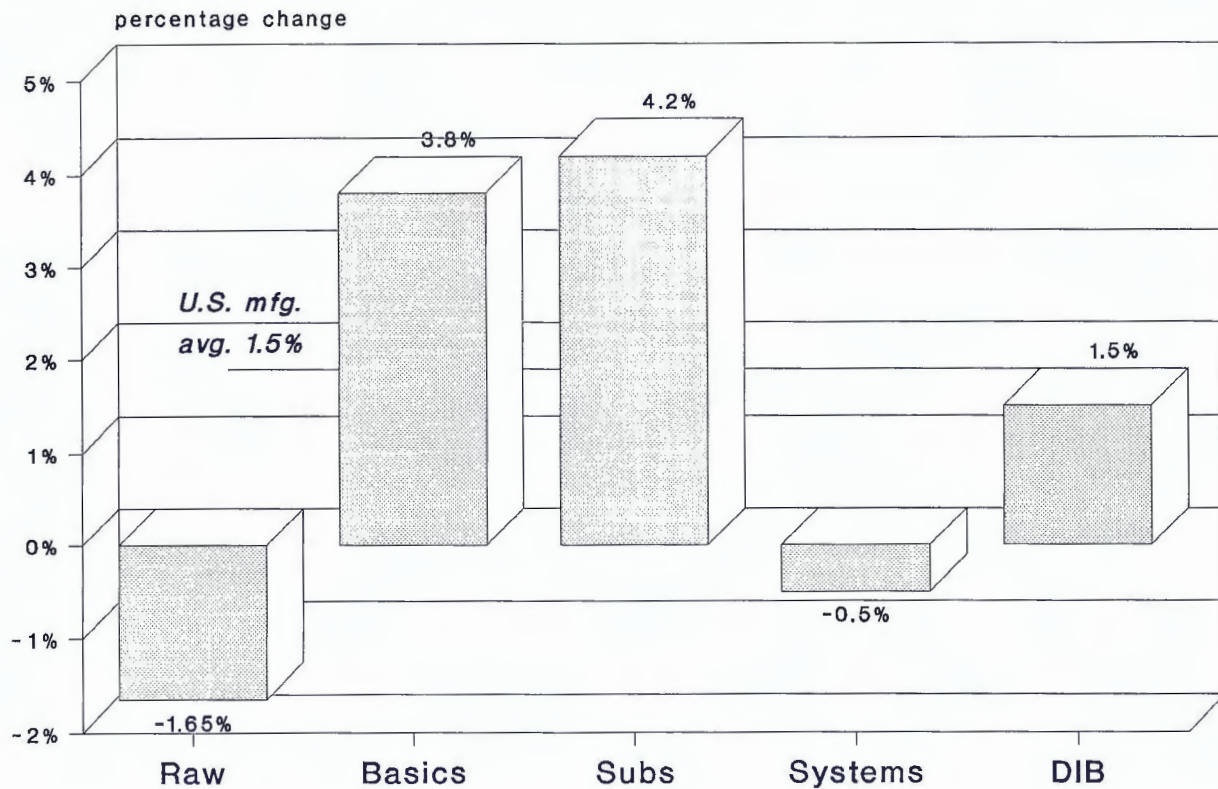


Note: Investment ratio = capital spending/value of shipments

Source: Logistics Management Institute, "Identifying Industrial Base Deficiencies" (Bethesda, Md.: Logistics Management Institute, 1987).

Return on fixed assets in the defense industrial base is much higher than in U.S. manufacturing overall. (See figure 10.) In 1986, return on assets in U.S. industry was 11.3 percent, while in defense sectors it averaged 44.7 percent. This difference may reflect that defense firms themselves do not own all of their production facilities; the government owns many of them. Moreover, the facilities and equipment firms themselves do own are generally quite old and, on paper, have a very low depreciation value. These two factors tend to overstate the true value of return on assets for defense firms. Nevertheless, even with such presumed overstatement, the return on fixed assets declined significantly during the 1980s, and, in some sectors, the decline was precipitous. Small arms, aircraft, and shipbuilding led the complete systems tier into a sharp decline while the basic supplies and components tiers declined marginally.

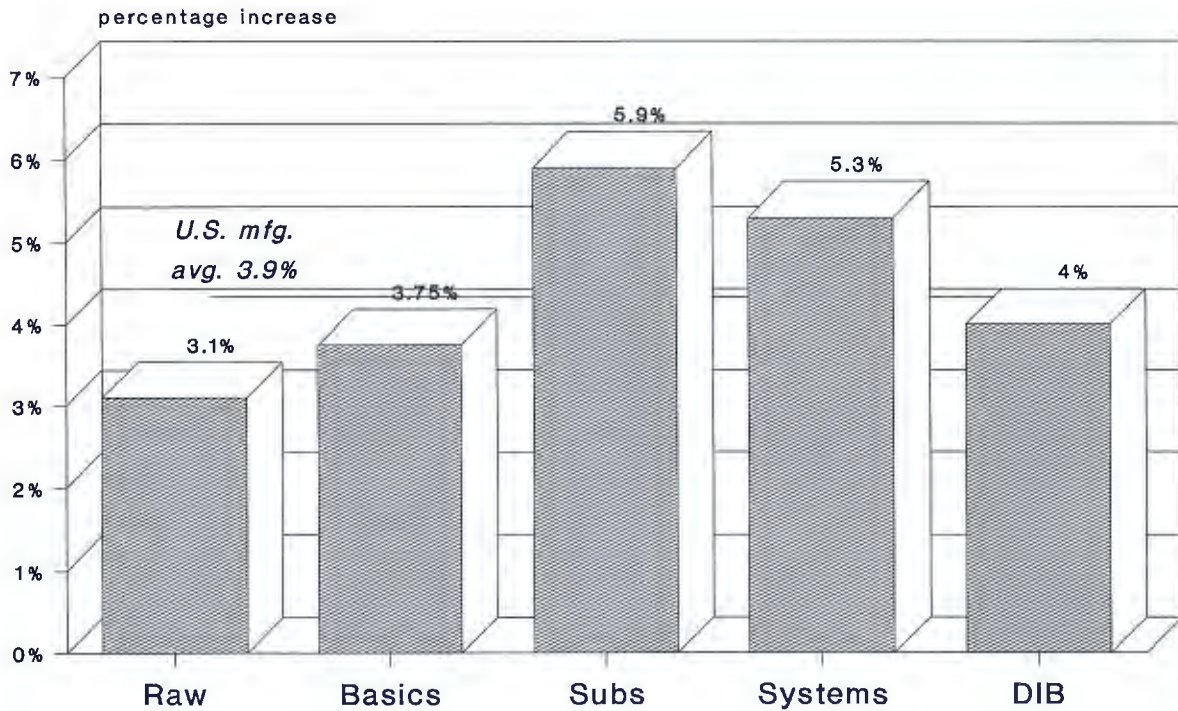
Figure 12
Manufacturing Capacity, 1980–1986 (average annual percent change)



Source: Logistics Management Institute, "Identifying Industrial Base Deficiencies" (Bethesda, Md.: Logistics Management Institute, 1987).

The best measure of the U.S. defense industrial base's ability to maintain its technological lead as a component of national strategy is reflected in the amount of capital spending in industry to expand capacity or improve productivity. In U.S. manufacturing as a whole, the ratio of capital spending to value of goods shipped was 3.8 percent in 1980 and 4.3 percent in 1985. (See figure 11.) The defense industrial base performed worse than U.S. manufacturing in general and, contrary to the experience of the rest of the manufacturing base, defense industry sectors actually declined, falling from a sectoral average of 3.9 percent in 1980 to 3.6 percent in 1985. The lowest performing sector was meat-packing with an investment ratio of only 0.1 percent, and the highest sector was semiconductors

Figure 13
Productivity, 1980–1986 (average annual growth)



Note: Productivity = dollar value of real shipments per production worker

Source: Logistics Management Institute, "Identifying Industrial Base Deficiencies" (Bethesda, Md.: Logistics Management Institute, 1987).

with an investment ratio of 17.2 percent in 1986. The greatest decline was registered in nonmetal mineral products, which fell 18.3 percentage points between 1980 and 1986, and the best performance was in primary nonferrous metals, which rose 7.3 points during the same time frame.

The physical productive capacity of industry is a measure of its ability to surge to meet crisis needs. From the LMI data, measures were drawn of the productive capacity of the defense industrial base, as indicated by practical capacity—the greatest output feasible given current facilities. In U.S. industry overall, capacity grew 1.5 percent annually; in the defense industrial base, it also grew at an average sectoral rate of 1.5 percent per

year. (See figure 12.) Again, significant differences are observed among specific tiers and sectors within the defense industrial base. Notably, on average, the raw materials and complete systems tiers declined in capacity. The largest drop in capacity was an annual decline in primary copper at a 14.4 percent and industrial trucks and tractors at 10.6 percent. The greatest increase was in surgical and medical instruments at 26.7 percent, with guided missiles and space vehicles close behind with a 20.7 percent increase.

Finally, efficiency was measured by examining changes in productivity in critical defense sectors, again drawing from the LMI data. Productivity grew in the U.S. manufacturing base between 1980 and 1986 at an average annual rate of 3.8 percent. (See figure 13.) In the defense industrial base, productivity grew at an average sectoral rate of 3.9 percent annually. Despite this similarity in performance in the aggregate, however, sectoral performance within the U.S. defense industrial base was quite varied. Ninety-nine critical defense sectors grew more slowly than the overall industrial base, and 17 sectors in the defense industrial base actually experienced productivity declines. These declines in productivity were registered in such industries as primary smelting and refining of nonferrous metals (including chromium, cobalt, platinum, silicon, and titanium, among others), chemical preparations (such as jet engine lubricant, heat-insulating compounds, napalm, and waterproofing compounds), asbestos products, and storage batteries.

Corporate Strategies

Because of the changing economic environment and structure of the U.S. defense industrial base, corporations that do business with the DOD are pursuing alternative strategies for future growth. Declining profitability rates, increasing risk, and program uncertainty—combined with the prospect of declining defense budgets—have caused most firms in the defense business to pursue profits elsewhere. Some companies are attempting to market their defense-related products overseas, but find themselves increasingly constrained by technology transfer restrictions, cooperative development agreements, foreign military sales laws, or import restrictions imposed by foreign

governments. Moreover, in many cases, the burdensome infrastructure costs borne by U.S. defense firms (imposed primarily by the costs of oversight and compliance with U.S. defense acquisition requirements) make U.S. products—except for the most advanced high technology systems (in which the performance of U.S. products cannot be matched at any price)—uncompetitive with the price of other nations' defense products.

Inefficient and costly DOD acquisition policies not only make it unattractive for firms to move into defense markets but also offer little incentive for defense firms to make their existing operations more cost-effective for the future. The CSIS Acquisition Study completed in 1986 estimated that unnecessary oversight, instability, and overly rigid military requirements add as much as 25 percent to the defense budget each year. In the corporate case studies examined here, several examples were found of business strategies for the defense sector that, because of acquisition policies, would not be rational in other markets.

One participant firm in this project is the civilian industry leader in the manufacture of a certain advanced microchip. To avoid the costs that accompany any business with the Defense Department, the firm does not include the cost of the chip in some weapon systems components manufactured by its defense division; thus, the oversight and pricing costs are not incurred by the civilian microchip division. In other words, the firm finds it more economical to provide the chip—worth about \$200 each—free to the government rather than impose on its civilian division the cost of doing business with the DOD.

There was also a case in which a leading defense division in the electronics industry decided it needed to reduce its cost structure drastically in order to remain competitive. Faced with anticipated flat growth in its product line (although much of the defense electronics industry is expected to grow) and faced with an increasing cost structure brought on by high labor costs, the firm decided that the prudent course would be to concentrate on its traditional areas of strength, to avoid pursuing new product lines, and to embark on a major reduction in costs. This division expected to make significant inroads into its cost structure by reducing its labor force and by selling off production and excess office space. Because the firm could not apply such savings to current contracts and because the cost basis for deriving overhead and a return on its expected future defense business would in turn be lowered by such moves, however, the

firm calculated that the gains made from such an otherwise prudent business decision were only marginal. In the end, the firm proceeded with the changes, but only because the chief executive officer decided it was the “right” thing to do— not necessarily the most profitable approach to the future.

Some firms have explored the potential for civilian spin-offs or outright conversion to civilian production from their military product lines. Few firms doing primarily defense work have found this approach to be viable. In those areas in which the DOD is the largest or only customer, firms accustomed to doing business with the Department of Defense cannot take advantage of scale economies because the civilian and military production requirements are so different. In some cases, this holds true even for products that are not different at all. When the DOD is a secondary customer, leaving the defense business is not only attractive but required for survival.

Yet another example from this study is the leading manufacturer of shotgun ammunition. Its civilian factory line for shotgun shells is the most efficient in the world, using three machines—each of which produces 240 rounds per minute. All three machines are supervised by one person. Quality control is done automatically through statistical process control with only one person providing a visual final check. Yet military process specification requirements do not allow them to use this production line for military shotgun shells—shells that are virtually identical to civilian shells. Military shotgun shells must be manufactured using antiquated processes involving about a dozen machines, each manned by an individual and producing about 60 rounds per minute. Quality control is monitored by an additional 24 machines that require a supervisor for every 5 machines, and they produce fewer than 100 rounds per minute in total. Even packing and crating is different: Civilian shells are done automatically, while military shells must be hand-packed and crated. This firm stays in the military business as a matter of principle, not profit, because its capital facilities, labor, and floor space could be more profitably dedicated to commercial products.

To meet the government’s goal of reducing costs, many prime contractors for the assembly of major weapon systems are forcing their suppliers to cut their costs. Such supplier data are the most difficult to get; these data are not routinely and systematically collected and aggregated by the federal government, either by the Defense Department or the

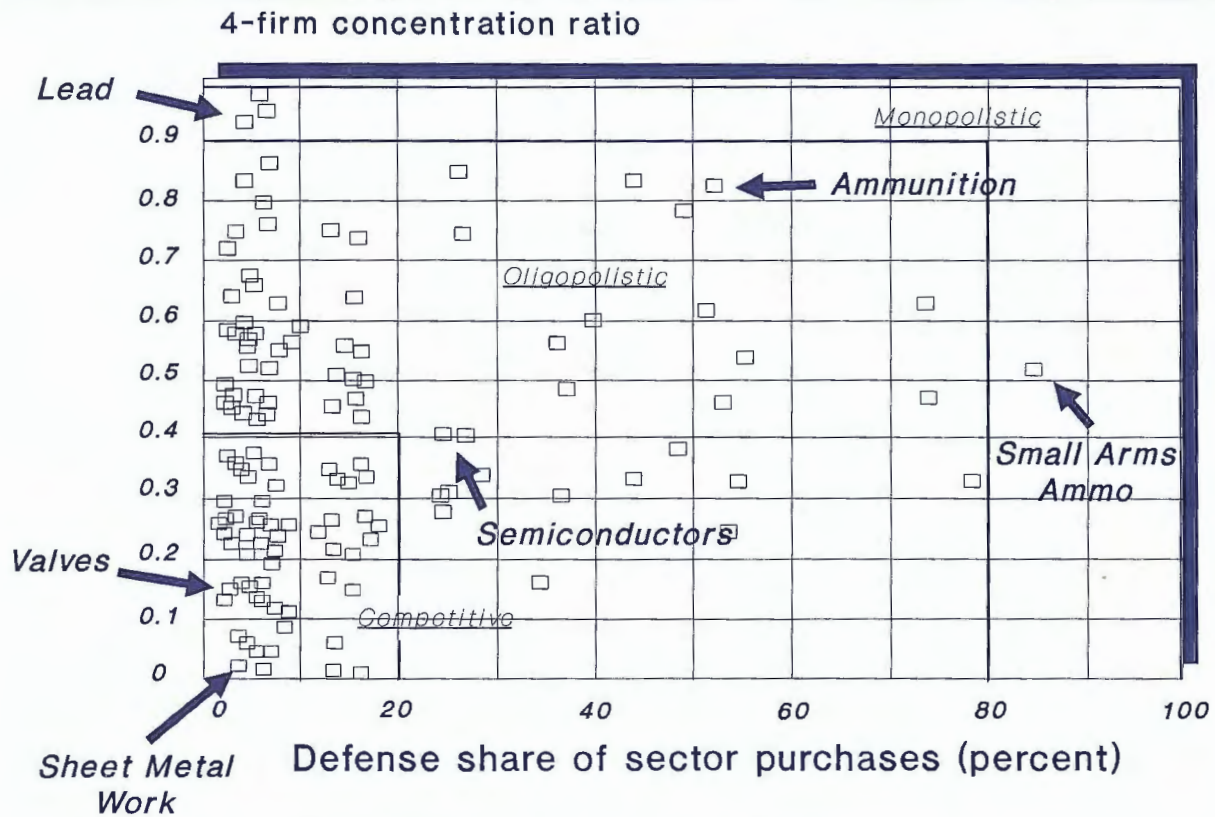
Commerce Department. This makes it difficult to generalize about trends for specific products in the supplier base, especially for firms that have no DOD prime contract. It is reasonable to assume, however, that many, if not most, suppliers to prime contractors are also suppliers to the DOD, if only for repair parts and spares. Because the data in this study capture information from all subtiers of the defense industrial base, study participants believe this presents an accurate picture of current events.

In this study, one U.S. aerospace contractor was pursuing significant increases in its foreign supplier base as a means of reducing costs in the manufacture and assembly of high technology aircraft. This firm reported that of the approximately 3,200 suppliers for a particular type of aircraft, it had expanded its foreign supplier base for that aircraft from 194 in 1985 to 263 in 1987. If this trend is being followed by other firms and in other sectors, and there is reason to suspect it is, the drive for greater efficiency through cost savings may be counterproductive to the goal of reducing dependence on foreign sources.

The most troubling corporate survival practice this study observed is the manner in which some firms are absorbing the costs of doing defense business. The firms that are surviving in the current defense environment have reasonable expectation for future growth. This is particularly the case with prime contractors. To win contracts for survival, firms sometimes price their bids below marginal costs to beat competition. (This is not the practice of "buying in" on development contracts to win subsequent production contracts.) Several firms were found to be doing this on production contracts well into the lifetime of some programs. The strategic objective of such irrational pricing behavior is for companies to outlast their rivals and to capture the shrinking amount of remaining business. Thus, the long-term goal is to face less competition when defense budgets are expected to increase, with the cyclical upswing of defense procurement expected sometime in the late 1990s. Such a practice in the civilian sector would be considered predatory pricing and would be in violation of antitrust statutes. In the defense business, it is increasingly becoming the only sensible response of the large firms to current acquisition policies.

Many firms have not survived in this environment. The Small Business Administration estimates that 4,000 small

Figure 14
Structure of the Defense Industrial Base



Source: Logistics Management Institute, "Identifying Industrial Base Deficiencies" (Bethesda, Md.: Logistics Management Institute, 1987).

defense firms went bankrupt in 1988 because they could not cope with the cost of doing business with such a cumbersome customer as the DOD. Some large firms filed for Chapter 11 protection. Many such companies have disappeared from the industrial base entirely, as is the case of small businesses. Some larger firms can perhaps survive a restructuring under Chapter 11, as was the case with the LTV Corporation. In a few cases, the government has been forced to bail out firms considered to be vital to national security—for example, the Avtex Fiber Company in 1988.

The basic reason for the erosion of the defense industrial base in the 1980s is rooted in the very structure of the base. (See figure 14.) Most sectors in which the DOD does business are highly competitive markets, and the DOD is a small customer. Most defense-related industries are commercially

driven. Acquisition policies that add to the cost of doing business with the DOD cause firms in these sectors to move toward more profitable, less risky commercial customers. Competition-enhancing policies—policies that attempt to drive down the costs of defense products—often fail because they try to generate more competition than can be supported by the underlying structure of the sector. As a result, the DOD often incurs higher costs because of the requirement for suppliers to build production facilities or because of losses it must bear when unqualified producers fail after winning unrealistically low bids. The fairly high entry barriers for firms that might be interested in and capable of making most DOD products is reflected in the large number of defense sectors that can be categorized as oligopolistic. Firms in these sectors that leave the defense business are making a long-term decision not to pay the high costs to return.

Technological Innovation

Issues of technological competitiveness have been a dominant theme of dozens of other studies in recent years. This study did not attempt to replicate those efforts. Instead, this work was enhanced by the participation of several people who significantly contributed to recent and ongoing analyses of competitiveness issues by such groups as the Council on Competitiveness, the Department of Defense, and the Office of Technology Assessment. In general, this study's participants endorse the work of those groups.

Maintaining a technological lead is a function not only of federal financing for technological R&D, but also of the civilian industry's ability to advance the state of the art in critical defense technologies as well. Trends in the performance of the defense industrial base that indicate poor peacetime efficiency also indicate an erosion in the industry's ability to push the leading edges of technology into the future.

In addition to the general trends affecting U.S. technological progress, this study also focused on some specific aspects of the eroding U.S. technological lead that have a particularly adverse effect on deterrence. First, it is important that the DOD have the necessary authority and resources to recruit and retain

skilled technological management personnel. Second, this study notes with some alarm the increasing dependence on foreign sources of certain high technology defense matériel. Although the U.S. foreign dependency on such items as microchips and precision optics are well known because of the exhaustive studies that have been conducted in these areas, there is reason to be troubled by the lack of adequate data and analysis of other products and sectors, which may conceal significant vulnerabilities lurking beyond view. In addition, there is concern that the erosion of the U.S. defense industrial base—through the concentration of defense industries and the reduction of incentives for investment in critical defense sectors—will reduce the capacity of the defense industrial base to bring together large amounts of capital and intense development efforts required for technological advancement and real growth.

Finally, there is concern about the ability of industry to recruit top-notch people to deal with this complex industrial environment and with the latest technology. Later in this report, the importance of government employment of first-rate people is discussed; the same is true of industry. The turbulent environment of the industry and the reputation it has been awarded—deservedly or not—are making it an increasingly unattractive place for first-rate college graduates to build a career. Moreover, there should be concern about the emerging trend in which very capable and experienced senior executives are leaving the industry at an earlier age, either to retire or take on new challenges.

In sum, it appears that the U.S. defense industrial base is in a state of decline. This malady is somewhat concealed by the overall health of the U.S. economy, but it is no less worrisome to U.S. national security when U.S. economic robustness reflects more the strength of service sectors than that of the manufacturing base. As Robert Costello, the former under secretary of defense for acquisition, recently noted, "You can't fight a war with pizza parlors." The structure and performance of the U.S. defense industrial base face significant challenges in peacetime efficiency, technological competitiveness, and flexibility in meeting future contingencies. These difficulties are caused by the combination of a changing global environment and poor government policies. The world cannot be changed. The United States can, however, influence its own reaction to these changes. Government policies must be changed to preserve the U.S. defense industrial base.

III

Policy

If the United States is to arrest the erosion of its defense industrial base as a matter of national security priority, then fundamental policy changes are needed. In the budget environment of the 1990s, however, those policies must be at little or no cost. The challenge before the Bush administration and Congress is to adopt policies that are based on thinking and working "smarter not richer." As observed in the first section of this report, present policies affecting the defense industrial base are uncoordinated, irrational, and, in many ways, counterproductive. To provide effective deterrence, the defense industrial base must

- meet the demands of DOD programs in peacetime with cost-effective, reliable matériel;
- keep the United States at the leading edge of advanced technologies to maintain a qualitative edge to overcome quantitative inferiority as compared with potential adversaries; and
- maintain the flexibility necessary to respond to the needs for surge and mobilization to meet anticipated operational contingencies.

Three basic areas of necessary policy change have been identified:

- more productive oversight of critical defense industries in peacetime;
- more rational planning, programming, and budgeting in the context of U.S. national security strategy; and

- the availability of selective incentives for firms in industries that are particularly disadvantaged in globally competitive critical defense markets or for industries in which a domestic production base is vital.

The application of defense industrial policy must be more rational and better coordinated than it is at present. Current policies that may be effective for one particular sector are sometimes counterproductive for others. Many policies aimed at the defense industrial base are motivated by political concerns other than national security policy and do not really contribute to the strategy of deterrence. For example, U.S. policies on competition in defense contracting, aimed at driving prices down, too often drive competition away or result in the production of lower quality goods that, in the long term, cost the taxpayers more. Present competition policies are also often counterproductive because they drive many prime contractors to purchase components and hardware from lower priced foreign suppliers. What is needed is an ability to measure and weigh contending priorities in defense and trade policy, rather than the present approach of addressing each of these issues in isolation or in an attempt to deal politically with the scandal of the moment.

Only an extension of the president's executive authority can resolve the numerous competing bureaucratic influences at work in defense industrial base decision making. The president needs a high-level policy mechanism for formulating, executing, and reviewing policy affecting the defense industrial base. This mechanism must garner strength from the DOD as well as draw upon the resources and authority of other relevant agencies such as the Departments of Commerce, State, and Energy and independent agencies such as the U.S Trade Representative and the Federal Emergency Management Agency.

For these reasons, this study recommends the formation of a Defense Industrial Base Senior Interagency Group, or similar subcommittee, in the National Security Council (NSC), augmented by the secretary of commerce and other relevant economic officials. This senior interagency group (SIG) would be chaired by the under secretary of defense for acquisition [USD(A)]. Subordinate interagency groups and working groups would deal with the entire range of details and issues related to the defense industrial base as appropriate. This step could be implemented by an executive order, a national security decision memo, or a

presidential decision memo.

Because the Defense Department has the greatest direct influence within the government on the defense industrial base and because the greatest concern about the eroding defense industrial base is the threat to U.S. national security strategy, this interagency process should reside in the NSC under the lead of the DOD. It should not be distanced from the DOD or the NSC by vesting policy authority in another cabinet agency or by placing the interagency process outside the NSC. Some recent proposals to create a new NSC-level interagency process or to place this process in the Economic or Domestic Policy Councils, even with strong DOD participation, would be shortsighted and ineffective. Only the DOD and the NSC, properly augmented, have the strategic perspective necessary to preserve the deterrent aspects of the defense industrial base.

For the authority in the USD(A) and the NSC to be effective, however, there needs to be a good working relationship between these bodies and the Congress in monitoring the legislation dealing with the defense industrial base. The current division of labor among the various congressional committees and subcommittees in the oversight of the U.S. defense industrial base needs to be revised and streamlined.

The banking committees should continue to exercise jurisdiction over the Defense Production Act, but they should narrow their focus to the jurisdiction of surge and mobilization production preparedness. Other aspects of congressional oversight should be vested in the armed services committees. Matters of trade and technology transfer policy should be routinely assessed concurrently in the armed services committees and in the relevant legislative committees that exercise principal jurisdiction over commercial and industrial policy. This step will require appropriate changes in the legislative and procedural rules in the House and Senate. It will also require the cooperation and agreement by the party leadership in each house to ensure the disciplined application of these changes both in committee and on the floor.

For any progress to be made in improving the effectiveness of the defense industrial base, there must be an effective management information analysis and evaluation system. There is a distressing lack of both raw and processed data on the status of the U.S. defense industrial base. To be sure, there is no

lack of anecdotal evidence of decay; witness the large number of studies published last year on the defense industrial base. Most such analyses lack rigor and consistency, however. Decision makers responsible for legislating, formulating, and executing defense industrial base decisions have no authoritative source of information for managing policy in this area.

A wealth of data is collected on each contract action, and these raw data are available publicly. The best source of processing, manipulating, and analyzing data for recent years, however, appears to be small commercial firms that specialize in this particular work. The data collection efforts of this study, for example, were severely constrained by an absence of quality data on the U.S. defense industrial base. Thus, a major contribution of this project is that it begins to define the parameters and format of the data requirements.

Most commercial business enterprises have data bases and information-processing capabilities superior to those available to the highest level U.S. defense industrial base decision makers. This area needs a complete overhaul. New types of data need to be collected. Data must be gathered from all levels of the defense industrial base, ranging from low-level suppliers to prime contractors. Currently, lower tier suppliers are not routinely required to submit data specifically on their role as subcontractors and suppliers in the defense industrial base.

The Defense Department must have adequate analysis and evaluation staff to manage the information for most efficient use by decision makers. Modern data base and collection techniques must be employed to achieve maximum efficiency, minimum cost, limited intrusion into proprietary information, and widespread availability and flexibility.

Recent innovations in programs such as DINET are useful, but because this program is no longer funded, there is danger of losing the limited progress already made. The DOD needs to expand these programs and accelerate their development with appropriate levels of funding to establish an effective information processing system for managing the defense industrial base. As a start, the \$29 million estimated by the DINET office to bring the program into initial operation over five years should be completely funded in FY 1990.

Given adequate information-gathering and processing systems and appropriate jurisdiction in congressional committees, as well as sufficient authority in the DOD and an

effective interagency process in the NSC, sensible policies can reverse the decline in the U.S. defense industrial base, thereby enhancing deterrence and preserving national security. There is a need for fundamental policy changes in three basic areas: more productive oversight of defense industries; more rational defense planning, programming, and budgeting; and competitive incentives targeted at selected industrial sectors.

Productivity in Oversight

The first set of policies that need reform are those that center on the defense acquisition process. Of course, it is impossible for the government to separate itself from involvement in the internal workings of the defense market. Although the government is not the only customer in every defense sector (nor is it even the dominant customer in most sectors), it is the only customer that matters for national security. Moreover, the accumulated practices of the post-World War II era have been those of massive government intervention and regulation of the defense market. The government-imposed oversight structure of the defense market makes the burden of publicly regulated utility markets pale in comparison. Fundamental reform of the defense acquisition process, with a view toward modestly deregulating some aspects of doing business with the DOD, would go a long way toward improving peacetime efficiency, technological competitiveness, and crisis flexibility in the U.S. defense industrial base.

The parameters of needed reform of the acquisition process are well known. This study endorses the recommendations of the 1986 President's Blue Ribbon Commission on Defense Management (the Packard Commission), and the Department of Defense and Congress are urged to follow the defense reform recommendations outlined in the November 1988 joint report on monitoring defense reorganization (the Brown-Schlesinger report) conducted by the Johns Hopkins Foreign Policy Institute and CSIS. Defense acquisition reforms that aim at streamlining and deregulating the defense acquisition process will have greater impact on the efficiency, competitiveness, and flexibility of the defense industrial base than any other set of measures. A number of such reforms have been identified that deserve

special attention as matters of priority for the defense industrial base.

Fundamentally, productive oversight of the defense industry must be guided by the aim of reducing the cost of doing business with the DOD. As a first step, this study urges significant reductions in personnel assigned to oversight and auditing of defense contractors. Such reductions can be made, while avoiding a loss of confidence in the government's ability to root out waste, fraud, and abuse. For example, modern quality control techniques by the DOD and industry application of total quality management programs should be accelerated and expanded. Inspections and audits should be better integrated and coordinated by empowering the USD(A) to schedule all oversight and requiring one inspection agency to accept the results of others. The only exception to this principle should be special investigations by the inspector general. The authority of the contracting officer should be increased by reducing auditors' and inspectors' roles to those of advisers rather than supervisors. Inspections and audits that reveal trends requiring contracting policy changes should be reflected in decisions by the USD(A), not in instructions by inspectors to individual contracting officers. Any proposed acquisition policy or regulation change should be implemented only after the proposer demonstrates cost-effectiveness in an impact statement prior to implementation.

Additional efficiency could be gained by increasing the use of nondevelopment items for military applications and by using commercial, instead of military, specifications where feasible. This project applauds the existence of an ongoing program by the DOD to accomplish this and urges the military services and acquisition agencies to devote greater resources to this effort. In addition, the acquisition process could be made more efficient by decriminalizing administrative errors made in acquisition. There is a need as well to decrease the number of costly and time-consuming bid protests sometimes made almost automatically upon award. The U.S. Army's recent success with the establishment of a contracting ombudsman in the buying commands could be replicated in the other services and other DOD purchasing agencies as well. These steps would protect the government in deterring, discovering, and prosecuting waste, fraud, and abuse. It would also serve to accelerate the acquisition process while better providing to defense contractors the same fundamental legal options conferred on civilian sector firms.

The high costs of doing business with the DOD form a barrier to the entry of new firms into critical defense sectors and to firms in those sectors to produce military products. In the 1987 CSIS acquisition study, it was estimated that reforms of the defense acquisition process would save 10 to 20 percent annually in defense budgets. The efficiency and savings realized from even a partial deregulation of the defense industry—in the form of more productive oversight—would be significant and would be available for reinvestment in the defense industrial base given the proper incentives. No new legislation or policy decisions are required to execute this recommendation, only aggressive and disciplined leadership and execution by the administration and by the Congress.

A second aspect of more productive oversight must include a revision of competition in contracting policies. To the extent feasible, market forces should be allowed to produce competitive prices on the high-quality products demanded by the Defense Department. The difficulty with this general approach is the wide variation of competitive structures of defense industrial base sectors from which the DOD makes purchases.

In some sectors, competition is already fierce, and the government is such a small buyer that competition in contracting policies gives the DOD very little leverage over the number of firms it can induce to compete for DOD contracts. In other sectors, the competitive structure is moderately concentrated and has been for decades, indicating high entry barriers to new firms trying to enter the market. To increase competition in such sectors, someone must be willing to pay the high price of establishing new production facilities. If there are insufficient investment incentives to attract new firms and if the government is not willing to assist in underwriting the start-up of new facilities, then no policy mandating competition can possibly force competition to come about. An across-the-board application of competition in contracting policy must be reviewed with a view toward differentiating the competition requirements for new contracts—based not only on cost and military requirements, but also on the ability of the sectoral market structure to support competition.

The experience of competition in contracting has been mixed. On the one hand, competition advocates claim that great savings have resulted from the increase in competitive awards and the decrease in sole-source contracts. On the other hand, it

is not altogether clear that all the costs of establishing competitive bids are considered in making such determinations. In 1988, the DOD inspector general audited dozens of contracts awarded on the basis of competition in contracting and found that in most cases the costs of creating competition were understated, and the resulting savings in unit costs of procured items were overstated. Competition in contracting is a valuable instrument and should be pursued; however, there is a need to be more discriminate in applying competition, and the Defense Department should be urged to examine more carefully the costs of producing competition when ruling on specific competing contracts. This should be done in the context of a sector-by-sector analysis of the market's ability to absorb increased competition and in the context of total costs and savings to be realized by doing so.

Other changes in competition policy could improve the achievement of the national security goals of the defense industrial base. The recent attempt by the DOD to consider quality and prior performance, as well as cost, in making contract awards is welcomed, and these practices should be accelerated. This would enhance the efficiency of the defense industrial base. There is also a need to consider an increase in the award of sole-source contracts for innovative or new technologies or new applications of both product and process developments. Granting contractors the ability to realize a reward on productivity-enhancing or technology-advancing R&D will provide an incentive to develop leading-edge technology with their own investment funds. Present competition policies discourage such investments by requiring the contractor to bear most of the costs and nearly all of the risks of such investments.

Improving oversight productivity of the defense industrial base in these ways will have a profound effect on its efficiency. Reducing the costs of doing business with the DOD through regulatory reform of defense acquisition should be the first priority for U.S. defense industrial base policymakers. Yet, without government intervention, the defense market will not produce the right mix of matériel needed for national security. For this reason, the government cannot simply take a complete hands-off approach to the defense industrial base. Therefore, the United States should embrace a set of government-managed incentives to encourage the creation and evolution of the defense industrial base to meet its deterrent strategy.

Incentives

The best way for the government to influence the individual sectors of the defense industrial base is not to make excessive demands; instead, it should reward industry for meeting the needs of national security. Industry will perform at its optimum through incentives rather than through regulations. A second component of the new approach should be the adoption of low-cost, high-payoff incentives to be selectively applied to individual sectors on the basis of an analysis of national security needs.

Some industries may be performing adequately in peacetime but need government investment incentives to hedge against anticipated surge requirements. Such investments need not be too costly, and certainly there is no need to build a massive yet idle production capacity as a hedge against an unlikely general war in the future. Yet, the United States cannot afford to allow critical military items to be procured exclusively from offshore sources. In a case in which the migration of military matériel sources overseas has come about because of a true lack of competitiveness of U.S. suppliers (as opposed to the predatory practices of U.S. industrial competitors), support of national defense may require the maintenance of good relations with allied suppliers to ensure adequate supplies in time of crisis. In cases in which friendly foreign suppliers are not available, and especially for items with no related civilian products, the United States must build some domestic capacity to maintain its flexibility.

For example, the chemical compound akardit, used in the manufacture of combustible cartridge cases, is today commercially available only from two producers, one in West Germany and one in Israel. There is no commercial use for akardit, yet the military demand will rise dramatically in the 1990s with new gun systems coming on line. Rather than build a new government production facility for the production of akardit, it would be feasible, under future ammunition procurement contracts for combustible cartridge ammunition, to provide some government investment funds, to be matched by industry, to create a manufacturing plant in the United States. The winning contractor(s) should then be allowed—even encouraged—to market akardit overseas by relaxing export restrictions, thus

creating a larger customer base over which to spread start-up costs. The resulting savings in net unit costs would benefit the government as well as provide a more secure and stable source of akardit, and industry would share in the greater profits from a larger overseas market.

This idea could be applied to other defense industry products and sectors as well. The point here is not to single out this particular sector as an immediate target for policy change. Rather, it is intended to illustrate the kind of investment incentives available and the degree of selectivity that must be exercised in determining the sectoral application of these incentives. The level of detail in the data and analysis required to make such determinations again points to the need for an effective defense industrial base management information and analysis capability to support such decision making.

There are many other such incentives that should be considered. Higher rates of profit could be allowed for R&D projects in those areas of product and process technology with the greatest potential payoff for national security. MANTECH and IMIP could be greatly expanded, as discussed in section I. The ceiling set by DOD on independent research and development (IR&D) spending should be raised and perhaps targeted to particularly critical sectors and to processing technology. The provisions of Title III of the Defense Production Act may need to be expanded as better data and analysis are available. Progress payment rates could be selectively increased, and certain foreign selling expenses could be permitted as allowable costs. The guiding criteria for determining which incentives to apply and which sectors to target should be

- the estimated government savings, return, or cost-avoidance in the long term;
- the criticality of the product or process for national defense;
- the dependence of the market sector on the DOD as a customer; and
- the competitiveness of the U.S. sector in the global market.

Striking the right balance to achieve the objectives of the defense industrial base is a complex and formidable task. There is a lack of data and analytical tools to make such precise determinations today. As the defense industrial base management information and analysis system is brought into

being, there should be experimentation with pilot projects that selectively apply incentives, and there should be a deliberate expansion of their use over time.

Rational Planning

For the defense industrial base to be effective, the government must not only influence the supply side of the defense economy through deregulation and incentives, it must also reform the demand side through more rational planning, programming, and budgeting in defense. In this regard, this study proposes nothing more novel than what many others have recommended before. The defense industrial base can be no more effective than the defense planning, programming, and budgeting system makes defense policy overall. For the defense industrial base, there are three basic areas that need improvement: realistic defense planning, program stability, and professionalization of personnel.

No defense policy can be rational if it is unrealistic. Recent defense budgets have created unrealistic expectations about future levels of resource availability. Those unrealistic expectations have created a disjunction between what is requested by the Defense Department for the long term and what can be expected in the short term or on a year-to-year basis. Five-year defense plans that project defense budget growth well beyond realistic expectations of legislative appropriations waste effort by distorting the demand curves for future defense production. The effect of this is not only to heighten the inefficient use of legislators', defense officials', and industry managements' time, but also to heighten pressure on existing programs when the inevitable cuts must be made. Defense industrial base programs, already among the lowest in priority, inevitably are among the first to be curtailed or cut outright.

Program stability has long been a concern of those who see a need to make defense acquisition more efficient. The CSIS acquisition study estimated that avoidable program instability adds 5 to 10 percent more to the cost of defense procurement overall. Acquisition programs could be made more efficient by adopting such measures as biennial defense appropriations, multiyear contracting, and milestone authorizations. The Defense Department

and the Congress should accelerate the implementation of these proposals.

Surge and mobilization planning needs to be brought into the 1990s by casting aside outmoded notions of recreating the industrial machine that brought the United States victoriously through World War II. The first step in this process should be to conduct a global exercise like that of the 1978 "Nifty Nugget" to identify surge and mobilization shortfalls in the context of operational contingency plans. Surge and mobilization capabilities must then be realistically integrated into the planning, programming, and budgeting cycle and into operational contingency plans, resolving any shortfalls between defense industrial base capabilities and the requirements of these contingency plans. The most promising concept for enhancing integration is the National War College's proposal for a Graduated Mobilization Response System wherein U.S. industrial preparedness is managed by increasing levels of readiness, or INDCON, which parallels the defense readiness condition system for various levels of DEFCON. The Graduated Mobilization Response System should be adopted as a rational means of conducting industrial readiness planning for the defense industrial base. Finally, as surge and mobilization issues are highlighted through this exercise and planning process, defense and industry program managers should be required to identify, for their specific acquisition strategies, contingency production plans to alleviate the problems presented by surge or mobilization bottlenecks throughout the prime contractor, subcontractor, and supplier chain.

In the final analysis, programs and policies do not make the defense industrial base more rational, people do. There continues to be a need for professionalization of defense acquisition personnel to enhance the ability of the Defense Department to preserve the defense industrial base. The Defense Department does not recruit and retain managers, whose daily decisions have a profound impact on the defense industrial base, with the measure of care that it should. This study urges the adoption of personnel management initiatives, such as those recommended by the Packard Commission and the Rittenhouse Committee, for the professionalization of defense acquisition personnel. As a guide to such reforms, the following steps are recommended:

- congressional review and revision of “revolving door” restrictions;
- adoption of the “China Lake” model for DOD civil service acquisition managers and contracting officers; and
- management of uniformed acquisition personnel as is done for doctors, lawyers, and engineers.

In sum, the erosion of the U.S. defense industrial base will not be arrested and reversed without fundamental changes in the way the customer—the Defense Department—does business. Measures aimed at improving the defense industrial base must be narrowly focused; that is, they must be applied only with a view to ensuring that the defense industrial base meet the requirements of deterrence within the context of the global economic environment. The administration and the Congress should consider carefully these policy recommendations and apply them in an orderly fashion.

IV

The Future of the U.S. Defense Industrial Base

At present, finding a solution to the problems of the defense industrial base is not very high on the U.S. national policy agenda. The Bush administration and the 101st Congress are concentrating on other, more pressing issues such as reviewing U.S. national security strategy, finding ways to cut the current defense budget, dealing with the uncertainty and opportunity in U.S.-Soviet relations brought about by changes in the Soviet Union, and reviewing the procedures and policies for reforming defense acquisition and management. Although all of these areas have an impact on the defense industrial base, these efforts do not explicitly focus on the future of the defense industrial base. Yet the urgency of these other issues does not lessen the importance of the problems of the U.S. defense industrial base.

As discovered in the course of this project, the difficulties of the defense industrial base are complex. They have a direct bearing on U.S. national security. Many of the problems stem from the very structure of the industrial base—a condition that is not conducive to an efficient interaction between industry and the Department of Defense. Because of this condition, the performance of U.S. defense industries is poor by commercial standards. Present legislation, policies, and programs designed to deal with the problems of the U.S. defense industrial base are not effective. A new approach to the defense industrial base is needed.

Any attempt to deal with the problems identified by this study is laden with difficulty. Part of the difficulty lies in the very

complexity of the problem. Defense industrial base issues are stratified into economic, trade, and commercial concerns that are beyond the purview of the Defense Department or of the legislative committees that traditionally exercise oversight responsibilities for the defense industrial base. Moreover, the public perception of the pervasiveness of waste, fraud, and abuse in the defense business makes its policies unpopular when they appear to advance the so-called military-industrial complex at the expense of the U.S. taxpayers.

Yet the health of the defense industrial base is crucial to U.S. national security, and it is a vital component of the strategy of deterrence. To persuade potential adversaries that it would be too costly for them to threaten U.S. interests, the United States must maintain a defense industrial base that is efficient, competitive, and flexible. This base must respond to the demands of peacetime defense programs with cost-effective, reliable, and capable systems. Maintaining a technological advantage over potential adversaries—particularly the Soviet Union, but increasingly other threats as well—is also an explicit part of U.S. national security strategy, which enables the United States to deter threats without matching its foes gun-for-gun or man-for-man. Finally, because there is some risk that deterrence may not always preserve the peace and because low-level threats may bring the United States into conflict, the defense industrial base must also retain some flexibility to convert from peacetime production and development to the production and development required for expected future forms of conflict. The performance and structure of the U.S. defense industrial base in the 1980s present serious questions about its ability to meet these criteria for deterrence in the future.

There are a number of changes that need to be explored and adopted to preserve the U.S. defense industrial base for the future. Above all, executive and legislative leadership must reorganize the way they manage the government's involvement in the defense industrial base to take account of the realities of the base as it exists, rather than the way some might like it to be. At the same time, decision makers must be equipped with information-processing systems, now lacking, that will give them an informed basis from which to make such decisions.

The most significant policy changes that would immediately affect the health of the defense industrial base would include more effective oversight and a reduced cost to industry of doing

business with the Department of Defense. In cases in which defense buying, commercial markets, or globally integrated marketplaces do not support efficient, competitive, flexible production of the matériel required for national security, the government must finance special incentives to attract the best industrial talent available. In the final analysis, U.S. defense planning, programming, and budgeting must more realistically project defense acquisition needs against anticipated levels of future funding.

This year-long study of the defense industrial base has convinced the participants that these issues deserve much more attention than they have been given. As strategies and policies change, so too must the nation's approach to the defense industrial base. We urge the administration and the Congress to join in a bipartisan effort to adopt the recommendations forwarded in this report and to integrate considerations of the defense industrial base into other related policy areas as well.

The industrial might of the United States is unequalled. Harnessing that strength into the future is a challenge that must be met if the United States is to remain strong into the twenty-first century. We pledge our best efforts to continue working toward that end.





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